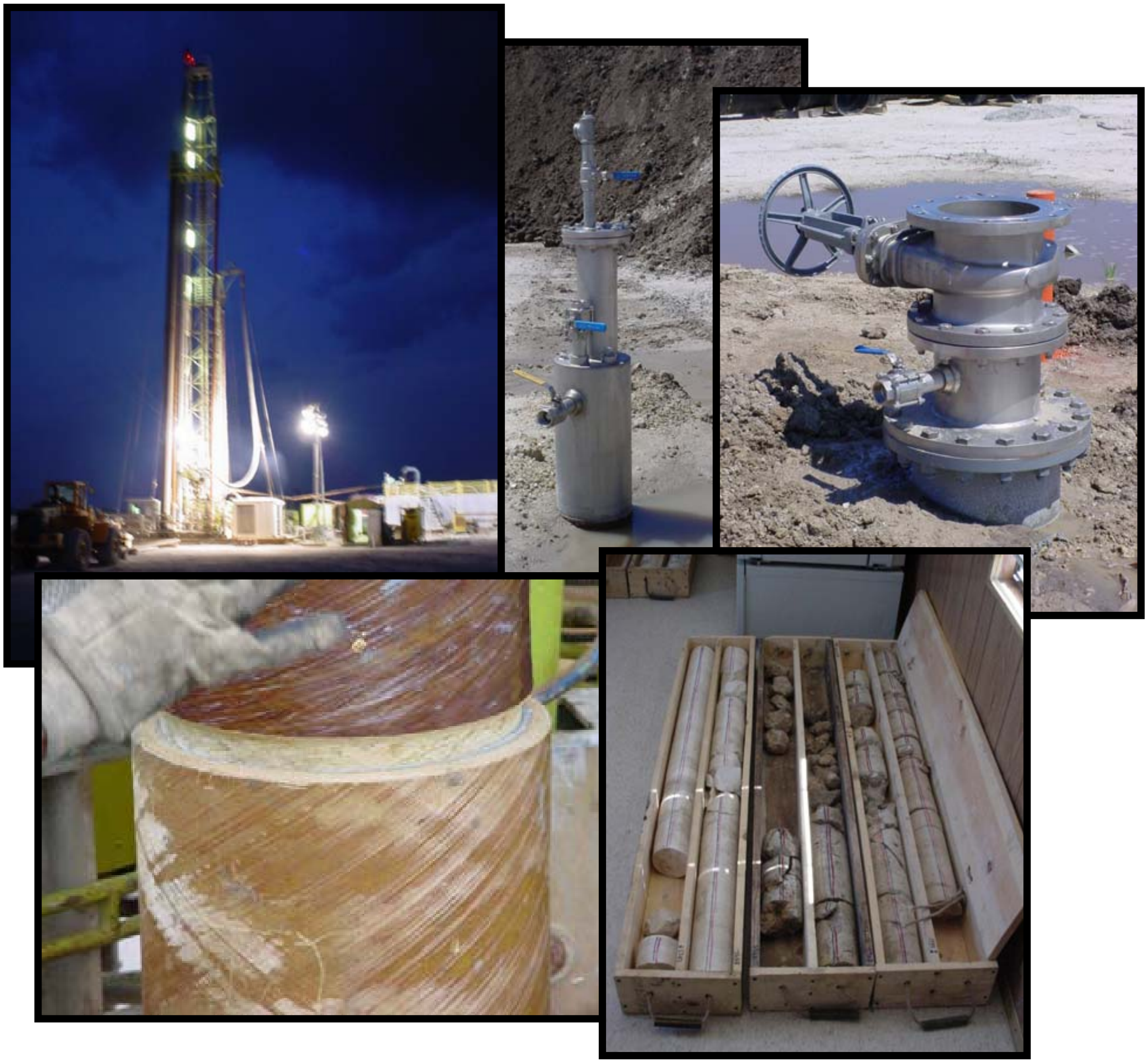

Palm Beach County Water Utilities Department

Lake Region Water Treatment Plant Concentrate Injection Well System PBCWUD Project No. 03 – 169

Well Construction Report

January 2009

PALM BEACH COUNTY FLORIDA

Water Utilities Department
Engineering
P.O. Box 16097
West Palm Beach, FL 33416-6097
(561) 493-6000
Fax: (561) 493-6113
www.pbcwater.com

January 15, 2009

Joseph R. May, P.G.
Florida Department of Environmental Protection
Underground Injection Control Permitting
400 N Congress Avenue,
Suit 200
West Palm Beach, Florida 33401

SUBJECT: Palm Beach County Water Utilities Department
Lake Region Water Treatment Plant
Deep Injection Well System Construction Report
FDEP Construction Permit No. 0138308-184-UC

Dear Mr. May:

Palm Beach County Water Utilities Department (PBCWUD) is pleased to submit this Final Report regarding the construction and testing of Injection Well IW-1 and Dual Zone Monitor Well DZMW-1 at the Lake Region Water Treatment Plant.

This report documents the construction and testing of the wells and presents the information required in the above-referenced permit relative to the drilling and testing of the wells.

If you should have any questions regarding this submittal or require any further information please contact Thomas Uram at 561-493-6105.

Sincerely,
PALM BEACH COUNTY WATER UTILITIES DEPARTMENT

Thomas G. Uram

Thomas G. Uram, P.G.
Hydrologist

cc: Brian Shields, P.E., PBCWUD
Regulatory Compliance
File

SOUTHEAST DISTRICT UIC
TECHNICAL ADVISORY COMMITTEE AND AGENCIES FOR DISTRIBUTION

Agency Address		TAC Member
FDEP (SED):	FDEP UIC Permitting 400 North Congress Avenue Suite 200 West Palm Beach, FL 33401 Telephone: (561) 681-6600 Fax: (561) 681-6760 e-mail: firstname.lastname@dep.state.fl.us	Joseph May, TAC Chairman Gardner Strasser
FDEP (TAL):	FDEP UIC Permitting Mail Station No. 3530 2600 Blair Stone Road Tallahassee, FL 32399-2400 Telephone: (850) 487-0505 or SUNCOM 277-0505 Fax: (850) 488-5917 or SUNCOM 278-5917 e-mail: firstname.lastname@dep.state.fl.us	Joe Haberfeld
USGS:	US Geological Survey Water Resources Division 3110 SW 9th Avenue Ft. Lauderdale, FL 33315 Telephone: (954) 377-5921 e-mail: rsreese@usgs.gov	Ron Reese
SFWMD:	SFWMD P.O. Box 24680 West Palm Beach, FL 33416 Telephone: (561) 682-2557 Fax: (561) 681-6264 e-mail: sanderso@sfwmd.gov	Steven D. Anderson
Brown & Caldwell	Brown and Caldwell 1800 South Australian Avenue Suite 202 West Palm Beach, Florida 33409 Telephone: (561) 684-3456	Helen Hickman

LOCAL COUNTY COMMITTEE MEMBERS

Palm Beach:	Palm Beach County Health Department (PBCHD) 901 Evernia Street West Palm Beach, FL 33401 Telephone: (561) 355-3070, ext 1136 Fax: (561) 355-2442 e-mail: thomas_lefevre@doh.state.fl.us	Tom LeFevre

SPECIAL ADVISOR TO THE COMMITTEE

USEPA:	USEPA Region IV Sam Nunn Atlanta Federal Center 16th Floor 61 Forsyth Street SW Atlanta, Georgia 30303 Telephone: (404) 562-9793 e-mail: lastname.firstname@epa.gov	Nancy Marsh - Permitting (404) 562-9450 Fax: (404) 562-9439

Updated February, 2006

Certificate of Completion

Palm Beach County Water Utilities Department
Lake Region WTP – Deep Injection Well System

Certification of Completion

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Bevin Beaudet, P.E.
Director, Water Utilities

Date 1/14/09

Brian Shields, P.E.
Deputy Director

Date 1/14/09

Thomas G. Uram

Thomas G. Uram, P.G.
Project Hydrogeologist

Date 1/14/09

Palm Beach County
Water Utilities Department

Lake Region Water Treatment Plant
Concentrate Injection Well System
PBCWUD Project No. 03 – 169

Well Construction Report

January 2009

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Section 1
Introduction

PURPOSE

This report documents the design, construction, and testing of Injection Well IW-1, a Class I Industrial Injection Well, and a Dual Zone Monitor Well, DZMW-1, constructed for the Palm Beach County Water Utilities Department in 2006. The subject wells were constructed in accordance with Florida Department of Environmental Protection (FDEP) Construction Permit 0138308-184-UC. The report presents the data collected during the construction and testing of IW-1 to provide technical justification for the issuance of an operating permit. Injection Well IW-1 will be used to inject membrane softening process concentrate at a rate of up to 4.0 million gallons per day (mgd) from the Palm Beach County Lake Region Water Treatment Plant (WTP). The dual-zone monitor well (DZMW-1) is located approximately 70 feet west of IW-1 and monitors two intervals below the Underground Source of Drinking Water (USDW) at the site.

SCOPE

On November 9, 2005, the FDEP issued a permit to construct an eighteen inch outside diameter (OD) Class I Industrial Injection Well with 13 3/8-inch OD fiberglass reinforced tubing, IW-1, and associated Dual Zone Monitor Well, DZMW-1. IW-1 was permitted for construction as the primary concentrate disposal system for the Lake Region WTP with an injection rate of up to 4.0 mgd. The injection interval was specified in the permit as the “Boulder Zone” located in the lower Oldsmar Formation between 3,000 feet and 3,450 feet below land surface. The monitor zones for DZMW-1 were designated as the interval between 1,940 feet and 1,965 feet below land surface (bpl) and between 2,073 feet and 2,100 feet bpl.

Construction Permit 0138308-184-UC contained 11 Specific Conditions that had to be fulfilled during construction, testing, and reporting for the injection well system. This report presents how those conditions were fulfilled by providing the results of the construction and testing program developed for IW-1 and DZMW-1. The construction and testing program was structured to demonstrate confinement, location of the Underground Source of Drinking Water (USDW), shallow monitor zone acceptability, mechanical integrity of the constructed wells, and the injectivity of IW-1.

To accomplish the above listed tasks, the construction and testing program included the following items:

- Documentation of drilling conditions
- Lithologic cuttings collection and description

- Core collection
- Geophysical logging
- Packer testing
- Pump testing
- Water quality sampling
- Pressure testing
- Injection testing

The report is organized to present and discuss the background, methods, and results of the construction and testing program as they pertain to fulfillment of the Construction Permit requirements.

PROJECT DESCRIPTION

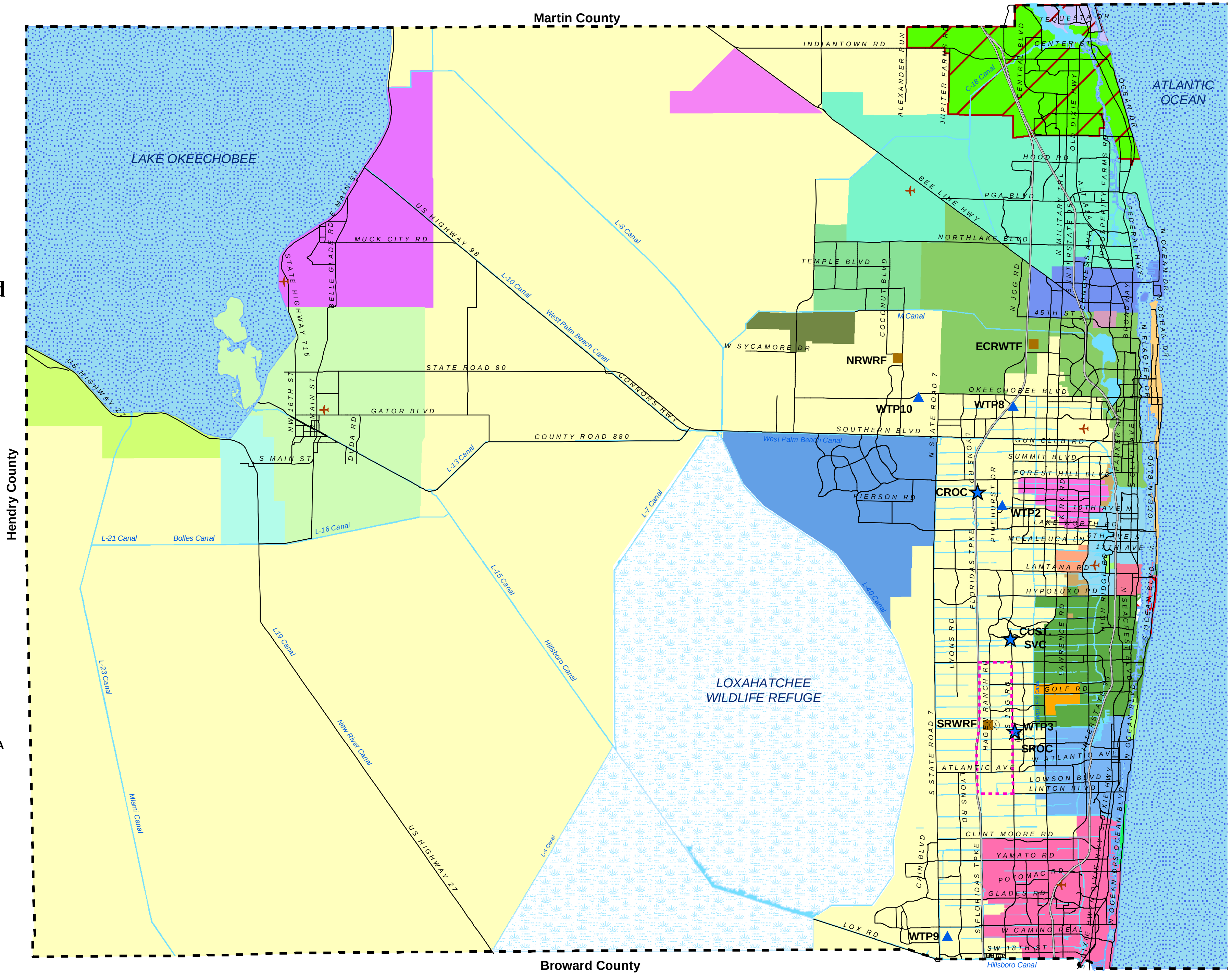
The Lake Region area includes three cities, Pahokee, Belle Glade, and South Bay and is located in western Palm Beach County, Florida. **Figure 1-1** presents a project location map. A membrane softening WTP, currently under construction, will provide wholesale water to the cities of Belle Glade, Pahokee, and South Bay and will be owned and operated by Palm Beach County Water Utilities Department. The WTP is situated in Section 19 of Township 43 South Range 37 East and is located at 39700 Hooker Highway, Belle Glade, Florida 33430. The WTP is scheduled for completion in early summer 2008.

The need for the Lake Region WTP became part of the political and social agenda in 2001. The three cities had relied on Lake Okeechobee as a source of water. Treating the lake water is particularly difficult as the water has turbidity, high organics, color, and varies in quality by a daily and even an hourly basis. Surface water sources are more likely to have bacteria, viruses, giardia and cryptosporidium than groundwater supplies. EPA adopted the surface water rule requiring utilities to meet turbidity requirements and to provide for 4 log removal of bacteria and viruses.

The conventional coagulation process does not effectively remove the organics which become the precursor for chlorinated disinfection byproducts known as trihalomethanes (THMs). These THMs are regulated by the State Drinking Water Act to 80 parts per billion (ppb). To meet this standard, the cities began using chloramination for disinfection which combines chlorine and ammonia. The chloramination disinfection process does not allow significant color removal but does control THMs. High color in potable water results in aesthetically poor quality product for the citizens.

In 2003 design began for the Lake Region WTP, a 10 million gallon per day (mgd) reverse osmosis water treatment plant. The reverse osmosis treatment process is accomplished by allowing raw water to pass through a semi-permeable membrane

Palm Beach County Water Utilities Department Service Area (SA) and Major Facilities



Legend

- 🟨 P.B.C.W.U.D. SA
- MANDATORY RECLAIMED SA
- Palm Beach County Limits
- ★ Administration
- ■ Water Reclamation Facility
- ▲ Water Treatment Facility
- Wetlands

N

NOT TO SCALE

under a pressure gradient. This process produces high quality finished water and a concentrate stream. The concentrate stream is typically 20 percent of the volume of finished water produced. The source water for this facility will be from the brackish Floridan aquifer from seven wells north of the plant. Bulk Water Service Agreements were executed on February 3, 2004 with the cities of Belle Glade (R-2004-0245), Pahokee (R-2004-0246) and South Bay (R-2004-0247) for the construction of a new Lake Region WTP.

On October 18, 2005, the Board of County Commissioners approved a Contract with Youngquist Brothers, Inc. in the amount of $3,947,350.00 to construct the injection well system and a Notice to Proceed was issued on November 14, 2005. On November 9, 2005, FDEP issued a Construction Permit (No. 0138308-184-UC) to the County (**Appendix A**). The permit authorized the construction of IW-1 and DZMW-1. The permit allowed for the construction of one 18-inch OD injection well equipped with a 13 3/8-inch OD tubing and packer assembly for the disposal of up to 4.0 mgd (peak hour flow) of membrane softening process concentrate from the Count's Lake Region WTP. The proposed dual-zone monitoring well DZMW-1 would provide water quality and water level monitoring in two intervals below the USDW. Drilling of IW-1 commenced on February 2nd, 2006. Construction of both wells was completed by July 12th, 2006. Final injection testing of IW-1 will be completed in early 2008 as soon as the raw water source becomes available.

SITE DEVELOPMENT

Site Preparation - Pre-Pad Construction

The Lake Region WTP is located along the south side of the Hooker Highway approximately midway between State Road 715 and State Road 80 in Belle Blades Florida. The new injection well is located near the southeast corner of the WTP site, within the property limits. Prior to construction, the site was cleared and shell rock brought in to build up a working area. The average elevation of the site was approximately 10 feet above the North American Vertical Datum of 1988 (NAVD). The site was graded to an approximate elevation of 11.5 feet NAVD prior to pad construction.

Containment Pad

Steel Containment Pad

DIW Final Containment Pad

Temporary steel containment pads were constructed for the injection well, dual-zone monitor well, and mud system. The injection well and dual-zone monitor well pad was approximately 50 feet by 30 feet (1,500 square feet) with a 2-foot high I-beam retaining wall which provided fluid containment and support for the drilling equipment. The perimeter retaining wall was designed to contain any fluid spills, principally saline water and drilling fluids, to within the limits of the pad, thereby protecting the surficial aquifer. A sump was installed in the vicinity of the well to remove water and drilling fluids from the pad. This containment pad was used while drilling the injection well then disassembled, moved, and reassembled for use during drilling of the dual-zone monitor well. The mud system pad was approximately 56 feet by 36 feet (2,000 square feet) with a 2-foot high I-beam retaining wall. At the completion of well construction, the temporary steel pads were removed and permanent steel reinforced concrete pads were constructed. The injection well pad is 18 feet by 20 feet and the dual-zone monitor well pad is 15 feet by 15 feet. Both well pads have a 1-foot high poured concrete retaining wall. The area around the injection well is shown on the site plan in **Figure 2-1.**

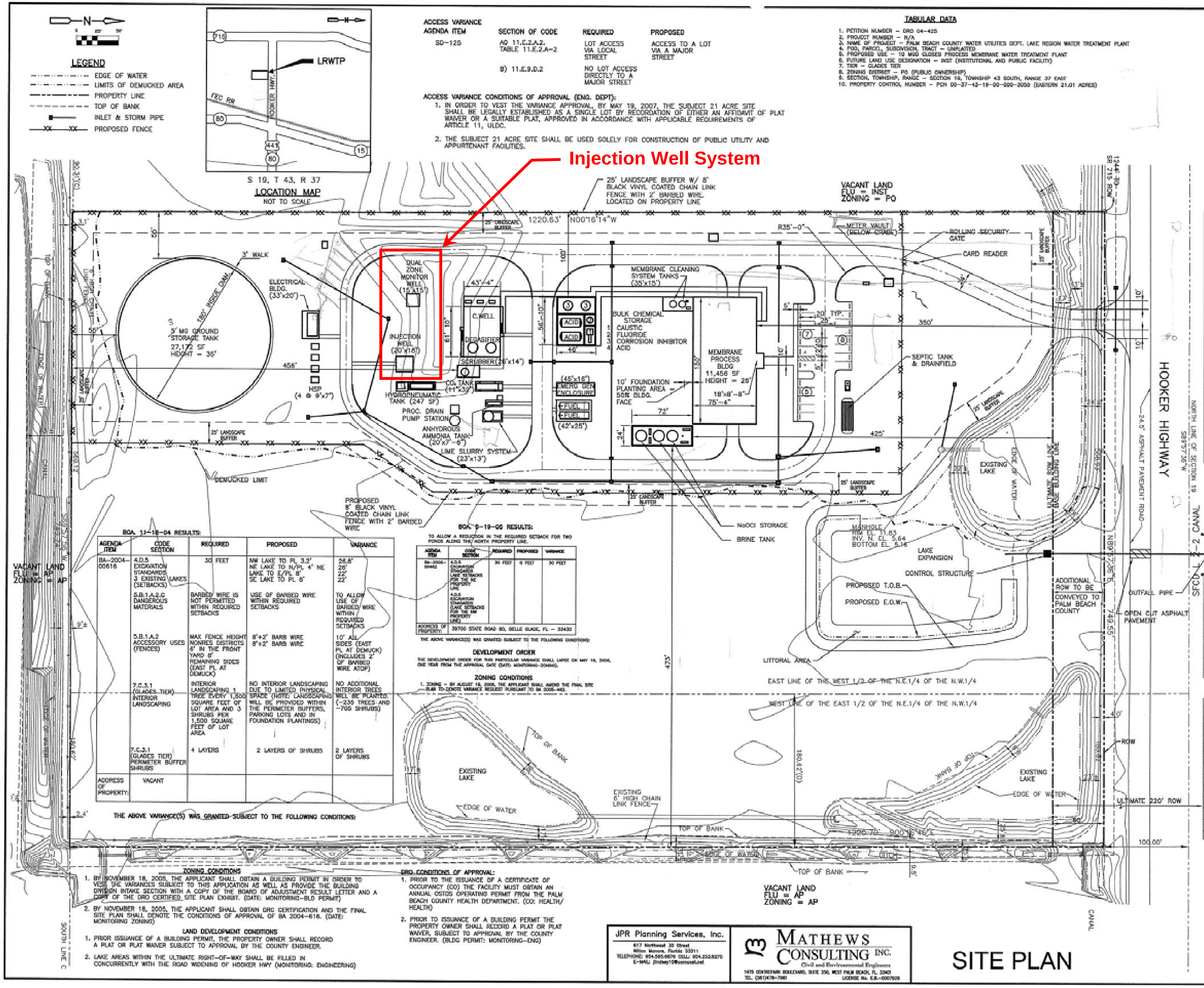
Pad Monitor Wells

Four water table monitor wells were drilled on January 6, 2006. The pad monitor wells were located at the northeast, northwest, southeast, and southwest corners of the injection well system. The four pad monitor wells were installed prior to the start of injection well drilling activities. Each well was constructed to a depth of 25 feet below land surface with 5 feet of 0.020-inch slot screen at the base of the well and Schedule 40 PVC blank casing from the top of screen to land surface. Water quality samples were collected from the wells after construction completion and well development; samples were analyzed for chloride concentration, total dissolved solids, specific conductivity, temperature, and pH. Results from the wells were used as a baseline for comparison with pad monitor well water quality data from weekly field sampling. The wells were subsequently plugged and abandoned following approval by FDEP. The plugging and abandonment was accomplished by grouting each well from bottom to top with 0.75 sacks of neat cement.

WELL CONSTRUCTION SEQUENCE

Construction of IW-1 commenced on February 2, 2006 and drilling activities were conducted on a 24 hour per day, 7 day per week schedule. The injection well was completed on May 25, 2006. Construction of DZMW-1 began on May 30, 2006, after the rig was moved to the new location. Drilling activities for the construction of DZMW-1 were also conducted on a 24 hour per day, 7 day per week schedule. The DZMW-1 was completed on July 12, 2006. The lower monitor zone of DZMW-1 was completed as an open-hole, designed to monitor water quality below the base of the USDW. The upper monitor zone was completed within the annular space between the base of the intermediate casing and the top of cement for the final casing. Water quality stratification at the site was determined during construction of IW-1 through straddle packer testing, open-hole (drill stem) flow testing, and geophysical logging.

A standard generalized sequence for drilling and testing of the injection and monitoring wells, based on Construction Permit Specific Condition 2 - Construction and Testing Requirements, consisted of the following sequence:



ACCESS VARIANCE

AGENDA ITEM	SECTION OF CODE	REQUIRED	PROPOSED
SD-125	A) 11.E.2.A.2. TABLE 11.E.2.A-2	LOT ACCESS VIA LOCAL STREET	ACCESS TO A LOT VIA A MAJOR STREET
	B) 11.E.9.D.2	NO LOT ACCESS DIRECTLY TO A MAJOR STREET	

ACCESS VARIANCE CONDITIONS OF APPROVAL (ENG. DEPT):

1. IN ORDER TO VEST THE VARIANCE APPROVAL, BY MAY 19, 2007, THE SUBJECT 21 ACRE SITE SHALL BE LEGALLY ESTABLISHED AS A SINGLE LOT BY RECORDATION OF EITHER AN AFFIDAVIT OF PLAT WAIVER OR A SUITABLE PLAT, APPROVED IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF ARTICLE 11, ULDC.
2. THE SUBJECT 21 ACRE SITE SHALL BE USED SOLELY FOR CONSTRUCTION OF PUBLIC UTILITY AND APPURTENANT FACILITIES.

TABULAR DATA

1. PETITION NUMBER – DRO 04-425
2. PROJECT NUMBER – N/A
3. NAME OF PROJECT – PALM BEACH COUNTY WATER UTILITIES DEPT. LAKE REGION WATER TREATMENT PLANT
4. POD, PARCEL, SUBDIVISION, TRACT – UNPLATED
5. PROPOSED USE – 10 MGD CLOSED PROCESS MEMBRANE WATER TREATMENT PLANT
6. FUTURE LAND USE DESIGNATION – INST (INSTITUTIONAL AND PUBLIC FACILITY)
7. TIER – GLADES TIER
8. ZONING DISTRICT – PO (PUBLIC OWNERSHIP)
9. SECTION, TOWNSHIP, RANGE – SECTION 19, TOWNSHIP 43 SOUTH, RANGE 37 EAST
10. PROPERTY CONTROL NUMBER – PCN 00-37-43-19-00-000-3050 (EASTERN 21.01 ACRES)

11.

CONCURRENCY APPROVAL*	
10 MGD WATER TREATMENT PLANT	11,456 SF PROCESS BUILDING INCLUDING 2,848 SF OF OFFICE SPACE, 5 MG WATER STORAGE TANK, ACCESSORY FACILITIES ASSOCIATED WITH WATER TREATMENT PLANT INCLUDING CHEMICAL STORAGE AREA, BRINE TANK AND NaOCL STORAGE AREA, CLEAR WELL, INJECTION WELL, MONITORING WELL, EMERGENCY GENERATOR AND FUEL STORAGE, HIGH SERVICE PUMPS, CARBON DIOXIDE TANKS, ANHYDROUS AMONIA TANK, SCRUBBER, LIME SLURRY SYSTEM AND PROCESS DRAIN P.S.

*CONCURRENCY IS APPROVED FOR THE ABOVE USE AND AMOUNTS SHOWN ON THIS PLAN

12. TRAFFIC ANALYSIS ZONE – 1215
13. LAST ZC/BCC APPROVAL DATE – N/A
14. BOARD OF ADJUSTMENT PETITION NUMBER AND APPROVAL DATE – BA 2004-616, NOVEMBER 18, 2004 – APPROVAL LETTER FOR LAKE SETBACK, FENCE AND LANDSCAPING VARIANCES IN FILE
15. APPLICABLE OVERLAY AND DENSITY BONUS PROGRAMS – GLADES ECONOMIC OVERLAY
16. TOTAL GROSS ACREAGE – 21.01 ACRES, MINUS 1.03 AC FOR ROW = 19.98 TOTAL NET ACREAGE
17. TOTAL GROSS FLOOR AREA (GFA) – 50,681 SF (INCLUDES PROCESS BUILDING AND FOOTPRINT DIMENSIONS FOR STORAGE TANK AND ALL PAVED SLABS ASSOCIATED WITH THE OTHER ACCESSORY FACILITIES).
18. GROSS FLOOR AREA BY USE:

BUILDING AND OTHER ACCESSORY UNIT INFORMATION			
FACILITY	SQUARE FOOTAGE	STORIES	HEIGHT FROM GRADE
BUILDING: PROCESS BUILDING	11,456	1	26 FEET
ACCESSORY UNITS: 5 MG GROUND STORAGE TANK	27172	N/A	35 FEET
INJECTION WELL (SLAB)	360	N/A	SLAB ON GRADE
HYDROPNEUMATIC TANK W/ AIR COMPRESSOR (SLAB)	247	N/A	SLAB ON GRADE W/ 8' TALL TANK
CLEAR WELL	2679	N/A	WATER STORAGE WELL W/DEGASIFIERS TO 45'
MONITOR WELL (SLAB)	225	N/A	SLAB ON GRADE W/8' TALL WELL HEAD
HIGH SERVICE PUMPS (SLABS)	252	N/A	AT GRADE
ELECTRICAL BLDG. (PREFAB)	448	1	10 FEET
SCRUBBER (SLAB)	364	N/A	40' TALL TANK ON SLAB
EMERGENCY GENERATOR AND FUEL TANKS (2-10000 GAL)	720; 1050	N/A	12' HIGH ENCLOSURE
BULK CHEMICAL STORAGE (CONTAINMENT AREA/SLAB)	2614	N/A	20' TALL TANKS ON SLAB
BRINE AND NaOCL STORAGE AREA (SLAB)	1728	N/A	35' TALL TANKS ON SLAB
ANHYDROUS AMMONIA AND CARBON DIOXIDE TANKS (SLAB)	150; 352	N/A	8' TALL TANKS ON SLAB
MEMBRANE CLEANING SYSTEM TANKS	525	N/A	SLAB ON GRADE W/2-10' TALL TANKS
LIME SLURRY SYSTEM (SLAB)	299	N/A	21' TALL TANK ON SLAB
PROCESS DRAIN PUMP STATION	40	N/A	SLAB W/ BELOW GRADE VAULT
TOTAL SF OF PROCESS BUILDING, GROUND STORAGE TANK AND SLABS	50,681		

19. FLOOR TO AREA RATIO(FAR) – 5.5%
20. BUILDING COVERAGE – 1.16 AC, 5.5%
21. IMPERVIOUS SURFACE AREA – 1.59 AC, 7.6%
22. LAKE/RETENTION/DETENTION (AC & %) – 2.56 AC, 12.2%
23. OPEN/LANDSCAPE AREA (INCLUDES LANDSCAPE AREAS, BUFFERS) MINIMUM 20 % (AC & %) – 15.7 AC, 74.7%
24. PRESERVE (REQUIRED AND PROPOSED AC & %)–0AC, 0AC, 0%
25. OTHER (AC &% SHOULD TOTAL 100%) – N/A
26. FINISHED GRADE ELEVATION FROM NGVD AND CHANGE FROM CURRENT GRADE – 12.3±, (+) 1.0'
27. PARKING AND LOADING (REQUIRED AND PROPOSED)

	REQUIRED	PROPOSED
TOTAL # OF SPACES	20	20
CALCULATION RATE	1 SPACE PER 200 SF OF OFFICE PLUS 1 PER EMPLOYEE	1 SPACE PER 200 SF OF OFFICE PLUS 1 PER EMPLOYEE
CALCULATION	2,848 SF OFFICE/200 = 14 SPACES + 6 EMPLOYEES = 20 SPACES	2,848 SF OFFICE/200 = 14 SPACES + 6 EMPLOYEES = 20 SPACES
HANDICAPPED PARKING (12 FOOT WIDE)	1 SPACE	2 SPACES
REGULAR PARKING (10 FOOT WIDE)	18 SPACES	18 SPACES

28. PROPERTY DEVELOPMENT REGULATIONS – SEE CHART BELOW FOR APPLICABLE SETBACK INFORMATION.

SETBACKS PER TABLE 4.B.1.A-12 (AS AMENDED ON NOVEMBER 18, 2004)**		
	REQUIRED	PROPOSED
FRONT	50 FEET	380 FEET
WEST SIDE	50 FEET	55 FEET
EAST SIDE	50 FEET	473 FEET
REAR	50 FEET	55 FEET
CHEMICAL STORAGE		
FRONT	100 FEET	425 FEET
WEST SIDE	100 FEET	100 FEET
EAST SIDE	100 FEET	473 FEET
REAR	100 FEET	456 FEET
** AMENDED PER ORDINANCE 2004-054, APPROVED ON NOVEMBER 18, 2004		
NOTE: THE PO ZONING DISTRICT DOES NOT HAVE PROPERTY DEVELOPMENT REGULATIONS.		

BOA. 11-18-04 RESULTS:

AGENDA ITEM	CODE SECTION	REQUIRED	PROPOSED	VARIANCE
BA-2004-00616	4.D.5 EXCAVATION STANDARDS 3 EXISTING LAKES (SETBACKS)	30 FEET	NW LAKE TO PL 3.2' NE LAKE TO N/PL 4' NE LAKE TO E/PL 8' SE LAKE TO PL 8'	26.8' 26' 22' 22'
	5.B.1.A.2.C DANGEROUS MATERIALS	BARBED WIRE IS NOT PERMITTED WITHIN REQUIRED SETBACKS	USE OF BARBED WIRE WITHIN REQUIRED SETBACKS	TO ALLOW USE OF BARBED WIRE WITHIN REQUIRED SETBACKS
	5.B.1.A.2 ACCESSORY USES (FENCES)	MAX FENCE HEIGHT NONRES DISTRICTS 6' IN THE FRONT YARD 8' REMAINING SIDES (EAST PL AT DEMUCK)	8'+2' BARB WIRE 8'+2' BARB WIRE	10' ALL SIDES (EAST PL AT DEMUCK) (INCLUDES 2' OF BARBED WIRE ATOP)
	7.C.3.1 (GLADES TIER) INTERIOR LANDSCAPING	INTERIOR LANDSCAPING 1 TREE EVERY 1,500 SQUARE FEET OF LOT AREA AND 3 SHRUBS PER 1,500 SQUARE FEET OF LOT AREA	NO INTERIOR LANDSCAPING DUE TO LIMITED PHYSICAL SPACE (NOTE: LANDSCAPING WILL BE PROVIDED WITHIN THE PERIMETER BUFFERS, PARKING LOTS AND IN FOUNDATION PLANTINGS)	NO ADDITIONAL INTERIOR TREES WILL BE PLANTED. (-236 TREES AND -706 SHRUBS)
	7.C.3.1 (GLADES TIER) PERIMETER BUFFER SHRUBS	4 LAYERS	2 LAYERS OF SHRUBS	2 LAYERS OF SHRUBS
ADDRESS OF PROPERTY:	VACANT			

THE ABOVE VARIANCE(S) WAS GRANTED SUBJECT TO THE FOLLOWING CONDITIONS:

ZONING CONDITIONS

1. BY NOVEMBER 18, 2005, THE APPLICANT SHALL OBTAIN A BUILDING PERMIT IN ORDER TO VEST THE VARIANCES SUBJECT TO THIS APPLICATION AS WELL AS PROVIDE THE BUILDING DIVISION INTAKE SECTION WITH A COPY OF THE BOARD OF ADJUSTMENT RESULT LETTER AND A COPY OF THE DRO CERTIFIED SITE PLAN EXHIBIT. (DATE: MONITORING-BLD PERMIT)
2. BY NOVEMBER 18, 2005, THE APPLICANT SHALL OBTAIN DRC CERTIFICATION AND THE FINAL SITE PLAN SHALL DENOTE THE CONDITIONS OF APPROVAL OF BA 2004-616. (DATE: MONITORING ZONING)

LAND DEVELOPMENT CONDITIONS

1. PRIOR ISSUANCE OF A BUILDING PERMIT, THE PROPERTY OWNER SHALL RECORD A PLAT OR PLAT WAIVER SUBJECT TO APPROVAL BY THE COUNTY ENGINEER.
2. LAKE AREAS WITHIN THE ULTIMATE RIGHT-OF-WAY SHALL BE FILLED IN CONCURRENTLY WITH THE ROAD WIDENING OF HOOKER HWY (MONITORING: ENGINEERING)

BOA. 5-19-05 RESULTS:

TO ALLOW A REDUCTION IN THE REQUIRED SETBACK FOR TWO PONDS ALONG THE NORTH PROPERTY LINE.

AGENDA ITEM	CODE SECTION	REQUIRED	PROPOSED	VARIANCE
BA-2005-00462	4.D.5 EXCAVATION STANDARDS LAKE SETBACKS FOR THE NE PROPERTY LINE 4.D.5 EXCAVATION STANDARDS (LAKE SETBACKS FOR THE NW PROPERTY LINE)	30 FEET	0 FEET	30 FEET
ADDRESS OF PROPERTY:	39700 STATE ROAD 80, BELLE GLADE, FL – 33430			

THE ABOVE VARIANCE(S) WAS GRANTED SUBJECT TO THE FOLLOWING CONDITIONS:

DEVELOPMENT ORDER

THE DEVELOPMENT ORDER FOR THIS PARTICULAR VARIANCE SHALL LAPSE ON MAY 19, 2006, ONE YEAR FROM THE APPROVAL DATE (DATE: MONITORING-ZONING).

ZONING CONDITIONS

1. ZONING – BY AUGUST 18, 2005, THE APPLICANT SHALL AMEND THE FINAL SITE PLAN TO DENOTE VARIANCE REQUEST PURSUANT TO BA 2005-462.

DRO CONDITIONS OF APPROVAL:

1. PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY (CO) THE FACILITY MUST OBTAIN AN ANNUAL OSTDS OPERATING PERMIT FROM THE PALM BEACH COUNTY HEALTH DEPARTMENT. (CO: HEALTH/ HEALTH)
2. PRIOR TO ISSUANCE OF A BUILDING PERMIT THE PROPERTY OWNER SHALL RECORD A PLAT OR PLAT WAIVER, SUBJECT TO APPROVAL BY THE COUNTY ENGINEER. (BLDG PERMIT: MONITORING-ENG)

JPR Planning Services, Inc.
617 Northeast 30 Street
Wilton Manors, Florida 33311
TELEPHONE: 954.565.6876 CELL: 954.253.8270
E-MAIL: jlindsey10@comcast.net

MATHEWS CONSULTING INC.
Civil and Environmental Engineers
1475 CENTREPARK BOULEVARD, SUITE 250, WEST PALM BEACH, FL 33401
TEL. (561)478-7961 LICENSE No. E.B.-0007920

SITE PLAN

Figure 2-1

7-18-07 whole copy from S.M.

1. For each stage (with the exception of the surface casing to 200 feet) of injection and monitor well drilling, a pilot borehole was drilled and lithologic cuttings were collected.
2. Cores were collected during IW-1 drilling at selected intervals of the pilot borehole and used to estimate porosity and permeability.
3. Geophysical logs were performed during pilot borehole drilling to estimate formation competency, the presence of clay minerals, porosity, permeability, water quality, and the contribution of water from zones of flow within the borehole.
4. Packer pumping tests were conducted in the IW-1 pilot borehole to isolate discrete intervals for determination of transmissivity, hydraulic conductivity, and water quality.
5. Video surveys were conducted in two phases of the open pilot borehole to observe physical borehole characteristics and to visually confirm log results.
6. Caliper logs were performed after each reaming operation to provide data with which to calculate hole volumes.
7. The information collected during pilot hole drilling was used to identify setting depths for each well casing. Following drilling and testing of each pilot borehole stage, the pilot borehole was reamed to the appropriate size for casing installation.
8. Casings were set in place and the annular space was cemented. Temperature and gamma ray logs were performed to verify cement stage tag depths. This sequence was repeated for each consecutive casing of smaller diameter set concentrically within the previous casing.
9. Deviation surveys (sure shots) of the pilot boreholes and reamed boreholes were measured approximately every 90 feet to track hole straightness during drilling. A summary of the deviation survey measured during the drilling operations for IW-1 and DZMW-1 is presented in **Appendix B.**
10. After setting and cementing the final casing in IW-1, the 13 3/8-inch OD FRP tubing was set in place with a YBI positive seal packer and the annular space was filled with an anti-corrosion fluid. The open hole then was developed and a water sample was collected.
11. In DZMW-1 the final borehole was 12.25 inches in diameter, drilled to the total depth of the well at 2,100 feet bpl. A specially designed cement basket was used to set and cement the final casing at 2,073 feet bpl. Both the upper and lower monitor intervals were developed and water samples collected

Drilling Methods

The injection and monitor wells were both drilled using the mud rotary method through the Hawthorn Formation, to a depth of approximately 850 feet (above the top of the production portion of the Floridan aquifer). The drilling rig then was configured for reverse air drilling. The reverse air drilling method was used to drill below 850 feet to the total depth of both wells.

Pilot Hole Cementing

Cement was emplaced in the pilot hole following completion of each stage of pilot hole drilling and testing below 850 feet bpl. Cementing the pilot hole reduced the possibility of an open conduit for fluid migration outside of the intermediate and final well casings. The cemented pilot hole also stabilized the drilled holes, reduced the number of lost circulation zones and caverns that may have occurred during reaming operations, and minimized the probability of poor cement returns during casing cementing.

Welding Methods

The factory-beveled ends of all steel casings were arc welded by certified pipeline welders to standard pipeline certifications. They were welded with 2 to 4 layers of weld. The first layer was a hot pass, which was subsequently ground, cleaned, and inspected. The subsequent passes were filler passes used to completely fill the beveled gap. Each pass was wire-brushed clean and inspected prior to the next pass.

Root or Hot Pass

Filler Pass

Well Casings

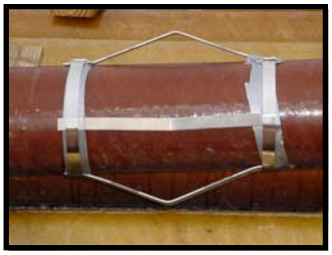
All steel casings in the injection well were centralized in the borehole using strap-type centralizers welded at intervals along the pipe at 0, 90, 180, and 270 degrees around the casing at each position. The factory-beveled ends of the casings were welded as described above. The FRP injection tubing contains threaded couplings where all joints are screwed together. Installation of the FRP was performed by the manufacturing company's installation crew. Centralizers were incorporated onto the FRP during the manufacturing process and installed at intervals as described above.

Strap-type Steel Centralizers

Factory Incorporated Centralizer

Details of the casing materials and sizes are listed in **Table 2-1**. The casing mill certificates can be found in **Appendix C**.

All casings in the monitor well were centralized in the borehole using strap-type centralizers welded at intervals along the pipe at 0, 90, 180, and 270 degrees around the casing at each position. The factory-beveled ends of the casings were welded as described above. The FRP monitoring tubing contains threaded couplings where all joints are screwed together. Installation of the FRP was performed by the manufacturing company's installation crew. Centralizers were banded to the FRP with stainless steel bands and installed at intervals as described above. Details of the casing materials and sizes are listed in **Table 2-2**.



Strap on Centralizer

Threaded Couplings

Table 2-1
IW-1 Injection Well Casing Summary

Casing Name and setting depth	**Outside Diameter** (inches)	**Wall Thickness** (inches)	**Casing Type**	**Grade**	**Joint Connection**
Conductor 188 feet	48	0.375	Rolled Steel Seamed	API 5L Grade B	Welded
Surface 848 feet	36	0.375	Rolled Steel Seamed	API 5L Grade B	Welded
Intermediate 1,921 feet	28	0.375	Rolled Steel Seamed	API 5L Grade B	Welded
Final 2,950 feet	18	0.500	Seamless Steel	API 5L Grade B	Welded
Tubing 2,941 feet	13 3/8	0.55	Fiberglass Reinforced	API 15TR ASTM D2996	Threaded

Table 2-2
DZMW-1 Monitor Well Casing Summary

Casing Name and setting depth	Outside Diameter (inches)	Wall Thickness (inches)	Casing Type	Grade	Joint Connection
Conductor 192 feet	30	0.375	Rolled Steel Seamed	ASTM A 53 Grade B	Welded
Surface 850 feet	20	0.375	Rolled Steel Seamed	ASTM A 53 Grade B	Welded
Final Upper 1,940 feet	12 3/4	0.375	Seamless Steel	ASTM A 53 Grade B	Welded
Final Lower 2,073 feet	6 5/8	0.27	Fiberglass Reinforced	API 15TR ASTM D2996	Threaded

Cementing Operations

Caliper logs were run inside the reamed borehole to determine borehole volumes for cement calculations. The complete annular space between each successive casing in IW-1 and DZMW-1 was then filled using sulfate-resistant cement. ASTM C 150 Type II cement was used in the injection well and in the monitor well with additives as necessary. The lowermost 200 feet of all casings was cemented with neat cement. Above the neat cement, where the casings were exposed to the formations, 6 percent bentonite cement was used. For all remaining casings (dual casing strings) 12 percent bentonite cement was used.

Cement was emplaced in stages. The first stage was pressure-grouted through a tremmie pipe located inside the fluid-filled casing near the bottom of the open hole. Subsequent stages were emplaced using a tremmie pipe placed in the annulus between casing and borehole. After each stage of cementing, the top of cement was located physically (tagged) with a tremmie pipe and by the performance of a temperature log inside the casing. The contractor collected representative samples of cement from each pumped stage. A summary of the cementing programs for IW-1 and DZMW-1 is presented in **Appendix D**.

Cement emplacement in DZMW-1 for both casing seals and pilot holes followed the same procedure described above with the exception of the final casing. The procedure for setting the 6.625-inch diameter monitor casing in DZMW-1 was accomplished using a California packer and tremmie cementing. This procedure was developed to preserve the 12.25-inch diameter open hole at

California Packer

the base of the monitor well.

The California packer was threaded to the base of the first section of 6.625-inch diameter FRP casing and the monitor casing was installed in the 12.25-inch diameter borehole. The California packer was then inflated to isolate the annulus from the open monitor interval below. Neat cement then was placed on top of the packer, in small stages, until the annular space separating the upper and lower monitoring intervals had been filled.

INJECTION WELL IW-1 CONSTRUCTION SUMMARY

Construction of IW-1 commenced on the morning of February 2, 2006. A 54-inch borehole was drilled by the mud rotary method to a depth of 190 feet bpl. A gamma ray/caliper log was performed on the open hole section of the borehole followed by the installation of the 48-inch diameter, 0.375-inch wall thickness conductor casing set at 188 feet bpl, with casing joints joined by the arc-welding method. The annular space between the borehole and casing was pressure grouted to surface in one stage with 1,460 cubic feet (cu ft) of neat cement.

Drilling resumed on February 5, 2006. A 46-inch bit was used to drill from the top of the neat cement, tagged at 183 feet bpl, to 855 feet bpl. A gamma ray/caliper log was then performed on the open hole section of the borehole. Following geophysical logging, the 36-inch diameter, 0.375-inch wall thickness surface casing was installed to a depth of 848 feet bpl. Casing joints were joined by the arc-welding method. The annular space between the borehole and casing was cemented to pad level in two stages with 4,212 cu ft of cement. The first stage of cement was pumped by the pressure grouting method and the second stage by the tremmie method. Of the 4,212 cu ft of cement pumped, 562 cu ft was neat and 3,650 cu feet was 12 percent bentonite. The 12 percent bentonite was emplaced in the annular space at the upper portion of the casing, and neat cement was used to seal the bottom of the casing.

Casing Welding

At this point in the well construction, the drilling method was changed from the mud-rotary method to the reverse-air method. At the completion of this changeover, drilling operations were resumed. Beginning on the evening of February 16, 2006, the drilling of the 12.25-inch pilot hole began from the top of the neat cement, at a depth of 838 feet, to a total depth of 1,915 feet bpl. Drill-stem water quality samples were collected every 90 feet during drilling of the pilot hole in an effort to identify water quality as the hole was advanced. Upon completion of pilot hole drilling the borehole was geophysically logged as described in Section 3: Geophysical Logging Program, followed by the performance of packer testing.

Packer testing of the completed pilot borehole was undertaken primarily to further evaluate the location of the base of the USDW. A secondary goal of the packer testing program for the interval between 1,630 and 1,915 feet bpl was to identify the appropriate interval for the shallow monitoring. Four straddle packer tests were completed at intervals from 1,630 to 1,650 feet bpl, 1,776 to 1,796 feet bpl, 1,791 to 1,811 feet bpl, and 1,851 to 1,871 feet bpl, and one single packer test was performed at the bottom of the well from 1,901 to 1,915 feet bpl. The analyses performed on water samples collected during the tests consisted of chloride, specific conductance, sulfate, total dissolved solids, laboratory pH, bicarbonate, calcium, potassium, sodium, magnesium, total alkalinity, ammonia nitrogen, total kjeldahl nitrogen and total phosphorous.

Following packer testing, a request was made by the Florida Department of Environmental Protection (FDEP) to drill an additional 50 feet of plot borehole, to collect a 10 foot core, perform geophysical logging, and to perform an additional packer test to further verify the depth of the USDW. The pilot borehole was advanced to 1,954 feet bpl. The bit was removed from the well and a 10-foot, 4-inch diameter core was collected from 1,954 feet to 1,964 feet bpl. The borehole was geophysically logged followed by a single packer test covering the interval from 1,939 feet to 1,964 feet bpl. A Representative water sample was again collected and analyzed.

Following the completion of the additional packer testing, tremie pipe was lowered to the bottom of the 12.25-inch pilot hole, and the borehole was cemented to the bottom of the 36-inch diameter Surface Casing. After completion of cementing, a 34-inch diameter reaming assembly was used to ream a borehole from 848 to 1,925 feet bpl. A gamma ray/caliper log was run in the completed reamed hole to calculate annular volumes for casing cementing. A 28-inch diameter, 0.375-inch wall thickness intermediate casing then was set to 1,921 feet bpl following FDEP approval. Casing joints were joined by the arc-welding method. The annular space between the borehole and casing was cemented to pad level in nine stages with 6,610 cu ft of cement. The first stage of cement was pumped by the pressure grouting method and the remaining stages by the tremmie method. The cement comprised three blends: neat, 6 percent bentonite, and 12 percent bentonite cement. Of the 6,610 cu ft of cement pumped, 679 cu ft was neat, 3,595 cu ft was 6 percent bentonite, and 2,336 cu feet was 12 percent bentonite. The 12 percent bentonite was emplaced in the annular space between the two casing strings (surface and intermediate), the 6 percent bentonite was emplaced in the upper portion of the casing between the casing and the open hole formation, and the neat cement was used to seal the bottom of the casing. Following setting of each stage, the depth of the cement top was tagged with tremie pipe and corroborated by temperature and gamma logs. A summary of the cement quantities for each stage is presented in **Appendix D**.

A 12.25-inch pilot hole then was drilled from the top of the neat cement at 1,886 feet bpl to 3,500 feet bpl. Five additional cores were cut at intervals from 2,350 feet to 2,360 feet bpl, 2,522 feet to 2,532 feet bpl, 2,786 feet to 2,796 feet bpl, 2,799 feet to 2,809 feet bpl, and 2,810 feet to 2,820 feet bpl during pilot hole drilling. Drill-stem water quality samples were collected every 60 feet during drilling of the pilot hole in an effort to identify the water quality as the hole was advanced.

Cores 4, 5, & 6

Geophysical logs were run from 1,900 feet bpl in the open borehole section of the pilot hole to 3,500 feet bpl. The logs were examined to locate packer test intervals within the borehole that would provide information on the existence of confinement, the location of the injection zone, and an appropriate final casing setting depth. A packer was then set at 2,970 feet bpl and capped with cement to 2,955 feet bpl. This packer isolated the injection zone from the remainder of the open hole section of the well. Geophysical logging was completed and three packer test intervals were selected for confinement testing. The packer tests were completed from 2,917 feet to 2,938 feet bpl, 2,780 feet to 2,801 feet bpl, and 2,525 feet to 2,546 feet bpl. Representative water samples were collected at the end of each packer test and analyzed for the water quality parameters listed above. The pilot hole was then cemented and preparations for reaming operations commenced.

Reaming of the cement pilot hole began on April 12, 2006. A 26-inch reaming assembly was used from 1,858 feet bpl to the final casing setting depth of 2,950 feet bpl. At this point the 26-inch ream assembly was replaced with a 17.5-inch ream assembly and reaming continued to the total depth of the well at 3,500 feet bpl. This change in ream assembly size created a ledge at 2,950 feet bpl to aid in the setting and cementing of the final casing string. A gamma ray/caliper log was then performed. The 18-inch diameter, 0.5-inch wall thickness final casing was set at a depth of 2,950 feet bpl following FDEP approval. A 22-inch by 16-inch concentric reducer was installed at the base of the final casing and used to set the casing on the ledge created at 2,950 feet bpl. A YBI positive seal packer was also installed nine feet above the concentric reducer for seating of the FRP injection tubing. Once the casing was installed a packer was set and inflated between 2,942 and 2,950 feet bpl. A hydrostatic pressure test (witnessed by FDEP) was performed to demonstrate mechanical integrity of the final casing on May 12, 2006. The annular space between the borehole and casing was then tremmie grouted to pad level in thirteen stages with 10,111 cu ft of cement. Cementing was comprised of three blends: 6 percent bentonite followed by

22 x 16 Concentric Reducer

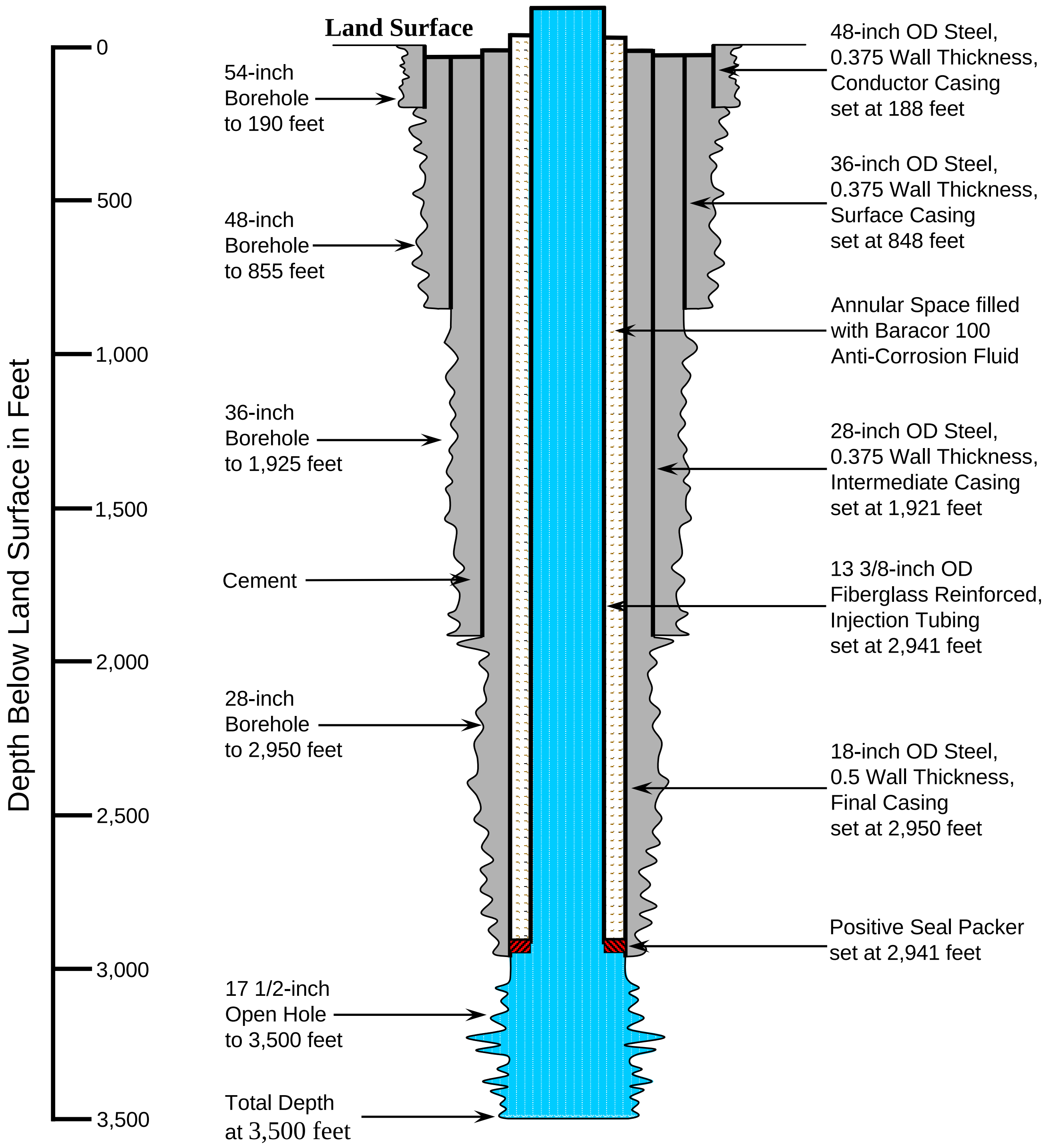
neat cement, for the first stage, sealing the bottom of the casing, 6 percent bentonite cement in the annular space to the bottom of the intermediate casing, and 12 percent bentonite between the dual strings of casing to the surface. Following setting of each stage, the depth of the cement top was tagged with tremie pipe and corroborated by temperature and gamma logs. A summary of the cement quantity for each stage is presented in **Appendix D**. A cement bond log was performed on May 21, and a video inspection of the casing and welded joints was conducted on May 22, 2006, prior to the thirteenth and final stage of cementing. Cement was brought from 523 feet bpl to land surface in stage thirteen. Following completion of the geophysical logs, the well was developed and a background water sample was collected from the injection zone by a State of Florida certified lab. The results of the laboratory analysis are contained in **Appendix E**.

The 13 3/8-inch OD injection tubing was lowered to 2,940.9 feet bpl, just above the positive seal packer. The annular space then was flushed with fresh water and filled with a 1% solution of BARACOR 100 as a corrosion inhibitor. The tubing then was set into the positive seal packer at 2,941 feet bpl and a preliminary pressure test was performed on the annulus between the 13 3/8-inch injection tubing and the 18 inch final casing. On June 13, 2006 the final annular pressure test was successfully completed in the presence of the FDEP.

The well then was temporarily capped in preparation for the installation of the well head valve. On May 28, 2006, the rig was moved to the monitor well location, which is approximately 70 feet west of the injection well. On June 14, 2006, a video camera survey was performed on the final injection tubing, including inspection of the threaded joints from the bottom of the final tubing to the surface and the injection zone below the bottom of the casing. On June 15, 2006, following the video survey, the radioactive tracer survey was performed. The well completion diagram is presented in **Figure 2-2.**

DUAL-ZONE MONITOR WELL DZMW-1 CONSTRUCTION SUMMARY

Construction of DZMW-1 began on May 30, 2006, with the drilling of a 38.5-inch diameter borehole to a depth of 199 feet bpl. The borehole was circulated clean and a gamma ray/caliper log was performed. The 30-inch diameter, 0.375 wall thickness conductor casing was then set and cemented in place at 192 feet bpl with 1,056 cu ft of neat cement in one stage. A 12.25-inch pilot hole was advanced from the bottom of the conductor casing to 900 feet bpl. Geophysical logging of the completed pilot hole occurred on June 3, 2006, and the pilot hole was reamed to a nominal 38.5-inch diameter to 860 feet bpl. A gamma ray/caliper log then was performed and 850 feet of 20-inch diameter surface casing was set and cemented in place in one stage using 2,173 cu ft of cement (517 cu ft-neat, 1,656 cu ft-12 percent).



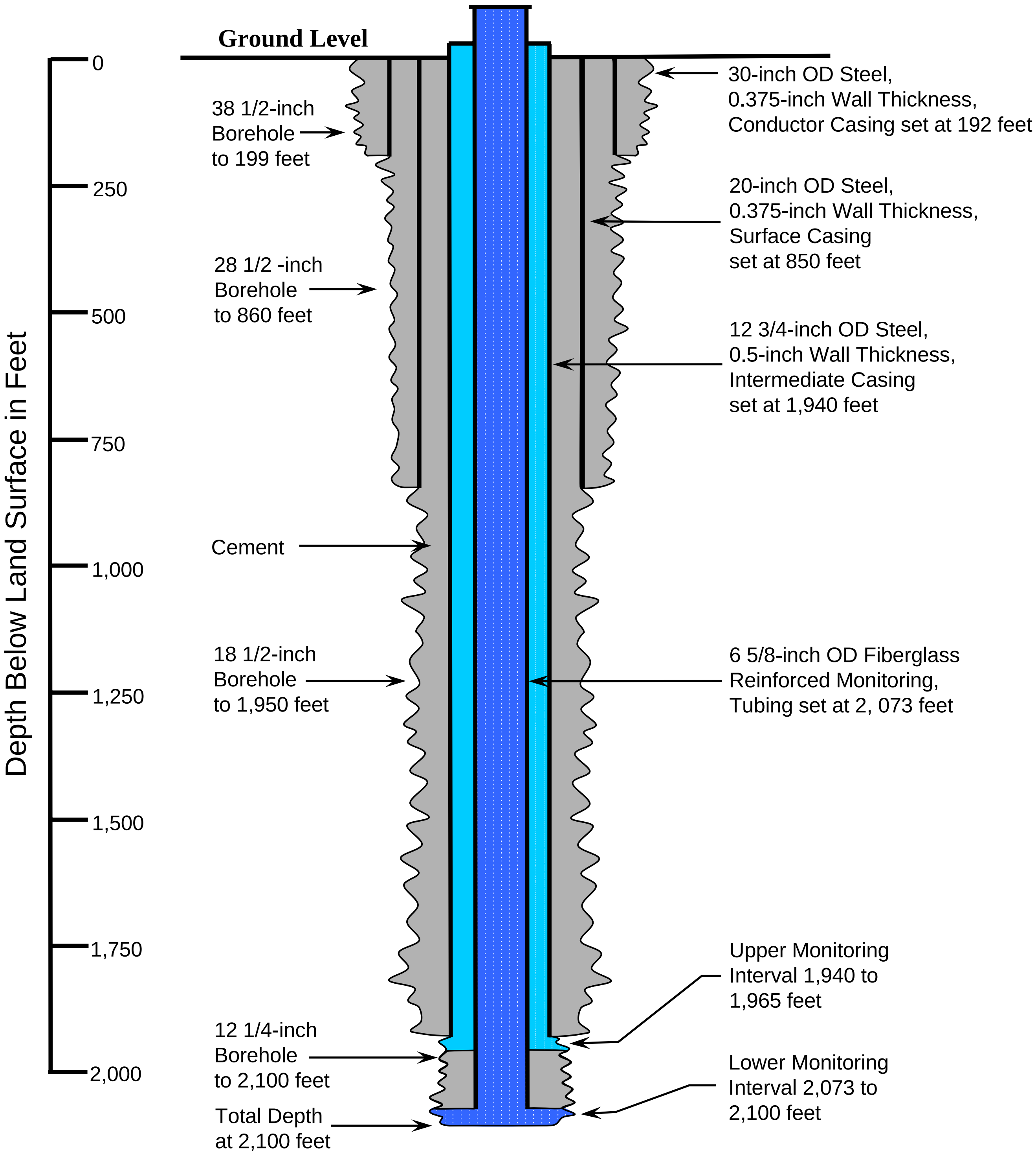
LAKE REGION WATER TREATMENT PLANT
DEEP INJECTION WELL
CONSTRUCTION DIAGRAM
Figure 2-2

At this point in the well construction, the drilling method was changed from the mud-rotary method to the reverse-air method. At the completion of this changeover, drilling operations were resumed. Beginning on the morning of June 7, 2006, the drilling of the 12.25-inch pilot hole began from the top of the neat cement, at a depth of 840 feet, to a total depth of 1,940 feet bpl. Drill-stem water quality samples were collected every 90 feet during drilling of the pilot hole in an effort to identify water quality as the hole was advanced and verify the water quality obtained during drilling of the injection well. Upon completion of pilot hole drilling the borehole was geophysically logged. Following logging, the pilot hole was cemented to the base of the surface casing and reaming operations were begun.

An 18.5-inch ream assembly was used to ream the borehole from the base of the surface casing to 1,950 feet bpl. Following the completion of the reaming operation, a gamma ray/caliper log was performed then the 12 ¾-inch intermediate casing was installed to a depth of 1,940 feet bpl. This casing was then cemented in place with 3,324 cu ft of cement in 6 stages. Cementing was comprised of three blends: 6 percent bentonite followed by neat cement, for the first stage, sealing the bottom of the casing, 6 percent bentonite cement in the annular space to the bottom of the surface casing, and 12 percent bentonite between the dual strings of casing to the surface. Following setting of each stage, the depth of the cement top was tagged with tremmie pipe and corroborated by temperature and gamma logs. A summary of the cement quantity for each stage is presented in **Appendix D**. The sixth and final stage of cement was pumped later during construction following the performance of the video and cement bond logs. On June 19, 2006, the pressure test of the 12 ¾-inch intermediate casing was successfully completed in the presence of the FDEP.

The final stage of drilling was started on the evening of June 19, 2006. The 12.25-inch diameter borehole was drilled to a depth of 2,100 feet bpl and geophysical logging conducted. The 6.625-inch diameter FRP monitoring tubing was then installed to a depth of 2,073 feet bpl and a pre-cementing cement bond log was performed on the monitor tubing. The california packer was then inflated and the monitoring tubing was cemented in place with 90 cubic feet of neat cement in 5 small stages. The top of cement was located at 1,965 feet bpl and identifies the bottom of the upper monitoring interval. A pressure test of the FRP monitoring tubing was successfully completed on June 30, 2006 and the video log and post-cementing cement bond log were completed on July 3, 2006.

After the completion of construction, the wellhead was installed and the drilling rig was demobilized. The upper and lower monitor zones were developed and background water quality samples were collected from both the upper and lower monitoring intervals. The samples were analyzed for all constituents listed in Chapter 62-550 of the Floridan Administrative Code (FAC) as primary and secondary drinking water standards. The results of the laboratory analysis are contained in **Appendix E**. A well completion diagram of DZMW-1 is shown as **Figure 2-3**.



LAKE REGION WATER TREATMENT PLANT
DUAL ZONE MONITOR WELL
CONSTRUCTION DIAGRAM
Figure 2-3

Section 3
Geophysical Logging Program

The objectives of the geophysical logging program were to estimate formation characteristics, borehole water quality changes, and identify flow zones. These objectives are described below in more detail for the various phases of injection well and monitor well pilot hole drilling. Geophysical logs were also run to test the mechanical integrity of the injection and monitor wells. The geophysical logging program for mechanical integrity is presented in **Section 6** of this report.

GEOPHYSICAL LOG DEFINITIONS

Geophysical logs were conducted in the pilot borehole in accordance with Specific Condition 2(g) of the FDEP Construction Permit. These logs were performed to confirm the formation characteristics and depths recorded by the geologist from the lithologic cuttings, and estimate the relative rate of fluid movement within the borehole. The following is a description of the uses and interpretation of the geophysical logs performed.

- **Caliper**: This log measures the diameter of the borehole and is useful in identifying fractures and solution features, and providing indirect evidence concerning the mechanical strength of the formation material.

- **Dual Induction/Spontaneous Potential (SP)**: The Dual Induction/SP log is used to measure the electrical properties of the formation. The electrical resistivities of the formation are affected by porosity and water quality. These logs give important information concerning the water quality transition found at the base of the USDW, the porosity of the formation and possible producing and confining zones, and the mixing of formation water with the drilling fluid in the borehole. The log consists of four traces:

    - **ILD**: Measures the resistivity of the formation material with a wide receiver spacing that penetrates deep into the formation.

    - **ILM**: Measures the resistivity of the formation with a medium receiver spacing that examines the formation material close to the borehole, where drilling fluids may have invaded the formation.

    - **LL3**: This log reads the lateral resistivity with closely spaced electrodes that measure primarily within the borehole and on the borehole wall.

  - **SP**: Measures potential differences within the borehole and in the formation. This trace is strongly affected by water quality changes and formation differences.

- **Borehole Compensated Sonic (BHCS) with Variable Density Log (VDL)**: The BHCS log measures the acoustic properties of the formation material. This log is strongly affected by the mechanical strength of the formation and by porosity. The VDL provides important information about fractures and solution features.

- **Gamma Ray**: The gamma ray log measures the natural gamma radiation produced by the formation material. The sources of gamma radiation contained in the formation are mostly associated with clays, phosphates and uranium compounds. These components are important in identifying geologic formations and give clues about the origins of the formational layers.

- **Temperature and Fluid Resistivity**: This log measures the temperature and resistivity of the fluid filling the borehole. These logs are used to measure the characteristics of the formation fluid under static and dynamic flow conditions and give clues about the movement of the fluids within the borehole.

- **Flowmeter Survey**: The fluid velocity log measures the rate of fluid movement in the borehole and detects the entry of water into the borehole as the well is pumped.

- **Digital Borehole Televiewer**: This log produces a 360 degree borehole ultrasonic image output from measurement of the acoustic properties around the borehole wall. This log is similar to the BHCS log, but has a much higher frequency of measurement with more complete coverage of the circumference of the borehole. Due to the high resolution of this tool, it can be used to identify bedding and fractures. The left hand track identifies the amplitude of the received signal and the right hand track identifies borehole diameter.

GEOPHYSICAL LOGGING PROGRAM FOR IW-1

The geophysical logs run for each stage of drilling in IW-1 are listed below. Logging was performed to assess formation competency, estimate composition, porosity and permeability, identify water quality changes, and locate zones of flow and fractures within the borehole. Detailed descriptions of the logs are presented below by borehole stages.

Reamed Hole Logs Run from 0 to 190 feet bpl and from 0 to 855 feet bpl: The following logs were run in the reamed hole prior to setting the 48-inch diameter conductor casing and the 36-inch diameter surface casing:

- Caliper
- Gamma Ray

The conductor casing and surface casing reamed hole logs were used to identify the depth of the base of the surficial aquifer and the bottom of the Hawthorn formation, to identify competent formations at which to set the casings, and to determine borehole volumes for cementing operations. The caliper log was run to identify and evaluate the physical nature of the formation materials and determine borehole volumes. The gamma ray log was used to aid in identification of the clays associated with the Hawthorn Group by a measurement of natural gamma radiation. The base of the surficial aquifer can typically be identified by the accumulation of sediments (clays) that emit higher gamma radiation indicating a formation change whereas the base of the Hawthorn formation is seen as a transition back to the clean, low gamma ray emitting limestones. A gamma ray log is run as a part of every logging suite, because it provides correlation due to the characteristics of the gamma ray emissions, which are related to the physical properties of a specific formation.

Pilot Hole Logs Run from 848 feet to 1,964 feet bpl: The following logs were run in the 12.25-inch diameter pilot hole prior to selection of the 28-inch diameter intermediate casing setting depth:

- Caliper
- Dual Induction/SP
- Gamma Ray
- Borehole Compensated Sonic (BHCS) with Variable Density Log (VDL)
- Digital Borehole Televiewer
- Temperature and Fluid Resistivity (Dynamic and Static)
- Flowmeter Survey (Dynamic and Static)

These geophysical logs were used to identify the changes in water quality, the producing zones, the confining intervals, and to select a monitor zone. The logs were also performed to assess mechanical formation properties prior to selecting a secure casing seat. From the results of these logs, packer test intervals were selected. Packer testing results yielded measurements of the permeability or hydraulic conductivity of the formations and water quality data from distinct intervals. The base of the USDW was identified in this interval using the logs and the results of packer testing. The confining intervals below the base of the USDW were also identified using the logs, packer test results, and core analyses.

The caliper log was performed to assist in identifying fractures, solution features and borehole wall collapse which are all associated with producing intervals in the carbonate formations found in this interval (Suwannee Limestone, Ocala Limestone and Avon Park Formation). The Dual-Induction log was particularly useful in identifying the high water quality gradient that is associated with the base of the USDW in southern Florida. This log, used together with the formation porosity calculated from the sonic log, provided an estimate of the formation water resistivity to identify the base of the USDW. A plot of estimated total dissolved solids (TDS) is presented in **Figure 3-1.** The gamma ray log was used with the Dual-Induction/SP log data to identify formation boundaries and lithology changes within the formations.

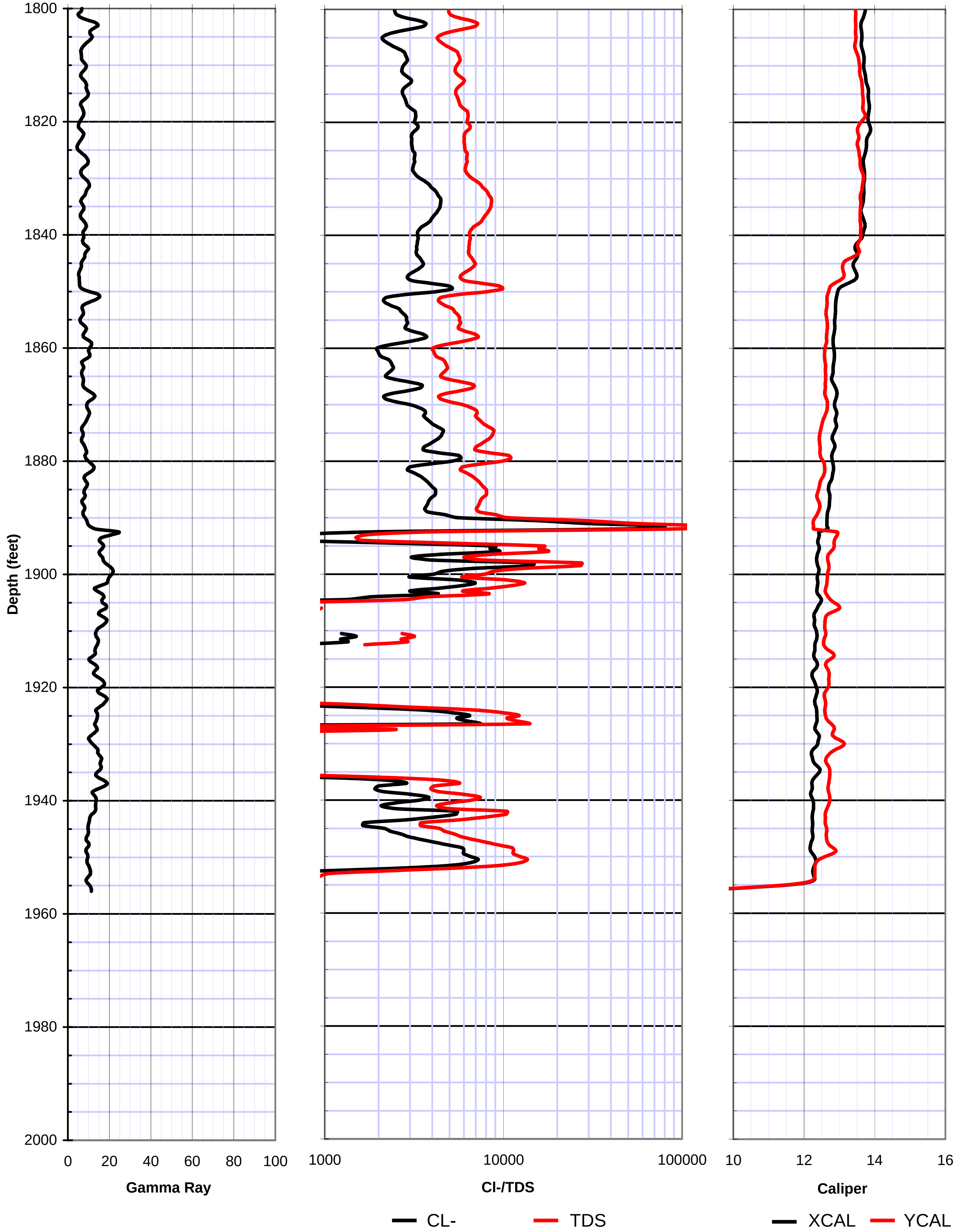
The dynamic temperature, fluid resistivity, and flowmeter logs were used to directly detect the producing intervals by measuring the water flow, the temperature changes, and the water quality changes generated by water production. The digital borehole televiewer log was used with the sonic and Dual-Induction logs to identify fracture planes, producing zones, and confining intervals. The producing zones were evaluated in terms of water production potential and water quality for the selection of monitor zones. A packer test was performed in intervals considered as a potential monitor zone.

<u>Pilot Hole Logs Run from 1,900 feet to 3,500 feet bpl</u>: The following logs were run in the 12.25-inch diameter pilot hole prior to selection of the 18-inch diameter final casing setting depth:

- Caliper
- Dual Induction/SP
- Gamma Ray
- BHCS with VDL
- Digital Borehole Televiewer
- Temperature and Fluid Resistivity (Dynamic and Static)
- Flowmeter Survey(Dynamic and Static)

These geophysical logs were run to identify the formation boundaries, producing zones, confining intervals, to assess the formation for the mechanical properties necessary to select an appropriate casing-setting depth, and well to provide a general indication of the physical aspects of the injection zone. These logs were used to determine the depth for the final casing based on the evaluation of confinement and the mechanical properties of the formation. The gamma ray log was used along with the Dual-Induction log data to identify formation boundaries and lithologic changes within the formations. The digital borehole televiewer log was used with the sonic and Dual-Induction logs to identify the producing zones, confining intervals, and fractures. The dynamic temperature, fluid resistivity, and flowmeter logs were used to directly detect the producing intervals by measuring the water flow, the temperature changes, and the water quality changes caused by water production. Results of the testing and the geophysical logging program are discussed later in this report.

Lake Region (Belle Glade) - Deep Injection Well
Log Derived Water Quality - TDS



Imperically derived (R-H, m=2.0, a=1.0) Non-Corrected RILD

Figure 3-1

GEOPHYSICAL LOGGING PROGRAM FOR DZMW-1

The objectives of the geophysical logging program for DZMW-1 were to verify information gathered from the injection well and to obtain an indication of various physical formation properties. These objectives are described in more detail for the various phases of pilot hole drilling below.

Reamed Hole Logs Run from 0 feet to 192 feet bpl: The following logs were run in the 38 ½-inch diameter borehole prior to setting the 30-inch diameter conductor casing:

- Caliper
- Gamma Ray

As stated above, caliper and gamma ray logs were run to provide information on the physical condition of the formations, determine borehole volumes, and verify previously identified source markers observed in the IW-1 logs.

Pilot Hole Logs Run from 192 feet to 900 feet bpl: The following logs were run in the 12.25-inch diameter pilot hole to confirm geologic information identified in IW-1 and determine an appropriate surface casing setting depth:

- Caliper
- Dual Induction/SP
- Gamma Ray

These logs were used to confirm the depth of the formation change that marks the base of the Hawthorn Group and the top of the Suwannee Limestone determined during drilling of the injection well. Once confirmation was obtained, reaming operations could begin for the previously selected surface casing setting depth.

Pilot Hole Logs Run from 850 feet to 1,940 feet bpl: The following logs were run in the 12.25-inch diameter borehole to verify the intermediate casing setting depth marking the top of the upper monitor interval:

- Caliper
- Dual Induction/SP
- Gamma Ray
- BHCS with VDL
- Digital Borehole Televiewer
- Temperature and Fluid Resistivity (Dynamic and Static)
- Flowmeter Survey (Dynamic and Static)

These logs were run to compare and contrast logs performed in IW-1, and confirm the selected casing setting depth for the 12 ¾-inch intermediate casing. This enabled conclusions to be drawn regarding the appropriateness of the selected monitor zones.

Pilot Hole Logs Run from 1,937 feet to 2,100 feet bpl: The following logs were run in the 12.25-inch diameter borehole to the top of the shallow monitoring interval and verify the appropriateness of the selected monitoring intervals:

- Caliper
- Dual Induction/SP
- Gamma Ray
- BHCS with VDL
- Digital Borehole Televiewer
- Temperature and Fluid Resistivity (Dynamic and Static)
- Flowmeter Survey (Dynamic and Static)

These logs were run to compare and contrast logs performed in IW-1, and confirm the selected casing setting depth for the 6 5/8-inch monitoring casing.

Section 4
Formation Testing Program

This section of the report describes the formation testing that was conducted in IW-1 and DZMW-1. Descriptions of test methods for the collection of cores, the performance of packer tests, drill stem water samples, injection test, and collection of background water samples for IW-1 and DZMW-1 are provided below.

CORING

Conventional cores were collected in accordance with Specific Condition 2(i) of the Construction Permit, below 1,600 feet bpl. The purpose of coring was to evaluate the porosity, permeability, and mechanical properties of the formation materials. This information was used to support the existence of confinement between the base of the USDW and the injection zone as well as confinement between the upper and lower monitor zones. Cores were collected using a 4-inch diameter, 20-foot long core barrel. After advancing the core barrel to the desired depth, the core barrel was removed and laid on the pad at land surface. The cutting head was removed and the core sample was allowed to slide out of the inner barrel. Samples were labeled and boxed. Several of the larger pieces were submitted to a geotechnical laboratory for analysis of porosity, permeability, specific gravity, and hydraulic conductivity, to aid in confining interval evaluation.

PACKER TESTS

Packer testing was performed in IW-1 as required by Construction Permit Specific Condition 2(h). Packer testing consisted of a single packer or combination of two straddle packers separated by a perforated section installed in the open hole section of the pilot hole on drill pipe to isolate a specific interval of the open pilot hole for pump testing. Packers were set and inflated to seal off the selected intervals for testing. The isolated intervals were pumped until fully developed and the formation fluid flowed freely into the borehole. This procedure purged the drilling fluids from the single or straddle packer interval. Following development, the wellhead was shut in, and the water level in the zone was allowed to recover to static level. Subsequently, a four-hour constant rate pumping test and three-hour recovery period were performed on each interval. Drawdown and recovery readings were measured using a pressure transducer and automatic data recording equipment. Water samples for laboratory analysis of chloride, conductivity, TDS, ammonia, TKN, and sulfates were collected from each interval prior to the completion of the four-hour pumping test. Field measurements of chloride and conductivity were also conducted.

Packer tests were performed at selected intervals in the IW-1 pilot hole between 1,600 feet and 2,800 feet bpl. Transducers were placed in the packer interval and the annular space to monitor water level changes in response to pumping. The transducer placed in the packer interval was used to determine the aquifer parameters and the transducer placed in the annular space was used to monitor the effectiveness of the packer seal.

From the packer tests, certain aquifer parameters such as hydraulic conductivity, transmissivity, and specific capacity were derived. Water quality samples were collected to provide data on the formation water quality in isolated zones within the aquifer. Drawdown and recovery measurements were collected and plotted on graphs. The hydraulic conductivities and specific capacities were estimated from the Theis Recovery Method approximation for each of the tests.

The water quality data from the packer tests was used to determine the location of the base of the USDW. The hydraulic data was used to assist in determining the relative confining and productive nature of the formations for confinement justification, location of fracturing, and also to determine if the monitor zones had adequate flow for a monitoring interval.

DRILL STEM WATER SAMPLES

Drill stem water samples were collected every 90 feet as the pilot hole was advanced below a depth of 855 feet and every 60 feet below a depth of 1,900 feet bpl. The samples were collected from the flowing wellhead (during pipe connections) and analyzed in an effort to identify water quality changes as depth increased during drilling. Each drill stem sample was analyzed for the parameters listed in **Table 4-1**.

Table 4-1
Drill-Stem Water Quality Parameters

Chloride	Conductivity
Total Kjeldahl Nitrogen	Ammonia

INJECTION TEST

The injection test plan required by FDEP in accordance with Specific Condition 4(i) of the Construction Permit was presented in a letter dated January 25, 2008. The injection test was conducted for a period of 12 hours, and preceded by a 24-hour static background period and followed by 24 hours of static recovery. The main objective of the injection test was to determine if the injection zone could accept the quantity of fluids for which it was designed. A secondary objective was to test the raw water pipeline and newly installed equipment. Since the water treatment plant was not completed at the time of testing, the raw water bypassed the treatment plant utilizing the tune up valve. Monitoring was conducted to confirm that injection would occur at an acceptable operating pressure and that there would be no adverse effects on overlying aquifers due to injection. Twelve hours was considered an adequate length of time to demonstrate if the well could accept the fluids and determine if there was any response to injection in the overlying aquifers.

Water levels and wellhead pressures were monitored in IW-1 and DZMW-1 during the background, injection, and recovery phases of the injection test. Monitoring was performed with a pressure transducer to record changes in IW-1 during all phases of the test. During the injection test, water from the Lake Region Production wells was routed through the cartridge filters, past the WTP membrane trains, and through the tune up valve to the injection well. Raw Floridan Aquifer water was supplied from the seven production wells at a rate of approximately 4,250 gpm for the duration of the 12-hour injection test. This flow represents the maximum 12 foot per second injection rate allowable.

WATER SAMPLING

Prior to the injection test, at the completion of the injection well construction, IW-1 was pumped a minimum of three well volumes until temperature, conductivity, and chloride concentrations were stable. A water quality sample then was collected from the injection zone using a thief bailer. The sample was analyzed for primary and secondary drinking water parameters and other constituents listed in Chapters 62-550 and 62-520, FAC. This analysis provided the existing background water quality for IW-1. The results of this water quality sample are contained in **Appendix E**.

Section 5
Formation Testing Results

This section of the report describes the results of the comprehensive formation testing program conducted at the WTP site. These results determine the criteria required to demonstrate that the injection well installed at the site qualifies to receive an operating permit. The testing program was consistent with both the Federal and State regulations governing Underground Injection Control (UIC) and the testing program approved in Specific Condition 2 of the Construction Permit.

GEOLOGIC BACKGROUND

The State of Florida lies on the Florida Platform on the southeastern edge of the North American continent. The platform extends 400 miles north to south and nearly 400 miles east to west (at its widest point). More than half of the platform is presently under water, leaving a narrow peninsula of land extending from the mainland. A thick sequence of primarily carbonate rocks, nearly five thousand feet thick (in southern Florida) and ranging in age from mid-Mesozoic to Recent, forms the Florida Platform (Scott, 1992). The stratigraphy and aquifer systems under discussion in this report range in age from Early Eocene to Late Pleistocene.

GEOLOGY AND HYDROGEOLOGY IN IW-1 AND DZMW-1

During the construction of IW-1 and DZMW-1 the geology and hydrogeology of the subsurface at the Lake Region Water Treatment Plant was achieved by:

- Collection and analysis of lithologic cuttings
- Continuous monitoring of drilling conditions
- Performance of geophysical logs according to the program described in Section 3 (Geophysical logging summaries and all geophysical logs are contained on CD's in **Appendix F** of this report)
- Collection of cores in the Avon Park and Oldsmar Formations in order to demonstrate confinement and the hydrologic characteristics of the monitoring zones
- Performance of straddle packer and pumping tests in the sections of pilot hole between 1,630 feet and 2,938 feet bpl, including water sampling in open portions of the borehole, at discrete intervals to the bottom of the well.

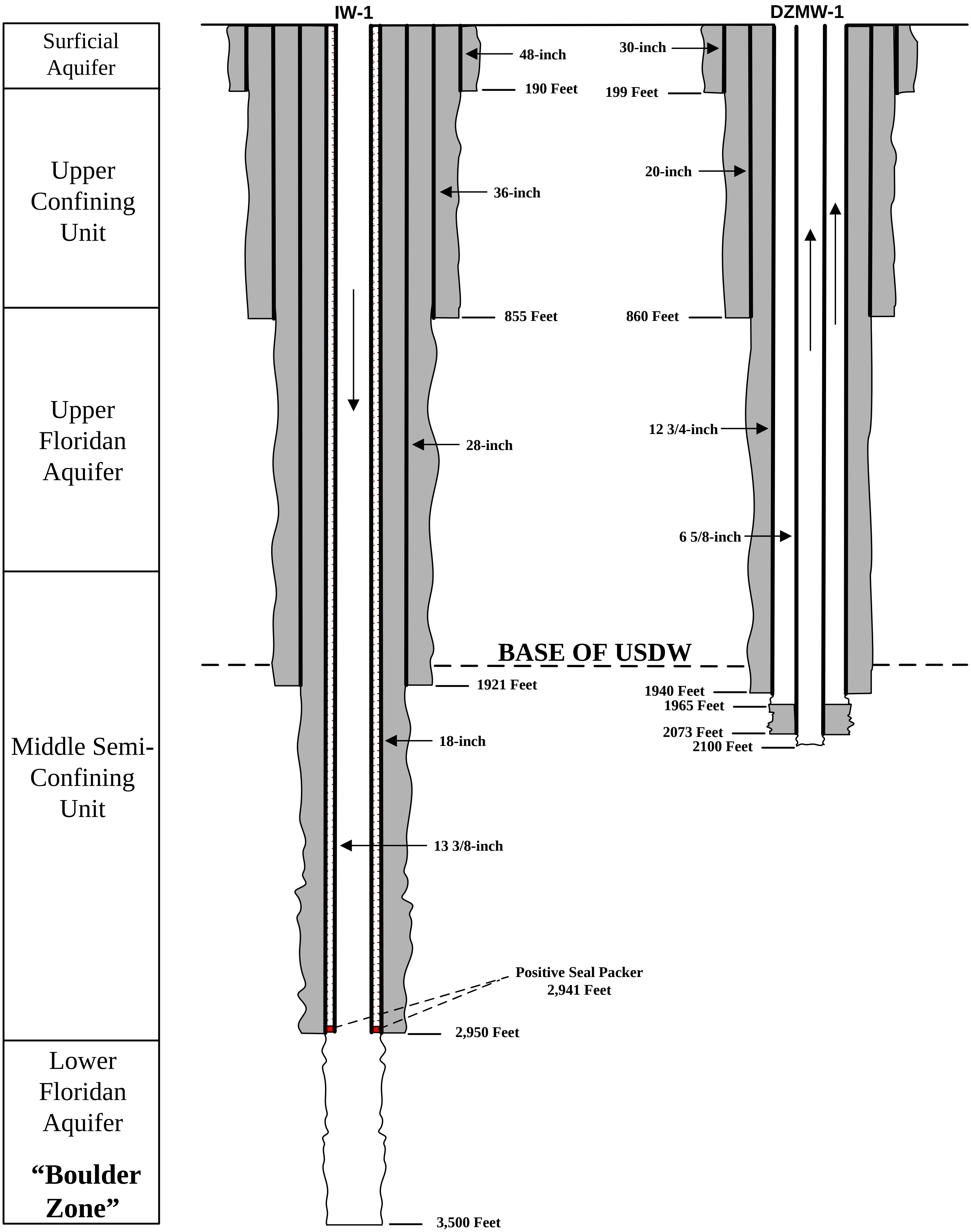
The following section presents a description of the geologic and hydrogeologic conditions in the vicinity of IW-1 and DZMW-1, followed by the results of the testing program and the satisfactory demonstration of regulatory-required criteria for operation of the well. The testing program was designed to obtain the majority of the information required to meet the regulatory requirements for construction and operation of IW-1. This information included data to select the monitoring interval depths for DZMW-1, prior to drilling of the monitoring well. **Figure 5-1** illustrates the configurations of IW-1 and DZMW-1 relative to a generalized site hydrogeology identified. Detailed lithologic logs for IW-1 and DZMW-1 are presented in **Appendix G**.

Injection Well IW-1 and Monitor Well DZMW-1 Geology

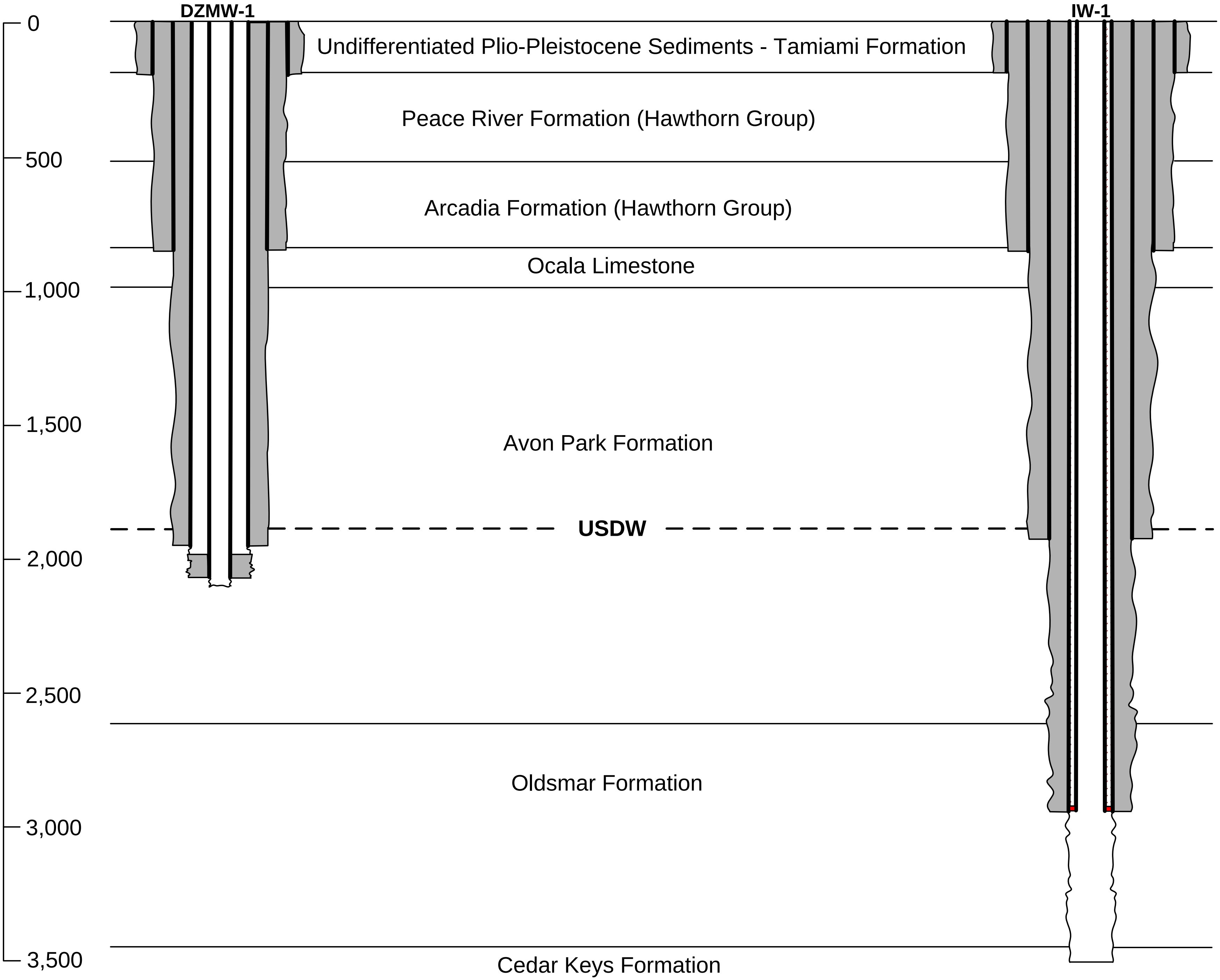
During drilling and testing of IW-1 and DZMW-1, undifferentiated Plio-Pleistocene-aged limestone, sand, clay, and variable amounts of whole and broken pelecypod and gastropod material were observed from land surface to a depth of approximately 180 feet bpl. These sediments unconformably overlie the Miocene-aged Hawthorn Group. At the location of wells IW-1 and DZMW-1, the Hawthorn Group extends from approximately 180 feet to approximately 848 feet bpl, for a total thickness of approximately 670 feet. The Hawthorn Group is generally segregated into two formations including an upper unit called the Peace River Formation and a lower unit called the Arcadia Formation. The Peace River Formation, found at this well between 180 feet and 515 feet bpl, consists of a light gray to greenish gray clay. The clay is plastic and interbedded with minor amounts of shell fragments. The clay contains some very fine quartz sand nodules, silt, and a minor percentage of shell fragments, with no cement. The Arcadia Formation occurs here between 515 feet and 848 feet bpl and is composed of interbedded argillaceous limestone and clay. Limestones of the Arcadia Formation are generally light gray to very pale orange, poor to moderately indurated wackestones to packstones, silty to fine grained, moderately rounded, and hard. The clays of the Arcadia Formation are yellowish gray in color and are generally unconsolidated. In contrast to the Peace River Formation, the Arcadia Formation contains as much as 50 percent limestone. **Figure 5-2** shows a generalized cross-section and **Figure 5-3** shows the local hydrologic and lithologic features of the WTP site.

Lying below the Hawthorn Group is the Eocene-aged Ocala limestone, the top of which is located at 848 feet bpl. It is composed of moderately soft, highly fossiliferous, pelletal, white to very pale orange wackestones and packstones, with 15 percent to 40 percent intergranular porosity. Locally, the unit is composed of thin layers of very hard micrite of low porosity and permeability. Abundant foraminifera and echinoids are present in the Ocala limestone, which is approximately 140 feet thick at this location. The Oligocene age Suwannee Limestone, typically found between the Hawthorn Group and the Ocala Limestone, appears to be absent at this location.

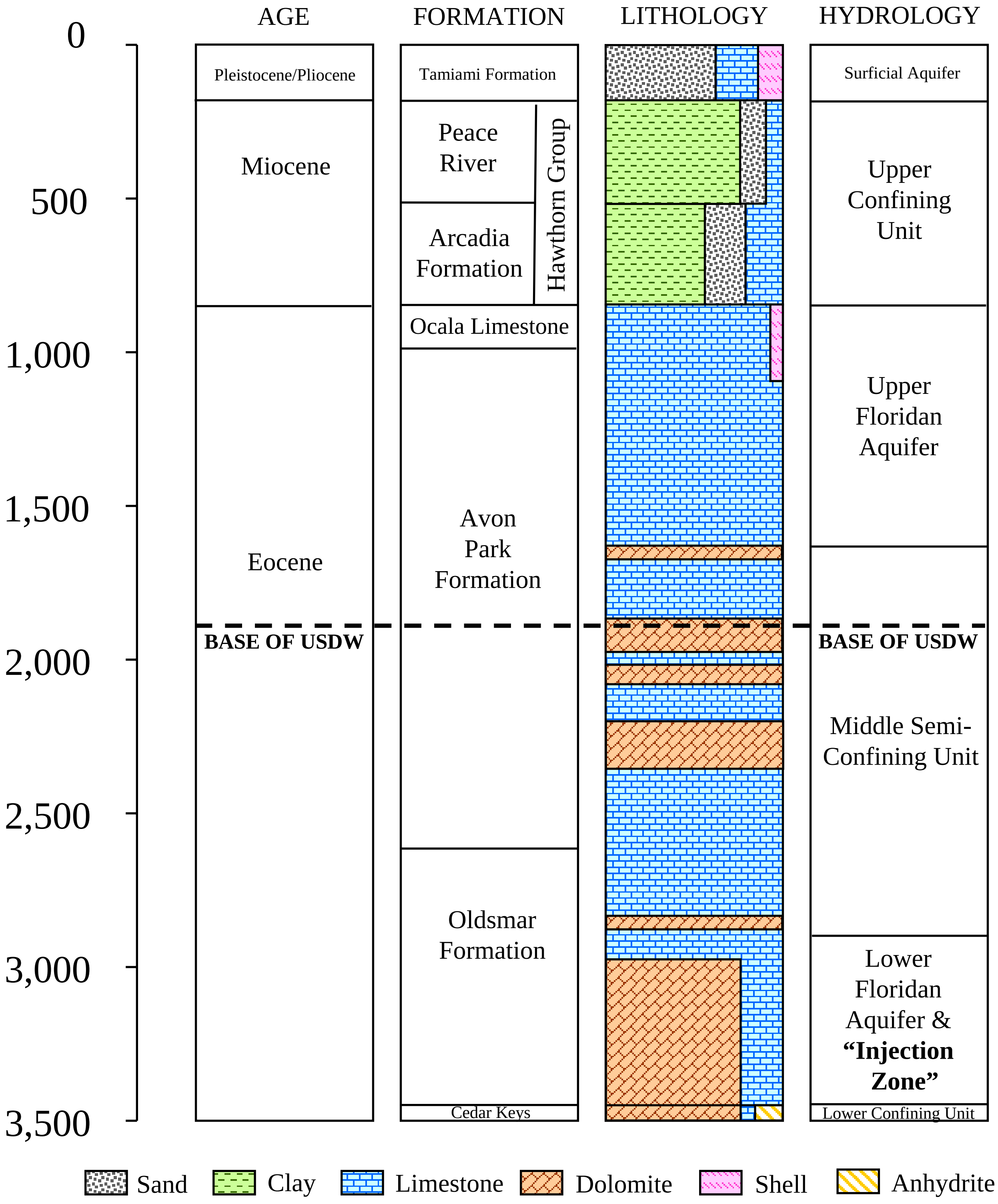
The stratum below the Ocala Limestone is the Avon Park Formation. This formation, located between 990 feet and 2,610 feet bpl, is comprised of Eocene-aged limestones and



LAKE REGION INJECTION WELL SYSTEM DIAGRAM
Figure 5-1



GEOLOGIC CROSS-SECTION OF THE LAKE REGION INJECTION WELL SITE
Figure 5-2



GENERALIZED HYDROLOGY AND LITHOLOGY IN THE VICINITY OF THE LAKE REGION WTP INJECTION WELL SITE

Figure 5-3

dolostones consisting of moderately soft, poorly to well-indurated pelletal wackestones and packstones. The unit is grayish orange to pale yellowish brown in color. Dolostone is found in the section as interbedded layers increasing in frequency and thickness with depth. Intergranular porosity is common in the pelletal zones of the section, and some of the samples appear to have been recrystallized. Locally, the unit is composed of thin layers of hard micrite (few inches to few feet) of low porosity and permeability. Abundant foraminifera can be found in the unit but generally concentrated in zones; minor amounts of lignite and pelecypoda debris are also present. Diagenetic features include the formation of dolostone as well as enhanced and reduced porosity through dissolution and cementation. At the location of these wells, the Avon Park Formation is approximately 1,600 feet thick. Monitor Well DZMW-1 was completed in the Avon Park Formation to depths of 1,940 feet, and 2,073 feet bpl.

The Oldsmar Formation is present in IW-1 from 2,610 feet to a depth of 3,450 feet bpl. The formation is comprised of wackestones and packstones similar to those described for the Avon Park Formation (above). This section of the well however, contains up to 75 percent dolostone, appearing as alternating layers with the limestone. Foraminifera and mollusca are found in the limestone portions of the section. In the dolostones of the lower sections of the formation replaced, recrystallized, and moldic porosity from foraminifera and pelecypods are found. Similar diagenetic processes as described above (Avon Park) are responsible for the current state of the Oldsmar Formation. From 2,975 feet to 3,450 feet bpl, the formation has undergone extensive fracturing and dissolution. This cavernous interval is known as the “Boulder Zone”. Diagenesis has obscured, through recrystallization, much of the depositional fabric of the section and the formation of dolostone.

Below the Oldsmar Formation lies the Cedar Keys Formation, the top of which was found at 3,450 feet bpl. The formation is comprised of dolomites with fractures and solution features, all filled with anhydrites. The porosity is zero and marks the lower confining unit.

Injection Well IW-1 and Monitor Well DZMW-1 Hydrogeology

The hydrogeologic units encountered during the construction of IW-1 include the Surficial Aquifer, the Hawthorn Group Upper Confining Unit, the Upper Floridan Aquifer, the Middle Floridan Confining Unit, the Lower Floridan Aquifer, and the Lower Confining Unit. These units are discussed separately in the following paragraphs.

Surficial Aquifer. The Surficial Aquifer in western Palm Beach County is present at the Lake Region Water Treatment Plant site to a depth of 190 feet bpl. This aquifer is found in undifferentiated Plio-Pleistocene deposits. No upper confining unit exists for this aquifer, and it is exposed at land surface in the Lake Region area. The Surficial

Aquifer is composed of unconsolidated sand and shell fragments overlying a well-consolidated, moderately porous and permeable, limestone material. Porosity in this aquifer is primary intergranular.

Hawthorn Confining Unit. From 190 feet to 848 feet bpl, the section includes clay, sand, silt, and low porosity limestones, which are collectively designated as the Hawthorn Group or Hawthorn Confining Unit. This aquitard comprises the upper confining unit, which overlies the Floridan aquifer. While minor amounts of water can be found in the sands and lower limestones of the Hawthorn Group in Palm Beach County, insufficient volumes of water perclude these intervals from being used for production. This is unlike the equivalent formation on the west coast of Florida, for example in Lee County, where parts of the Hawthorn Formation are major water producing aquifers.

FLORIDAN AQUIFER

Upper Floridan Aquifer. Between 848 feet and 1,625 feet bpl, the section includes sediments of the Ocala Limestone, and approximately half of the Avon Park Formation. This is known as the Upper Floridan Aquifer. Porosity in the Upper Floridan Aquifer is a mixture of primary intergranular, moldic, and fabric selective, and nonfabric selective dissolution, resulting in the formation of vugs, and enlargement of bedding planes. The transmissivity of the Upper Floridan Aquifer in western of Palm Beach County is typically reported as high as 500,000 gpd/ft.

Middle Confining Unit. The Upper Floridan Aquifer is separated from the Lower Floridan Aquifer by the middle confining unit. In western Palm Beach County, the middle confining unit is comprised of low to moderate porosity/permeability, well-cemented, micritic limestones from the middle of the Avon Park Formation, and upper Oldsmar Formation. These limestones are inter-layered with limestones of higher relative porosity and permeability and dolomitic lenses. This confining unit is found in the interval from 1,625 feet to approximately 2,975 feet bpl. The base of the USDW (10,000 mg/L TDS interface) at the Lake Region site lies within the middle confining unit.

Lower Floridan Aquifer. The Lower Floridan Aquifer at the Lake Region site is located below the middle confining unit, from a depth of approximately 2,975 feet to 3,450 feet bpl. Drilling at the site continued below the base of the Lower Floridan Aquifer, which is generally recognized by the first appearance of anhydrites characteristic of the Cedar Keys Formation. The formations that contain this aquifer include the lower Avon Park and the Oldsmar Formations. Porosity in the Lower Floridan Aquifer is a mixture of primary intragranular, and fabric selective, and nonfabric selective dissolution, resulting in vug and cavern formation, as well as enlargement of bedding planes, and other primary porosity types. The "Boulder Zone" is included in this aquifer and was identified at the site as occurring at a depth of approximately 2,975 feet bpl. The "Boulder Zone" was the targeted injection zone and is generally accepted as the identifiable base of the Oldsmar Formation.

Confinement in the Vicinity of IW-1 and DZMW-1

Confining units were evaluated based on data from lithologic samples, the analysis and description of core samples, geophysical log interpretations, straddle packer tests, and water samples collected during drilling as required in Specific Condition 2(m) of the County's FDEP Construction Permit. The Middle Confining Unit that separates the Upper and Lower Floridan Aquifer, and the Upper Confining Unit that marks the bottom of the Biscayne Aquifer and the Top of the Floridan Aquifer meets the criteria of Chapter 62-528, FAC with respect to designation of a confining unit. The lower confining unit, below all underground sources of drinking water and below the injection zone, also meets these criteria.

Hawthorn Confining Unit. From 190 feet to 848 feet bpl, the section includes clay, sand, silt, and low porosity limestones, which is designated as the Hawthorn Group or Hawthorn Confining Unit.

> **<u>Confining Interval 190 feet – 848 feet bpl</u>:** This interval contains the Hawthorn Group, and although it is a confining unit, small sand layers in the lower third of the section, and limestones below 800 feet bpl produce small amounts of water.

Middle Confining Unit. The Upper Floridan Aquifer is separated from the Lower Floridan Aquifer by the middle confining unit. At the Lake Region injection well site, the middle confining unit is comprised of three distinct intervals (Miller, 1986) of low porosity and permeability, well cemented, micritic limestones and some hard dolostones from the middle to the base of the Avon Park Formation, and the top of the Oldsmar Formation. The limestones are inter-layered with limestones of higher relative porosity and permeability. The recrystallization of the limestone has reduced primary porosity by the growth of pore-filling calcite. The diagenetic activity of water has also produced secondary porosity by dissolution of limestone. As a result, below the USDW, the effective confining beds are numerous and are separated by very narrow producing zones. There is some development of solution features in this interval, but it appears to be associated only with bedding planes. There is no evidence of fracturing in this interval. The producing zones are discussed below, and the confining natures of the formations are discussed here. This three interval confining unit is found from 1,625 feet to approximately 2,975 feet bpl.

Examination of the drill cuttings also indicated that porosity was low to moderate throughout the intervals between 1,625 feet to 2,975 feet bpl. Porosity is secondary or intergranular and has been reduced due to the cementation and recrystallization of the formations. In some intervals, carbonate silt (marl) and secondarily cemented fine carbonate sand are present.

The below listed intervals of significant confinement were identified between 1,625 feet and 2,975 feet bpl (top of the injection zone) based on the information collected during the drilling and testing program. These intervals are also included on **Figure 5-4.**

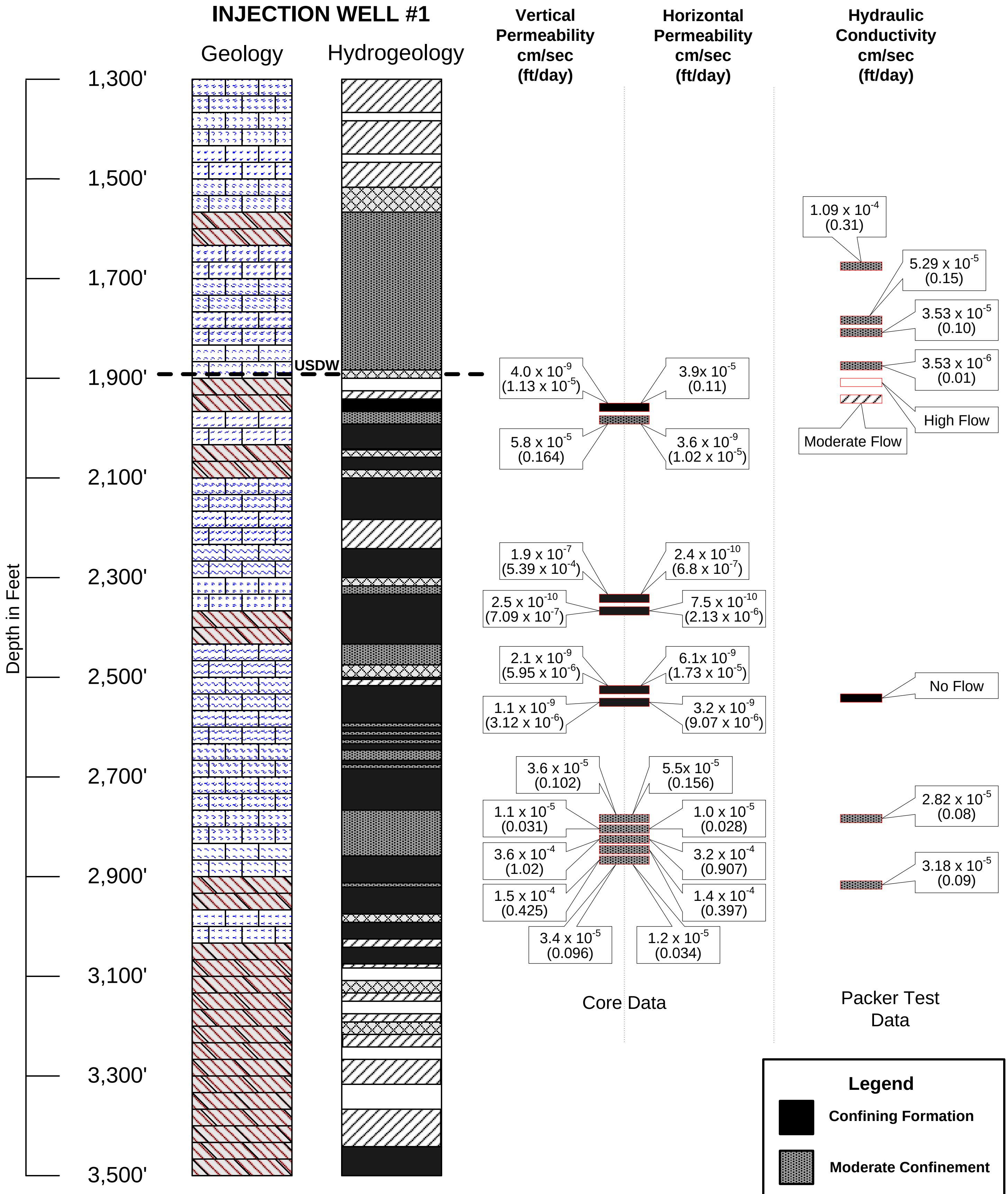
> **Confining Interval 1,625 feet - 1,894 feet bpl:** The confining unit shown on Figure 5-4 was identified from the following information and represents Miller (1986) Confining Unit I: This confining interval is located above the USDW.

Lithologic Samples: This interval is predominately limestone with intermittent stringers of dolomite and minor amounts of clay and chert. The limestone is very pale orange to pale yellowish brown. Recrystallized wackestone/packstone, poorly cemented, poorly indurated, calcareous sand and forams. Porosity is reduced intergranular. Unit is locally hard, but poorly cemented. The dolomite is dark yellowish brown, microcrystalline, and very hard.

Dual-Induction: The Dual-Induction log of the pilot hole indicates the relative homogeneity of the formation and indirectly the formation porosity and the water quality. The interval between 1,625 feet and 1,894 feet bpl shows constant readings on the Dual-Induction log, representing uniform conditions in the borehole through the interval. Short intervals of increased resistivity correspond with the dolomite stringers indicating lower porosity and increased density.

BHTV: The borehole televiewer log shows dense, hard, or massive borehole walls with the appearance of a bright yellow color in the left-hand track. This indicates a higher amplitude signal being returned to the tool. This type of signal is associated with non-porous materials. Extensive layers of non-porous materials are apparent throughout the entire interval. The right hand track can be viewed as an acoustic caliper with the brightest color being the smallest diameter. The decrease in amplitude between 1,680 feet and 1,800 feet bpl is due to the increase borehole diameter and attenuation of the signal over a greater distance.

BHCS & VDL: A borehole compensated sonic log of the pilot borehole was reviewed for indications of layering within the formation along with fractures and bedding planes. Bedding planes and cracks or fractures are usually open due to dissolution and can be horizontal conduits for fluid movement. The BHCS shows consistency in this interval of the pilot borehole. The travel time is relatively flat and the VDL is smooth and unbroken. Alternating fast and slow travel times as well as sharp movements of the VDL indicate that the formation is layered with alternating beds of limestone and dolomite.



Legend

- ■ **Confining Formation**
- ▩ **Moderate Confinement**
- ▦ **Poor Production**
- ▨ **Moderate Production**
- □ **High Production**

LAKE REGION INJECTION WELL SYSTEM
CONFINEMENT AT INJECTION WELL SITE
Figure 5-4

Flowmeter Log: No fluid was seen entering the borehole in the 1,625-foot to 1,894-foot interval.

Temperature Log: The temperature log gives an indication of fluid entry points into the borehole. Increases in temperature result from frictional forces between the formation and moving fluid. No temperature fluctuations were observed in this interval.

Packer Tests: Four packer tests were performed between 1,625 feet and 1,894 feet bpl. The transmissivities calculated from these four packer tests are very low (1.5 to 46.7 gallons per day per foot [gpd/ft]). The packer test results are summarized below in **Table 5-3**.

Video: Intervals were identified based on the appearance of smooth gauge hole, lack of apparent porosity (vugs or fractures), the presence of silt or silt nodules, and the presence of possible exposure surfaces indicating secondary cementation. The video survey results provided visual confirmation of confinement between 1,625 feet and 1,894 feet bpl. Written observations made during the video survey are presented in **Appendix H.**

> **Confining Interval 1,939 feet – 1,958 feet, 1,975 feet – 2,041 feet, and 2,050 feet - 2,075 feet bpl:** The confining units shown on Figure 5-4 were identified from the following information and represents the upper portion of Miller (1986) confining unit VI: This confining interval is directly below the USDW and separates the Upper Monitoring Interval from the Lower Monitoring Interval.

Lithologic Samples: Dolomite 98% with minor amounts of clay 2%, moderate yellowish brown packstone, thinly bedded, massive to very fine crystalline, very low porosity and permeability, moderately hard to hard.

Dual-Induction: The Dual-Induction log of the pilot hole indicates the relative homogeneity of the formation and indirectly the formation porosity and the water quality. The interval between 1,939 and 2,075 feet bpl shows some variability in the readings on the Dual-Induction log, representing non-uniform conditions between confinement and producing intervals.

BHTV: The borehole televiewer log shows dense, hard, or massive borehole walls with the appearance of a bright yellow color in the left-hand track. This indicates a higher amplitude signal being returned to the tool. This type of signal is associated with non-porous materials. Extensive layers of non-porous materials are apparent within this interval. The right hand acoustic caliper track shows an ecentered tool or oval shaped borehole accounting for the lower amplitude color changes of the left hand track.

BHCS & VDL: A borehole compensated sonic log of the pilot borehole was reviewed for indications of layering within the formation along with fractures and bedding planes. Bedding planes and cracks or fractures are usually open due to dissolution, and can be horizontal conduits for fluid migration. Further, the BHCS is a valuable tool in determining the layered nature of the formation. The BHCS shows consistency in this interval of the pilot borehole with the exception of the short producing intervals encountered. Alternating fast and slow travel times as well as sharp movements of the VDL indicate that the formation is layered and/or contains fractured sections or bedding planes.

Flowmeter Log: No fluid was seen entering the borehole in the 1,939 feet to 2,075 feet bpl interval.

Temperature Log: The temperature log gives an indication of fluid entry points into the wellbore. Decreases in temperature result from pressure drops due to fluid entering the wellbore. Fluid appears to be entering the well from approximately 2,042 feet bpl, a small producing interval.

Core: A core sample was successfully retrieved from 1,954 feet to 1,964 feet bpl. Core recovery percentage was good due to the consistent nature of the dolomite encountered. Descriptions and laboratory analysis verified that porosity and permeability for each of the samples was very low **(Table 5-2).** Core descriptions and laboratory data are contained in **Appendix I.**

Video: Intervals were identified based on the appearance of smooth gauge hole, lack of apparent porosity (vugs or fractures), the presence of silt or silt nodules, and the presence of possible exposure surfaces indicating secondary cementation.

> **Confining Interval 2,088 feet - 2,182 feet bpl.** The confining unit on Figure 5-4 was identified from the following information and represents the middle portion of Miller (1986) confining unit VI:

Lithologic Samples: Dolomite 100%, moderate yellowish brown to light gray, massive to recrystallized packstone to grainstone. Porosity is low, and permeability is low due to recrystallization and secondary pore filling cement. Interval is very hard.

Dual-Induction: The Dual-Induction log of the pilot hole indicates the relative homogeneity of the formation and indirectly the formation porosity and the water quality. The interval between 2,088 feet and 2,182 feet bpl shows constant readings on the Dual-Induction log, representing uniform conditions in the borehole through the interval.

BHTV: The borehole televiewer log shows dense, hard, or massive borehole walls with the appearance of a bright yellow color in the left-hand track. This indicates a higher amplitude signal being returned to the tool. This type of signal is associated with non-porous materials. Extensive layers of non-porous materials are apparent between 2,088 feet and 2,182 feet bpl. The right hand track can be viewed as an acoustic caliper with the brightest color being the smallest diameter. The decrease in amplitude between 2,100 feet and 2,182 feet bpl is due to the increase borehole diameter and attenuation of the signal over a greater distance.

BHCS & VDL: A borehole compensated sonic log of the pilot borehole was reviewed for indications of layering within the formation along with fractures and bedding planes. Bedding planes and cracks or fractures are usually open due to dissolution and can be horizontal conduits for fluid movement. The BHCS shows consistency in this interval of the pilot borehole. The travel time is relatively flat and the VDL is smooth and unbroken.

Flowmeter Log: No fluid was seen entering the borehole in the 2,255-foot to 2,471-foot interval.

Temperature Log: The temperature log gives an indication of fluid entry points into the wellbore. Increases in temperature result from frictional forces between the formation and moving fluid. No fluid entry points can be seen in this interval.

Video: Intervals were identified based on the appearance of smooth gauge hole, lack of apparent porosity (vugs or fractures), the presence of silt or silt nodules, and the presence of possible exposure surfaces indicating secondary cementation. The video survey results provided visual confirmation of confinement between 2,088 feet and 2,182 feet bpl.

Confining Interval 2,255 feet - 2,287 feet and 2,320 feet – 2,471 feet bpl. The confining units shown on Figure 5-4 were identified from the following information and represents the lower portion of Miller (1986) confining unit VI:

Lithologic Samples: Dolomite 100%, moderate yellowish orange to grayish orange, recrystallized packstone to wackestone. Porosity and permeability are low due to recrystallization and secondary pore filling cement. Contains corals and shell fragments. Hard. Cementation is dominantly dolomitic and porosity reducing. Areas of dolomitization are highly crystalline and non-porous.

Dual-Induction: The Dual-Induction log of the pilot hole indicates the relative homogeneity of the formation and indirectly the formation porosity and the water quality. The interval between 2,255 feet and 2,471 feet bpl shows consistent readings on the Dual-Induction log, representing uniform conditions in the borehole through the interval.

BHTV: The borehole televiewer log shows dense, hard, or massive borehole walls with the appearance of a bright yellow color in the left-hand track. This indicates a higher amplitude signal being returned to the tool. This type of signal is associated with non-porous materials. Extensive layers of non-porous materials are apparent between 2,255 feet and 2,287 feet bpl. The right hand track can be viewed as an acoustic caliper with the brightest color being the smallest diameter. The interval between 2,320 feet and 2,471 feet bpl shows some vugs and solution pitting although the lack of fluid flow would indicate that there is limited interconnectivity between the vugs. The darker color towards the bottom of the interval is due to the increase borehole diameter and attenuation of the signal over a greater distance.

BHCS & VDL: A borehole compensated sonic log of the pilot borehole was reviewed for indications of layering within the formation along with fractures and bedding planes. The BHCS shows consistency in the interval between 2,250 feet and 2,287 feet bpl and 2,360 feet and 2,471 feet bpl. The VDL for the interval between 2,320 feet and 2,360 feet bpl appears broken and hazy indicating fractures, although the core retrieved from this interval was in tact. The travel time is relatively flat and the VDL is smooth and unbroken.

Flowmeter Log: No fluid was seen entering the borehole in the 2,255-foot to 2,471-foot interval.

Temperature Log: The temperature log gives an indication of fluid entry points into the borehole. Increases in temperature result from frictional forces between the formation and moving fluid. No temperature fluctuations were observed in this interval.

Video: Intervals were identified based on the appearance of smooth gauge hole, lack of apparent porosity (vugs or fractures), the presence of silt or silt nodules, and the presence of possible exposure surfaces indicating secondary cementation. The video survey results provided visual confirmation of confinement between 2,255 feet and 2,471 feet bpl.

Core: A core sample was successfully retrieved from 2,350 feet to 2,360 feet bpl. Core recovery percentage was average (60%) due to the small fractures, vugs and harder materials across the cored intervals. Descriptions and laboratory analysis verified that porosity and permeability for each of the samples was very low.

Confining Interval 2,500 feet - 2,975 feet bpl. The confining unit on Figure 5-4 was identified from the following information:

Lithologic Samples: Dolomite 100%, moderate yellowish orange to medium dark gray, recrystallized packstone to wackestone. Porosity is low and permeability is low due to recrystallization and secondary pore filling cement. Well lithified, non-sucrosic unit. Mostly crystalline and massive.

Dual-Induction: The Dual-Induction log of the pilot hole indicates the relative homogeneity of the formation and indirectly the formation porosity and the water quality. The interval between 2,500 feet and 2,975 feet bpl shows relatively consistent readings on the Dual-Induction log, representing uniform conditions in the borehole through the interval.

BHTV: The borehole televiewer log shows dense, hard, or massive borehole walls with the appearance of a bright yellow color in the left-hand track. This indicates a higher amplitude signal being returned to the tool. This type of signal is associated with non-porous materials. Extensive layers of non-porous materials are apparent between 2,500 feet and 2,975 feet bpl. The right hand track can be viewed as an acoustic caliper with the brightest color being the smallest diameter. Throughout the interval small sections of vugs and fractures are visible, although isolated. The darker color between 2,750 feet and 2,810 feet bpl is due to the increase borehole diameter and attenuation of the signal over a greater distance.

BHCS & VDL: A borehole compensated sonic log of the pilot borehole was reviewed for indications of layering within the formation along with fractures and bedding planes. The VDL of the sonic log shows very consistent returns indicating the homogeneity of the formation. The non-broken nature of the returns indicate the lack of fracturing. The consistency of the travel time supports this conclusion.

Flowmeter Log: No fluid was seen entering the borehole in the 2,500-foot to 2,975-foot interval.

Temperature Log: The temperature log gives an indication of fluid entry points into the borehole. Increases in temperature result from frictional forces between the formation and moving fluid. No temperature fluctuations were observed in this interval.

Video: Intervals were identified based on the appearance of smooth gauge hole, lack of apparent porosity (vugs or fractures), the presence of silt or silt nodules, and the presence of possible exposure surfaces indicating secondary cementation. The video survey results provided visual confirmation of confinement between 2,500 feet and 2,975 feet bpl.

Producing Intervals in the Vicinity of IW-1 and DZMW-1

From composite information collected at the site during drilling, and from the video TV surveys and geophysical logs, it was possible to determine the major producing intervals in the vicinity of IW-1 and DZMW-1. The porosity associated with some of these intervals is of the lithologic type and does not appear to be a result of fractures; other producing intervals are clearly a result of secondary porosity or fracturing. Using the testing program outlined in Section 4, an effort was made to separate the principal confining intervals, described above, from the principal producing intervals. Furthermore, this part of the report further separates the producing intervals into those resulting from primary porosity and those that appear to result from fracturing. The principal geophysical logs used for this determination were the borehole televiewer, flowmeter, and fluid resistivity and temperature logs, in addition to the Dual-Induction and Borehole Compensated Sonic Logs.

Biscayne Aquifer

The Biscayne Aquifer in western Palm Beach County is present at the Lake Region Injection well site to a depth of 190 feet bpl.

- **0 feet to 190 feet bpl**: A producing interval is present from 0 feet to 190 feet bpl. This interval is the Biscayne aquifer. The unit comprises highly porous layers of limestone and shell. It contains high, primary intergranular porosity. Diagenesis, including dissolution and cementation appear to have produced the porosity in this interval.

Floridan Aquifer

Between 848 feet and 3,450 feet bpl, the section includes sediments of the Ocala Limestone, Avon Park Formation, and Oldsmar Formation. These units comprise the Floridan Aquifer, including the Upper Floridan Aquifer, Middle Confining Unit, and Lower Floridan Aquifer.

- **848 feet to 1,625 feet bpl (Ocala Limestone and Upper Avon Park Formation):** The Ocala Limestone consists of moderately soft, highly fossiliferous, pelletal, white to very pale orange wackestones and packstones, with 15 percent to 40 percent intergranular porosity. Minor amounts of secondary porosity result from solution enhancement of fossil grains. The BHTV log shows a very fine-grained mixture of high amplitude and medium to low amplitude returns, reflecting the intergranular nature of the porosity. The Avon Park Formation is comprised of grayish orange to pale yellowish brown limestones and dolostones consisting of moderately soft, poorly to well-indurated pelletal wackestones and packstones. Dolostone is found in the section as interbedded layers increasing in frequency and thickness with depth. Diagenetic features include the formation of dolostone as well as enhanced porosity through dissolution and recrystallation. Bedding planes showing solution enhancement are also found in the interval. The BHTV log and the BHC Sonic log show numerous fractures and bedding planes.

- **1,894 feet to 2,100 feet bpl (Avon Park Formation):** This interval is predominantly Dolomite (98%) with minor amounts of clay (2%). The dolomite exists as alternating layers of low and high porosity and permeability material. The highly productive intervals result from the diagenetic formation of dolomite and solution enhancement along bedding planes and fractures. This interval is present as enlarged bedding plane fractures and solution features within the middle confining unit and was selected to contain the upper and lower monitor zones. The BHTV log and the BHC Sonic log show numerous fractures, bedding planes, and solution cavities. The Dual Induction log shows alternating highly resistive, low permeability, massive, dense dolomite with low resistive, highly permeable, fractured dolomite layers. The flowmeter log shows a large influx of water at 2,080 feet bpl.
- **2,182 feet bpl to 2,255 feet bpl (Avon Park Formation):** This interval consists of highly fractured, friable limestone underlain by highly recrystallized, fractured, friable dolostone. Porosity consists of a combination of intergranular and fracturing. Dissolution and recrystallization has enhanced the porosity. The caliper log shows the soft friable nature of the limestone above the harder dolomite as a large washed out area. The BHTV log and the BHC Sonic log show numerous fractures, bedding planes, and solution cavities.
- **2,975 feet to 3,450 feet bpl (Oldsmar Formation):** This interval is the “Boulder Zone”, the targeted principal injection target. Porosity is fractured and vuggy to cavernous, and formed from extensive dissolution and secondary dolomitization. No depositional fabric is visible in the unit. The caliper log shows that the borehole is essentially gauge (12-inch) with fractures, cavities, and vugs throughout.

TESTING RESULTS

This section of the report discusses the results of the formation testing program. It includes coring, packer test, water quality, and injection test information. The presented information is then summarized with reference to the regulatory criteria.

Coring Results for Injection Well IW-1

The coring program in IW-1 was designed to collect detailed lithologic information in the interval from approximately 1,954 feet to 2,820 feet bpl. Coring depths in IW-1 were selected to augment drill cuttings and aid in the determination of confinement. Formation lithology based on the cores was described using Dunham’s Classification of Limestones and is presented in **Appendix I**. Included in the lithologic descriptions were color, matrix, cement, hardness, and fossil content. Six cores were collected from the IW-1 pilot hole at various depths as required by Specific Condition 2(i) of the Construction Permit. The percent recovery for each core collected is listed in **Table 5-1** below.

Table 5-1
Coring Summary for IW-1

Core Number	Depth Interval	% Recovery
1	1,954 – 1,964	90
2	2,350 – 2,360	60
3	2,522 – 2,532	100
4	2,786 – 2,796	100
5	2,799 – 2,809	40
6	2,810 – 2,820	100

Selected intervals from each core were sent to Ardaman and Associates, Inc. in Orlando for analysis of horizontal and vertical permeability (HP and VP), porosity (P), compressive strength (CS), specific gravity (SG), Young's Modulus (E), Archie's cementation coefficient and exponent (CC), and formation factor (FF) as required by the contract documents. The results of that analysis are listed in **Table 5-2** below and copies of the laboratory reports are contained in **Appendix I**. The core information assisted in determining the hydrologic character of the middle confining unit.

Descriptions and laboratory analysis verified that porosity and permeability for each of the samples was low to moderate.

Table 5-2
Summary of IW-1 Core Data Analysis

Core	Sample	Depth (feet)	VP (cm/sec)	HP (cm/sec)	P %	SG	CS (lb/in^2)	E (lb/in^2)	CC	FF
1	1	1,956.4	4.0x10^{-9}	3.9x10^{-5}	16	2.87	6,330	6.7x10^{5}	17.94	1.872
	2	1,958.5	5.8x10^{-5}	3.6x10^{-9}	9	2.87	10,190	8.3x10^{5}	161.70	2.654
2	1	2,354.0	1.9x10^{-7}	2.4x10^{-10}	11	2.89			289.30	2.240
	2	2,359.0	2.5x10^{-10}	7.5x10^{-10}	10	2.86			1041.00	2.568
3	1	2,522.0	2.1x10^{-9}	6.1x10^{-9}	19	2.78	8,240	5.3x10^{5}	38.17	1.741
	2	2,530.6	1.1x10^{-9}	3.2x10^{-9}	18	2.78	6,850	5.1x10^{5}	36.84	1.834
4	1	2,788.1	3.6x10^{-5}	5.5x10^{-5}	31	2.75	1,430	2.7x10^{5}	14.27	1.866
	2	2,793.0	1.1x10^{-5}	1.0x10^{-5}	30	2.77			12.21	1.872
5	1	2,807.2	3.6x10^{-4}	3.2x10^{-4}	25	2.74	2,130	3.9x10^{5}	68.74	1.967
6	1	2,812.0	1.5x10^{-4}	1.4x10^{-4}	31	2.76	1,940	3.3x10^{5}	23.24	2.344
	2	2,818.6	3.4x10^{-5}	1.2x10^{-5}	25	2.79			10.94	1.323

Packer Test Results for IW-1

Packer testing consisted of nine straddle packer tests, all performed in the pilot hole during the drilling of IW-1. The interval or span between the two packers (straddle interval) varied from 14 feet to 25 feet. Distances between packers were selected based upon the presence of mechanically competent formation materials as determined from a review of the borehole televiewer, Dual-Induction, borehole compensated sonic, and caliper log to identify sections of the borehole that would support the inflated packers.

Aquifer Characteristics. The results of these tests with respect to physical aquifer characteristics are summarized in **Table 5-3**. The aquifer characteristics obtained from packer testing aided in the evaluation of confining zones, potential monitoring zones, producing intervals, and the overall hydrogeologic characteristics of the formation materials tested. The aquifer parameters of interest were hydraulic conductivity or transmissivity and specific capacity. These parameters were determined from pumping tests of limited duration. Drawdown and recovery rates were measured and plotted and the hydraulic conductivities and specific capacities were estimated from the Theis Recovery Method approximation. Drawdown and recovery graphs with analytical hydrologic results are presented in **Appendix J**.

Table 5-3
Summary of Packer Tests Performed in IW-1

Interval	Test Number	Pumping Rate	Drawdown	Transmissivity*
1,630-1,650	5	26 gpm	165 feet	46.69 gpd/ft
1,776-1,796	4	15 gpm	161 feet	22.25 gpd/ft
1,791-1,811	3	8 gpm	186 feet	15.42 gpd/ft
1,851-1,871	2	1.25 gpm	176 feet	1.53 gpd/ft
1,901–1,915	1	175 gpm	NA	NA
1,939-1,964	6	46 gpm	NA	NA
2,525-2,546	9	0 gpm	NA	0 gpd/ft
2,780-2,801	8	5 gpm	122 feet	11.89 gpd/ft
2,917-2,938	7	5.5 gpm	114 feet	14.38 gpd/ft

** Transmissivity values calculated using the Theis Recovery Method in IW-1.*

Transmissivities calculated from the packer tests verify the presence of confinement between 1,775 feet and 1,875 feet bpl, and 2,525 feet and 2,938 feet bpl with low transmissivity values ranging from 1.53 to 22.25 gallons per day per foot [gpd/ft]).

Water Quality. Based on the laboratory-analyzed water quality analyses of the packer test water samples shown in **Table 5-4**, the USDW was tentatively identified between 1,875 feet and 1,900 feet bpl.

Confinement in the proximity of the USDW was indicated by the rapid degradation of water quality from 7,128 milligrams per liter (mg/l) TDS to 13,300 mg/l TDS over the 30-foot interval from 1,871 feet to 1,901 feet bpl. Similarly, the existence of confinement between the upper and lower monitoring intervals (separation of 108 feet) by a significant change in water quality between the background water quality samples. A diagram showing the location of core samples and packer tests that confirm the presence of confinement in the pilot hole is shown in **Figure 5-4.**

Table 5-4
Summary of IW-1 Packer Test Water Samples

Interval (feet)	**Specific Conductance** (umhos/cm)	**TDS** (mg/L)	**Chloride** (mg/L)	**Sulfate** (mg/L)	**Calcium** (mg/L)	**Magnesium** (mg/L)	**Potassium** (mg/L)	**Sodium** (mg/L)
1,630-1,650	7,970	5,220	2,340	500	178	1,218	145	67.5
1,776-1,796	8,970	5,644	2,640	630	200	1,372	157	80
1,791-1,811	10,200	6,188	2,920	838	192	1,460	172	81.9
1,851-1,871	12,020	7,128	3,600	358	225	1,880	164	100
1,901–1,915	21,700	13,300	7,900	36.1	279	3,100	320	200
1,939-1,964	24,900	15,008	8,250	798	490	3,970	220	179
2,525-2,546	No Flow – No Water Sample Collected							
2,780-2,801	53,600	36,.328	20,150	2,410	1,380	11,340	740	800
2,917-2,938	54,100	36,368	20,800	1,900	1,460	11,840	720	825

Water Quality Sampling Results From IW-1

Water samples were collected and analyzed at various times during the construction and testing of IW-1. Samples collected at the completion of each packer test were used to evaluate the hydrology of tested intervals as described above. During the pilot hole drilling in IW-1, drill stem water samples were collected at 90-foot intervals between 1,000 feet and 1,950 feet bpl and 60-foot intervals between 1,950 feet and 2,966 feet bpl as required by Construction Permit Specific Condition 2(o). These data were used to help identify water quality and aid in the location of confining intervals. **Table 5-5** summarizes the results from the collected drill stem water samples. Complete laboratory results are found in **Appendix E.**

Table 5-5
Summary of IW-1 Drill Stem Water Samples

Depth (feet)	**Specific Conductance** (umhos/cm)	**TDS** (mg/L)	**Cl^-** (mg/L)	**NH^3** (mg/L)	**TKN** (mg/L)
986	1321	643	200	0.82	4
1076	2020	1010	170	0.74	2.2
1166	2100	1030	320	0.79	2.8
1256	2900	1470	505	0.67	2
1346	3380	1680	520	0.57	2.3
1436	2980	1500	555	0.62	0.94
1520	2790	1400	780	0.56	2.2
1616	2820	1420	740	0.64	2.1
1700	3030	1530	800	0.57	2.4
1790	4060	2080	880	0.5	1.9
1880	3940	2020	1080	0.53	2
1915	10070	5530	3000	0.53	1.9
1950				0.42	4.7
2010				1.27	1.6
2070				0.88	1.3
2130	41700	13768	25567	3.12	3.2
2190	40900	13497	25072	3.24	3.3
2250	46300	15327	28413	1.63	1.7
2310	49900	16547	30640	0.55	0.71
2370	49800	16514	30578	0.35	0.54
2430	49300	16344	30268	0.58	0.82
2490	48600	16107	29835	0.6	0.81
2550	52400	17395	32186	0.55	0.31
2610	47400	15700	29093	0.27	2.3
2670	46700	15463	28660	0.31	1.5
2730	47000	15564	28846	0.71	7.2
2790	48200	15971	29588	0.45	1.4
2850	37100	12208	22722	1.7	2.5
2910	41200	13598	25258	2.62	3.5
2966	41100	13564	25196	0.91	1.2

A discussion of the results of drill stem sampling is presented later in this section.

Water samples were also collected from the injection zone of IW-1 and each of the monitoring intervals in DZMW-1, at the completion of each well. The samples were analyzed for primary and secondary water quality standards and minimum criteria. The samples were collected to establish background water quality for both wells to facilitate the monitoring of water quality over time. The results of these analyses are found in **Appendix E.**

DEPTH OF THE BASE OF THE USDW

The base of the USDW was identified using geophysical logs, log-derived TDS values, packer test water quality data, and calculated aquifer parameters as required in the FDEP Construction and Testing permit under Specific Conditions 2(j) 1), 2), and 3).

These conditions specifically require the following:

The depth of the 10,000 mg/L TDS interface (USDW): This interface was determined using packer test water samples, aquifer performance tests, geophysical logs (specifically, caliper, gamma, Dual-Induction, borehole compensated sonic, pumping flowmeter, temperature and fluid resistivity). **Figure 5-5** is a plot of sonic porosity and apparent formation fluid resistivity (Rwa).

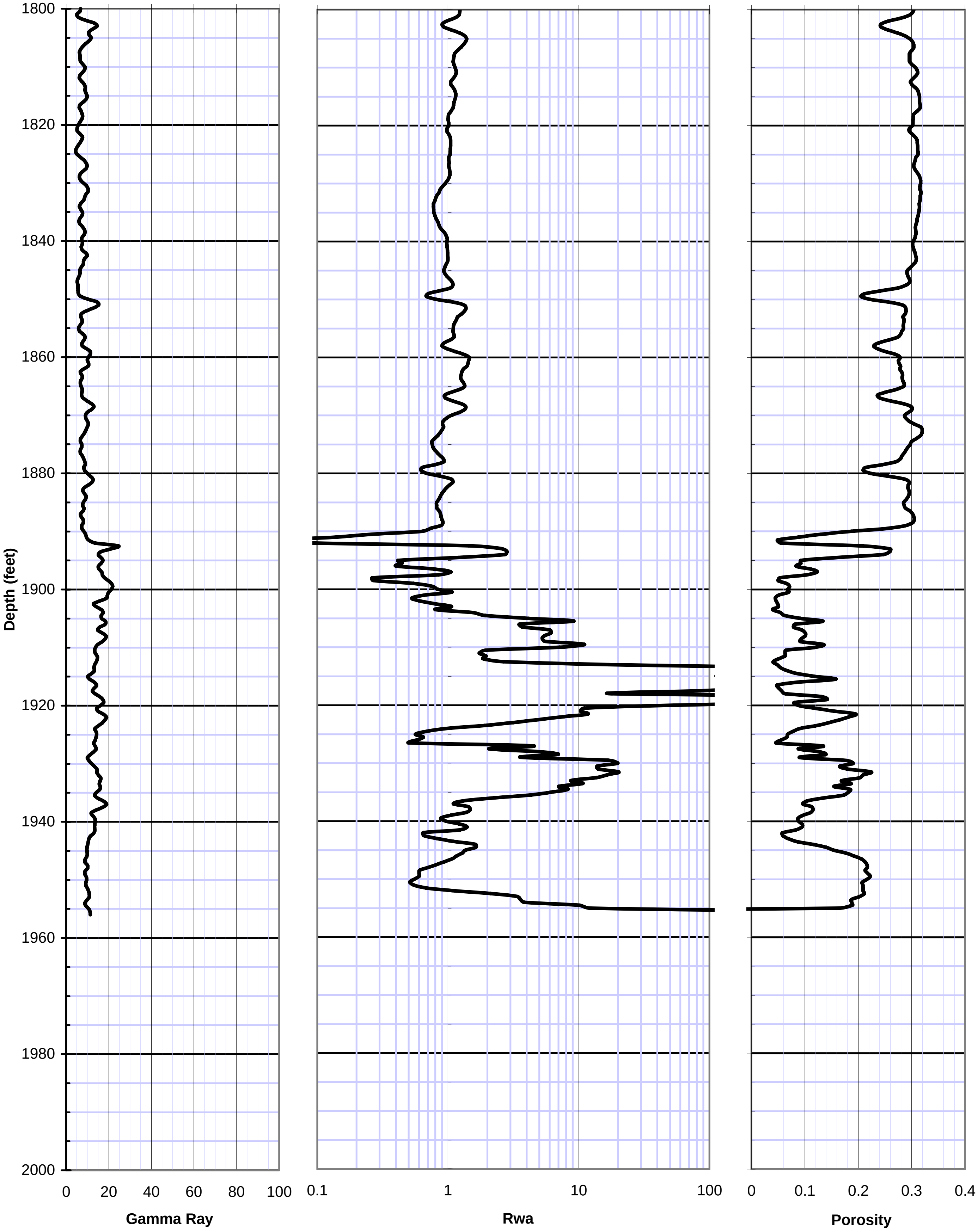
Geophysical Log Interpretation

The base of the USDW is found at the top of an interval where the resistivity increases with depth, as shown on the Dual-Induction Log. This appears to be contrary to normal decreasing resistivity with increasing salinity. In the Lake Region Deep Injection Well, the USDW was found at a point where the formation consists of very dense dolomite with very little porosity. Rock itself, having no porosity and thus no water, is infinitely resistive. The deep resistivity curve of the dual induction measures farther from the borehole wall and thus reflects a more accurate formation resistivity. In this well, just below the USDW the deep resistivity curve climbs to over 100,000 Ohm-m. indicating no fluid filled pores. The depth at which the base of the USDW (10,000 mg/L TDS) interface was selected is a depth of 1,895 feet bpl.

Packer Testing

Single packer tests were conducted in the intervals from 1,901 feet to 1,915 feet bpl and 1,939 feet to 1,964 feet bpl to establish and verify the base of the USDW. These depths were selected after reviewing the caliper, Dual-Induction, and BHCS logs. The water quality results obtained from samples collected during these tests are shown in Table 5-4 above. Water quality samples taken from the packer test intervals of 1,901 feet to 1,915 feet bpl and 1,939 feet to 1,964 feet bpl indicated TDS values of 13,300 mg/L and 15,008 mg/L, respectively. The Dual-Induction log showed that a clear transition zone existed between 1,890 feet and 1,900 feet bpl. Using the sonic porosity log, the deep induction log, and the equations from a paper recently published by the USGS entitled Hydrogeology and the Distribution and Origin of Salinity in the Floridan Aquifer System, Southeastern Florida (USGS Publication No. 94-4010), a TDS curve was plotted using data from south Florida waters. From this information, the base of the USDW was determined to exist at an approximate depth of 1,895 feet bpl.

Lake Region (Belle Glade) - Deep Injection Well
Log Derived Water Quality - Rwa



Imperically derived (R-H, m=2.0, a=1.0) Non-Corrected RILD

Figure 5-5

DETERMINATION OF THE MONITOR ZONES

Establishment of the upper and lower monitor zones were dictated by the Florida Department of Environmental Protection (FDEP). Both upper and lower monitor intervals were to be established below the USDW. To this degree, the upper monitor interval was chosen in the first productive interval below the USDW and the lower monitor interval was chosen immediately above the highest confining interval. These intervals were chosen based on geophysical log interpretation, packer test water quality data, specific capacity, and the identification of the base of the USDW.

Geophysical Log Interpretation

The geophysical logs showed a fairly uniform formation for the packer interval selected to test the suitability of the upper monitor interval between 1,939 feet and 1,964 feet bpl. The caliper log showed a relatively gauge (12-inch) borehole between 1,928 feet and 2,100 feet bpl. This data was supported by the BHC Sonic log and the BHTV log. The BHC Sonic log and the BHTV log also showed that the alternating vuggy, highly fractured (productive) versus dense, massive (confining) nature of the dolomite could support both monitoring intervals.

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Packer Testing

The results of the single packer test performed from 1,939 feet to 1,964 are summarized in Tables 5-3 and 5-4 above. The interval was pumped at 46 gpm until fully developed then a water sample was collected and analyzed. The results of the water quality analysis indicate this interval is located below the base of the USDW. These results indicate that this interval will produce an adequate supply of water to be used as a monitoring interval.

No packer test was conducted over the lower monitor interval between 2,075 feet and 2,100 feet bpl. The interval was pumped until fully developed then sampled and analyzed. The results from the lower monitor interval shows that this zone will produce an adequate volume of water.

DEFINITION OF THE INJECTION INTERVAL

An evaluation of the injection zone was made based upon the results from testing conducted during and after drilling. Testing included description of lithologic cuttings, drill stem water quality sampling, packer testing, geophysical logging, video surveys, and an injection test. The injection zone consists of fractured, and in places cavernous, dolostone. This dolostone has the capacity to receive concentrate as a result of the high secondary porosity associated with solution and fracture features. The testing program conducted in IW-1 verified that this zone does in fact exist. The description of the IW-1 lithologic cuttings is presented in **Appendix G**. The lithologic descriptions of the injection zone were confirmed by the geophysical logging program results.

Geophysical Logs

Geophysical logs were run in the injection zone prior to the installation of the final casing to evaluate the potential of the injection zone to accept effluent. The porosity, mechanical strength, and fracturing or solution features in this interval are the key properties that make injection possible. The caliper log was run to identify fractures, solution features, and wall collapse associated with the Boulder Zone of southern Florida. The BHC Sonic log and BHTV log was run to evaluate the porosity of the formation in the fractured intervals. The Dual-Induction and SP logs were run to make an independent estimate of the porosity of the formation. Fluid velocity, temperature, and fluid resistivity logs were run to evaluate the flow patterns in the borehole under pumping conditions.

Secondary porosity, identified from lithologic descriptions below 2,950 feet bpl, was also seen in the geophysical logs and was identified by the following log features:

- The caliper log showed increases of borehole diameters in the fractured, vuggy zones of the well and very nearly gauge hole diameter (12-inches) in the hard dolomitic sections.
- The sonic log showed gaps and broken VDL lines or very weak late arrivals in the vuggy and fractured zones, which strongly contrasted with the rapid travel times occurring in the hard dolomitic intervals. The broken nature of the VDL also gives an indication of the amount of fracturing.
- The Dual-Induction log showed a contrast similar to the sonic log between solution features/fractures (very low density) and the dolomitic ledges (high resistivity).
- The temperature log showed a very uniform temperature in the cavernous zones where high permeability allowed thorough mixing of formation fluids. A very slight positive gradient was observed below the injection zone.

Video Surveys

The formation in the open hole portion of the injection well consisted of dolostone identifiable in the video survey. The borehole walls are composed of alternating structural features such as fractures, cavities, and vugs from approximately 20 feet below the base of the IW-1 injection well casing (at 2,950 feet) to 3,450 feet bpl. From 3,450 feet bpl to the bottom of the hole, all porosity, vugs, holes, and fractures are filled with anhydrite. The borehole diameter remains relatively gauge throughout the length of the injection zone. Water movement from the injection of fresh water or crosscurrents was visible at a depth of approximately 2,985 feet bpl, and many fractures are present in the walls of the borehole to the bottom of the injection zone. The total depth of the well was verified with the video survey at approximately 3,490 feet bpl.

Injection Test

The injection test performed in IW-1 was approximately 12 hours in duration. The injection test was performed between 7:00 PM Tuesday March 25, 2008 and 10 AM Friday March 28, 2008. The test consisted of 24 hours of background measurements, 12 hours of injection, and 24 hours of static recovery data. The purpose of the injection test was to predict the operating pressure of the final well and to assess the suitability of the selected zone to accept the quantity of concentrate for which the well was designed. The injection test was performed at an average rate of 3,860 gpm (5.5 MGD). This injection rate represents the volume of concentrate that can be pumped into IW-1 at approximately 11 feet per second. Twelve hours was considered a sufficient time length to demonstrate the trend of injection pressure on long term operating conditions. Water levels and wellhead pressures were monitored in IW-1 and in Monitor Well DZMW-1 during the background, injection, and recovery phases of the injection test. A pressure transducer located on the concentrate pipeline to the injection well was used to determine the pressure changes throughout the test. The fluid used for the injection test was raw Floridan Aquifer water from three of the seven newly constructed Floridan supply wells located north of the WTP. The wells were brought on line one at a time over a 30 minute period to allow for stabilization prior to adding the next well. Immediately following the addition of the third well (at approximately 3,350 gpm) a flange gasket inside the Water Treatment Plant blew and the test had to be stopped to repair the leak. Following the repair, the test was restarted at approximately 8:15 PM. Again, the three wells were brought online and the flow rate of approximately 3,860 gpm was achieved. This rate was held constant until 4:30 AM Thursday morning when the radio communication system shut down the three wells. The wells were restarted in the manual mode within 10 minutes but the radio communication system remained inactive. The wells were shut down again and the SCADA system was rebooted to reset the radio system. This resulted in another 20 minute injection delay. The missing flow data was filled in with hand measurements during this period of down time and the test was extended an addition 2 hours for data collection. Approximately 30 minutes after shutdown of the injection test, 2 wells were restarted to calibrate and check a flowmeter. As soon as flow was noticed, the wells were shut down and the tune-up valve leaving the water treatment plant was closed. Static measurements were collected for the remainder of the recovery period.

Pressure readings from the IW-1 wellhead gauge increased from approximately 26 psi to a maximum of 57 psi in response to the injection of 3,860 gpm of raw water. The wellhead pressure responded immediately to injection. By placing one well in service at a time, a short duration injection step test was performed. The table below shows the injection rate and corresponding injection pressure during the initial portion of the injection test.

Table 5-6
Summary of Injection Step Test

Number of Wells	Flow Rate (gpm)	Pressure (psi)
0	0	26
1	1,800	35
2	3,350	47
3	3,850	57
0	0	27

Similarly, wellhead pressure decreased at the end of the injection test from 57 psi to 27 psi. Pressure readings from the upper and lower intervals of the Dual Zone Monitor Well were monitored throughout the injection test. The Upper Monitor Interval remained relatively constant throughout the test at approximately 9.1 psi. The lower monitor interval remained constant during the first 12 hours of background readings then slowly began increasing through the remainder of the monitoring time. Initially the pressure was approximately 0.8 psi and by the end of the 60 hours of monitoring read approximately 1.7 psi. The annular tank was filled, pressurized, and opened to the deep well annular space at approximately 4:30 PM Tuesday March 25, 2008. The tank was filled to approximately 40 percent full with potable water, sealed, then pressurized to approximately 50 psi. The pressure and level remained relatively constant throughout the test except for thermal variations between day and night. The graphical representations of the injection test results are presented in **Appendix K**.

Water Quality

Water quality samples were collected and analyzed for primary and secondary drinking water parameters and other selected constituents listed in Chapter 62-550, FAC. This analysis provided the background water quality for the injection zone. The water quality analysis for the injection zone is in **Appendix E**.

Section 6
MIT - Testing and Results

Mechanical Integrity testing was performed in IW-1 and DZMW-1 to verify the internal and external well integrity. The testing included Cement Bond logs, pressure tests, and video surveys in both wells, and a Radioactive Tracer Survey (RTS) and background temperature and gamma ray logs in IW-1. These logs are designed to give a direct indication of the borehole hydraulic seal quality, the potential for upward migration of injection fluids, and to identify the existence of casing leaks. Additionally, the logs coupled with a video survey of the well interior provide background information with which to evaluate future mechanical integrity. Below is a description of the testing and results for each well.

MECHANICAL INTEGRITY TESTING PROGRAM FOR IW-1

The following mechanical integrity testing program was completed for the concentrate injection well:

- Cement Bond Log
- Casing Pressure Test
- Annular Pressure Test
- Radioactive Tracer Survey (RTS)
- Background Cased Temperature
- Background Cased Gamma Ray
- Video Television Survey

Cement Bond Log

A Cement Bond Log was run to evaluate the quality of the cement seal emplaced in the annular space behind the wall of the final casing. This log aids in the determination of the external mechanical integrity of the well and gives a direct indication of the quality of the hydraulic seal adjacent to the well bore which inhibits vertical flow within the annular space.

Radioactive Tracer Survey (RTS)

The RTS was used to assist in determination of external mechanical integrity. This log was performed after the final 13 3/8-inch diameter tubing and packer was emplaced in the well. The purpose of the survey was to determine if water pumped into the injection zone could readily migrate upwards adjacent to the well bore. This is accomplished by monitoring the movement of a slug of radioactive fluid (Iodide-131). Very small quantities of Iodide-131 are used in the survey. By strategic placement of three gamma ray detectors on the geophysical logging tool, it is possible to track the movement of the Iodide-131 tracer fluid precisely as it disperses within the well bore. The Iodide-131 assay and flowmeter calibration are contained in **Appendix M**.

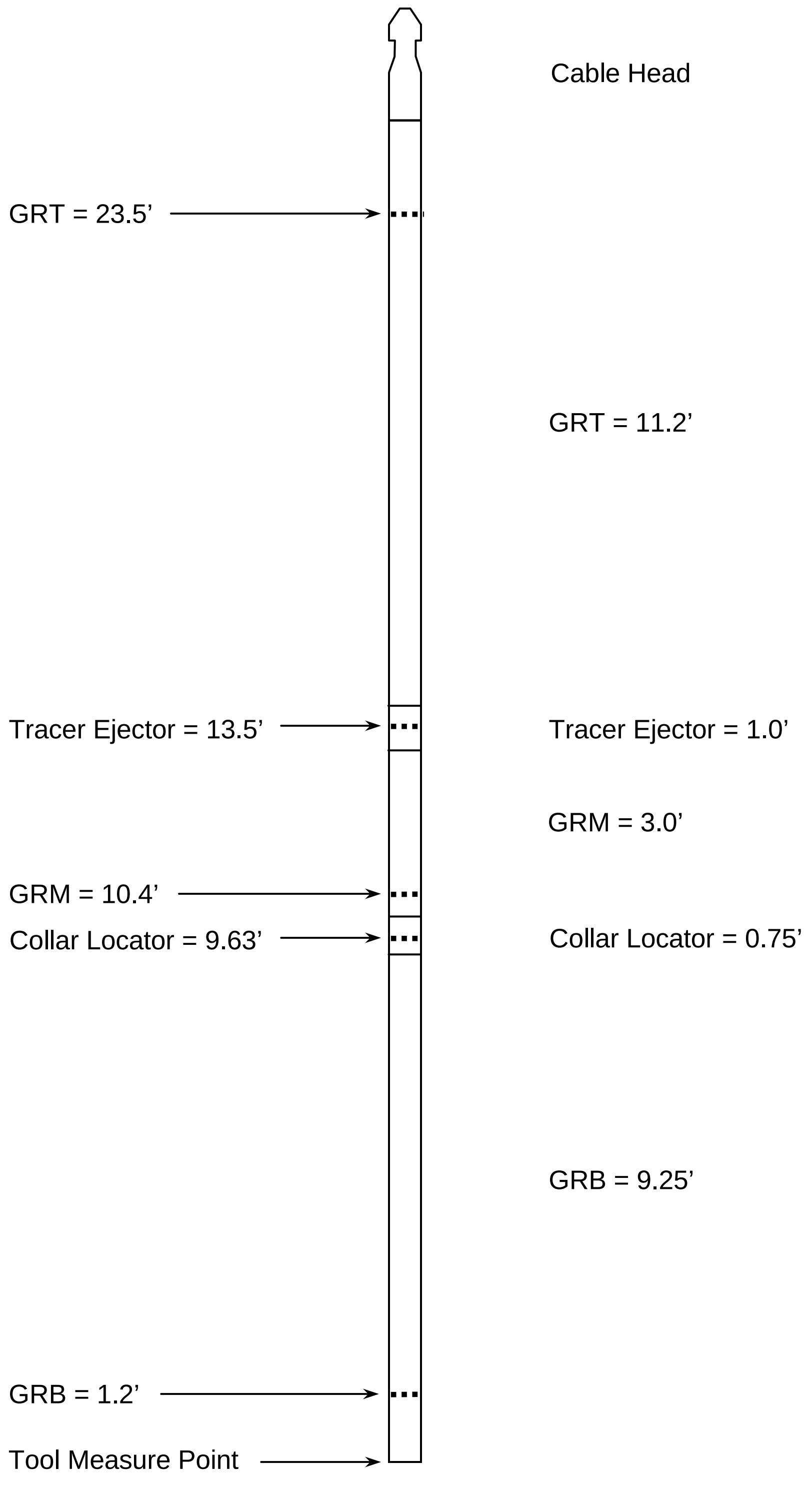
The RTS consists of a gamma ray intensity record (log), measured after the ejection of a radioactive tracer, Iodide-131, in the well. Two dynamic flow conditions are maintained in two subsequent tests. The radioactive tracer tool was configured with three detectors; Gamma Ray Top (GRT), Gamma Ray Middle (GRM), and Gamma Ray Bottom (GRB) arranged above and below the ejector as shown in **Figure 6-1**.

The RTS consisted of three steps. These are as follows:

- **An initial Gamma Ray/Casing Collar Locator Log:** The logs were run to determine background gamma ray emission and to precisely locate the bottom of the casing. The logs were run the entire length of well.
- **A dynamic well portion:** The RTS consisted of two dynamic flow tests, "A" and "B". Both tests were identical with the exception of the flow rate; the second functioned as a repeatability test for the first. A pumping rate of 55 gpm (9 feet per minute) and 107 gpm (18 feet per minute) were used for the respective tests. The tool was positioned with the ejector port 5 feet above the bottom of the casing and the flow of water into the well started. A slug of radioactive Iodide-131 measuring 1 mCi was ejected. Radioactive slug movement was monitored for one hour. During this period, the tool was stationary and the injection rate constant. After the one-hour monitoring period, a log out of position was performed between the ejection point and 200 feet above the highest movement of the slug. Upon completion of the logging section, the well was completely flushed at 107 gpm for 10 minutes. After the completion of the well flushing, the tool was run to the base of the casing and an after-flush logging pass was performed over the same interval as described above. The second dynamic flow test "B" was run in the same manner as flow test "A" to provide repeatability.
- **A post test Gamma Ray/Casing Collar Locator Log:** Following the completion of the dynamic sections of the RTS, a Gamma Ray/Casing Collar Log was run on the entire length of well as an after-flush final background pass.

Pressure Tests

Casing Pressure Test: The casing pressure test, designed to detect leaks in the final casing, was used to evaluate the integrity of the final casing string prior to the installation of the final tubing. Utilizing an inflatable packer set at the bottom of the casing, the casing was filled with water and pressurized to 154.0 psi. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.



LAKE REGION WATER TREATMENT PLANT
RADIOACTIVE TRACER TOOL SCHEMATIC
Figure 6-1

Annular Pressure Test: The injection tubing was tested by pressurizing the annular space between the final casing and the injection tubing after the tubing was set into the packer. The annular space was pressurized to 151.9 psi. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.

Ideally, under stable temperature conditions within the injection well, there should be no pressure change over the period of either test if there are no leaks in the casing or tubing. Changes in pressure may occur due to the following influences:

- Temperature fluctuations
- Leaks in the pressure test apparatus

Temperature changes during the test can cause the pressure to increase (if the wellhead becomes warmer) or decrease (if the wellhead cools). The acceptance criterion established by FDEP is within a ±5 percent change in pressure over a 1-hour period. This criterion allows for ordinary heating or cooling of the wellhead by temperature fluctuations throughout the day. During preparations for the pressure test, the contractor generally eliminates significant leaks in the pressure test apparatus. Pressure on the inflatable packer located in the well also could be a probable cause of leakage so it too is maintained during testing.

Background Cased Temperature Log

The temperature log is used to evaluate internal casing mechanical integrity and external hydraulic seal. Externally, it is used to detect fluid movement behind the casing in the annular space. Internally, it is used to detect leaks in the casing wall. The temperature log is also important as a base log for future mechanical integrity tests.

Background Cased Gamma Ray Log

The gamma ray log is used as a main component of the RTS. It is used as a background log for comparisons of gamma radiation before and after ejection of the tracer material. Its major purpose is to monitor the movement of the radioactive Iodide-131 following ejection into the well.

Video Television Survey

The video television survey is used as a visual inspection of the internal nature of the final casing and tubing strings. Its purpose is to detect any visual defects in the casing wall. It is also used as a comparison log for future mechanical integrity tests.

MECHANICAL INTEGRITY TESTING PROGRAM FOR DZMW-1

After the installation of the final casing, the mechanical integrity of the monitor well was investigated and the following testing program was completed:

- Cement Bond Log
- Casing Pressure Test
- Tubing Pressure Test
- Video Television survey

The intent of the cement bond log is to determine the satisfactory nature of the final casing cement. The required pressure test and television survey demonstrated the internal mechanical integrity of the final casing, and the temperature survey provided a background log for comparison with future mechanical integrity tests. Results of the testing and the geophysical logging program for DZMW-1 are discussed later in this report.

Cement Bond Log

A cement bond log (CBL) was run to evaluate the strength and continuity of the cement to the casing and cement to formation bond. This log detects potential voids in the grout sheath around the casing by measuring the acoustic properties of the cemented casing. The Cement Bond Log utilizes one transmitter, a 3-foot receiver and a 5-foot receiver. The log presentation contains information of travel time, amplitude, and variable density.

Pressure Tests

Casing Pressure Test: The casing pressure test, designed to detect leaks in the final casing, was used to evaluate the integrity of the final casing string prior to the installation of the final tubing. Utilizing a cement plug at the bottom of the casing, the casing was filled with water and pressurized to 126.0 psi. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.

Tubing Pressure Test: The monitoring tubing was tested by utilizing an inflatable packer set at the bottom of the tubing, the tubing was then filled with water and pressurized to 60.0 psi. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.

Ideally, under stable temperature conditions within the injection well, there should be no pressure change over the period of either test if there are no leaks in the casing or tubing. Changes in pressure may occur due to the following influences:

- Temperature fluctuations
- Leaks in the pressure test apparatus

Temperature changes during the test can cause the pressure to increase (if the wellhead becomes warmer) or decrease (if the wellhead cools). The acceptance criterion established by FDEP is within a ±5 percent change in pressure over a 1-hour period. This criterion allows for ordinary heating or cooling of the wellhead by temperature fluctuations throughout the day. During preparations for the pressure test, the contractor generally eliminates significant leaks in the pressure test apparatus. Pressure on the inflatable packer located in the well also could be a probable cause of leakage so it too is maintained during testing.

Video Television Survey

The video television survey is used as a visual inspection of the internal nature of the final casing and tubing strings. Its purpose is to detect any visual defects in the casing wall. It is also used as a comparison log for future mechanical integrity tests.

EVALUATION OF MECHANICAL INTEGRITY

Demonstration of mechanical integrity was performed on IW-1 and DZMW-1 to verify the integrity of the final casing, injection tubing and monitor casings, and confirm the effectiveness of the hydraulic seal at the base the casing. The final mechanical integrity test (MIT) on IW-1 required the performance of a pressure test to prove that there were no leaks in the casing and a video survey to provide visual inspection of the interior of the final casings. In order to demonstrate that there is no fluid movement behind the casing, a high resolution temperature log and RTS were also performed during the final MIT in the injection well. In order to determine if an adequate cement seal exists between casing and cement, a cement bond log was performed on the final casing of IW-1. The testing performed on both monitoring casings of the DZMW-1 consisted of the performance of a pressure test to prove that there were no leaks in the casings and a video survey to provide visual inspection of the interior of the final casings. Additionally, a pre and post cementing cement bond log was performed on the final monitoring casing to inspect the hydraulic seal between the two monitoring intervals. The FDEP was notified so that a representative would be present during testing. The mechanical integrity testing program was conducted to comply with FDEP Chapter 62-528.300 (6), (b)2, and (c) of the Florida Administrative Code as prescribed in the County's Construction and Testing Permit Special Condition 2) g 10) and 11) and 2) q.

Pressure Tests

IW-1 Casing Pressure Test: The pressure test on the final casing string of IW-1 was performed on May 12, 2006. This pressure test used an inflatable packer set at 2,935 feet bpl in the bottom of the final casing to seal the base of the casing from the formation below. The top of casing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 154.0 psi. The valve then was shut, and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 154.0 psi, a 0.0 percent change in pressure from the start of the test. The pressure test was successfully completed within the 5 percent tolerance established by the FDEP. The test was witnessed and recorded by Mr. Roger Simon, Barnes, Ferland and Associates and Mr. Gardner Strasser, P.G., FDEP. The results of the pressure test and pressure gauge calibration certification are presented in **Appendix L**.

IW-1 Annular Pressure Test: The annular pressure test on the injection tubing of IW-1 was performed on June 13, 2006. This pressure test was completed using the annular space between the final casing and the injection tubing. The annular space was pressurized to 151.9 psi and shut in for a period of 1 hr. The top of annulus was sealed with a pressure head equipped with a pressure gauge and valve. The valve then was shut, and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 151.7 psi, a 0.13 percent decrease in pressure from the start of the test. The pressure test was successfully completed within the 5 percent tolerance established by the FDEP. This pressure test also demonstrates that the Positive Seal Packer was set properly and will hold pressure. The test was witnessed and recorded by Mr. Thomas Uram, P.G., PBCWUD and Mr. Gardner Strasser, P.G., FDEP. The results of the pressure test and pressure gauge calibration certification are presented in **Appendix L**.

DZMW-1 Casing Pressure Test: The monitoring casing (12-inch) pressure test was performed on June 19, 2006. This pressure test utilized the cement plug in the bottom of the casing and the top of the casing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 126.0 psi. The valve was shut and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 125.5 psi, a 0.4 percent decrease in pressure from the start of the test. The pressure test was successfully completed within the 5 percent tolerance established by the FDEP. The test was witnessed and recorded by Mr. Thomas Uram, P.G. of PBCWUD.

DZMW-1 Monitor Tubing Pressure Test. The monitor tubing pressure test was performed on June 30, 2006. An inflatable packer was set in the monitor tubing at a depth of 2,055 feet bpl on tubing. The packer was inflated to form a watertight seal against the casing. The top of the tubing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 60.0 psi. The valve was shut and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 60.0 psi, a 0.0 percent change in pressure from the start of the test. The pressure test was successfully completed within the 5 percent tolerance established by the FDEP. The test was witnessed and recorded by Mr. Adam Bingham, of Brown and Caldwell. FDEP declined an invitation to witness both pressure tests in the monitor well. The results of the pressure test are presented in **Appendix L**.

Radioactive Tracer Survey

The RTS, is a measure of the gamma ray intensity following the ejection of a radioactive tracer, usually Iodide-131, into the well. The RTS consists of 3 parts: an initial gamma ray/casing collar locator log for background readings, a dynamic well portion, and an after gamma ray/casing collar locator log for final background readings. A base temperature log is also performed along with the RTS. The radioactive tracer tool is configured with three gamma ray detectors; Gamma Ray Top (GRT), Gamma Ray Middle (GRM), and Gamma Ray Bottom (GRB), arranged above and below the ejector

The first part of the test consisted of a gamma ray/casing collar locator log and a base Temperature Log covering the entire length of the well for initial background readings.

The second portion of the RTS consisted of two dynamic flow condition tests, “A” and “B”. Both of these tests were identical in nature with the exception of the flow rate, with Test B used as a repeatability test of Test A. A constant fluid velocity of 9 feet per minute was attained using a pumping rate of 55 gpm into the well. The tool was positioned with the ejector port 5 feet above the bottom of the casing and the flow of water into the well was started. A slug of radioactive Iodide-131 measuring 1 mCi was ejected, and monitoring of the radioactive Iodide-131 slug movement was conducted for one hour. During this period, the tool was kept stationary and the injection rate was held constant. After the one-hour monitoring period, a log out of position was performed between the ejection point and 200 feet above the highest movement of the slug. Upon completion of the logging section, the well was completely flushed at 107 gpm for 10 minutes. After completion of the well flushing, the tool was run to the base of the casing, and an after-flush logging pass was performed over the same interval as described above. The second Dynamic flow test, Test B, was run in the same manner as Test A to prove repeatability except the flow rate was doubled. Following the completion of the dynamic sections of the RTS, a gamma ray/casing collar locator log was run on the entire length of well as an after-flush final background pass.

Dynamic Test “A” One Hour Monitoring

A slug of tracer was ejected into IW-1 at 9:00 AM under dynamic, or pumping, conditions at 2,950 feet bpl, 5 feet above the bottom of the casing. This 1 milliCurie slug was ejected over a 5 second interval while fresh water was pumped into the well at 55 gpm; pumping continued at that rate, approximately equal to 9 feet per minute, for the full hour of the dynamic test. **Table 6-1** below summarizes the data collected during this portion of the testing.

Detectors GRM and GRB both detect downward movement of the tracer fluid within 1 minute 20 seconds of ejection of the tracer fluid. Within 1 minute, shortly before the tracer fluid reached the bottom detector, the slug of tracer material passed the middle detector. Within 3 minutes 10 seconds, the bottom detector started a slow but continuous decline in gamma activity indicating that the slug of Iodide 131 is moving down into the injection zone. This result is substantiated by the lack of gamma activity seen at detector GRT. It continues at background readings for the entire hour of monitoring.

Table 6-1
Summarized Results of Dynamic Test "A"
One Hour Monitoring

RTS Tool Specifics		**Sequence of Events During Test**				
Tool Section	**Depth (feet bpl)**	**Test Start**	**Response Time Since Start of Test**			
		1 mCi released at *9:00* hours	**15 sec.**	**80 sec.**	**None detected**	**Maximum Value (API units)**
GRT	2,939.5				X	10
Ejector	2,950.0	X				---
GRM	2,953.0		X			1,796
GRB	2,962.3			X		2,025

Dynamic Test "A" - Log Out of Position

Following the monitoring period, a log-out-of-position was performed by moving the tool upward from its monitoring position to 2,740 feet bpl. This log was designed to detect the distance which the tracer traveled behind the casing during the monitoring period. **Table 6-2** below summarizes the data collected during this portion of the testing.

Table 6-2
Summarized Results of Dynamic Test "A"
Log Out Of Position

Tool Detector	Initial Measuring Depth (feet bpl)	Upper Detectable Limit of Tracer (feet bpl)	Final Measuring Depth (feet bpl)
GRT	2,939.5	None	2,740
GRM	2,953.0	None	2,740
GRB	2,962.3	None	2,740

None of the detectors GRT, GRM, and GRB detect any elevated levels of gamma radiation throughout the logged interval. No casing stain was observed and no indication of upward movement of the tracer fluid.

Post Dynamic Test "A" - After Flush Pass

Following the log-out-of-position, the casing was flushed with fresh water at a rate of 107 gpm to discharge the tracer into the formation and clean any possible stained portions of casing wall. **Table 6-3** below summarizes the data collected during this portion of the testing.

Table 6-3
Summarized Results of the After Flush Pass
Following Dynamic Test "A"

Tool Detector	Initial Measuring Depth (feet bpl)	Upper Detectable Limit of Tracer (feet bpl)	Final Measuring Depth (feet bpl)
GRT	2,939.5	None	2,740
GRM	2,953.0	None	2,740
GRB	2,962.3	None	2,740

Dynamic Test "B"

A second dynamic test was run to confirm the results of the previous tests. The test method was the same as the previous dynamic test except the flow rate was doubled to 107 gpm.

The second dynamic test commenced at 10:17 AM, with a second slug of tracer ejected into IW-1 at 10:18 AM under dynamic, or pumping, conditions at 2,950 feet bpl, 5 feet above the bottom of the casing. This 1.5 milliCurie slug was ejected while fresh water was pumped into the well at 107 gpm; pumping continued at that rate, approximately equal to 18 feet per minute, for the full hour of the dynamic test. **Table 6-4** below summarizes the data collected during this portion of the testing.

Table 6-4
Summarized Results of Dynamic Test "B"
One Hour Monitoring

RTS Tool Specifics		Sequence of Events During Test				
Tool Section	**Depth (feet bpl)**	**Test Start**	**Response Time Since Start of Test**			
		1 mCi released at *10:18* hours	**10 sec.**	**55 sec.**	**None detected**	**Maximum Value (API units)**
GRT	2,939.5				X	10
Ejector	2,950.0	X				---
GRM	2,953.0		X			1,869
GRB	2,962.3			X		2,026

Dynamic Test "B" - Log Out of Position

Following the monitoring period, a log-out-of-position was performed by moving the tool upward from its monitoring position to 2,744 feet bpl. This log was designed to detect the distance which the tracer traveled behind the casing during the monitoring period. **Table 6-5** below summarizes the data collected during this portion of the testing.

Table 6-5
Summarized Results of Dynamic Test "B"
Log Out Of Position

Tool Detector	Initial Measuring Depth (feet bpl)	Upper Detectable Limit of Tracer (feet bpl)	Final Measuring Depth (feet bpl)
GRT	2,939.5	None	2,744
GRM	2,953.0	None	2,744
GRB	2,962.3	None	2,744

After Flush/Final Background Check

Water was injected at a rate of 107 gpm for 10 minutes to flush the well and clean the tracer tool. The tracer tool was also flushed of all excess tracer material below the base of the casing. The well was logged from 3,105 feet bpl to 2,695 feet bpl following flushing of the tracer tool. A small amount of tracer fluid was observed blow the base of the casing between 2,955 feet and 2,990 feet bpl. The final gamma ray log was run from the bottom of the well at 3,500 feet bpl to surface to compare initial to final gamma radiation. The final background log matched the initial background log to within 10 API units with the exception of two areas. These two areas are at 2,955 feet to 2,990 feet bpl, and 3,325 to 3,480 feet bpl. These areas correspond to the tool flushing area and the area of the injection zone where the tracer fluid exits the well.

Table 6-6 below summarizes the data collected during this final portion of the testing.

Table 6-6
Summarized Results of the After Flush Pass/
Final Background Check

Tool Detector	Initial Measuring Depth (feet bpl)	Upper Detectable Limit of Tracer (feet bpl)	Final Measuring Depth (feet bpl)
GRT	3,476.0	2,955.0	0
GRM	3,490.5	2,955.0	0
GRB	3,500.0	2,955.0	0

SUMMARY

Palm Beach County has concluded that the RTS has shown that no fluid is migrating upwards behind the wall of the casing, or within the wellbore, due to channeling or inadequate cementing. The initial and final background passes showed responses that were very similar. This similarity in the initial background and post-test gamma ray log passes indicates that the injection well has external mechanical integrity as defined by Chapter 62-528. It is Palm Beach County's understanding that radioactive tracer surveys verify the hydraulic seal created at the base of the casing between the outer casing wall and the formation. The limits of upward migration can therefore be defined as within the confines of the wellbore.

Background Cased Temperature Log

A background cased temperature log was run in the final casing and open hole of IW-1 prior to the RTS. The log shows a gradual decrease in temperature with increase in depth throughout the cased interval and in the injection zone. The temperature log shows no abnormalities and will serve as background data for future mechanical integrity tests.

Cement Bond Logs

A cement bond log (CBL) was run in the final casing of IW-1 to evaluate the strength and continuity of the cement bond to the casing. This log detects potential voids in the grout sheath around the casing by measuring the acoustic properties of the cemented casing. The County's Construction Permit 0138308-184-UC requires the performance of a CBL in IW-1 under Special Condition 2) g 10) prior to the injection test. Below are the details of the CBL results.

IW-1 Cement Bond Log

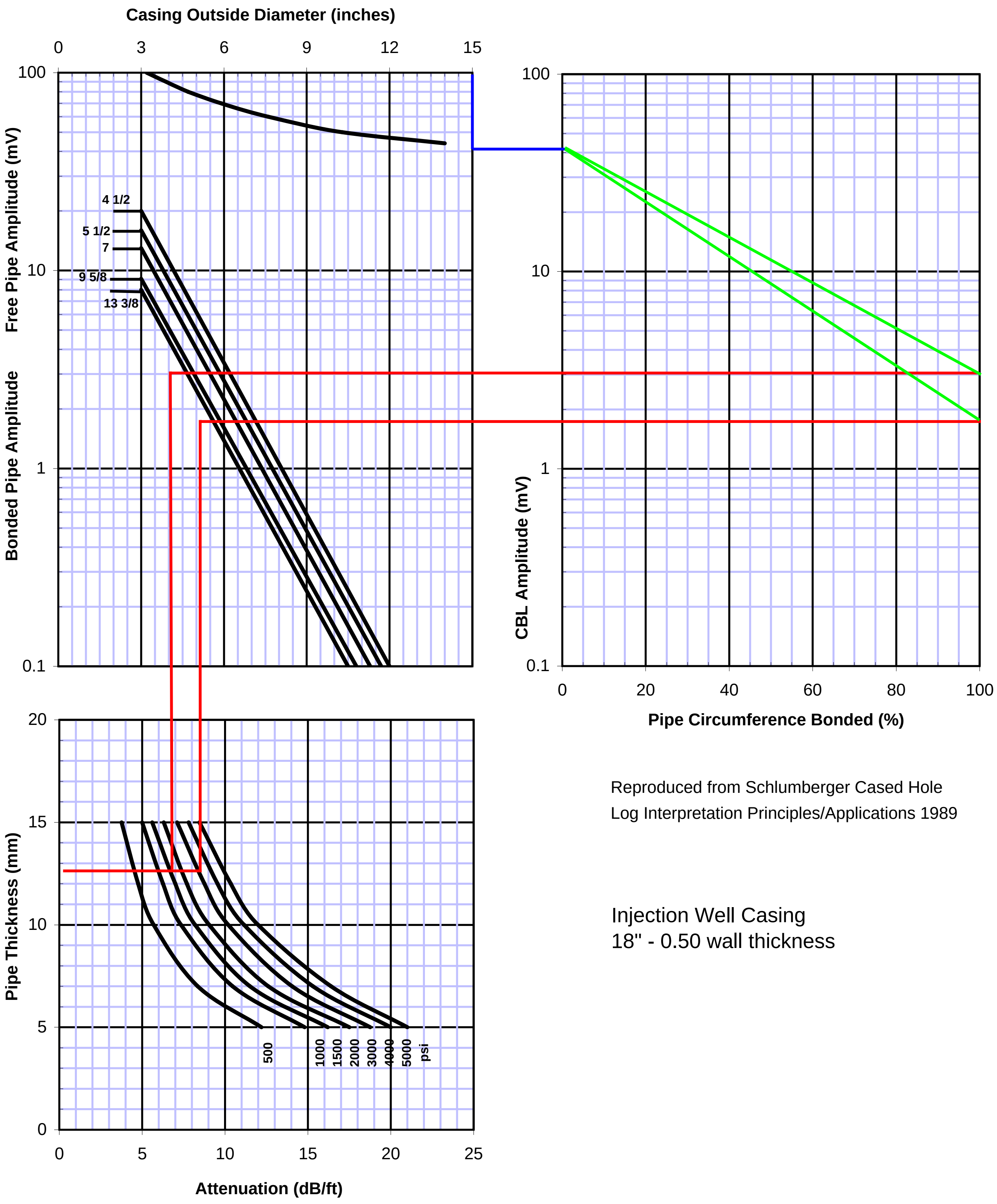
The cement bond log (CBL) is used to assess the quality of the cement-to-casing bond and cement-to-formation bond around a cemented casing. The principle is to record the travel time and attenuation of an acoustic wave after propagation through the borehole fluid, casing, cement and formation. All CBL measurements are made from the received wave signal. They include: the amplitude of the first arrival of the waveform and the time in which this first arrival is received. The variable density portion of the log is a composite of the received waveform.

The CBL records the amplitude, in millivolts, of the first arrival of the wave signal at the 3-foot receiver created by a calibrated, 1,000 millivolt output signal. It is a maximum in unsupported pipe and a minimum in well cemented casing. The amplitude is a function of the attenuation of the transmitted signal due to the coupling of the cement to the casing. The attenuation rate depends on the cement compressive strength, the casing diameter, casing thickness, and the degree of cement bonding.

The variable density log (VDL) is a composite of the received waveform at the 5-foot receiver. It is generally used to assess the cement-to-formation bond, detect the presence of channels and for better discrimination between casing and formation arrivals. In unsupported pipe, the casing arrivals will appear very strong while the formation arrivals will seem weaker and washed out. In well bonded pipe, with good cement-to-formation bond, the casing arrivals will be weak to absent and the formation signals will be very strong.

Cementing of the 18-inch diameter final casing string was completed on the evening of May 18, 2006 to within 523 feet of land surface. The upper section of the casing (surface to 1,883 feet bpl) was cemented with 12% bentonite cement, the middle section of the casing (1,883 feet to 2,828 feet bpl) was cemented with 6% bentonite gel cement, and the lower section of the casing (2,828 feet bpl to casing bottom at 2,955 feet bpl) was cemented with neat cement.

A CBL was run on IW-1 after cementing of the 18-inch diameter, 1/2-inch wall thickness, final casing had been completed. Using the Schlumberger CBL interpretation chart, **Figure 6-2**, Palm Beach County estimates that good bond for neat cement (3,000 pound compressive strength) under normal conditions would result in amplitudes in the range of 3.5 millivolts or less. Moderate to good bond would result in amplitudes of 3.5 to 6.5 millivolts. Good bond for 12% bentonite cement (1500 pound compressive



Reproduced from Schlumberger Cased Hole
Log Interpretation Principles/Applications 1989

Injection Well Casing
18" - 0.50 wall thickness

IW-1 CBL INTERPRETATION CHART

FIGURE 6-2

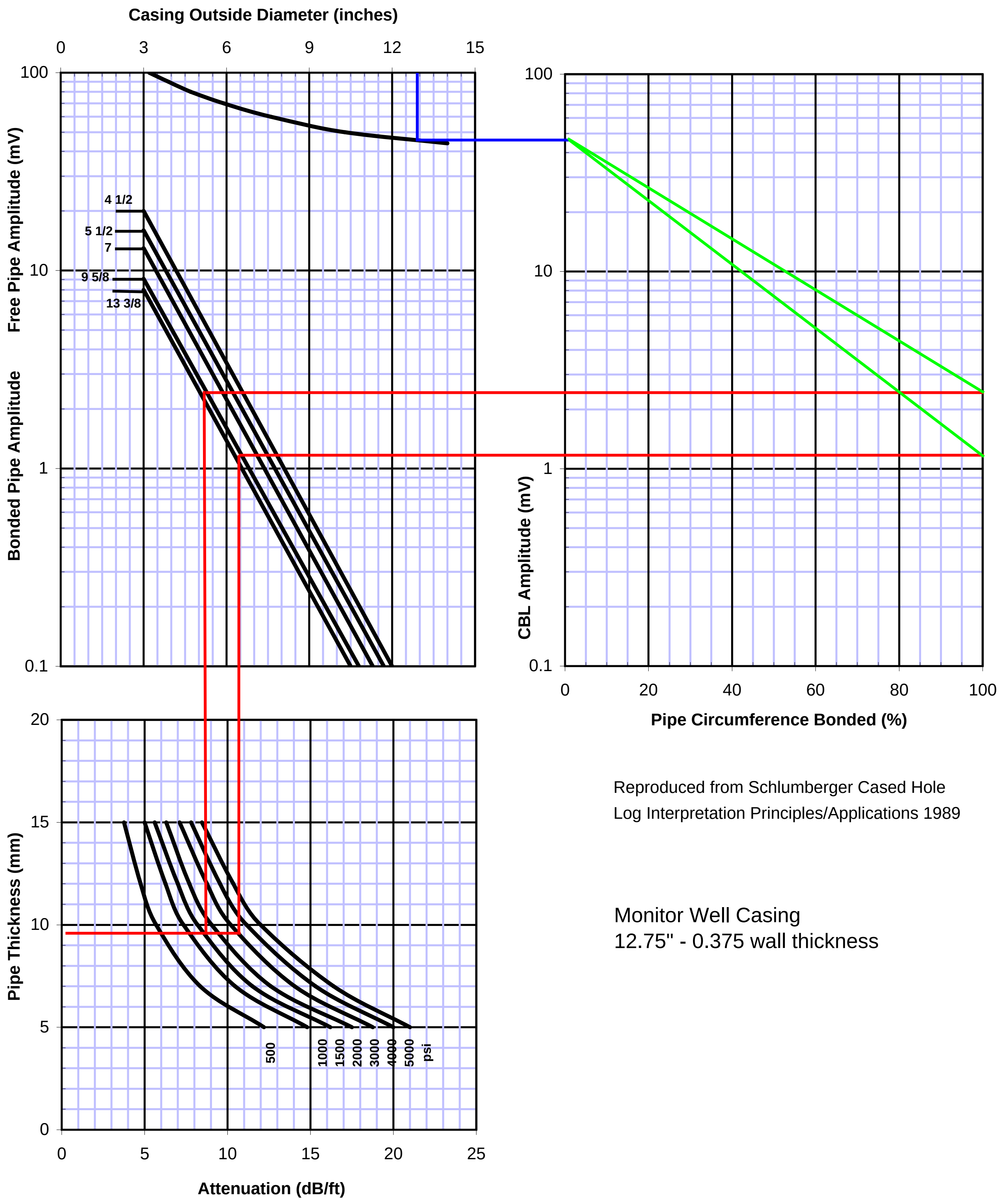
strength) should result in CBL amplitudes of 5.2 millivolts or less. This range of CBL response should indicate an acceptable cement seal. The free pipe readings at the top of the casing, where cement had not been applied, was 25 to 40 millivolts. This CBL response range indicates a lack of cement behind the casing. Between 15 and 25 millivolts is a range of questionable cement bond, indicating the presence of cement but of relatively poor quality. Poor cement seal can be the result of channeling of cement during pumping, the formation of a micro-annulus when the pressure is released from the casing or simply a poor connection between cement and casing. In some cases, poor cement bond may indicate that a hydraulic flow path exists between cement and pipe, whereas in others no such path may exist even though the cement quality appears poor.

The cement bond log was run on May 19, 2006. It showed good to moderate bonding over the intervals from 2,925 feet bpl (total depth logged) to 2,660 feet bpl, 2,525 feet bpl to 2,275 feet bpl, and from 2,170 feet bpl to 523 feet bpl. Within these intervals there exists some localized spots of poor quality cement, however, they are small and isolated and do not appear to be detrimental to the hydraulic seal. Moderate to poor bonding is seen in the intervals from 2,660 feet bpl to 2,525 feet bpl and from 2,275 feet bpl to 2,170 feet bpl. The top of cement was found to be at a depth of 523 feet bpl. Although these intervals do not demonstrate good cement bond, there is no evidence that there are voids or lack of cement across these intervals. The cement bond log is typical of difficult cementing conditions, but does not indicate any failure of cement seal.

DZMW-1

A Cement Bond Log (CBL) was run on DZMW-1 following the cementing of the 12 ¾-inch monitor casing and prior to and following cementing of the 6 5/8-inch monitor tubing.

Using the Schlumberger CBL interpretation chart, **Figure 6-3**, Palm Beach County estimates that good bond for neat cement encasing the 12 ¾-inch diameter casing would result in amplitudes in the range of 2.4 millivolts or less. Moderate to good bond would result in amplitudes of 2.4 to 5.2 millivolts. This range of CBL response should indicate an acceptable cement seal. The free pipe readings in the casing above the top of the cement were approximately 55 millivolts. This CBL response range indicates a lack of cement behind the casing. Between 5.2 and 55 millivolts is a range of questionable cement bond, indicating the presence of cement but of relatively poor quality. Poor cement seal can be the result of channeling of cement during pumping, the formation of a micro-annulus when the pressure is released from the casing or simply a poor connection between cement and casing. In some cases, poor cement bond may indicate that a hydraulic flow path exists between cement and pipe, whereas in others no such path may exist even though the cement quality is poor.



Reproduced from Schlumberger Cased Hole
Log Interpretation Principles/Applications 1989

Monitor Well Casing
12.75" - 0.375 wall thickness

DZMW-1 CBL INTERPRETATION CHART

FIGURE 6-3

The CBL was run on June 21, 2006. The interval logged was from the bottom of casing at 1,940 feet bpl to surface. The CBL shows moderate to good cement across the entire cemented interval. The top of cement was estimated to be at 260 feet bpl.

Two CBL's were performed on the 6 5/8-inch FRP monitoring tubing in the DZMW-1. Because this monitoring tubing is made of fiberglass, an interpretation using the Schlumberger CBL interpretation chart can not be completed. Therefore, a before cementing and after cementing Cement Bond Log was performed The interval logged was the cemented interval separating the upper and lower monitor zones and extends from the bottom of the casing at 2,073 feet bpl to the bottom of the upper monitor zone at 1,965 feet bpl (108 feet). The comparison of the pre and post cementing CBL showed large change in the tool response. Amplitudes on the post cementing CBL dropped an average of approximately half of the values observed on the pre cementing CBL. The variable density shows strong pipe arrivals on the pre cementing CBL whereas the pipe arrivals on the post cementing CBL are absent. The interval above the top of cement (1,965 feet bpl) is relatively the same for both the pre and post cementing CBL's. The log indicates that the emplacement of the cement has achieved hydraulic isolation.

Video Television Surveys

A video television survey was performed on the final casing of IW-1 on May 22, 2006 (**Appendix G**). No visible flaws were detected in the casing and welds. The casing was clean, and factory markings and labels were visible at nearly all welded joints.

A video television survey was performed on the injection tubing and open hole of IW-1 on June 14, 2006. No visible flaws were detected in the casing and threaded joints. The casing was clean, and factory markings and labels were visible at nearly all pipe connections.

The video television survey of monitoring casing and open hole of DZMW-1 was conducted on June 21, 2006. The casing showed no signs of damage, and all welds appeared normal. No visible flaws were detected.

The video television survey of monitoring tubing and open hole of DZMW-1 was conducted on July 3, 2006. No visible flaws were detected in the casing and threaded joints. The casing was clean, and factory markings and labels were visible at nearly all pipe connections.

A complete description of the IW-1 and DZMW-1 video surveys is included in **Appendix G.**

Appendix A
Permit

Department of
Environmental Protection

Southeast District
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Jeb Bush
Governor

Colleen M. Castille
Secretary

ELECTRONIC CORRESPONDENCE November 9, 2005

NOTICE OF PERMIT

Bevin A. Beaudet, P.E., Director
Palm Beach County Water Utilities Department
8100 Forest Hill Boulevard
Palm Beach County, Florida 33413

County: Palm Beach
UIC – Palm Beach County Lake Region
Water Treatment Plant
FILE: 0138308-184-UC
Class I Injection Well IW-1

Dear Mr. Beaudet:

Enclosed is Permit Number 0138308-184-UC, to construct an injection well system for Palm Beach County Lake Region Water Treatment Plant, consisting of a Class I Injection Well IW-1, with one associated Dual Zone Monitoring Well, MW-1, issued pursuant to Section(s) 403.087, Florida Statutes and Florida Administrative Codes 62-4, 62-520, 62-522, 62-528, 62-550 and 62-660.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, Mail Stop 35, 3900 Commonwealth Blvd., Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Should you have any questions, please contact J. Gardner Strasser, PG, or Joseph R. May, PG, of this office at (561) 681-6688 or (561) 681-6691, respectively.

Executed in West Palm Beach, Florida.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

____
Kevin R. Neal
District Director
Southeast District

KRN/LAH/JRM/JGS

cc:	Richard Deuerling, FDEP/TLH	Nancy Marsh, USEPA/ATL	Ron Reese, USGS/FLL
	Steve Anderson, SFWMD/WPB	Tom Lefevre, PBCHD	Steven McGrew, P.E., PBCWUD
	Leisha L. Pica, P.E., PBCWUD	Hassan Hadjimiry, P.E., PBCWUD	

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on
____11/9/05____ to the listed persons.
Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to the §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

____________________ ____11/9/05____
Clerk Date

Department of
Environmental Protection

Southeast District
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Jeb Bush
Governor

Colleen M. Castille
Secretary

Bevin A. Beaudet, P.E., Director
Palm Beach County Water Utilities Department
8100 Forest Hill Boulevard
West Palm Beach, Florida 33413

Permit/Certification Number: 138308-184-UC
Date Issued: November 9, 2005
Expiration Date : November 8, 2008
County: Palm Beach
Position: 26° 43' 21" N / 80° 40' 45" W
Project: Palm Beach County Lake Region WTP Class One Injection Well

PROJECT: Construction and testing permit for Injection Well IW-1 and associated dual zone monitoring well, MW-1.

This permit is issued under the provisions of Chapter 403.087, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Rules 62-4, 62-520, 62-522, 62-528, 62-550, and 62-660. The above named permittee is hereby authorized to perform the work or construct the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

TO CONSTRUCT AND OPERATIONALLY TEST: One Class I tubing and packer injection well, IW-1, with an associated deep dual zone monitoring well, MW-1. The purpose of the injection well system will be the disposal and monitoring of non-hazardous reverse-osmosis reject concentrate and potable water-treatment by-product and production well development water from the Lake Region Water Treatment Plant (WTP). Injection Well IW-1 will be used as the primary disposal system. The planned maximum injection rate of reject concentrate to the injection well is 4.8 feet per second (fps) or 4.86 million gallons per day (MGD) peak hour flow. However, to allow for operational testing of Phase I of the WTP, the injection well may be tested at a flow rate up to 3.57 feet per second or 2.31 MGD peak hour flow. The rated capacity will be contingent on the results of such testing and Department approval.

Injection Well IW-1 will be constructed with a design that includes tubing, packer, and fluid filled annular space around the tubing. A 11.97-inch inside diameter (I.D.), 0.66-inch thick fiberglass reinforced plastic (FRP) tubing will be installed within a 18-inch outside diameter (O.D.) steel casing. The preliminarily planned depth of the packer center point is approximately 2850 feet below land surface (bls). The injection interval will be in the "Boulder Zone" in the lower Oldsmar Formation, and is preliminarily planned between approximately 2900 and the total depth of the well at 3500 feet (bls). The confinement of the injection zone from overlying underground source of drinking water (USDW) aquifers and fluid movement adjacent to the wellbore of the injection well will be monitored by two monitoring zones in Monitoring Well MW-1. The lower interval shall be positioned in a transmissive interval below the USDW at an appropriate point above the injection interval and major confining unit to monitor for reasonable assurance with the earliest indication of vertical confinement of injected fluids and external mechanical integrity of the injection well. The upper interval shall be positioned in a transmissive interval in immediate proximity to the base of the USDW. Final depths of Injection Well IW-1 and Monitoring Well MW-1 will be determined during construction and field-testing.

IN ACCORDANCE WITH: Application to Construct a Class I Injection Well received on November 24, 2004; Request for Information One (RFI-1) dated December 22, 2004; response to RFI-1 received on January 25, 2005; RFI-2 dated February 17, 2005; responses to RFI-2 received on March 29, 2005; Request for Modification dated July 25, 2005; Certificate of Financial Responsibility was approved on August 8, 2005; publication of the Notice of Draft Permit in the Palm Beach Post on September 4, 2005; in consideration of public comment received as a result of the public meeting held on October 5, 2005 at the Palm Beach County Utilities Dept.; and, publication of the Notice of Intent to Issue Permit in the Palm Beach Post on October 17, 2005.

LOCATED AT: Palm Beach County Lake Region Water Treatment Plant, located at 39700 State Road 80, Belle Glade, Palm Beach County, Florida.

TO SERVE: West Palm Beach County Lake Region Water Treatment District.

SUBJECT TO: General Conditions 1-24 and Specific Conditions 1-11.

GENERAL CONDITIONS:

The following General Conditions are referenced in Florida Administrative Code Rule 62-528.307.

1) The terms, conditions, requirements, limitations and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to Section 403.141, F.S.

2) This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action.

3) As provided in subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.

4) This permit conveys no title to land, water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5) This permit does not relieve the permittee from liability for harm to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefrom; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6) The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, or are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7) The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

    a) Have access to and copy any records that must be kept under conditions of this permit;

b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time will depend on the nature of the concern being investigated.

8) If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a) A description of and cause of noncompliance; and
b) The period of noncompliance, including dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent the recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for
c) penalties or for revocation of this permit.

9) In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10) The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11) This permit is transferable only upon Department approval in accordance with rules 62-4.120 and 62-528.350, F.A.C. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12) This permit or a copy thereof shall be kept at the work site of the permitted activity.

13) The permittee shall comply with the following;

a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records shall be extended automatically unless the Department determines that the records are no longer required.

b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c) Records of monitoring information shall include:

- i) the date, exact place, and time of sampling or measurements;
- ii) the person responsible for performing the sampling or measurements;
- iii) the dates analyses were performed;
- iv) the person responsible for performing the analyses;
- v) the analytical techniques or methods used;
- vi) the results of such analyses.

d) The permittee shall furnish to the Department, within the time requested in writing, any information which the Department requests to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

e) If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

14) All applications, reports, or information required by the Department shall be certified as being true, accurate, and complete.

15) Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each scheduled date.

16) Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

17) It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

18) The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

19) This permit may be modified, revoked and reissued, or terminated for cause, as provided in 40 CFR Sections 144.39(a), 144.40(a), and 144.41 (1998). The filing of a request by the permittee for a permit modification, revocation or reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

20) The permittee shall retain all records of all monitoring information concerning the nature and composition of injected fluid until five years after completion of any plugging and abandonment procedures specified under Rule 62-528.435, F.A.C. The permittee shall deliver the records to the Department office that issued the permit at the conclusion of the retention period unless the permittee elects to continue retention of the records.

21) All reports and other submittals required to comply with this permit shall be signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C. All reports shall contain the certification required in Rule 62-528.340(4), F.A.C.

22) The permittee shall notify the Department as soon as possible of any planned physical alterations or additions to the permitted facility. In addition, prior approval is required for activities described in Rule 62-528.410(1)(h), F.A.C.

23) The permittee shall give advance notice to the Department of any planned changes in the permitted facility or injection activity which may result in noncompliance with permit requirements.

24) The permittee shall report any noncompliance which may endanger health or the environment including:

    a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or
    b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

    Information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

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SPECIFIC CONDITIONS:

1) General Requirements

a. This permit is to construct and operationally test the Palm Beach County Lake Region Water Treatment Plant Class I injection well, IW-1, and an associated dual zone monitoring well, MW-1.

b. This permit approval is based upon evaluation of the data contained in the application and the plans and specification submitted in support of the application. Any changes, except as provided elsewhere in this permit, must be approved by the Department before implementation.

c. The permittee shall be subject to all requirements and regulations of Palm Beach County and the South Florida Water Management District regarding the construction and testing of this exploratory well.

d. Four surficial aquifer monitoring wells, identified as Pad Monitoring Wells (PMWs), shall be located near the corners of the pad to be constructed for IW-1, and shall be identified by location number and pad location, e.g., NW, NE, SW, and SE. If located in a traffic area the well head(s) must be protected by traffic bearing enclosure(s) and cover(s). Each cover must lock and be specifically marked to identify the well and its purpose. The PMWs shall be sampled as follows:

   1) During the construction and associated testing phases, the PMWs shall be sampled weekly for total dissolved solids (TDS) (mg/L), chlorides (mg/L), specific conductance (μmho/cm or μS/cm), temperature and water level (relative to the North American Vertical Datum of 1988 [NAVD 88]).
   2) Initial PMW analyses shall be submitted prior to the onset of drilling activities.
   3) The PMWs shall also be sampled for total dissolved solids (mg/L) during the first four weeks of PMW sampling; prior to events as described under Item **4)** below; and at all times when specifically requested by the Department.
   4) The PMWs shall be sampled 48 hours prior to any maintenance, testing (including mechanical integrity testing) or repairs to the system which represent an increased potential for accidental discharge to the surficial aquifer.

   The results of the PMW analyses shall be submitted to the Department weekly. A summary sheet from the FDEP Southeast District is attached for your use when reporting the above information. The PMWs shall be retained in service for subsequent sampling upon receipt of written authorization from the Department for operational testing.

e. No fluid shall be injected without written authorization to the Department. The issuance of this construction and testing permit does not obligate the Department to authorize its operation, unless the well, monitoring system and surface appurtenances qualifies for an authorization. Note: exploratory wells do not inject as part of the testing program.

f. No underground injection is allowed that causes or allows movement of fluid into an underground source of drinking water (USDW) if such fluid movement may cause a violation of any primary drinking water standard or may otherwise adversely affect the health of persons.

g. If historical or archaeological artifacts, such as Indian canoes, are discovered at any time within the project site, the permittee shall notify the FDEP SED office in West Palm Beach and the Bureau of Historic Preservation, Division of Archives, History and Records Management, R. A. Gray Building, Tallahassee, Florida 32301, telephone number (850) 487-2073.

2) Construction and Testing Requirements

a. Prior to the commencement of any work, the name of the Florida-licensed water well contractors supervising the drilling operations and the water well contractors' registration number shall be submitted to the Department. The permittee or the engineer of record shall provide the Department with copies of all required federal, state or local permits prior to spudding well IW-1.

b. The measurement points for drilling and logging operations shall be surveyed and referenced to the North American Vertical Datum (NAVD) of 1988 prior to the onset of drilling activities for well IW-1.

c. Blow-out preventers or equal shall be installed IW-1 and the dual zone monitoring well prior to penetration of the Floridan Aquifer System.

b. No drilling operations shall begin without an approved disposal site for drilling fluids, cuttings, or waste. It shall be the permittee's responsibility to obtain the necessary Department and local agency approval(s) for disposal prior to the start of construction. A detailed disposal plan shall be submitted to the Department prior to the commencement of drilling activities (for the injection and monitoring wells).

c. The Department shall be notified within 72 hours after work has commenced.

d. Hurricane Preparedness - Upon the issuance of a "Hurricane Watch" by the National Weather Service, the preparations to be made shall include but are not limited to the following:

   1) Secure all on-site chemicals, and other stockpiled additive materials to prevent surface and/or ground water contamination.

   2) Properly secure drilling equipment and rig(s) to prevent damage to well(s) and on-site treatment process equipment as well as public property.

e. Waters spilled during construction or testing of the injection well system shall be contained and properly disposed.

f. UIC-TAC review and Department approval are required prior to the following stages of construction and testing:

   1) Contract documents and spud date
   2) Intermediate (28-inch) casing seat in injection well
   3) Final (18-inch) casing seat in injection well
   4) Final seat for tubing and packer in injection well
   5) Intermediate (12.75-inch) casing seat in monitoring well
   6) Final (6.10-inch O.D.) casing seat in monitoring well
   7) Monitoring zone selection
   8) Mechanical integrity testing
   9) Short-term injection test
   10) Operational testing

g. The geophysical logging program shall at a minimum include:

   1) Prior to setting the 28-inch O.D. conductor casing in Dual Zone Monitor Well DZMW-1, the following geophysical logs shall be run on the pilot hole, to establish a mechanically secure casing setting depth:

      - Caliper
      - Gamma ray

2) Prior to setting the 12.75-inch O.D. intermediate casing in Dual Zone Monitor Well DZMW-1, the following geophysical logs shall be run on the pilot hole for stratigraphic correlation, identification of the upper monitoring zone, and to aid in the casing seat determination (mechanically secure casing setting depth):

- Caliper
- Gamma ray
- Dual induction and Spontaneous potential
- Borehole compensated sonic with VDL display
- Temperature (with differential plot)
- Borehole televiewer or Downhole radial color television survey with rotating lens
- Logs to be run under pumping and static conditions:
    - Flowmeter
    - Temperature
    - Fluid resistivity

***** Note: The pumping logs shall be run while pumping the borehole at a rate that adequately stresses the confining units, as shown by head loss across the beds, and allows the log interpreter to clearly identify the confining beds.

3) Prior to setting the 6.10-inch O.D. final casing in Dual Zone Monitor Well DZMW-1, the following geophysical logs shall be run on the pilot hole for stratigraphic correlation, identification of the lower monitoring zone, and to aid in the casing seat determination (mechanically secure casing setting depth):

- Caliper
- Gamma ray
- Dual induction and Spontaneous potential
- Borehole compensated sonic with VDL display
- Temperature (with differential plot)
- Borehole televiewer or Downhole radial color television survey with rotating lens
- Logs to be run under pumping and static conditions:
    - Flowmeter
    - Temperature
    - Fluid resistivity

***** Note: The pumping logs shall be run while pumping the borehole at a rate that adequately stresses the confining units, as shown by head loss across the beds, and allows the log interpreter to clearly identify the confining beds.

4) Prior to setting the 36-inch O.D. surface casing in Injection Well IW-1, the following geophysical logs shall be run on the pilot hole, to identify the base of the Hawthorn Group at approximately 1000 feet bls, and to establish a mechanically secure casing setting depth:

- Caliper
- Gamma ray
- Dual induction and Spontaneous potential

5) To determine the intermediate (28-inch) casing depth in Injection Well IW-1, the logs indicated below shall be run on the pilot hole. These logs shall be interpreted for stratigraphic correlation, identification of confining units, identification of producing intervals, and to aid in the casing seat determination:

- Caliper
- Gamma ray
- Dual induction and Spontaneous potential
- Borehole compensated sonic with VDL display
- Temperature (with differential plot)
- Borehole televiewer or Downhole radial color television survey with rotating lens
- Logs to be run under pumping* and static conditions:
    - Flowmeter
    - Temperature (with differential plot)
    - Fluid resistivity

***** Note: The pumping logs shall be run while pumping the borehole at a rate that adequately stresses the confining units, as shown by head loss across the beds, and allows the log interpreter to clearly identify the confining beds. The results of the flowmeter log run under dynamic conditions shall include presentations both in gallons per minute and in percent of flow analysis.

6) To determine the final (18-inch) casing depth in Injection Well IW-1, the logs indicated below shall be run on the pilot hole. These logs shall be interpreted for stratigraphic correlation, identification of confining units, identification of producing intervals, and to aid in the casing seat determination:

- Caliper
- Gamma ray
- Dual induction and Spontaneous potential
- Borehole compensated sonic with VDL display
- Temperature (with differential plot)
- Borehole televiewer or Downhole radial color television survey with rotating lens
- Logs to be run under pumping* and static conditions (to a depth of approximately 2,900 ft bls):
  - Flowmeter
  - Temperature (with differential plot)
  - Fluid resistivity

7) In the injection zone below the final casing of Injection Well IW-1, the following logs shall be run on the pilot hole:

- Caliper
- Gamma ray
- Dual induction
- Borehole compensated sonic with VDL display
- Temperature (with differential plot)
- Borehole televiewer or Downhole radial color television survey with rotating lens
- Flowmeter
- Fluid resistivity

8) Caliper and gamma ray logs shall be run on all reamed holes.

9) Temperature logs shall be run after each stage of cementing on all casings to identify the top of the cement.

10) A cement bond log shall be run after cementing the final casing in Injection Well IW-1 (18-inch casing), and both before and after cementing the final FRP casing in Dual Zone Monitor Well DZMW-1 (6.10-inch O.D. casing). Should the results of the cement bond log run in DZMW-1 be inconclusive, the completion of a sector bond log in DZMW-1 may be required.

11) Television surveys shall also be performed (to total depth of well) upon completion of Injection Well IW-1 and Dual Zone Monitor Well DZMW-1.

h. Packer testing shall at a minimum include the following:

1) A combined total of at least nine packer tests shall be conducted during the drilling of Injection Well IW-1 and Dual Zone Monitor Well DZMW-1.
2) At least one packer test conducted in each prospective monitoring zone in DZMW-1.
3) At least seven packer tests, conducted from the lowermost zone of the USDW to the top of the proposed injection horizon, will be used for the demonstration of confinement at the IW-1/DZMW-1 location. For this reason the packer tests will be performed in the anticipated confining zones. At least one packer test supporting the demonstration of confinement will be obtained from each interval under consideration, based on the data collected to date, to be a confining unit. [See Specific Condition (S.C.) **2.n.**]. To the extent

feasible, the packer tests in the confining zones shall be performed over intervals that are sufficiently narrow so as not to include high hydraulic conductivity beds.

4) At least one packer test conducted to determine the USDW base at the IW-1/DZMW-1 location.
5) Water samples shall be collected from each packer test, and analyzed for total dissolved solids (TDS), chlorides, temperature compensated specific conductance, sulfate, ammonia and Total Kjeldahl Nitrogen (TKN), at a minimum.
6) A 2½ water sample, obtained from intervals where sufficient water is available, shall be collected at the end of each packer test. These samples shall be shipped to Florida State University, Department of Geological Sciences, 108 Carraway Building, Tallahassee, FL 32306-4100.

i. A combined total of at least six cores shall be collected during the drilling of Injection Well IW-1 and Dual Zone Monitor Well DZMW-1. At least one core shall be collected between 1,600 and 2,000 feet bls and at least five cores shall be collected between 2,000 and 2,900 feet bls.

j. The depth of the USDW and the background water quality of the monitoring zones shall be determined during drilling and testing. Determination of the depth of the USDW shall be accomplished, interpreted, and analyzed using the following information:

1) Water samples from packer tests with analysis and interpretation.
2) Geophysical logging upon reaching the total depth of the appropriate pilot hole interval including the following logs: caliper, gamma, dual induction, borehole compensated sonic, pumping flowmeter, temperature, and fluid resistivity.
3) Plots of sonic porosity and apparent formation fluid resistivity (Rwa). Interpretation will include calculation of sonic porosity and Rwa. The input parameters used to make this calculation shall be provided.

The confinement of the injection zone in the injection well system from overlying aquifers shall be monitored using the dual zone monitoring well and a regular monitoring program. The lower interval shall be positioned in a transmissive interval below the USDW (i.e., where groundwater contains a TDS concentration of greater than 10,000 mg/L) at an appropriate point above the injection interval and major confining unit to monitor for reasonable assurance of vertical confinement of injected fluids and external mechanical integrity of the injection wells. The upper interval shall be positioned in immediate proximity to the base of the USDW. The data and analysis supporting the selection of the monitoring intervals shall be submitted to the Department and the UIC-TAC after the collection, interpretation and analysis of all pertinent cores, geophysical logs and analysis of fluid samples. The hydrogeologic evaluation of a proposed monitoring zone will be submitted only after the collection, interpretation and analysis of all pertinent cores, packer tests, geophysical logs and analysis of fluid samples.

k. Analysis of fluid samples. The Department shall approve the final selection of the specific upper and lower monitoring intervals.

l. To identify the upper and lower monitoring zones, the following information from the injection well and all available on-site sources of data shall be analyzed, interpreted and submitted for UIC-TAC review and Department approval:

1) borehole televiewer or downhole television survey
2) the permeability of the transition zone in the vicinity of the USDW
3) packer test data including water quality (TDS, chlorides, temperature compensated specific conductance, ammonia and TKN, at a minimum)
4) the specific capacity of the upper and lower monitoring zones
5) the identification of the base of the USDW

m. Confinement for the Injection Well IW-1 location shall be demonstrated using, at a minimum, directly measured lithologic properties, geophysical evidence, and tests performed while pumping the formation.

n. Test results pertaining to confinement shall include and/or specifically reference the following informational and quality control items:

1) Quality control measures taken, including:

- Information that documents the calibration of tools, including field checks prior to testing.
- The conditioning/development of the borehole prior to logging, including the techniques used and the time periods in which applied, and
- Pertaining to packer/pump testing — recording the pumping rate regularly throughout the test to account for possible variations in the pumping rate, and providing information regarding the detection of packer leaks, if any, during testing.

o. Representative samples of circulation fluid shall be collected during the drilling of the pilot hole of Injection Well IW-1, and during the drilling of Dual Zone Monitor Well DZMW-1. At IW-1, the representative samples of circulation fluid shall be collected a minimum of every 90 feet in drilling from a depth of approximately 1000 feet bls to a depth of 2,000 feet bls. Below this depth, the representative samples shall be collected a minimum of every 60 feet to the top of the “Boulder Zone” preliminarily estimated at approximately 2,920 feet bls. At MW-1, the representative samples shall be collected a minimum of every 90 feet in drilling from a depth of approximately 1000 feet bls to the total depth of the pilot hole. The circulation fluid samples shall be analyzed for chlorides, specific conductance, ammonia and TKN, at a minimum.

p. If effluent is encountered or suspected during pilot hole drilling and testing, the Department shall be notified immediately by telephone and in writing and immediate appropriate precautionary measures shall be taken to prevent any upward fluid movement.

q. Mechanical integrity of the injection well shall be determined pursuant to Rules 62-528.300(6)(b)1. and 62-528.300(6)(c), F.A.C.

1) The pressure test for the injection casing shall be accepted if tested at 1.5 times the operating pressure at which the well is to be permitted. A test tolerance of not greater than ± 5% in total must be certified by the engineer of record.
2) The pressure test for the annular space (between the final casing and the injection tubing) shall be accepted if tested with a liquid filled annular space at 1.5 times the operating pressure at which the well is to be permitted. A test tolerance of not greater than ± 5% in total must be certified by the engineer of record.
3) Verification of pressure gauge calibration must be provided to the Department representative at the time of the test and in the certified test report.

r. The Department shall be notified at least 72 hours prior to all testing for mechanical integrity.

s. All testing for mechanical integrity must be initiated during normal business hours, Monday through Friday.

t. UIC-TAC meetings are scheduled on the 2nd and 4th Tuesday of each month subject to a five working day prior notice and timely receipt of critical data by all UIC-TAC members and the USEPA, Region IV, Atlanta. Emergency meetings may be arranged when justified to avoid undue construction delays.

3. Quality Assurance/Quality Control Requirements

a. Pursuant to Rule 62-528.440(5)(b), F.A.C., the Professional Engineer(s) of Record shall certify all documents related to the completion of the Class I injection well system (including the associated Floridan aquifer monitoring well) as a disposal facility. The Department shall be notified immediately of any change of the Engineer(s) of Record.

b. In accordance with Section 492, Florida Statutes, all documents prepared for the geological/hydrogeological evaluation of the injection well system shall be signed and sealed by a Florida Licensed Professional Geologist or qualified Florida Licensed Professional Engineer.

c. Continuous on-site supervision by qualified personnel (engineer or geologist) is required during all testing, geophysical logging and cementing operations.

4. Reporting Requirements

a. All reports and surveys required by this permit shall be submitted concurrently to all members of the UIC-TAC. The UIC-TAC shall consist of representatives of the following agencies:

- Department of Environmental Protection, West Palm Beach and Tallahassee
- United States Geological Survey (USGS), Miami
- South Florida Water Management District (SFWMD), West Palm Beach
- Palm Beach County Department

b. A drilling and construction schedule shall be submitted to the Department, all members of the UIC-TAC prior to site preparation for the injection well system.

c. The Department and other applicable agencies must be notified of any unusual or abnormal events occurring during construction, and in the event the permittee is temporarily unable to comply with the provisions of the permit (e.g., on-site spills, artesian flows, large volume circulation losses, equipment damage due to: fire, wind and drilling difficulties, etc.). Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

d. The permittee shall report any noncompliance which may endanger health or the environment, including:

1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or

2) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

e. Weekly progress reports shall be submitted throughout the construction period for IW-1 and DZMW-1. These weekly reports shall be submitted no later than the 2nd day immediately following the period of record, and shall include at a minimum the following information:

1) A cover letter summary of the daily engineer report, driller's log and a projection for activities in the next reporting period.
2) Daily engineers report and driller's/work log with detailed descriptions of all drilling progress, cementing, testing, logging, deviation surveys, amounts of material added to control flow (salt, mud, etc.), and casing installation activities.
3) Lithologic and geophysical logs and water quality test results.
4) Interpretations shall be included with all test results and logs submitted under Items **2)** and **3)** above.
5) Detailed description of any unusual construction-related events that occur during the reporting period.
6) Weekly water quality analysis and water levels for the four pad monitoring wells. [See S.C. **1.b.**]
7) A certified evaluation of all logging and test results must be submitted with test data.
8) Description of the formations and lithology encountered.
9) Details of cementing operations, including the number of cementing stages, and the following information for each stage of cementing: cement slurry composition, specific

gravity, pumping rate, volume of cement pumped, theoretical fill depth, and actual tag depth. From both the physical tag and the geophysical logs, a percent fill shall be calculated. An explanation of any deviation between actual versus theoretical fill shall be provided. For each casing, laboratory analysis of dry cement composition of a sample taken during the neat cement stage emplaced at the base of each casing.

f. Per Rules 62-528.410(4)(c), 62-528.420(4)(c) and 62-528.605(2), F.A.C., the final selection of specific injection and monitoring intervals must be approved by the Department. In order to obtain an approval, the permittee shall submit a request to the Department. The request shall be submitted concurrently to all members of the UIC-TAC and the USEPA, Region IV, Atlanta. All casing seat requests for the injection well and the Floridan aquifer monitoring well shall be accompanied by technical justification. To the extent possible, each casing seat request should address the following items:

  1) Lithologic and geophysical logs with interpretations, as the interpretations relate to the casing seat.
  2) Water quality data (including but not necessarily limited to TDS concentrations).
  3) Identification of confining units, including hydrogeologic data and interpretations.
  4) Identification of monitoring zones.
  5) Casing depth evaluation (mechanically secure formation, potential for grout seal).
  6) Lithologic drilling rate and weight on bit data, with interpretations (related to the casing seat).
  7) Identification of the base of the USDW using water quality, Rwa plots, and geophysical log interpretations.

g. Monitoring zone requests shall contain the following:

  1) Identification of the base of the USDW.
  2) Identification of confining units.
  3) Water quality of proposed monitoring zone (including but not necessarily limited to TDS).
  4) Transmissivity or specific capacity of proposed monitoring zone.
  5) Packer test drawdown curves and interpretation.

h. An interpretation of all test results and geophysical logs must be submitted with all submittals.

i. The short-term injection test request shall contain the following justifications:

  1) Cement bond logs and interpretation.
  2) Final downhole television survey with interpretation.
  3) Radioactive tracer test results (if the test is to be run using effluent).
  4) Demonstration of mechanical integrity, which shall include Items **1)** through **3)** above, and the pressure testing and temperature logging results (if the test is to be run using effluent)
  5) Reasonable assurance that adequate confinement exists.
  6) Proposed source water to be used (if any untreated source water, must include analysis for primary and secondary drinking water standards (62-550, F.A.C.) and minimum criteria parameters (62-520, F.A.C.) as attached). Per Rule 62-528.405(3)(b), F.A.C., if an adequate water supply for the injection test does not exist, and the data collected during drilling provide assurance of the presence of confining bed(s), the applicant shall, after demonstrating mechanical integrity pursuant to Rules 62-528.300(6)(b)2. and (c), F.A.C., be allowed to use an alternate source for testing only with specific prior written authorization from the Department as described in Rule 62-528.100(2), F.A.C.
  7) Planned injection procedures.

j. Upon completion of analysis of cores (when no longer needed by the well owner) and sample cuttings recovered during the construction of Injection Well IW-1 and Dual Zone Monitoring Well DZMW-1, the County shall contact the UIC Section of the Department of Environmental Protection in Tallahassee to arrange their transfer to the Florida State Geologic Survey.

k. A final report of the construction and testing of the injection well and dual zone monitoring well, shall be submitted no later than 120 days after commencement of operational testing, pursuant to Rule 62-528.430(1)(e), F.A.C. This report shall include, as a minimum, definitions of the injection interval, all relevant confining units, the depth of the base of the USDW and all monitoring zones, including all relevant data and interpretations.

5. Operational Testing Requirements

a. The operational testing of the Class I injection well system under this permit shall not commence without written authorization from the Department.

b. Prior to operational testing approval, the following items must be submitted (with the request for operational testing approval) for UIC-TAC and USEPA review and Department approval:

1) Lithologic and geophysical logs with interpretations.

2) A copy of the borehole television survey of the injection well with interpretation.

3) Certification of mechanical integrity and interpreted test data.

4) Results of the short-term injection test with interpretation of the data. Each well shall first be tested for integrity of construction, and shall be followed by a short term injection test of such duration to allow for the prediction of operating pressure. The test results shall include a calculation or determination of fracture pressure of the injection formation [per Rule 62-528.410(6)(b)3., F.A.C.]. For a minimum of 12 hours, the injection test rate shall be no less than the maximum rate at which the well is to be permitted. Pressure/water level data from the injection zone and both monitoring zones shall be recorded continuously for at least 24 hours before the test and at least 24 hours following the test. The following data shall be recorded, analyzed, and reported for the duration of the injection test, i.e., all data should encompass the entire background, injection and recovery periods:

- injection flow rate, in MGD, with all injection periods recorded (IW-1)
- injection wellhead pressure, in psig (IW-1).
- pressure, in psig (IW-1)
- pressure with no flow (shut-in pressure in psig; IW-1)
- monitoring well pressures (DZMW-1 upper and lower zones)
- tidal data
- barometric pressure

5) A description of the actual injection procedure including the anticipated maximum pressure and flow rate at which the well will be operated under normal and emergency conditions.

6) Information concerning the compatibility of the injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone.

7) Certification of completion of well construction.

8) Surface equipment (including piping, pressure gauges and flow meters, and all appurtenances) completion certified by the Engineer of Record.

9) Draft operation and maintenance manual, including a description of surge and water hammer control and emergency discharge management plan procedures. The emergency discharge system must be fully constructed and operational (ready to operate) prior to approval of operational testing.

10) Calibration certificates for pressure gauges and flow meters.

11) Signed and sealed record "as-built" engineering drawings of the injection well system including all well construction, subsurface and surface piping and equipment, and appurtenances.

12) The well construction drawings shall include a geologic stratigraphic cross-section depicting the corresponding formations, the base of the USDW, and the boundaries of the confining and injection zone intervals.

13) The demonstration of confinement for the Injection Well IW-1 location, 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 dual zone monitoring 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/monitoring 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 qualified Professional Engineer.

14) Background water quality data from the monitor and injection zones, analyzed for primary and secondary drinking water standards (62-550, F.A.C.) as attached.

15) Other data obtained during well construction needed by the Department to evaluate whether the well will operate in compliance with Department Rules. [Rule 62-528.450(3)(a)3.i., F.A.C.]

16) A request to properly plug and abandon the pad monitoring wells, or to properly secure them from vandalism in the event they may wish to be used by the permittee for uses other than this permit or future permits.

c. Prior to operational testing, the permittee shall comply with the requirements of Rule 62-528.450(3)(a),(b), and (c), F.A.C.

d. Pressure gauges and flow meters shall be installed on the injection well prior to initiating injection activities at the site.

e. Prior to the authorization of operational testing by the Department, the County shall contact the UIC Section of the Department, Southeast District, to arrange a site inspection. The inspection will determine if the conditions of the permit have been met and to verify that the injection well system is operational. During the inspection, emergency procedures and reporting requirements shall be reviewed.

6. Operational Testing Conditions

a. Upon receipt of written authorization from the Department [S.C. 5.a.], the operational testing of the injection well system shall be subject to the following conditions:

1) A qualified representative of the Engineer of Record shall be present for the start-up operations.

2) The Department shall be notified in writing of the date of commencement operations.

3) The Department and UIC-TAC will monitor the progress of the operational testing phase of this project. UIC-TAC meetings shall be held if necessary to aid the Department in determining if it may be necessary to modify the operational testing conditions. If requested by the Department, reports evaluating the system's progress shall be submitted to the Department, each member of the UIC-TAC, and the USEPA, Region IV, Atlanta at least two weeks prior to the scheduled UIC-TAC meeting. The conditions for the operational testing period may be modified by the Department at each of these UIC-TAC review intervals.

4) The flow to the injection well at the wellhead shall be monitored and controlled at all times to ensure the maximum injection rate does not exceed the rate at which the well was tested.

5) Injection well system monitoring devices:

a) Pursuant to Rule 62-528.425(1)(b), F.A.C., the injection well system shall be monitored by continuous indicating, recording and totalizing devices to monitor concentrate flow rate and volume, and continuous indicating and recording devices to monitor injection pressure, annular pressure and monitoring zone pressure (or water level, as appropriate; all zones). All indicating, recording and totalizing devices shall be maintained in good operating condition.

b) The surface equipment shall be such that manual backup capability to monitor pressure shall be provided for systems utilizing automatic and continuous recording equipment.

6) The permittee shall calibrate all pressure gauges, flowmeters, chart recorders, and other related equipment associated with the injection well system on a semiannual basis, at a minimum. The permittee shall maintain all monitoring equipment and shall ensure that the monitoring equipment is calibrated and in proper operating condition at all times.

Laboratory equipment, methods, and quality control will follow USEPA guidelines as expressed in Standard Methods for the Examination of Water and Wastewater. The pressure gauges, flow meter, and chart records shall be calibrated using standard engineering methods.

7) The wellhead and associated appurtenances shall be equipped with lightning arrestors, surge capacitors or other similar devices.

8) The flow from the monitoring zones during well evacuation and sampling must not be discharged to surface waters or aquifers containing a USDW.

9) The wastewater stream shall be non-hazardous in nature at all times, as defined in 40-CFR, Part 261 and as adopted in Chapter 62-730, F.A.C.

10) Only non-hazardous reverse-osmosis reject concentrate and associated wastestreams from the County's Lake Region WTP, development water from the brackish-water production wells, and purge water from the on-site monitoring wells (associated with the injection well systems at the Lake Region WTP) may be discharged into this well.

11) Mechanical Integrity

    a) Injection is prohibited until the permittee demonstrates that the well has mechanical integrity. Prior to operational testing the permittee shall establish, and thereafter maintain, the mechanical integrity of the well at all times.
    b) If the Department determines that the injection well lacks mechanical integrity, written notice shall be given to the permittee.
    c) Within 48 hours of receiving written notice that the well lacks mechanical integrity, unless the Department requires immediate cessation of injection, the permittee shall cease injection into the well unless the Department allows continued injection pursuant to subparagraph (d) below.
    d) The Department shall allow the permittee to continue operation of a well that lacks mechanical integrity if the permittee has made a satisfactory demonstration that fluid movement into or between USDWs is not occurring.

12) The pressure at the wellhead shall be monitored and controlled at all times to ensure the maximum pressure at the wellhead casing does not exceed 66 percent (%) of the tested pressure on the final casing and injection tubing. [See S.C. 2.r.]

13) Any failure of the Class I injection well monitoring and recording equipment for a period of more than 48 hours shall be reported within 24 hours to the Department. A written report describing the incident shall also be given to the Department within five days of the start of the event. The final report shall contain a complete description of the occurrence, a discussion of its cause(s) and the steps being taken to reduce, eliminate, and prevent recurrence of the event, and all other information deemed necessary by the Department.

14) The injection system shall be monitored in accordance with Rules 62-528.425(1)(g) and 62-528.430(2), F.A.C. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The following injection well performance and monitoring zone data shall be collected and reported to the Department in Monthly Operating Reports (MORs) as indicated below.

    a) Injection well performance:

        (1) Physical characteristics of the injection well (IW-1):

            Flow rate parameters:
            - average daily flow rate to injection well as measured from flowmeter (MGD)
            - daily maximum sustained (15 minutes minimum) flow rate to injection well (MGD)
            - daily minimum sustained (15 minutes minimum) flow rate to injection well (MGD)
            - monthly average of the daily flow rates to injection well (MGD)
            - monthly maximum (peak hour) flow rate to injection well (MGD)
            - monthly minimum flow rate to injection well (MGD)

Volumetric parameters:

- total daily effluent to injection well from as measured from totalizer (MG)
- total monthly flow volume to injection well (MG)
- monthly average of the daily flow volumes to injection well (MG)
- monthly maximum of the daily flow volumes to injection well (MG)
- monthly minimum of the daily flow volumes to injection well (MG)

Wellhead pressure parameters:

- daily average injection pressure at injection well (psig)
- daily maximum sustained (15 minutes minimum) injection pressure at injection well (psig)
- daily minimum sustained (15 minutes minimum) injection pressure at injection well (psig)
- monthly average injection pressure at injection well (psig)
- monthly maximum sustained injection pressure at injection well (psig)
- monthly minimum sustained injection pressure at injection well (psig)
- monthly wellhead pressure with no flow (shut-in pressure, psig)

Annulus pressure parameters:

- daily average annular pressure at injection well (psig)
- daily maximum annular pressure at injection well (psig)
- daily minimum annular pressure at injection well (psig)
- monthly average annular pressure at injection well (psig)
- monthly maximum annular pressure at injection well (psig)
- monthly minimum annular pressure at injection well (psig)

(2) Chemical characteristics of the concentrate stream sampled monthly:

- residue, total filterable (dried at 180° C) [total dissolved solids, TDS] (mg/L)
- chloride (mg/L)
- specific conductance (temperature compensated, μmho/cm or μS/cm)
- total suspended solids, TSS (mg/L)
- nitrogen, ammonia, total as N (mg/L)
- nitrogen, total Kjeldahl as N (TKN, mg/L)
- nitrogen, nitrate, total as N (mg/L)
- phosphorous, total as P (mg/L)
- pH (standard units, s.u.)
- sulfate, total as SO_4 (mg/L)
- potassium (mg/L)
- sodium, as Na (mg/L)
- calcium, as Ca (mg/L)
- magnesium, as Mg (mg/L)
- iron, as Fe (mg/L)
- bicarbonate, as HCO_3 (mg/L)
- temperature, as C

- gross alpha (ρCi/L)
- radium 226 (ρCi/L)
- radium 228 (ρCi/L)

The MORs shall indicate monthly averages for all parameters sampled daily.

b) Monitoring well performance:

(1) Physical characteristics - upper and lower monitoring zones potentiometric surface or water table height relative to NAVD 88 (feet of head) or pressure (psig) referenced to NAVD 88:

- daily maximum pressure or water level (as appropriate)
- daily minimum pressure or water level (as appropriate)
- daily average pressure or water level (as appropriate)

- monthly maximum pressure or water level (as appropriate)
- monthly minimum pressure or water level (as appropriate)
- monthly average pressure or water level (as appropriate)

(2) Chemical characteristics of the upper and lower monitoring zones:

Weekly sampling:

- residue, total filterable (dried at 180° C) [total dissolved solids, TDS] (mg/L)
- chloride (mg/L)
- specific conductance (temperature compensated, μmho/cm or μS/cm)
- nitrogen, ammonia, total as N (mg/L)
- nitrogen, total Kjeldahl as N (TKN, mg/L)
- nitrogen, nitrate, total as N (mg/L)
- phosphorous, total as P (mg/L)

- temperature, as C
- pH (standard units, s.u.)
- sulfate, total as SO_4 (mg/L)

The MORs for the deep monitoring well shall also indicate monthly averages for all parameters sampled weekly.

(3) Chemical characteristics of the upper and lower monitoring zones:

Monthly sampling:

- potassium (mg/L)
- sodium, as Na (mg/L)
- calcium, as Ca (mg/L)
- magnesium, as Mg (mg/L)
- iron, as Fe (mg/L)
- bicarbonate, as HCO-3 (mg/L)

The MORs for the deep monitoring well shall also indicate monthly averages for all parameters sampled weekly.

Monthly sampling for lower monitoring well only:

- gross alpha (ρCi/L)
- radium 226 (ρCi/L)
- radium 228 (ρCi/L)

c) After the upper and lower monitoring zones have been sampled weekly for at least six months, the permittee may submit data for UIC-TAC and USEPA review and Department approval to demonstrate that reasonable assurance of groundwater stability has been established in justification of any request to reduce the sampling frequency to monthly. The request for reduction in sampling frequency shall be accompanied by technical justification and interpretations.

15) A minimum of three well volumes of fluid shall be evacuated from the monitoring systems prior to sampling for the chemical parameters listed above. A State-certified laboratory shall analyze all samples. Sufficient purging shall have occurred when either of the following have occurred:

a) pH, specific conductivity <u>and</u> 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
b) upon purging the fifth well volume.

16) All samples must be collected and analyzed in accordance with the quality assurance/quality control (QA/QC) requirements of Rule 62-160, F.A.C.

17) All injection well system data submissions including MORs shall be clearly identified on each page with facility name, I.D. Number, permit number, operator's name, license number, daytime phone number, date of sampling/recording, and type of data. Monitoring zones shall be identified by well number and depth interval. The lead plant operator or higher official must sign and date each submittal. An approved summary sheet from the FDEP Southeast District UIC Section is attached.

18) The permittee shall submit monthly to the Department the results of all injection well and monitoring well data required by this permit (MORs) **no later than the last day of the month** immediately following the month of record. The results shall be sent to the Department of Environmental Protection's Southeast District Office (FDEP, UIC Section, 400 N. Congress Avenue, Suite 200, West Palm Beach, FL 33401). A copy of this report shall also be sent to the Department of Environmental Protection, Underground Injection Control Program, MS 3530, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

19) A controlled monthly injectivity test (rate/pressure) shall be conducted on IW-1 in accordance with Rule 62-528.430(2)(d), F.A.C. This test shall be conducted at a rate that approaches the maximum design flow but which can be repeated on a monthly basis. The injectivity test results shall be reported to the Department in the MORs. The following data shall be recorded and reported:

Parameters pertinent to flow rate:

- injection flow rate as measured from flowmeter (MGD)
- initial totalizer reading (gallons)
- final totalizer reading (gallons)
- time (minutes) from initial to final totalizer readings

Pressure parameters:

- static injection wellhead pressure (psig)
- wellhead injection pressure fall-off — every 30 seconds until again static (psig)
- final pressure upon test cessation — approximately 10-15 minutes (psig)
- wellhead pressure with no flow (shut-in pressure in psig)
- monitoring zone pressures (psig)

Specific Injectivity shall be reported in gpm/psig.
All readings shall be taken after a minimum 5-minute period of stabilized flow.

Pursuant to Rule 62-528.430(2)(d), F.A.C., as part of the specific injectivity test, each well shall be shut-in for a period of time necessary to conduct a valid observation of pressure fall-off.

20) Wastewater stream analysis:

a) A wastewater stream analysis (24 hour composite sample) for primary and secondary drinking water standards (Chapter 62-550, F.A.C.) see attached list, shall be submitted within one month of the commencement of operational testing.

b) Pursuant to Rules 62-528.425(1)(a) and 62-528.450(2)(f)3., F.A.C., a wastewater stream analysis (24 hour composite sample) for primary and secondary drinking water standards (Chapter 62-550, F.A.C.), see attached list, shall be submitted annually (sampled in February and **submitted on or before April 30**).

7. Surface Equipment

a. The integrity of the monitoring zone sampling systems shall be maintained at all times. Sampling lines shall be clearly and unambiguously identified by monitoring zone at the point at which samples are drawn. All reasonable and prudent precautions shall be taken to ensure that samples are properly identified by monitoring zone and that samples obtained are representative of those zones. Sampling lines and equipment shall be kept free of contamination with independent discharges and no interconnections with any other lines.

b. The surface equipment for the injection well system shall maintain compliance with Chapter 62-600, F.A.C. for water hammer control, screening, access for logging and testing, and reliability and flexibility in the event of damage to the well and effluent piping. A regular program of exercising the valves integral to the wellhead shall be instituted. At a minimum, all valves integral to the wellhead shall be exercised during the regularly scheduled monthly injectivity testing.

c. The injection well and monitoring well surface equipment and piping shall be kept free of corrosion at all times.

d. Spillage onto the injection well pad during construction activities, and any waters spilled during mechanical integrity testing, other maintenance, testing or repairs to the system shall be contained by an impermeable wall around the edge of the pad. The spilled waters shall be directed to a sump which in turn discharges to the pumping station wet well or via other approved means to the injection well system.

e. An injection well construction pad with impermeable perimeter retaining wall shall be maintained and retained in service for the life of the injection well. The injection and monitoring well pad(s) are not, unless specific approval is obtained form the Department, to be used for storage of any material or equipment at any time.

8. Financial Responsibility

a. The permittee shall maintain the resources necessary to close, plug and abandon the injection and associated monitoring wells, at all times [Rule 62-528.435(9), F.A.C.].

b. The permittee shall review annually the plugging and abandonment cost estimates. An increase of ten percent or more over the cost estimate upon which financial responsibility is based shall require the permittee to submit documentation to obtain an updated Certificate of Demonstration of Financial Responsibility.

c. In the event the mechanism used to demonstrate financial responsibility should become invalid for any reason, the Permittee shall notify the Department of Environmental Protection in writing within 14 days of such invalidation. The permittee shall then within 30 days of said notification submit to the Department for approval new financial documentation in order to comply with Rule 62-528.435(9), F.A.C., and the conditions of this permit.

9. Emergency Disposal

a. All applicable federal, state, and local permits shall be in place to allow for any alternate discharges due to emergency or planned outage conditions.

b. Any proposed changes in emergency disposal methods shall be submitted for UIC-TAC review and Department approval prior to implementation.

c. In the event of an emergency and/or discharge, or other abnormal event where the permittee is temporarily unable to comply with any of the conditions of this permit due to breakdown of equipment, power outages, destruction by hazard or fire, wind, or by other cause, the Department shall be notified in person or by telephone within 24 hours of the incident. A written report describing the incident shall also be submitted to the Department within five days of the start of the incident. The written report shall contain a complete description of the emergency and/or discharge, a discussion of its cause(s), and if it has been corrected, the anticipated time the discharge is to continue, the steps being taken to reduce, eliminate, and prevent recurrence of the event, and all other information deemed necessary by the Department.

d. The emergency disposal method consists of the following:

1) The emergency disposal method presented in the permit application received November 24, 2004 and approved by the Department as a part of this permit, shall be maintained in fully operational order at all times.

2) The emergency disposal method includes termination of reject concentrate. In the unlikely event that the well might have to be shut-down for several days for repairs, there is sufficient room on site to construct temporary lined storage basins for concentrate, which would later be disposed of in the injection well upon completion of repairs.

3) Any emergency bypass of the injection well system shall be governed by Rule 62-620.610, F.A.C.

4) Any proposed changes in emergency disposal methods shall be submitted for UIC-TAC and USEPA review and Department approval prior to implementation.

10. Permit Extension(s), Renewal(s) and Operation Permit Application(s)

a. Pursuant to Rule 62-4.080(3), a permittee may request that a permit be extended as a modification of an existing permit. A request for an extension is the responsibility of the permittee and shall be submitted to the Department before the expiration of the permit. In accordance with Rule 62-4.070(4), F.A.C., a permit cannot be extended beyond the maximum 5-year statutory limit. Should operational testing need to continue beyond the 5-year limit for this permit, the permittee must renew the construction permit in accordance with S.C. **10.b.** below.

b. If injection is to continue beyond the expiration date of this permit the permittee shall apply for, and obtain an operation permit. If necessary to complete the two-year operational testing period, the permittee shall apply for renewal of the construction permit at least 60 days prior to the expiration date of this permit.

11. Signatories

a. All reports and other submittals required to comply with this permit shall be signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C.

b. In accordance with Rule 62-528.340(4), F.A.C., all reports shall contain the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel
> properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Issued this 9th day of November, 2005

Executed in West Palm Beach, Florida.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

____
Kevin R. Neal
District Director
Southeast District

SOUTHHEAST DISTRICT UIC SECTION
SURFICIAL AQUIFER MONITORING WELL (SAMW) REPORT

FACILITY NAME ____
REPORT MONTH/YR. _________________________

OPERATOR NAME ____________________ LICENSE # ______________________________

INJECTION WELL # ___________________ PERMIT # _______________________________

SAMPLING DATE _____________________ TIME ___________________________________

	SAMW #1	SAMW #2	SAMW #3	SAMW #4
LOCATION	NE CORNER	NW CORNER	SE CORNER	SW CORNER
ELEV. OF TOC* (NAVD 88)				
DEPTH TO WATER (TOC*)				
WATER LEVEL (NAVD 88)				
CHLORIDE (mg/L)				
CONDUCTIVITY(µS/cm)				
TOTAL DISOLV. SOLIDS (mg/L)				
TEMPERATURE (° C)				

* TOC: indicates the "top of the casing" of the Surficial Aquifer Monitoring Well

ANALYZED BY___________________________ SAMPLED BY ________________________

PHONE # ________________________________ TITLE ______________________________

SITE PLAN OF SAMW LOCATIONS

PARAMETER

Alachlor (Polychlorinated Biphenyl or PCB)
Aldicarb
Aldicarb sulfoxide
Aldicarb sulfone
Aroclors (Polychlorinated Biphenyls or PCBs)
Alpha, Gross
Antimony
Arsenic
Atrazine
Barium
Benzene
Benzo(a)pyrene
Beryllium
Bis(2-ethylhexyl) adipate (Di(2-ethylhexyl) adipate)
Bis(2-ethylhexyl) phthalate (Di(2-ethylhexyl) phthalate)
Cadmium
Carbofuran
Carbon Tetrachloride (Tetrachloromethane)
Chlordane
Chlorobenzene (Monochlorobenzene)
Chloroethylene (Vinyl Chloride)
Chromium
Coliforms, Total
Cyanide
2,4-D (2,4-Dichlorophenoxyacetic acid)
Dalapon (2,2-Dichloropropionic acid)
Dibromochloropropane (DBCP)
1,2-Dibromoethane (EDB, Ethylene Dibromide)
1,2-Dichlorobenzene (o-Dichlorobenzene)
1,4-Dichlorobenzene (p-Dichlorobenzene or Para Dichlorobenzene)
1,2-Dichloroethane (Ethylene dichloride)
1,1-Dichloroethylene (Vinylidene chloride)
1,2-Dichlorethylene (cis-1,2-Dichloroethylene or trans-1,2-Dichloroethylene)
cis-1,2-Dichloroethylene (1,2-Dichlorethylene)
trans-1,2-Dichloroethylene (1,2-Dichlorethylene)
Dichloromethane (Methylene chloride)
1,2-Dichloropropane
Di(2-ethylhexyl) adipate (Bis(2-ethylhexyl) adipate)
Di(2-ethylhexyl) phthalate (Bis(2-ethylhexyl) phthalate)
Dinoseb
Diquat
EDB (Ethylene dibromide, 1,2-Dibromoethane)
Endothall
Endrin
Ethylbenzene
Ethylene dichloride (1,2-Dichloroethane)
Fluoride
Glyphosate (Roundup)
Gross Alpha
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene (HCB)
gamma-Hexachlorocyclohexane (Lindane)
Hexachlorocyclopentadiene
Lead

PRIMARY DRINKING WATER STANDARDS, CONT'D

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

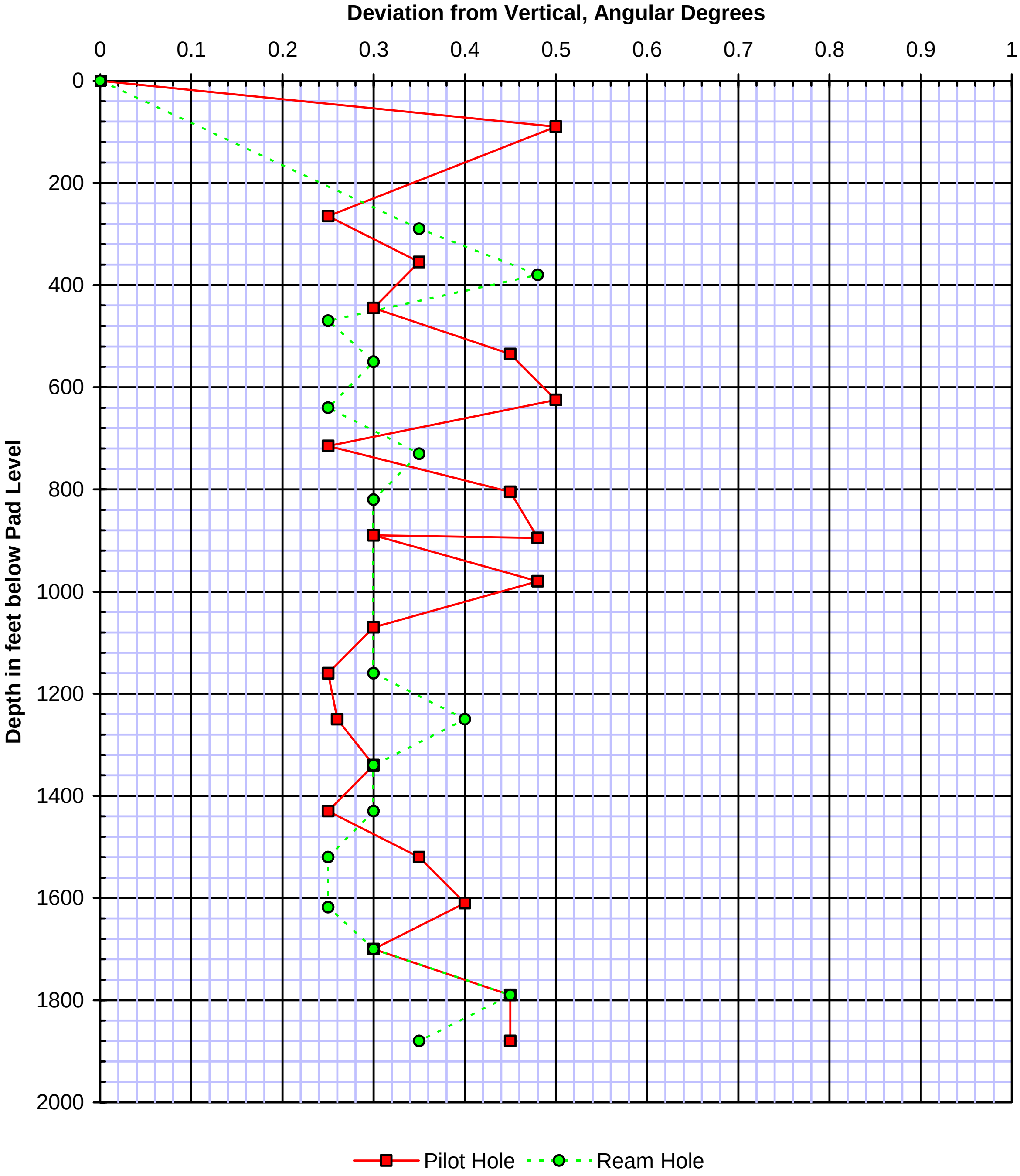
PARAMETER

Aluminum
Chloride
Color
Copper
Ethylbenzene
Fluoride
Foaming Agents (MBAS)
Iron
Manganese
Odor
pH
Silver
Sulfate
Toluene
Total Dissolved Solids (TDS)
Xylenes
Zinc

Appendix B
Deviation Survey

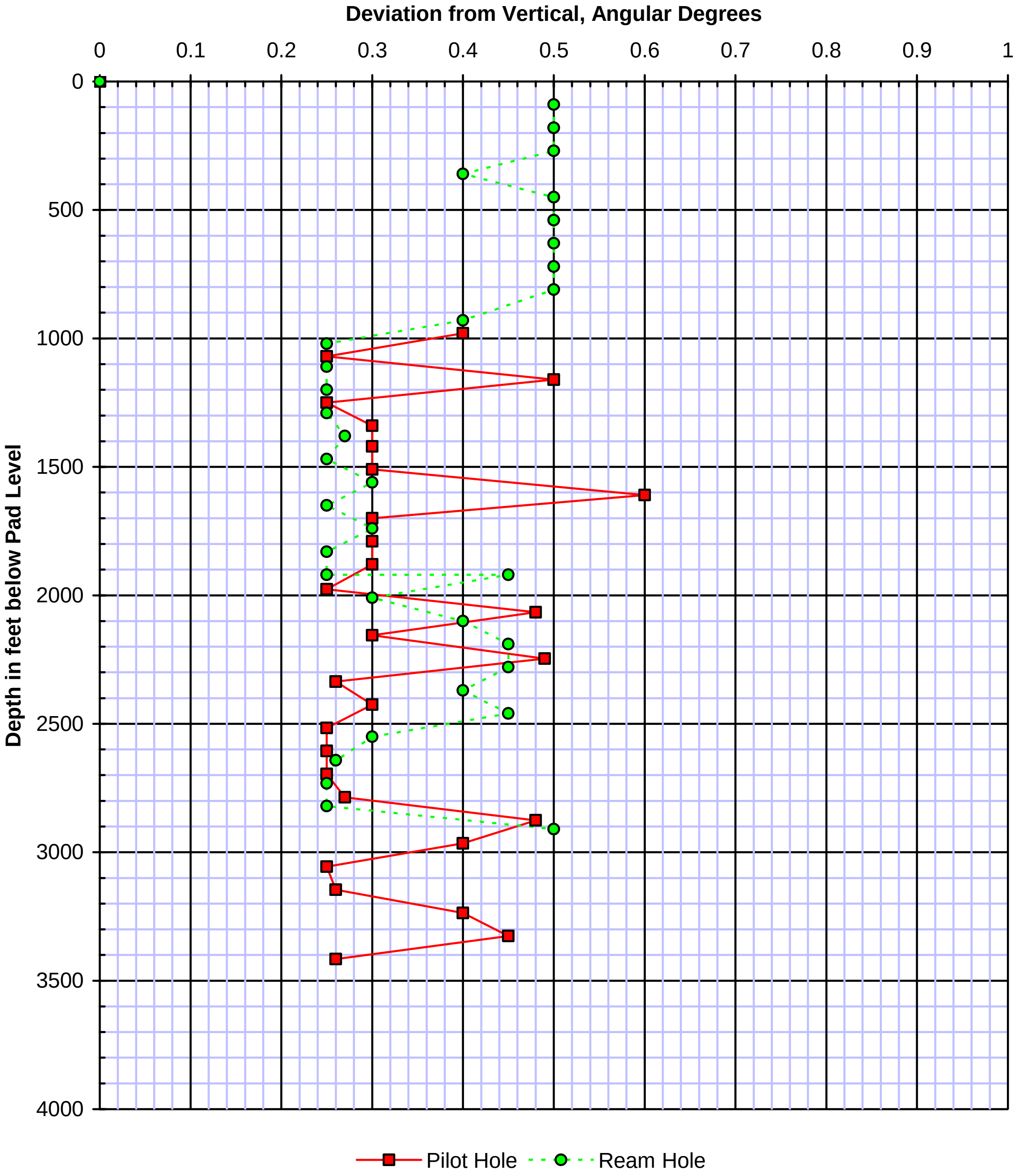
DZMW

DZMW
Pilot & Ream
Comparison of Deviation Surveys



IW

Injection Well
Pilot & Ream
Comparison of Deviation Surveys



Appendix C
Mill Certifications

DZMW

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: December 29, 2005

Number of Copies: 9

Submittal Number: 11360-015-A

Specification Section Number: 11360-015-A

Item Submitted: 6" FRP M/W Tubing

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: December 29, 2005

☑ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: S. Ulcer

Firm: PBCWUD

Date: 1/4/06

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 16 inch sizes that has a proven low installed cost and long lifespan.

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

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

COMPOSITION AND CLASSIFICATION

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

RED BOX casing and tubing will be authorized to use the API monogram by conforming to API Specification 15TR (when issued). Future Pipe Industries, Inc.'s 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.

FUTURE PIPE INDUSTRIES
Complete Pipe System Solutions

RED BOX 1500

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

DIMENSIONAL SPECIFICATIONS

February 20

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)	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	2.26	0.13	2.69	3.45	0.8	25	2-3/8" 8Rd EUE Long*IJ
2-7/8	2.47	2.37	2.77	0.15	3.19	3.95	1.2	35	2-7/8" 8Rd EUE Long*IJ
3-1/2	3.00	2.90	3.37	0.19	3.85	4.84	1.8	53	3-1/2" 8Rd EUE Long*IJ
4	3.33	3.24	3.75	0.21	4.35	5.26	2.3	70	4" 8Rd EUE Long* TC
4-1/2	3.98	3.89	4.48	0.25	4.85	5.77	3.0	90	4-1/2" 8Rd EUE Long*IJ
5-1/2	4.42	4.33	4.96	0.27	5.60	6.71	3.8	115	5-1/2" 8Rd Csg Long**IJ
6-5/8	5.43	5.33	6.10	0.34	6.73	8.00	5.7	171	6-5/8" 8Rd Csg Long**IJ
7	6.21	6.11	6.97	0.38	7.10	8.61	6.9	208	7" 8Rd Csg Long**IJ
7-5/8	6.21	6.11	6.97	0.38	7.73	9.38	7.6	227	7-5/8" 8Rd Csg Long**IJ
9-5/8	7.84	7.75	8.80	0.48	9.73	11.84	12.0	361	9-5/8" 8Rd Csg*** IJ
10-3/4	8.85	8.76	9.94	0.54	10.85	13.15	15.3	459	10-3/4" 8Rd Csg***IJ
11-3/4	10.72	10.62	11.90	0.59	12.61	14.70	21.1	632	11-3/4 8/6Rd L Csg TC
13-3/8	11.97	11.87	13.29	0.66	13.48	15.65	24.0	721	13-3/8" 8/6Rd Csg***TC
16	14.48	14.39	16.08	0.80	16.20	19.20	35.1	1,054	16" 6Rd Csg TC
18	16.60	16.50	18.43	0.92	18.71	23.10	47.7	1,432	18" 6Rd Csg TC
20	17.98	17.89	19.97	1.00	20.06	24.80	54.9	1,648	20" 6Rd Csg TC

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

Thread lengths may exceed API L4

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	1,500	1,850	1,200	13,000	0.363
2-7/8	1,500	1,850	1,000	19,000	0.266
3-1/2	1,500	1,850	1,100	28,000	0.178
4	1,500	1,850	1,100	35,000	0.138
4-1/2	1,500	1,850	1,100	46,500	0.098
5-1/2	1,500	1,850	1,000	55,500	0.084
6-5/8	1,500	1,850	1,100	72,500	0.054
7	1,500	1,850	1,000	76,500	0.042
7-5/8	1,500	1,850	1,000	86,500	0.042
9-5/8	1,500	1,850	1,000	140,500	0.027
10-3/4	1,500	1,850	1,000	161,500	0.021
11-3/4	1,500	1,850	750	126,500	0.024
13-3/8	1,500	1,850	750	136,000	0.019
16	1,500	1,850	750	167,000	0.013
18	1,500	1,850	750	194,000	0.010
20	1,500	1,850	750	208,000	0.008

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 - 20	TEST METHOD
Tensile Strength, Hoop	psi	31,300	31,300	ASTM D1599
Tensile Strength, Axial	psi	30,000	12,000	ASTM D2105
Modulus of Elasticity, Axial	10E+06 psi	3.0	2.0	ASTM D2105
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

ISO 9001 CERTIFIED FIRM

11811 Proctor Road • Houston, Texas 77038 • Phone: (281) 847-2987 • Fax: (281) 847-1931
Email: houston@future-pipe.com • website: www.futurepipe.com

Submittal Data
FROM

Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 7, 2006 Number of Copies: 9

Submittal Number: 11360-014-A

Specification Section Number: 11360-014-A

Item Submitted: 12" M/W Intermediate Casing Mill Cert

New Submittal: X Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: February 7, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ______

Firm: ______

Date: ______

FORM MTC-001
baskı tarihi : 05/08/2004
baskı no : 3

MILL TEST CERTIFICATE

ACC.EN 10204 / 3.1 B

ÇAYIROVA BORU SAN ve TİC . A . Ş .

PAGE : 1
CERTIFICATE NO : 0010129
COMMODITY : ERW STEEL TUBES
SPECIFICATION : ASTM/ASMEA/SA53B,API5LB/X-42,PSL1 -42'. BPE

TRANS.NO :
INDEX NO :

DATE : 22.12.2004
CONTRACT NO : 1040069600
CUSTOMER : VASS PIPE
SHIPPER :

HEAT NO.	SIZE	QUANTITY				THREADS	END PROTECT	BEVEL DEGREE	SURFACE AND DIM	FLATTEN	BENDING	NDT	INTERNAL BEAD REMOVED	COATING (PAINT)	COPPER SULFIDE	HEAT TREAT C	IMPACT STRENGTH joule
		Pcs	B/Pcs	TOTAL LENGTH feet	TOTAL WEIGHT pound												
18128	12 3/4"x0,375"	108	108/1	4536	225031			OK	OK	OK	****	OK	OK	OK	****	****	****
18129	12 3/4"x0,375"	106	106/1	4452	220864			OK	OK	OK	****	OK	OK	OK	****	****	****
18130	12 3/4"x0,375"	109	109/1	4578	227114			OK	OK	OK	****	OK	OK	OK	****	****	****

DESCRIPTION OF GOODS:

HEAT NO.	LOT NO.	Hydrostatic Test PSI	TENSION TEST			CHEMICAL COMPOSITION																
			T.S	Y.P	E.L.	Heat Analysis						Product Analysis %										
			PSI		%	C	Si	Mn	P	S	N	C	Si	Mn	P	S	Ti	Cu	Ni	Cr	Mo	.V
						÷ 100			÷ 1000			÷ 100			÷ 1000							
18128	****	2100	72370	54820	33							13	****	94	6	B	2	****	****	****	****	****
18129	****	2100	70490	55110	32							10	****	96	10	6	2	****	****	****	****	****
18130	****	2100	67440	52210	32							13	****	92	10	9	.1	****	****	****	****	****

SURVEYOR TO	WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTANCE.	MILLS EXPERT
NOTE	**Our pipes are not suitable for roll grooving, roll forming, swaging, thread rolling, hard die stamping, extra bending.**	

Ticaret A.Ş.

FORM MTC-001
baskı tarihi : 09/08/2004
baskı no : 3

MILL TEST CERTIFICATE

ACC.EN 10204 / 3.1 B

ÇAYIROVA BORU SAN ve TİC . A . Ş .

PAGE : 14
CERTIFICATE NO : 0010092
COMMODITY : ERW STEEL TUBES
SPECIFICATION : ASTM/ASMEA/SA53B,API5LB/X-42,PSL1 –42' BPE

TRANS.NO :
INDEX NO :

DATE : 22.12.2004
CONTRACT NO : 1040057700
CUSTOMER : VASS PIPE
SHIPPER :

EAT NO.	SIZE	QUANTITY				THREADS	END PROTECT	BEVEL DEGREE	SURFACE AND DIM	FLATTEN	BENDING	NDT	INTERNAL BEAD REMOVED	COATING (PAINT)	COPPER SULFIDE	HEAT TREAT C	IMPACT STRENGTH joule
		Pcs	B/Pcs	TOTAL LENGTH feet	TOTAL WEIGHT pound												
17029	12 3/4"x0,375"	107	107/1	4494	222947			OK	OK	OK	****	OK	OK	OK	****	****	****
17030	12 3/4"x0,375"	106	106/1	4452	220864			OK	OK	OK	****	OK	OK	OK	****	****	****

DESCRIPTION OF GOODS:

HEAT NO.	LOT NO.	Hydrostatic Test PSI	TENSION TEST			CHEMICAL COMPOSITION																
			T.S	Y.P	E L.	Heat Analysis						Product Analysis %										
			PSI		%	C	Si	Mn	P	S	N	C	Si	Mn	P	S	Ti	Cu	Ni	Cr	Mo	V
						÷ 100			÷ 1000			÷ 100			÷ 1000							
17029	****	2100	66130	48010	32							17	****	43	6	14	2	****	****	****	****	****
17030	****	2100	71070	52790	33							12	****	45	9	12	2	****	****	****	****	****

SURVEYOR TO	WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTANCE.	MILLS EXPERT
NOTE	**Our pipes are not suitable for roll grooving, roll forming, swaging, thread rolling, hard die stamping, extra bending.**	

Çayırova
Boru Sanayi ve Ticaret A.Ş.

YOUNGQUIST BROTHERS, INC.
Has Received This Shop Drawing/Submittal
YBI/Section No# 11360-014- D
Date: 2-22-06
Signature: P Porter

Submittal Data
FROM

Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 20, 2006

Number of Copies: 9

Submittal Number: 11360-012-A

Specification Section Number: 11360-012-A

Item Submitted: 20" ~~30~~" Mill Certs

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

MaryBeth Rios

Marybeth Rios

Transmittal Date: February 20, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ______

Firm: ______

Date: ______

성적서 번호 CERTIFICATE NO. : E53056

페이지 Page 2 of 2

발행일자 DATE OF ISSUE : JAN. 09. 2006. E4439002

계약번호 CONTRACT(P/O) NO. :

품명 COMMODITY : E.R.W. STEEL PIPE

제품규격 SPECIFICATION : API 5L X42/API 5LB PSL1/ASTM A53B/ASME SA539

검 사 증 명 서(A)
MILL INSPECTION CERTIFICATE

고객사 CUSTOMER :

HYSCO 현대하이스코주식회사
HYUNDAI HYSCO

본사 · 공장 : 울산광역시 북구 염포동 265번지 683-040
(ULSAN PLANT) #265 YUMPO-DONG, BUK-KU, ULSAN, KOREA.
TEL: 82-52-280-0114, FAX: 82-52-287-8916
서울사무소 : 서울시 강남구 역삼동 837-36번지 랜드마크타워 135-080
(SEOUL OFFICE) LANDMARK TOWER 837-36, YEOKSAM-DONG,
GANGNAM-KU, SEOUL, KOREA
TEL: 82-2-2112-8114, FAX: 82-2-775-7095

TYPE OF PIPE END ※1	DIMENSION OUTDIA X THICK X LENGTH ※2 ※3 ※4	QUANTITY (PCS)	WEIGHT (KG)	HYDROSTATIC TEST Kgf/cm2 PSI	※5	HEAT NO.	※6	YIELD STRENGTH Kgf/mm2 PSI	TENSILE STRENGTH ※7B	TENSILE STRENGTH ※7W	El %	※8	C X100	Si	Mn	P X1000	S	Cu X100	Ni	Cr	Mo	V	Ti	Nb	Al X1000	CEQ ※9	HARDNESS HV	ABSORBED ENERGY JOULE	SHEAR AREA %	WEIGHT OF ZINC COAT g/m2	DIP TEST	※5	REMARK
FVBE	NB 20" x .375" x42.000'			100	G	C428765		32.7	48.0	51.4	38	H	16	1	73	11	10	1	2	2	1	Tr											
	(508.0mm x 9.53mm 12.802M			1,420				46,500	68,300	73,100																							
				100	G	C428766		33.7	48.5	51.1	37	H	17	1	74	12	10	1	2	1	1	Tr											
								47,900	69,000	72,700																							
				100	G	C429995		30.1	48.9	49.7	39	H	18	1	79	12	12	2	2	1	2	Tr											
						✓		42,830	69,700	70,700																							
				100	G	C429044		37.2	49.5	52.6	39	H	17	2	81	13	10	1	1	2	1	Tr											
								52,900	70,400	74,900																							
BVBE	NB 20" x .500" x42.000'	8	17,872	133	G	C416890		34.2	50.0	53.2	38	H	18	3	76	15	11	2	1	1	2	Tr											
	(508.0mm x12.70mm 12.802M			1,890				48,650	71,100	75,700																							
	TOTAL =>	324	488,728																														

※10 HEAT TREATMENT	※11 VISUAL & DIMENSION TEST	※12 FLATTENING, BEND, GUIDED BEND TEST	※13 R-FLATTENING TEST	※14 FLARING TEST	※15 NONDESTRUCTIVE TEST	※16 R.M.T	※17 CRUSH TEST	※18 DRIFT TEST	
GOOD	GOOD	GOOD			GOOD	GOOD			GOOD

NOTE 1 ※1 Type of pipe End 관끝

B: Black	PE: Plain End
G: Galvanized	BE: Bevel End
V: Varnish	TE: Thread End
O: Oiling	TC: Thread Coupling
	RG: Roll Grooving

※2 NB: Nominal Size 호칭경, OD: Outside Diameter
※5 G: GOOD
※8 H: Heat(Ladle) analysis 용강분석, P: Product Analysis 제품분석, W: Weld Product Analysis 용접부 제품분석
※10 Heat Treatment 열처리
※13 Reverse Flattening Test 역편평시험
※15 Residual Magnetism Test 잔류자기시험 ※17 Crush Test 압궤시험
※3 Unit 단위(M: mm, I: Inch)
※6 L: Longitudinal 관축방향, T: Transverse 원주방향
※11 Visual & Dimension Test 외관 및 치수검사
※14 Flaring Test 확관시험
※18 Drift Test 관통시험
※4 Unit 단위(M: Meter, F: Feet, I: Inch)
※7 B: Base Metal 모재부, W: Weld Part 용접부
※9 CEQ=C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 탄소당량
※12 Flattening/Bend/Guided Bend Test 편평/굽힘/형굽힘시험
※15 Nondestructive Test 비파괴검사

NOTE 2 * RESIDUAL MAGNETISM TEST : GOOD

SURVEYOR

본 제품을 관련 규격에 합격되었음을 보증합니다.
WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER
* 본 검사증명서의 원가를 규격범위 사용시 [illegible]

H. J. KIM

INSPECTION MANAGER.

HYS - 8301 - 831 - 1 - OLT

HYUNDAI HYSCO

A4(210 X 297)

성적서 번호 CERTIFICATE NO. : 553056
페이지 Page 1 of 2
발행일자 DATE OF ISSUE : JAN. 09. 2006. E4439002
계약번호 CONTRACT(P/O) NO. :
품명 COMMODITY : E.R.W. STEEL PIPE
고객사 CUSTOMER :
제품규격 SPECIFICATION : API 5L X42/API 5LB PSL1/ASTM A53B/ASME SA53B

검 사 증 명 서(A)
MILL INSPECTION CERTIFICATE

HYSCO 현대하이스코주식회사 HYUNDAI HYSCO

본사·공장 : 울산광역시 북구 염포동 265번지 683-040
(ULSAN PLANT) #265-YUMPO-DONG, BUK-KU, ULSAN, KOREA
TEL: 82-52-280-0114, FAX: 82-52-287-6915
서울사무소 : 서울시 강남구 역삼동 837-36번지 랜드마크타워 135-080
(SEOUL OFFICE) LANDMARK TOWER 837-36, YEOKSAM-DONG,
GANGNAM-KU, SEOUL, KOREA
TEL: 82-2-2112-8114, FAX: 82-2-775-7095

관종 TYPE OF PIPE END ※1	치수 DIMENSION 외경 x 두께 x 길이 (OUTDIA X THICK X LENGTH) ※2 ※3 ※4	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDROSTATIC TEST kgf/cm2 PSI	※5	제강번호 HEAT NO.	※6	인장시험 TENSILE TEST (Gage Length : 2 INCH) 항복강도 YIELD STRENGTH Kgf/mm2 PSI	인장강도 TENSILE STRENGTH ※7B	※7W	연신율 EL %	※8	C X100	Si	Mn	P X1000	S	Cu X100	Ni	Cr	Mo	V	Ti	Nb	Al X1000	CEQ ※9	경도 HARDNESS HV	충격시험 IMPACT TEST ℃ 흡수에너지 ABSORBED ENERGY JOULE	전단면적 SHEAR AREA %	도금시험 COATING TEST 아연부착량 WEIGHT OF ZINC COAT g/m2	침지시험 DIP TEST	※5	비고 REMARK
BVBE	NB 20" x .375" x42,000' (508.0mm x 9.53mm x 12.802M)	315	470,856	100 1,420	G	C425604		33.5 47,600	46.4 66,000	49.3 70,100	38	H	17	1	76	18	15	1	2	1	2	Tr											
				100	G	C426605		31.6 44,900	46.9 66,700	49.8 70,800	39	H	16	1	77	11	15	1	1	1	2	Tr											
				100	G	C428762		31.6 44,900	46.4 66,000	49.3 70,100	33	H	17	1	76	19	13	2	1	1	2	Tr											
				100	G	C429045		32.2 45,800	48.6 69,100	51.3 73,000	39	H	16	2	81	13	10	1	2	2	1	Tr											
				100	G	C429046		30.6 43,500	46.4 66,000	48.2 68,600	37	H	15	1	78	14	12	2	2	1	1	Tr											
				100	G	C429047 ✓		31.6 44,950	47.4 67,400	50.5 71,800	36	H	15	2	77	14	9	2	1	1	2	Tr											

※10 HEAT TREATMENT	※11 VISUAL & DIMENSION TEST	※12 FLATTENING,BEND, GUIDED BEND TEST	※13 R-FLATTENING TEST	※14 FLARING TEST	※15 NONDESTRUCTIVE TEST	※16 R.M.T	※17 CRUSH TEST	※18 DRIFT TEST	
GOOD	GOOD	GOOD			GOOD	GOOD			GOOD

NOTE 1 ※1 Type of pipe End 관종

B: Black	PE: Plain End
G: Galvanized	BE: Bevel End
V: Varnish	TE: Thread End
C: Coating	TC: Thread Coupling
	RG: Roll Grooving

※2 NB: Nominal Bore 호칭경, OD: Outside Diameter
※5 G: GOOD
※8 H: Heat(Ladle) analysis 용강분석, P: Product Analysis 제품분석, WP: Weld Product Analysis 용접부 제품분석
※10 Heat Treatment 열처리
※13 Reverse Flattening Test 역편평시험
※16 Residual Magnetism Test 잔류자기측정시험 ※17 : Crush Test 압축시험
※3 Unit 단위(M: mm, I: inch)
※6 L: Longitudinal 압연방향, T: Transverse 직각방향
※11 Visual & Dimension Test 외관 및 치수검사
※14 Flaring Test 확관시험
※18 Drift Test 관통시험
※4 Unit 단위(M: Meter, F: Feet, I: Inch)
※7 B: Base Metal 모재부, W: Weld Part 용접부
※9 CEQ=C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 탄소당량
※12 Flattening/Bend/Guided Bend Test 편평/굽힘시험
※15 Nondestructive Test 비파괴검사

NOTE 2 · RESIDUAL MAGNETISM TEST : GOOD

SURVEYOR

본 제품은 위의 규격에 합격되었음을 보증합니다.
WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER
· [illegible]

H. J. KIM
INSPECTION MANAGER

HYS - BR01 - 681 - 1 - CLT

HYUNDAI HYSCO

A4(210 X 297)

[illegible]
[illegible]
[illegible] 11340-008-C
Date: 2-10-06
Signature PPorter

SHANGHAI ALISON STEEL PIPE CO.,LTD

MILL TEST CERTIFICATE

Consignee:

Description: ERW STEEL PIPE

This is to certify that the ERW STEEL PIPE in accordance with order No.1040065300.
were tested qualified by our Quality Control Department.
The pipes are tested according to ASTM A53B(99B)/ASME SA53B(E95)
The tensile test and chemical values are as stated below.

P. O. NO. 1040065300

Shipping Marks: 10400

No.	Heat No.	Size	Quantity		Weight (mt)	Surface and size	Pipe chemical Composition									Pipe mechanical properties			Weld Tensile Strength (psi)	Hydrostatic Test P=Mpa	Flattening Test	Ultrasonic Test
			pcs	ft			C	Mn	P	S	Cu	Ni	Cr	Mo	V	Yield Point (psi)	Tensile Strength (psi)	Elongation(%)				
ZQ08	123321	10"X0.250"X40'2"	264	10604.001	134.811	OK	0.15	0.44	0.020	0.019	0.013	0.011	0.008	0.006	0.002	53662	71065	34.0	74692	6.8	OK	OK
ZQ10	057D0154	12"X0.250"X40'2"	7	281.167	149.625	OK	0.17	0.19	0.007	0.002	0.013	0.011	0.037	0.010	0.002	53662	71791	35.0	76867	5.7	OK	OK
	102321		239	9599.834		OK	0.15	0.36	0.010	0.011	0.015	0.014	0.005	0.010	0.002	55837	70341	36.0	73241	5.7	OK	OK
ZQ11	058D0518	12"X0.375"X40'2"	501	20123.502	481.320	OK	0.16	0.22	0.007	0.005	0.013	0.011	0.019	0.010	0.002	54387	69615	44.0	73241	8.5	OK	OK
	M2046089.		32	1285.333		OK	0.10	0.69	0.014	0.011	0.015	0.015	0.005	0.010	0.002	59463	71066	38.0	76867	8.5	OK	OK

Manager of Q.C. Dept.: 张耘

Inspector: 戚军花

Issuing Date: Mar.30,2005

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-014
Transmittal No. # ________ **Date:** 2/20/06
Signature

We state the material has been manufactured ,samples, tested and inspected in accordance with this specification, and has been found to meet the requirements.

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 20, 2006

Number of Copies: 9

Submittal Number: 11360-012-A

Specification Section Number: 11360-012-A

Item Submitted: 30" Mill Certs

New Submittal: X

Resubmitted: ____

Youngquist Brothers, Inc. Representative:

MaryBeth Rios

Marybeth Rios

Transmittal Date: February 20, 2006

- ☐ Approved
- ☐ Approved with changes
- ☐ Rejected, Revise & Resubmit
- ☐ Not Reviewed

By: ____

Firm: ____

Date: ____

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-012-A
Transmittal No. # ________ **Date:** 2/20/06
Signature

서 번 호 CERTIFICATE No. : HRS-050-038 페이지 Page : 1 of 10
행 일 자 : OF ISSUE : APR. 18. 2005
약 번 호 RACT(P/O)No :
명 COMMODITY : S.A.W. STEEL PIPE
제 품 규 격 SPECIFICATION : API 5L Gr.X42 PSL1/5L Gr.B PSL1

검 사 증 명 서
MILL INSPECTION CERTIFICATE

EN10204 TYPE 3.1B-1991

수 요 가 CUSTOMER :

주식회사 현대 RB
HYUNDAI RB CO.LTD
울산광역시 울주군 온산읍 원산리 916-2번지 689-892
#916-2, WONSAN-RI, ONSAN-EUP, ULJU-GUN, ULSAN, KOREA
TEL : 052-238-7001
FAX : 052-238-7011

관종 TYPE OF PIPE END ※1	※2	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA.×THICK.×LENGTH) ※3 ※4	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDROSTATIC TEST kgf/cm²	수압시험 HYDROSTATIC TEST ※5	제강번호 HEAT No.	인장시험 TENSILE TEST 항복강도 YIELD STRENGTH N/mm²	인장강도 TENSILE STRENGTH B ※6 N/mm²	인장강도 TENSILE STRENGTH W ※7 N/mm²	연신율 (EL) %	※8	화학성분(%) CHEMICAL COMPOSITION C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Nb ×1000	V ×1000	Ti ×1000	Cr ×1000	Ni ×1000	Cu ×1000	Mo ×1000	CEQ ×1000	경도 HARDNESS HV	충격시험(℃) IMPACT TEST 흡수에너지 ENERGY(J) BASE	HAZ	WELD	비고 REMARK
		SPEC			67↑	10↑		290↑	414↑		28↑		26↓	–	130↓	30↓	30↓	N/A		40↓	N/A					N/A	N/A	N/A	N/A	
BV/BE	NB	30"× 9.5mm × 40.000F	26	55,883	67	10	SA08916	326	470			H	15	21	78	18	5	Tr	1											
		'37SW					✓	307	458	492	40	P	13	19	73	16	6	1	1	1										
												P	13	19	72	16	7	1	Tr	1										
			22	47,285	67	10	SA09129	327	476			H	15	21	79	21	6	2	1											
							✓	306	462	494	39	P	13	19	74	19	5	1	1	1										
												P	13	17	70	17	6	Tr	1	Tr										
			2	4,299	67	10	SB14186	339	481			H	15	18	86	24	10	Tr	1											
								313	471	508	39	P	13	16	81	22	8	1	1	1										
												P	13	16	80	22	8	Tr	1	1										
		SUB TOTAL→	50	107,467																										

HEAT TREATMENT (WELD SEAM)	※10 VISUAL & DIMENSION TEST	※11 GUIDED BEND TEST	※12 NONDESTRUCTIVE TEST (R.T)	※13 RMT
N/A	GOOD	GOOD	GOOD	GOOD

TE 1 ※1 Type of pipe End 관종

Black	V:Varnish	PE:Plain End VJ:Vicaulic Joint
Galvanized	R:Removal Varnish	BE:Bevel End
Enameled	O:Oiling Coating	TE:Thread End
	F:PE Coating	TC:Thread Coupling

※2 NB : Nominal Bore 호칭경, OD : Outside Diameter
※3 Unit : 단위 (M:mm, I:Inch)
※4 Unit 단위(M:m, F:Feet, I:Inch)
※5 Holding Time : sec
※6 B : Base Metal 모재부
※7 W : Weld Part 용접부
※8 H : Heat (Ladle) Analysis 용현분석, P : Product Analysis 제품분석, WP : Weld Part Product Analysis 용접부 제품분석
※9 Heat Treatment 열처리
※10 Visual & Dimension Test 육안 및 치수검사
※11 Guided Bending Test 굽힘시험
※12 Nondestructive Test 비파괴검사
※13 Resideual Magnetism Test 잔류자장
- Tr(Trace)

본 제품은 관련규격에 합격 되었음을 보증합니다.
WE HEREBY CERTIFY THAT MATERIAL DESCRIBED SPECIFICATION HEREIN HAS BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER

SURVEYOR

S. H. LEE
INSPECTION MANAGER

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 22, 2006

Number of Copies: 9

Submittal Number: 11360-033-A

Specification Section Number: 11360-033-A

Item Submitted: 42" IW Conductor Casing

New Submittal: X

Resubmitted: ____

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: February 22, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ____

Firm: ____

Date: ____

TÜV

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902252234

ACCORDING TO: EN 10204/3.1.B

CUSTOMER: CORPAC STEEL PRODUCTS ,CORP / PO A3623

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 10-Oct-05

ORDER: 900034/80002386

STANDARD: API 5L 43EDITION;API 5B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.1%L *(NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,6

LOT: IHA PO : 3244

MECHANICAL TESTS

TOTAL NO.OF PIECES 16 TOTAL WEIGHT: 102527 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	Rm[psi] BASE MATERIAL	Re[psi] BASE MATERIAL	A[%] BASE MATERIAL	Re/ Rm [%]	DIM.OF SPECIMENS [inch] WELD	Rm [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL 32°F [ft-lb]	HYDRO STATIC TEST [illegible] psi/10SEC	X RAY INVESTIGATION ACC.TO WIRE [illegible]
1	172375	811588	X 52/X42 PSL1	42	37.30	0.375	[illegible]	172171	TRANS.	1.49x0.38	84270	71627	37	0.85	1.49x0.38	86632	177	SUITABLE	44-51-45	SUITABLE	SUITABLE
2	172308	838843		42	37.17	0.375	6200.67	172308	TRANS.	1.49x0.38	79690	68736	36	0.863	1.49x0.38	91864	173	SUITABLE	65-68-70	SUITABLE	SUITABLE
3	172463			42	38.52	0.375	6428.82													SUITABLE	SUITABLE
4	172492			42	38.48	0.375	6422.00													SUITABLE	SUITABLE
5	172451	938735		42	38.68	0.375	6455.08	172516	TRANS.	1.44x0.38	83727	71879	36	0.858	1.50x0.40	82520	179	SUITABLE	81-84-82	SUITABLE	SUITABLE
6	172453			42	38.66	0.375	6453,08													SUITABLE	SUITABLE
7	172454			42	38.68	0.375	6455,08													SUITABLE	SUITABLE
8	172455			42	38.70	0.375	6457,29													SUITABLE	SUITABLE
9	172456			42	38.35	0.375	6398.95													SUITABLE	SUITABLE
10	172509			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
11	172510			42	38.70	0.375	6457,29													SUITABLE	SUITABLE
12	172511			42	38.32	0.375	6395.54													SUITABLE	SUITABLE
13	172512			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
14	172513			42	38.52	0.375	6428.82													SUITABLE	SUITABLE
15	172515			42	38.32	0.375	6395.54													SUITABLE	SUITABLE
16	172516			42	38.68	0.375	6455.08													SUITABLE	SUITABLE

YOUNGQUIST BROTHERS, INC.
Has Received This Shop Drawing/Submittal
YBI/Section No.: 11360-033-A
Date: 2-22-06
Signature: P Porter

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902252234

ACCORDING TO: EN 10204/3.1.B

CUSTOMER: CORPAC STEEL PRODUCTS ,CORP / PO A3823

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 10-Oct-05

ORDER: 900024/50002866

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT: INA PO : 3254

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceq
1	936643H	0.08	1.42	0.25	0.018	0.008	0.060	0.250	0.020	0.210	0.03	0.003	0.006	0.035	0					
2	936643P1	0.07	1.36	0.24	0.014	0.008	0.057	0.240	0.020	0.200	0.02	0.005	0.002	0.035	0					0.17
3	936643P2	0.07	1.38	0.24	0.016	0.007	0.051	0.210	0.030	0.170	0.02	0.003	0.002	0.034	0					0.17
4	911569H	0.08	1.35	0.19	0.025	0.007	0.033	0.160	0.02	0.12	0.03	0.003	0.005	0.03	0					
5	911569P1	0.07	1.34	0.21	0.025	0.007	0.034	0.160	0.030	0.12	0.03	0.004	0.002	0.034	0					0.16
6	911569P2	0.07	1.35	0.20	0.021	0.008	0.034	0.160	0.02	0.12	0.03	0.003	0.002	0.034	0					0.16
7	936735H	0.08	1.42	0.32	0.013	0.008	0.080	0.120	0.01	0.13	0.03	0.002	0.007	0.036	0					
8	936735P1	0.08	1.47	0.32	0.015	0.008	0.075	0.140	0.02	0.13	0.03	0	0.004	0.035	0					0.19
9	936735P2	0.09	1.41	0.32	0.013	0.005	0.080	0.010	0.020	0.01	0.03	0.003	0.003	0.043	0					0.18

Ceq = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

INSPECTOR NAME
MARIANA LUNGU

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902252137

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:		**ORDER:**	900024/50002365
PRODUCT:	LSAW CARBON STEEL LINE PIPE	**STANDARD:**	API 5L 42EDITION;API 5B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS
EXTERNAL ASPECT:	SUITABLE	**DELIVERY STATE:**	EXPANDATED, BEVELLED ENDS AT 30° ; V=1,6
DATE 21-Sep-06		**LOT:**	INA PO : 3264

MECHANICAL TESTS

TOTAL NO.OF PIECES 40 TOTAL WEIGHT: 342194 lbs

NO. CRT	NO PIPE	NO. HEAT	QUALITY	DIAMETER (inch)	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	Rt[psi] BASE MATERIAL	Rm[psi] BASE MATERIAL	A(%) BASE MATERIAL	Rt/ Rm [%]	DIM.OF SPECIMENS [inch] WELD	Rm [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL 32°F 20 FT-LB	HYDRO STATIC TEST 1110 psi/10SEC	X RAY INVESTIGATION ACC.ISO WIRES
1	172334	911654	X 52 / X42- PSL2	42	38.65	0.5	8578.84	172459	TRANS.	1,53x0.52	78238	83254	34	0.809	1,51x0.52	82542	173	SUITABLE	75-72-70	SUITABLE	SUITABLE
2	172301			42	38.42	0.5	8528.12													SUITABLE	SUITABLE
3	172302			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
4	172323			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
5	172460			42	38.45	0.5	8534.74													SUITABLE	SUITABLE
6	172473			42	38.68	0.5	8585.46													SUITABLE	SUITABLE
7	172202	926601		42	38.62	0.5	8570.02	172700	TRANS.	1.50x0.52	81324	89542	32	0.908	1.46x0.52	89228	169	SUITABLE	85-88-85	SUITABLE	SUITABLE
8	172203			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
9	172204			42	38.55	0.5	8558.79													SUITABLE	SUITABLE
10	172205			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
11	172206			42	38.68	0.5	8585.46													SUITABLE	SUITABLE
12	172207			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
13	172208			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
14	172210			42	38.58	0.5	8563.41													SUITABLE	SUITABLE
15	172320			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
16	172321			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
17	172322			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
18	172474			42	38.42	0.5	8528.12													SUITABLE	SUITABLE
19	172475			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
20	172476			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
21	172477			42	38.68	0.5	8585.46													SUITABLE	SUITABLE
22	172478			42	38.19	0.5	8475.19													SUITABLE	SUITABLE
23	172479			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
24	172480			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
25	172481			42	38.35	0.5	8512.68													SUITABLE	SUITABLE
26	172521			42	38.58	0.5	8563.41													SUITABLE	SUITABLE
27	172211	936843		42	38.68	0.5	8585.46	172457	TRANS.	1,51x0.51	82477	71719	32	0.87	1.46x0.51	85208	173	SUITABLE	112-116-123	SUITABLE	SUITABLE
28	172212			42	38.19	0.5	8475.19													SUITABLE	SUITABLE
29	172372			42	38.68	0.5	8585.46													SUITABLE	SUITABLE
30	172457			42	37.11	0.5	8234.51													SUITABLE	SUITABLE
31	172458			42	38.58	0.5	8563.41													SUITABLE	SUITABLE
32	172465			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
33	172466			42	38.68	0.5	8585.46													SUITABLE	SUITABLE
34	172468			42	38.70	0.5	8589.87													SUITABLE	SUITABLE
35	172469			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
36	172470			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
37	172471			42	38.62	0.5	8570.02													SUITABLE	SUITABLE
38	172472			42	38.65	0.5	8578.84													SUITABLE	SUITABLE
39	172495			42	39.25	0.5	8490.63													SUITABLE	SUITABLE
40	172496			42	38.68	0.5	8585.46														

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MITTAL

INSPECTION CERTIFICATE: 4902252137

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 21-Sep-05

ORDER: 900024/50002865

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT: INA PO : 3254

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceq
1	911654H	0.08	1.35	0.24	0.020	0.009	0.064	0.160	0.030	0.140	0.03	0.003	0.006	0.032	0					
2	911654P1	0.08	1.36	0.24	0.016	0.008	0.051	0.200	0.030	0.150	0.02	0.003	0.002	0.032	0					0.17
3	911654P2	0.08	1.37	0.25	0.016	0.009	0.062	0.150	0.030	0.130	0.02	0.004	0.002	0.036	0					0.17
4	926801H	0.09	1.35	0.27	0.020	0.010	0.055	0.160	0.02	0.14	0.03	0.001	0.006	0.035	0					
5	926601P1	0.10	1.35	0.25	0.017	0.008	0.055	0.150	0.020	0.130	0.03	0.002	0.002	0.032	0					0 19
6	926801P2	0.09	1.37	0.27	0.017	0.006	0.048	0.010	0.02	0.01	0.03	0.002	0.002	0.037	0					0.17
7	936643H	0.06	1.42	0.25	0.018	0.006	0.060	0.250	0.020	0.210	0.03	0.003	0.006	0.035	0					
8	936643P1	0.07	1.36	0.24	0.014	0.008	0.057	0.240	0.020	0.200	0.02	0.005	0.002	0.035	0					0.17
9	936643P2	0.07	1.38	0.24	0.016	0.007	0.051	0.210	0.030	0.170	0.02	0.003	0.002	0.034	0					0.17

Ceq = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

INSPECTOR NAME
MARIANA [illegible]ENGU

CONTROLUL CALITATII 8
J17/21/1991

ISPAT SIDEX
Member of THE LNM GROUP
THE LARGEST IRON AND STEEL PRODUCER OF ROMANIA

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Phone: +40 236 407 633
Fax: +40 236 407 633
http://www.ispat.com; e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 4902250738 ✓

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT SUITABLE

DATE 1-Dec-04

ORDER: 100021/50001405

STANDARD: API 5L 42EDITION;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,6

LOT:

MECHANICAL TESTS

TOTAL NO.OF PIECES 43 TOTAL WEIGHT: 275639 lbs

NO. CRT	NO. PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM. OF SPECIMEN [inch] BASE MATERIAL	Rm[psi] BASE MATERIAL	Re[psi] BASE MATERIAL	A% BASE MATERIAL	Re/ Rm [%]	DIM. OF SPECIMENS [inch] WELD	Rm [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL 32°F [ft-lb]	HYDRO STATIC TEST 840 psi/10SEC	X RAY INVESTIGATION ACC. TO ...
1	163935	[illegible]	X52- X47 PSL2	42	38.52	0.375	6428.62	163937	TRANS.	1.52x0.38	77617	63084	33	[illegible]	1.47x0.38	81180	170	SUITABLE	81-67-81	SUITABLE	SUITABLE
2	163936			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
3	163937			42	37.20	0.375	6206.06													SUITABLE	SUITABLE
4	163912	916391		42	38.68	0.375	6455.08	183915	TRANS.	1.51x0.41	74767	60045	40	0.809	1.55x0.40	77532	170	SUITABLE	75-76-82	SUITABLE	SUITABLE
5	163913			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
6	163914			42	38.58	0.375	6439.65													SUITABLE	SUITABLE
7	163915			42	37.17	0.375	6203.67													SUITABLE	SUITABLE
8	163916			42	38.52	0.375	6428.62													SUITABLE	SUITABLE
9	163917			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
10	163918			42	38.65	0.375	6450.57													SUITABLE	SUITABLE
11	163831	931444		42	38.58	0.375	6439.85	163835	TRANS.	1.50x0.40	71704	56180	36	0.764	1.50x0.40	76306	184	SUITABLE	132-124-128	SUITABLE	SUITABLE
12	163832			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
13	163833			42	38.62	0.375	6444.06													SUITABLE	SUITABLE
14	163834			42	38.65	0.375	6450.57													SUITABLE	SUITABLE
15	163835			42	37.17	0.375	6203.67													SUITABLE	SUITABLE
16	163836			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
17	163837			42	38.22	0.375	6377.50													SUITABLE	SUITABLE
18	163838			42	38.68	0.375	6455.06													SUITABLE	SUITABLE
19	163839			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
20	163840			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
21	163841			42	38.68	0.375	6455.06													SUITABLE	SUITABLE
22	163842			42	38.39	0.375	6406.56													SUITABLE	SUITABLE
23	163843			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
24	163844			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
25	163845			42	38.65	0.375	6450.57													SUITABLE	SUITABLE
26	163846			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
27	163847			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
28	163848			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
29	163849			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
30	163850			42	38.68	0.375	6455.08													SUITABLE	SUITABLE
31	163851			42	38.68	0.375	6455.06													SUITABLE	SUITABLE
32	163852			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
33	163853			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
34	163854			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
35	163906 ✓			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
36	163907			42	38.62	0.375	6444.06													SUITABLE	SUITABLE
37	163908			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
38	163909			42	38.65	0.375	6450.67													SUITABLE	SUITABLE
39	163910			42	38.65	0.375	6605.05													SUITABLE	SUITABLE
40	163911			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
41	163941			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
42	163942			42	38.70	0.375	6457.29													SUITABLE	SUITABLE
43	163943			42	38.48	0.375	6422.00														

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INSPECTION CERTIFICATE: 4902250739

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 01-Dec-04

ORDER: 900021/50001405

STANDARD: API 5L 42EDITION;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT:

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	CEQ
1	916391H	0.08	1.16	0.27	0.018	0.006	0.036	0.020	0.030	0.010			0.011	0.02						
2	916391P1	0.10	1.21	0.27	0.014	0.005	0.031	0.020	0.030	0.010			0.011	0.024						0.17
3	916391P2	0.09	1.17	0.20	0.015	0.005	0.030	0.020	0.030	0.020			0.012	0.022						0.15
4	931444H	0.09	1.22	0.34	0.017	0.008	0.040	0.020	0.03	0.02			0.011	0.025						
5	931444P1	0.08	1.20	0.36	0.013	0.003	0.032	0.020	0.04	0.02			0.009	0.021						0.15
6	931444P2	0.09	1.17	0.35	0.013	0.005	0.032	0.020	0.04	0.02			0.01	0.024						0.16
7	916288H	0.08	1.20	0.32	0.018	0.008	0.026	0.020	0.02	0.01			0.02	0.02						
8	916288P1	0.09	1.19	0.35	0.012	0.005	0.021	0.020	0.03	0.02			0.013	0.021						0.16
9	916288P2	0.09	1.20	0.35	0.012	0.005	0.022	0.020	0.03	0.02			0.013	0.022						0.16

Ceq = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

INSPECTOR NAME
GABRIEL ARHODAN

8

IW

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: December 29, 2005

Number of Copies: 9

Submittal Number: 11360-010-A

Specification Section Number: 11360-010-A

Item Submitted: 13.63" I/W Injection Tubing FRP

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: December 29, 2005

☑ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ______

Firm: PBCWUD

Date: 1/4/06

FUTURE PIPE INDUSTRIES
Complete Pipe System Solutions

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 16 inch sizes that has a proven low installed cost and long lifespan.

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

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

COMPOSITION AND CLASSIFICATION

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

RED BOX casing and tubing will be authorized to use the API monogram by conforming to API Specification 15TR (when issued). Future Pipe Industries, Inc.'s 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.

FUTURE PIPE INDUSTRIES
Complete Pipe System Solutions

RED BOX 1250

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

DIMENSIONAL SPECIFICATIONS

February 2005

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)	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	2.21	0.10	2.69	3.45	0.7	21	2-3/8" 8Rd EUE Long*IJ
2-7/8	2.47	2.37	2.73	0.13	3.19	3.95	1.0	31	2-7/8" 8Rd EUE Long*IJ
3-1/2	3.00	2.90	3.30	0.15	3.85	4.84	1.5	44	3-1/2" 8Rd EUE Long*IJ
4	3.33	3.24	3.68	0.17	4.35	5.17	2.0	61	4" 8Rd EUE Long* TC
4-1/2	3.98	3.89	4.40	0.21	4.85	5.77	2.5	76	4-1/2" 8Rd EUE Long*IJ
5-1/2	4.42	4.33	4.87	0.23	5.60	6.70	3.2	97	5-1/2" 8Rd Csg Long**IJ
6-5/8	5.43	5.33	5.97	0.27	6.73	7.98	4.8	144	6-5/8" 8Rd Csg Long**IJ
7	6.21	6.11	6.83	0.31	7.10	8.61	5.8	173	7" 8Rd Csg Long**IJ
7-5/8	6.21	6.11	6.83	0.31	7.73	9.35	6.4	192	7-5/8" 8Rd Csg Long**IJ
9-5/8	7.84	7.75	8.63	0.40	9.73	11.81	10.3	309	9-5/8" 8Rd Csg*** IJ
10-3/4	8.85	8.76	9.76	0.45	10.85	13.12	13.1	394	10-3/4" 8Rd Csg***IJ
11-3/4	10.72	10.62	11.70	0.49	11.85	14.00	16.1	484	11-3/4" 8/6Rd Csg***TC
→ 13-3/8	11.97	11.87	13.06	0.55	13.48	15.20	20.5	614	13-3/8" 8/6Rd Csg***TC
16	14.48	14.39	15.80	0.66	16.20	18.65	29.9	896	16" 6Rd Csg TC
18	16.60	16.50	18.11	0.76	18.71	22.30	40.6	1,219	18" 6Rd Csg TC
20	17.98	17.89	19.62	0.82	20.06	24.00	46.7	1,401	20" 6Rd Csg TC

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

Thread lengths may exceed API L4
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	1,250	1,570	640	10,500	0.467
2-7/8	1,250	1,570	670	16,000	0.295
3-1/2	1,250	1,570	600	22,500	0.221
4	1,250	1,570	640	29,000	0.169
4-1/2	1,250	1,570	640	41,000	0.118
5-1/2	1,250	1,570	600	49,500	0.101
6-5/8	1,250	1,570	590	72,500	0.069
7	1,250	1,570	590	76,500	0.052
7-5/8	1,250	1,570	590	86,500	0.052
9-5/8	1,250	1,570	580	140,500	0.033
10-3/4	1,250	1,570	600	161,500	0.025
11-3/4	1,250	1,570	450	103,500	0.029
→ 13-3/8	1,250	1,570	450	129,000	0.023
16	1,250	1,570	450	167,000	0.016
18	1,250	1,570	450	194,000	0.012
20	1,250	1,570	450	208,000	0.010

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 - 20	TEST METHOD
Tensile Strength, Hoop	psi	31,300	31,300	ASTM D1599
Tensile Strength, Axial	psi	30,000	12,000	ASTM D2105
Modulus of Elasticity, Axial	10E+06 psi	3.0	2.0	ASTM D2105
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

ISO 9001

Submittal Data
FROM

Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 6, 2006

Number of Copies: 9

Submittal Number: 11360-009-A

Specification Section Number: 11360-009-A

Item Submitted: 18" I/W Surface Casing Mill Certs

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Transmittal Date: February 6, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ____________

Firm: ____________

Date: ____________

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2069/EXP/R/05/A1

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1

/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadreesse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	**4228510/05**		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L Outside surface double lacquered. ✓	**18" x 0,500"** **(457 x 12,70 mm)** **36 - 44 ft** **(10,97 - 13,41 m)**	**B/C/X42**	**828906** ✓	**3**	**109,4** **(33,32)**	**10233** **(4636)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la [illegible] exécute par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 828906 control anal.	0,17 0,20	1,01 1,01	0,21 0,23	0,011 0,011	0,004 0,004	0,22 0,22	0,08 0,08	0,22 0,22
	Al	Mo	Ti	Nb	Ce			
	0,038 0,035	0,01 0,01	0,004 0,004	0,0000 0,0000	0,37 0,41			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN
МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No № плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re psi (Mpa) min 290**	**Rm psi (Mpa) min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Dureté Hardness Härte Твердость
✓ 828906/17717	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	52359 (361)	74984 (517)	34,4			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN:

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont ete controlés et 100% - Surface and dimensions tested at 100%
Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – Le material est marqué – Material marked – Das Material wurde bezeichnet – Метериал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53/ B
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivre
According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI [illegible]	dn. 20.06. 2005 r.

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2283/EXP/R/05

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1
/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stuck Штук	**mb.** ft (c. mtr.) c. mtr. I. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/'02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L Outside surface double lacquered. ✓	**18" x 0,500"** **(457 x 12,70 mm)** **36 - 44 ft** **(10,97 - 13,41 m)**	**B/C/X42**	**829087** ✓	**2**	**73,3** **(22,34)**	**6856** **(3109)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Controle. Les resultats des essais sont indiqués ci-après.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolie durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. SKŁAD CHEMICZNY – ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ **829087**	**0,16**	**1,04**	**0,19**	**0,017**	**0,004**	0,07	0,09	0,24
control anal.	**0,19**	**1,03**	**0,20**	**0,017**	**0,006**	0,07	0,08	0,24
	Al	**Mo**	**Ti**	**Nb**	**Ce**			
	0,042	0,02	**0,003**	**0,0000**	**0,37**			
	0,042	0,02	**0,003**	**0,0000**	**0,40**			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No № плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re psi (Mpa) min 290**	**Rm psi (Mpa) min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Dureté Hardness Härte Твердость
✓ 829087/19925	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C**	50618 (349)	76000 (524)	42,[illegible]	[illegible]		

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results.

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRES OBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont ėte controlės et 100% - Surface and dimensions tested at 100% Oberflache und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol .Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B/
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеменованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPEC[illegible]RESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII Inż. HENRYK [illegible]ONDERKO	dn. 05.07. 2005 r.

HUTA BATORY **Sp. z o.o.** UL. Dyrekcyjna 6 41-506 Chorzów POLAND	**ŚWIADECTWO ODBIORU No 2073/EXP/R/05/A1** CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ **Acc.to EN 10204:2004 type 3.1** /nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadreesse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagon No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spezifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gagenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм.– и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to ✓ API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L Outside surface double lacquered.	18" x 0,500" (457 x 12,70 mm) 36 - 44 ft. (10,97 - 13,41 m)	B/C/X42	828961 ✓	8	294,8 (89,87)	27576 (12505)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Controle. Les resultats des essais sont indiqués ci-après.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prufing obigen Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 828961	0,17	1,01	0,23	0,011	0,006	0,10	0,09	0,23
control anal.	0,18	1,01	0,23	0,011	0,005	0,10	0,09	0,23
	Al	Mo	Ti	Nb	Ce			
	0,036	0,02	0,004	0,0000	0,38			
	0,031	0,02	0,004	0,0000	0,39			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No № плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatment Therm. Bearbeitung Термич. обработка	**Re psi (Mpa) min 290**	**Rm psi (Mpa) min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Dureté Hardness Härte Твердость
828961/17761	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	53374 (368)	77450 (534)	41,2	[illegible]		

✓

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi – positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRES OBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont été controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Materiał oznaczono – Le material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53/ B
Size in inches. Heat number.

21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le materiał est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышенаименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA Z ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII inż. HENRYK KONDERKO	dn. 20.06. 2005 r.

HUTA BATORY **Sp. z o.o.** UL. Dyrekcyjna 6 41-506 Chorzów POLAND	**ŚWIADECTWO ODBIORU No 2282/EXP/R/05** **CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE** **ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ** **Acc.to EN 10204:2004 type 3.1** /nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadreesse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spezifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gagenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/ SA 53/04. Outside diameter tolerances +/-0,75 %. Bevelled ends acc.to API - 5L Outside surface double lacquered. ✓	18" x 0,500" (457 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B/C/X42	829016 ✓	12	450,4 (137,25)	42130 (19098)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestallung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** – ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 829016	0,17	1,02	0,25	0,019	0,009	0,14	0,10	0,24
control anal.	0,18	1,02	0,26	0,018	0,009	0,13	0,10	0,24
	Al	Mo	V	Ti	Nb	Ce		
	0,040	0,03	0,00	0,004	0,0000	0,40		
	0,036	0,03	0,00	0,004	0,0000	0,41		

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN
МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No № плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re** MPa min 290	**Rm** MPa min 485	**A 2"** % min 30.0	**Z** %	**U**	**Twardość** Dureté Hardness Härte Твердость
829016/19913	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	53664 (370)	78755 (543)	40.9			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont été controlés et 100% - Surface and dimensions tested at 100%
Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен:

Mill's symbol : Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób material zwolniono – Sur la base des essais si-dessus le material est délivré
According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеисследованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten – Direktion Дирекция Завода	
SPECJALISTA D/S ZAKRESU KONTROLI JAKOŚCI HALINA [illegible]HMET	KIEROWNIK BIURA KONTROLI JAKOŚCI I TECHNOLOGII inż. HENRYK [illegible]ONDERKO	dn. 06.07. 2005 r.

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2072/EXP/R/05/A1

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRŮFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1

/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadreesse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan-obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gagenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order, Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L. Outside surface double lacquered. ✓	18" x 0,500" (457 x 12,70 mm) 36 - 44 ft (10,97 - 13,41 m)	B/C/X42	828950 ✓	3	94,2 (28,74)	8811 (3999)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been exceqted by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. SKŁAD CHEMICZNY – ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 828950	0,17	1,02	0,23	0,012	0,007	0,10	0,09	0,24
control anal.	0,18	1,02	0,23	0,012	0,006	0,10	0,09	0,24
	Al	Mo	Ti	Nb	Ce			
	0,034	0,02	0,004	0,0000	0,39			
	0,031	0,02	0,004	0,0000	0,39			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	Stan obróbki Termicznej Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	Re psi (Mpa) min 290	Rm psi (Mpa) min 485	A 2" % min 30,0	Z %	U	Twardość Dureté Hardness Härte Твердость
828950/17749	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	50618 (349)	78755 (543)	40,[illegible]			

✓

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRES OBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont été controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – La matérial est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B
Size in inches. Heat number.

B
KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le matérial est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA DS. ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII inż. HENRYK BONDERKO	dn. 02.07. 2005 r.

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2071/EXP/R/05/A2

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1
/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер-чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. I. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L Outside surface double lacquered. ✓	18" x 0,500" (457 x 12,70 mm) 30 - 44 ft (10,97 - 13,41 m)	B/C/X42	828942 ✓	6	215,0 (65,47)	20111 (9110)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécuté par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытаний представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 828942	0,17	0,99	0,24	0,016	0,005	0,08	0,09	0,24
control anal.	0,18	0,97	0,24	0,017	0,005	0,08	0,09	0,23
	Al	Mo	Ti	Nb	Ce			
	0,045	0,02	0,003	0,0000	0,38			
	0,039	0,02	0,003	0,0000	0,38			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN
МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re psi (Mpa) min 290**	**Rm psi (Mpa) min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Durete Hardness Härte Твердость
828942/17737	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	51198 (353)	76870 (530)	42,[illegible]			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRES OBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont éte controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка [illegible] 100%

Materiał oznaczono – La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B

Size in inches. Heat number.

KJ 21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivre According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	Dyrekcja Huty Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPEC. KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII inż. HENRYK SONDERKO	dn. 20.06. 2005 r.

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2070/EXP/R/05/A1

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1
/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извощения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1041	4228510/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimensions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ✓ ASTM - A106/02a/A 53/A53M/ 02/ ASME SA 106/04/ SA 53/04. Outside diameter tolerances +/-0,75%. Bevelled ends acc.to API - 5L Outside surface double lacquered.	18" x 0,500" (457 x 12,70 mm) 36 - 44 ft. (10,97 - 13,41 m)	B/C/X42	828924 ✓	6	222,8 (67,94)	20841 (9454)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le contrôle technique de la cdé exécute par le Service de Controle. Les resultats des essais sont indiqués ci-après.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

I. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
✓ 828924 control anal.	0,17 0,20	1,06 1,03	0,23 0,22	0,011 0,010	0,004 0,004	0,06 0,06	0,09 0,08	0,23 0,23
	Al 0,036 0,031	Mo 0,01 0,01	Ti 0,004 0,004	Nb 0,0000 0,0000	Ce 0,38 0,42			

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN
МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re psi (Mpa) min 290**	**Rm psi (Mpa) min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Dureté Hardness Härte Твердость
828924/17725	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Type C	53519 (369)	78320 (540)	49,0			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRES OBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont été controlés et 100% - Surface and dimensions tested at 100% Oberflache und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Materiał oznaczono – Le materiel est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеизложенных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
KONTROLI JAKOŚCI HALINA REHMET	inż. [illegible]	dn. 20.06. 2005 r.

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: March 20, 2006

Number of Copies: 9

Submittal Number: 11360-009-C

Specification Section Number: 11360-009-C

Item Submitted: 18" Additional Mill Certs

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

MaryBeth Rios

Marybeth Rios

Transmittal Date: March 20, 2006

- ☐ Approved
- ☐ Approved with changes
- ☐ Rejected, Revise & Resubmit
- ☐ Not Reviewed

By: ______

Firm: ______

Date: ______

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-009-C
Transmittal No. #______ **Date:** 3/20/06
Signature

Manufacturer: MITTAL STEEL ROMAN SA STEFAN CEL MARE STREET, NO 246 ROMAN, NEAMT, ROMANIA	**MILL TEST CERTIFICATE** ACC. TO E.N. 10204/3.1.	**NO.:** D 241	**Date:** 10.12.2005
Buyer:	**Description of Goods &/ or Services:** SEAMLESS STEEL LINE PIPES	**Total weight:** 144.642 tons 318838 lbs	**Total Length:** 1041.48 meters 3416.93 feet
Contract No.: 1E 0335 INA VASS PIPE PO: 3084	**Standard:** API 5L /2004; ASTM A106/2002; ASME SA53/2001; ASME SA 106/2001 NACE MR 01-75-2003		94 pieces loose

Item	Dimensions [inches/mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	Mechanical Properties YS [PSI] :1000	UTS [PSI] :1000	E %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12 ✓	18"SCH XS 457.2 x 12.7 mm Length: 29.5'– 36.1' 9–11 m 3000'	Gr.B/ X42 PSL1	58091 ✓	2			1980	18	73	22	16	14	16	5	14	2	0.7	3.8	0.3	0.5	0.00	0.015	50.2	75.1	46.4	6;5	OK
								17	74	22	15	14	16	5	14	2	0.7	3.8	0.3	0.5	0.00	0.015	55.7	80.8	41.4	7;7	
		✓	58094	2			1980	18	71	22	14	13	16	5	14	2	0.7	3.8	0.2	0.5	0.00	0.014	53.7	80.4	42.4	5;5	OK
								18	70	22	15	13	16	5	13	2	0.7	3.9	0.1	0.4	0.00	0.012	51.7	74.9	43.6	6;6	
		✓	58098	6			1980	18	70	22	13	13	16	5	13	2	0.7	3.8	0.1	0.4	0.00	0.012	51.3	76.8	45.4	6;5	OK
								17	71	22	12	13	16	5	13	2	0.7	3.9	0.2	0.5	0.00	0.014	54.2	78.5	41.2	6;5	
		✓	58111	6			1980	19	70	22	13	13	15	5	13	2	0.7	4.0	0.0	0.4	0.00	0.011	52.1	77.9	43.8	5;5	OK
								18	69	21	12	13	15	5	13	2	0.7	3.9	0.0	0.4	0.00	0.011	55.3	80.1	40.6	6;7	
		✓	58278	4			1980	21	77	31	14	13	14	5	19	2	0.6	4.7	0.0	0.6	0.00	0.012	47.9	66.3	46.6	5;5	OK
								22	75	30	13	12	14	5	18	2	0.6	4.9	0.0	0.6	0.00	0.012	45.3	64.0	38.8	6;7	
		✓	58282	2			1980	22	76	30	12	11	14	5	18	2	0.6	5.0	0.0	0.6	0.00	0.012	50.0	69.2	43.8	7;6	OK
								21	75	30	13	12	14	5	18	2	0.6	4.9	0.0	0.6	0.00	0.012	49.0	69.1	36.8	5;5	

Remarks: Hydrostatic test hold for 5 sec. no leakage noticed.
Manufacturing process – hot rolling
Steel is fully killed and produced by electrical furnace

Marking: according to the standards + MADE IN ROMANIA + INA # 003048 + VASS PIPE

We state on our sole responsibility that the delivered products are in conformity with the order requirements.	QUALITY DIRECTOR Eng. Cristian Rendler MITTAL 327/88/91	Chief Inspection Dept., Eng. Luță Romeo	QA Office Eng. Mercianu Mihai AQ 3

BRĂILA
REVIEWED / ~~WITNESSED~~
by
B. Cercel

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

Item	Dimensions [inches/mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product															Mechanical Properties				
								C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	YS [PSI] :1000	UTS [PSI] :1000	E. %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12	18"SCH XS 457.2 x 12.7 mm Length: 29.5' – 38.1' 9 – 11 m	Gr.B/ X42 PSL1	36871 ✓	7			1980	20	74	29	13	12	14	5	18	2	0.6	4.5	0.0	0.6	0.00	0.012	51.2	70.9	42.4	6;8	OK
								20	73	28	14	12	13	5	18	2	0.6	4.4	0.0	0.5	0.00	0.011	46.1	65.1	40.8	7;5	
			58270	4			1980	21	74	29	13	12	14	5	18	2	0.6	4.7	0.0	0.5	0.00	0.011	52.6	72.9	41.2	6;6	OK
								21	73	29	12	12	13	5	18	2	0.6	4.7	0.0	0.6	0.00	0.012	49.6	70.0	39.2	6;7	
		✓	58135	3			1980	20	74	29	13	12	14	5	18	2	0.6	4.5	0.0	0.6	0.00	0.012	55.9	80.4	42.8	7;6	OK
								20	75	29	12	12	14	5	18	2	0.6	4.5	0.0	0.5	0.00	0.011	46.6	65.8	39.8	7;7	
			58143	1			1980	19	73	28	13	11	13	5	17	0.2	0.6	4.7	0.0	0.6	0.00	0.012	55.9	78.5	40.6	6;7	OK
								20	74	28	12	11	13	5	17	0.2	0.6	4.6	0.0	0.6	0.00	0.012	48.3	66.1	38.0	6;6	
		✓	58154	4			1980	17	79	23	26	13	16	5	12	2	0.7	4.4	0.0	0.5	0.00	0.012	59.0	85.2	48.6	6;8	OK
								18	80	22	27	14	17	6	11	2	0.7	4.2	0.0	0.5	0.00	0.012	57.6	83.2	34.4	5;6	
		✓	58096	5			1980	19	78	22	16	12	17	6	10	2	0.7	4.3	0.0	0.5	0.00	0.012	57.3	82.7	44.8	5;6	OK
								19	79	23	15	12	17	6	11	3	0.7	4.5	0.0	0.5	0.00	0.012	55.7	80.5	35.2	5;6	
		✓	58130	3			1980	19	70	21	10	10	16	4	17	2	0.6	3.9	0.0	0.5	0.00	0.011	56.4	81.5	46.8	6;7	OK
								18	71	21	11	11	17	4	18	2	0.6	3.7	0.0	0.5	0.00	0.011	58.8	85.0	33.4	5;6	
			58104	1			1980	19	69	21	7	10	16	4	18	2	0.5	3.7	0.0	0.5	0.00	0.010	55.6	80.3	47.4	7;5	OK
								18	68	21	6	10	16	4	18	2	0.5	3.6	0.0	0.5	0.00	0.010	57.2	82.6	36.0	6;6	
			58112	1			1980	19	79	24	21	14	17	6	11	3	0.8	4.3	0.2	0.5	0.00	0.015	56.8	82.1	43.4	6;5	OK
								18	78	24	22	14	17	6	11	3	0.8	4.2	0.2	0.5	0.00	0.015	57.9	83.7	34.4	5;6	
		✓	58140	4			1980	18	70	22	8	11	16	5	19	2	0.6	3.6	0.1	0.5	0.00	0.012	58.1	83.9	41.6	5;5	OK
								19	69	22	7	11	16	5	19	2	0.6	3.5	0.1	0.5	0.00	0.012	56.8	82.1	35.8	5;7	

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR
Eng. Cristian Rendler
527/88/91

Chief Inspection Dept.,
Eng. Luţă Romeo

QA Office
Eng. Merolaniu Mitel
QC

BUREAU VERITAS ROMANIA SURVEYOR 26 BRAILA

REVIEWED / ~~WITNESSED~~ by
B. Cercel

S.M.

Formular 12A, rev.6

E 014187

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

Item	Dimensions [inches/mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product															Mechanical Properties				
								C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	YS [PSI] :1000	UTS [PSI] :1000	E %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12	18"SCH XS 457.2 x 12.7 mm Length: 29.5' – 36.1' 9 – 11 m	Gr.B/ X42 PSL1	58114	3			1980	18	77	23	16	13	17	5	12	3	0.7	4.0	0.1	0.5	0.00	0.013	56.0	80.9	43.8	6;5	OK
								17	79	23	17	14	17	6	11	3	0.8	4.1	0.1	0.5	0.00	0.014	59.8	86.5	33.4	6;7	
		✓	36875	4			1980	18	72	23	10	12	17	5	18	2	0.7	4.0	0.0	0.5	0.00	0.012	57.7	83.3	42.2	7;6	OK
								17	70	22	9	11	16	5	19	2	0.8	3.8	0.1	0.5	0.00	0.012	57.9	83.7	34.2	7;6	
			58266	7			1980	18	70	28	12	13	9	5	14	2	0.6	5.6	0.1	0.5	0.00	0.012	52.2	74.1	46.4	5;5	OK
								18	70	27	12	12	9	5	14	2	0.6	5.5	0.1	0.5	0.00	0.012	52.8	74.7	41.8	5;7	
			58274	5			1980	19	71	28	14	13	9	5	14	2	0.6	5.3	0.1	0.5	0.00	0.012	51.1	72.5	47.2	6;5	OK
								18	71	27	12	12	9	5	14	2	0.6	5.3	0.1	0.5	0.00	0.012	56.8	80.6	40.6	5;6	
		✓	58261	6			1980	18	71	27	12	12	9	5	14	2	0.6	5.4	0.0	0.5	0.00	0.011	53.4	75.8	43.4	7;7	OK
								18	70	27	13	12	9	5	14	2	0.6	5.3	0.0	0.5	0.00	0.011	55.5	78.7	38.8	5;6	
		✓	58123	4			1980	17	70	26	16	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	51.5	73.0	44.6	6;5	OK
								17	71	27	17	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	54.6	77.5	41.4	7;5	
		✓	58122	5			1980	18	71	27	15	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	51.8	73.6	43.2	6;7	OK
								17	70	26	14	12	9	5	14	2	0.6	5.4	0.0	0.5	0.00	0.011	55.9	79.4	38.8	7;6	
			58118	5			1980	17	70	26	13	12	9	5	14	2	0.6	5.1	0.0	0.5	0.00	0.011	50.7	72.0	46.8	6;6	OK
								17	69	25	13	12	9	5	14	2	0.6	5.0	0.0	0.5	0.00	0.011	57.3	81.3	38.0	6;5	

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR
Eng. Cristian Rendler

Chief Inspection Dept.,
Eng. Luță Romeo

QA Officer
Eng. Moroianu Mihai

REVIEWED / WITNESSED
by
B. Cercel

S.M.

Formular 12A, rev.6

E 014187

Manufacturer: MITTAL STEEL ROMAN SA STEFAN CEL MARE STREET, NO 246 ROMAN, NEAMT, ROMANIA	**MILL TEST CERTIFICATE** ACC. TO E.N. 10204/3.1.	**NO.:** **D 241**	**Date;** 10.12.2005

Heat No.	Standard	Gauge	length Inch	width inch	thickness inch	Chemical Analysis Bulletin No.	Mechanical Test Bulletin No	Hardness Test Bulletin No.	Flattening Test Bulletin No.
58091	API 5L	longitudinal	2	1.503	0.539	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.498	0.500		1470B		
58094	API 5L	longitudinal	2	1.503	0.503	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.500	0.538		1470B		
58098	API 5L	longitudinal	2	1.503	0.527	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.496	0.514		1470B		
58111	API 5L	longitudinal	2	1.503	0.519	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.503	0.502		1470B		
58278	API 5L	longitudinal	2	1.503	0.523	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.498	0.516		1471B		
58282	API 5L	longitudinal	2	1.496	0.503	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.501	0.476		1471B		
36871	API 5L	longitudinal	2	1.503	0.492	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.496	0.508		1471B		
58270	API 5L	longitudinal	2	1.503	0.476	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.496	0.472		1471B		
58135	API 5L	longitudinal	2	1.503	0.492	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.498	0.502		1471B		
58143	API 5L	longitudinal	2	1.503	0.503	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.496	0.485		1471B		
58154	API 5L	longitudinal	2	1.503	0.519	3940	2619	1327	1113
	ASTM/ASME	transversal	2	1.500	0.533		1485B		
58096	API 5L	longitudinal	2	1.503	0.535	3940	2619	1327	1113
	ASTM/ASME	transversal	2	1.503	0.550		1485B		
58130	API 5L	longitudinal	2	1.503	0.543	3940	2619	1327	1113
	ASTM/ASME	transversal	2	1.503	0.521		1485B		
58104	API 5L	longitudinal	2	1.503	0.551	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.499	0.537		1485B		
58112	API 5L	longitudinal	2	1.503	0.539	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.503	0.529		1485B		
58140	API 5L	longitudinal	2	1.503	0.527	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.501	0.540		1485B		

We state on our sole responsibility that the delivered products are in conformity with the order requirements.	**QUALITY DIRECTOR** Eng. Cristian Rendler	Chief Inspection Dept., Eng. Luţă Romeo	QA Office Eng. Morolanu Mihail

REVIEWED / ~~WITNESSEE~~
by
B. Cercel

S.M.

Formular 12A, rev.6 *E 014187*

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

Heat No.	Standard	Gauge	length Inch	width Inch	thickness Inch	Chemical Analysis Bulletin No.	Mechanical Test Bulletin No	Hardness Test Bulletin No.	Flattening Test Bulletin No.
58114	API 5L	longitudinal	2	1.503	0.547	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.502	0.512		1485B		
38875	API 5L	longitudinal	2	1.503	0.531	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.496	0.531		1485B		
58266	API 5L	longitudinal	2	1.503	0.535	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.531		1487B		
58274	API 5L	longitudinal	2	1.503	0.547	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.492		1487B		
58261	API 5L	longitudinal	2	1.503	0.523	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.503		1487B		
58123	API 5L	longitudinal	2	1.503	0.543	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.511		1487B		
58122	API 5L	longitudinal	2	1.503	0.539	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.500		1487B		
58118	API 5L	longitudinal	2	1.503	0.551	3939	2620	1329	1115
	ASTM/ASME	transversal	2	1.503	0.488		1487B		

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR	Chief Inspection Dept.,	QA Office
Eng. Cristian Randler	Eng. Luță Romeo	Eng. Morgenu Mihai

BUREAU VERITAS ROMANIA SURVEYOR 20 BRAILA CONTROLE INTERNATIONAL S.R.L.

REVIEWED / ~~WITNESSED~~
by
B. Cercel

27/58/91

AQ

S.M.

Formular 12A, rev.6 *E 014187*

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: May 18, 2006 Number of Copies: 9

Submittal Number: 11360-009-E

Specification Section Number: 11360-009-E

Item Submitted: 18" Additional Mill Certs

New Submittal: X Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Marybeth Rios

Marybeth Rios

Transmittal Date: May 18, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ______

Firm: ______

Date: ______

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 4435/EXP/R/05/A1

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1
/nr normy/

Zamawiający **STALEXPORT S.A.**
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagon No Car No Wagon No No вагона
PL/271936361/205/1147	4248567/05		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Piéces Pieces Stück Штук	**mb.** ft (c. mr.) c. mr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ✓ ASTM - A106/A106M/04b/A 53/ A53M/ 04a/ASME SA 106/ SA 53/04. Outside diameter tolerances +/-0,75 %. Bevelled ends acc.to API - 5L. Outside surface double lacquered.	**18" x 0,500"** **(457 x 12,7 mm)** **36 - 45 ft** **(10,97 - 13,41 m)**	**B/C/X42**	**831396** ✓	**2**	**67,9** **(20,68)**	**6351** **(2878)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécuté par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	**C**	**Mn**	**Si**	**P**	**S**	**Cr**	**Ni**	**Cu**
✓ **831396** **control anal.**	0,17 0,19 0,19	1,02 1,01 1,00	0,24 0,24 0,24	0,013 0,015 0,014	0,007 0,006 0,006	0,07 0,07 0,07	0,08 0,08 0,08	0,27 0,27 0,27
	Al	**Mo**	**V**	**Ti**	**Nb**	**Ce**		
	0,045 0,042 0,041	0,01 0,01 0,01	0,00 0,00 0,00	0,003 0,003 0,003	0,0000 0,0000 0,0000	0,38 0,40 0,40		

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-009-E
Transmittal No. # ______ **Date:** 5/18
Signature ______

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re** **PSI** **MPa** **min** **290**	**Rm** **PSI** **MPa** **min** **485**	**A 2"** **%** **min** **30,0**	**Z** **%**	**U**	**Twardość** Dureté Hardness Härte Твердость
831396/39803 **TYP C**	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75/ ISO - 15156-2/03**	**53229** **(367)**	**79771** **(550)**	**40,9**			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes has been hydrostatically tested by pressure 1980 PSI - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont éte controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono –
La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B .
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеуказанных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA Z ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII [illegible] DERKO	**dn. 16.01. 2006 r.**

HUTA BATORY
Sp. z o.o.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 4436/EXP/R/05/A1

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
Acc.to EN 10204:2004 type 3.1
/nr normy/

Zamawiający Le client-Ordered by-Besteller-Заказчик: **STALEXPORT S.A.**

Adres wysyłkowy Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/205/1147	**4248567/05**		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2004/ ASTM - A106/A106M/04b/A 53/ A53M/ 04a/ASME SA 106/ SA 53/04. Outside diameter tolerances +/-0,75 %. Bevelled ends acc.to API - 5L. Outside surface double lacquered. ✓	**18" x 0,500"** **(457 x 12,7 mm)** **36 - 45 ft** **(10,97 - 13,41 m)**	**B/C/X42**	**831400** ✓	**3**	**97,0** **(29,58)**	**9073** **(4116)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécuté par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	**C**	**Mn**	**Si**	**P**	**S**	**Cr**	**Ni**	**Cu**
✓ **831400** **control anal.**	0,18 0,20 0,21	0,95 0,95 0,95	0,22 0,22 0,22	0,014 0,015 0,015	0,008 0,010 0,008	0,12 0,12 0,12	0,08 0,09 0,09	0,26 0,26 0,26
	Al	**Mo**	**V**	**Ti**	**Nb**	**Ce**		
	0,041 0,037 0,036	0,02 0,02 0,02	0,00 0,00 0,00	0,003 0,003 0,003	0,0000 0,0000 0,0000	0,39 0,41 0,42		

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re PSI MPa min 290**	**Rm PSI MPa min 485**	**A 2" % min 30,0**	**Z %**	**U**	**Twardość** Dureté Hardness Härte Твердость
✓ **831400/39814** **TYP C**	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75/ ISO - 15156-2/03**	**55840 (385)**	**77450 (534)**	**41,3**			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes has been hydrostatically tested by pressure 1980 PSI - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont éte controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Materiał oznaczono –
La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B .
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA Z ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII inż. HENRYK ONDERKO	**dn. 16.01. 2006 r.**

Page 1 of 5

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

Buyer:

Description of Goods &/ or Services:
SEAMLESS STEEL LINE PIPES

Total weight:
144.642 tons
318838 lbs

Total Length:
1041.48 meters
3416.93 feet

94 pieces
loose

Contract No.: 1E 0335 INA VASS PIPE
PO: 3084

Standard:
API 5L /2004; ASTM A106/2002; ASME SA53/2001; ASME SA 106/2001
NACE MR 01-75-2003

Item	Dimensions [inches/mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product															Mechanical Properties				
								C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	YS [PSI] :1000	UTS [PSI] :1000	E %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12	18"SCH XS 457.2 x 12.7 mm Length: 29.5'– 36.1' 9 – 11 m	Gr.B/ X42 PSL1	58091	2			1980	18	73	22	16	14	16	5	14	2	0.7	3.8	0.3	0.5	0.00	0.015	50.2	75.1	46.4	6;5	OK
								17	74	22	15	14	16	6	14	2	0.7	3.8	0.3	0.5	0.00	0.015	55.7	80.6	41.4	7;7	
			58094	2			1980	18	71	22	14	13	16	5	14	2	0.7	3.8	0.2	0.5	0.00	0.014	53.7	80.4	42.4	5;5	OK
								18	70	22	15	13	16	5	13	2	0.7	3.9	0.1	0.4	0.00	0.012	51.7	74.9	43.6	6;6	
	3000'		58098	6			1980	18	70	22	13	13	16	5	13	2	0.7	3.8	0.1	0.4	0.00	0.012	51.3	76.8	45.4	6;5	OK
								17	71	22	12	13	16	5	13	2	0.7	3.9	0.2	0.5	0.00	0.014	54.2	78.5	41.2	6;5	
			58111	6			1980	19	70	22	13	13	15	5	13	2	0.7	4.0	0.0	0.4	0.00	0.011	52.1	77.9	43.8	5;5	OK
								18	69	21	12	13	15	5	13	2	0.7	3.9	0.0	0.4	0.00	0.011	55.3	80.1	40.6	6;7	
			58276	4			1980	21	77	31	14	13	14	5	19	2	0.6	4.7	0.0	0.6	0.00	0.012	47.9	66.3	46.6	5;5	OK
								22	75	30	13	12	14	5	18	2	0.6	4.9	0.0	0.6	0.00	0.012	45.3	64.0	38.8	6;7	
			58282	2			1980	22	76	30	12	11	14	5	18	2	0.6	5.0	0.0	0.6	0.00	0.012	50.0	69.2	43.8	7;6	OK
								21	75	30	13	12	14	5	18	2	0.6	4.9	0.0	0.6	0.00	0.012	49.0	69.1	36.8	5;5	

Remarks: Hydrostatic test hold for 5 sec. no leakage noticed.
Manufacturing process – hot rolling
Steel is fully killed and produced by electrical furnace

Marking: according to the standards + MADE IN ROMANIA + INA # 003048 +1

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR
Eng. Cristian Rendler
J27/88/91

Chief Inspection Dept.,
Eng. Luţă Romeo

QA Officer
Eng. Mordahq Mihai

REVIEWED / WITNESSED
by
B. Cercel

BRAILA

S.M.

Formular 12A, rev.6

E 014187

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

Item	Dimensions [inches/mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product															Mechanical Properties				
								C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	YS [PSI] ·1000	UTS [PSI] ·1000	E. %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12	18"SCH XS 457.2 x 12.7 mm Length: 29.5' – 36.1' 9 – 11 m	Gr.B/ X42 PSL1	36871	7			1980	20	74	29	13	12	14	5	18	2	0.6	4.5	0.0	0.6	0.00	0.012	51.2	70.9	42.4	6;6	OK
								20	73	28	14	12	13	5	18	2	0.6	4.4	0.0	0.5	0.00	0.011	46.1	65.1	40.8	7;5	
			58270	4			1980	21	74	29	13	12	14	5	18	2	0.6	4.7	0.0	0.5	0.00	0.011	52.8	72.9	41.2	6;6	OK
								21	73	29	12	12	13	5	18	2	0.6	4.7	0.0	0.6	0.00	0.012	49.6	70.0	39,2	6;7	
			58135	3			1980	20	74	29	13	12	14	5	18	2	0.6	4.5	0.0	0.6	0.00	0.012	55.9	80.4	42.8	7;8	OK
								20	75	29	12	12	14	5	18	2	0.6	4.5	0.0	0.5	0.00	0.011	46.6	65.8	39.8	7;7	
			58143	1			1980	19	73	28	13	11	13	5	17	0.2	0.6	4.7	0.0	0.6	0.00	0.012	55.9	78.5	40.6	6;7	OK
								20	74	28	12	11	13	5	17	0.2	0.6	4.6	0.0	0.6	0.00	0.012	48.3	68.1	38.0	6;8	
			58154	4			1980	17	79	23	26	13	16	5	12	2	0.7	4.4	0.0	0.5	0.00	0.012	59.0	85.2	48.6	6;6	OK
								18	80	22	27	14	17	6	11	2	0.7	4.2	0.0	0.5	0.00	0.012	57.6	83.2	34.4	5;6	
			58096	5			1980	19	78	22	16	12	17	6	10	2	0.7	4.3	0.0	0.5	0.00	0.012	57.3	82.7	44.8	5;6	OK
								19	79	23	15	12	17	6	11	3	0.7	4.5	0.0	0.5	0.00	0.012	55.7	80.5	35.2	5;6	
			58130	3			1980	19	70	21	10	10	16	4	17	2	0.6	3.9	0.0	0.5	0.00	0.011	58.4	81.5	46.8	6;7	OK
								18	71	21	11	11	17	4	18	2	0.6	3.7	0.0	0.5	0.00	0.011	58.8	85.0	33.4	5;6	
			58104	1			1980	19	69	21	7	10	16	4	18	2	0.5	3.7	0.0	0.5	0.00	0.010	55.6	80.3	47.4	7;5	OK
								18	68	21	6	10	16	4	18	2	0.5	3.6	0.0	0.5	0.00	0.010	57.2	82.6	36.0	6;6	
			58112	1			1980	19	79	24	21	14	17	6	11	3	0.8	4.3	0.2	0.5	0.00	0.015	56.8	82.1	43.4	6;5	OK
								18	78	24	22	14	17	6	11	3	0.8	4.2	0.2	0.5	0.00	0.015	57.9	83.7	34.4	5;6	
			58140	4			1980	18	70	22	8	11	16	5	19	2	0.6	3.6	0.1	0.5	0.00	0.012	58.1	83.9	41.6	5;5	OK
								19	69	22	7	11	16	5	19	2	0.6	3.5	0.1	0.5	0.00	0.012	56.8	82.1	35.8	5;7	

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR	Chief Inspection Dept.,	QA Office
Eng. Cristian Rendler	Eng. Luţă Romeo	Eng. Maroleanu Mihail

327/SS/91

BRAILA

~~REVIEWED / WITNESSED~~
by
B. Cercel

S.M.

Formular 12A, rev.6

E 014187

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date: 10.12.2005

								Chemical Composition %, on the product															Mechanical Properties				
Item	Dimensions (inches/mm)	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V. x100	Al x100	Nb x100	Ti x100	B x100	V + Nb + Ti ≤0.15%	YS (PSI) :1000	UTS (PSI) :1000	E %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
12	18"SCH XS 457.2 x 12.7 mm Length: 29.5' – 36.1' 9 – 11 m	Gr.B/ X42 PSL1	58114	3			1980	18	77	23	16	13	17	5	12	3	0.7	4.0	0.1	0.5	0.00	0.013	56.0	80.9	43.8	6;5	OK
								17	79	23	17	14	17	6	11	3	0.8	4.1	0.1	0.5	0.00	0.014	59.8	86.5	33.4	6;7	
			36875	4			1980	18	72	23	10	12	17	5	18	2	0.7	4.0	0.0	0.5	0.00	0.012	57.7	83.3	42.2	7;6	OK
								17	70	22	9	11	16	5	19	2	0.6	3.8	0.1	0.5	0.00	0.012	57.9	83.7	34.2	7;6	
		✓	58266	7			1960	18	70	28	12	13	9	5	14	2	0.6	5.6	0.1	0.5	0.00	0.012	52.2	74.1	46.4	5;5	OK
								18	70	27	12	12	9	5	14	2	0.6	5.6	0.1	0.5	0.00	0.012	52.6	74.7	41.8	5;7	
		✓	58274	5			1980	19	71	28	14	13	9	5	14	2	0.6	5.3	0.1	0.5	0.00	0.012	51.1	72.5	47.2	6;5	OK
								18	71	27	12	12	9	5	14	2	0.6	5.3	0.1	0.5	0.00	0.012	56.8	80.6	40.8	5;8	
			58261	6			1980	18	71	27	12	12	9	5	14	2	0.6	5.4	0.0	0.5	0.00	0.011	53.4	75.8	43.4	7;7	OK
								18	70	27	13	12	9	5	14	2	0.6	5.3	0.0	0.5	0.00	0.011	55.5	78.7	38.8	5;6	
			58123	4			1980	17	70	26	16	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	51.5	73.0	44.6	6;5	OK
								17	71	27	17	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	54.6	77.5	41.4	7;5	
			58122	6			1980	18	71	27	15	12	9	5	14	2	0.6	5.5	0.0	0.5	0.00	0.011	51.8	73.6	43.2	6;7	OK
								17	70	26	14	12	9	5	14	2	0.8	5.4	0.0	0.5	0.00	0.011	55.9	79.4	38.8	7;6	
		✓	58118	5			1980	17	70	26	13	12	9	5	14	2	0.6	5.1	0.0	0.5	0.00	0.011	50.7	72.0	46.8	6;6	OK
								17	69	25	13	12	9	5	14	2	0.6	5.0	0.0	0.5	0.00	0.011	57.3	81.3	38.0	6;5	

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR	Chief Inspection Dept.,	QA Officer
Eng. Cristian Randler	Eng. Luță Romeo	Eng. Moroianu Mihai

J27/60/91

REVIEWED / WITNESSED
by
B. Cercel

BRĂILA 20

S.M.

Formular 12A, rev.6

E 014187

Manufacturer:
MITTAL STEEL ROMAN SA
STEFAN CEL MARE STREET, NO 246
ROMAN, NEAMT, ROMANIA

MILL TEST CERTIFICATE
ACC. TO E.N. 10204/3.1.

NO.: D 241

Date; 10.12.2005

Heat No.	Standard	Gauge	length Inch	width Inch	thickness inch	Chemical Analysis Bulletin No.	Mechanical Test Bulletin No	Hardness Test Bulletin No.	Flattening Test Bulletin No.
58091	API 5L	longitudinal	2	1.503	0.539	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.498	0.500		1470B		
58094	API 5L	longitudinal	2	1.503	0.503	4007	2596	1320	1117
	ASTM/ASME	transversal	2	1.500	0.538		1470B		
58098	API 5L	longitudinal	2	1.503	0.527	4007	2598	1320	1117
	ASTM/ASME	transversal	2	1.496	0.514		1470B		
58111	API 5L	longitudinal	2	1.503	0.519	4007	2598	1320	1117
	ASTM/ASME	transversal	2	1.503	0.502		1470B		
58278	API 5L	longitudinal	2	1.503	0.523	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.498	0.516		1471B		
58282	API 5L	longitudinal	2	1.496	0.503	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.501	0.478		1471B		
36871	API 5L	longitudinal	2	1.503	0.492	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.496	0.508		1471B		
58270	API 5L	longitudinal	2	1.503	0.476	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.498	0.472		1471B		
58135	API 5L	longitudinal	2	1.503	0.492	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.496	0.502		1471B		
58143	API 5L	longitudinal	2	1.503	0.503	3918	2597	1326	1113
	ASTM/ASME	transversal	2	1.495	0.486		1471B		
58154	API 5L	longitudinal	2	1.503	0.519	3940	2619	1327	1113
	ASTM/ASME	transversal	2	1.500	0.533		1485B		
58096	API 5L	longitudinal	2	1.503	0.535	3940	2618	1327	1113
	ASTM/ASME	transversal	2	1.503	0.650		1485B		
68130	API 5L	longitudinal	2	1.503	0.543	3940	2619	1327	1113
	ASTM/ASME	transversal	2	1.503	0.521		1485B		
58104	API 5L	longitudinal	2	1.503	0.551	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.499	0.537		1485B		
58112	API 5L	longitudinal	2	1.503	0.539	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.503	0.529		1485B		
58140	API 5L	longitudinal	2	1.503	0.527	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.501	0.540		1485B		

We state on our sole responsibility that the delivered products are in conformity with the order requirements.

QUALITY DIRECTOR	Chief Inspection Dept.,	QA Office
Eng. Cristian Rendler	Eng. Luţă Romeo	Eng. Moroianu Mihail

BUREAU VERITAS ROMANIA
SURVEYOR
20
BRAILA

REVIEWED / ~~WITNESSED~~
by
B. Cercel

J27/88/91

AQ

S.M.

Formular 12A, rev.6

E 014187

Manufacturer: MITTAL STEEL ROMAN SA STEFAN CEL MARE STREET, NO 246 ROMAN, NEAMT, ROMANIA	**MILL TEST CERTIFICATE** ACC. TO E.N. 10204/3.1.	**NO.:** D 241	**Date:** 10.12.2005

Heat No.	Standard	Gauge	length Inch	width Inch	thickness Inch	Chemical Analysis Bulletin No.	Mechanical Test Bulletin No	Hardness Test Bulletin No.	Flattening Test Bulletin No.
58114	API 5L	longitudinal	2	1.503	0.547	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.502	0.512		1485B		
36875	API 5L	longitudinal	2	1.503	0.531	3940	2619	1327	1114
	ASTM/ASME	transversal	2	1.496	0.531		1485B		
58266	API 5L	longitudinal	2	1.503	0.535	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.531		1487B		
58274	API 5L	longitudinal	2	1.503	0.547	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.492		1487B		
58261	API 5L	longitudinal	2	1.503	0.523	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.503		1487B		
58123	API 5L	longitudinal	2	1.503	0.543	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.511		1487B		
58122	API 5L	longitudinal	2	1.503	0.539	3939	2620	1329	1114
	ASTM/ASME	transversal	2	1.503	0.500		1487B		
58118	API 5L	longitudinal	2	1.503	0.551	3939	2620	1329	1115
	ASTM/ASME	transversal	2	1.503	0.488		1487B		

We state on our sole responsibility that the delivered products are in conformity with the order requirements.	**QUALITY DIRECTOR** Eng. Cristian Randler	Chief Inspection Dept., Eng. Luţă Romeo	QA Office Eng. Morosanu Mihai

BRAILA

REVIEWED / ~~WITNESSED~~
by
B. Cercel

27/08/91

AQ

S.M.

Formular 12A, rev.6

E 014187

Submittal Data
FROM

Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: May 18, 2006

Number of Copies: 9

Submittal Number: 11360-009-F

Specification Section Number: 11360-009-F

Item Submitted: 18" Additional Mill Certs

New Submittal: X

Resubmitted: ____

Youngquist Brothers, Inc. Representative:

Marybeth Rios

Marybeth Rios

Transmittal Date: May 18, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ____

Firm: ____

Date: ____

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-009-F
Transmittal No. # Date: 3/18
Signature

Page 1 of 1

MANUFACTURER:
ISPAT PETROTUB SA
STEFAN CEL MARE STREET, NO. 246, ROMAN
JUD NEAMT, ROMANIA

MILL TEST CERTIFICATE
acc. to E.N. 10204/3.1.B

NO. D 91

Date: 25.01.2005

BUYER:

Description of goods &/or Services:
SEAMLESS STEEL LINE PIPES

Total weight: 15259 KGS
37658 LBS

Total Length: 109.66 METERS
359.78 FEET

10 PCS
loose

Contract No. 1E 0249

Standard
API 5L /2004; ASTM A106/2002 ;ASME SA 53/2001; NACE MR 01-75/2003

Item	Size [Inches] [mm]	Steel	Heat	Pcs	Length [m]	Weight [kg]	Hydro Test [PSI]	Chemical Composition %, on the product C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	V x100	Nb x100	Ti x100	B x100	Mechanical Properties R [PSI] :1000	Rm [PSI] :1000	A %	HRC max. 22	Flattening Test
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	18"SCH XS	Gr.C/	58090	7			1980	21	95	29	13	16	11	5	13	1	0.0	0.3	0.0	0.05	56.7	78.7	44.8	6;5;7;6	OK
	457.2x 12.70	X42	✓					20	94	29	14	15	11	5	13	1	0.0	0.3	0.0	0.05	52.0	76.6	37.4		
	mm	PSL1	58125	1			1980	21	95	30	16	16	11	5	13	1	0.0	0.4	0.0	0.05	57.9	80.4	42.8	5;5;6;7	OK
	Length:		✓					20	95	29	18	16	11	5	13	1	0.0	0.4	0.0	0.05	54.0	79.5	36.8		
	29.5'-36.1' ft	✓	58095	2			1980	19	82	26	6	12	12	4	9	0.0	0.0	0.2	0.0	0.03	52.6	75.4	42.8	6;7;8;7	OK
	9-11 m							20	83	27	7	11	11	4	8	0.0	0.0	0.2	0.0	0.03	52.1	79.8	35.8		

Heat No.	Standard	Gauge	Length Inch	Width Inch	Thickness Inch	Chemical Analysis Bulletin No.	Mechanical Test Bulletin No	Hardness Test HRC Bulletin No.	Flattening Test Bulletin No.
58090	API 5L	longitudinal	2	1.496	0.547	58	2219;40B	18	43
	ASTM/ASME	transversal	2	1.503	0.549				
58125	API 5L	longitudinal	2	1.496	0.535	"	"	"	"
	ASTM/ASME	transversal	2	1.500	0.530				
58095	API 5L	longitudinal	2	1.503	0.511	37	2204;28B	14	38
	ASTM/ASME	transversal	2	1.503	0.467				

REMARKS: Hydrostatic test hold for 5 sec. No leakage noticed.
Manufacturing process – hot rolling
Steel is fully killed and produced in electric furnace.

We state our sole responsibility that the product conforms to the requirements mentioned at "Standard" heading of the present certificate.

QUALITY DIRECTOR
Eng. Mircea Gabriel

Chief Inspection Dept.
Eng. Dumea Iosif

QA Office
Eng. Moroianu M.

ISPAT PETROTUB SA ROMAN
AQ
3

S.M.

Giorgis Milu

Formular 12A, rev.4

E 010524

Huta
„BATORY” S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2553/EXP/R/04

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/204/1100	4238508/04		

Wyszczególnienie zamówienia:
Specyfication de la commande-Order Specification-Spizifikation der Bestellung-Спецификация заказа

Przedmiot i wykonanie (stan obr. Termicz.,mech. Itp.) L'objet et l'execution (traitement thermique et l'usinage) Item and specification (Heat and mechanical treatment etc.) Gegenstand und Ausführung (therm und mechan. Bearbeitung usw.) Предмет и исполнение (состояние терм. и механобраб. и пр.)	**Wymiar lub rysunek** Dimensions ou dessin Dimesions or drawing Abmessung order Zeichnung Размер чертеж	**Marka** Marque Steel type Marke Марка	**Wytop** Coulée Heat Abstich Плавка	**Sztuk** Pièces Pieces Stück Штук	**mb.** ft (c. mtr.) c. mtr. l. M. пог. м	**Kg** lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2000/ ASTM - A106/A 53/A53M/ 02/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 0,75 %. Bevelled ends acc.to API - 5L. Outside surface double lacquered. ✓	**18" x 0,500"** **(457 x 12,70 mm)** **36 - 44 ft** **(10,97 - 13,41 m)**	**B / C / X42**	824480 ✓	**4**	**146,8** **(44,76)**	**13732** **(6230)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Controle. Les resultats des essais sont indiqués ci-après.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	**C**	**Mn**	**Si**	**P**	**S**	**Cr**	**Ni**	**Cu**
✓ **824480**	**0,17**	**0,96**	**0,24**	**0,011**	**0,004**	**0,07**	**0,09**	**0,20**
	Mo	**V**	**Al**	**Ti**	**Nb**	**Ce**		
	0,04	**0,00**	**0,037**	**0,003**	**0,0000**	**0,37**		

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu lub próby No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No № плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re** **psi** **(MPa)**	**Rm** **psi** **(MPa)**	**A 2"** **%**	**Z** **%**	**U**	**Twardość** Dureté Hardness Härte Твердость
824480/24719	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	51343 (345)	78755 (543)	39,2			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont ête controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol , Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 /B/
Size in inches. Heat number.

KJ
21/634

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA Z ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI TECHNOLOGII inż. [illegible]	dn. 07.09. 2004 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 2562/EXP/R/04

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRŰFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A.
Le client-Ordered by-Besteller-Заказчик

Adres wysyłkowy
Adresse-Address-Versandadresse-Адрес получателя

Nr i data zamówienia klienta No et date la commande Order No and date No und Datum der Bestellung No и число заказа	**Nr zlecenia** Ordre No Manuf. Order No Auftrag No No наряда	**Nr awizu** Avis No Advice No Versandanzeige No No извещения	**Nr wagonu** Wagen No Car No Wagon No No вагона
PL/271936361/204/1100	4238508/04		

Wyszczególnienie zamówienia:
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Seamless steel pipes acc.to API 5L - PSL1/2000/ ASTM - A106/A 53/A53M/ 02/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 0,75 %. Bevelled ends acc.to API - 5L. Outside surface double lacquered. ✓	**18" x 0,500"** **(457 x 12,70 mm)** **36 - 44 ft** **(10,97 - 13,41 m)**	**B / C / X42**	824820 ✓	**3**	**112,3** **(34,25)**	**10505** **(4768)**

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le contrôle technique de la été exécuté par le Service de Controle. Les resultats des essais sont indiqués ci-aprés.
The technical investigation of this order has been executed by the Works Control. Results of tests are as follows.
Die technische Prüfung obiger Bestellung wurde vor der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянутого заказа произвел Отдел Технического Контроля. Результат испытания представлен ниже.

1. **SKŁAD CHEMICZNY** - ANALYSE CHIMIQUE – CHEMICAL COMPOSITION – CHEMISCHE ZUSAMMENSETZUNG
ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
824820 ✓	0,16	1,04	0,26	0,012	0,006	0,08	0,09	0,24
	Mo	**V**	**Al**	**Ti**	**Nb**	**Ce**		
	0,03	0,00	0,042	0,004	0,0000	0,38		

2. BADANIA MECHANICZNE – ESSAIS MECANIQUES – MECHANICAL TESTS – MECHANISCHE UNTERSUCHUNGEN МЕХАНИЧЕСКИЕ ИСПЫТАНИЯ

Nr wytopu **lub próby** No de la coulée ou De l'eprouvette Heat No Or. Tests No Abstich Oder Probe No No плавки или пробы	**Stan obróbki Termicznej** Traitement thermique Heat treatement Therm. Bearbeitung Термич. обработка	**Re** **psi (MPa)**	**Rm** **psi (MPa)**	**A 2"** **%**	**Z** **%**	**U**	**Twardość** Dureté Hardness Härte Твердость
✓ 824820/24777	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E**	**48733 (336)**	**78610 (542)**	**39,6**			

2. BADANIA TECHNOLOGICZNE – ESSAIS TECHNOLOGIQUES – TECHNOLOGICAL TESTS – TECHNOLOGISCHE PRÜFUNGEN

Flattening test - positive results

4. BADANIA METALOGRAFICZNE – ESSAIS METALLOGRAPHIQUES – METALLOGRAPHIC TESTS – METALLOGRAPHISCHE UNTERSUCHUNGEN – МЕТАЛЛОГРАФИЧЕСКИЕ ИСПЫТАНИЯ

5. INNE BADANIA – AUTRES ESSAIS – OTHER TESTS – ANDERE UNTERSUCHUNGEN – ДРУГИЕ ИСПЫТАНИЯ

Each pipes hydrostatically tested by pressure 1980 psi - positive results time 5 s

6. UWAGI DODATKOWE – ADDITIONAL REMARKS – AUTRESOBSERVATIONS – ANDERE BEMERUNGEN

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont été controlés et 100% - Surface and dimensions tested at 100% Oberfläche und Abmessungen geprüft zu 100% - Наружный осмотр и проверка измерений произведены в 100%

Material oznaczono – La material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless. Acc.to API 5 L/ B /X42/ PSL 1 / A106/ /B/ C/ A53/ B/ S A106/ B / C/ SA53 / B . Size in inches. Heat number.

KJ
21/63

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur la base des essais si-dessus le material est délivré According to the carried out tests the material released – Untersuchungen wurde das Material freigegeben – На основании вышеименованных Испытаний признан годным.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	**Dyrekcja Huty** Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
SPECJALISTA Z ZAKRESU KONTROLI JAKOŚCI HALINA REHMET	KIEROWNIK DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII [illegible]	**dn. 07.09. 2004 r.**

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 8, 2006 Number of Copies: 9

Submittal Number: 11360-008-A

Specification Section Number: 11360-008-A

Item Submitted: 28" M/W Intermediate Casing Mill Cert

New Submittal: X Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: February 8, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ______

Firm: ______

Date: ______

ISPAT SIDEX
Member of the LNM GROUP
THE LARGEST IRON AND STEEL PRODUCER OF ROMANIA

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com, e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 578193

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:		**ORDER:**	900024/60000303
PRODUCT:	LSAW CARBON STEEL LINE PIPE	**STANDARD:**	API 5L 42edition;API2B for dimensional tolerances;straightness max.0.661 ";NACE MR 0175 for hardness
EXTERNAL ASPECT:	SUITABLE	**DELIVERY STATE:**	Expandated, Bevelled ends at 30° ; V=1,0
DATE:	27-May-04	**LOT:**	

MECHANICAL TESTS

Total number of pieces: 70 Total weight 298135 lbs

No. crt.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi]base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-band test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10 sec	X ray investigation acc.ISO w/e 4%
1	158470	911709	X 52- X42-Gr.B PSL1	28	38,65	0,375	4282,81	158480	trans.	1,50x0,39	86720	67868	32	0,782	1,50x0,38	89421	170	suitable		suitable	suitable
2	158471				38,62	—	4278,39													suitable	suitable
3	158473			✓	38,02		4214,44													suitable	suitable
4	158475				38,65		4282,81													suitable	suitable
5	158456				38,65		4282,81													suitable	suitable
6	158457				38,65		4282,81													suitable	suitable
7	158458				38,65		4282,81													suitable	suitable
8	158459				38,39		4254,14													suitable	suitable
9	158460				38,65		4282,81													suitable	suitable
10	158461				38,65		4282,81													suitable	suitable
11	158462				38,62		4278,39													suitable	suitable
12	158463				38,65		4282,81													suitable	suitable
13	158464				38,65		4282,81													suitable	suitable
14	158465				38,65		4282,81													suitable	suitable
15	158466				38,65		4282,81													suitable	suitable
16	158467				38,65		4282,81													suitable	suitable
17	158468				38,65		4282,81													suitable	suitable
18	158469				38,65		4282,81													suitable	suitable
19	158472				38,39		4254,14													suitable	suitable
20	158474				38,65		4282,81													suitable	suitable
21	158476				38,65		4282,81													suitable	suitable
22	158477				38,65		4282,81													suitable	suitable
23	158478				38,65		4282,81													suitable	suitable
24	158479				38,48		4265,16													suitable	suitable
25	158480				37,17		4119,81													suitable	suitable
26	158481				38,65		4282,81													suitable	suitable
27	158482				38,65		4282,81													suitable	suitable
28	158483				38,65		4282,81													suitable	suitable
29	158484				38,42		4256,34													suitable	suitable
30	158485				38,65		4282,81													suitable	suitable
31	158486				38,65		4282,81													suitable	suitable
32	158487				38,65		4282,81													suitable	suitable
33	158488	911710			38,65		4282,81	158491	trans.	1,46x0,42	80179	57528	36	0,717	1,47x0,41	82519	179	suitable		suitable	suitable
34	158489				38,62		4278,39													suitable	suitable
35	158490				38,45		4260,75													suitable	suitable
36	158491				37,07		4108,58													suitable	suitable
37	158492				38,62		4278,39													suitable	suitable
38	158493				38,65		4282,81													suitable	suitable
39	158494				38,65		4282,81													suitable	suitable
40	158495				38,65		4282,81													suitable	suitable
41	158496	✓			38,62		4278,39													suitable	suitable
42	158497				38,65		4282,81													suitable	suitable
43	158498				38,65		4282,81													suitable	suitable
44	158499				38,65		4282,81													suitable	suitable

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 27-May-04

ORDER: 900024/80000303

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0,551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

MECHANICAL TESTS

Total number of pieces: 70

Total weight: 299135 lbs

No. crt	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi]base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10 sec	X ray investigation acc.ISO wire 4%
45	158500			✓	38,65		4282,81													suitable	suitable
46	158501				38,65		4282,81													suitable	suitable
47	158502				38,39		4254,14													suitable	suitable
48	158503	✓			38,65		4282,81													suitable	suitable
49	158504				38,62		4278,39													suitable	suitable
50	158505				38,58		4278,19													suitable	suitable
51	158506				38,65		4282,81													suitable	suitable
52	158510				38,65		4282,81													suitable	suitable
53	158511				38,62		4278,39													suitable	suitable
54	158512				38,65		4282,81													suitable	suitable
55	158513	✓			38,65		4282,81													suitable	suitable
56	158514				38,65		4282,81													suitable	suitable
57	158515				38,65		4282,81													suitable	suitable
58	158516				38,65		4282,81													suitable	suitable
59	158517				38,65		4282,81													suitable	suitable
60	158518				38,45		4260,75													suitable	suitable
61	158519				38,65		4282,81													suitable	suitable
62	158520				38,65		4282,81													suitable	suitable
63	158521				38,65		4282,81													suitable	suitable
64	158522				38,65		4282,81													suitable	suitable
65	158523				38,65		4282,81													suitable	suitable
66	158524				38,65		4282,81													suitable	suitable
67	158525				38,29		4243,11													suitable	suitable
68	158526				38,62		4278,39													suitable	suitable
69	158527				38,65		4282,81													suitable	suitable
70	158528				38,65		4282,81													suitable	suitable

ISPAT SIDEX
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TÜV ISO 9001

INSPECTION CERTIFICATE: 578193

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:		ORDER:	900024/50000303
PRODUCT:	LSAW CARBON STEEL LINE PIPE	STANDARD:	API 5L 42edition;API2B for dimensional tolerances;straightness max,0.551 ";NACE MR 0175 for hardness
EXTERNAL ASPECT:	SUITABLE	DELIVERY STATE:	Expandated, Bevelled ends at 30° ; V=1,0
DATE:	27-May-04	LOT:	

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceq
1	911709	0,13	1,14	0,27	0,020	0,013	0,058	0,010	0,010	0,010	0,04									
✓ 2	911710	0,13	1,10	0,25	0,018	0,015	0,044	0,010	0,010	0,010	0,04		0,016	0,037						

INSPECTOR NAME
MARIANA LUNGU

ISPAT SIDEX S.A.
3

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http://www.ispat.com, e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 578107

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 27-May-04

ORDER: 900024/60000303

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,6

LOT:

MECHANICAL TESTS

Total number of pieces: 48   Total weight: 205299 lbs

No. ord.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi] base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10 sec	X ray investigation acc.ISO wire 4%
1	158338	912037	X 52- X42-Gr.B PSL1	28	38,65	0,375	4282,81	158349	trans.	1,49x0,39	82890	81252	38	0,74	1,49x0,39	83851	183	suitable		suitable	suitable
2	158339				38,65		4282,81													suitable	suitable
3	158340			✓	38,65		4282,81													suitable	suitable
4	158341				38,42		4258,34													suitable	suitable
5	158342				38,65		4282,81													suitable	suitable
6	158343				38,66		4282,81													suitable	suitable
7	158344				38,49		4265,16													suitable	suitable
8	158345				38,65		4282,81													suitable	suitable
9	158346				38,65		4282,81													suitable	suitable
10	158347				38,65		4282,81													suitable	suitable
11	158348				38,65		4282,81													suitable	suitable
12	158349	✓			37,14		4115,20													suitable	suitable
13	158350				38,65		4282,81													suitable	suitable
14	158351				38,65		4282,81													suitable	suitable
15	158352				38,65		4282,81													suitable	suitable
16	158353				38,65		4282,81													suitable	suitable
17	158354				38,65		4282,81													suitable	suitable
18	158355				38,65		4282,81													suitable	suitable
19	158356				38,65		4282,81													suitable	suitable
20	158357				38,65		4282,81													suitable	suitable
21	158358				38,65		4282,81													suitable	suitable
22	158359				38,65		4282,81													suitable	suitable
23	158360				38,39		4254,14													suitable	suitable
24	158361				38,65		4282,81													suitable	suitable
25	158362				38,65		4282,81													suitable	suitable
26	158363				38,65		4282,81													suitable	suitable
27	158364				38,65		4282,81													suitable	suitable
28	158365				38,65		4282,81													suitable	suitable
29	158366				38,65		4282,81													suitable	suitable
30	158367				38,65		4282,81													suitable	suitable
31	158368				38,65		4282,81													suitable	suitable
32	158369				38,65		4282,81													suitable	suitable
33	158370				38,65		4282,81													suitable	suitable
34	158371				38,65		4282,81													suitable	suitable
35	158372				38,65		4282,81													suitable	suitable
36	158373				38,65		4282,81													suitable	suitable
37	158374				38,62		4278,39													suitable	suitable
38	158375				38,65		4282,81													suitable	suitable
39	158376				38,65		4282,81													suitable	suitable
40	158377	✓			38,52		4267,37													suitable	suitable
41	158378				38,65		4282,81													suitable	suitable
42	158379				38,65		4282,81													suitable	suitable
43	158450				38,65		4282,81													suitable	suitable
44	158451				38,65		4282,81														

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 27-May-04

ORDER: 900024/60000303

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

MECHANICAL TESTS

Total number of pieces: 48

Total weight: 205299 lbs

No. crt.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi] base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10 sec	X ray investigation acc.ISO wire 4%
45	158452	✓			38,65		4282,81													suitable	suitable
46	158453				38,85		4282,81													suitable	suitable
47	158454				38,85		4282,81													suitable	suitable
48	158455				38,52		4267,4													suitable	suitable

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http://www.ispat.com; e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 578107

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 27-May-04

ORDER: 900024/50000303

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceo
✓ 1	912037	0,10	1,16	0,22	0,014	0,009	0,057	0,010	0,010	0,010	0,03									

INSPECTOR NAME
MARIANA LUNGU

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 9, 2006 Number of Copies: 9

Submittal Number: 11360-008-B

Specification Section Number: 11360-008-B

Item Submitted: 28" M/W Intermediate Casing Mill Cert

New Submittal: X Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter
Patty Porter

Transmittal Date: February 9, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ______

Firm: ______

Date: ______

S.C. ISPAT SIDEX S.A.   GALATI - ROMANIA

INSPECTION CERTIFICATE No 577328
ACC.TO EN 10204/3.1.B.

ORDER : 50025 / 250
CUSTOMER :
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1. API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED. CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

DATE:12.02.2004

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	* 1	* 2	* 3	TENSILE TEST YS PSI	TS PSI	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	* 4	IMPACT TEST NOTCH : BM 1	BM 2	BM 3	W 1	W 2	W 3
155550	936165	28X0.375X38.58	4274.66	L	B	T	54294	73900	38	0.734	1.48x0.40	170	-	E	-	-	-			
					W	T		78129			1.47x0.39		SUITABLE					-	-	-
155562	"	28X0.375X38.65	4282.42																	
155576	"	28X0.375X38.65	4282.42																	
155577	"	28X0.375X38.68	4285.74																	
✓ 154965	910309	28X0.375X38.68	4285.74	L	B	T	65681	81179	34	0.809	1.50x0.40	180	-	E	-	-	-			
					W	T		86093			1.53x0.40		SUITABLE					-	-	-
154967	"	28X0.375X37.14	4115.11																	
154968	"	28X0.375X38.65	4282.42																	
154969	"	28X0.375X38.62	4279.10																	
155581	910545	28X0.375X38.68	4285.74	L	B	T	56739	79136	34	0.716	1.51x0.39	170	-	E	-	-	-			
					W	T		79289			1.47x0.39		SUITABLE					-	-	-

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
✓ 936165	H	12	110	26	16	9.0	70	-	-	2.0	1.0	2.0	-	4.0	-
910309	H	12	118	24	22	10	47	42	18	2.0	1.0	2.0	-	5.0	-
910545	H	11	113	25	25	10	65	-	-	2.0	1.0	2.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577335
ACC.TO EN 10204/3.1.B.

ORDER : 50025 / 250
CUSTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
DATE:13.02.2004
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	*1	*2	*3	TENSILE TEST				DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	*4	IMPACT TEST NOTCH :					
							YS PSI	TS	EL %	YS/TS					BM 1	BM 2	BM 3	W 1	W 2	W 3
155552	936165	28X0.375X38.65	4282.42	L	B	T	54294	73900	38	0.734	1.48x0.40	170	-	E	-	-	-			
					W	T		78129			1.47x0.39		SUITABLE					-	-	-
155559	"	28X0.375X38.68	4285.74																	
155563	"	28X0.375X38.68	4285.74																	
155565	"	28X0.375X38.71	4289.07																	
155566	"	28X0.375X38.68	4285.74																	
155567	"	28X0.375X38.68	4285.74																	
155568	"	28X0.375X38.65	4282.42																	
155570	"	28X0.375X38.62	4279.10																	
155572	"	28X0.375X38.68	4285.74																	

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
936165	H	12	110	26	16	9.0	70	-	-	2.0	1.0	2.0	-	4.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577340
ACC.TO EN 10204/3.1.B.

ORDER : 50025 / 250
CUSTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

DATE:17.02.2004

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	* 1	* 2	* 3	TENSILE TEST				DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	* 4	IMPACT TEST NOTCH :					
							YS PSI	TS	EL %	YS/TS					BM 1	2	3	W 1	2	3
155447	910533	28X0.375X38.65	4282.42	L	B	T	58434	83683	34	0.698	1.58x0.39	183	-	E	-	-	-			
					W	T		85998			1.52x0.39		SUITABLE					-	-	-
155449	"	28X0.375X38.71	4289.07																	
155451	"	28X0.375X38.62	4279.10																	
155459	"	28X0.375X38.65	4282.42																	
155578	910545	28X0.375X37.11	4111.79	L	B	T	56739	79136	34	0.716	1.51x0.39	170	-	E	-	-	-			
					W	T		79289			1.47x0.39		SUITABLE					-	-	-
155728	"	28X0.375X38.71	4289.07																	
155729	"	28X0.375X38.71	4289.07																	
155731	"	28X0.375X38.65	4282.42																	
155492	922262	28X0.375X38.02	4212.62	L	B	T	60317	77971	38	0.773	1.52x0.40	180	-	E	-	-	-			
					W	T		78390			1.51x0.40		SUITABLE					-	-	-

TO BE CONTINUED

2/

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
910533	H	13	117	24	18	10	63	45	19	1.0	1.0	2.0	-	5.0	-
922262	H	13	120	22	16	8.0	65	43	17	2.0	1.0	1.0	-	5.0	-
910545	H	11	113	25	25	10	65	-	-	2.0	1.0	2.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
L = LOT
H = HEAT
* 2 LOCATION
B = BASE MATERIAL
W = WELD
* 3 DIRECTION
L = LONGITUDINAL
T = TRANSVERSE
* 4 IMPACT TEST
E = ENERGY

* 5 CHEMICAL ANALYSIS
H = HEAT
P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

CONTROLUL CALITATII
ISPAT SIDEX
S.A.
-8-
GALATI ROMANIA

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577341
ACC.TO EN 10204/3.1.B.

ORDER : 50025 / 250
CUSTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
DATE:17.02.2004
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	* 1	* 2	* 3	TENSILE TEST				DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	* 4	IMPACT TEST NOTCH :					
							YS	TS	EL	YS/TS					BM			W		
							PSI		%						1	2	3	1	2	3
155854	910824	28X0.375X38.52	4268.02	L	B W	T T	69674	83073 84644	36	0.838	1.47x0.39 1.49x0.39	206	- SUITABLE	E	-	-	-	-	-	-
155856	"	28X0.375X38.58	4274.66																	
155858	"	28X0.375X38.71	4289.07																	
155859	"	28X0.375X38.65	4282.42																	
155860	"	28X0.375X37.04	4104.03																	
155916	"	28X0.375X38.71	4289.07																	
155919	"	28X0.375X38.68	4285.74																	
155923	"	28X0.375X38.65	4282.42																	
155932	"	28X0.375X38.71	4289.07																	

TO BE CONTINUED

31

HEAT	* 5	CHEMICAL ANALYSIS x 100 C	Mn	Si	x 1000 P	S	Al	Nb	Ti	x 100 Cr	Ni	Cu	MO	V	
910824	H	12	119	25	22	8.0	48	-	-	1.0	1.0	2.0	-	4.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
L = LOT
H = HEAT
* 2 LOCATION
B = BASE MATERIAL
W = WELD
* 3 DIRECTION
L = LONGITUDINAL
T = TRANSVERSE
* 4 IMPACT TEST
E = ENERGY

* 5 CHEMICAL ANALYSIS
H = HEAT
P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

ISPAT SIDEX S.A. GALATI-ROMANIA

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577333
ACC.TO EN 10204/3.1.B.

DATE:13.02.2004

ORDER : 50025 / 250
CUSTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1. API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	*1	*2	*3	TENSILE TEST YS PSI	TS	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	*4	IMPACT TEST NOTCH : BM 1	BM 2	BM 3	W 1	W 2	W 3
155455	910533	28X0.375X38.71	4289.07	L	B W	T T	58434	83683 85998	34	0.698	1.58x0.39 1.52x0.39	183	- SUITABLE	E	-	-	-	-	-	-
155458	"	28X0.375X38.42	4256.94																	
155463	"	28X0.375X38.71	4289.07																	
155464	"	28X0.375X38.65	4282.42																	
155475	"	28X0.375X38.68	4285.74																	
155479	"	28X0.375X38.71	4289.07																	
155481	"	28X0.375X38.71	4289.07																	
155484	"	28X0.375X38.65	4282.42																	
155487	"	28X0.375X38.65	4282.42																	

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 1136D-005-B
Transmittal No. # ______ **Date:** 2/20/06
Signature

TO BE CONTINUED

7,

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C.	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
910533	H	13	117	24	18	10	63	45	19	1.0	1.0	2.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:

1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 9, 2006

Number of Copies: 9

Submittal Number: 11360-008-C

Specification Section Number: 11360-008-C

Item Submitted: 28" M/W Intermediate Casing Mill Cert (Additional)

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

Patty Porter

Patty Porter

Transmittal Date: February 9, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ______

Firm: ______

Date: ______

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577332
ACC.TO EN 10204/3.1.B.

DATE:13.02.2004

RDER : 50025 / 250
USTOMER :
RODUCT : LSAW CARBON STEEL LINE PIPE
PECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
ELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	*1	*2	*3	TENSILE TEST YS PSI	TS	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	*4	IMPACT TEST NOTCH : BM 1	BM 2	BM 3	W 1	W 2	W 3
155538	910545	28X0.375X38.68	4285.74	L	B W	T T	56739	79136 79289	34	0.716	1.51x0.39 1.47x0.39	170	- SUITABLE	E	-	-	-	-	-	-
✓ 155541	"	28X0.375X38.65	4282.42																	
155542	"	28X0.375X38.68	4285.74																	
155543	"	28X0.375X38.58	4274.66																	
155579	"	28X0.375X38.65	4282.42																	
155583	"	28X0.375X38.71	4289.07																	
155584	"	28X0.375X38.65	4282.42																	
155585	"	28X0.375X38.62	4279.10																	
155595	"	28X0.375X38.65	4282.42																	

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
910545	H	11	113	25	25	10	65	-	-	2.0	1.0	2.0	-	5.0	-
910309	H	12	118	24	22	10	47	48	18	2.0	1.0	2.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

ISPAT SIDEX S.A.
GALATI-ROMANIA

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577323
ACC.TO EN 10204/3.1.B.

DATE:11.02.2004

RDER : 50025 7 250
USTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
RODUCT : LSAW CARBON STEEL LINE PIPE
PECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
ELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	* 1	* 2	* 3	TENSILE TEST YS PSI	TS	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	* 4	IMPACT TEST NOTCH : BM 1	2	3	W 1	2	3
155540	910545	28X0.375X38.68	4285.74	L	B W	T T	56739	79136 79289	34	0.716	1.51x0.39 1.47x0.39	170	- SUITABLE	E	-	-	-	-	-	-
155544	"	28X0.375X38.68	4285.74																	
155545	"	28X0.375X38.62	4279.10																	
155580	"	28X0.375X38.68	4285.74																	
155582	"	28X0.375X38.68	4285.74																	
155594	"	28X0.375X38.68	4285.74																	
155598	"	28X0.375X38.68	4285.74																	
154964	910309	28X0.375X38.65	4282.42	L	B W	T T	65681	81179 86093	34	0.809	1.50x0.40 1.53x0.40	180	- SUITABLE	E	-	-	-	-	-	-
154966	"	28X0.375X38.62	4279.10																	

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
910545	H	11	113	25	25	10	65	-	-	2.0	1.0	2.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

S.C. ISPAT SIDEX S.A.   GALATI - ROMANIA

INSPECTION CERTIFICATE No.577322
ACC.TO EN 10204/3.1.B.

DATE:11.02.2004

RDER :-50025-/ 250
USTOMER : .O. # 14172 N.J.)
RODUCT : LSAW CARBON STEEL LINE PIPE
PECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1. API 2B FOR DIMENSIONAL TOLERANCES.
ELIVERYSTATE : EXPANDATED. CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	*1	*2	*3	TENSILE TEST YS PSI	TS	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	*4	IMPACT TEST NOTCH : BM 1	BM 2	BM 3	W 1	W 2	W 3
155548	936165	28X0.375X38.71	4289.07	L	B W	T T	54294	73900 78129	38	0.734	1.48x0.40 1.47x0.39	170	- SUITABLE	E	-	-	-	-	-	-
155549	"	28X0.375X38.68	4285.74																	
155551	"	28X0.375X38.62	4279.10																	
155553	"	28X0.375X38.68	4285.74																	
155564	"	28X0.375X38.65	4282.42																	
155571	"	28X0.375X38.68	4285.74																	
155574	"	28X0.375X37.07	4107.36																	
155575	"	28X0.375X38.55	4271.34																	
154952	935699	28X0.375X38.68	4285.74	L	B W	T T	57992	80463 81179	34	0.720	1.57x0.39 1.54x0.39	180	- SUITABLE	E	-	-	-	-	-	-

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
936165	H	12	110	26	16	9.0	70	-	-	2.0	1.0	2.0	-	4.0	-
935699	H	11	113	36	16	8.0	62	48	19	2.0	1.0	1.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  - I = LOT
  - H = HEAT
* 2 LOCATION
  - B = BASE MATERIAL
  - W = WELD
* 3 DIRECTION
  - L = LONGITUDINAL
  - T = TRANSVERSE
* 4 IMPACT TEST
  - E = ENERGY

* 5 CHEMICAL ANALYSIS
  - H = HEAT
  - P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

ISPAT SIDEX S.A.

S.C. ISPAT SIDEX S.A. GALATI - ROMANIA

INSPECTION CERTIFICATE No.577330
ACC.TO EN 10204/3.1.B.

ORDER : 50025 / 250
CUSTOMER : VASS PIPE / INA ORDER # 2642 (VASS P.O. # 14172 N.J.)
DATE:12.02.2004
PRODUCT : LSAW CARBON STEEL LINE PIPE
SPECIFICATION : API 5L 42 EDITION GRADE X52 / X42 / B - PSL1, API 2B FOR DIMENSIONAL TOLERANCES.
DELIVERYSTATE : EXPANDATED, CLEAR LAQUERED OUTSIDE
BEVELLED ENDS AT 30° (+5° / -0°)
WELD FACTOR : V = 1.0
STRAIGHTNESS : max. 0.551 inch.

PIPE No.	HEAT	DIMENSION inchxinchxft	WEIGHT lbs.	*1	*2	*3	TENSILE TEST YS PSI	TS	EL %	YS/TS	DIM. OF SPECIMENS inch.	HARDNES HV10	GUIDED-BEND TEST	*4	IMPACT TEST NOTCH : BM 1	BM 2	BM 3	W 1	W 2	W 3
154945	935699	28X0.375X38.71	4289.07	L	B	T	57992	80463	34	0.720	1.57x0.39	180	-	E	-	-	-			
					W	T		81179			1.54x0.39		SUITABLE					-	-	-
154946	"	28X0.375X38.71	4289.07																	
154947	"	28X0.375X38.71	4289.07																	
154948	"	28X0.375X38.71	4289.07																	
154949	"	28X0.375X38.71	4289.07																	
54950	"	28X0.375X37.17	4118.44																	
54951	"	28X0.375X38.68	4285.74																	
55478	910533	28X0.375X38.71	4589.07	L	B	T	58434	83683	34	0.698	1.58x0.39	183	-	E	-	-	-			
					W	T		85998			1.52x0.39		SUITABLE					-	-	-
155482	"	28X0.375X38.71	4589.07																	

TO BE CONTINUED

HEAT	* 5	CHEMICAL ANALYSIS													
		x 100			x 1000					x 100					
		C	Mn	Si	P	S	Al	Nb	Ti	Cr	Ni	Cu	MO	V	
910533	H	13	117	24	18	10	63	45	19	1.0	1.0	2.0	-	5.0	-
935699	H	11	113	36	16	8.0	62	48	19	2.0	1.0	1.0	-	5.0	-

END OF CERTIFICATE

DEFINITIONS:
* 1 TYPE OF TEST
  L = LOT
  H = HEAT
* 2 LOCATION
  B = BASE MATERIAL
  W = WELD
* 3 DIRECTION
  L = LONGITUDINAL
  T = TRANSVERSE
* 4 IMPACT TEST
  E = ENERGY

* 5 CHEMICAL ANALYSIS
  H = HEAT
  P = PRODUCT

OBSERVATIONS:
1. SURFACE & DIMENSION TEST : ACCEPTED
2. HYDROSTATIC TEST : ACCEPTED 1250 PSI / 10"
3. X RAY INVESTIGATION 100 % : ACCEPTED ACC. TO ISO WIRE 4% PENETRAMETER

This document certifies that the materials above indicated have been inspected in accordance with the specifications mentioned herewith and NACE MR 0175 Specifications.

INSPECTOR
TEODORA BUNEA

QUALITY DIRECTOR
Eng. ION IVAN

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 20, 2006 Number of Copies: 9

Submittal Number: 11360-008-D

Specification Section Number: 11360-008-D

Item Submitted: Additional 28" Mill Certs

New Submittal: X Resubmitted: ____

Youngquist Brothers, Inc. Representative:

Marybeth Rios

Marybeth Rios

Transmittal Date: February 20, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ____

Firm: ____

Date: ____

PAT SIDEX
mber of THE LNM GROUP
E LARGEST IRON AND STEEL PRODUCER OF ROMANIA

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 578231

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 1-Jul-04

ORDER: 900024/50000613

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

MECHANICAL TESTS

Total number of pieces: 81

Total weight: 345721 lbs

No. crt.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi] base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10sec	X ray investigation acc.ISO wire 4%
1	158782	837974	X 52- X42-Gr.B PSL1	28	38.71	0.375	4289.42	158804	trans.	1,50x0,38	83888	61217	32	0.731	1,50x0,38	85681	170	suitable		suitable	suitable
2	158783			28	38.71	0.375	4289.42													suitable	suitable
3	158784			28	38.71	0.375	4289.42													suitable	suitable
4	158785			28	38.65	0.375	4282.81													suitable	suitable
5	158786			28	38.71	0.375	4289.42													suitable	suitable
6	158787			28	38.71	0.375	4289.42													suitable	suitable
7	158788			28	38.58	0.375	4276.19													suitable	suitable
8	158789			28	36.42	0.375	4256.34													suitable	suitable
9	158790			28	38.68	0.375	4287.22													suitable	suitable
10	158791			28	38.71	0.375	4289.42													suitable	suitable
11	158792			28	38.71	0.375	4289.42													suitable	suitable
12	158793			28	38.88	0.375	4287.22													suitable	suitable
13	158795			28	38.68	0.375	4287.22													suitable	suitable
14	158796			28	38.68	0.375	4287,22													suitable	suitable
15	158797			28	38.65	0.375	4282.81													suitable	suitable
16	158798			28	38.62	0.375	4278.39													suitable	suitable
17	158799			28	38.09	0.375	4221.06													suitable	suitable
18	158800			28	38.68	0.375	4287.22													suitable	suitable
19	158801			28	38.62	0.375	4278.39													suitable	suitable
20	158802			28	38.68	0.375	4287.22													suitable	suitable
21	158803			28	38.88	0.375	4287.22													suitable	suitable
22	158804			28	37.20	0.375	4121.81													suitable	suitable
23	158805			28	38.71	0.375	4289.42													suitable	suitable
24	158806			28	38.32	0.375	4245.31													suitable	suitable
25	158808			28	38.88	0.375	4287.22													suitable	suitable
26	158809			28	38.65	0.375	4282.81													suitable	suitable
27	158810			28	38.65	0.375	4282.81													suitable	suitable
28	158811			28	38.65	0.375	4282.81													suitable	suitable
29	158812			28	38.68	0.375	4287.22													suitable	suitable
30	158813			28	38.65	0.375	4282.81													suitable	suitable
31	158814			28	38.65	0.375	4282.81													suitable	suitable
32	158820			28	38.68	0.375	4287.22													suitable	suitable
33	152821			28	38.62	0.375	4278.39													suitable	suitable
34	158822			28	38.35	0.375	4249.72													suitable	suitable
35	158823			28	38.65	0.375	4282.81													suitable	suitable
36	158824			28	38.16	0.375	4227.67													suitable	suitable
37	158825			28	37.50	0.375	4154.89													suitable	suitable
38	158826			28	38.71	0.375	4289.42													suitable	suitable
39	158827			28	38.32	0.375	4245.31													suitable	suitable
40	158828			28	38.68	0.375	4287.22													suitable	suitable
41	158829			28	38.65	0.375	4282.81													suitable	suitable
42	158830			28	38.68	0.375	4287.22													suitable	suitable
43	158831			28	38.55	0.375	4271.78													suitable	suitable
44	158832			28	38.68	0.375	4287.22													suitable	suitable

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-008-D
Transmittal No. # ______ **Date:** 2/2006
Signature

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 1-Jul-04

ORDER: 100024/60000613

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.561 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

MECHANICAL TESTS

Total number of pieces: 81

Total weight: 345721 lbs

No. crt.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi] base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 1250psi/10sec	X ray investigation acc.ISO wire 4%
45	158833			✓ 28	38.88	0.375	4287.22													suitable	suitable
46	158834			28	38.71	0.375	4289.42													suitable	suitable
47	158835			28	38.55	0.375	4271.78													suitable	suitable
48	158836			29	38.75	0.375	4293.8													suitable	suitable
49	158837			28	38.25	0.375	4238.7													suitable	suitable
50	158858 ✓			28	38.62	0.375	4276.4													suitable	suitable
51	158859			28	38.88	0.375	4287.22	158825										suitable		suitable	suitable
52	158861			28	38.62	0.375	4278.39													suitable	suitable
53	158862			28	38.88	0.375	4287.22													suitable	suitable
54	158863			28	38.68	0.375	4287.22													suitable	suitable
55	158864			28	38.68	0.375	4287.22													suitable	suitable
56	158865			28	38.29	0.375	4243.11													suitable	suitable
57	158866 ✓			28	38.85	0.375	4282.81													suitable	suitable
58	158867			28	38.16	0.375	4227.67													suitable	suitable
59	158868			28	38.58	0.375	4276.19													suitable	suitable
60	158869			28	38.68	0.375	4287.22													suitable	suitable
61	158794			28	38.71	0.375	4289.42													suitable	suitable
62	158880			28	38.62	0.375	4278.39													suitable	suitable
63	159244 ✓			28	38.68	0.375	4287.22													suitable	suitable
64	159245			28	38.39	0.375	4254.14													suitable	suitable
65	159246			28	38.29	0.375	4243.11													suitable	suitable
66	159247 ✓			28	38.42	0.375	4258.34													suitable	suitable
67	159248			28	38.68	0.375	4287.22													suitable	suitable
68	158838	924811		28	38.22	0.375	4236.49	158840	trans.	1,50x0,39	91368	71064	30	0.777	1,47x0,38	94968	170	suitable		suitable	suitable
69	158839			28	38.68	0.375	4287.22													suitable	suitable
70	158840			28	37.04	0.375	4104.17													suitable	suitable
71	159252	924777		28	38.71	0.375	4289.42	159261	trans.	1,50x0,40	82458	58687	30	0.711	1,49x0,40	85933	180	suitable		suitable	suitable
72	159254			28	38.68	0.375	4287.22													suitable	suitable
73	159255			28	38.71	0.375	4289.42													suitable	suitable
74	159256			28	38.19	0.375	4232.06													suitable	suitable
75	159257 ✓			28	38.29	0.375	4243.11													suitable	suitable
76	159258			28	38.22	0.375	4236.49													suitable	suitable
77	159259			28	38.68	0.375	4287.22													suitable	suitable
78	158260			28	38.71	0.375	4289.42													suitable	suitable
79	159261			28	37.11	0.375	4110.79													suitable	suitable
80	159262			28	38.42	0.375	4258.34													suitable	suitable
81	158263			28	38.65	0.375	4282.81													suitable	suitable

ISPAT SIDEX
Member of THE LNM GROUP
THE LARGEST IRON AND STEEL PRODUCER OF ROMANIA

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

INSPECTION CERTIFICATE: 578231

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 01-Jul-04

ORDER: 900024/50000613

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR
1	937974	0.14	1.13	0.24	0.022	0.008	0.055	0.020	0.020	0.010	0.04		0.016	0.04					
2	924811	0.13	1.15	0.26	0.017	0.006	0.039	0.010	0.010	0.010	0.05		0.017	0.04					
3	924777	0.12	1.18	0.21	0.022	0.011	0.048	0.010	0.020	0.010	0.05		0.015	0.038					

INSPECTOR NAME
PRODAN GABRIELA

ISPAT SIDEX S.A.
8

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 6, 2006

Number of Copies: 9

Submittal Number: 11360-007-A

Specification Section Number: 11360-007-A

Item Submitted: 36" I/W Surface Casing Mill Certs

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

PattPorter

Patty Porter

Transmittal Date: February 6, 2006

☐ Approved

☐ Approved with changes

☐ Rejected, Revise & Resubmit

☐ Not Reviewed

By: ______

Firm: ______

Date: ______

1, Smardan Street, Galati 6200, ROMANIA
Phone +40 236 407 633
Fax +40 236 407 635
http://www.ispat.com e-mail: office@[illegible]

MITTAL

INSPECTION CERTIFICATE: 4902251790

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 5 Sep 06

ORDER: [illegible]

STANDARD: API 5L 42 EDITION, API 5B FOR DIMENSIONAL TOLERANCES; STRAIGHTNESS MAX 0.661 "; NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30°, V-1.0

LOT: IIA 3172

MECHANICAL TESTS

TOTAL NO OF PIECES 24 TOTAL WEIGHT 131883 lbs

NO. CRT	N PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs]	NO TEST	POSITION	DIM OF SPECIMENS [inch] BASE MATERIAL	Rm [psi] BASE MATERIAL	Rt0.5 [psi] BASE MATERIAL	A[%] BASE MATERIAL	Rt0.5/Rm [%]	DIM OF SPECIMENS [inch] WELD	Rm [psi] WELD	HARDNESS HV10 BASE MATERIAL	GUIDED BEND TEST TRANS	IMPACT TEST NOTCH FOR BASE MATERIAL	HYDROSTATIC TEST 960 [illegible]	X RAY TESTED SATISF. ACC. ISO [illegible]
1	169485 ✓	919397	X52-X52 B- PSL1	36	38.65	0.375	5515.60	169477	TRANS	1.15x0.39	80004	64317	38	0.804	1.18x0.39	80312	169	SUITABLE		SUITABLE	SUITABLE
2	169497 ✓		✓	36	38.65	0.375	5515.60													SUITABLE	SUITABLE
3	169969 ✓	935510		36	38.25	0.375	5460.47	169975	TRANS	1.47x0.41	89050	68608	32	0.782	1.44x0.41	90355	179	SUITABLE		SUITABLE	SUITABLE
✗ 4	169971 ✓			36	38.46	0.375	5493.55													SUITABLE	SUITABLE
5	169972			36	38.70	0.375	5524.42													SUITABLE	SUITABLE
✗ 6	169973 ✓			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
7	169974			36	38.55	0.375	5502.37													SUITABLE	SUITABLE
8	169975			36	37.11	0.375	5297.27													SUITABLE	SUITABLE
9	169970			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
10	169977			36	37.14	0.375	5301.68													SUITABLE	SUITABLE
11	169976			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
12	169979 ✓			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
13	169980			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
14	169981			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
15	169982 ✓			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
✗ 16	169983 ✓			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
✗ 17	169984 ✓			36	38.55	0.375	5502.37													SUITABLE	SUITABLE
18	[illegible] ✓			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
19	[illegible] ✓			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
20	169987			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
✗ 21	169988 ✓			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
22	169989			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
23	169990			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
24	169991			36	38.68	0.375	5520.01													SUITABLE	SUITABLE

YOUNGQUIST BROTHERS, INC.
Has Received This Shop Drawing/Submittal
YB/Section No# 11360-007-A + 11360-009-A
Date: 2/6/06
Signature: PL

1, Smardan Street, Galati, 6200, ROMANIA
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Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sldex.ro

MITTAL

INSPECTION CERTIFICATE: 4902251809

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 01 Sep 05

ORDER: 900024/50002407

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT: INA 3172

CHEMICAL ANALYSIS, %

	No Heal	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR
✓ 1	919997	0.08	1.41	0.29	0.020	0.009	0.060	0.020	0.020	0.010	0.01	0.001	0.007	0.04					
✓ 2	935540	0.08	1.50	0.35	0.018	0.008	0.050	0.040	0.030	0.010	0.03	0.001	0.007	0.045					

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS"

"API 5L Type B Spec modification notice: Mn content 1.30-1.50"

INSPECTOR NAME
MARIANA LUNGU

CONTROL CALITATE
MITTAL
J17/21/1991

1, Smardan Street, Galati, 6200, ROMANIA
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Fax +40 236 407 635
http://www.ispat.com, e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902251809

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:		ORDER:	500024/50032407
PRODUCT:	DSAW CARBON STEEL LINE PIPE	STANDARD:	API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES,STRAIGHTNESS MAX 0.1%;NACE MR 0175 FOR HARDNESS
EXTERNAL ASPECT: SUITABLE		DELIVERY STATE:	EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0
DATE 1 Sep 05		LOT:	INA 3172

MECHANICAL TESTS

TOTAL NO OF PIPES 4 TOTAL WEIGHT 22012 lbs

NO CRT	NO PIPE	NO HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs]	NO TEST	DIRECTION	DIM OF SPECIMENS [inch] BASE MATERIAL	RM[psi] BASE MATERIAL	RE[psi] BASE MATERIAL	A[%] BASE MATERIAL	RE/RM [%]	DIM OF SPECIMENS [inch] WELD	RM[psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS	IMPACT TEST NOTCH FOR BASE MATERIAL	HYDROSTATIC TEST PRESSURE	X-RAY INVESTIGATION ACC. TO WIPFAN
1	169468	918997	X52-X42-B- PSL1	36	38 52	0.375	5497 95	169477	TRANS	1.45x0 39	80004	64317	38	0 804	1.45x0 39	80312	189	SUITABLE		SUITABLE	SUITABLE
2	169492			36	38 65	0.375	5515 60													SUITABLE	SUITABLE
3	169525			36	38 68	0.375	5520 01													SUITABLE	SUITABLE
4	169970	935540		36	39 39	0.375	5478 11	169975	TRANS	1.42x0.41	88050	68908	32	0 782	1.41x0.41	90355	179	SUITABLE		SUITABLE	SUITABLE

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MITTAL

INSPECTION CERTIFICATE: 4902251790

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 01-Sep-05

ORDER: 900024/50002407

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V~1,0

LOT: INA 3172

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 hellow	H2	ZR
1	919997	0.08	1.41	0.29	0.020	0.009	0.060	0.020	0.023	0.010	0.01	0.001	0.007	0.04					
2	935540	0.08	1.50	0.35	0.018	0.008	0.050	0.040	0.030	0.010	0.03	0.001	0.007	0.045					

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

"API 5L Type B Spec.modification notice: Mn content 1,30-1.50"

INSPECTOR NAME
MARIANA LUNGU

1, Smardan Street, Galati, 6200, ROMANIA
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MITTAL

INSPECTION CERTIFICATE: 4902251710

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 1-Sep-05

ORDER: 900024/50002407

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT: INA 3172

MECHANICAL TESTS

TOTAL NO.OF PIECES 48 TOTAL WEIGHT: 263728 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [foot]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	RM[psi] BASE MATERIAL	RE[psi] BASE MATERIAL	A[%] BASE MATERIAL	RE/ RM [%]	DIM.OF SPECIMENS [inch] WELD	RM [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL	HYDRO STATIC TEST 980 psi/10SEC	X RAY INVESTIGATION ACC.ISO WIRE4%
1	169474	919997	X52-X42-B- PSL1	36	38.12	0.375	5440.62	169477	TRANS.	1.45x0.39	80004	64317	38	0.804	1.48x0.39	80312	189	SUITABLE		SUITABLE	SUITABLE
2	169475			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
3	169476			36	38.52	0.375	5497.96													SUITABLE	SUITABLE
4	169477			36	37.11	0.375	5297.27													SUITABLE	SUITABLE
5	169478			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
6	169479			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
7	169480			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
8	169481			36	38.12	0.375	5440.62													SUITABLE	SUITABLE
9	169482			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
10	169483			36	38.58	0.375	5508.78													SUITABLE	SUITABLE
11	169486			36	37.96	0.375	5418.56													SUITABLE	SUITABLE
12	169487			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
13	169489			36	38.45	0.375	5489.14													SUITABLE	SUITABLE
14	169490			36	38.52	0.375	5497.96													SUITABLE	SUITABLE
15	169491			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
16	169493			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
17	169494			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
X 18	169495			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
19	169496			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
20	169498			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
21	169499			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
22	169500			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
23	169501			36	38.18	0.375	5447.23													SUITABLE	SUITABLE
24	169502			36	38.55	0.375	5502.37													SUITABLE	SUITABLE
X 25	169503			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
26	169504			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
X 27	169506			36	38.55	0.375	5502.37													SUITABLE	SUITABLE
28	169507			36	38.55	0.375	5502.37													SUITABLE	SUITABLE
29	169508			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
30	169509			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
X 31	169510			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
32	169511			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
33	169512			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
34	169034	935200		36	38.65	0.375	5515.60	169627	TRANS.	1.41x0.38	85686	68698	38	0.802	1.49x0.36	87656	170	SUITABLE		SUITABLE	SUITABLE
35	169035			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
36	169036			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
37	169037			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
38	169484			36	38.12	0.375	5440.62													SUITABLE	SUITABLE
39	169530			36	38.42	0.375	5484.73													SUITABLE	SUITABLE
40	169531			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
41	169532			36	38.68	0.375	5520.01													SUITABLE	SUITABLE
42	169533			36	38.52	0.375	5497.96													SUITABLE	SUITABLE
43	169626			36	38.65	0.375	5515.60													SUITABLE	SUITABLE
44	169627			36	37.11	0.375	5297.27													SUITABLE	SUITABLE

YOUNGQUIST BROTHERS, INC.
Has Received This Shop Drawing/Submittal
YBI/Section No# 11360-007-B
Date: 2-22-06
Signature: PPorter

CUSTOMER:		**ORDER:**	900024/60002407
PRODUCT:	DSAW CARBON STEEL LINE PIPE	**STANDARD:**	API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.461 ";NACE MR 0175 FOR HARDNESS
EXTERNAL ASPECT:	SUITABLE	**DELIVERY STATE:**	EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0
DATE	1-Sep-05	**LOT:**	INA 3172

MECHANICAL TESTS

TOTAL NO.OF PIECES 48 TOTAL WEIGHT: 263728 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	RM[psi] BASE MATERIAL	RE[psi] BASE MATERIAL	A[%] BASE MATERIAL	RE/ RM [%]	DIM.OF SPECIMENS [inch] WELD	RM [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL	HYDRO STATIC TEST 980 psi/10SEC	X RAY INVESTIGATION ACC.ISO WIRE4%
45	169628	935200		36	38,68	0.375	5520,01													SUITABLE	SUITABLE
46	169768			36	38.62	0.375	5511.19													SUITABLE	SUITABLE
✓ 47	169769			36	38.45	0.375	5489.14													SUITABLE	SUITABLE
48	169770			36	38,65	0.375	5515,60													SUITABLE	SUITABLE

1, Smardan Street, Galati, 6200, ROMANIA
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http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902251710

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE
DATE: 01-Sep-05

ORDER: 900024/50002407
STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS
DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0
LOT: INA 3172

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR
1	919997	0.08	1.41	0.29	0.020	0.009	0.060	0.020	0.020	0.010	0.01	0.001	0.007	0.04					
2	935200	0.08	1.50	0.31	0.018	0.010	0.045	0.020	0.020	0.010	0.01	0.001	0.007	0.041					

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

"API 5L Type B Spec.modification notice: Mn content 1.30-1.50"

INSPECTOR NAME
MARIANA LUNGU

Submittal Data
FROM
Youngquist Brothers, Inc.

15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 2, 2006

Number of Copies: 9

Submittal Number: 11360-005-A

Specification Section Number: 11360-005-A

Item Submitted: 48" Conductor Casing

New Submittal: X

Resubmitted: ____

Youngquist Brothers, Inc. Representative:

____
Patty Porter

Transmittal Date: February 2, 2006

☐ Approved
☐ Approved with changes
☐ Rejected, Revise & Resubmit
☐ Not Reviewed

By: ____________

Firm: ____________

Date: ____________

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MITTAL

INSPECTION CERTIFICATE: 4902251480

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:	ISPAT NORTH AMERICA CHICAGO	ORDER:	900034/50002121
PRODUCT:	DSAW CARBON STEEL LINE PIPE	STANDARD:	API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS
EXTERNAL ASPECT:	SUITABLE	DELIVERY STATE:	EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0
DATE 23-May-05		LOT:	

MECHANICAL TESTS

TOTAL NO.OF PIECES 32 TOTAL WEIGHT: 235056 lbs

NO CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [foot]	THICKNESS [inch]	WEIGHT [lbs]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	RM[psi] BASE MATERIAL	RS[psi] BASE MATERIAL	A[%] BASE MATERIAL	RS/ RM [%]	DIM.OF SPECIMENS [inch] WELD	RM [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL	HYDRO STATIC TEST 730 psi/10SEC	X RAY INVESTIGATION ACC.ISO WIRE4%
1	167679	823735	X52-X42-B PSL1 ✓	48	38.82	0.375	7370.31	167729	TRANS.	1.58x0.39	88851	74762	34	0.841	1.54x0.40	88905	190	SUITABLE		SUITABLE	SUITABLE
2	167684			48	38.42	0.375	7332.82													SUITABLE	SUITABLE
3	167685			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
4	167686			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
5	167687			48	38.25	0.375	7301.94													SUITABLE	SUITABLE
6	167688			48	38.52	0.375	7350.46													SUITABLE	SUITABLE
7	167689			48	38.68	0.375	7383.54													SUITABLE	SUITABLE
8	167691 ✓			48	31.58	0.375	7363.69													SUITABLE	SUITABLE
9	167710			48	38.48	0.375	7348.05													SUITABLE	SUITABLE
10	167711			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
11	167713 ✓			48	38.58	0.375	7363.69													SUITABLE	SUITABLE
12	167714			48	38.62	0.375	7370.31													SUITABLE	SUITABLE
13	167715			48	38.48	0.375	7348.05													SUITABLE	SUITABLE
14	167716			48	38.42	0.375	7332.82													SUITABLE	SUITABLE
15	167717			48	38.58	0.375	7363.69													SUITABLE	SUITABLE
16	167718			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
17	167719			48	38.52	0.375	7350.46													SUITABLE	SUITABLE
18	167723			48	38.39	0.375	7328.20													SUITABLE	SUITABLE
19	167725			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
20	167726			48	38.68	0.375	7383.54													SUITABLE	SUITABLE
21	167727			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
22	167728			48	38.70	0.375	7386.74													SUITABLE	SUITABLE
23	167730			48	38.58	0.375	7363.69													SUITABLE	SUITABLE
24	167731			48	38.68	0.375	7383.54													SUITABLE	SUITABLE
25	167734			48	38.58	0.375	7363.69													SUITABLE	SUITABLE
26	167678	834005		48	37.99	0.375	7251.22	167680	TRANS.	1.53x0.37	75939	56654	34	0.75	1.54x0.37	82565	181	SUITABLE		SUITABLE	SUITABLE
27	167680			48	37.04	0.375	7070.38													SUITABLE	SUITABLE
28	167681 ✓			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
29	167682			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
30	167683			48	38.19	0.375	7288.71													SUITABLE	SUITABLE
31	167732			48	38.09	0.375	7271.07													SUITABLE	SUITABLE
32	167733			48	38.65	0.375	7378.92													SUITABLE	SUITABLE

YOUNGQUIST BROTHERS, INC.
Has Received This Shop Drawing/Submittal
YBI/Section No# 11360-005-A
Date: 2-2-06
Signature:

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
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http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902251480

ACCORDING TO: EN 10204/3.1.B

CUSTOMER: ISPAT NORTH AMERICA CHICAGO

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE
DATE: 23-May-05

ORDER: 900024/60002121

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS
DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0
LOT:

CHEMICAL ANALYSIS, %

		No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR
✓	1	923739	0.08	1.03	0.24	0.015	0.008	0.039	0.010	0.010	0.010	0.05	0.001	0.015	0.042					
	2	934005	0.10	1.13	0.24	0.019	0.009	0.052	0.010	0.010	0.010	0.04	0.001	0.02	0.041					

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

INSPECTOR NAME
MARIANA LUNGU

S.C. MITTAL STEEL GALATI S.A.
J17/21/1991

Submittal Data
FROM
Youngquist Brothers, Inc.
15465 Pine Ridge Rd.
Ft. Myers, FL. 33908
239-489-4444 Fax: 239-489-4545

Project

Palm Beach County
Lake Region WTP

I have reviewed this submittal for general conformance with the design concepts and contract documents. Generally no conflict with materials or dimensions will arise from the approval of this shop drawing submittal.

Date: February 20, 2006

Number of Copies: 9

Submittal Number: 11360-005-C

Specification Section Number: 11360-005-C

Item Submitted: Additional 48" Mill Certs

New Submittal: X

Resubmitted: ______

Youngquist Brothers, Inc. Representative:

____
Marybeth Rios

Transmittal Date: February 20, 2006

- ☐ Approved
- ☐ Approved with changes
- ☐ Rejected, Revise & Resubmit
- ☐ Not Reviewed

By: ______________________

Firm: ______________________

Date: ______________________

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # 11360-005-C
Transmittal No. # Date: 2/20/06
Signature

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INSPECTION CERTIFICATE: 4902250011

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 20-Jul-04

ORDER: 900-024/60000613

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR.0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

MECHANICAL TESTS

Total number of pieces: 42 Total weight: 308422 lbs

No. crt.	No. Pipe	No. Heat	Quality	Diameter [inch]	Length [foot]	Thickness [inch]	Weight [lbs.]	No. Test	Direction	Dim. of specimens[inch]base material	Rm [psi] base material	Re[psi] base material	A[%] base material	Re/Rm [%]	Dim. of specimens[inch]weld	Rm [psi]weld	Hardness HV 10 for base material	Guided-bend test trans.	Impact test notch for base material 32°F	Hydrostatic test 730psi/10sec	X ray investigation acc.ISO wire 4%
1	159348	912896	X 52- X42-Gr.B PSL1	48	38.65	0.375	7383.54	159351	trans.	1.55x0.42	84182	70606	36	0.838	1.53x0.42	88221	179	suitable		suitable	suitable
2	159349			48	38.65	0.375	7383.54													suitable	suitable
3	159350			48	38.68	0.375	7390.15													suitable	suitable
4	159351			48	37.14	0.375	7096.84													suitable	suitable
5	159352			48	38.68	0.375	7390.15													suitable	suitable
6	159353			48	38.06	0.375	7271.07													suitable	suitable
7	159995	913095		48	38.62	0.375	7379.13	159997	trans.	1.50x0.41	83322	64205	40	0.77	1.53x0.41	83849	192	suitable		suitable	suitable
8	159996			48	38.65	0.375	7383.53													suitable	suitable
9	159997			48	37.28	0.375	7121.10													suitable	suitable
10	159998			48	38.71	0.375	7396.77													suitable	suitable
11	159999			48	38.71	0.375	7396.77													suitable	suitable
12	159342	924865		48	38.71	0.375	7396.77	159939	trans.	1.50x0.39	85753	68908	32	0.803	1.50x0.38	88200	179	suitable		suitable	suitable
13	159343			48	38.65	0.375	7383.54													suitable	suitable
14	159344			48	38.65	0.375	7383.54													suitable	suitable
15	159345			48	38.68	0.375	7390.15													suitable	suitable
16	159346			48	38.71	0.375	7396.77													suitable	suitable
17	159347			48	38.68	0.375	7390.15													suitable	suitable
18	159649			48	38.62	0.375	7379.13													suitable	suitable
19	159938			48	38.65	0.375	7383.54													suitable	suitable
20	159939			48	37.07	0.375	7083.61													suitable	suitable
21	159940			48	38.32	0.375	7321.79													suitable	suitable
22	159941			48	38.58	0.375	7372.51													suitable	suitable
23	159942			48	38.68	0.375	7390.15													suitable	suitable
24	158746	937870		48	38.65	0.375	7383.54	158752	trans.	1.51x0.41	86430	69144	36	0.8	1.53x0.40	88647	167	suitable		suitable	suitable
25	158747			48	38.65	0.375	7383.54													suitable	suitable
26	158748			48	38.68	0.375	7390.15													suitable	suitable
27	158749			48	38.42	0.375	7339.43													suitable	suitable
28	158750			48	38.62	0.375	7379.13													suitable	suitable
29	158751			48	38.68	0.375	7390.15													suitable	suitable
30	158752			48	37.07	0.375	7083.61													suitable	suitable
31	158753			48	38.68	0.375	7390.15													suitable	suitable
32	158754			48	38.71	0.375	7396.77													suitable	suitable
33	158755			48	38.71	0.375	7396.77													suitable	suitable
34	158756			48	38.25	0.375	7308.56													suitable	suitable
35	158757			48	38.06	0.375	7271.07													suitable	suitable
36	158758			48	38.68	0.375	7390.15													suitable	suitable
37	158759			48	38.68	0.375	7390.15													suitable	suitable
38	159801	938463		48	38.68	0.375	7390.15	159803	trans.	1.57x0.41	85839	68392	34	0.793	1.50x0.41	88269	167	suitable		suitable	suitable
39	159802			48	38.71	0.375	7396.77													suitable	suitable
40	159803			48	37.07	0.375	7083.61													suitable	suitable
41	159804			48	38.71	0.375	7396.77													suitable	suitable
42	159805			48	38.71	0.375	7396.77													suitable	suitable

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TÜV

INSPECTION CERTIFICATE: 4902250011

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 20-Jul-04

ORDER: 900024/50000613

STANDARD: API 5L 42edition;API2B for dimensional tolerances;straightness max.0.551 ";NACE MR 0175 for hardness

DELIVERY STATE: Expandated, Bevelled ends at 30° ; V=1,0

LOT:

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceq
1	912896	0.14	1.12	0.28	0.018	0.007	0.070	0.010	0.010	0.010	0.04			0.048						
2	913095	0.14	1.12	0.34	0.025	0.008	0.035	0.010	0.020	0.010	0.04		0.02	0.042						
3	924866	0.12	1.20	0.17	0.023	0.009	0.025	0.020	0.020	0.020	0.05			0.035						
4	937870	0.12	1.17	0.23	0.019	0.010	0.037	0.010	0.020	0.010	0.05		0.018	0.04						
5	938493	0.11	1.20	0.29	0.019	0.006	0.040	0.010	0.020	0.010	0.04			0.037						

INSPECTOR NAME
MARIANA LUNGU

ISPAT SIDEX S.A.
8

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MITTAL

INSPECTION CERTIFICATE: 4902251185

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE 31-Mar-05

ORDER: [illegible]

STANDARD: API 5L 43EDITION;API 2B FOR DIMENSIONAL TOLERANCES; STRAIGHTNESS MAX.0,001 *L;NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30' ; V=1,0

LOT:

MECHANICAL TESTS

TOTAL NO.OF PIECES 48 TOTAL WEIGHT 328815 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	R[psi] BASE MATERIAL	R[psi] BASE MATERIAL	A[%] BASE MATERIAL	RE/RM [%]	DIM.OF SPECIMENS [inch] WELD	RM [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL 32F [ft-lb]	HYDRO-STATIC TEST 750 psi/10SEC	X RAY INVESTIGATION ACC. [illegible]
1	164837	917165	X 52-X42 PSL2	48	38.82	0.375	7370.31	164840	TRANS.	1.54x0.39	89951	82196	38	0.891	1.45x0.39	90224	180	SUITABLE	23-25-28	SUITABLE	SUITABLE
2	164838			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
3	164839			48	38,19	0.375	7288.71													SUITABLE	SUITABLE
4	164840			48	37.34	0.375	7088.02													SUITABLE	SUITABLE
5	164845			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
6	165457 ✓	917487		48	37.87	0.375	7078.99	165457	TRANS.	1.52x0.39	85571	58040	34	0.678	1.55x0.40	83309	179	SUITABLE	32-35-34	SUITABLE	SUITABLE
7	165458			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
8	165472			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
9	165473 ✓			48	38.88	0.375	7383.54													SUITABLE	SUITABLE
10	165490			48	38.88	0.375	7383.54													SUITABLE	SUITABLE
11	165491 ✓			48	38.88	0.375	7383.54													SUITABLE	SUITABLE
12	164841	922279		48	38.55	0.375	7378.92	164865	TRANS.	1.50x0.40	92134	71181	38	0.772	1.50x0.40	90040	209	SUITABLE	41-45-44	SUITABLE	SUITABLE
13	164842			48	38,88	0.375	7383.54													SUITABLE	SUITABLE
14	164843			48	38.56	0.375	7357.07													SUITABLE	SUITABLE
15	164844			48	38,29	0.375	7306.98													SUITABLE	SUITABLE
16	164845			48	38.82	0.375	7370.31													SUITABLE	SUITABLE
17	164846			48	38,85	0.375	7378.92													SUITABLE	SUITABLE
18	164847			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
19	164848			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
20	164849			48	38,85	0.375	7378.92													SUITABLE	SUITABLE
21	164850			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
22	164851			48	38,58	0.375	7363.81													SUITABLE	SUITABLE
23	164853			48	38.25	0.375	7331.94													SUITABLE	SUITABLE
24	164854			48	38.65	0.375	7378.92													SUITABLE	SUITABLE
25	164855			48	38.82	0.375	7370.31													SUITABLE	SUITABLE
26	164856			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
27	164858			48	38.85	0.375	7378.92													SUITABLE	SUITABLE
28	164859			48	38.70	0.375	7385.74													SUITABLE	SUITABLE
29	164860			48	38.88	0.375	7383.54													SUITABLE	SUITABLE
30	164861			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
31	164862			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
32	164863			48	38,18	0.37	7288.71													SUITABLE	SUITABLE
33	164864			48	38.82	0.37	7370.31													SUITABLE	SUITABLE
34	164866			48	38.82	0.37	7370.31													SUITABLE	SUITABLE
35	164876			48	38.42	0.37	7332.62													SUITABLE	SUITABLE
36	164878			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
37	165005			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
38	165006			48	38.62	0.37	7370.31													SUITABLE	SUITABLE
39	165007			48	38.62	0.37	7370.31													SUITABLE	SUITABLE
40	165008			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
41	165009			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
42	165010			48	37.00	0.37	7081.38													SUITABLE	SUITABLE
43	165011			48	38.33	0.37	7319.58													SUITABLE	SUITABLE
44	165012			48	38.88	0.37	7383.54													SUITABLE	SUITABLE
																				SUITABLE	SUITABLE

CUSTOMER: IGO		**ORDER:**	[illegible]
PRODUCT: LSAW CARBON STEEL LINE PIPE		**STANDARD:**	API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.5H ";NACE MR 0175 FOR HARDNESS
EXTERNAL ASPECT: SUITABLE		**DELIVERY STATE:**	EXPANDATED, BEVELLED ENDS AT 30°; V=1,5
DATE 31-Mar-05		**LOT:**	

MECHANICAL TESTS

TOTAL NO.OF PIECES 48 TOTAL WEIGHT: 351815 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [feet]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	Rt0.5[psi] BASE MATERIAL	Rm[psi] BASE MATERIAL	A[%] BASE MATERIAL	REZ. Rt [%]	DIM.OF SPECIMENS [inch] WELD	Rm [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	IMPACT TEST NOTCH FOR BASE MATERIAL 32°F (J/FT.LB)	HYDRO-STATIC TEST 720 psi/10SEC	X RAY INVESTIGATION ACCORDING NORMS
45	165013	962279		48	39.52	0.37	7370.31													SUITABLE	SUITABLE
46	165562			48	39.55	0.37	7374.92													SUITABLE	SUITABLE

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902251185

ACCORDING TO: EN 10204/3.1.B

CUSTOMER:

PRODUCT: LSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 31-Mar-05

ORDER: 900024/50001667

STANDARD: API 5L 42EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551 ";NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

LOT:

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	P	S	AL	CU	CR	NI	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	CEQ
1	917165H	0.13	1.45	0.27	0.017	0.010	0.051	0.020	0.010	0.010	0.05		0.005	0.04						
2	917165P1	0.12	1.50	0.27	0.019	0.009	0.034	0.020	0.030	0.020	0.05		0.008	0.039						
3	917165P2	0.11	1.42	0.24	0.015	0.010	0.040	0.020	0.020	0.020	0.05		0.003	0.037						0.21
4	917497H	0.13	1.40	0.34	0.020	0.010	0.039	0.040	0.03	0.02	0.04		0.004	0.038						0.19
5	917497P1	0.12	1.45	0.34	0.018	0.008	0.035	0.040	0.04	0.03	0.04		0.003	0.032						
6	917497P2	0.11	1.43	0.34	0.018	0.008	0.034	0.040	0.04	0.03	0.04		0.003	0.034						0.20
7	932279H	0.12	1.50	0.30	0.018	0.007	0.038	0.020	0.02	0.01	0.04		0.011	0.043						0.20
8	932279P1	0.11	1.49	0.28	0.019	0.007	0.032	0.020	0.03	0.02	0.04		0.009	0.036						
9	932279P2	0.12	1.50	0.28	0.020	0.008	0.033	0.020	0.03	0.02	0.04		0.009	0.038						0.20
																				0.21

Ceq = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNES

INSPECTOR NAME
GABRIELA PRODAN

S.C. MITTAL STEEL GALATI S.A.
CONTROLUL CALITATII 8
MITTAL
J17/21/1991
GALATI-ROMANIA

Appendix D
Cementing Data

DZMW

CEMENTING RECORD

Palm Beach County Water Utilities

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 6 5/8-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
6/27/2006	1	Neat with 4% Calcium	1.2	8.4	2073-2058	15.0	No Tag	2073-2073	0	0	8.4	TGU
6/28/2006	2	Neat with 4% Calcium	1.2	8.4	2073-2058	15.0	No Tag	2073-2073	0	0	16.8	TGU
6/28/2006	3	Neat with 4% Calcium	1.2	16.8	2073-2043	30.0	No Tag	2073-2073	0	0	33.6	TGU
6/28/2006	4	Neat with 4% Calcium	1.2	16.8	2073-2043	30.0	2043	2073-2043	30	100	50.4	TGU
6/29/2006	5	Neat with 2% Calcium Chloride	1.2	39.3	2043-1965	78.0	1967	2043-1967	76	97	89.7	AJB

CEMENTING RECORD

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 12-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT³/SK)	QUANTITY PUMPED (FT³)	THEORETICAL FILL INTERVAL	FOOTAGE	TAG DEPTH PAD LEVEL	ACTUAL FILL INTERVAL	FOOTAGE	PERCENT FILLED J/G x 100	CUMULATIVE TOTAL (FT³)	INSPECTOR'S INITIALS
6/15/2006	1	Neat	1.2	371	1950-1700	250.0	1776	1950-1776	174	70	371.0	JW
6/15/2006	2	6%	1.69	314	1776-1585	191.0	1475	1776-1475	301	158	685.0	JW
6/16/2006	3	6%	1.69	809.0	1475- 015	460.0	1127	1475-1127	348	76	1494.0	JW
6/16/2006	4	6%	1.69	842	1127-600	527.0	860	1127-860	267	51	2336.0	JW
6/17/2006	5	4%	1.4	786	860-170	690	265	860-265	595	86	3122.0	JW
7/4/2006	6	12%	2.2	202	265-0	265	0	265-0	265	100	3324.0	TGU

CEMENTING RECORD

PROJECT: LAKE REGION DEEP INJECTION WELL

Palm Beach County Water Utilities

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 30-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT³/SK)	QUANTITY PUMPED (FT³)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT³)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
5/31/2006	1	Neat 15.6 cement slurry	1.2	1056	0-192	192	0	0-192	192	100	1056	TGU

CEMENTING RECORD

PROJECT: LAKE REGION DEEP INJECTION WELL

Palm Beach County Water Utilities

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 20-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT³/SK)	QUANTITY PUMPED (FT³)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT³)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
6/6/2006	1	Neat and 12%	1.2/2.2	2173	0-860	860	0	0-860	860	100	2173	RES

IV

CEMENTING RECORD

PROJECT: LAKE REGION DEEP INJECTION WELL

Palm Beach County Water Utilities

WUD Project No.: 03-169
CONTRACTOR: Youngquist Brothers, Inc.
BID ITEM:
CASING SIZE: 18-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
5/12/2006	A	Neat	1.18	8.4	2954-2950	4	2954	2954-2954	0	0	8.4	AJB
5/12/2006	B	Neat	1.18	22.5	2954-2945	9	2954	2954-2954	0	0	30.9	AJB
5/13/2006	C	Gravel		8.4	2954-2950	4	2950	2954-2950	4	100	30.9	AJB
5/13/2006	D	Neat	1.18	16.8	2950-2940	10	2946	2950-2946	4	40	47.7	RES
5/13/2006	E	Neat	1.18	56.1	2946-2920	26	2927	2946-2927	19	73	103.8	RES
5/13/2006	1	Neat	1.18	336.9	2927-2798	129	2828	2927-2828	99	77	440.7	AJB
5/13/2006	2	6%	1.69	1252.1	2828-2384	444	2576	2828-2576	252	57	1692.8	AJB
5/15/2006	3	6%	1.69	848	2576-2292	284	2376	2576-2376	200	70	2540.8	TGU
5/15/2006	4	6%	1.69	623	2376-2210	166	2241	2376-2241	135	81	3163.8	MPC
5/16/2006	5	6%	1.69	730	2241-2062	179	2234	2241-2234	7	4	3893.8	MPC
5/16/2006	6	6% with 2% calcium	1.69	309	2234-2190	44	2146	2234-2146	88	200	4202.8	TGU

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED J/G x 100	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE			
5/17/2006	7	6%	1.69	562	2146-1910	236	2093	2146-2093	53	22	4764.8	MPC
5/17/2006	8	6%	1.69	421	2093-1900	193	2044	2093-2044	49	25	5185.8	TGU
5/17/2006	9	Neat with 8% calcium	1.18	140	2044-1976	68	1970	2044-1970	74	109	5325.8	TGU
5/17/2006	10	Neat with 8% calcium	1.18	281	1970-1850	120	1883	1970-1883	87	73	5606.8	MPC
5/18/2006	11	12%	2.2	1572	1883-1195	688	1222	1883-1222	661	96	7178.8	MPC
5/18/2006	12	12%	2.2	1685	1222-485	737	523	1222-523	699	95	8863.8	TGU
7/4/2006	13	12%	2.2	1247	523--23	546	0	523-0	523	96	10110.8	TGU

CEMENTING RECORD

Palm Beach County
Water Utilities

PROJECT: **LAKE REGION DEEP INJECTION WELL**

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 28-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
					INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
3/21/2006	1	Neat	1.18	679	1925-1666	259	1773	1925-1773	152	59	679	PTS
3/21/2006	2	6%	1.69	562	1773-1566	207	1624	1773-1624	149	72	1241	RES
3/22/2006	3	6%	1.69	562	1624-1434	190	1439	1624-1439	185	97	1803	PTS
3/22/2006	4	6%	1.69	674	1439-1210	229	1292	1439-1292	147	64	2477	TGU
3/22/2006	5	6%	1.69	786	1292-1042	250	1107	1292-1107	185	74	3263	PTS
3/23/2006	6	6%	1.69	1011	1107-844	263	863	1107-863	244	93	4274	PTS
3/23/2006	7	12%	2.2	618	863-621	242	670	863-670	193	80	4892	TGU
3/24/2006	8	12%	2.2	752	670-369	301	364	670-364	306	102	5644	PTS
3/24/2006	9	12%	2.2	966	364-0	364	0	364-0	364	100	6610	TGU

CEMENTING RECORD

PROJECT: LAKE REGION DEEP INJECTION WELL

Palm Beach County Water Utilities

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 36-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT	YIELD	QUANTITY PUMPED (FT^3)	THEORETICAL FILL		TAG DEPTH	ACTUAL FILL		PERCENT FILLED	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
		(ADDITIVES, BLENDS, MIXTURES)	(FT^3/SK)		INTERVAL	FOOTAGE	PAD LEVEL	INTERVAL	FOOTAGE	J/G x 100		
2/13/2006	1	Neat and 12%	1.2/2.2	3594	262-855	603	129	129-855	726	120	3594	RES
2/14/2006	2	12%	2.2	618	0-129	129	0	0-129	129	100	4212	TGU

CEMENTING RECORD

Palm Beach County Water Utilities

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 48-inch casing

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL INTERVAL	FOOTAGE	TAG DEPTH PAD LEVEL	ACTUAL FILL INTERVAL	FOOTAGE	PERCENT FILLED J/G x 100	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
2/4/2006	1	Neat 15.6 cement slurry	1.2	1460	0-192	192	0	0-192	192	100	1460	AJB

Appendix E
Background Water Quality

DZMW

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 1 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10726

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 897
Collected: 06/07/06 18:00
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.40		mg/L	0.1	0.3	350.1	06/13 16:41	06/13 16:41	JGT
Nitrogen (Kjeldahl) as "N"	6.87		mg/L	0.025	0.075	351.2	06/14 12:52	06/14 12:52	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 2 **of** 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10727

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 987
Collected: 06/07/06 20:51
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.34		mg/L	0.1	0.3	350.1	06/13 16:41	06/13 16:41	JGT
Nitrogen (Kjeldahl) as "N"	6.33		mg/L	0.025	0.075	351.2	06/14 12:52	06/14 12:52	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 3 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10728

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1077
Collected: 06/07/06 23:00
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.20		mg/L	0.1	0.3	350.1	06/13 16:41	06/13 16:41	JGT
Nitrogen (Kjeldahl) as "N"	5.62		mg/L	0.025	0.075	351.2	06/14 12:56	06/14 12:56	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 4 **of** 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10729

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1167
Collected: 06/08/06 01:35
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.09		mg/L	0.1	0.3	350.1	06/13 16:42	06/13 16:42	JGT
Nitrogen (Kjeldahl) as "N"	5.46		mg/L	0.025	0.075	351.2	06/14 12:58	06/14 12:58	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 5 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10730

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1257
Collected: 06/08/06 04:20
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.19		mg/L	0.1	0.3	350.1	06/13 16:42	06/13 16:42	JGT
Nitrogen (Kjeldahl) as "N"	5.01		mg/L	0.025	0.075	351.2	06/14 12:58	06/14 12:58	JGT

QC = Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 6 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10731

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1347
Collected: 06/08/06 06:59
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.16		mg/L	0.1	0.3	350.1	06/13 16:42	06/13 16:42	JGT
Nitrogen (Kjeldahl) as "N"	2.77		mg/L	0.025	0.075	351.2	06/14 12:59	06/14 12:59	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 7 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10732

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1437
Collected: 06/08/06 08:45
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.15		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	5.91		mg/L	0.025	0.075	351.2	06/14 12:59	06/14 12:59	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 8 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10733

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1527
Collected: 06/08/06 10:20
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.22		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	4.14		mg/L	0.025	0.075	351.2	06/14 12:59	06/14 12:59	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 9 of 13
Report Printed: 06/14/06
Submission # 606000233
Order # 10734

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1610
Collected: 06/08/06 12:00
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.75		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	2.89		mg/L	0.025	0.075	351.2	06/14 12:59	06/14 12:59	JGT

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Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 07/05/06
Submission # 606000233
Order # 10735

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1707
Collected: 06/08/06 19:00
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.87		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	2.43		mg/L	0.025	0.075	351.2	06/22 17:59	06/22 15:00	JGT

* SAMPLES WERE RE-DIGESTED & RERAN FOR TKN ANALYSIS

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Jay Swartzentruber
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15465 Pine Ridge Road
Ft Myers, FL 33908

Page 11 of 13
Report Printed: 07/05/06
Submission # 606000233
Order # 10736

Sample I.D.: 1790
Collected: 06/08/06 22:30
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.06		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	2.30		mg/L	0.025	0.075	351.2	06/14 12:59	06/14 12:59	JGT

Qualifier Codes as defined by DEP 62-160
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Analytes not currently NELAC certified denoted by *.
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Ft Myers, FL 33908

Page 12 of 13
Report Printed: 07/05/06
Submission # 606000233
Order # 10737

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: 1880
Collected: 06/09/06 02:50
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.77		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	4.82		mg/L	0.025	0.075	351.2	06/14 13:00	06/14 13:00	JGT

Qualifier Codes as defined by DEP 62-160
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Page 13 **of** 13
Report Printed: 07/05/06
Submission # 606000233
Order # 10738

Sample I.D.: 1940
Collected: 06/09/06 08:00
Received: 06/12/06 15:06
Collected by: Jay Swartzentruber

Project: PBLR DZMW-1
Site Location: Belle Glade, FL
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.80		mg/L	0.1	0.3	350.1	06/13 16:43	06/13 16:43	JGT
Nitrogen (Kjeldahl) as "N"	3.51		mg/L	0.025	0.075	351.2	06/14 13:00	06/14 13:00	JGT

Qualifier Codes as defined by DEP 62-160
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Analytes not currently NELAC certified denoted by *.
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Page 1 of 2
Report Printed: 07/19/06
Submission # 607000145
Order # 14212

Project: PBLR DZMW
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: Drill Stem Samples 2067
Collected: 06/20/06 10:15
Received: 07/11/06 16:45
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.90		mg/L	0.1	0.3	350.1	07/12 19:33	07/12 19:33	JGT
Nitrogen (Kjeldahl) as "N"	1.97		mg/L	0.025	0.075	351.2	07/14 12:53	07/14 12:53	JGT

QC =Qualifier Codes as defined by DEP 62-160
s indicated, soil results are reported based on actual (wet) weight basis.
ytes not currently NELAC certified denoted by *.
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Page 2 of 2
Report Printed: 07/19/06
Submission # 607000145
Order # 14213

Project: PBLR DZMW
Site Location: Belle Glade, FL
Matrix: Water

Sample I.D.: Drill Stem Samples 2100
Collected: 06/20/06 23:15
Received: 07/11/06 16:45
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.56		mg/L	0.1	0.3	350.1	07/12 19:33	07/12 19:33	JGT
Nitrogen (Kjeldahl) as "N"	1.94		mg/L	0.025	0.075	351.2	07/14 13:05	07/14 13:05	JGT

Qualifier Codes as defined by DEP 62-160
s indicated, soil results are reported based on actual (wet) weight basis.
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WATER QUALITY ANALYSES SUMMARY
REVERSE AIR DISCHARGE - FIELD METER CHLORIDES AND TDS

WELL: IW-1
PROJECT NO.: 03-169
PAGE: 1/1
SITE LOCATION: Lake Region DZMW
PERMIT NO.: 138308-184-UC
Data = field/lab
CONTRACTOR: YOUNGQUIST
ND = None Detected

DATE	TIME	DEPTH (feet) (BLS)	SPECIFIC CONDUCTANCE (µmhos) Field/Lab	SALINITY (ppt) Field	TEMP (^{oC}) Field	pH Field	CHLORIDE (mg/l) Field/Lab	TDS (mg/l) Field/Lab	AMMONIA (mg/l) Lab	TKN (mg/l) Lab	RECORDED BY
6/7/2006	18:00	897	6160	3.4	29.5		1720	3280	1.4	3.64	TGU
6/7/2006	20:50	987	6950	3.4	29.4		1988	4071	1.34	3.03	RES
6/7/2006	22:55	1077	6990	3.8	27.2		2001	4096	1.2	3.06	RES
6/8/2006	1:10	1167	6920	3.8	26.8		1977	4053	1.09	4.9	RES
6/8/2006	4:20	1257	7670	4.1	23.9		2232	4517	1.19	2.4	RES
6/8/2006	6:45	1347	6940	3.8	26.5		1984	4065	1.16	2.4	RES
6/8/2006	8:45	1437	6220	3.4	29.6	na	1740	3620	1.15	3.2	AJB
6/8/2006	10:20	1527	5960	3.2	29.4	na	1652	3459	1.22	2.03	AJB
6/8/2006	17:00	1617	5890	2.8	26.2	na	1628	3415	0.75	1.86	AJB
6/8/2006	18:55	1707	5260	2.8	28.2	na	1415	3026	0.87	2.43	RES
6/8/2006	22:30	1797	5550	3	25.9	na	1513	3205	1.06	2.3	RES
6/8/2006	2:50	1887	5750	3.1	26.1	na	1581	3329	0.77	4.82	RES
6/8/2006	8:00	1940	4670	2.5	21.6	na	1215	2410	0.8	3.51	RES
6/20/2006	10:15	2067	56200	37.3	24.6	na	18683	34537	1.9	1.97	TGU
6/20/2006	23:15	2100							1.56	1.94	

Note: Chloride and TDS Measured with Field Meter
NM = Not measured

Florida Environmental

Report To:
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Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 1 of 18
Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Biochemical Oxygen Demand	23.4		mg/L	2.0	6.0	405.1	07/05 13:52	07/10 13:52	DSM
Coliform, Total	U	U	CFU100ml	1.0	3.0	9222B	07/05 12:32	07/06 12:32	DSM
Specific Conductance (Field)(grab)	45900		µS/cm	0.1	0.3	120.1	07/05 09:45	07/05 09:45	BO
pH (field)	6.54		units	0.1	0.3	150.1	07/05 09:45	07/05 09:45	BO
Temperature (Field)	35.3		Degree C	1	3	170.1	07/05 09:45	07/05 09:45	BO
Total Dissolved Solids (TDS)	28752		mg/L	0.82	2.46	EPA 160.1	07/11 10:29	07/11 10:29	MAY
Chloride	17000		mg/L	2.00	6.00	300.0	07/06 10:40	07/06 10:40	EAC
Fluoride	0.46		mg/L	0.011	0.033	300.0	07/06 09:58	07/06 09:58	EAC
Nitrate (as N)	U	U	mg/l	0.011	0.033	300.0	07/06 09:58	07/06 09:58	EAC
Nitrate+Nitrite (as N)	U	U	mg/L	0.011	0.033	300.0	07/06 09:58	07/06 09:58	EAC
Nitrite (as N)	U	U	mg/L	0.016	0.048	300.0	07/06 09:58	07/06 09:58	EAC
Sulfate	6200		mg/L	0.20	0.60	300.0	07/06 10:25	07/06 10:25	EAC
Cyanide, Total	U	U	mg/L	0.002	0.006	335.3	07/11 11:38	07/11 11:38	EAC
Nitrogen (Ammonia) as N	0.32		mg/L	0.1	0.3	350.1	07/10 18:12	07/10 18:12	JGT
Nitrogen (Kjeldahl) as "N"	0.64		mg/L	0.025	0.075	351.2	07/07 19:25	07/07 19:25	JGT
Nitrogen (Total Organic)	0.24		mg/L	0.041	0.123	351.2	07/07 19:25	07/07 19:25	JGT
Phosphorus, Total as "P"	2.32		mg/L	0.003	0.009	365.4	07/07 19:32	07/07 19:32	JGT
Chemical Oxygen Demand	948		mg/L	19.80	59.40	410.4	07/13 13:48	07/13 13:48	EMS

Report To:
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Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
MBAS Surfactants (LAS Mol.Wt. 340)	0.32		mg/L	0.02	0.06	425.1	07/06 14:49	07/06 14:49	RJT
Odor (Lab)	3.00		TON	0.1	0.3	SM2150B	07/06 08:10	07/06 08:10	EMS
Color (Lab)	5.00		Pt-Co	0.1	0.3	SM2120B	07/06 08:09	07/06 08:09	EMS
Aluminum	0.13		mg/L	0.009	0.027	200.7	07/06 09:00	07/06 14:12	IMN
Iron	0.23		mg/L	0.002	0.006	200.7	07/06	07/06 14:12	IMN
Sodium	9630		mg/L	0.100	0.300	200.7	07/06	07/07 15:49	IMN
Zinc	U	U	mg/L	0.00056	0.00168	200.7	07/06	07/06 14:12	IMN
200.8 DW-10 Metals in Drinking Water 62-550.310				**Dilution Factor =1**					
Arsenic	0.0156		mg/L	0.00002	0.00006	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Barium	0.214		mg/L	0.0002	0.0006	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Cadmium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Chromium	0.0054		mg/L	0.00004	0.00012	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Lead	0.0015		mg/L	0.00006	0.00018	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Nickel	0.0051		mg/L	0.00004	0.00012	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Selenium	U	U	mg/L	0.00013	0.00039	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Antimony	0.0010		mg/L	0.00003	0.00009	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Beryllium	0.0004		mg/L	0.00003	0.00009	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT
Thallium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	07/10 19:05	07/10 19:05	KYT

Report To:
Jay Swartzentruber
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15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Copper	0.0103		mg/L	0.00016	0.00048	200.8	07/10	07/10 19:05	KYT
Manganese	0.0422		mg/L	0.00007	0.00021	200.8	07/10	07/10 19:05	KYT
Silver	U	U	mg/L	0.00002	0.00006	200.8	07/10	07/10 19:05	KYT
Mercury	U	U	mg/L	0.0002	0.0006	245.1	07/11	07/11 14:24	EN
504.1 EDB, DBCP: 62-550.310(4)(b)				**Dilution Factor =1**					
1,2-Dibromo-3-Chloropropane (DBCP)	U	U	ug/L	0.30	0.90	EPA 504.1 ECD	07/1108:00	07/11 13:52	RGC
Ethylene Dibromide (EDB)	U	U	ug/L	0.02	0.06	EPA 504.1 ECD	07/1108:00	07/11 13:52	RGC
508 Pesticides & PCBs: 62-550.310(4)(b)				**Dilution Factor =1**					
Hexachlorocyclopentdiene	U	U	ug/L	0.42	1.26	508	07/07 10:00	07/08 02:34	RGC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	508	07/07 10:00	07/08 02:34	RGC
v-BHC (Lindane)	U	U	ug/L	0.004	0.012	508	07/07 10:00	07/08 02:34	RGC
Heptachlor	U	U	ug/L	0.005	0.015	508	07/07 10:00	07/08 02:34	RGC
Heptachlor Epoxide	U	U	ug/L	0.008	0.024	508	07/07 10:00	07/08 02:34	RGC
Endrin	U	U	ug/L	0.005	0.015	508	07/07 10:00	07/08 02:34	RGC
Methoxychlor	U	U	ug/L	0.007	0.021	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1016	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1221	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1232	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC

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Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Arochlor 1242	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1248	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1254	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Arochlor 1260	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
Toxaphene	U	U	ug/L	0.40	1.20	508	07/07 10:00	07/08 02:34	RGC
Chordane	U	U	ug/L	0.10	0.30	508	07/07 10:00	07/08 02:34	RGC
515.3 Chlorophenoxy Herbicides: 62-550.310(4)(b)				**Dilution Factor =1**					
Dalapon	U	U	ug/L	0.08	0.24	515.3	07/06 09:39	07/08 09:39	AC
2,4-D	U	U	ug/L	0.09	0.27	515.3	07/06 09:39	07/08 09:39	AC
Pentachlorophenol	U	U	ug/L	0.02	0.06	515.3	07/06 09:39	07/08 09:39	AC
2,4,5-TP (silvex)	U	U	ug/L	0.038	0.114	515.3	07/06 09:39	07/08 09:39	AC
Dinoseb	U	U	ug/L	0.06	0.18	515.3	07/06 09:39	07/08 09:39	AC
Picloram	U	U	ug/L	0.08	0.24	515.3	07/06 09:39	07/08 09:39	AC
524.2 Volatile Organics: 62-550.310(4)(a)				**Dilution Factor =1**					
Vinyl Chloride	U	U	ug/L	0.34	1.02	524.2	07/06 17:17	07/06 17:17	MMD
1,1-Dichloroethylene	U	U	ug/L	0.52	1.56	524.2	07/06 17:17	07/06 17:17	MMD
Dichloromethane (Methylene Chloride)	U	U	ug/L	0.99	2.97	524.2	07/06 17:17	07/06 17:17	MMD
Trans-1,2-Dichloroethylene	U	U	ug/L	0.50	1.50	524.2	07/06 17:17	07/06 17:17	MMD

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Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Cis-1,2-Dichloroethylene	U	U	ug/L	0.11	0.33	524.2	07/06 17:17	07/06 17:17	MMD
1,1,1-Trichloroethane	U	U	ug/L	0.25	0.75	524.2	07/06 17:17	07/06 17:17	MMD
Carbon Tetrachloride	U	U	ug/L	0.19	0.57	524.2	07/06 17:17	07/06 17:17	MMD
Benzene	U	U	ug/L	0.09	0.27	524.2	07/06 17:17	07/06 17:17	MMD
1,2-Dichloroethane	U	U	ug/L	0.24	0.72	524.2	07/06 17:17	07/06 17:17	MMD
Trichloroethylene	U	U	ug/L	0.09	0.27	524.2	07/06 17:17	07/06 17:17	MMD
1,2-Dichloropropane	U	U	ug/L	0.20	0.60	524.2	07/06 17:17	07/06 17:17	MMD
Toluene	U	U	ug/L	0.14	0.42	524.2	07/06 17:17	07/06 17:17	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	524.2	07/06 17:17	07/06 17:17	MMD
Tetrachloroethylene	U	U	ug/L	0.11	0.33	524.2	07/06 17:17	07/06 17:17	MMD
Chlorobenzene	U	U	ug/L	0.09	0.27	524.2	07/06 17:17	07/06 17:17	MMD
Ethylbenzene	U	U	ug/L	0.13	0.39	524.2	07/06 17:17	07/06 17:17	MMD
Xylenes (Total)	U	U	ug/L	0.21	0.63	524.2	07/06 17:17	07/06 17:17	MMD
Styrene	U	U	ug/L	0.17	0.51	524.2	07/06 17:17	07/06 17:17	MMD
1,4-Dichlorobenzene (para)	U	U	ug/L	0.14	0.42	524.2	07/06 17:17	07/06 17:17	MMD
1,2-Dichlorobenzene (ortho)	U	U	ug/L	0.48	1.44	524.2	07/06 17:17	07/06 17:17	MMD
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	524.2	07/06 17:17	07/06 17:17	MMD
525.2 Semivolatile Organics: 62-550.310(4)(b)				**Dilution Factor =1**					

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

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Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Di(2-Ethylhexyl)phthalate	U	U	ug/L	0.36	1.08	525.2	07/06 12:29	07/08 12:29	AC
Di(2-Ethylhexyl)adipate	U	U	ug/L	0.36	1.08	525.2	07/06 12:29	07/08 12:29	AC
Benzo(a)pyrene	U	U	ug/L	0.017	0.051	525.2	07/06 12:29	07/08 12:29	AC
Pentachlorophenol	U	U	ug/L	2.13	6.39	525.2	07/06 12:29	07/08 12:29	AC
Alachlor	U	U	ug/L	0.2000	0.6000	525.2	07/06 12:29	07/08 12:29	AC
Atrazine	U	U	ug/L	0.2000	0.6000	525.2	07/06 12:29	07/08 12:29	AC
Simazine	U	U	ug/L	0.2000	0.6000	525.2	07/06 12:29	07/08 12:29	AC
608 Chlorinated Pesticides & PCBs in WATER				**Dilution Factor =1**					
a-BHC	U	U	ug/L	0.005	0.015	EPA 608	07/10 11:00	07/10 19:34	RGC
b-BHC	U	U	ug/L	0.005	0.015	EPA 608	07/10 11:00	07/10 19:34	RGC
g-BHC (lindane)	U	U	ug/L	0.004	0.012	EPA 608	07/10 11:00	07/10 19:34	RGC
d-BHC	U	U	ug/L	0.005	0.015	EPA 608	07/10 11:00	07/10 19:34	RGC
Heptachlor	U	U	ug/L	0.005	0.015	EPA 608	07/10 11:00	07/10 19:34	RGC
Aldrin	U	U	ug/L	0.017	0.051	EPA 608	07/10 11:00	07/10 19:34	RGC
Heptachlor Epoxide	U	U	ug/L	0.008	0.024	EPA 608	07/10 11:00	07/10 19:34	RGC
Endosulfan I	U	U	ug/L	0.006	0.018	EPA 608	07/10 11:00	07/10 19:34	RGC
Dieldrin	U	U	ug/L	0.006	0.018	EPA 608	07/10 11:00	07/10 19:34	RGC
4,4-DDE	U	U	ug/L	0.39	1.17	EPA 608	07/10 11:00	07/10 19:34	RGC

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LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Endrin	U	U	ug/L	0.005	0.015	EPA 608	07/10 11:00	07/10 19:34	RGC
Endosulfan II	U	U	ug/L	0.006	0.018	EPA 608	07/10 11:00	07/10 19:34	RGC
4,4-DDD	U	U	ug/L	0.60	1.80	EPA 608	07/10 11:00	07/10 19:34	RGC
Endrin Aldehyde	U	U	ug/L	0.010	0.030	EPA 608	07/10 11:00	07/10 19:34	RGC
Endosulfan Sulfate	U	U	ug/L	0.007	0.021	EPA 608	07/10 11:00	07/10 19:34	RGC
4,4-DDT	U	U	ug/L	0.69	2.07	EPA 608	07/10 11:00	07/10 19:34	RGC
Methoxychlor	U	U	ug/L	0.007	0.021	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1016	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1221	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1232	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1242	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1248	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1254	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Aroclor 1260	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
Toxaphene	U	U	ug/L	0.40	1.20	EPA 608	07/10 11:00	07/10 19:34	RGC
Chlordane	U	U	ug/L	0.10	0.30	EPA 608	07/10 11:00	07/10 19:34	RGC
625 Semivolatile Organics in Water by GC/MS				**Dilution Factor =1**					
N-Nitrosodimethylamine	U	U	ug/L	0.50	1.50	625	07/12 20:12	07/18 20:12	AC

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Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Phenol	U	U	ug/L	1.86	5.58	625	07/12 20:12	07/18 20:12	AC
Bis (2-Chloroethyl) Ether	U	U	ug/L	0.85	2.55	625	07/12 20:12	07/18 20:12	AC
2-Chlorophenol	U	U	ug/L	3.00	9.00	625	07/12 20:12	07/18 20:12	AC
1,3-Dichlorobenzene	U	U	ug/L	0.20	0.60	625	07/12 20:12	07/18 20:12	AC
1,4-Dichlorobenzene	U	U	ug/L	0.14	0.42	625	07/12 20:12	07/18 20:12	AC
Benzyl Alcohol	U	U	ug/L	0.75	2.25	625	07/12 20:12	07/18 20:12	AC
1,2-Dichlorobenzene	U	U	ug/L	0.48	1.44	625	07/12 20:12	07/18 20:12	AC
Bis (2-Chloroisopropyl) Ether ~	U	U	ug/L	0.85	2.55	625	07/12 20:12	07/18 20:12	AC
N-Nitrosodi-N-Propylamine	U	U	ug/L	1.14	3.42	625	07/12 20:12	07/18 20:12	AC
Hexachloroethane	U	U	ug/L	2.31	6.93	625	07/12 20:12	07/18 20:12	AC
Nitrobenzene ~	U	U	ug/L	0.66	1.98	625	07/12 20:12	07/18 20:12	AC
Isophorone	U	U	ug/L	1.56	4.68	625	07/12 20:12	07/18 20:12	AC
2-Nitrophenol	U	U	ug/L	3.00	9.00	625	07/12 20:12	07/18 20:12	AC
2,4-Dimethylphenol	U	U	ug/L	3.00	9.00	625	07/12 20:12	07/18 20:12	AC
Bis (2-Chloroethoxy)methane ~	U	U	ug/L	1.89	5.67	625	07/12 20:12	07/18 20:12	AC
2,4-Dichlorophenol	U	U	ug/L	3.00	9.00	625	07/12 20:12	07/18 20:12	AC
1,2,3-Trichlorobenzene	U	U	ug/L	2.00	6.00	625	07/12 20:12	07/18 20:12	AC
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	625	07/12 20:12	07/18 20:12	AC

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Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Naphthalene	U	U	ug/L	0.015	0.045	625	07/12 20:12	07/18 20:12	AC
Hexachlorobutadiene	U	U	ug/L	0.57	1.71	625	07/12 20:12	07/18 20:12	AC
4-Chloro-3-Methylphenol	U	U	ug/L	3	9	625	07/12 20:12	07/18 20:12	AC
1-Methylnaphthalene	U	U	ug/L	0.36	1.08	625	07/12 20:12	07/18 20:12	AC
2-Methylnaphthalene	U	U	ug/L	0.024	0.072	625	07/12 20:12	07/18 20:12	AC
2-Methylphenol (o-cresol)	U	U	ug/L	2.0	6.0	625	07/12 20:12	07/18 20:12	AC
Hexachlorocyclopentadiene	U	U	ug/L	0.42	1.26	625	07/12 20:12	07/18 20:12	AC
3-MethylPhenol (m-cresol)	U	U	ug/L	0.84	2.52	625	07/12 20:12	07/18 20:12	AC
4-Methylphenol (p-cresol)	U	U	ug/L	1.16	3.48	625	07/12 20:12	07/18 20:12	AC
2,3,6-Trichlorophenol	U	U	ug/L	2.5	7.5	625	07/12 20:12	07/18 20:12	AC
2,4,5-Trichlorophenol	U	U	ug/L	3.51	10.53	625	07/12 20:12	07/18 20:12	AC
2,4,6-Trichlorophenol	U	U	ug/L	3.0	9.0	625	07/12 20:12	07/18 20:12	AC
2-Chloronaphthalene	U	U	ug/L	1.16	3.48	625	07/12 20:12	07/18 20:12	AC
Dimethyl Phthalate	U	U	ug/L	3.7	11.1	625	07/12 20:12	07/18 20:12	AC
Acenaphthylene	U	U	ug/L	0.015	0.045	625	07/12 20:12	07/18 20:12	AC
2,6-Dinitrotoluene	U	U	ug/L	0.54	1.62	625	07/12 20:12	07/18 20:12	AC
Acenaphthene	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC
2,4-Dinitrophenol	U	U	ug/L	3.0	9.0	625	07/12 20:12	07/18 20:12	AC

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Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
2,4-Dinitrotoluene	U	U	ug/L	1.17	3.51	625	07/12 20:12	07/18 20:12	AC
4-Nitrophenol	U	U	ug/L	3.0	9.0	625	07/12 20:12	07/18 20:12	AC
Diethyl Phthalate	U	U	ug/L	3.4	10.2	625	07/12 20:12	07/18 20:12	AC
Fluorene	U	U	ug/L	0.012	0.036	625	07/12 20:12	07/18 20:12	AC
4-Chlorophenyl Phenyl Ether	U	U	ug/L	0.87	2.61	625	07/12 20:12	07/18 20:12	AC
4,6-Dinitro-2-Methylphenol	U	U	ug/L	2.0	6.0	625	07/12 20:12	07/18 20:12	AC
N-Nitrosodiphenylamine	U	U	ug/L	3.42	10.26	625	07/12 20:12	07/18 20:12	AC
4-Bromophenyl Phenyl Ether	U	U	ug/L	1.44	4.32	625	07/12 20:12	07/18 20:12	AC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	625	07/12 20:12	07/18 20:12	AC
Pentachlorophenol	U	U	ug/L	2.13	6.39	625	07/12 20:12	07/18 20:12	AC
Phenanthrene	U	U	ug/L	0.028	0.084	625	07/12 20:12	07/18 20:12	AC
Anthracene	U	U	ug/L	0.049	0.147	625	07/12 20:12	07/18 20:12	AC
Di-N-Butyl Phthalate	U	U	ug/L	1.2	3.6	625	07/12 20:12	07/18 20:12	AC
Fluoranthene	U	U	ug/L	0.025	0.075	625	07/12 20:12	07/18 20:12	AC
Benzidine ˜	U	U	ug/L	4.0	12.0	625	07/12 20:12	07/18 20:12	AC
Pyrene	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC
Butyl Benzyl Phthalate	U	U	ug/L	1.44	4.32	625	07/12 20:12	07/18 20:12	AC
Benzo(A)Anthracene	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC

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Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
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LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
3,3-Dichlorobenzidine	U	U	ug/L	2.0	6.0	625	07/12 20:12	07/18 20:12	AC
Chrysene	U	U	ug/L	0.75	2.25	625	07/12 20:12	07/18 20:12	AC
Bis (2 Ethylhexyl) Phthalate	U	U	ug/L	2.37	7.11	625	07/12 20:12	07/18 20:12	AC
Di-N-Octyl Phthalate	U	U	ug/L	1.4	4.2	625	07/12 20:12	07/18 20:12	AC
Benzo(B)Fluoranthene	U	U	ug/L	0.029	0.087	625	07/12 20:12	07/18 20:12	AC
Benzo(K)Fluoranthene	U	U	ug/L	0.025	0.075	625	07/12 20:12	07/18 20:12	AC
Benzo(A)Pyrene	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC
Indeno(1,2,3-CD)Pyrene	U	U	ug/L	0.93	2.79	625	07/12 20:12	07/18 20:12	AC
Dibenzo(A,H,)Anthracene	U	U	ug/L	0.029	0.087	625	07/12 20:12	07/18 20:12	AC
Benzo(G,H,I)Perylene	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC
Bis-2-ethylhexyl Adipate	U	U	ug/L	0.36	1.08	625	07/12 20:12	07/18 20:12	AC
Aldrin ~	U	U	ug/L	0.017	0.051	625	07/12 20:12	07/18 20:12	AC
alpha-BHC ~	U	U	ug/L	0.005	0.015	625	07/12 20:12	07/18 20:12	AC
beta-BHC ~	U	U	ug/L	0.005	0.015	625	07/12 20:12	07/18 20:12	AC
delta-BHC ~	U	U	ug/L	0.005	0.015	625	07/12 20:12	07/18 20:12	AC
gamma-BHC (Lindane) ~	U	U	ug/L	0.004	0.012	625	07/12 20:12	07/18 20:12	AC
Chlordane (Screen) ~	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
4,4'-DDD ~	U	U	ug/L	0.60	1.80	625	07/12 20:12	07/18 20:12	AC

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Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
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LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
4,4'-DDE ˜	U	U	ug/L	0.39	1.17	625	07/12 20:12	07/18 20:12	AC
4,4'-DDT ˜	U	U	ug/L	0.69	2.07	625	07/12 20:12	07/18 20:12	AC
Dieldrin ˜	U	U	ug/L	0.006	0.018	625	07/12 20:12	07/18 20:12	AC
Endosulfan I ˜	U	U	ug/L	0.006	0.018	625	07/12 20:12	07/18 20:12	AC
Endosulfan II ˜	U	U	ug/L	0.006	0.018	625	07/12 20:12	07/18 20:12	AC
Endosulfan Sulfate ˜	U	U	ug/L	0.007	0.021	625	07/12 20:12	07/18 20:12	AC
Endrin ˜	U	U	ug/L	0.005	0.015	625	07/12 20:12	07/18 20:12	AC
Endrin Aldehyde ˜	U	U	ug/L	0.010	0.030	625	07/12 20:12	07/18 20:12	AC
Heptachlor ˜	U	U	ug/L	0.005	0.015	625	07/12 20:12	07/18 20:12	AC
Heptachlor Epoxide ˜	U	U	ug/L	0.008	0.024	625	07/12 20:12	07/18 20:12	AC
Toxaphene ˜	U	U	ug/L	0.40	1.20	625	07/12 20:12	07/18 20:12	AC
PCB-1016 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1221 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1232 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1242 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1248 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1254 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC
PCB-1260 (screen) ˜	U	U	ug/L	0.10	0.30	625	07/12 20:12	07/18 20:12	AC

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Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
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LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Dioxin (screen)	U	U	ug/L	0.03	0.09	625	07/12 20:12	07/18 20:12	AC
Azobenzene ~	U	U	ug/L	0.75	2.25	625	07/12 20:12	07/18 20:12	AC
Methoxychlor ~	U	U	ug/L	0.007	0.021	625	07/12 20:12	07/18 20:12	AC
Benzoic Acid	U	U	ug/L	0.84	2.52	625	07/12 20:12	07/18 20:12	AC
Aniline	U	U	ug/L	0.50	1.50	625	07/12 20:12	07/18 20:12	AC
4-Chloroaniline	U	U	ug/L	0.65	1.95	625	07/12 20:12	07/18 20:12	AC
Dibenzofuran	U	U	ug/L	0.66	1.98	625	07/12 20:12	07/18 20:12	AC
2-Nitroaniline	U	U	ug/L	0.58	1.74	625	07/12 20:12	07/18 20:12	AC
3-Nitroaniline	U	U	ug/L	0.50	1.50	625	07/12 20:12	07/18 20:12	AC
4-Nitroaniline	U	U	ug/L	0.84	2.52	625	07/12 20:12	07/18 20:12	AC
Carbazole ~	U	U	ug/L	0.68	2.04	625	07/12 20:12	07/18 20:12	AC
2,6-Dichlorophenol	U	U	ug/L	0.89	2.67	625	07/12 20:12	07/18 20:12	AC
Pyridine	U	U	ug/L	0.99	2.97	625	07/12 20:12	07/18 20:12	AC
2,3,4,6-Tetrachlorophenol	U	U	ug/L	1.00	3.00	625	07/12 20:12	07/18 20:12	AC
2,3,5,6-Tetrachlorophenol	U	U	ug/L	0.80	2.40	625	07/12 20:12	07/18 20:12	AC
8260.C Volatile Organics in Water by GC/MS				**Dilution Factor =1**					
Acetone	U	U	ug/L	1.75	5.25	5030/8260C	07/06 17:17	07/06 17:17	MMD
Acrolein	U	U	ug/L	0.75	2.25	5030/8260C	07/06 17:17	07/06 17:17	MMD

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

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Report Printed: 08/16/07 Rev. 1
Submission # 607000020
Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Acrylonitrile	U	U	ug/L	0.41	1.23	5030/8260C	07/06 17:17	07/06 17:17	MMD
Methyl Ethyl Ketone	U	U	ug/L	0.75	2.25	5030/8260C	07/06 17:17	07/06 17:17	MMD
Dichlorodifluoromethane	U	U	ug/L	0.13	0.39	5030/8260C	07/06 17:17	07/06 17:17	MMD
Chloromethane	U	U	ug/L	0.35	1.05	5030/8260C	07/06 17:17	07/06 17:17	MMD
Vinyl Chloride	U	U	ug/L	0.34	1.02	5030/8260C	07/06 17:17	07/06 17:17	MMD
Bromomethane	U	U	ug/L	0.41	1.23	5030/8260C	07/06 17:17	07/06 17:17	MMD
Chloroethane	U	U	ug/L	0.17	0.51	5030/8260C	07/06 17:17	07/06 17:17	MMD
Trichlorofluoromethane	U	U	ug/L	0.47	1.41	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1-Dichloroethene	U	U	ug/L	0.52	1.56	5030/8260C	07/06 17:17	07/06 17:17	MMD
Methylene Chloride	U	U	ug/L	0.99	2.97	5030/8260C	07/06 17:17	07/06 17:17	MMD
Trans-1,2-Dichloroethene	U	U	ug/L	0.50	1.50	5030/8260C	07/06 17:17	07/06 17:17	MMD
Methyl-Tert-Butyl Ether	U	U	ug/L	0.50	1.50	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1-Dichloroethane	U	U	ug/L	0.53	1.59	5030/8260C	07/06 17:17	07/06 17:17	MMD
2,2-Dichloropropane	U	U	ug/L	0.31	0.93	5030/8260C	07/06 17:17	07/06 17:17	MMD
Cis-1,2-Dichloroethene	U	U	ug/L	0.11	0.33	5030/8260C	07/06 17:17	07/06 17:17	MMD
Chloroform	U	U	ug/L	0.80	2.40	5030/8260C	07/06 17:17	07/06 17:17	MMD
Bromochloromethane	U	U	ug/L	0.55	1.65	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1,1-Trichloroethane	U	U	ug/L	0.25	0.75	5030/8260C	07/06 17:17	07/06 17:17	MMD

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Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
1,1-Dichloropropene	U	U	ug/L	0.07	0.21	5030/8260C	07/06 17:17	07/06 17:17	MMD
Carbon Tetrachloride	U	U	ug/L	0.19	0.57	5030/8260C	07/06 17:17	07/06 17:17	MMD
Benzene	U	U	ug/L	0.09	0.27	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2-Dichloroethane	U	U	ug/L	0.24	0.72	5030/8260C	07/06 17:17	07/06 17:17	MMD
Trichloroethene	U	U	ug/L	0.09	0.27	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2-Dichloropropane	U	U	ug/L	0.20	0.60	5030/8260C	07/06 17:17	07/06 17:17	MMD
Bromodichloromethane	U	U	ug/L	0.24	0.72	5030/8260C	07/06 17:17	07/06 17:17	MMD
2-Chloroethylvinyl Ether	U	U	ug/L	1.00	3.00	5030/8260C	07/06 17:17	07/06 17:17	MMD
Dibromomethane	U	U	ug/L	0.42	1.26	5030/8260C	07/06 17:17	07/06 17:17	MMD
Cis-1,3-Dichloropropene	U	U	ug/L	0.38	1.14	5030/8260C	07/06 17:17	07/06 17:17	MMD
Toluene	U	U	ug/L	0.14	0.42	5030/8260C	07/06 17:17	07/06 17:17	MMD
Trans-1,3-Dichloropropene	U	U	ug/L	0.50	1.50	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,3-Dichloropropane	U	U	ug/L	0.38	1.14	5030/8260C	07/06 17:17	07/06 17:17	MMD
Tetrachloroethene	U	U	ug/L	0.11	0.33	5030/8260C	07/06 17:17	07/06 17:17	MMD
Dibromochloromethane	U	U	ug/L	0.39	1.17	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2-Dibromoethane (EDB)	U	U	ug/L	0.40	1.20	5030/8260C	07/06 17:17	07/06 17:17	MMD
Bromobenzene	U	U	ug/L	0.46	1.38	5030/8260C	07/06 17:17	07/06 17:17	MMD

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Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Chlorobenzene	U	U	ug/L	0.09	0.27	5030/8260C	07/06 17:17	07/06 17:17	MMD
Ethylbenzene	U	U	ug/L	0.13	0.39	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1,1,2-Tetrachloroethane	U	U	ug/L	0.37	1.11	5030/8260C	07/06 17:17	07/06 17:17	MMD
m & p-Xylene	1.68		ug/L	0.19	0.57	5030/8260C	07/06 17:17	07/06 17:17	MMD
o-Xylene	0.85		ug/L	0.19	0.57	5030/8260C	07/06 17:17	07/06 17:17	MMD
Styrene	U	U	ug/L	0.17	0.51	5030/8260C	07/06 17:17	07/06 17:17	MMD
Isopropylbenzene	U	U	ug/L	0.50	1.50	5030/8260C	07/06 17:17	07/06 17:17	MMD
Bromoform	U	U	ug/L	0.38	1.14	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,1,2,2-Tetrachloroethane	U	U	ug/L	0.29	0.87	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2,3-Trichloropropane	U	U	ug/L	0.23	0.69	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,3,5-Trimethylbenzene	U	U	ug/L	0.11	0.33	5030/8260C	07/06 17:17	07/06 17:17	MMD
2-Chlorotoluene	U	U	ug/L	0.13	0.39	5030/8260C	07/06 17:17	07/06 17:17	MMD
4-Chlorotoluene	U	U	ug/L	0.16	0.48	5030/8260C	07/06 17:17	07/06 17:17	MMD
Tert-Butylbenzene	U	U	ug/L	0.16	0.48	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2,4-Trimethylbenzene	U	U	ug/L	0.11	0.33	5030/8260C	07/06 17:17	07/06 17:17	MMD
Sec-Butylbenzene	U	U	ug/L	0.17	0.51	5030/8260C	07/06 17:17	07/06 17:17	MMD
P-Isopropyltoluene	U	U	ug/L	0.11	0.33	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,3-Dichlorobenzene	U	U	ug/L	0.20	0.60	5030/8260C	07/06 17:17	07/06 17:17	MMD

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Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
1,4-Dichlorobenzene	U	U	ug/L	0.14	0.42	5030/8260C	07/06 17:17	07/06 17:17	MMD
n-Butylbenzene	U	U	ug/L	0.21	0.63	5030/8260C	07/06 17:17	07/06 17:17	MMD
n-PropylBenzene	U	U	ug/L	0.17	0.51	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2-Dichlorobenzene	U	U	ug/L	0.48	1.44	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2-Dibromo-3-Chloropropane (DBCP)	U	U	ug/L	0.30	0.90	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	5030/8260C	07/06 17:17	07/06 17:17	MMD
Hexachlorobutadiene	U	U	ug/L	0.57	1.71	5030/8260C	07/06 17:17	07/06 17:17	MMD
Naphthalene	U	U	ug/L	0.015	0.045	5030/8260C	07/06 17:17	07/06 17:17	MMD
1,2,3-Trichlorobenzene	U	U	ug/L	1.27	3.81	5030/8260C	07/06 17:17	07/06 17:17	MMD
SUB 531 Carbamate Pesticides: 62-550.310(4)(b				**Dilution Factor =1**					
Carbofuran	0.5U		ug/L	0.5	1.5	531.1	07/11 04:45	07/11 04:45	E84129
Oxamyl (vydate)	0.5U		ug/L	0.5	1.5	531.1	07/11 04:45	07/11 04:45	E84129
SUB 531 Carbamate Pesticides: 62-550.UNREGULA				**Dilution Factor =1**					
Aldicarb Sulfoxide	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129
Aldicarb Sulfone	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129
Methomyl	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129
3-Hydrocarbofuran	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129
Aldicarb	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129

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Order # 13564

Project: Rig-511 DZMW #1
Site Location: 3900 Hooker Hwy. Bell Glade FL, 33430
Matrix: Water

Sample I.D.: Lower Zone
Collected: 07/05/06 09:45
Received: 07/05/06 11:55
Collected by: Bruce Orand

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Carbaryl	0.5U		ug/L	0.50	1.50	531.1	07/11 04:45	07/11 04:45	E84129
Glyphosate	10U		ug/L	10	30	547.1	07/12 16:44	07/12 16:44	E84129
Endothall	20U		ug/L	20	60	548.1	07/11 11:00	07/14 16:14	E84129
SUB 549 Diquat : 62-550.310(4)(b)				**Dilution Factor =1**					
Diquat	1U		ug/L	1.0	3.0	549.2	07/11 09:30	07/13 18:31	E84129
	1U		ug/L	1.0	3.0	549.2	07/11 09:30	07/13 18:31	E84129
Gross Alpha	10.5± 1.2		pCi/L	1.0	3.0	EPA 00-02	07/13 15:45	07/13 15:45	E84088
Radium-226	11.1 ± 0.1		pCi/L	0.10	0.30	EPA 903.1	07/17 10:15	07/17 10:15	E84088
Radium-228	0.5 ± 0.5U		pCi/L	0.50	1.50	EPA Ra-05	07/17 11:20	07/17 11:20	E84088

* CONDUCTIVITY CHECKED IN THE LAB ON 08/04/06

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by ~.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.
Results relate only to the sample.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Data Qualifier Codes

A	Value reported is the mean (average) of two or more determinations.
B	Results based upon colony counts outside the acceptable range. The code is to be used if the colony count is generated from a plate in which the total number of Coliform colonies exceeds the method indicated ideal ranges, which are: Total Coliforms: 20-80 colonies Fecal Coliforms: 20-60 colonies
C	Result was confirmed by a separate analysis of the sample.
D	Measurement was made in the field (i.e. in situ). This applies to any value (ex. pH, specific conductance, etc.) that was obtained under field conditions using approved analytical methods.
H	Value based on field kit determination; results may not be accurate.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J	Estimated value; value not accurate. This code shall be used in the following instances: 1. surrogate recovery limits have been exceeded. 2. no known quality control criteria exists for the component 3. the reported value failed to meet the established quality control criteria for either precision or accuracy. 4. the sample matrix interfered with the ability to make any accurate determination; or 5. if the data is questionable because of improper laboratory or field protocols (e.g. composite sample was collected instead of a grab sample).
N	Presumptive evidence of presence of material. This qualifier shall be used if: 1. the component has been tentatively identified based on mass spectral library search.a 2. there is an indication that the analyte is present. but quality control requirements for confirmation were not met
O	Sampled, but analysis lost or not performed; sample compromised.
Q	Sample held beyond accepted holding time. This code shall be used if the value is derived from a sample that was prepared or analyzed after the approved holding time restrictions for sample preparation or analysis.
R	Significant rain in the past 48 hours. This code shall be used when the rainfall might contribute to a lower than normal value.
T	Value reported is less than the laboratory method detection limit
U	Indicated that the compound was analyzed for but not detected. This shall be used to indicate that the specified component <u>was not</u> detected. The value associated with the qualifier shall be the laboratory method detection limit
V	Indicated that the analyte was detected in both the sample and the associated method blank. Note: the value in the blank shall not be subtracted from associated samples.
Y	The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
Z	Too many colonies were present (TNTC), the numeric value represents the filtration volume.
?	Data is rejected and should not be used. Some of all of the quality control data for the analyte were outside criteria, and the presence or absence of the analyte cannot be determined from the data.
*	Not analyzed due to interference.
!	Data deviates from historically established concentration ranges.
~	Analysis performed outside NELAP program. (e.g. State of Georgia, UCMR, ICR or other certification.)

Florida Environmental

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

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Report Printed: 08/15/06
Submission # 607000144
Order # 14210

Lake Regiox

Project: Belle Glade
Site Location: 3900 Hooker Hwy, Belle Glade, FL 33430
Matrix: Water

Sample I.D.: Upper Zone
Collected: 07/11/06 11:05
Received: 07/11/06 16:45
Collected by: Joseph Pinkocze

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Biochemical Oxygen Demand	U	U	mg/L	2.0	6.0	405.1	07/12 14:22	07/17 14:22	DSM
Coliform, Total	U	U	CFU100ml	1.0	3.0	9222B	07/11 16:50	07/12 16:50	CRL
Specific Conductance (Field)(grab)	25317		Ω*cm.	0.1	0.3	120.1	07/11 11:05	07/11 11:05	JP
pH (field)	7.5		units	0.1	0.3	150.1	07/11 11:05	07/11 11:05	JP
Temperature (Field)	30.3		Degree C	1	3	170.1	07/11 11:05	07/11 11:05	JP
Total Dissolved Solids (TDS)	16332		mg/L	0.82	2.46	EPA 160.1	07/13 16:10	07/13 16:10	MAY
Chloride	9608		mg/L	10.00	30.00	300.0	07/13 13:21	07/13 13:21	EAC
Fluoride	U	U	mg/L	0.011	0.033	300.0	07/13 13:20	07/13 13:20	EAC
Nitrate (as N)	U	U	mg/l	0.011	0.033	300.0	07/13 13:21	07/13 13:21	EAC
Nitrite (as N)	U	U	mg/L	0.016	0.048	300.0	07/13 13:21	07/13 13:21	EAC
Sulfate	987		mg/L	20.00	60.00	300.0	07/13 13:21	07/13 13:21	EAC
Cyanide, Total	U	U	mg/L	0.002	0.006	335.3	07/18 10:01	07/18 10:01	EAC
Nitrogen (Ammonia) as N	1.67		mg/L	0.1	0.3	350.1	07/12 19:29	07/12 19:29	JGT
Nitrogen (Kjeldahl) as "N"	1.90		mg/L	0.025	0.075	351.2	07/14 12:52	07/14 12:52	JGT
Nitrate+Nitrite (as N)	U	U	mg/L	0.011	0.033	353.1	07/13 12:15	07/13 12:15	EAC
Phosphorus, Total as "P"	U	U	mg/L	0.003	0.009	365.4	07/14 13:25	07/14 13:25	JGT
Chemical Oxygen Demand	607		mg/L	1.98	5.94	410.4	07/13 13:48	07/13 13:48	EMS
MBAS Surfactants	0.89		mg/L	0.02	0.06	425.1	07/12 16:33	07/12 16:33	RJT

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Order # 14210

Project: Belle Glade
Site Location: 3900 Hooker Hwy, Belle Glade, FL 33430
Matrix: Water

Sample I.D.: Upper Zone
Collected: 07/11/06 11:05
Received: 07/11/06 16:45
Collected by: Joseph Pinkocze

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Odor (Lab)	2.00		TON	0.1	0.3	SM2150B	07/12 08:47	07/12 08:47	EMS
Color (Lab)	160		Pt-Co	0.4	1.2	SM2120B	07/12 08:45	07/12 08:45	EMS
Aluminum	U	U	mg/L	0.009	0.027	200.7	07/12 09:00	07/12 13:03	IMN
[illegible]	2.63		mg/L	0.002	0.006	200.7	07/12	07/12 13:03	IMN
Sodium	4557		mg/L	0.100	0.300	200.7	07/12	07/13 10:51	IMN
Zinc	0.09		mg/L	0.00056	0.00168	200.7	07/12	07/12 13:03	IMN
200.8 DW-10 Metals in Drinking Water 62-550.310				**Dilution Factor =1**					
Arsenic	0.0109		mg/L	0.00002	0.00006	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Barium	0.199		mg/L	0.0002	0.0006	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Cadmium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Chromium	0.0008		mg/L	0.00004	0.00012	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Lead	U	U	mg/L	0.00006	0.00018	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Nickel	0.0039		mg/L	0.00004	0.00012	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Selenium	0.0389		mg/L	0.00013	0.00039	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Antimony	0.0010		mg/L	0.00003	0.00009	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Beryllium	U	U	mg/L	0.00003	0.00009	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Thallium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	07/14 15:37	07/14 15:37	KYT
Copper	0.0035		mg/L	0.00016	0.00048	200.8	07/14	07/14 13:58	KYT

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Project: Belle Glade
Site Location: 3900 Hooker Hwy, Belle Glade, FL 33430
Matrix: Water

Sample I.D.: Upper Zone
Collected: 07/11/06 11:05
Received: 07/11/06 16:45
Collected by: Joseph Pinkocze

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Manganese	0.283		mg/L	0.00007	0.00021	200.8	07/14	07/14 15:37	KYT
Silver	0.0005		mg/L	0.00002	0.00006	200.8	07/14	07/14 13:58	KYT
Mercury	U	U	mg/L	0.0002	0.0006	245.1	07/12	07/12 14:59	EN
1 EDB, DBCP: 62-550.310(4)(b)				**Dilution Factor =1**					
1,2-Dibromo-3-Chloropropane (DBCP)	U	U	ug/L	0.30	0.90	EPA 504.1 ECD	07/1308:00	07/13 09:20	RGC
Ethylene Dibromide (EDB)	U	U	ug/L	0.02	0.06	EPA 504.1 ECD	07/1308:00	07/13 09:20	RGC
508 Pesticides & PCBs: 62-550.310(4)(b)				**Dilution Factor =1**					
Hexachlorocyclopentdiene	U	U	ug/L	0.42	1.26	508	07/11 10:00	07/12 16:45	RGC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	508	07/11 10:00	07/12 16:45	RGC
v-BHC (Lindane)	U	U	ug/L	0.004	0.012	508	07/11 10:00	07/12 16:45	RGC
Heptachlor	U	U	ug/L	0.005	0.015	508	07/11 10:00	07/12 16:45	RGC
Heptachlor Epoxide	U	U	ug/L	0.008	0.024	508	07/11 10:00	07/12 16:45	RGC
Endrin	U	U	ug/L	0.005	0.015	508	07/11 10:00	07/12 16:45	RGC
Methoxychlor	U	U	ug/L	0.007	0.021	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1016	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1221	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1232	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1242	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC

Report To:
Jay Swartzentruber
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Project: Belle Glade
Site Location: 3900 Hooker Hwy, Belle Glade, FL 33430
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LABORATORY ANALYSIS REPORT

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Arochlor 1248	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1254	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
Arochlor 1260	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
oxaphene	U	U	ug/L	0.40	1.20	508	07/11 10:00	07/12 16:45	RGC
Chordane	U	U	ug/L	0.10	0.30	508	07/11 10:00	07/12 16:45	RGC
515.3 Chlorophenoxy Herbicides: 62-550.310(4)(b)				Dilution Factor =1					
Dalapon	U	U	ug/L	0.08	0.24	515.3	07/13 21:11	07/13 14:35	PJM
2,4-D	U	U	ug/L	0.09	0.27	515.3	07/13 21:11	07/13 14:35	PJM
Pentachlorophenol	U	U	ug/L	0.02	0.06	515.3	07/13 21:11	07/13 14:35	PJM
2,4,5-TP (silvex)	U	U	ug/L	0.038	0.114	515.3	07/13 21:11	07/13 14:35	PJM
Dinoseb	U	U	ug/L	0.06	0.18	515.3	07/13 21:11	07/13 14:35	PJM
Picloram	U	U	ug/L	0.08	0.24	515.3	07/13 21:11	07/13 14:35	PJM
524.2 Trihalomethanes: 62-550.310(3)	THMs			Dilution Factor =1					
Bromodichloromethane	U	U	ug/L	0.24	0.72	524.2	07/12 13:05	07/12 13:05	MMD
Dibromochloromethane	U	U	ug/L	0.39	1.17	524.2	07/12 13:05	07/12 13:05	MMD
Tribromomethane (Bromoform)	U	U	ug/L	0.38	1.14	524.2	07/12 13:05	07/12 13:05	MMD
Trichloromethane (Chloroform)	U	U	ug/L	0.80	2.40	524.2	07/12 13:05	07/12 13:05	MMD
TOTAL Trihalomethanes	U	U	ug/L	2.0	6.0	524.2	07/12 13:05	07/12 13:05	MMD

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524.2 Volatile Organics: 62-550.310(4)(a)				**Dilution Factor =1**					
Vinyl Chloride	U	U	ug/L	0.34	1.02	524.2	07/12 13:05	07/12 13:05	MMD
1,1-Dichloroethylene	U	U	ug/L	0.52	1.56	524.2	07/12 13:05	07/12 13:05	MMD
Dichloromethane (Methylene Chloride)	U	U	ug/L	0.99	2.97	524.2	07/12 13:05	07/12 13:05	MMD
Trans-1,2-Dichloroethylene	U	U	ug/L	0.50	1.50	524.2	07/12 13:05	07/12 13:05	MMD
Cis-1,2-Dichloroethylene	U	U	ug/L	0.11	0.33	524.2	07/12 13:05	07/12 13:05	MMD
1,1,1-Trichloroethane	U	U	ug/L	0.25	0.75	524.2	07/12 13:05	07/12 13:05	MMD
Carbon Tetrachloride	U	U	ug/L	0.19	0.57	524.2	07/12 13:05	07/12 13:05	MMD
Benzene	U	U	ug/L	0.09	0.27	524.2	07/12 13:05	07/12 13:05	MMD
1,2-Dichloroethane	U	U	ug/L	0.24	0.72	524.2	07/12 13:05	07/12 13:05	MMD
Trichloroethylene	U	U	ug/L	0.09	0.27	524.2	07/12 13:05	07/12 13:05	MMD
1,2-Dichloropropane	U	U	ug/L	0.20	0.60	524.2	07/12 13:05	07/12 13:05	MMD
Toluene	U	U	ug/L	0.14	0.42	524.2	07/12 13:05	07/12 13:05	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	524.2	07/12 13:05	07/12 13:05	MMD
Tetrachloroethylene	U	U	ug/L	0.11	0.33	524.2	07/12 13:05	07/12 13:05	MMD
Chlorobenzene	U	U	ug/L	0.09	0.27	524.2	07/12 13:05	07/12 13:05	MMD
Ethylbenzene	U	U	ug/L	0.13	0.39	524.2	07/12 13:05	07/12 13:05	MMD
Xylenes (Total)	U	U	ug/L	0.21	0.63	524.2	07/12 13:05	07/12 13:05	MMD

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Styrene	U	U	ug/L	0.17	0.51	524.2	07/12 13:05	07/12 13:05	MMD
1,4-Dichlorobenzene (para)	U	U	ug/L	0.14	0.42	524.2	07/12 13:05	07/12 13:05	MMD
1,2-Dichlorobenzene (ortho)	U	U	ug/L	0.48	1.44	524.2	07/12 13:05	07/12 13:05	MMD
2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	524.2	07/12 13:05	07/12 13:05	MMD
525.2 Semivolatile Organics: 62-550.310(4)(b)				**Dilution Factor =1**					
Di(2-Ethylhexyl)phthalate	U	U	ug/L	0.36	1.08	525.2	07/12 19:35	07/20 19:35	AC
Di(2-Ethylhexyl)adipate	U	U	ug/L	0.36	1.08	525.2	07/12 19:35	07/20 19:35	AC
Benzo(a)pyrene	U	U	ug/L	0.017	0.051	525.2	07/12 19:35	07/20 19:35	AC
Pentachlorophenol	U	U	ug/L	2.13	6.39	525.2	07/12 19:35	07/20 19:35	AC
Alachlor	U	U	ug/L	0.20	0.60	525.2	07/12 19:35	07/20 19:35	AC
Atrazine	U	U	ug/L	0.20	0.60	525.2	07/12 19:35	07/20 19:35	AC
Simazine	U	U	ug/L	0.20	0.60	525.2	07/12 19:35	07/20 19:35	AC
552.2 Haloacetic Acids : 62-550.310(3)				**Dilution Factor =1**					
Monochloroacetic Acid	U	U	ug/L	0.78	2.34	552.2	**/** 13:00	07/15 02:55	RGC
Dichloroacetic Acid	U	U	ug/L	0.36	1.08	552.2	**/** 13:00	07/15 02:55	RGC
Trichloroacetic Acid	U	U	ug/L	0.16	0.48	552.2	**/** 13:00	07/15 02:55	RGC
Monobromoacetic Acid	U	U	ug/L	0.71	2.13	552.2	**/** 13:00	07/15 02:55	RGC
Dibromoacetic Acid	U	U	ug/L	0.08	0.24	552.2	**/** 13:00	07/15 02:55	RGC

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Total Haloacetic Acids (HAA5)	U	U	ug/L	2.0	6.0	552.2	**/** 13:00	07/15 02:55	RGC
608 Chlorinated Pesticides & PCBs in WATER				**Dilution Factor =1**					
a-BHC	U	U	ug/L	0.005	0.015	EPA 608	07/12 09:00	07/13 00:55	RGC
BHC	U	U	ug/L	0.005	0.015	EPA 608	07/12 09:00	07/13 00:55	RGC
g-BHC (lindane)	U	U	ug/L	0.004	0.012	EPA 608	07/12 09:00	07/13 00:55	RGC
d-BHC	U	U	ug/L	0.005	0.015	EPA 608	07/12 09:00	07/13 00:55	RGC
Heptachlor	U	U	ug/L	0.005	0.015	EPA 608	07/12 09:00	07/13 00:55	RGC
Aldrin	U	U	ug/L	0.017	0.051	EPA 608	07/12 09:00	07/13 00:55	RGC
Heptachlor Epoxide	U	U	ug/L	0.008	0.024	EPA 608	07/12 09:00	07/13 00:55	RGC
Endosulfan I	U	U	ug/L	0.006	0.018	EPA 608	07/12 09:00	07/13 00:55	RGC
Dieldrin	U	U	ug/L	0.006	0.018	EPA 608	07/12 09:00	07/13 00:55	RGC
4,4-DDE	U	U	ug/L	0.39	1.17	EPA 608	07/12 09:00	07/13 00:55	RGC
Endrin	U	U	ug/L	0.005	0.015	EPA 608	07/12 09:00	07/13 00:55	RGC
Endosulfan II	U	U	ug/L	0.006	0.018	EPA 608	07/12 09:00	07/13 00:55	RGC
4,4-DDD	U	U	ug/L	0.60	1.80	EPA 608	07/12 09:00	07/13 00:55	RGC
Endrin Aldehyde	U	U	ug/L	0.010	0.030	EPA 608	07/12 09:00	07/13 00:55	RGC
Endosulfan Sulfate	U	U	ug/L	0.007	0.021	EPA 608	07/12 09:00	07/13 00:55	RGC
4,4-DDT	U	U	ug/L	0.69	2.07	EPA 608	07/12 09:00	07/13 00:55	RGC

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Methoxychlor	U	U	ug/L	0.007	0.021	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1016	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1221	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
oclor 1232	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1242	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1248	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1254	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Aroclor 1260	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
Toxaphene	U	U	ug/L	0.40	1.20	EPA 608	07/12 09:00	07/13 00:55	RGC
Chlordane	U	U	ug/L	0.10	0.30	EPA 608	07/12 09:00	07/13 00:55	RGC
625 Semivolatile Organics in Water by GC/MS				Dilution Factor = 1					
N-Nitrosodimethylamine	U	U	ug/L	0.50	1.50	625	07/17 20:13	07/18 20:13	AC
Phenol	U	U	ug/L	0.38	1.14	625	07/17 20:13	07/18 20:13	AC
Bis (2-Chloroethyl) Ether	U	U	ug/L	0.85	2.55	625	07/17 20:13	07/18 20:13	AC
2-Chlorophenol	U	U	ug/L	0.45	1.35	625	07/17 20:13	07/18 20:13	AC
1,3-Dichlorobenzene	U	U	ug/L	0.20	0.60	625	07/17 20:13	07/18 20:13	AC
1,4-Dichlorobenzene	U	U	ug/L	0.14	0.42	625	07/17 20:13	07/18 20:13	AC
Benzyl Alcohol	U	U	ug/L	0.75	2.25	625	07/17 20:13	07/18 20:13	AC

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1,2-Dichlorobenzene	U	U	ug/L	0.48	1.44	625	07/17 20:13	07/18 20:13	AC
Bis (2-Chloroisopropyl) Ether *	U	U	ug/L	0.85	2.55	625	07/17 20:13	07/18 20:13	AC
N-Nitrosodi-N-Propylamine	U	U	ug/L	1.14	3.42	625	07/17 20:13	07/18 20:13	AC
exachloroethane	U	U	ug/L	2.31	6.93	625	07/17 20:13	07/18 20:13	AC
Nitrobenzene *	U	U	ug/L	0.66	1.98	625	07/17 20:13	07/18 20:13	AC
Isophorone	U	U	ug/L	1.56	4.68	625	07/17 20:13	07/18 20:13	AC
2-Nitrophenol	U	U	ug/L	1.09	3.27	625	07/17 20:13	07/18 20:13	AC
2,4-Dimethylphenol	U	U	ug/L	0.62	1.86	625	07/17 20:13	07/18 20:13	AC
Bis (2-Chloroethoxy)methane *	U	U	ug/L	1.89	5.67	625	07/17 20:13	07/18 20:13	AC
2,4-Dichlorophenol	U	U	ug/L	1.11	3.33	625	07/17 20:13	07/18 20:13	AC
1,2,3-Trichlorobenzene	U	U	ug/L	2.00	6.00	625	07/17 20:13	07/18 20:13	AC
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	625	07/17 20:13	07/18 20:13	AC
Naphthalene	U	U	ug/L	0.015	0.045	625	07/17 20:13	07/18 20:13	AC
Hexachlorobutadiene	U	U	ug/L	0.57	1.71	625	07/17 20:13	07/18 20:13	AC
4-Chloro-3-Methylphenol	U	U	ug/L	0.67	2.01	625	07/17 20:13	07/18 20:13	AC
1-Methylnaphthalene	U	U	ug/L	0.36	1.08	625	07/17 20:13	07/18 20:13	AC
2-Methylnaphthalene	U	U	ug/L	0.024	0.072	625	07/17 20:13	07/18 20:13	AC
2-Methylphenol (o-cresol)	U	U	ug/L	1.0	3.0	625	07/17 20:13	07/18 20:13	AC

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Hexachlorocyclopentadiene	U	U	ug/L	0.42	1.26	625	07/17 20:13	07/18 20:13	AC
3-MethylPhenol (m-cresol)	U	U	ug/L	0.84	2.52	625	07/17 20:13	07/18 20:13	AC
4-Methylphenol (p-cresol)	U	U	ug/L	1.16	3.48	625	07/17 20:13	07/18 20:13	AC
3,6-Trichlorophenol	U	U	ug/L	1.2	3.6	625	07/17 20:13	07/18 20:13	AC
2,4,5-Trichlorophenol	U	U	ug/L	0.81	2.43	625	07/17 20:13	07/18 20:13	AC
2,4,6-Trichlorophenol	U	U	ug/L	0.78	2.34	625	07/17 20:13	07/18 20:13	AC
2-Chloronaphthalene	U	U	ug/L	1.16	3.48	625	07/17 20:13	07/18 20:13	AC
Dimethyl Phthalate	U	U	ug/L	3.7	11.1	625	07/17 20:13	07/18 20:13	AC
Acenaphthylene	U	U	ug/L	0.015	0.045	625	07/17 20:13	07/18 20:13	AC
2,6-Dinitrotoluene	U	U	ug/L	0.54	1.62	625	07/17 20:13	07/18 20:13	AC
Acenaphthene	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
2,4-Dinitrophenol	U	U	ug/L	1.0	3.0	625	07/17 20:13	07/18 20:13	AC
2,4-Dinitrotoluene	U	U	ug/L	1.17	3.51	625	07/17 20:13	07/18 20:13	AC
4-Nitrophenol	U	U	ug/L	1.0	3.0	625	07/17 20:13	07/18 20:13	AC
Diethyl Phthalate	U	U	ug/L	3.4	10.2	625	07/17 20:13	07/18 20:13	AC
Fluorene	U	U	ug/L	0.012	0.036	625	07/17 20:13	07/18 20:13	AC
4-Chlorophenyl Phenyl Ether	U	U	ug/L	0.87	2.61	625	07/17 20:13	07/18 20:13	AC
4,6-Dinitro-2-Methylphenol	U	U	ug/L	1.4	4.2	625	07/17 20:13	07/18 20:13	AC

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N-Nitrosodiphenylamine	U	U	ug/L	3.42	10.26	625	07/17 20:13	07/18 20:13	AC
4-Bromophenyl Phenyl Ether	U	U	ug/L	1.44	4.32	625	07/17 20:13	07/18 20:13	AC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	625	07/17 20:13	07/18 20:13	AC
utachlorophenol	U	U	ug/L	1.14	3.42	625	07/17 20:13	07/18 20:13	AC
Phenanthrene	U	U	ug/L	0.028	0.084	625	07/17 20:13	07/18 20:13	AC
Anthracene	U	U	ug/L	0.049	0.147	625	07/17 20:13	07/18 20:13	AC
Di-N-Butyl Phthalate	U	U	ug/L	1.2	3.6	625	07/17 20:13	07/18 20:13	AC
Fluoranthene	U	U	ug/L	0.025	0.075	625	07/17 20:13	07/18 20:13	AC
Benzidine *	U	U	ug/L	4.0	12.0	625	07/17 20:13	07/18 20:13	AC
Pyrene	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
Butyl Benzyl Phthalate	U	U	ug/L	1.44	4.32	625	07/17 20:13	07/18 20:13	AC
Benzo(A)Anthracene	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
3,3-Dichlorobenzidine	U	U	ug/L	2.0	6.0	625	07/17 20:13	07/18 20:13	AC
Chrysene	U	U	ug/L	0.75	2.25	625	07/17 20:13	07/18 20:13	AC
Bis (2 Ethylhexyl) Phthalate	U	U	ug/L	2.37	7.11	625	07/17 20:13	07/18 20:13	AC
Di-N-Octyl Phthalate	U	U	ug/L	1.4	4.2	625	07/17 20:13	07/18 20:13	AC
Benzo(B)Fluoranthene	U	U	ug/L	0.029	0.087	625	07/17 20:13	07/18 20:13	AC
Benzo(K)Fluoranthene	U	U	ug/L	0.025	0.075	625	07/17 20:13	07/18 20:13	AC

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Order # 14210

Project: Belle Glade
Site Location: 3900 Hooker Hwy, Belle Glade, FL 33430
Matrix: Water

Sample I.D.: Upper Zone
Collected: 07/11/06 11:05
Received: 07/11/06 16:45
Collected by: Joseph Pinkocze

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Benzo(A)Pyrene	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
Indeno(1,2,3-CD)Pyrene	U	U	ug/L	0.93	2.79	625	07/17 20:13	07/18 20:13	AC
Dibenzo(A,H,)Anthracene	U	U	ug/L	0.029	0.087	625	07/17 20:13	07/18 20:13	AC
nzo(G,H,I)Perylene	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
Bis-2-ethylhexyl Adipate	U	U	ug/L	0.36	1.08	625	07/17 20:13	07/18 20:13	AC
Aldrin *	U	U	ug/L	0.017	0.051	625	07/17 20:13	07/18 20:13	AC
alpha-BHC *	U	U	ug/L	0.005	0.015	625	07/17 20:13	07/18 20:13	AC
beta-BHC *	U	U	ug/L	0.005	0.015	625	07/17 20:13	07/18 20:13	AC
delta-BHC *	U	U	ug/L	0.005	0.015	625	07/17 20:13	07/18 20:13	AC
gamma-BHC (Lindane) *	U	U	ug/L	0.004	0.012	625	07/17 20:13	07/18 20:13	AC
Chlordane (Screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
4,4'-DDD *	U	U	ug/L	0.60	1.80	625	07/17 20:13	07/18 20:13	AC
4,4'-DDE *	U	U	ug/L	0.39	1.17	625	07/17 20:13	07/18 20:13	AC
4,4'-DDT *	U	U	ug/L	0.69	2.07	625	07/17 20:13	07/18 20:13	AC
Dieldrin *	U	U	ug/L	0.006	0.018	625	07/17 20:13	07/18 20:13	AC
Endosulfan I *	U	U	ug/L	0.006	0.018	625	07/17 20:13	07/18 20:13	AC
Endosulfan II *	U	U	ug/L	0.006	0.018	625	07/17 20:13	07/18 20:13	AC
Endosulfan Sulfate *	U	U	ug/L	0.007	0.021	625	07/17 20:13	07/18 20:13	AC

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Endrin *	U	U	ug/L	0.005	0.015	625	07/17 20:13	07/18 20:13	AC
Endrin Aldehyde *	U	U	ug/L	0.010	0.030	625	07/17 20:13	07/18 20:13	AC
Heptachlor *	U	U	ug/L	0.005	0.015	625	07/17 20:13	07/18 20:13	AC
'eptachlor Epoxide *	U	U	ug/L	0.008	0.024	625	07/17 20:13	07/18 20:13	AC
Toxaphene *	U	U	ug/L	0.40	1.20	625	07/17 20:13	07/18 20:13	AC
PCB-1016 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1221 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1232 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1242 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1248 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1254 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
PCB-1260 (screen) *	U	U	ug/L	0.10	0.30	625	07/17 20:13	07/18 20:13	AC
Dioxin (screen)	U	U	ug/L	0.03	0.09	625	07/17 20:13	07/18 20:13	AC
Azobenzene *	U	U	ug/L	0.75	2.25	625	07/17 20:13	07/18 20:13	AC
Methoxychlor *	U	U	ug/L	0.007	0.021	625	07/17 20:13	07/18 20:13	AC
Benzoic Acid	U	U	ug/L	0.84	2.52	625	07/17 20:13	07/18 20:13	AC
Aniline	U	U	ug/L	0.50	1.50	625	07/17 20:13	07/18 20:13	AC
4-Chloroaniline	U	U	ug/L	0.65	1.95	625	07/17 20:13	07/18 20:13	AC

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Dibenzofuran	U	U	ug/L	0.66	1.98	625	07/17 20:13	07/18 20:13	AC
2-Nitroaniline	U	U	ug/L	0.58	1.74	625	07/17 20:13	07/18 20:13	AC
3-Nitroaniline	U	U	ug/L	0.50	1.50	625	07/17 20:13	07/18 20:13	AC
Nitroaniline	U	U	ug/L	0.84	2.52	625	07/17 20:13	07/18 20:13	AC
Carbazole *	U	U	ug/L	0.68	2.04	625	07/17 20:13	07/18 20:13	AC
2,6-Dichlorophenol	U	U	ug/L	0.89	2.67	625	07/17 20:13	07/18 20:13	AC
Pyridine	U	U	ug/L	0.99	2.97	625	07/17 20:13	07/18 20:13	AC
2,3,4,6-Tetrachlorophenol	U	U	ug/L	1.00	3.00	625	07/17 20:13	07/18 20:13	AC
2,3,5,6-Tetrachlorophenol	U	U	ug/L	0.80	2.40	625	07/17 20:13	07/18 20:13	AC
8260.B Volatile Organics in Water by GC/MS				**Dilution Factor =1**					
Acetone	U	U	ug/L	1.75	5.25	5030/8260B	07/12 13:05	07/12 13:05	MMD
Acrolein	U	U	ug/L	0.75	2.25	5030/8260B	07/12 13:05	07/12 13:05	MMD
Acrylonitrile	U	U	ug/L	0.41	1.23	5030/8260B	07/12 13:05	07/12 13:05	MMD
Methyl Ethyl Ketone	U	U	ug/L	0.75	2.25	5030/8260B	07/12 13:05	07/12 13:05	MMD
Dichlorodifluoromethane	U	U	ug/L	0.13	0.39	5030/8260B	07/12 13:05	07/12 13:05	MMD
Chloromethane	U	U	ug/L	0.35	1.05	5030/8260B	07/12 13:05	07/12 13:05	MMD
Vinyl Chloride	U	U	ug/L	0.34	1.02	5030/8260B	07/12 13:05	07/12 13:05	MMD
Bromomethane	U	U	ug/L	0.41	1.23	5030/8260B	07/12 13:05	07/12 13:05	MMD

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Chloroethane	U	U	ug/L	0.17	0.51	5030/8260B	07/12 13:05	07/12 13:05	MMD
Trichlorofluoromethane	U	U	ug/L	0.47	1.41	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1-Dichloroethene	U	U	ug/L	0.52	1.56	5030/8260B	07/12 13:05	07/12 13:05	MMD
'ethylene Chloride	U	U	ug/L	0.99	2.97	5030/8260B	07/12 13:05	07/12 13:05	MMD
Trans-1,2-Dichloroethene	U	U	ug/L	0.50	1.50	5030/8260B	07/12 13:05	07/12 13:05	MMD
Methyl-Tert-Butyl Ether	U	U	ug/L	0.50	1.50	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1-Dichloroethane	U	U	ug/L	0.53	1.59	5030/8260B	07/12 13:05	07/12 13:05	MMD
2,2-Dichloropropane	U	U	ug/L	0.31	0.93	5030/8260B	07/12 13:05	07/12 13:05	MMD
Cis-1,2-Dichloroethene	U	U	ug/L	0.11	0.33	5030/8260B	07/12 13:05	07/12 13:05	MMD
Chloroform	U	U	ug/L	0.80	2.40	5030/8260B	07/12 13:05	07/12 13:05	MMD
Bromochloromethane	U	U	ug/L	0.55	1.65	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1,1-Trichloroethane	U	U	ug/L	0.25	0.75	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1-Dichloropropene	U	U	ug/L	0.07	0.21	5030/8260B	07/12 13:05	07/12 13:05	MMD
Carbon Tetrachloride	U	U	ug/L	0.19	0.57	5030/8260B	07/12 13:05	07/12 13:05	MMD
Benzene	U	U	ug/L	0.09	0.27	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2-Dichloroethane	U	U	ug/L	0.24	0.72	5030/8260B	07/12 13:05	07/12 13:05	MMD
Trichloroethene	U	U	ug/L	0.09	0.27	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2-Dichloropropane	U	U	ug/L	0.20	0.60	5030/8260B	07/12 13:05	07/12 13:05	MMD

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Bromodichloromethane	U	U	ug/L	0.24	0.72	5030/8260B	07/12 13:05	07/12 13:05	MMD
2-Chloroethylvinyl Ether	U	U	ug/L	1.00	3.00	5030/8260B	07/12 13:05	07/12 13:05	MMD
Dibromomethane	U	U	ug/L	0.42	1.26	5030/8260B	07/12 13:05	07/12 13:05	MMD
is-1,3-Dichloropropene	U	U	ug/L	0.38	1.14	5030/8260B	07/12 13:05	07/12 13:05	MMD
Toluene	U	U	ug/L	0.14	0.42	5030/8260B	07/12 13:05	07/12 13:05	MMD
Trans-1,3-Dichloropropene	U	U	ug/L	0.50	1.50	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,3-Dichloropropane	U	U	ug/L	0.38	1.14	5030/8260B	07/12 13:05	07/12 13:05	MMD
Tetrachloroethene	U	U	ug/L	0.11	0.33	5030/8260B	07/12 13:05	07/12 13:05	MMD
Dibromochloromethane	U	U	ug/L	0.39	1.17	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2-Dibromoethane (EDB)	U	U	ug/L	0.40	1.20	5030/8260B	07/12 13:05	07/12 13:05	MMD
Bromobenzene	U	U	ug/L	0.46	1.38	5030/8260B	07/12 13:05	07/12 13:05	MMD
Chlorobenzene	U	U	ug/L	0.09	0.27	5030/8260B	07/12 13:05	07/12 13:05	MMD
Ethylbenzene	U	U	ug/L	0.13	0.39	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1,1,2-Tetrachloroethane	U	U	ug/L	0.37	1.11	5030/8260B	07/12 13:05	07/12 13:05	MMD
m & p-Xylene	U	U	ug/L	0.19	0.57	5030/8260B	07/12 13:05	07/12 13:05	MMD
o-Xylene	U	U	ug/L	0.19	0.57	5030/8260B	07/12 13:05	07/12 13:05	MMD
Styrene	U	U	ug/L	0.17	0.51	5030/8260B	07/12 13:05	07/12 13:05	MMD

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Isopropylbenzene	U	U	ug/L	0.50	1.50	5030/8260B	07/12 13:05	07/12 13:05	MMD
Bromoform	U	U	ug/L	0.38	1.14	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,1,2,2-Tetrachloroethane	U	U	ug/L	0.29	0.87	5030/8260B	07/12 13:05	07/12 13:05	MMD
2,3-Trichloropropane	U	U	ug/L	0.23	0.69	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,3,5-Trimethylbenzene	U	U	ug/L	0.11	0.33	5030/8260B	07/12 13:05	07/12 13:05	MMD
2-Chlorotoluene	U	U	ug/L	0.13	0.39	5030/8260B	07/12 13:05	07/12 13:05	MMD
4-Chlorotoluene	U	U	ug/L	0.16	0.48	5030/8260B	07/12 13:05	07/12 13:05	MMD
Tert-Butylbenzene	U	U	ug/L	0.16	0.48	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2,4-Trimethylbenzene	U	U	ug/L	0.11	0.33	5030/8260B	07/12 13:05	07/12 13:05	MMD
Sec-Butylbenzene	U	U	ug/L	0.17	0.51	5030/8260B	07/12 13:05	07/12 13:05	MMD
P-Isopropyltoluene	U	U	ug/L	0.11	0.33	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,3-Dichlorobenzene	U	U	ug/L	0.20	0.60	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,4-Dichlorobenzene	U	U	ug/L	0.14	0.42	5030/8260B	07/12 13:05	07/12 13:05	MMD
n-Butylbenzene	U	U	ug/L	0.21	0.63	5030/8260B	07/12 13:05	07/12 13:05	MMD
n-PropylBenzene	U	U	ug/L	0.17	0.51	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2-Dichlorobenzene	U	U	ug/L	0.48	1.44	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2-Dibromo-3-Chloropropane (DBCP)	U	U	ug/L	0.30	0.90	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	5030/8260B	07/12 13:05	07/12 13:05	MMD

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Hexachlorobutadiene	U	U	ug/L	0.57	1.71	5030/8260B	07/12 13:05	07/12 13:05	MMD
Naphthalene	U	U	ug/L	0.015	0.045	5030/8260B	07/12 13:05	07/12 13:05	MMD
1,2,3-Trichlorobenzene	U	U	ug/L	1.27	3.81	5030/8260B	07/12 13:05	07/12 13:05	MMD
B 300.1 (Chlorite, Bromate) Part B				Dilution Factor =1					
Chlorite	ND	U	mg/L	0.005	0.015	EPA 300.1	07/17 17:36	07/17 17:36	E86035
Bromate	ND	U	mg/L	0.005	0.015	EPA 300.1	07/17 17:36	07/17 17:36	E86035
SUB 531.1 Carbamate Pesticides: 62-550.310(4)(b				Dilution Factor =1					
Carbofuran	0.5U		ug/L	0.5	1.5	531.1	07/19 18:44	07/19 18:44	E84129
Oxamyl (vydate)	0.5U		ug/L	0.5	1.5	531.1	07/19 18:44	07/19 18:44	E84129
SUB 531.1 Carbamate Pesticides: 62-550.UNREGULAT				Dilution Factor =1					
Aldicarb Sulfoxide	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
Aldicarb Sulfone	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
Methomyl	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
3-Hydrocarbofuran	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
Aldicarb	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
Carbaryl	U	U	ug/L	0.50	1.50	531.1	07/19 18:44	07/19 18:44	E84129
Glyphosate	10U		ug/L	10	30	547.1	07/20 15:08	07/20 15:08	E84129
Endothall	20U		ug/L	20	60	548.1	07/17 11:30	07/19 19:49	E84129

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SUB 549.2 Diquat/Paraquat: 62-550.310(4)(b)				Dilution Factor =1					
Diquat	1U		ug/L	1	3	549.2	07/14 13:00	07/21 14:22	E84129
Paraquat	1U		ug/L	1	3	549.2	07/14 13:00	07/21 14:22	E84129
ss Alpha	2.4 ± 0.6	I	pCi/L	1.0	3.0	EPA 00-02	07/27 18:00	07/27 18:00	E84088
Radium-226	1.7 ± 0.1		pCi/L	0.10	0.30	EPA 903.1	07/25 15:15	07/25 15:15	E84088
Radium-228	0.5 ± 0.5U		pCi/L	0.50	1.50	EPA Ra-05	07/20 10:50	07/20 10:50	E84088

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

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RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 193-022006
LOCATION: DS 986
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060216 0400
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	4.0	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.82	mg/l	.0200	.060	060223 1714	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 194-022006
LOCATION: DS 1076
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060217 0830
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.2	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.74	mg/l	.0200	.060	060223 1714	JGT-FTL	

Lyle A. Johnson

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: **YOUNG QUIST**
SAMPLE NUMBER: **195-022006**
LOCATION: **DS 1166**
ADDITIONAL DATA: **PBLR IW 1 PILOT HOLE DRILL**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060217 1100
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.8	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.79	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

Florida Environmental

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RESULTS OF ANALYSIS

CLIENT: **YOUNG QUIST**
SAMPLE NUMBER: **196-022006**
LOCATION: **DS 1256**
ADDITIONAL DATA: **PBLR IW 1 PILOT HOLE DRILL**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060217 1330
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.0	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.67	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: **YOUNG QUIST**
SAMPLE NUMBER: **197-022006**
LOCATION: **DS 1346**
ADDITIONAL DATA: **PBLR IW 1 PILOT HOLE DRILL**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060217 1800
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.3	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.57	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 200-022006
LOCATION: DS 1436
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060217 1900
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	0.94	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.62	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A. JOHNSON
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Contact Phone: (954) 978-6400

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RESULTS OF ANALYSIS

CLIENT: **YOUNG QUIST**
SAMPLE NUMBER: **198-022006**
LOCATION: **DS 1520**
ADDITIONAL DATA: **PBLR IW 1 PILOT HOLE DRILL**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060218 0930
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.2	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.56	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

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RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 199-022006
LOCATION: DS 1616
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060218 1240
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.1	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.64	mg/l	.0200	.060	060223 1715	JGT-FTL	

LYLE A. JOHNSON
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Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 201-022006
LOCATION: DS 1700
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060218 0430
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.4	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.57	mg/l	.0200	.060	060223 1716	JGT-FTL	

KYLE A. JOHNSON
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Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 202-022006
LOCATION: DS 1790
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060218 0910
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.9	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.50	mg/l	.0200	.060	060223 1716	JGT-FTL	

LYLE A. JOHNSON
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Florida Environmental

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RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 203-022006
LOCATION: DS 1880
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060218 0900
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	2.0	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.53	mg/l	.0200	.060	060223 1717	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNG QUIST
SAMPLE NUMBER: 204-022006
LOCATION: DS 1915
ADDITIONAL DATA: PBLR IW 1 PILOT HOLE DRILL
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060219 0130
DATE REPORTED: FEB. 23 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060220 1355
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.9	mg/l	.2000	.600	060223 1133	JGT-FTL	
AMMONIA NITROGEN	350.1	0.53	mg/l	.0200	.060	060223 1717	JGT-FTL	

LYLE A. JOHNSON
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Contact Phone: (954) 978-6400

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RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 097-031006
LOCATION: DRILL STEM 1920
ADDITIONAL DATA: PBLR IW-1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060310
DATE REPORTED: MAR. 28 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060310 1611
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.1	mg/l	.2000	.600	060322 1158	JGT-FTL	
AMMONIA NITROGEN	350.1	0.95	mg/l	.0200	.060	060317 1844	JGT-FTL	

Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 098-031006
LOCATION: DRILL STEM 1930
ADDITIONAL DATA: PBLR IW-1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060310
DATE REPORTED: MAR. 28 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060310 1611
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	6.8	mg/l	.2000	.600	060322 1158	JGT-FTL	
AMMONIA NITROGEN	350.1	1.5	mg/l	.0200	.060	060317 1844	JGT-FTL	

Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 099-031006
LOCATION: DRILL STEM 1940
ADDITIONAL DATA: PBLR IW-1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060310
DATE REPORTED: MAR. 28 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060310 1611
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	5.2	mg/l	.2000	.600	060322 1159	JGT-FTL	
AMMONIA NITROGEN	350.1	1.4	mg/l	.0200	.060	060317 1845	JGT-FTL	

Castellanos

Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 100-031006
LOCATION: DRILL STEM 1950
ADDITIONAL DATA: PBLR IW-1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060310
DATE REPORTED: MAR. 28 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060310 1611
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	4.6	mg/l	.2000	.600	060322 1159	JGT-FTL	
AMMONIA NITROGEN	350.1	1.4	mg/l	.0200	.060	060317 1845	JGT-FTL	

Client Services Manager
Contact Phone: (954) 978-6400

Florida Environmental

RESULTS OF ANALYSIS

CLIENT: **YOUNGQUIST BROTHERS INC.**
SAMPLE NUMBER: 073-032806
LOCATION: **BELLE GLADE/1950**
ADDITIONAL DATA: **BELLE GLADE**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060325 0410
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	4.7	mg/l	.2000	.600	060405 1844	JGT-FTL	
AMMONIA NITROGEN	350.1	0.42	mg/l	.0200	.060	060331 1838	JGT-FTL	

Cindy McClure

Client Services Manager
Contact Phone: (954) 978-6400

All NELAP certified analyses are performed in accordance with Chapter 64E-1 Florida Administrative Code, which has been determined to be equivalent to NELAC standards. Analyses certified by programs other than NELAP are designated with a "-"

RESULTS OF ANALYSIS

CLIENT: **YOUNGQUIST BROTHERS INC.**
SAMPLE NUMBER: **074-032806**
LOCATION: **BELLE GLADE/2010**
ADDITIONAL DATA: **BELLE GLADE**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060325 1100
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.6	mg/l	.2000	.600	060405 1845	JGT-FTL	
AMMONIA NITROGEN	350.1	1.27	mg/l	.0200	.060	060331 1838	JGT-FTL	

Cindy McElwee

Client Services Manager
Contact Phone: (954) 978-6400

Florida Environmental

RESULTS OF ANALYSIS

CLIENT: **YOUNGQUIST BROTHERS INC.**
SAMPLE NUMBER: **075-032806**
LOCATION: **BELLE GLADE/2070**
ADDITIONAL DATA: **BELLE GLADE**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060325 1745
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.3	mg/l	.2000	.600	060405 1845	JGT-FTL	
AMMONIA NITROGEN	350.1	0.88	mg/l	.0200	.060	060331 1838	JGT-FTL	

Cindy McElwa

Client Services Manager
Contact Phone: (954) 978-6400

Florida Environmental

RESULTS OF ADANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 076-032806
LOCATION: BELLE GLADE/2130
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060325 2100
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	3.2	mg/l	.2000	.600	060405 1845	JGT-FTL	
AMMONIA NITROGEN	350.1	3.12	mg/l	.0200	.060	060331 1838	JGT-FTL	

Cindy McElwee
Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 077-032806
LOCATION: BELLE GLADE/2190
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060325 2315
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	3.3	mg/l	.2000	.600	060405 1845	JGT-FTL	
AMMONIA NITROGEN	350.1	3.24	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McElwee
Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 078-032806
LOCATION: BELLE GLADE/2250
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060326 0530
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	1.7	mg/l	.2000	.600	060405 1845	JGT-FTL	
AMMONIA NITROGEN	350.1	1.63	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McClure

Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 079-032806
LOCATION: BELLE GLADE/2310
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060326 1100
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	0.71	mg/l	.2000	.600	060405 1846	JGT-FTL	
AMMONIA NITROGEN	350.1	0.55	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McElwee
Client Services Manager
Contact Phone: (954) 978-6400

Florida Environmental

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 080-032806
LOCATION: BELLE GLADE/2370
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060327 0930
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095
DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	0.54	mg/l	.2000	.600	060405 1846	JGT-FTL	
AMMONIA NITROGEN	350.1	0.35	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McElwee

Client Services Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: **YOUNGQUIST BROTHERS INC.**
SAMPLE NUMBER: 081-032806
LOCATION: **BELLE GLADE/2430**
ADDITIONAL DATA: **BELLE GLADE**
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060327 1300
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	0.82	mg/l	.2000	.600	060405 1846	JGT-FTL	
AMMONIA NITROGEN	350.1	0.58	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McElwee
Client Services Manager
Contact Phone: (954) 978-6400

Florida Environmental

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 082-032806
LOCATION: BELLE GLADE/2490
ADDITIONAL DATA: BELLE GLADE
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060327 1515
DATE REPORTED: APR. 11 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060328 1650
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T KJELDAHL NIT.	351.2	0.81	mg/l	.2000	.600	060405 1846	JGT-FTL	
AMMONIA NITROGEN	350.1	0.60	mg/l	.0200	.060	060331 1839	JGT-FTL	

Cindy McClure

Client Services Manager
Contact Phone: (954) 978-6400

Report To:
Jay Swartzentruber
Youngquist Brothers Drilling
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 1 of 8
Report Printed: 06/08/06 Rev. 1
Submission # 604000204
Order # 1340

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2550'
Collected: 03/29/06 00:05
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.55		mg/L	0.1	0.3	350.1	04/12 16:53	04/12 16:53	JGT
Nitrogen (Kjeldahl) as "N"	0.31	Q	mg/L	0.03	0.09	351.2	05/08 09:29	05/08 09:29	JGT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
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15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 06/08/06
Submission # 604000204
Order # 1341

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2610'
Collected: 03/29/06 08:30
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.27	I	mg/L	0.1	0.3	350.1	04/12 16:54	04/12 16:54	JGT
Nitrogen (Kjeldahl) as "N"	2.3		mg/L	0.03	0.09	351.2	04/12 09:29	04/12 09:29	RJT

QC=Qualifier Codes as defined by DEP 62-160
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Report Printed: 06/08/06
Submission # 604000204
Order # 1342

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2670'
Collected: 03/29/06 12:05
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.31		mg/L	0.1	0.3	350.1	04/12 16:55	04/12 16:55	JGT
Nitrogen (Kjeldahl) as "N"	1.5		mg/L	0.03	0.09	351.2	04/12 09:29	04/12 09:29	RJT

QC=Qualifier Codes as defined by DEP 62-160
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Report Printed: 06/08/06
Submission # 604000204
Order # 1343

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2730'
Collected: 03/29/06 16:05
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.71		mg/L	0.1	0.3	350.1	04/12 16:56	04/12 16:56	JGT
Nitrogen (Kjeldahl) as "N"	7.2		mg/L	0.03	0.09	351.2	04/12 09:29	04/12 09:29	RJT

QC=Qualifier Codes as defined by DEP 62-160
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Analytes not currently NELAC certified denoted by *.
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Jay Swartzentruber
Youngquist Brothers Drilling
15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 06/08/06
Submission # 604000204
Order # 1344

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2790'
Collected: 03/30/06 11:29
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.45		mg/L	0.1	0.3	350.1	04/12 16:58	04/12 16:58	JGT
Nitrogen (Kjeldahl) as "N"	1.4		mg/L	0.03	0.09	351.2	04/12 09:29	04/12 09:29	RJT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
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Report To:
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Report Printed: 06/08/06
Submission # 604000204
Order # 1345

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2850'
Collected: 03/31/06 01:49
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	1.70		mg/L	0.1	0.3	350.1	04/12 17:00	04/12 17:00	JGT
Nitrogen (Kjeldahl) as "N"	2.5		mg/L	0.03	0.09	351.2	04/12 09:29	04/12 09:29	RJT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
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Report To:
Jay Swartzentruber
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15465 Pine Ridge Road
Ft Myers, FL 33908

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Report Printed: 06/08/06
Submission # 604000204
Order # 1346

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2910'
Collected: 03/31/06 19:15
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	2.62		mg/L	0.1	0.3	350.1	04/12 17:05	04/12 17:05	JGT
Nitrogen (Kjeldahl) as "N"	3.5		mg/L	0.03	0.09	351.2	04/12 09:30	04/12 09:30	RJT

QC=Qualifier Codes as defined by DEP 62-160
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Analytes not currently NELAC certified denoted by *.
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Report To:
Jay Swartzentruber
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Ft Myers, FL 33908

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Report Printed: 06/08/06
Submission # 604000204
Order # 1347

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Drill Stem Samples 2966'
Collected: 04/01/06 02:10
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Nitrogen (Ammonia) as N	0.91		mg/L	0.1	0.3	350.1	04/12 17:08	04/12 17:08	JGT
Nitrogen (Kjeldahl) as "N"	1.2		mg/L	0.03	0.09	351.2	04/12 09:30	04/12 09:30	RJT

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
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Florida Environmental;Certification # E86006

WATER QUALITY ANALYSES SUMMARY
REVERSE AIR DISCHARGE - FIELD METER CHLORIDES AND TDS

WELL: IW-1 PROJECT NO.: 03-169 PAGE: 1/1
SITE LOCATION: Lake Region IW-1 PERMIT NO.: 138308-184-UC
Data = field/lab CONTRACTOR: YOUNGQUIST ND = None Detected

DATE	TIME	DEPTH (feet) (BLS)	SPECIFIC CONDUCTANCE (µmhos) Field/Lab	SALINITY (ppt) Field	TEMP (^{oC}) Field	pH Field	CHLORIDE (mg/l) Field/Lab	TDS (mg/l) Field/Lab	AMMONIA (mg/l) Lab	TKN (mg/l) Lab	RECORDED BY
2/17/2006	4:00	986	1321	0.7	24.7	11.18	200	643	0.82	4	TGU
2/17/2006	8:36	1076	2020	1	25.7	10.9	170	1010	0.74	2.2	TGU
2/17/2006	10:43	1166	2100	1.1	26.2	10.62	320	1030	0.79	2.8	TGU
2/17/2006	13:30	1256	2900	1.5	26.8	9.58	505	1470	0.67	2	TGU
2/17/2006	17:55	1346	3380	1.8	25.9	10.83	520	1680	0.57	2.3	TGU
2/17/2006	18:55	1436	2980	1.6	25.6	10.52	555	1500	0.62	0.94	TGU
2/17/2006	21:40	1520	2790	1.4	25.2	10.66	780	1400	0.56	2.2	TGU
2/18/2006	1:00	1616	2820	1.5	24.2	10.3	740	1420	0.64	2.1	TGU
2/18/2006	4:00	1700	3030	1.6	23.7	9.46	800	1530	0.57	2.4	TGU
2/18/2006	9:20	1790	4060	2.1	24.8	8.12	880	2080	0.5	1.9	TGU
2/18/2006	18:36	1880	3940	2.1	26.1	8.28	1080	2020	0.53	2	TGU
2/19/2006	1:30	1915	10070	5.7	24.9	8.13	3000	5530	0.53	1.9	TGU
3/10/2006	16:11	1920							0.95	1.1	
3/10/2006	16:11	1930							1.5	6.8	
3/10/2006	16:11	1940							1.4	5.2	
3/10/2006	16:11	1950							1.4	4.6	
3/25/2006	4:10	1950	NM	NM	NM	NM	NM	NM	0.42	4.7	PTS
3/25/2006	11:00	2010	NM	NM	NM	NM	NM	NM	1.27	1.6	DPS
3/25/2006	17:45	2070	NM	NM	NM	NM	NM	NM	0.88	1.3	DPS
3/25/2006	21:00	2130	41700	26.4	24.7	7.76	NM	NM	3.12	3.2	PTS
3/25/2006	23:10	2190	40900	26.1	24.2	7.72	NM	NM	3.24	3.3	PTS
3/26/2006	4:45	2250	46300	30	24.1	7.89	NM	NM	1.63	1.7	PTS
3/26/2006	11:00	2310	49900	32.5	24.7	7.98	NM	NM	0.55	0.71	DPS
3/27/200	9:30	2370	49800	32.5	23.1	7.79	NM	NM	0.35	0.54	TGU

Note: Chloride and TDS Measured with Field Meter
NM = Not measured

DATE	TIME	DEPTH (feet) (BLS)	SPECIFIC CONDUCTANCE (µmhos) Field/Lab	SALINITY (ppt) Field	TEMP (^{o}C) Field	pH Field	CHLORIDE (mg/l) Field/Lab	TDS (mg/l) Field/Lab	AMMONIA (mg/l) Lab	TKN (mg/l) Lab	RECORDED BY
3/27/2006	12:00	2430	49300	32.2	25.2	7.85	NM	NM	0.58	0.82	TGU
3/27/2006	15:15	2490	48600	31.9	25.6	8.3	NM	NM	0.6	0.81	TGU
3/29/2006	0:05	2550	52400	30.6	5.5	8.3	NM	NM	0.55	0.31	TGU
3/29/2006	8:30	2610	47400	31.2	28.7	8.28	NM	NM	0.27	2.3	TGU
3/29/2006	12:05	2670	46700	30.2	23.2	8.36	NM	NM	0.31	1.5	TGU
3/29/2006	16:05	2730	47000	30.6	25.9	8.55	NM	NM	0.71	7.2	TGU
3/30/2006	11:27	2790	48200	31.4	26.1	8.12	NM	NM	0.45	1.4	DPS
3/31/2006	13:49	2850	37100	23.5	26.1	8.33	NM	NM	1.7	2.5	DPS
3/31/2006	19:15	2910	41200	24.9	26.2	7.58	NM	NM	2.62	3.5	RES
3/31/2006	1:48	2966	41100	26.5	24.2	7.96	NM	NM	0.91	1.2	RES

Note: Chloride and TDS Measured with Field Meter
NM = Not measured

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 1 of 15
Report Printed: 06/23/06
Submission # 605000541
Order # 8028

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Biochemical Oxygen Demand	U	U	mg/L	0.1	0.3	405.1	05/22 15:20	05/27 15:10	DSM
Coliform, Total	P(A)	U	———	1.0	3.0	9223B	05/22 15:10	05/23 15:10	CRL
Specific Conductance (grab)	56200		Ω*cm.	0.1	0.3	120.1	05/24 13:18	05/24 13:18	RJT
pH	7.75	Q	units	0.1	0.3	150.1	05/23 11:55	05/23 11:55	RJT
Total Dissolved Solids (TDS)	36086		mg/L	0.82	2.46	EPA 160.1	05/24 15:32	05/24 15:32	MAY
Nitrate (as N)	0.352		mg/l	0.011	0.033	300.0	05/23	05/23 19:32	KYT
Nitrate+Nitrite (as N)	0.352		mg/L	0.011	0.033	300.0	05/23	05/23 19:32	KYT
Nitrite (as N)	U	U	mg/L	0.016	0.048	300.0	05/23	05/23 19:32	KYT
Cyanide, Total	U	U	mg/L	0.002	0.006	335.3	05/23	05/23	KYT
Nitrogen (Ammonia) as N	U	U	mg/L	0.1	0.3	350.1	05/24 19:01	05/24 19:01	JGT
Nitrogen (Kjeldahl) as "N"	U	U	mg/L	0.025	0.075	351.2	05/24 17:26	05/24 17:26	JGT
Nitrogen (Total Organic)	U	U	mg/L	0.041	0.123	351.2	05/24 19:10	05/24 19:10	JGT
Phosphate, Ortho	0.035		mg/L	0.003	0.009	365.2	05/23 13:51	05/23 13:51	EMS
Phosphorus, Total as "P"	0.11		mg/L	0.003	0.009	365.4	05/24 17:49	05/24 17:49	JGT
Chemical Oxygen Demand	1220		mg/L	19.80	59.40	410.4	05/24 13:02	05/24 13:02	EMS
MBAS Surfactants	1.0		mg/L	0.02	0.06	425.1	05/23 18:55	05/23 18:55	RJT
Odor (Lab)	1.00		TON	0.1	0.3	SM2150B	05/23 08:59	05/23 08:59	EMS
Color (Lab)	5.00		Pt-Co	0.1	0.3	SM2120B	05/23 08:55	05/23 08:55	EMS
Chloride	21100		mg/L	2.50	7.50	SM4500CL-B	05/24 12:27	05/24 12:27	MAY
oride	0.132		mg/L	0.011	0.033	SM4500 F-C	05/24 15:05	05/24 15:05	RJT

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 2 of 15
Report Printed: 06/23/06
Submission # 605000541
Order # 8028

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Sulfate	1984		mg/L	8.00	24.00	SM4500-SO4E	05/24 13:41	05/24 13:41	RJT
Aluminum	U	U	mg/L	0.009	0.027	200.7	05/24 10:00	05/25 09:01	EAC
Iron	0.29		mg/L	0.002	0.006	200.7	05/24 10:00	05/25 09:01	EAC
Sodium	6100		mg/L	0.001	0.003	200.7	05/24 10:00	05/25 09:00	EAC
	0.03		mg/L	0.00056	0.00168	200.7	05/24 10:00	05/25 09:01	EAC
200.8 DW-10 Metals in Drinking Water 62-550.310				**Dilution Factor = 1**					
Arsenic	U	U	mg/L	0.00002	0.00006	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Barium	0.08		mg/L	0.0002	0.0006	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Cadmium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Chromium	0.03		mg/L	0.00004	0.00012	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Lead	0.006		mg/L	0.00006	0.00018	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Nickel	0.01		mg/L	0.00004	0.00012	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Selenium	U	U	mg/L	0.00013	0.00039	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Antimony	U	U	mg/L	0.00003	0.00009	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Beryllium	U	U	mg/L	0.00003	0.00009	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Thallium	U	U	mg/L	0.00001	0.00003	4.1.3/200.8	05/30 12:00	05/31 14:53	IMN
Copper	0.06		mg/L	0.00016	0.00048	200.8	05/30	05/31 14:53	IMN
Manganese	0.013		mg/L	0.00007	0.00021	200.8	05/30	05/31 14:53	IMN
Silver	U	U	mg/L	0.00002	0.00006	200.8	05/30	05/31 14:53	IMN
cury	U	U	mg/L	0.0002	0.0006	245.1	05/23 10:00	05/24 11:23	EAC

Report To:
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15465 Pine Ridge Road
Ft Myers, FL 33908

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Report Printed: 06/23/06
Submission # 605000541
Order # 8028

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
504.1 EDB, DBCP: 62-550.310(4)(b)				**Dilution Factor = 1**					
1,2-Dibromo-3-Chloropropane (DBCP)	U	U	ug/L	0.30	0.90	EPA 504.1 ECD	05/3008:00	05/31 13:57	RGC
Ethylene Dibromide (EDB)	U	U	ug/L	0.02	0.06	EPA 504.1 ECD	05/3008:00	05/31 13:57	RGC
508 Pesticides & PCBs: 62-550.310(4)(b)				**Dilution Factor = 1**					
xachlorocyclopentdiene	U	U	ug/L	0.42	1.26	508	05/26 08:00	06/06 14:59	RGC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	508	05/26 08:00	06/06 14:59	RGC
v-BHC (Lindane)	U	U	ug/L	0.004	0.012	508	05/26 08:00	06/06 14:59	RGC
Heptachlor	U	U	ug/L	0.005	0.015	508	05/26 08:00	06/06 14:59	RGC
Heptachlor Epoxide	U	U	ug/L	0.008	0.024	508	05/26 08:00	06/06 14:59	RGC
Endrin	U	U	ug/L	0.005	0.015	508	05/26 08:00	06/06 14:59	RGC
Methoxychlor	U	U	ug/L	0.007	0.021	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1016	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1221	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1232	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1242	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1248	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1254	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Arochlor 1260	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC
Toxaphene	U	U	ug/L	0.40	1.20	508	05/26 08:00	06/06 14:59	RGC
ordane	U	U	ug/L	0.10	0.30	508	05/26 08:00	06/06 14:59	RGC

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 06/23/06
Submission # 605000541
Order # 8028

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
508 Pesticides 62-550.405 UNREGULATED				**Dilution Factor =1**					
Propachlor	U	U	ug/L	0.03	0.09	508	05/26 08:00	06/06 14:59	RGC
Aldrin	U	U	ug/L	0.03	0.09	508	05/26 08:00	06/06 14:59	RGC
Dieldrin	U	U	ug/L	0.03	0.09	508	05/26 08:00	06/06 14:59	RGC
3 Chlorophenoxy Herbicides: 62-550.310(4)(b)				**Dilution Factor =1**					
Dalapon	U	U	ug/L	0.08	0.24	515.3	05/24 12:09	05/25 10:06	PJM
2,4-D	U	U	ug/L	0.09	0.27	515.3	05/24 12:09	05/25 10:06	PJM
Pentachlorophenol	U	U	ug/L	0.02	0.06	515.3	05/24 12:09	05/25 10:06	PJM
2,4,5-TP (silvex)	U	U	ug/L	0.038	0.114	515.3	05/24 12:09	05/25 10:06	PJM
Dinoseb	U	U	ug/L	0.06	0.18	515.3	05/24 12:09	05/25 10:06	PJM
Picloram	U	U	ug/L	0.08	0.24	515.3	05/24 12:09	05/25 10:06	PJM
524.2 Trihalomethanes: 62-550.310(3) THMs				**Dilution Factor =1**					
Bromodichloromethane	U	U	ug/L	0.24	0.72	524.2	05/24 07:31	05/24 07:31	MMD
Dibromochloromethane	U	U	ug/L	0.39	1.17	524.2	05/24 07:31	05/24 07:31	MMD
Tribromomethane (Bromoform)	U	U	ug/L	0.38	1.14	524.2	05/24 07:31	05/24 07:31	MMD
Trichloromethane (Chloroform)	U	U	ug/L	0.80	2.40	524.2	05/24 07:31	05/24 07:31	MMD
TOTAL Trihalomethanes	U	U	ug/L	2.0	6.0	524.2	05/24 07:31	05/24 07:31	MMD
524.2 Volatile Organics: 62-550.310(4)(a)				**Dilution Factor =1**					
Vinyl Chloride	U	U	ug/L	0.34	1.02	524.2	05/24 07:31	05/24 07:31	MMD
1-Dichloroethylene	U	U	ug/L	0.52	1.56	524.2	05/24 07:31	05/24 07:31	MMD

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Dichloromethane (Methylene Chloride)	U	U	ug/L	0.99	2.97	524.2	05/24 07:31	05/24 07:31	MMD
Trans-1,2-Dichloroethylene	U	U	ug/L	0.50	1.50	524.2	05/24 07:31	05/24 07:31	MMD
Cis-1,2-Dichloroethylene	U	U	ug/L	0.11	0.33	524.2	05/24 07:31	05/24 07:31	MMD
1,1,1-Trichloroethane	U	U	ug/L	0.25	0.75	524.2	05/24 07:31	05/24 07:31	MMD
arbon Tetrachloride	U	U	ug/L	0.19	0.57	524.2	05/24 07:31	05/24 07:31	MMD
Benzene	U	U	ug/L	0.09	0.27	524.2	05/24 07:31	05/24 07:31	MMD
1,2-Dichloroethane	U	U	ug/L	0.24	0.72	524.2	05/24 07:31	05/24 07:31	MMD
Trichloroethylene	U	U	ug/L	0.09	0.27	524.2	05/24 07:31	05/24 07:31	MMD
1,2-Dichloropropane	U	U	ug/L	0.20	0.60	524.2	05/24 07:31	05/24 07:31	MMD
Toluene	U	U	ug/L	0.14	0.42	524.2	05/24 07:31	05/24 07:31	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	524.2	05/24 07:31	05/24 07:31	MMD
Tetrachloroethylene	U	U	ug/L	0.11	0.33	524.2	05/24 07:31	05/24 07:31	MMD
Chlorobenzene	U	U	ug/L	0.09	0.27	524.2	05/24 07:31	05/24 07:31	MMD
Ethylbenzene	U	U	ug/L	0.13	0.39	524.2	05/24 07:31	05/24 07:31	MMD
Xylenes (Total)	U	U	ug/L	0.21	0.63	524.2	05/24 07:31	05/24 07:31	MMD
Styrene	U	U	ug/L	0.17	0.51	524.2	05/24 07:31	05/24 07:31	MMD
1,4-Dichlorobenzene (para)	U	U	ug/L	0.14	0.42	524.2	05/24 07:31	05/24 07:31	MMD
1,2-Dichlorobenzene (ortho)	U	U	ug/L	0.48	1.44	524.2	05/24 07:31	05/24 07:31	MMD
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	524.2	05/24 07:31	05/24 07:31	MMD

1.2 Volatile Organics: 62-550. UNREGULATED **Dilution Factor =1**

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Dichlorodifluoromethane	U	U	ug/L	0.13	0.39	524.2	05/24 07:31	05/24 07:31	MMD
Chloromethane	U	U	ug/L	0.35	1.05	524.2	05/24 07:31	05/24 07:31	MMD
Bromomethane	U	U	ug/L	0.41	1.23	524.2	05/24 07:31	05/24 07:31	MMD
Chloroethane	U	U	ug/L	0.17	0.51	524.2	05/24 07:31	05/24 07:31	MMD
ichlorofluoromethane	U	U	ug/L	0.47	1.41	524.2	05/24 07:31	05/24 07:31	MMD
Methyl-Tert-Butyl Ether	U	U	ug/L	0.50	1.50	524.2	05/24 07:31	05/24 07:31	MMD
1,1-Dichloroethane	U	U	ug/L	0.53	1.59	524.2	05/24 07:31	05/24 07:31	MMD
2,2-Dichloropropane	U	U	ug/L	0.31	0.93	524.2	05/24 07:31	05/24 07:31	MMD
Cis-1,2-Dichloroethene	U	U	ug/L	0.11	0.33	524.2	05/24 07:31	05/24 07:31	MMD
Chloroform	U	U	ug/L	0.80	2.40	524.2	05/24 07:31	05/24 07:31	MMD
1,1-Dichloropropene	U	U	ug/L	0.07	0.21	524.2	05/24 07:31	05/24 07:31	MMD
Bromodichloromethane	U	U	ug/L	0.24	0.72	524.2	05/24 07:31	05/24 07:31	MMD
Dibromomethane	U	U	ug/L	0.42	1.26	524.2	05/24 07:31	05/24 07:31	MMD
Cis-1,3-Dichloropropene	U	U	ug/L	0.38	1.14	524.2	05/24 07:31	05/24 07:31	MMD
Trans-1,3-Dichloropropene	U	U	ug/L	0.50	1.50	524.2	05/24 07:31	05/24 07:31	MMD
1,1,2-Trichloroethane	U	U	ug/L	0.36	1.08	524.2	05/24 07:31	05/24 07:31	MMD
1,3-Dichloropropane	U	U	ug/L	0.38	1.14	524.2	05/24 07:31	05/24 07:31	MMD
Dibromochloromethane	U	U	ug/L	0.39	1.17	524.2	05/24 07:31	05/24 07:31	MMD
1,1,1,2-Tetrachloroethane	U	U	ug/L	0.37	1.11	524.2	05/24 07:31	05/24 07:31	MMD
omoform	U	U	ug/L	0.38	1.14	524.2	05/24 07:31	05/24 07:31	MMD

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1,1,2,2-Tetrachloroethane	U	U	ug/L	0.29	0.87	524.2	05/24 07:31	05/24 07:31	MMD
1,2,3-Trichloropropane	U	U	ug/L	0.23	0.69	524.2	05/24 07:31	05/24 07:31	MMD
Bromobenzene	U	U	ug/L	0.46	1.38	524.2	05/24 07:31	05/24 07:31	MMD
2-Chlorotoluene (ortho)	U	U	ug/L	0.13	0.39	524.2	05/24 07:31	05/24 07:31	MMD
Chlorotoluene (para)	U	U	ug/L	0.16	0.48	524.2	05/24 07:31	05/24 07:31	MMD
1,3-Dichlorobenzene (meta)	U	U	ug/L	0.20	0.60	524.2	05/24 07:31	05/24 07:31	MMD
1,2-Dibromo-3-Chloropropane	U	U	ug/L	0.30	0.90	524.2	05/24 07:31	05/24 07:31	MMD
525.2 Semivolatile Organics: 62-550.310(4)(b)				**Dilution Factor =1**					
Di(2-Ethylhexyl)phthalate	U	U	ug/L	0.36	1.08	525.2	05/25 09:20	05/26 09:20	AC
Di(2-Ethylhexyl)adipate	U	U	ug/L	0.36	1.08	525.2	05/25 09:20	05/26 09:20	AC
Benzo(a)pyrene	U	U	ug/L	0.017	0.051	525.2	05/25 09:20	05/26 09:20	AC
Pentachlorophenol	U	U	ug/L	2.13	6.39	525.2	05/25 09:20	05/26 09:20	AC
Alachlor	U	U	ug/L	0.2000	0.6000	525.2	05/25 09:20	05/26 09:20	AC
Atrazine	U	U	ug/L	0.2000	0.6000	525.2	05/25 09:20	05/26 09:20	AC
Simazine	U	U	ug/L	0.2000	0.6000	525.2	05/25 09:20	05/26 09:20	AC
525.2 Semivolatile Organics: 62-550.UNREGULATED				**Dilution Factor =1**					
Butyl benzyl phthalate	U	U	ug/L	1.44	4.32	525.2	05/25 09:21	05/26 09:21	AC
Di-n-butylphthalate	U	U	ug/L	1.2	3.6	525.2	05/25 09:21	05/26 09:21	AC
Diethylphthalate	U	U	ug/L	3.4	10.2	525.2	05/25 09:21	05/26 09:21	AC
imethylphthalate	U	U	ug/L	3.7	11.1	525.2	05/25 09:21	05/26 09:21	AC

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LABORATORY ANALYSIS REPORT

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2,4-dinitrotoluene	U	U	ug/L	1.17	3.51	525.2	05/25 09:21	05/26 09:21	AC
Dioctylphthalate	U	U	ug/L	1.86	5.58	525.2	05/25 09:21	05/26 09:21	AC
Isophorone	U	U	ug/L	1.56	4.68	525.2	05/25 09:21	05/26 09:21	AC
(Dioxin) {Screen/Optional}	U	U	ug/L	0.03	0.09	525.2	05/25 09:21	05/26 09:21	AC
chlorophenol	U	U	ug/L	1.47	4.41	525.2	05/25 09:21	05/26 09:21	AC
2-methyl-4,6-dinitrophenol	U	U	ug/L	3.0	9.0	525.2	05/25 09:21	05/26 09:21	AC
Phenol	U	U	ug/L	1.86	5.58	525.2	05/25 09:21	05/26 09:21	AC
2,4,6-trichlorophenol	U	U	ug/L	3.0	9.0	525.2	05/25 09:21	05/26 09:21	AC
552.2 Haloacetic Acids : 62-550.310(3)				**Dilution Factor =1**					
Monochloroacetic Acid	1.60	I	ug/L	0.78	2.34	552.2	05/26 08:00	05/27 02:36	RGC
Dichloroacetic Acid	U	U	ug/L	0.36	1.08	552.2	05/26 08:00	05/27 02:36	RGC
Trichloroacetic Acid	12.2		ug/L	0.16	0.48	552.2	05/26 08:00	05/27 02:36	RGC
Monobromoacetic Acid	U	U	ug/L	0.71	2.13	552.2	05/26 08:00	05/27 02:36	RGC
Dibromoacetic Acid	U	U	ug/L	0.08	0.24	552.2	05/26 08:00	05/27 02:36	RGC
Total Haloacetic Acids (HAA5)	13.8		ug/L	2.0	6.0	552.2	05/26 08:00	05/27 02:36	RGC
625 Semivolatile Organics in Water by GC/MS				**Dilution Factor =1**					
N-Nitrosodimethylamine	U	U	ug/L	0.50	1.50	625	05/27 07:19	05/31 07:19	AC
Phenol	U	U	ug/L	1.86	5.58	625	05/27 07:19	05/31 07:19	AC
Bis (2-Chloroethyl) Ether	U	U	ug/L	0.85	2.55	625	05/27 07:19	05/31 07:19	AC
Chlorophenol	U	U	ug/L	3.00	9.00	625	05/27 07:19	05/31 07:19	AC

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1,3-Dichlorobenzene	U	U	ug/L	0.20	0.60	625	05/27 07:19	05/31 07:19	AC
1,4-Dichlorobenzene	U	U	ug/L	0.14	0.42	625	05/27 07:19	05/31 07:19	AC
Benzyl Alcohol	U	U	ug/L	0.75	2.25	625	05/27 07:19	05/31 07:19	AC
1,2-Dichlorobenzene	U	U	ug/L	0.48	1.44	625	05/27 07:19	05/31 07:19	AC
s (2-Chloroisopropyl) Ether *	U	U	ug/L	0.85	2.55	625	05/27 07:19	05/31 07:19	AC
N-Nitrosodi-N-Propylamine	U	U	ug/L	1.14	3.42	625	05/27 07:19	05/31 07:19	AC
Hexachloroethane	U	U	ug/L	2.31	6.93	625	05/27 07:19	05/31 07:19	AC
Nitrobenzene *	U	U	ug/L	0.66	1.98	625	05/27 07:19	05/31 07:19	AC
Isophorone	U	U	ug/L	1.56	4.68	625	05/27 07:19	05/31 07:19	AC
2-Nitrophenol	U	U	ug/L	3.00	9.00	625	05/27 07:19	05/31 07:19	AC
2,4-Dimethylphenol	U	U	ug/L	3.00	9.00	625	05/27 07:19	05/31 07:19	AC
Bis (2-Chloroethoxy)methane *	U	U	ug/L	1.89	5.67	625	05/27 07:19	05/31 07:19	AC
2,4-Dichlorophenol	U	U	ug/L	3.00	9.00	625	05/27 07:19	05/31 07:19	AC
1,2,3-Trichlorobenzene	U	U	ug/L	2.00	6.00	625	05/27 07:19	05/31 07:19	AC
1,2,4-Trichlorobenzene	U	U	ug/L	0.82	2.46	625	05/27 07:19	05/31 07:19	AC
Naphthalene	U	U	ug/L	0.015	0.045	625	05/27 07:19	05/31 07:19	AC
Hexachlorobutadiene	U	U	ug/L	0.57	1.71	625	05/27 07:19	05/31 07:19	AC
4-Chloro-3-Methylphenol	U	U	ug/L	3	9	625	05/27 07:19	05/31 07:19	AC
1-Methylnaphthalene	U	U	ug/L	0.36	1.08	625	05/27 07:19	05/31 07:19	AC
Methylnaphthalene	U	U	ug/L	0.024	0.072	625	05/27 07:19	05/31 07:19	AC

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2-Methylphenol (o-cresol)	U	U	ug/L	2.0	6.0	625	05/27 07:19	05/31 07:19	AC
Hexachlorocyclopentadiene	U	U	ug/L	0.42	1.26	625	05/27 07:19	05/31 07:19	AC
3-MethylPhenol (m-cresol)	U	U	ug/L	0.84	2.52	625	05/27 07:19	05/31 07:19	AC
4-Methylphenol (p-cresol)	U	U	ug/L	1.16	3.48	625	05/27 07:19	05/31 07:19	AC
3,6-Trichlorophenol	U	U	ug/L	2.5	7.5	625	05/27 07:19	05/31 07:19	AC
2,4,5-Trichlorophenol	U	U	ug/L	3.51	10.53	625	05/27 07:19	05/31 07:19	AC
2,4,6-Trichlorophenol	U	U	ug/L	3.0	9.0	625	05/27 07:19	05/31 07:19	AC
2-Chloronaphthalene	U	U	ug/L	1.16	3.48	625	05/27 07:19	05/31 07:19	AC
Dimethyl Phthalate	U	U	ug/L	3.7	11.1	625	05/27 07:19	05/31 07:19	AC
Acenaphthylene	U	U	ug/L	0.015	0.045	625	05/27 07:19	05/31 07:19	AC
2,6-Dinitrotoluene	U	U	ug/L	0.54	1.62	625	05/27 07:19	05/31 07:19	AC
Acenaphthene	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
2,4-Dinitrophenol	U	U	ug/L	3.0	9.0	625	05/27 07:19	05/31 07:19	AC
2,4-Dinitrotoluene	U	U	ug/L	1.17	3.51	625	05/27 07:19	05/31 07:19	AC
4-Nitrophenol	U	U	ug/L	3.0	9.0	625	05/27 07:19	05/31 07:19	AC
Diethyl Phthalate	U	U	ug/L	3.4	10.2	625	05/27 07:19	05/31 07:19	AC
Fluorene	U	U	ug/L	0.012	0.036	625	05/27 07:19	05/31 07:19	AC
4-Chlorophenyl Phenyl Ether	U	U	ug/L	0.87	2.61	625	05/27 07:19	05/31 07:19	AC
4,6-Dinitro-2-Methylphenol	U	U	ug/L	2.0	6.0	625	05/27 07:19	05/31 07:19	AC
-Nitrosodiphenylamine	U	U	ug/L	3.42	10.26	625	05/27 07:19	05/31 07:19	AC

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PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
4-Bromophenyl Phenyl Ether	U	U	ug/L	1.44	4.32	625	05/27 07:19	05/31 07:19	AC
Hexachlorobenzene	U	U	ug/L	0.42	1.26	625	05/27 07:19	05/31 07:19	AC
Pentachlorophenol	U	U	ug/L	2.13	6.39	625	05/27 07:19	05/31 07:19	AC
Phenanthrene	U	U	ug/L	0.028	0.084	625	05/27 07:19	05/31 07:19	AC
thracene	U	U	ug/L	0.049	0.147	625	05/27 07:19	05/31 07:19	AC
Di-N-Butyl Phthalate	U	U	ug/L	1.2	3.6	625	05/27 07:19	05/31 07:19	AC
Fluoranthene	U	U	ug/L	0.025	0.075	625	05/27 07:19	05/31 07:19	AC
Benzidine *	U	U	ug/L	4.0	12.0	625	05/27 07:19	05/31 07:19	AC
Pyrene	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
Butyl Benzyl Phthalate	U	U	ug/L	1.44	4.32	625	05/27 07:19	05/31 07:19	AC
Benzo(A)Anthracene	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
3,3-Dichlorobenzidine	U	U	ug/L	2.0	6.0	625	05/27 07:19	05/31 07:19	AC
Chrysene	U	U	ug/L	0.75	2.25	625	05/27 07:19	05/31 07:19	AC
Bis (2 Ethylhexyl) Phthalate	U	U	ug/L	2.37	7.11	625	05/27 07:19	05/31 07:19	AC
Di-N-Octyl Phthalate	U	U	ug/L	1.4	4.2	625	05/27 07:19	05/31 07:19	AC
Benzo(B)Fluoranthene	U	U	ug/L	0.029	0.087	625	05/27 07:19	05/31 07:19	AC
Benzo(K)Fluoranthene	U	U	ug/L	0.025	0.075	625	05/27 07:19	05/31 07:19	AC
Benzo(A)Pyrene	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
Indeno(1,2,3-CD)Pyrene	U	U	ug/L	0.93	2.79	625	05/27 07:19	05/31 07:19	AC
ibenzo(A,H,)Anthracene	U	U	ug/L	0.029	0.087	625	05/27 07:19	05/31 07:19	AC

Report To:
Jay Swartzentruber
Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft Myers, FL 33908

Report Printed: 06/23/06
Submission # 605000541
Order # 8028

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Benzo(G,H,I)Perylene	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
Bis-2-ethylhexyl Adipate	U	U	ug/L	0.36	1.08	625	05/27 07:19	05/31 07:19	AC
Aldrin *	U	U	ug/L	0.017	0.051	625	05/27 07:19	05/31 07:19	AC
alpha-BHC *	U	U	ug/L	0.005	0.015	625	05/27 07:19	05/31 07:19	AC
ta-BHC *	U	U	ug/L	0.005	0.015	625	05/27 07:19	05/31 07:19	AC
delta-BHC *	U	U	ug/L	0.005	0.015	625	05/27 07:19	05/31 07:19	AC
gamma-BHC (Lindane) *	U	U	ug/L	0.004	0.012	625	05/27 07:19	05/31 07:19	AC
Chlordane (Screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
4,4'-DDD *	U	U	ug/L	0.60	1.80	625	05/27 07:19	05/31 07:19	AC
4,4'-DDE *	U	U	ug/L	0.39	1.17	625	05/27 07:19	05/31 07:19	AC
4,4'-DDT *	U	U	ug/L	0.69	2.07	625	05/27 07:19	05/31 07:19	AC
Dieldrin *	U	U	ug/L	0.006	0.018	625	05/27 07:19	05/31 07:19	AC
Endosulfan I *	U	U	ug/L	0.006	0.018	625	05/27 07:19	05/31 07:19	AC
Endosulfan II *	U	U	ug/L	0.006	0.018	625	05/27 07:19	05/31 07:19	AC
Endosulfan Sulfate *	U	U	ug/L	0.007	0.021	625	05/27 07:19	05/31 07:19	AC
Endrin *	U	U	ug/L	0.005	0.015	625	05/27 07:19	05/31 07:19	AC
Endrin Aldehyde *	U	U	ug/L	0.010	0.030	625	05/27 07:19	05/31 07:19	AC
Heptachlor *	U	U	ug/L	0.005	0.015	625	05/27 07:19	05/31 07:19	AC
Heptachlor Epoxide *	U	U	ug/L	0.008	0.024	625	05/27 07:19	05/31 07:19	AC
xaphene *	U	U	ug/L	0.40	1.20	625	05/27 07:19	05/31 07:19	AC

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Report Printed: 06/23/06
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Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

Sample I.D.: PBLR IW 1
Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
PCB-1016 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
PCB-1221 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
PCB-1232 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
PCB-1242 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
CB-1248 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
PCB-1254 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
PCB-1260 (screen) *	U	U	ug/L	0.10	0.30	625	05/27 07:19	05/31 07:19	AC
Dioxin (screen)	U	U	ug/L	0.03	0.09	625	05/27 07:19	05/31 07:19	AC
Azobenzene *	U	U	ug/L	0.75	2.25	625	05/27 07:19	05/31 07:19	AC
Methoxychlor *	U	U	ug/L	0.007	0.021	625	05/27 07:19	05/31 07:19	AC
Benzoic Acid	U	U	ug/L	0.84	2.52	625	05/27 07:19	05/31 07:19	AC
Aniline	U	U	ug/L	0.50	1.50	625	05/27 07:19	05/31 07:19	AC
4-Chloroaniline	U	U	ug/L	0.65	1.95	625	05/27 07:19	05/31 07:19	AC
Dibenzofuran	U	U	ug/L	0.66	1.98	625	05/27 07:19	05/31 07:19	AC
2-Nitroaniline	U	U	ug/L	0.58	1.74	625	05/27 07:19	05/31 07:19	AC
3-Nitroaniline	U	U	ug/L	0.50	1.50	625	05/27 07:19	05/31 07:19	AC
4-Nitroaniline	U	U	ug/L	0.84	2.52	625	05/27 07:19	05/31 07:19	AC
Carbazole *	U	U	ug/L	0.68	2.04	625	05/27 07:19	05/31 07:19	AC
2,6-Dichlorophenol	U	U	ug/L	0.89	2.67	625	05/27 07:19	05/31 07:19	AC
yridine	U	U	ug/L	0.99	2.97	625	05/27 07:19	05/31 07:19	AC

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Project: Belle Glade Job
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Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
2,3,4,6-Tetrachlorophenol	U	U	ug/L	1.00	3.00	625	05/27 07:19	05/31 07:19	AC
2,3,5,6-Tetrachlorophenol	U	U	ug/L	0.80	2.40	625	05/27 07:19	05/31 07:19	AC
SUB 531.1 Carbamate Pesticides: 62-550.310(4)(b				**Dilution Factor =1**					
Carbofuran	0.5U		ug/L	0.5	1.5	531.1	06/06 02:47	06/06 02:47	E84129
amyl (vydate)	0.5U		ug/L	0.5	1.5	531.1	06/06 02:47	06/06 02:47	E84129
SUB 549.2 Diquat/Paraquat: 62-550.310(4)(b)				**Dilution Factor =1**					
Diquat	1 U,Q2	Q	ug/L	1.00	3.00	549.2	05/31 08:30	06/07 11:58	E84129
Paraquat	1 U,Q2	Q	ug/L	1.0	3.0	549.2	05/31 08:30	06/07 11:58	E84129
Radium-226	1.4 ± 0.1		pCi/L	0.10	0.30	EPA 903.1	06/01 14:30	06/01 14:30	E84088
Radium-228	0.5 ± 0.5		pCi/L	0.50	1.50	EPA Ra-05	06/01 15:15	06/01 05:15	E84088
SUB 300.1 (Chlorite, Bromate) Part B				**Dilution Factor =1**					
Chlorite	1.0		mg/L	0.005	0.015	EPA 300.1	05/23 10:38	05/23 10:38	E86035
Bromate	0.010	I	mg/L	0.005	0.015	EPA 300.1	05/23 10:38	05/23 10:38	E86035
Glyphosate	10U		ug/L	10	30	547.1	05/30 20:23	05/30 20:23	E84129
Endothall	20U		ug/L	20	60	548.1	05/23 15:00	06/07 19:24	E84129

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Collected: 05/22/06 10:30
Received: 05/22/06 15:07
Collected by: Alberto Pozo

Project: Belle Glade Job
Site Location: 3900 Hooker Hwy, Belle Glade, FL
Matrix: Water

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Gross Alpha	2.5±0.6	I	pCi/L	1.0	3.0	EPA 00-02	05/31 14:30	05/31 14:30	E84088

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

VG Castellanos
Authorized CSM Signature
Florida Environmental;Certification # E86006

Appendix F
Geophysical Logs

DZMW

Palm Beach County Water Utilities Department
WUD Project No. 03 – 169
Lake Region Dual Zone Monitor Well

GEOPHYSICAL LOG

DATE	RUN #	DEPTH	LOGGED INTERVAL (FROM - TO)	LOG TYPE
5/30/06	1	192	192 - 0	XY Caliper, Gamma Ray
6/3/06	2	900	900 - 192	XY Caliper, Gamma Ray, Dual Induction
6/5/06	3	861	861 - 190	XY Caliper, Gamma Ray
6/9/06	4	1940	1940 - 850	Dual Induction, Borehole Compensated Sonic, XY Caliper, Borehole Televiewer, Gamma Ray, Fluid Resistivity, Flow Meter, Temperature
6/14/06	5	1949	1949 - 850	XY Caliper, Gamma Ray
6/15/06	6	1949	1949 - 0	Cement Top Log (Temp)
6/21/06	7	2100	2100 - 1937	Dual Induction, Borehole Compensated Sonic, XY Caliper, Video Log, Gamma Ray, Fluid Resistivity, Flow Meter, Temperature
6/27/06	8	2100	2100 - 1800	Pre-cementing Cement Bond Log
6/28/06	9	2100	2100 - 0	Cement Top Log (Temp)
7/3/06	10	2100	2100 - 0	Cement Bond Log, Video Log

IW

Palm Beach County Water Utilities Department
WUD Project No. 03 – 169
Lake Region Deep Injection Well

GEOPHYSICAL LOG

DATE	RUN #	DEPTH	LOGGED INTERVAL (FROM - TO)	LOG TYPE
2/3/06	1	192	192 - 0	XY Caliper, Gamma Ray
2/13/06	2	855	855 - 0	XY Caliper, Gamma Ray
2/14/06	3	855	855 - 0	Cement Top Log (Temp)
2/19/06	4	1915	1915 - 848	Dual Induction, Borehole Compensated Sonic, XY Caliper, Borehole Televiewer, Gamma Ray, Fluid Resistivity, Flow Meter, Temperature
3/9/06	5	1964	1964 - 1800	Dual Induction, Borehole Compensated Sonic, XY Caliper, Gamma Ray, Fluid Conductivity, Temperature
3/19/06	6	1925	1925 - 848	XY Caliper, Gamma Ray
3/21/06	7	1921	1921 - 0	Cement Top Log (Temp)
4/4/06	8	3500	3500 - 1900	Dual Induction, Borehole Compensated Sonic, XY Caliper, Borehole Televiewer, Gamma Ray, Fluid Resistivity, Flow Meter, Temperature
5/6/06	9	3500	3500 - 1900	XY Caliper, Gamma Ray
5/13/06	10	3500	3500 – 0	Cement Top Log (Temp)
5/19/06	11	2935	2935 - 150	Cement Bond Log
5/22/06	12	2940	2940 - 0	Video Log
6/14/06	13	3490	3490 - 0	Video Log, Gamma Ray
6/15/06	14	3490	3490 - 0	Radioactive Tracer Survey, Temperature

Lake Region (Belle Glade) - Deep Injection Well
Log Derived Water Quality - TDS

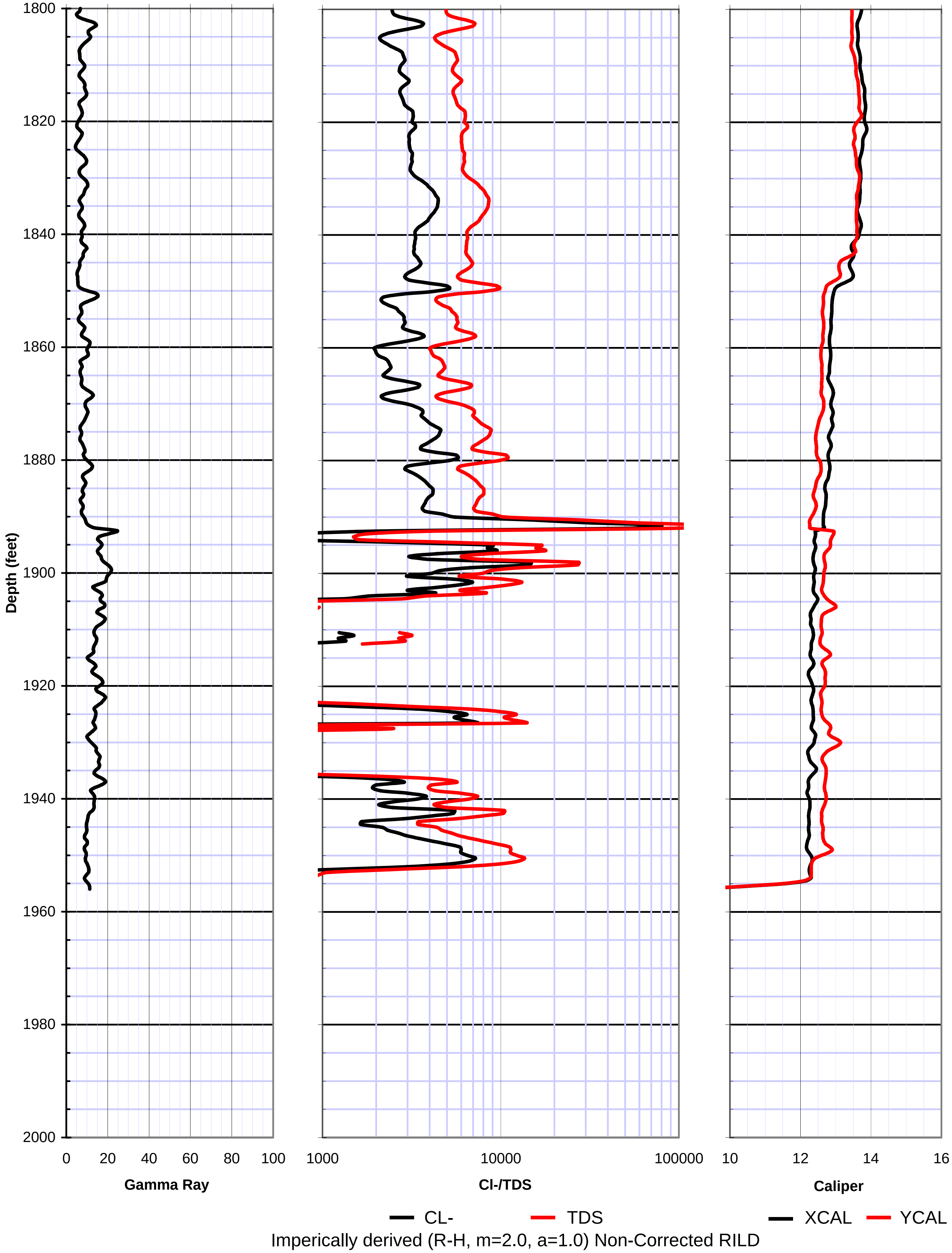
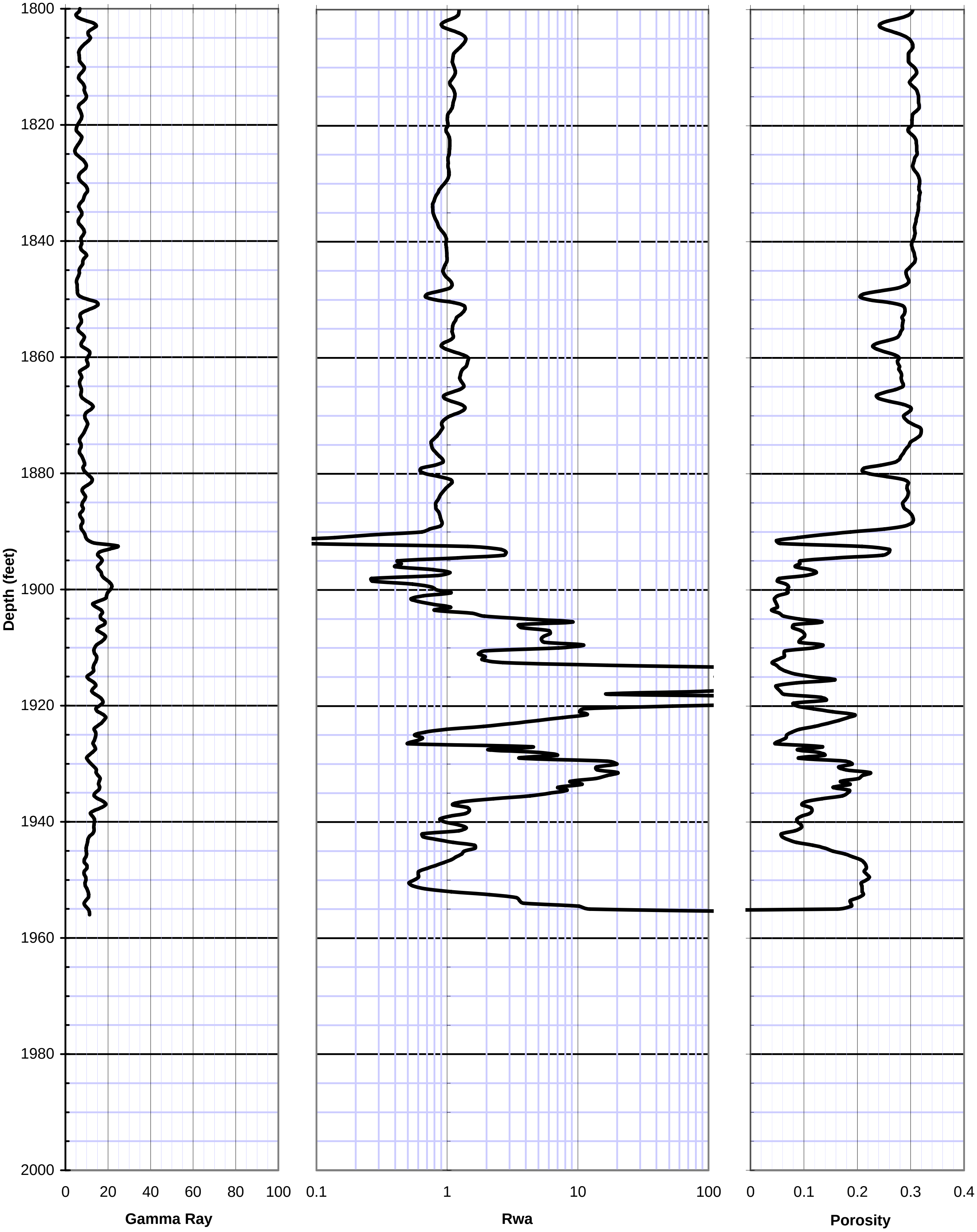


Figure 3-1

Lake Region (Belle Glade) - Deep Injection Well
Log Derived Water Quality - Rwa



Imperically derived (R-H, m=2.0, a=1.0) Non-Corrected RILD

Figure 5-5

Appendix G
Lithology Logs

DZMW

Palm Beach County Water Utilities

Date: May 30, 2006

PROJECT: Lake Region DIW - WUD Project No. 98-66B

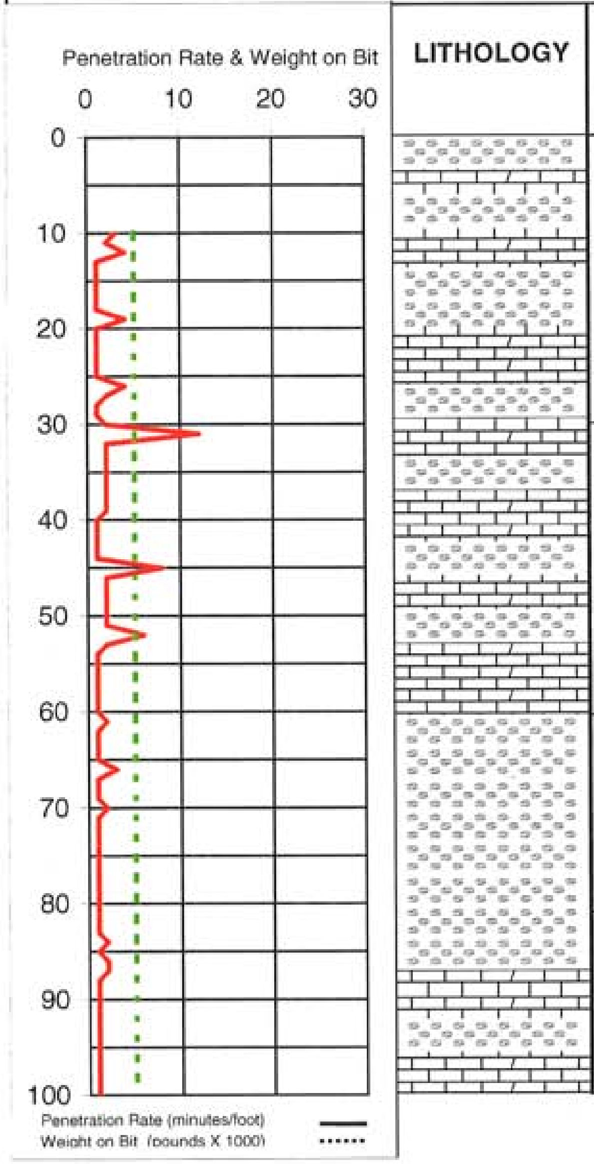
WELL: Lake Region DZMW

KEY TO LITHOLOGIC COLUMN

▭ --SAND ▤ --LIMESTONE ▤ --CLAY

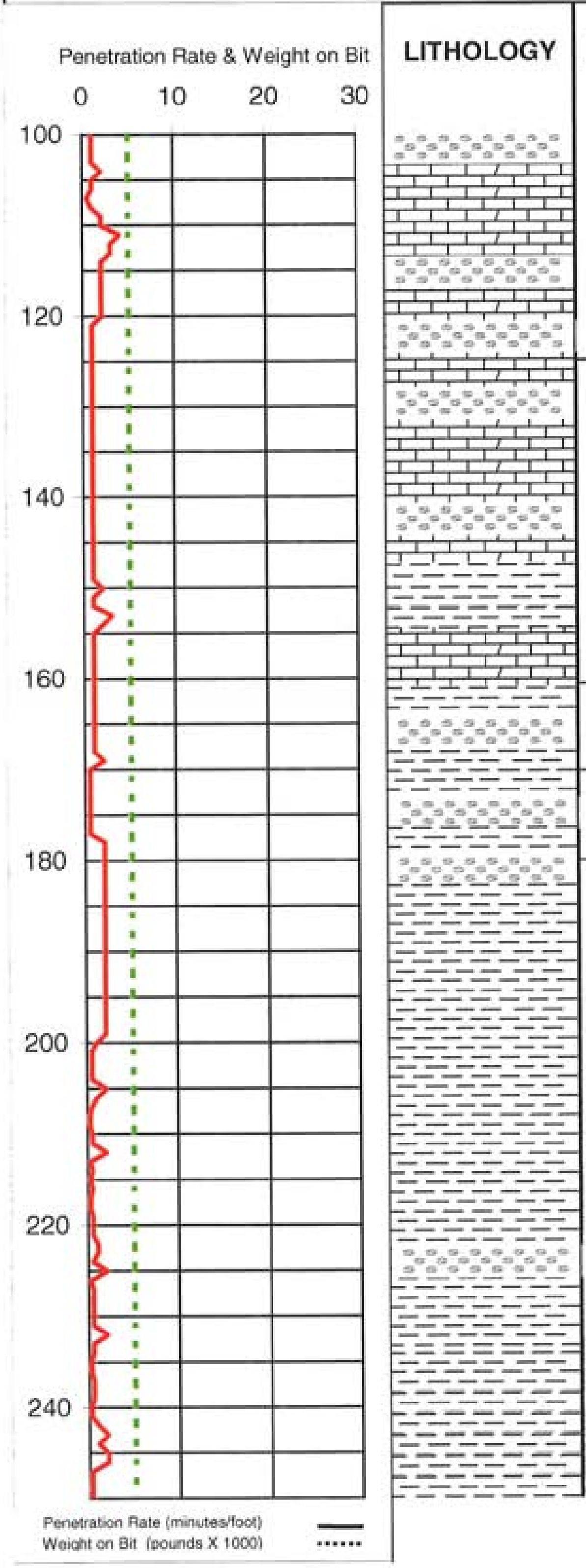
▒ --SHELL ▨ --DOLOMITE ☰ --SILT

▦ --CHERT ▨ --CALCITE



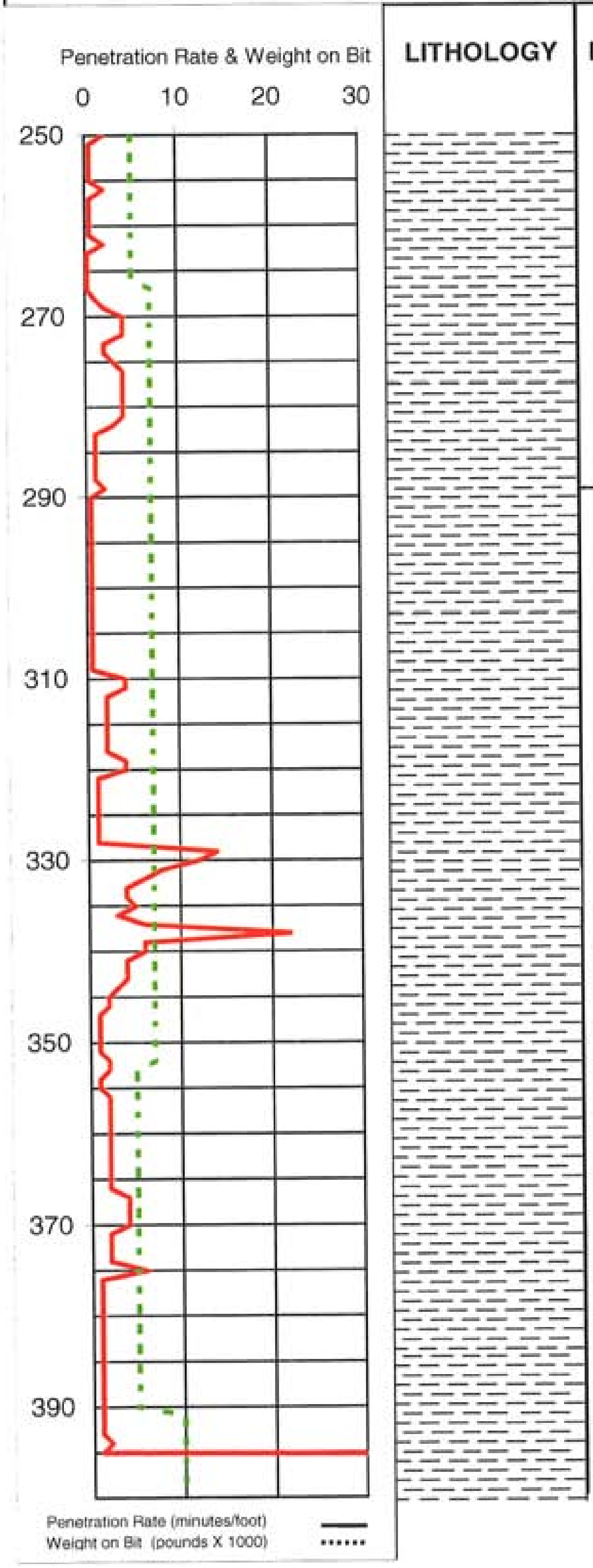
DEPTH	LITHOLOGIC DESCRIPTION
0 30	**SHELL ROCK/LIMEROCK FILL 100%:** Color – White (N9) to very light grey (N8). Grains – medium grained, moderately rounded, moderately sorted, contains limestone fragments and some organics. Cement/Matrix – none. Porosity – high. Permeability – high. Hardness – unconsolidated.
60	**LIMESTONE 40%:** Color – very light gray (N8) to light gray (N7). Grains – medium to coarse grained, sub-rounded/sub-angular, poorly sorted. Texture – microcrystalline, pockmarked. Cement/Matrix – none. Porosity – high. Permeability – high. Hardness – moderate. **SHELL 60%:** Color – very pale orange (10YR 8/2) to white (N9). Grains – fragmented, broken, and angular.
	SHELL 100%: Color – white (N9) to very pale orange (10YR 8/2) to medium dark gray (N4). Grains – poorly sorted coarse grained fragmented, broken, and angular with assorted complete shells – gastropods, bivalves.
80 100	**SHELL 65%:** Color – Same as 60'- 80'. Grains – poorly sorted very coarse grained broken angular fragments with occasional whole polished shells, bivalves and gastropods. **LIMESTONE 35%:** Color – yellowish gray (5Y 8/1). Grains – coarse grained, sub rounded. Texture – coquina like, shell fragments tightly cemented. Cement/Matrix – micritic limestone. Porosity – moderate. Permeability – moderate. Hardness – hard.

WELL: **Lake Region DZMW**



DEPTH	LITHOLOGIC DESCRIPTION
130	**SHELL 60%:** Same as 60'- 80' above. **LIMESTONE 40%:** Same as 80'- 100' above. Color – light gray (5Y 8/1). Grains – fine grained sub-rounded fragments.
160	**LIMESTONE 80%:** Same as 80'- 100' above. Color – light gray (5Y 8/1) to dusky yellow green (5GY 5/2). Grains – fine grained sub-rounded fragments. **SHELL 10%:** Color – white to very pale orange (10YR 8/2) to medium dark gray (N4). Grains – poorly sorted coarse grained fragmented, broken, and angular. **CLAY 10%:** Color – grayish olive green (5GY 3/2). Texture – unconsolidated clay/mud. Grains – silt to clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.
170	**CLAY 90%:** Same as 130'- 160' above. **SHELL 10%:** Color – shell fragments in matrix. Light gray (5GY 3/2) to white (N9). Difficult to distinguish in clay. Grains – very coarse grained shell fragments, angular.
180	**CLAY 70%:** Same as 130'- 160' above. **SHELL 30%:** Color – shell fragments stained from the mud difficult to tell actual color. Grains – very coarse grained shell fragments, angular.
	CLAY 90%: Color – medium light gray (N6). Texture – unconsolidated clay/mud, plastic. Grains – clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Accessories – none. Hardness – soft. **SHELL 10%:** Same as 170'- 180' above.

WELL: **Lake Region DZMW**



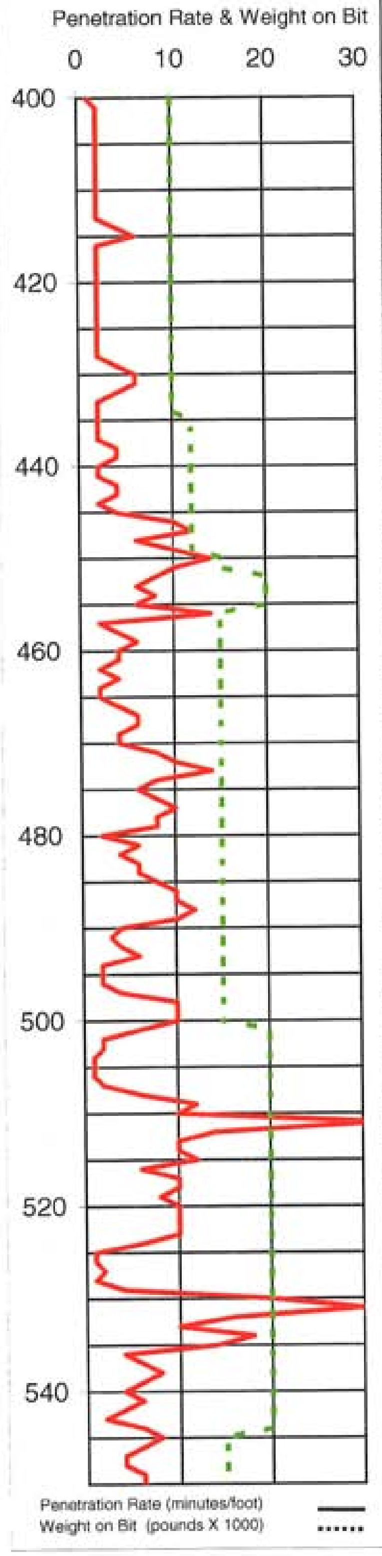
DEPTH

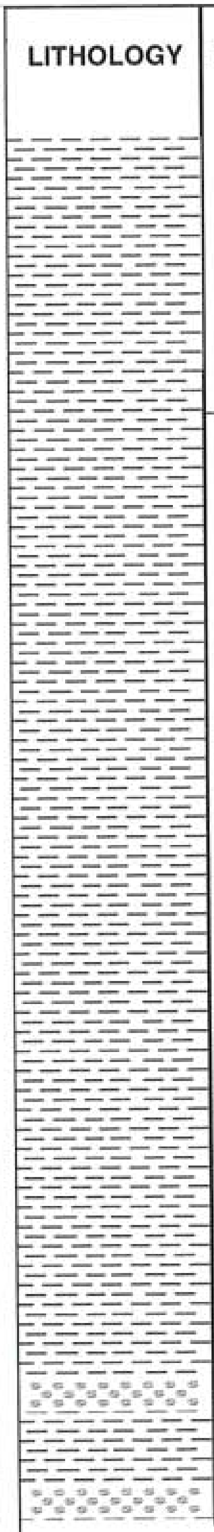
290

CLAY 100%:

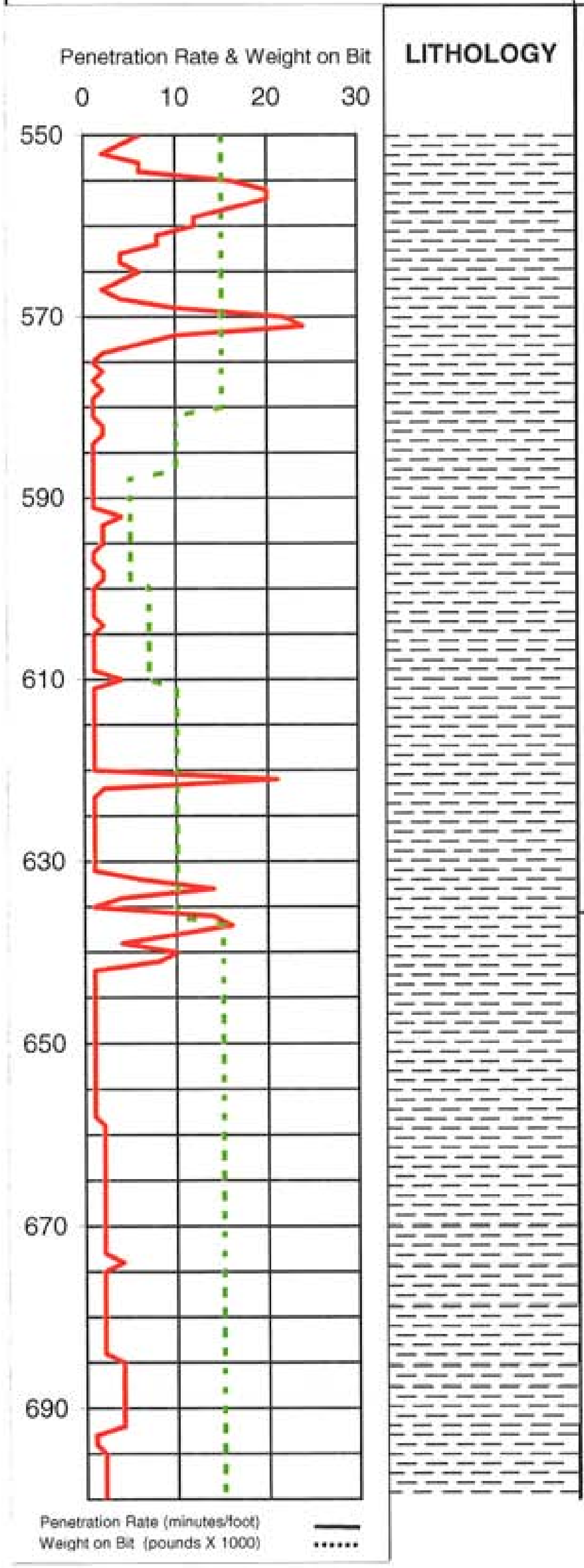
Same as 180'- 290' above. Color – grayish olive green (5GY 3/2).

WELL: **Lake Region DZMW**

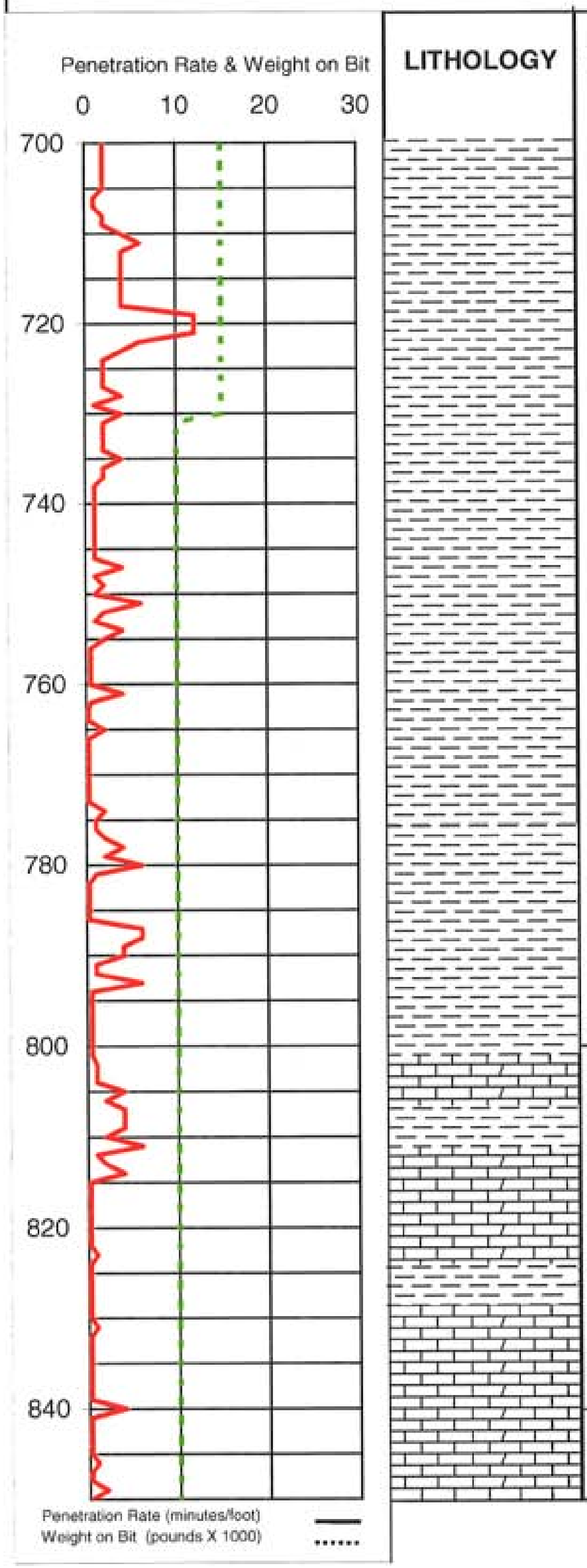




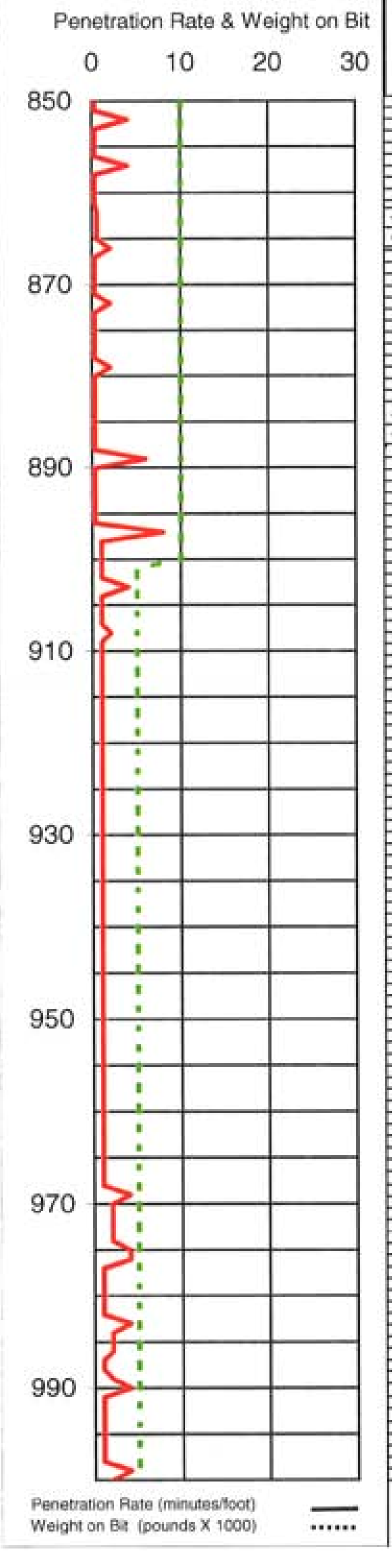
DEPTH	LITHOLOGIC DESCRIPTION
430	
530	**CLAY 100%:** Same as 180'- 290' above. Color – dusky yellow green (5GY 5/2).
	CLAY 100%: Color – Grayish olive green (5GY 3/2) to light olive gray (5Y 5/2) to yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Grains – silty/sandy clay sized carbonate particles. Cement/Matrix – none. Porosity – low.



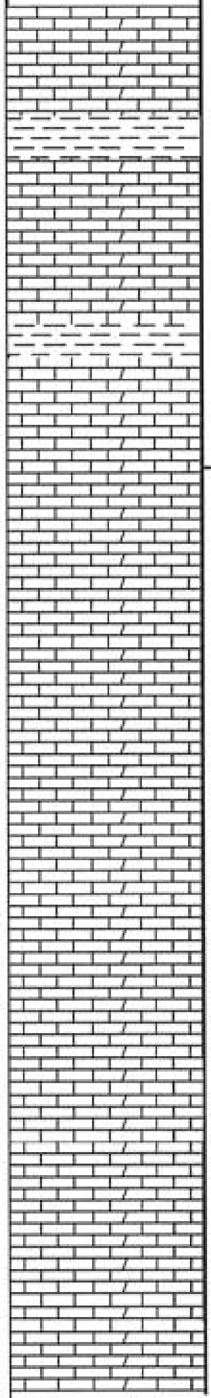
DEPTH	LITHOLOGIC DESCRIPTION
	Permeability – low. Hardness – soft. Accessories – phosphate grains present to 20 percent, increasing with depth.
640	**CLAY 100%:** Color – yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Grains – silty/sandy clay sized carbonate particles. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft. Accessories – phosphate grains present <1%.



DEPTH	LITHOLOGIC DESCRIPTION
800	
840	**LIMESTONE 80%:** Color – medium light gray (N6). Texture – unconsolidated, fine grained, micritic limestone. Cement/Matrix – none. Grains - fine grained, sub rounded. Porosity – medium. Permeability - medium. Hardness – hard. **CLAY 20%:** Same as 640 to 800 above.
	LIMESTONE 90%: Color - very pale orange (10YR 8/2). Texture - friable to



LITHOLOGY



DEPTH

900

LITHOLOGIC DESCRIPTION

unconsolidated. Grains - coarse to fine grained, poorly sorted. Cement/Matrix – calcite. Porosity – medium. Permeability - medium. Hardness – moderate.

CLAY 10%:

Color - medium light gray (N6). Texture - unconsolidated clay/mud. Grains - silt to clay sized.

LIMESTONE 70%:

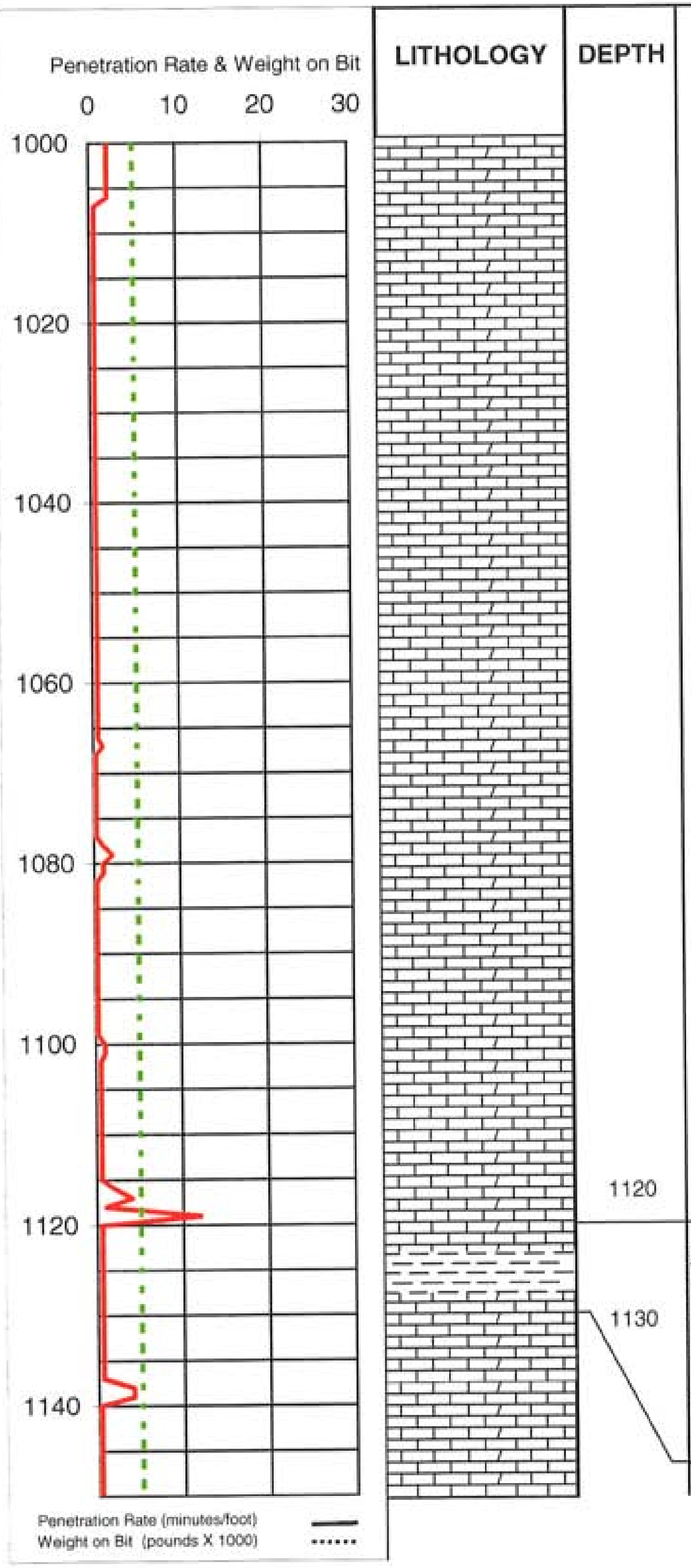
Color - very pale orange (10YR 8/2). Texture – grainstone, semi-friable. Grains - fine grained. Cement/Matrix – calcite. Porosity – medium. Permeability - medium. Hardness – moderate. Fossils - whole to broken, fragmented, shell and discoid fossils (foraminifera and possibly ecinoderms).

LIMESTONE 30%:

Color – medium gray (N5). Texture - boundstone. Grains - coarse to fine grained, poorly sorted. Cement/Matrix – micritic limestone. Porosity – medium. Permeability - medium. Hardness – hard.

WELL: **Lake Region DIW**

LITHOLOGIC DESCRIPTION

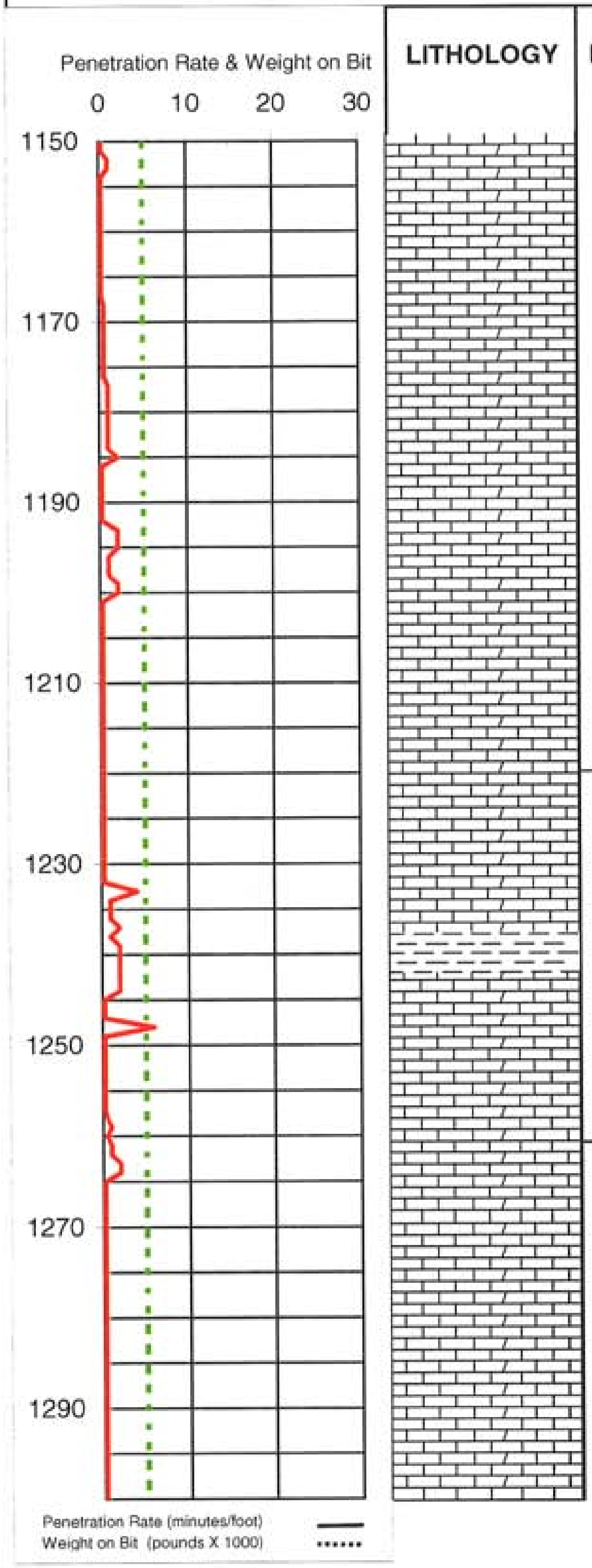


LIMESTONE 80%:

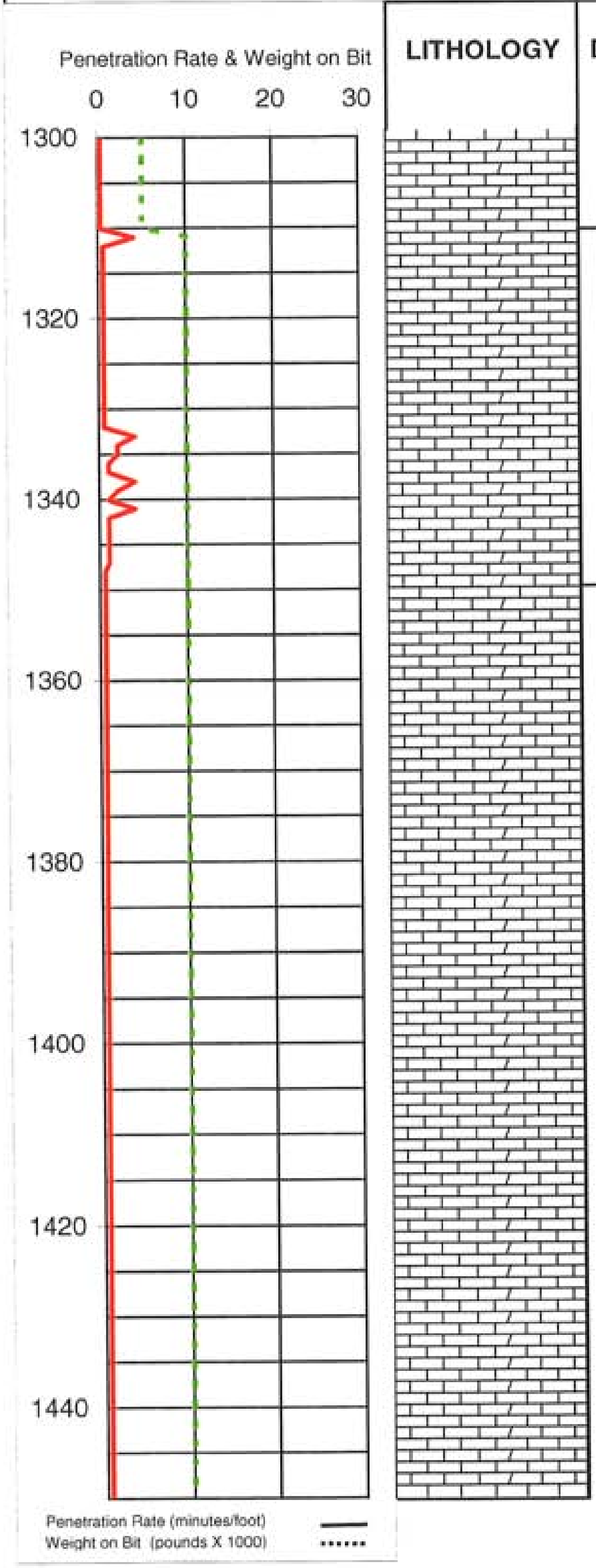
Color - very pale orange (10YR 8/2). Texture – grainstone, friable. Grains - fine grained. Cement/Matrix – calcite. Porosity – medium. Permeability - medium. Hardness – moderate.

CLAY 20%:

Color - very pale orange (10YR 8/2). Texture - unconsolidated clay/mud. Grains - silt to clay sized.

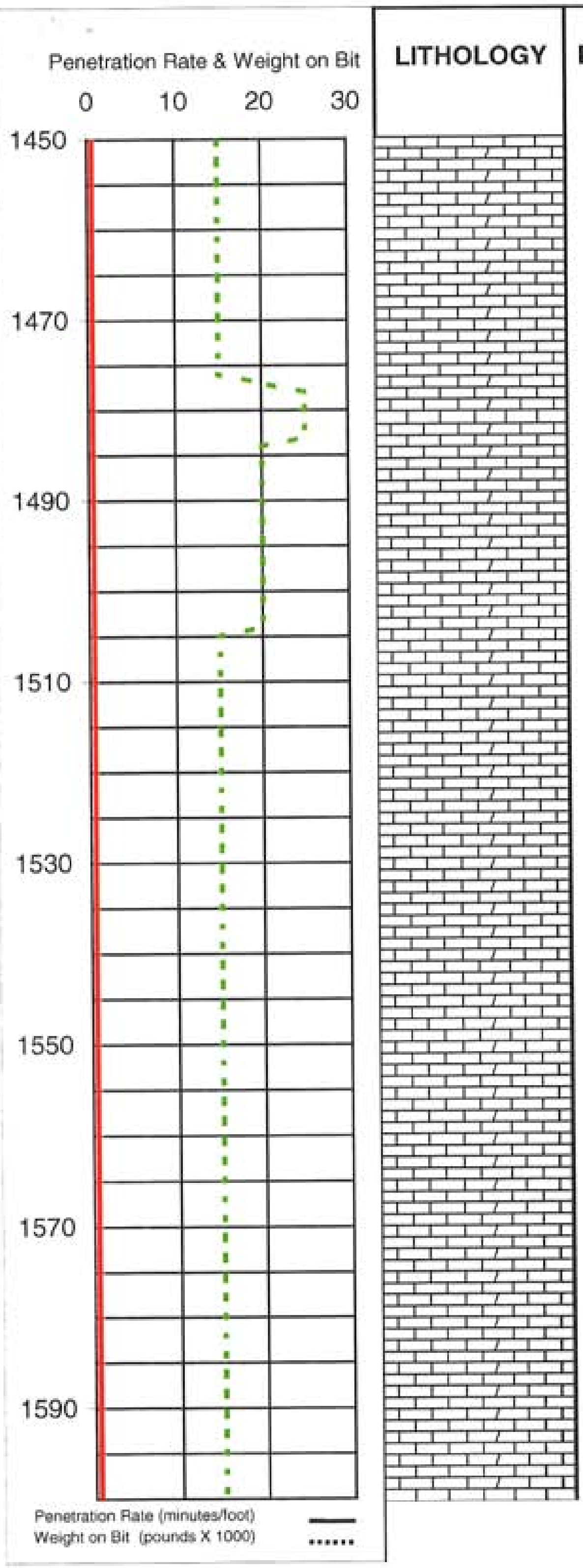


DEPTH	LITHOLOGIC DESCRIPTION
1220	**LIMESTONE 100%:** Color - very pale orange (10YR 8/2). Texture - friable to unconsolidated. Grains - coarse to fine grained, poorly sorted. Cement/Matrix – calcite. Porosity – medium. Permeability - medium. Hardness – moderate. Fossils - whole to broken, fragmented, shell and discoid fossils (foraminifera, dicticones, and possibly ecinoderms).
1260	**LIMESTONE 90%:** Color - very pale orange (10YR 8/2). Texture - friable to unconsolidated with local hard beds (chert). Grains - coarse to fine grained, poorly sorted. Cement/Matrix – calcite. Porosity – medium. Permeability - medium. Hardness – moderate. **CLAY 10%:** Same as 840 – 900 above.
	LIMESTONE 100%: Color - very pale orange (10YR 8/2). Texture – grainstone semi-friable to micritic limestone. Grains – coarse to fine grained. Cement/Matrix – micritic limestone and calcite. Porosity – medium. Permeability - medium. Hardness – moderate to hard. Note: Some grains are small shell fragments, foramifera.



DEPTH	LITHOLOGIC DESCRIPTION
1310	
	LIMESTONE 100%: Color - very pale orange (10YR 8/2) to medium gray (N5). Texture – grainstone often coquina like to micritic limestone. Grains – coarse to fine grained. Cement/Matrix – micritic limestone and calcite. Porosity – medium. Permeability - medium. Hardness – moderate to hard. Note: Some grains are small shell fragments, foramifera.
1350	
	LIMESTONE 100%: Color - very pale orange (10YR 8/2) and medium gray (N5), <2%. Texture – grainstone and <2% micritic limestone. Grains – medium to fine grained. Cement/Matrix – calcite and micritic limestone. Porosity – medium. Permeability - medium. Hardness – moderate to hard. Note: Some grains are small shell fragments, foramifera. Sparsely interbedded with thin clay layers.

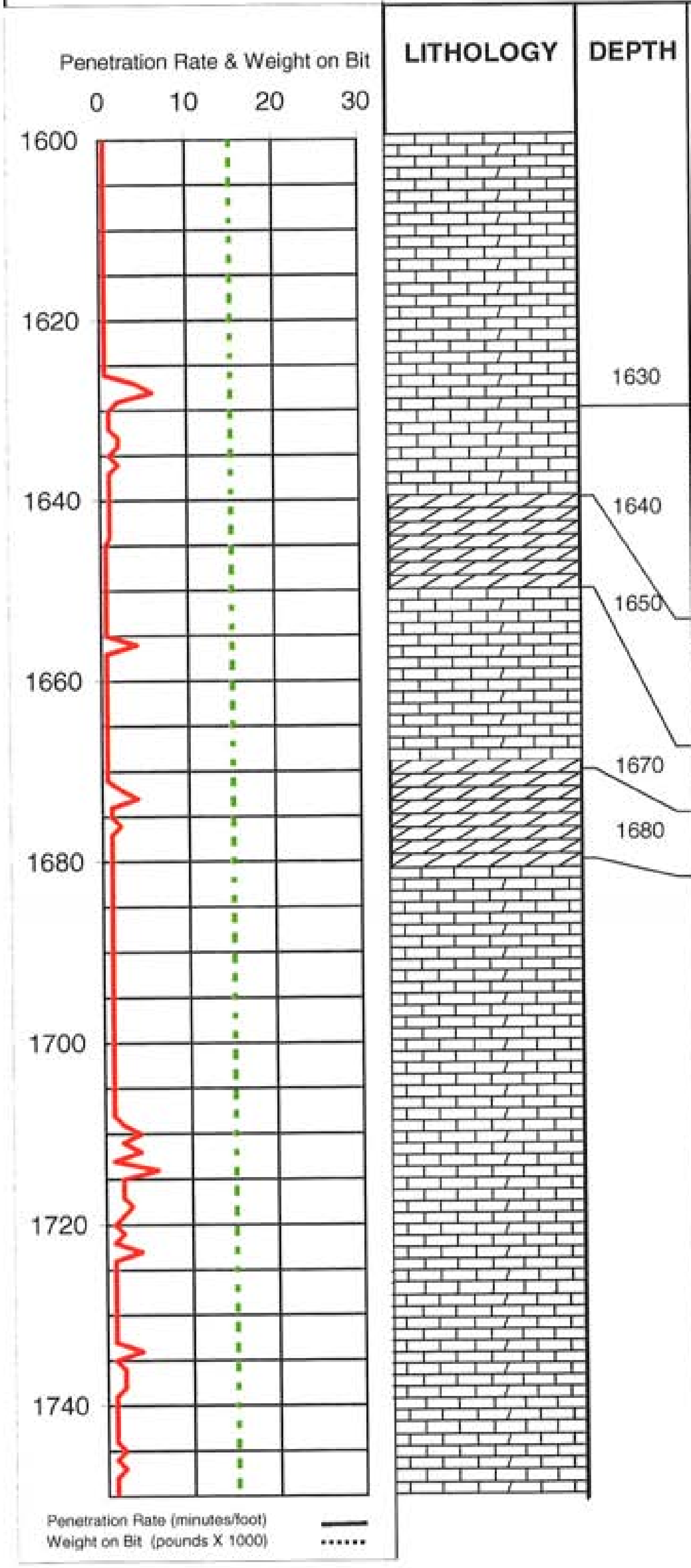
WELL: **Lake Region DIW**



DEPTH

LITHOLOGIC DESCRIPTION

LITHOLOGIC DESCRIPTION



LIMESTONE 100%:

Color - very pale orange (10YR 8/2) and pale to moderate yellowish brown (10YR 6/4). Texture – grainstone to packstone, friable. Grains – medium to fine grained. Cement/Matrix – calcite and micritic limestone. Porosity – medium. Permeability - medium. Hardness – moderate to hard.

Dolomite 100%:

Color – dark yellowish brown (10YR 4/2). Texture – cryptocrystalline. Cement/Matrix – none. Porosity – low. Permeability - low. Hardness – very hard.

LIMESTONE 100%:

Same as 1630 to 1640 above.

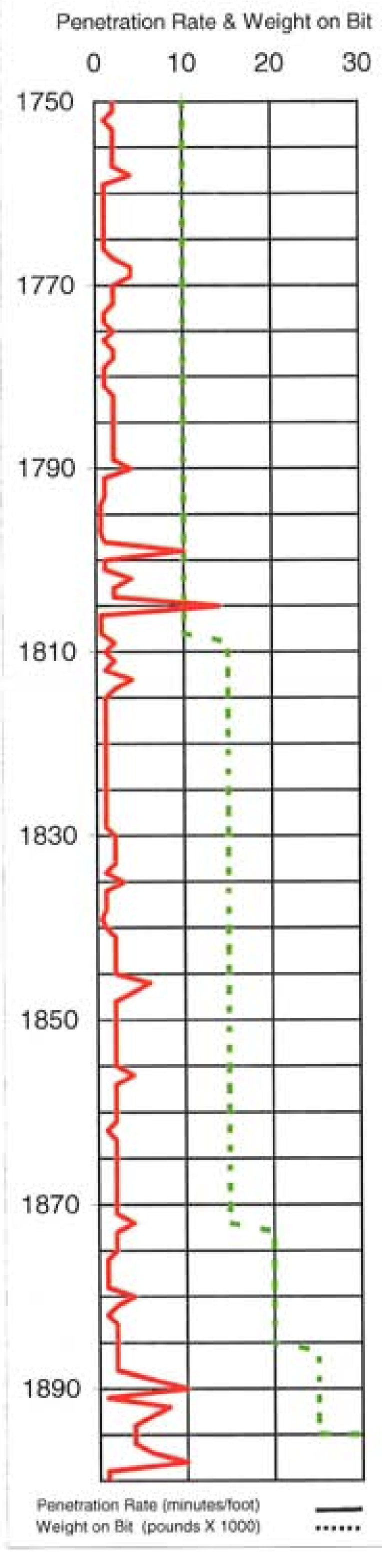
Dolomite 100%:

Same as 1640 to 1650 above.

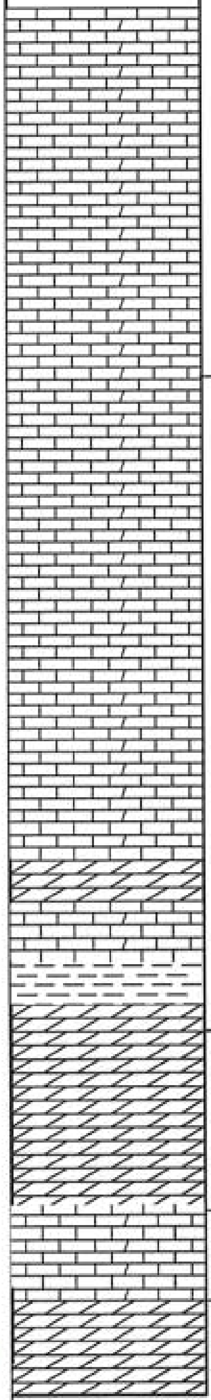
LIMESTONE 100%:

Same as 1630 to 1640 above.

WELL: **Lake Region DIW**

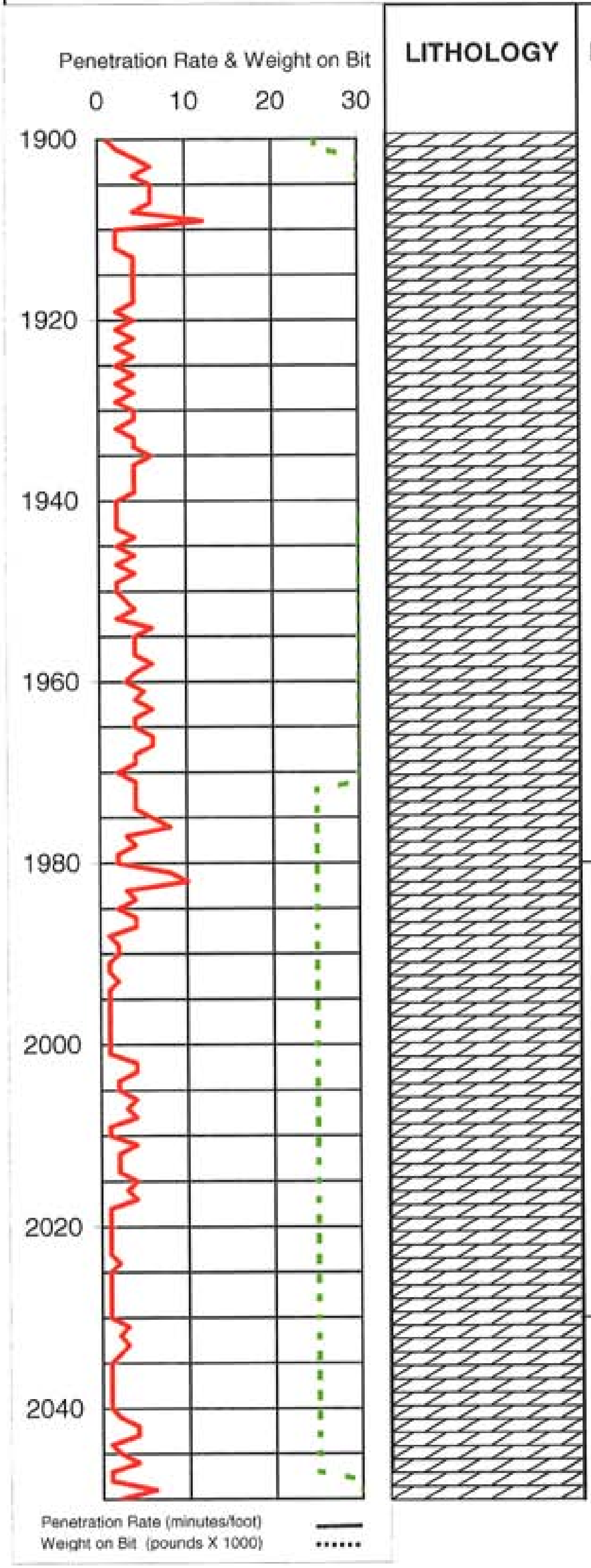


LITHOLOGY



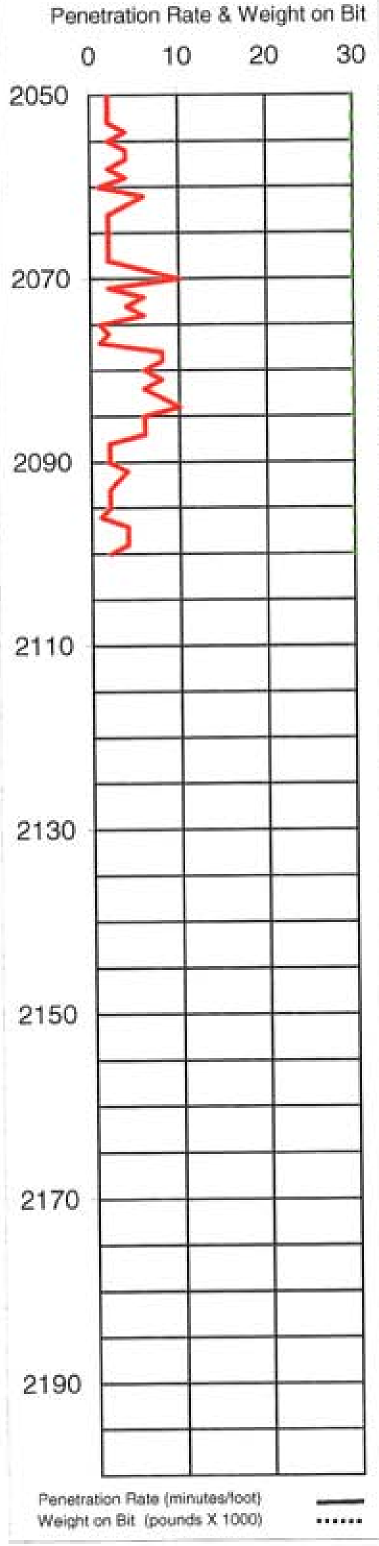
DEPTH	LITHOLOGIC DESCRIPTION
1790	
1860	**LIMESTONE 60%:** Same as 1630 to 1640 above. **Dolomite 40%:** Same as 1640 to 1650 above.
1880	**Dolomite 100%:** Same as 1640 to 1650 above.
1890	**LIMESTONE 100%:** Same as 1630 to 1640 above.
	Dolomite 100%: Same as 1640 to 1650 above.

WELL: **Lake Region DIW** Page: 14

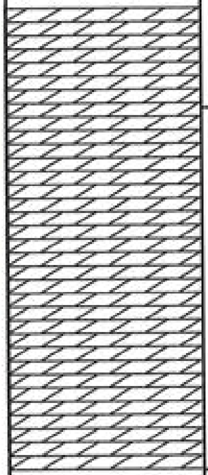


DEPTH	LITHOLOGIC DESCRIPTION
1980	
2030	**Dolomite 80%:** Same as 1640 to 1650 above. **Chert 20%:** Color – very pale orange (10YR 8/2). Texture – microcrystalline. Hardness – very hard, non-friable.
	Dolomite 100%: Same as 1640 to 1650 above.

WELL: **Lake Region DIW**



LITHOLOGY



DEPTH	LITHOLOGIC DESCRIPTION
2060	
2100	**Dolomite 80%:** Same as 1640 to 1650 above. **Chert 20%:** Same as 1980 to 2030 above.

LITHOLOGIC DESCRIPTION

Well:	Lake Region Dual Zone Monitor Well
Total Depth:	2,100 feet
County:	Palm Beach
Location:	Belle Glade
Owner:	Palm Beach County Water Utilities Department
Driller:	Youngquist Brother's, Inc.
Date Drilled:	May 30, 2006 through July 10, 2006

HYDROLOGIC UNITS

0 to 190 feet	Surficial Aquifer
190 to 848 feet	Upper Confining Unit – Hawthorn Group
848 to 1,625 feet	Upper Floridan Aquifer
2,950 to 3,500 feet	Lower Floridan Aquifer

DEPTH	DESCRIPTION
0'-30'	**SHELL ROCK/LIMEROCK FILL 100%:** **Color** – white (N9) to very light gray (N8). **Grains** – medium grained, moderately rounded, moderately sorted, contains limestone fragments and some organics. **Cement/Matrix** – none. **Porosity** – high. **Permeability** – high. **Hardness** – unconsolidated.
30'-60'	**LIMESTONE 40%:** **Color** – very light gray (N8) to light gray (N7). **Grains** – medium to coarse grained, sub-rounded/sub-angular, poorly sorted. **Texture** – microcrystalline, pockmarked. **Cement/Matrix** – none. **Porosity** – high. **Permeability** – high. **Hardness** – moderate. **SHELL 60%:** **Color** – very pale orange (10YR 8/2) to white (N9). **Grains** – fragmented, broken, and angular.
60'-80'	**SHELL 100%:** **Color** – white (N9) to very pale orange (10YR 8/2) to medium dark gray (N4). **Grains** – poorly sorted coarse grained fragmented, broken, and angular with assorted complete shells – gastropods, bivalves.
80'-100'	**SHELL 65%:** **Color** – Same as 60'- 80'. **Grains** – poorly sorted very coarse grained broken angular fragments with occasional whole polished shells, bivalves and gastropods. **LIMESTONE 35%:** **Color** – yellowish gray (5Y 8/1). **Grains** – coarse grained, sub rounded. **Texture** – coquina like, shell fragments tightly cemented. **Cement/Matrix** – micritic limestone. **Porosity** – moderate. **Permeability** – moderate. **Hardness** – hard.

DEPTH	DESCRIPTION
100’-130’	**<u>SHELL 60%:</u>** Same as 60’- 80’ above. **<u>LIMESTONE 40%:</u>** Same as 80’- 100’ above. **Color** – light gray (5Y 8/1). **Grains** – fine grained sub-rounded fragments.
130’-160’	**<u>LIMESTONE 80%:</u>** Same as 80’- 100’ above. **Color** – light gray (5Y 8/1) to dusky yellow green (5GY 5/2). **Grains** – fine grained sub-rounded fragments. **<u>SHELL 10%:</u>** **Color** – white to very pale orange (10YR 8/2) to medium dark gray (N4). **Grains** – poorly sorted coarse grained fragmented, broken, and angular. **<u>CLAY 10%:</u>** **Color** – grayish olive green (5GY 3/2). **Texture** – unconsolidated clay/mud. **Grains** – silt to clay sized carbonate. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
160’-170	**<u>CLAY 90%:</u>** Same as 130’- 160’ above. **<u>SHELL 10%:</u>** **Color** – shell fragments in matrix. Light gray (5GY 3/2) to white (N9). Difficult to distinguish in clay. **Grains –** very coarse grained shell fragments, angular.
170’-180’	**<u>CLAY 70%:</u>** Same as 130’- 160’ above. **<u>SHELL 30%:</u>** **Color** – shell fragments stained from the mud difficult to tell actual color. **Grains –** very coarse grained shell fragments, angular.
180’-290’	**<u>CLAY 90%:</u>** **Color** – medium light gray (N6). **Texture –** unconsolidated clay/mud, plastic. **Grains –** clay sized carbonate. **Cement/Matrix –** none. **Porosity –** low. **Permeability –** low. **Accessories –** none. **Hardness –** soft. **<u>SHELL 10%:</u>** Same as 170’- 180’ above.
290’-430’	**<u>CLAY 100%:</u>** Same as 180’- 290’ above. **Color** – grayish olive green (5GY 3/2).
430’-530’	**<u>CLAY 100%:</u>** Same as 180’- 290’ above. **Color** – dusky yellow green (5GY 5/2).

DEPTH	DESCRIPTION
530'-640'	**CLAY 100%:** **Color** – Grayish olive green (5GY 3/2) to light olive gray (5Y 5/2) to yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Grains** – silty/sandy clay sized carbonate particles. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft. **Accessories** – phosphate grains present to 20 percent, increasing with depth.
640'-800'	**CLAY 100%:** **Color** – yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Grains** – silty/sandy clay sized carbonate particles. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft. **Accessories** – phosphate grains present <1%.
800'- 840'	**LIMESTONE 80%:** **Color** – medium light gray (N6). **Texture** – unconsolidated, fine grained, micritic limestone. **Cement/Matrix** – none. **Grains** - fine grained, sub rounded. **Porosity** – medium. **Permeability** - medium. **Hardness** – hard. **CLAY 20%:** Same as 640 to 800 above.
840'-900'	**LIMESTONE 90%:** **Color -** very pale orange (10YR 8/2). **Texture** - friable to unconsolidated. **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **CLAY 10%:** **Color** - medium light gray (N6). **Texture** - unconsolidated clay/mud. **Grains** - silt to clay sized.
900'-1120'	**LIMESTONE 70%:** **Color -** very pale orange (10YR 8/2). **Texture** – grainstone, semi-friable. **Grains** - fine grained. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness –** moderate. **Fossils** - whole to broken, fragmented, shell and discoid fossils (foraminifera and possibly ecinoderms). **LIMESTONE 30%:** **Color –** medium gray (N5). **Texture** - boundstone. **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix –** micritic limestone. **Porosity** – medium. **Permeability** - medium. **Hardness –** hard.
1120'-1130'	**LIMESTONE 80%:** **Color -** very pale orange (10YR 8/2). **Texture** – grainstone, friable. **Grains** - fine grained. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **CLAY 20%:** **Color** - very pale orange (10YR 8/2). **Texture** - unconsolidated clay/mud. **Grains** - silt to clay sized.

DEPTH	DESCRIPTION
1130'-1220'	**<u>LIMESTONE 100%:</u>** **Color -** very pale orange (10YR 8/2). **Texture** - friable to unconsolidated. **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **Fossils** - whole to broken, fragmented, shell and discoid fossils (foraminifera, dicticones, and possibly ecinoderms).
1220'-1260	**<u>LIMESTONE 90%:</u>** **Color -** very pale orange (10YR 8/2). **Texture** - friable to unconsolidated with local hard beds (chert). **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **<u>CLAY 10%:</u>** Same as 840 – 900 above.
1260'-1310'	**<u>LIMESTONE 100%:</u>** **Color -** very pale orange (10YR 8/2). **Texture** – grainstone semi-friable to micritic limestone. **Grains** – coarse to fine grained. **Cement/Matrix** – micritic limestone and calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate to hard. **Note:** Some grains are small shell fragments, foramifera.
1310'-1350	**<u>LIMESTONE 100%:</u>** **Color -** very pale orange (10YR 8/2) to medium gray (N5). **Texture** – grainstone often coquina like to micritic limestone. **Grains** – coarse to fine grained. **Cement/Matrix** – micritic limestone and calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate to hard. **Note:** Some grains are small shell fragments, foramifera.
1350'-1630	**<u>LIMESTONE 100%:</u>** **Color -** very pale orange (10YR 8/2) and medium gray (N5), <2%. **Texture** – grainstone and <2% micritic limestone. **Grains** – medium to fine grained. **Cement/Matrix** – calcite and micritic limestone. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate to hard. **Note:** Some grains are small shell fragments, foramifera. Sparsely interbedded with thin clay layers.
1630'-1640'	**<u>LIMESTONE 100%:</u>** **Color -** very pale orange (10YR 8/2) and pale to moderate yellowish brown (10YR 6/4). **Texture** – grainstone to packstone, friable. **Grains** – medium to fine grained. **Cement/Matrix** – calcite and micritic limestone. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate to hard.
1640'-1650'	**<u>DOLOMITE 100%:</u>** **Color –** dark yellowish brown (10YR 4/2). **Texture** – cryptocrystalline. **Cement/Matrix** – none. **Porosity** – low. **Permeability** - low. **Hardness** – very hard.

DEPTH	DESCRIPTION
1650’-1670’	**LIMESTONE 100%:** Same as 1630 to 1640 above.
1670’-1680’	**DOLOMITE 100%:** Same as 1640 to 1650 above.
1680’-1790’	**LIMESTONE 100%:** Same as 1630 to 1640 above.
1790’-1860’	**LIMESTONE 60%:** Same as 1630 to 1640 above. **DOLOMITE 40%:** Same as 1640 to 1650 above.
1860’-1880’	**DOLOMITE 100%:** Same as 1640 to 1650 above.
1880’-1890’	**LIMESTONE 100%:** Same as 1630 to 1640 above.
1890’-1980’	**DOLOMITE 100%:** Same as 1640 to 1650 above.
1980’-2030’	**DOLOMITE 80%:** Same as 1640 to 1650 above. **CHERT 20%:** **Color** – very pale orange (10YR 8/2). **Texture –** microcrystalline. **Hardness –** very hard, non-friable.
2030’-2060’	**DOLOMITE 100%:** Same as 1640 to 1650 above.
2060’-2100’	**DOLOMITE 80%:** Same as 1640 to 1650 above. **CHERT 20%:** Same as 1980 to 2030 above.

IW

Date: February 2, 2006

Palm Beach County Water Utilities

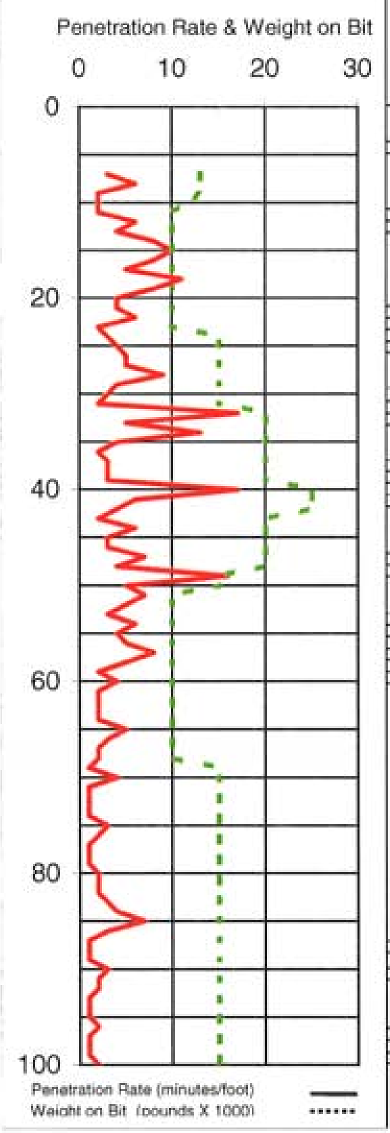
PROJECT: Lake Region DIW - WUD Project No. 98-66B

WELL: Lake Region DIW

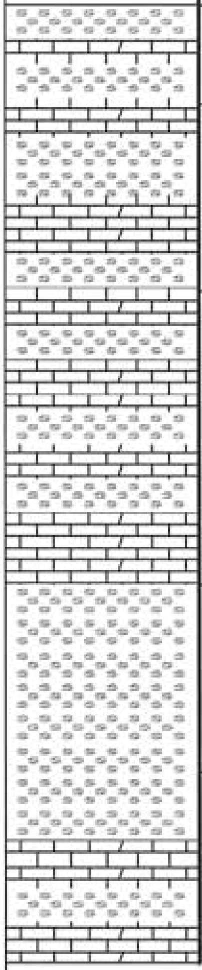
Page: 1

KEY TO LITHOLOGIC COLUMN

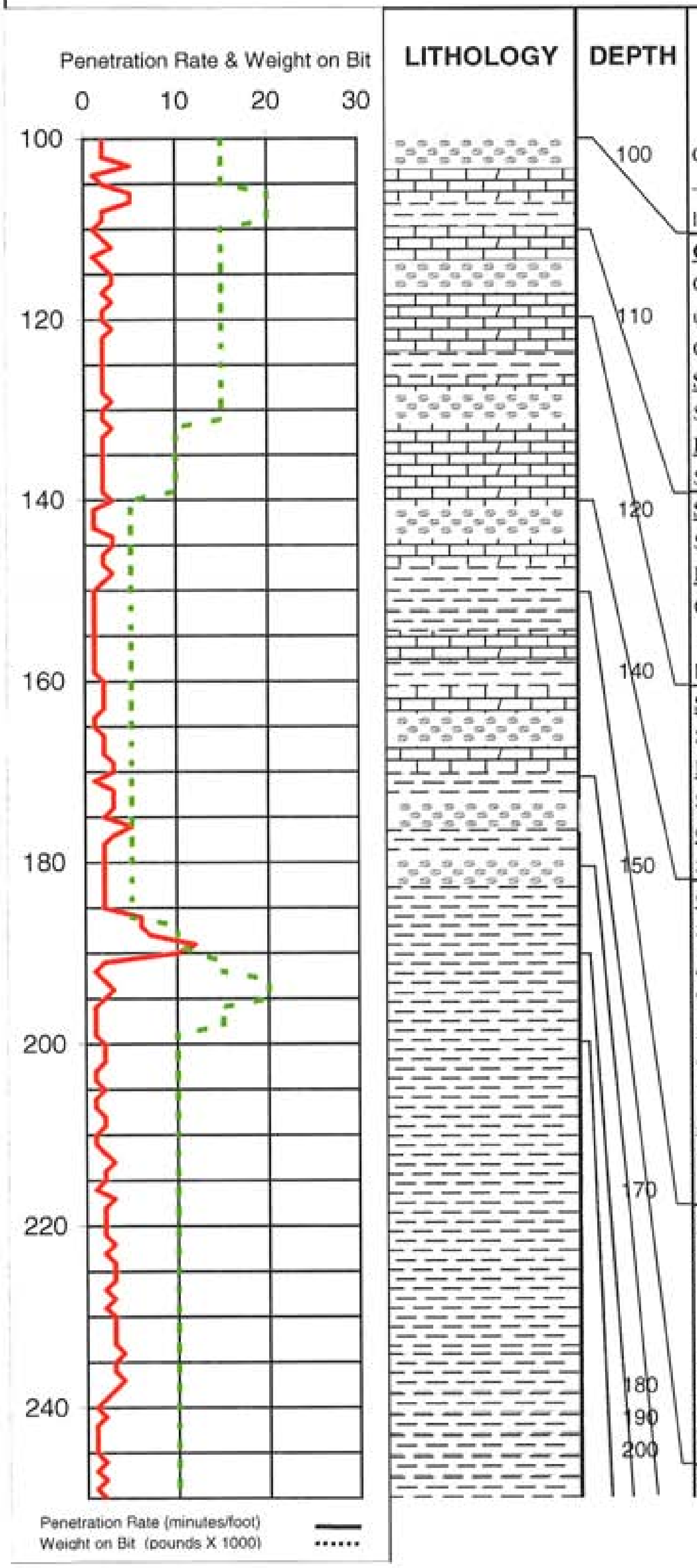
☐ --SAND	▦ --LIMESTONE	▤ --CLAY
░ --SHELL	▨ --DOLOMITE	☰ --SILT
▩ --CHERT	▧ --CALCITE	



LITHOLOGY



DEPTH	LITHOLOGIC DESCRIPTION
0 10	**SHELL ROCK/LIMEROCK FILL 100%:** Color – White (N9) to very light grey (N8). Grains – medium grained, moderately rounded, moderately sorted, contains limestone fragments and some organics. Cement/Matrix – none. Porosity – high. Permeability – high. Hardness – unconsolidated.
30	**LIMESTONE 40%:** Color – very light gray (N8) to light grey (N7). Grains – medium to coarse grained, sub-rounded/sub-angular, poorly sorted. Texture – microcrystalline, pockmarked. Cement/Matrix – none. Porosity – high. Permeability – high. Hardness – moderate. **SHELL 60%:** Color – very pale orange (10YR 8/2) to white (N9). Grains – fragmented, broken, and angular.
60	**LIMESTONE/COQUINA 50%:** Color – medium dark gray (N4) to medium grey (N5). Grains – coarse grained, sub rounded. Texture – coquina like with fine shell particles. Cement/Matrix – micritic limestone. Porosity – high. Permeability – high. Hardness – moderately hard. **SHELL 50%:** Color – white to very pale orange (10YR 8/2) to grayish orange (10YR 7/4). Grains – fragmented, broken, and angular gastropods, bivalves.
80	**SHELL 100%:** Color – white to very pale orange (10YR 8/2) to medium dark grey (N4). Grains – poorly sorted coarse grained fragmented, broken, and angular with assorted complete shells – gastropods, bivalves.
	SHELL 65%: Color – Same as 60'-80'. Grains – poorly sorted very coarse grained broken angular fragments with occasional whole polished shells, bivalves and gastropods. **LIMESTONE 35%:**



LITHOLOGIC DESCRIPTION

Color – yellowish gray (5Y 8/1). Grains – coarse grained, sub rounded. Texture – coquina like, shell fragments tightly cemented. Cement/Matrix – micritic limestone. Porosity – moderate. Permeability – moderate. Hardness – hard.

CLAY 50%:

Color – Medium light gray (N6) to greenish gray (5GY 6/1). Texture – unconsolidated clay/mud, plastic. Grains – silt to clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

SHELL 25%:

Same as 60 to 80 above.

LIMESTONE 25%:

Same as 80 to 100 above.

SHELL 60%:

Same as 100 to 110.

LIMESTONE 40%:

Color – Light gray (5Y 8/1). Grains – fine grained sub-rounded fragments. Texture – coquina like, shell fragments tightly cemented. Cement/Matrix – micritic limestone. Porosity – moderate. Permeability – moderate. Hardness – hard.

SHELL 45%:

Same as 110'-120' above.

LIMESTONE 45%:

Same as 110'-120' above.

CLAY 10%:

Same as 100 to 110.

CLAY 50%:

Same as 120'-140' above.

LIMESTONE 40%:

Color – Light gray (5Y 8/1) to dusky yellow green (5GY 5/2). Grains – fine grained sub-rounded fragments. Texture – coquina like, shell fragments tightly cemented. Cement/Matrix – micritic limestone. Porosity – moderate. Permeability – moderate. Hardness – hard.

SHELL 10%:

Color – white to very pale orange (10YR 8/2) to medium dark grey (N4). Grains – poorly sorted coarse grained fragmented, broken, and angular.

CLAY 40%:

Color – Dusky yellow green (5GY 5/2). Texture – unconsolidated clay/mud. Grains – silt to clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

LIMESTONE 50%:

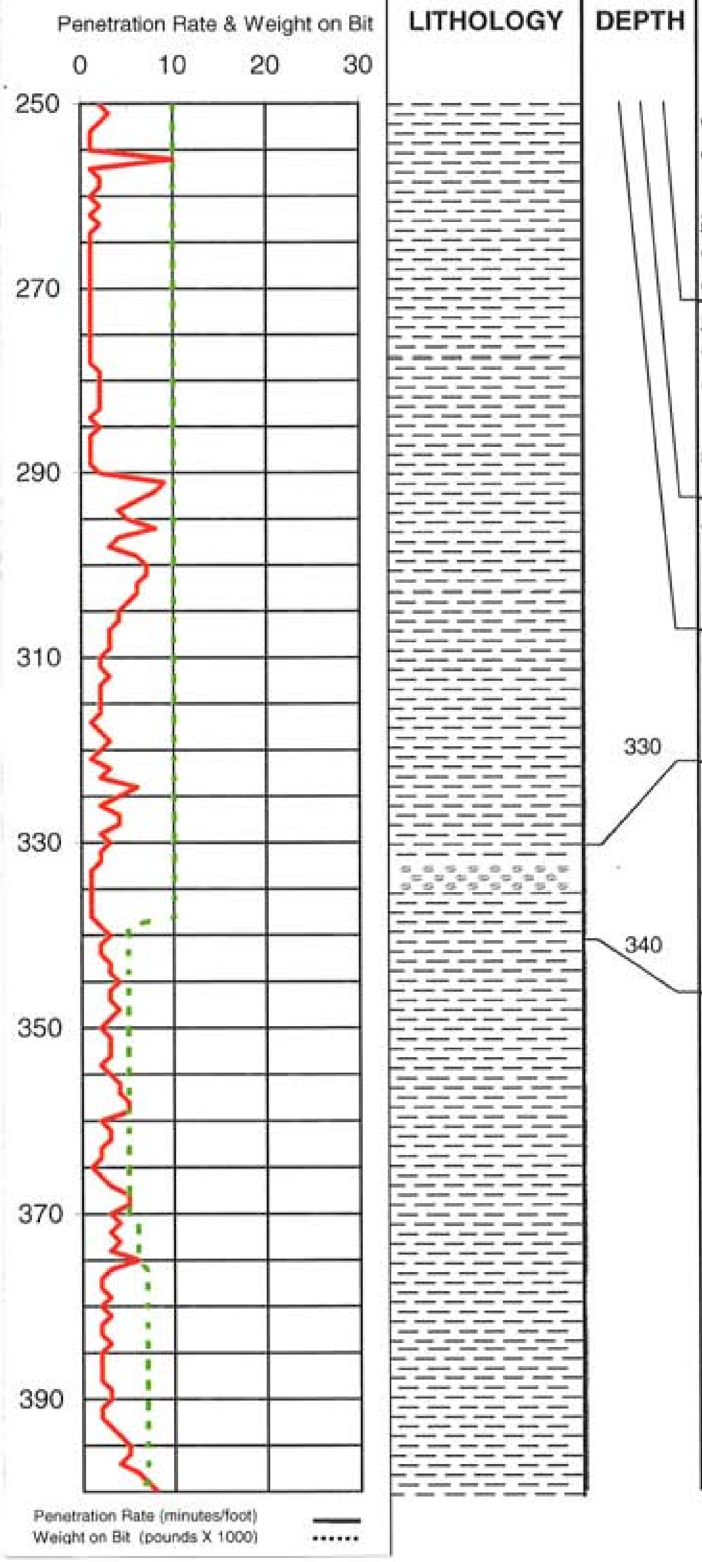
Same as 140'-150' above.

SHELL 10%:

Same as 140'-150' above.

CLAY 70%:

WELL: **Lake Region DIW**



LITHOLOGIC DESCRIPTION

Color – Grayish olive green (5GY 3/2). Texture – unconsolidated clay/mud. Grains – silt to clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

SHELL 30%:

Color – shell fragments stained from the mud difficult to tell actual color. Grains – very coarse grained shell fragments, angular.

CLAY 90%:

Color – Medium light gray (N6). Texture – unconsolidated clay/mud, plastic. Grains – clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Accessories - none. Hardness – soft.

SHELL 10%:

Same as 170 to 180 above.

CLAY 100%:

Color – Light gray (N7) to grayish olive green (5GY 3/2). Texture – unconsolidated clay/mud, plastic. Grains – clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Accessories –none. Hardness – soft.

CLAY 100%:

Color – Grayish olive green (5GY 3/2). Texture – unconsolidated clay/mud, plastic. Grains – clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Accessories – none. Hardness – soft.

CLAY 80%:

Color – Dusky yellow green (5GY 5/2). Texture – unconsolidated clay/mud plastic. Grains – clay sized carbonate. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

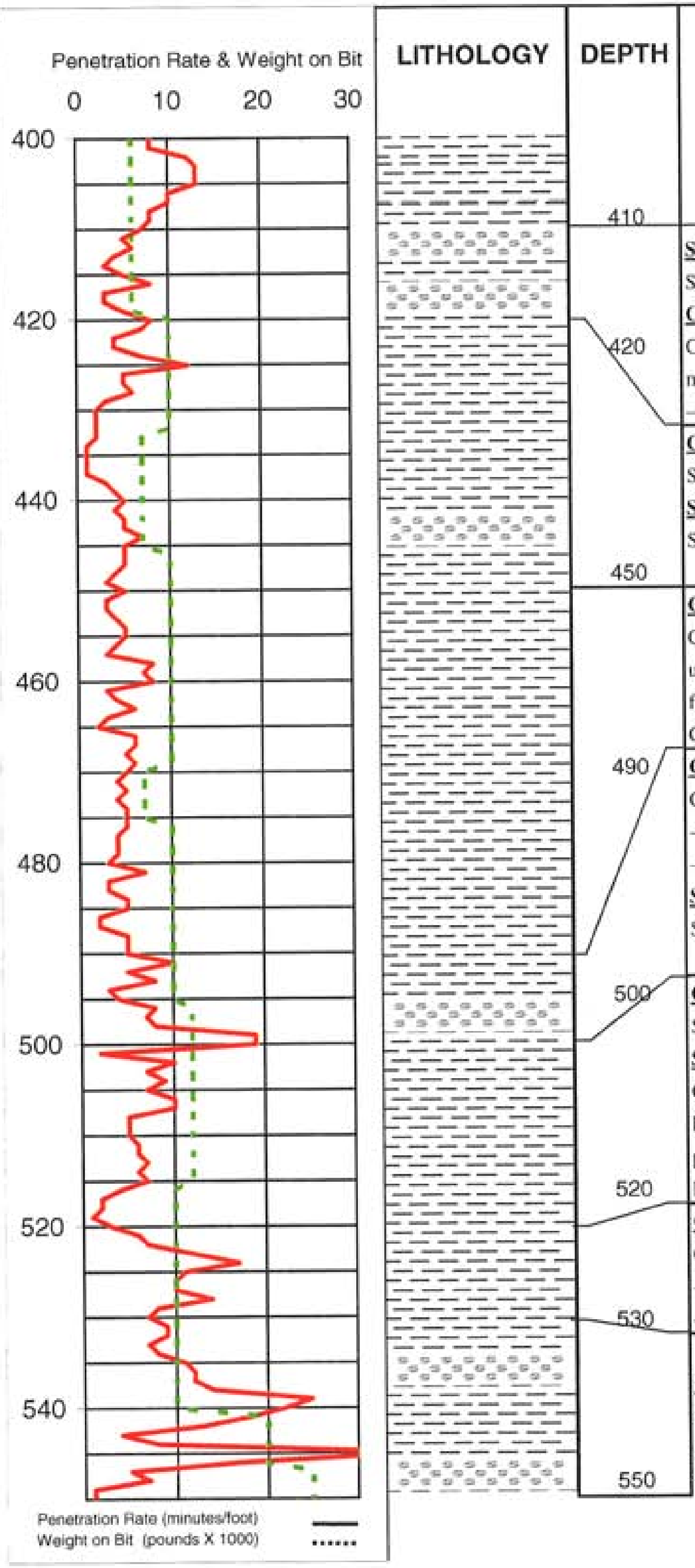
SHELL 20%:

Color – shell fragments stained from the mud difficult to tell actual color. Grains – very coarse grained shell fragments, angular up to ¾ inch long.

CLAY 100%:

Color – Dusky yellow green (5GY 5/2). Texture – unconsolidated clay/mud plastic. Grains – clay sized carbonate with occasional silty nodules. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

WELL: **Lake Region DIW**



LITHOLOGIC DESCRIPTION

SHELL 60%:

Same as 170 to 180 above.

CLAY 40%:

Color – Greenish gray (5GY 6/1). Texture – unconsolidated clay/mud. Grains – mostly clay sized carbonate with some silt and very fine sand. – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 80%:

Same as 410 to 420 above.

SHELL 20%:

Same as 170 to 180 above.

CLAY 100%:

Color – Greenish gray (5GY 6/1) to light olive gray (5Y 5/2). Texture – silt/ unconsolidated clay/mud. Grains – mostly clay sized carbonate with some very fine sand nodules and fine grained shell fragments or tiny whole gastropods. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 80%:

Color – Yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Grains – clay, some silt and very fine sand sized carbonate particles. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

SHELL 20%:

Same as 170 to 180 above.

CLAY 70%:

Same as 490' - 500' above.

SAND 30%:

Color – Yellowish gray (5Y 8/1). Grains – fine to medium grained quartz limestone and phosphate, sub-rounded fragments. Texture – wackestone to packstone, friable. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 100%:

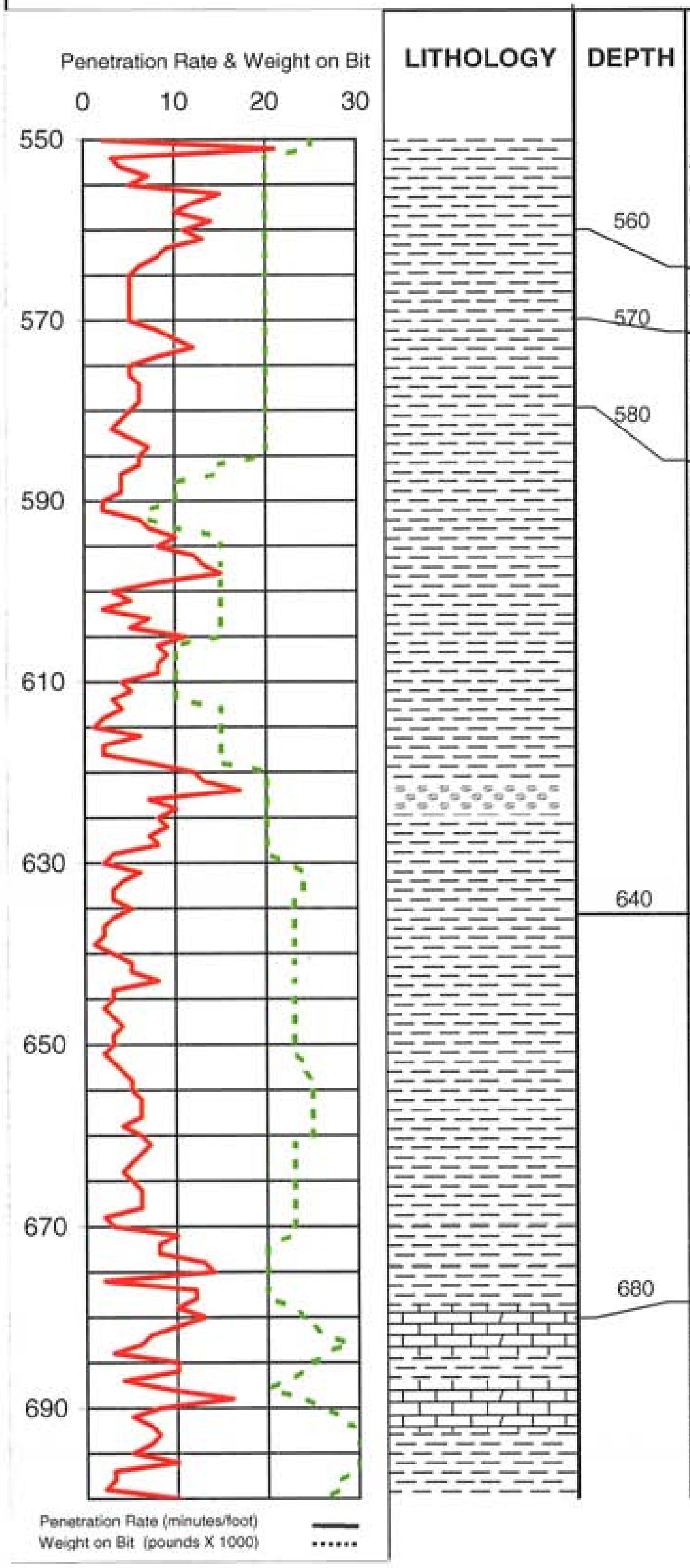
Color – Yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Grains – silty/sandy clay sized carbonate particles. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 60%:

Same as 520' - 530' above.

SHELL 40%:

Same as 170' - 180' above.



LITHOLOGIC DESCRIPTION

CLAY 100%:

Color – Light olive gray (5Y 5/2). Texture – unconsolidated clay/mud. Grains – silty/sandy clay sized carbonate particles. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 100%:

Same as 520' - 530' above.

CLAY 100%:

Color – Light olive gray (5Y 5/2). Texture – unconsolidated clay/mud. Grains – silty/sandy clay sized carbonate particles, <1% shell fragments. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

CLAY 95%:

Same as 520' - 530' above.

SHELL 5%:

Same as 170' - 180' above.

CLAY 100%:

Color – Yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Grains – silt and clay sized particles, <1% shell fragments. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

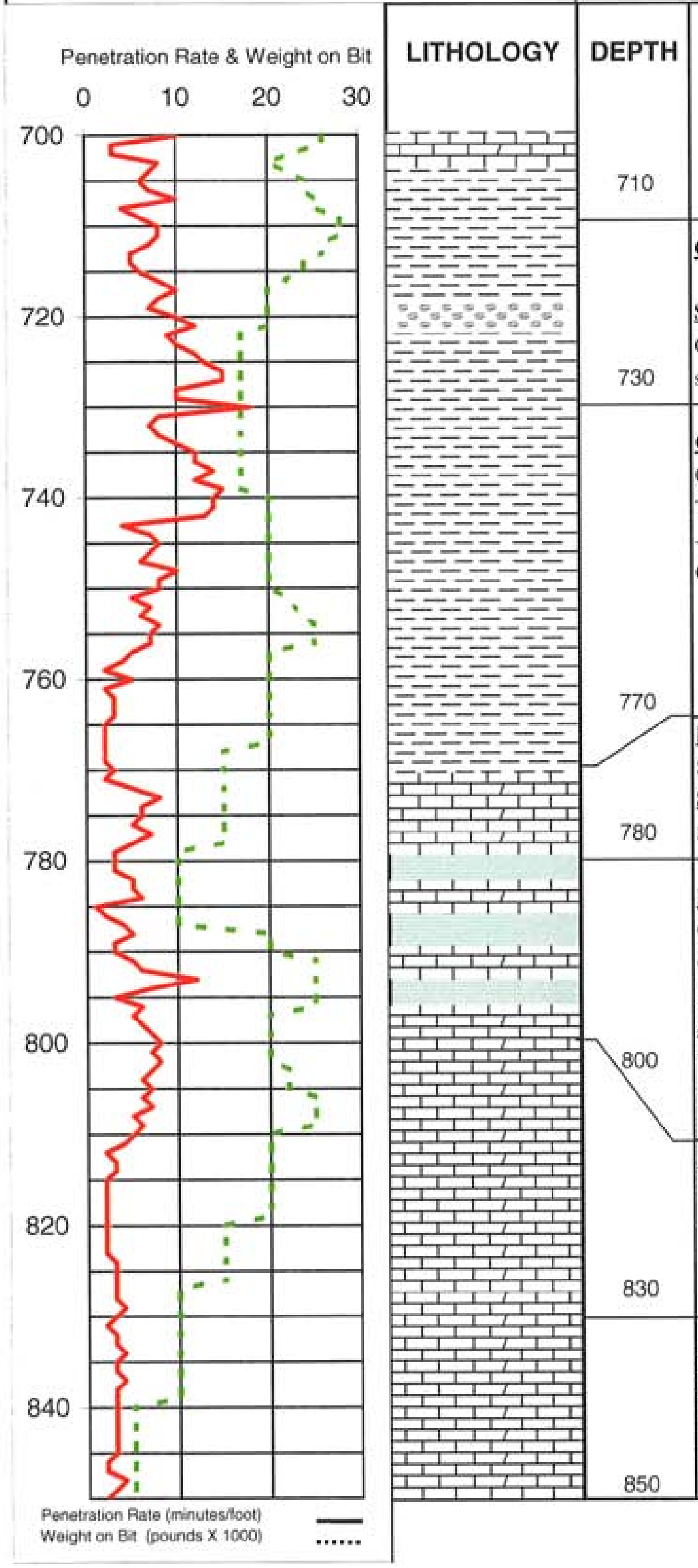
MARL 80%:

Color – Yellowish gray (5Y 7/2). Texture – unconsolidated clay/mud. Porosity – low. Permeability – low. Hardness – soft.

SAND/SILT 20%:

Grains – fine to coarse grained sand particles – quartz and calcite-sub rounded, <1% phosphate grains.

WELL: **Lake Region DIW**



LITHOLOGIC DESCRIPTION

CLAY 90%:

SAND and SHELL 20%:

Grains – fine to coarse grained sand particles – quartz and calcite – sub rounded, and shell fragments – angular, <1% phosphate grains.

CLAY 100%:

Color – yellowish gray (5YR 7/2) to light olive gray (5Y 5/2). Texture – unconsolidated mud/clay, tacky and plastic. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft. Grains – <1% medium grained sand and shell particles.

MARL 80%:

Same as 680 to 710 above.

SAND/SILT 20%:

Same as 680 to 710 above.

MARL 50%:

Color – med. light gray (N5-N6). Texture – unconsolidated clay/mud. Grains – silt sized grains. Cement/Matrix – none. Porosity – low. Permeability – low. Hardness – soft.

SAND/SILT 50%:

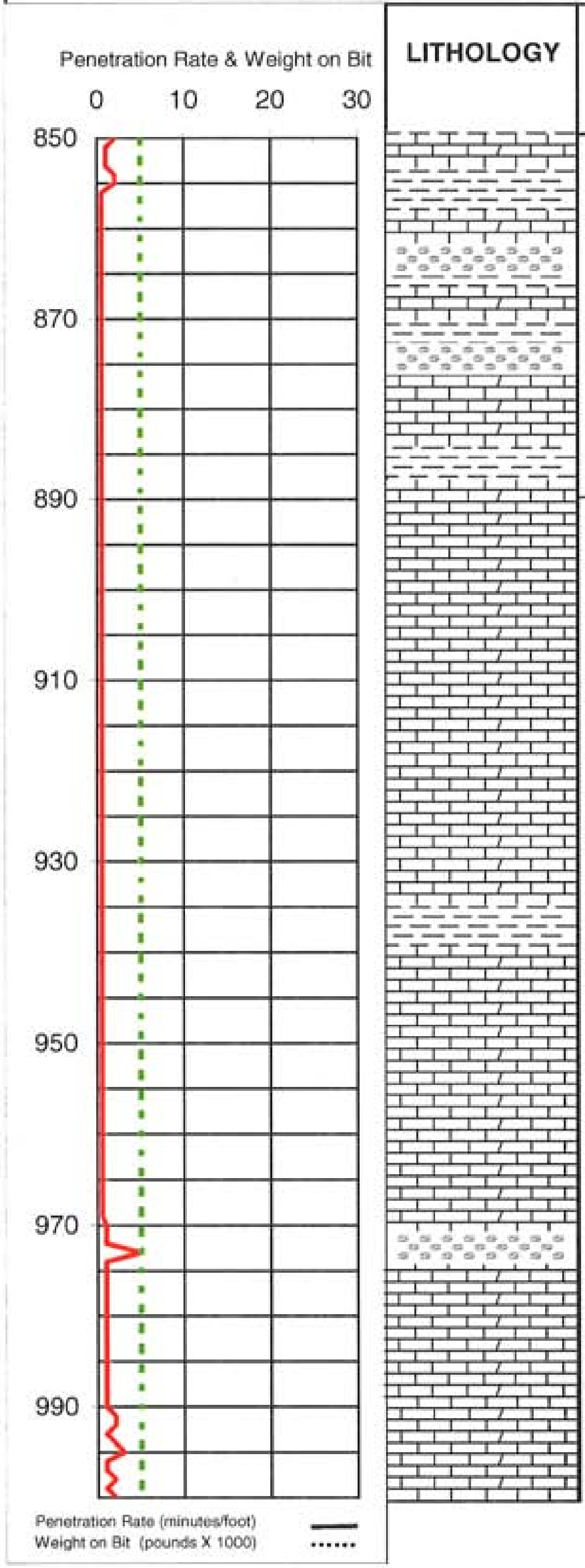
Texture – wackestone to packstone, friable. Grains – fine to very coarse grained sand particles – quartz and calcite- sub rounded, <1% phosphate grains.

LIMESTONE 100%:

Color - Light Gray (N7) to Olive Gray (5Y 4/1). Texture – wackestone to packstone. Grains - fine grained, moderately rounded. Porosity – medium. Permeability - medium. Hardness – hard.

LIMESTONE 100%:

Color - Very pale orange (10YR 8/2). Texture – unconsolidated, fine grained, micritic limestone. Grains - fine grained, sub rounded. Porosity – medium. Permeability - medium. Hardness – hard.



DEPTH

LITHOLOGIC DESCRIPTION

850–890

LIMESTONE 50%:

Color - Very pale orange (10YR 8/2). Texture - friable to unconsolidated. Grains - coarse to fine grained, poorly sorted. Cement/Matrix - calcite. Porosity - Medium. Permeability - medium. Hardness - moderate.

CLAY 30%:

Color - med light gray (N6). Texture - unconsolidated clay/mud. Grains - silt to clay sized.

LOOSE FOSSILS and SHELL FRAGMENTS 20%:

Color - Very pale orange (10YR 8/2). Grains - whole to broken, fragmented. Shell and discoid fossils (Foraminifera).

LIMESTONE 90%:

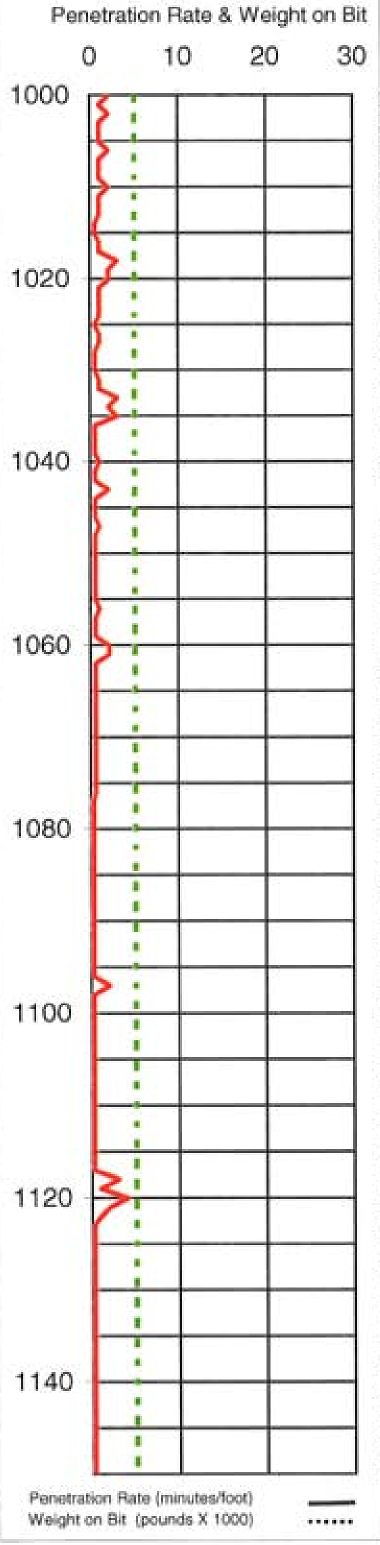
Color - Very pale orange (10YR 8/2). Texture - friable to unconsolidated. Grains - coarse to fine grained, poorly sorted. Cement/Matrix - calcite. Porosity - Medium. Permeability - medium. Hardness - moderate.

FOSSIL FRAGMENTS 5%:

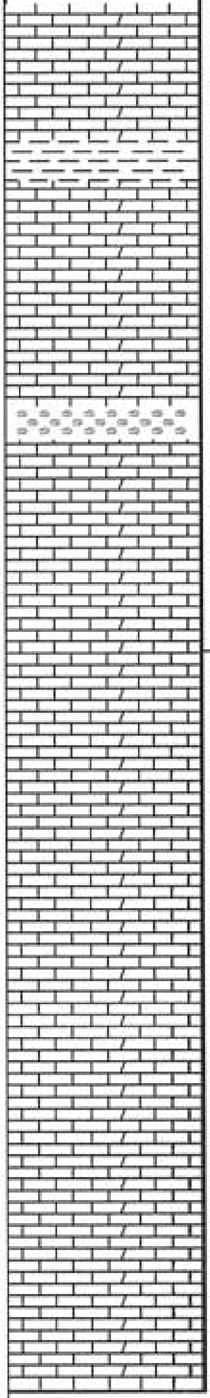
Color - Very pale orange (10YR 8/2). Grains - whole to broken, fragmented. Shell, discoid fossils.

CLAY 5%:

Color - med light gray (N6). Texture - compact uncemented clay/mud. Grains - silt to clay sized.



LITHOLOGY



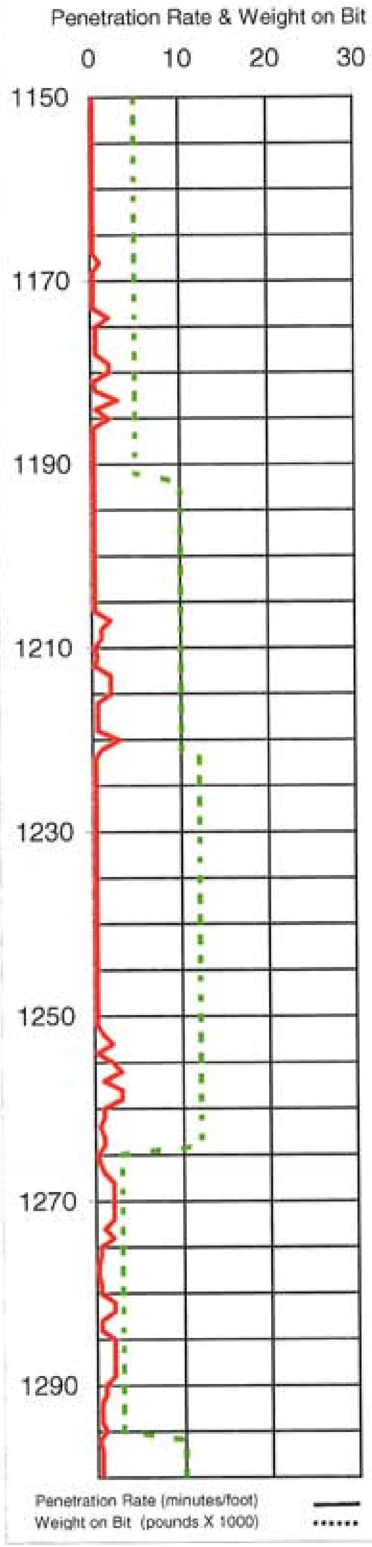
DEPTH

LITHOLOGIC DESCRIPTION

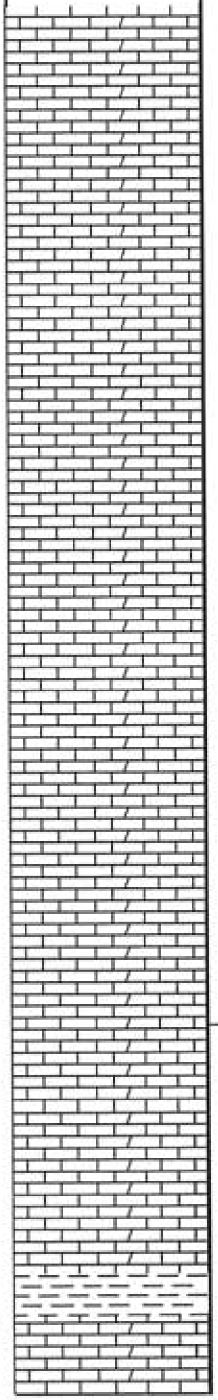
1070

LIMESTONE 100%:

Same as 890 to 1070 above.



LITHOLOGY



DEPTH

LITHOLOGIC DESCRIPTION

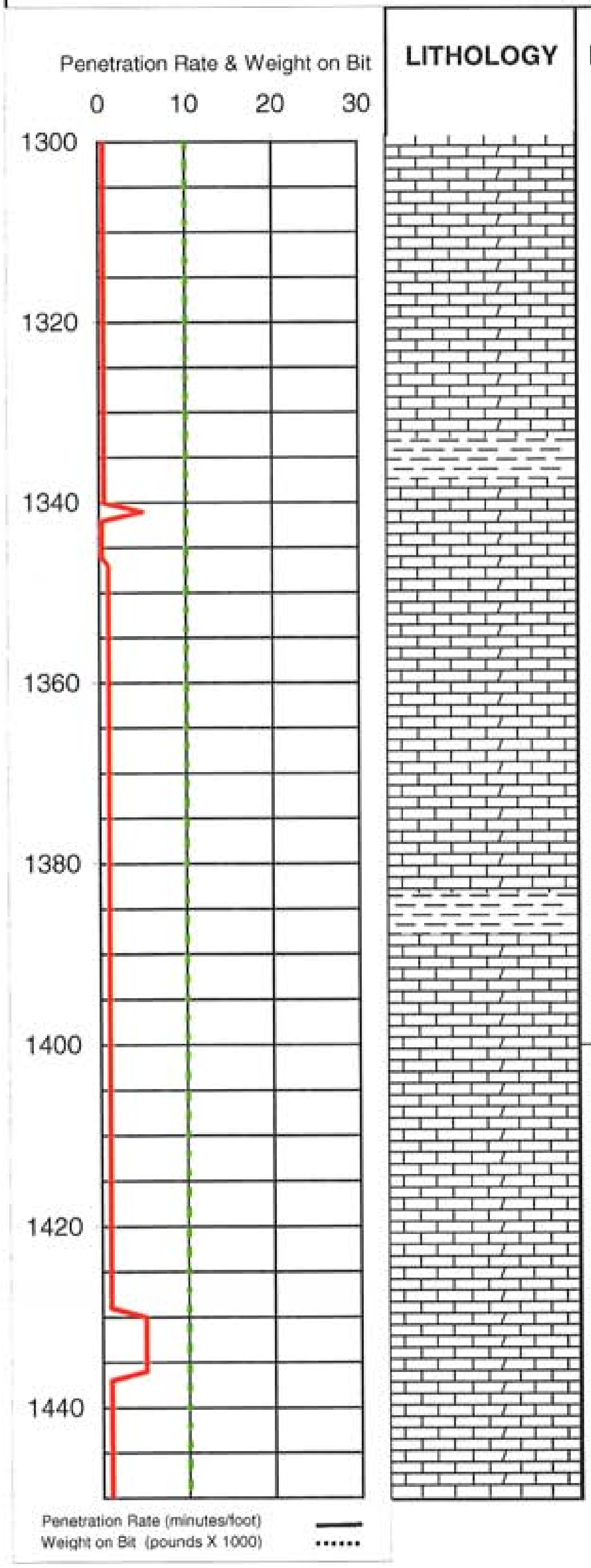
1260

LIMESTONE 85%:

Same as 890 to 1070 above.

CLAY 15%:

Color - med light gray (N6). Texture - compact unconsolidated clay/mud. Grains - silt to clay sized.



DEPTH

LITHOLOGIC DESCRIPTION

1400

LIMESTONE 100%:

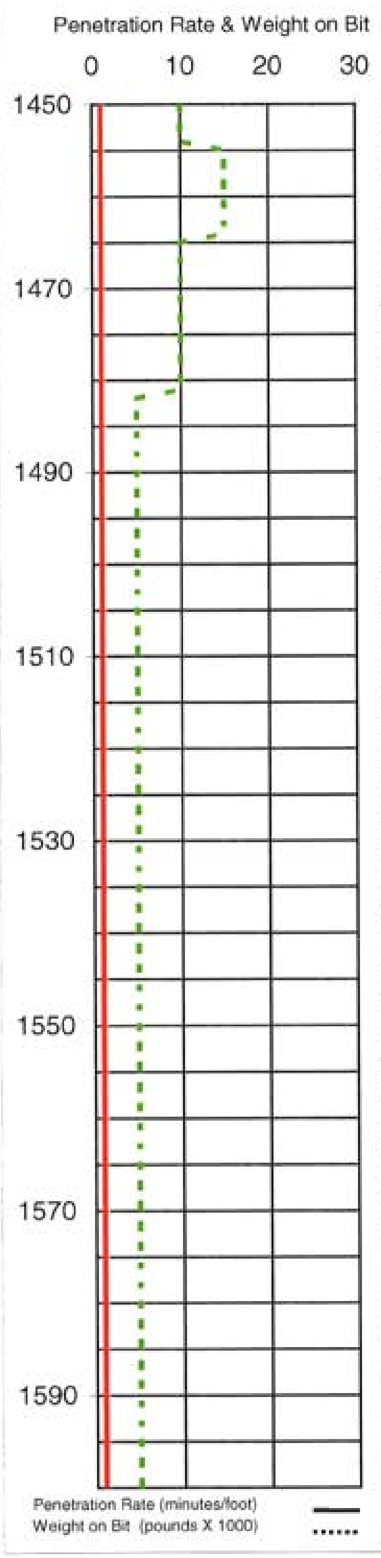
Same as 890 to 1070 above.

90%, Texture - coarse grained. Hardness – soft, friable.

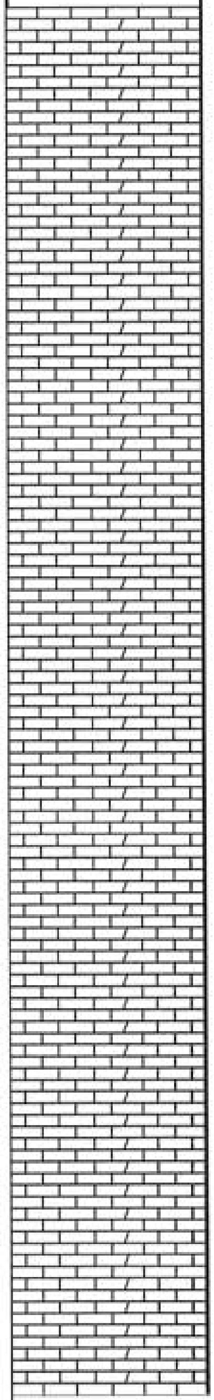
10 % Texture - fine grained. Hardness - friable.

Note: foraminifera present in samples from 1520-1560.

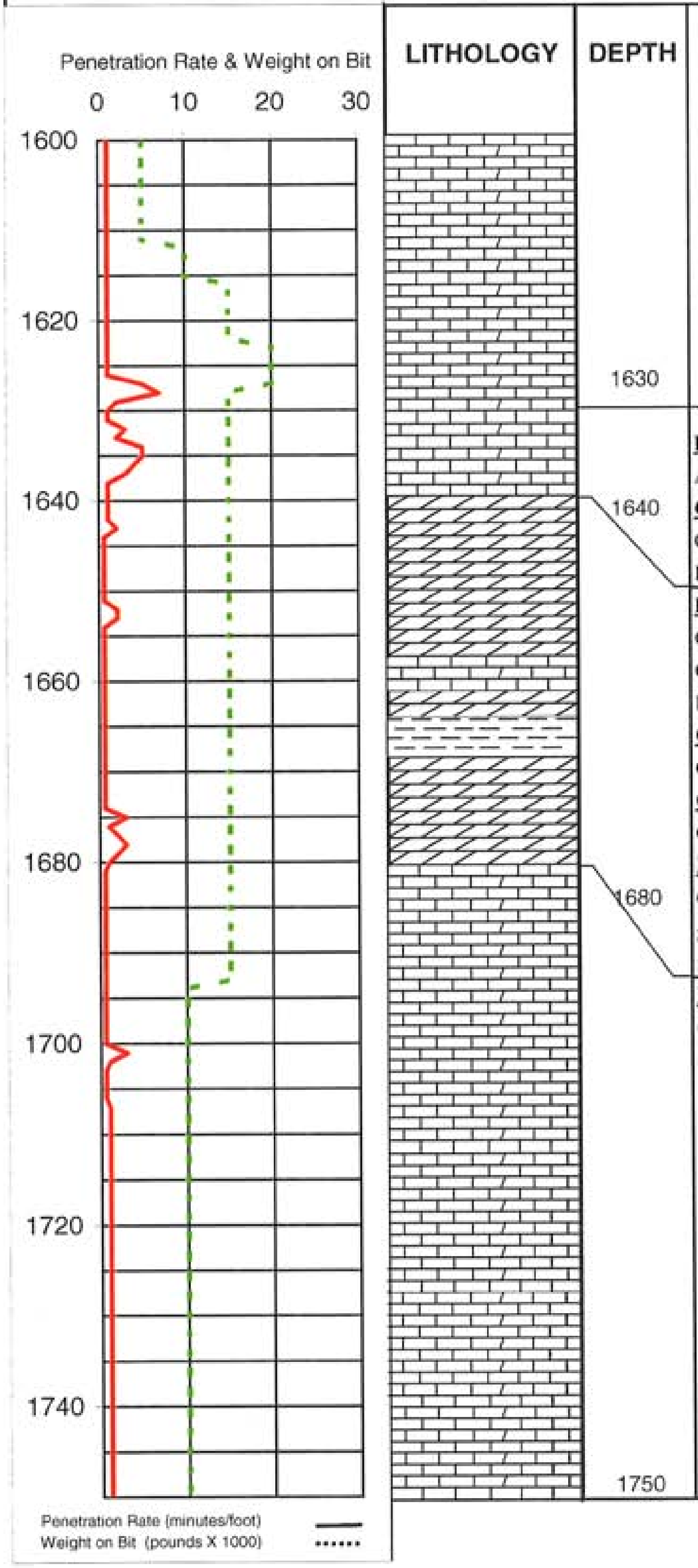
WELL: **Lake Region DIW**



LITHOLOGY | **DEPTH** | **LITHOLOGIC DESCRIPTION**



WELL: **Lake Region DIW** Page: 12



LITHOLOGIC DESCRIPTION

LIMESTONE 97%:

As 1450 – 1630 above.

CHERT 3%:

Color - yellowish brown (10YR 6/2). Texture – microcrystalline. Hardness – very hard, non-friable.

DOLOMITE 95%:

Color – Dark Yellowish brown (10YR 4/2). Texture – microcrystalline. Cement/matrix - none. Porosity - high. Permeability - high. Hardness - Very hard. Note: some small solution pitting seen.

CLAY 1%:

Color – Very pale orange (10 YR 8/2). Texture - fine grained. Hardness -

CLAY 1%:

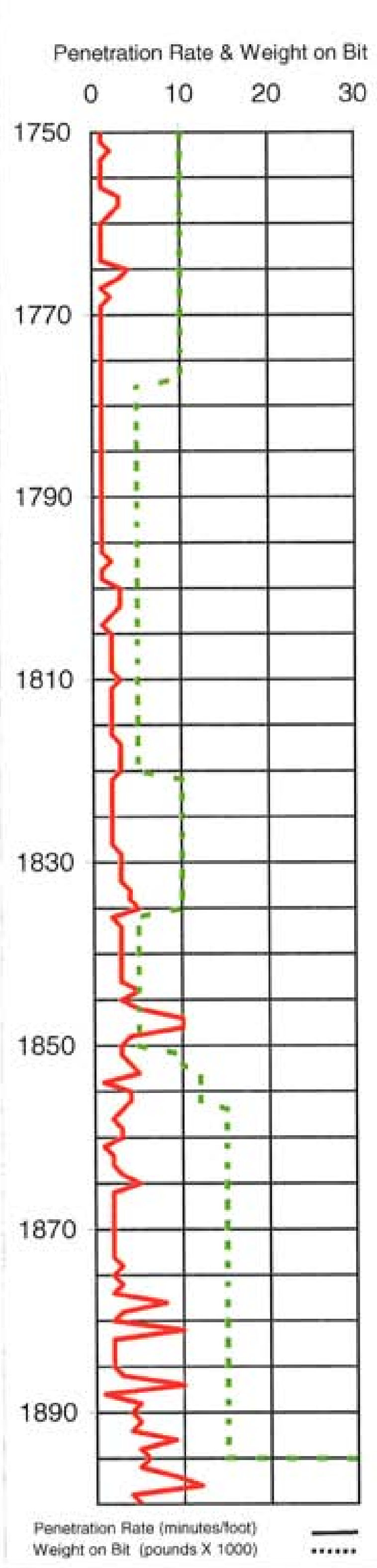
Color - med light gray (N6). Texture - Well indurated, hard.

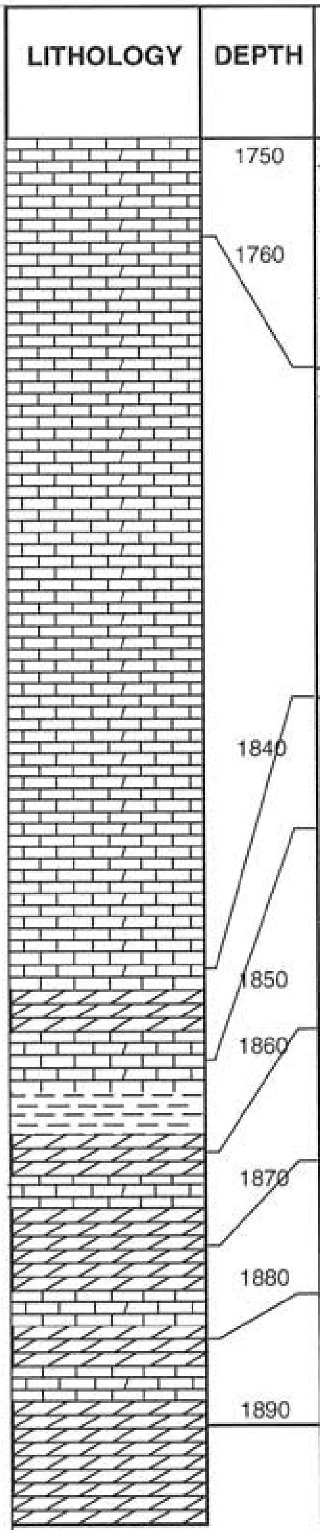
LIMESTONE 3%:

Color - Pale Yellowish Brown (10YR 6/2). Texture – fine to medium grained with well rounded grains. Cement/matrix - calcite. Porosity - medium. Permeability - medium. Hardness - moderate.

LIMESTONE 100%:

Color - Very pale orange (10YR 8/2). Texture - medium grained. Cement/matrix - calcite. Porosity - medium. Permeability - medium. Hardness – soft, friable.





LITHOLOGIC DESCRIPTION

LIMESTONE 95%:

Color - Pale Yellowish Brown (10YR 6/2). Texture – fine to medium grained with well rounded grains. Cement/matrix - calcite. Porosity - medium. Permeability - medium. Hardness – moderate.

DOLOMITE 5%:

Color – Dark Yellowish brown (10YR 4/2). Texture – microcrystalline. Hardness - Very hard.

LIMESTONE 100%:

As 1680 to 1750 above.

LIMESTONE 85%:

As 1750 – 1760 above.

DOLOMITE 15%:

As 1750 – 1760 above.

LIMESTONE 65%:

As 1750 – 1760 above.

DOLOMITE 30%:

As 1750 – 1760 above.

CLAY 5%:

Color- med light gray (N6). Texture- Well indurated, hard.

DOLOMITE 85%:

As 1850 – 1860 above.

LIMESTONE 15%:

As 1850 – 1860 above.

DOLOMITE 60%:

As 1850 – 1860 above.

LIMESTONE 40%:

As 1850 – 1860 above.

DOLOMITE 90%:

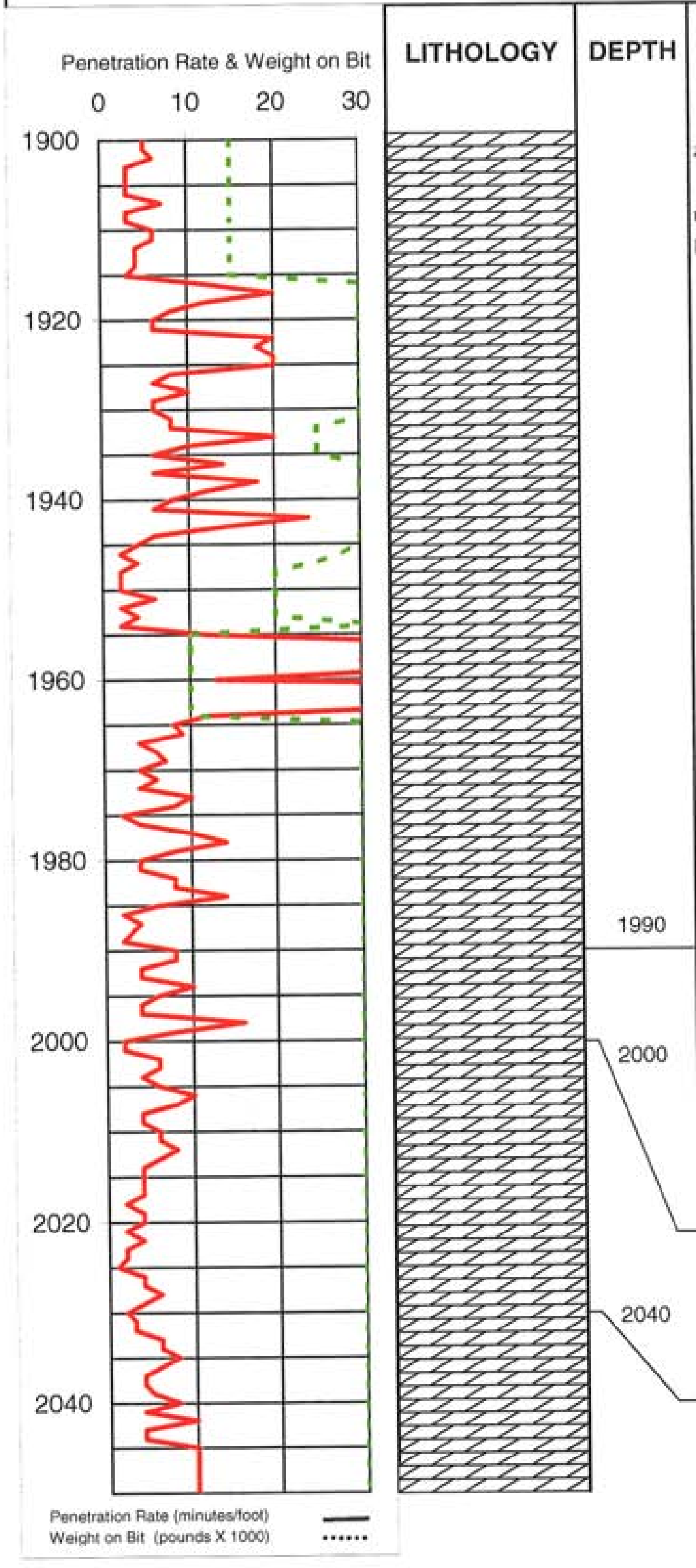
As 1850 – 1860 above.

LIMESTONE 10%:

As 1850 – 1860 above.

DOLOMITE 100%:

Color – moderate yellowish brown (10YR 5/4). Texture – micritic to packstone, thinly bedded. Some moderate thickness fractured



LITHOLOGIC DESCRIPTION

zones. Grains – massive to very finely crystalline. Cement/Matrix – dolomitic. Porosity – very low (<5%), Permeability - low in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – none observed.

DOLOMITE 85%:

As 1890 to 1990 above.

CLAY 15%:

Color – pale yellowish brown (10YR 6/2). Texture – slightly to moderately plastic. May fill dolomite fractures or found as thin mudstone beds. Grains – some fine sand. Cement/Matrix – dolomitic. Porosity – moderate to high. Permeability - low. Hardness – very soft. Fossils – none observed.

DOLOMITE 95%:

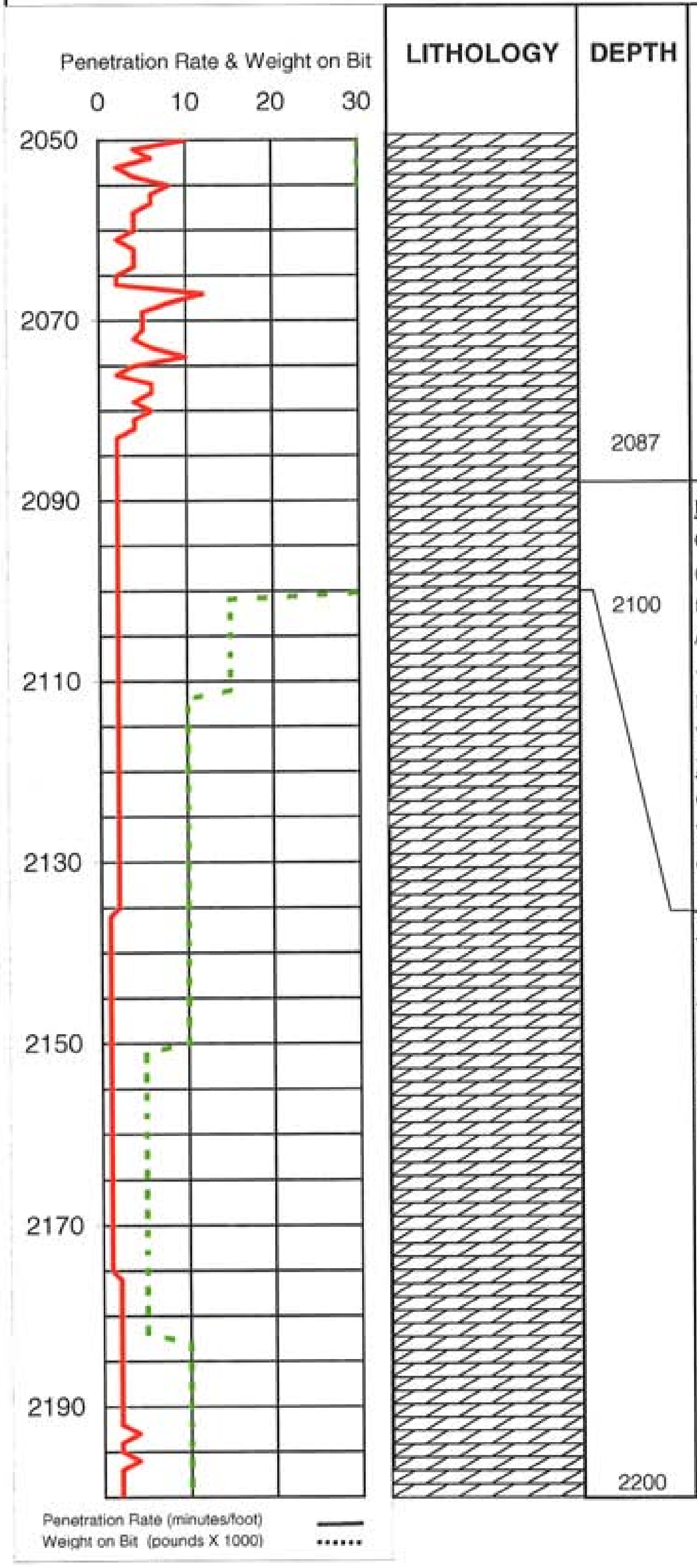
As 1890 to 1990 above.

CLAY 5%:

As 1890 to 1990 above.

DOLOMITE 100%:

As 1890 to 1990 above.



LITHOLOGIC DESCRIPTION

DOLOMITE 80%:

Color – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). Texture – micritic to packstone, thinly bedded. Some fractured zones. Grains – massive to very finely crystalline. Cement /Matrix – dolomitic. Porosity – very low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – none observed. Thinly interbedded with:

PACKSTONE 20%:

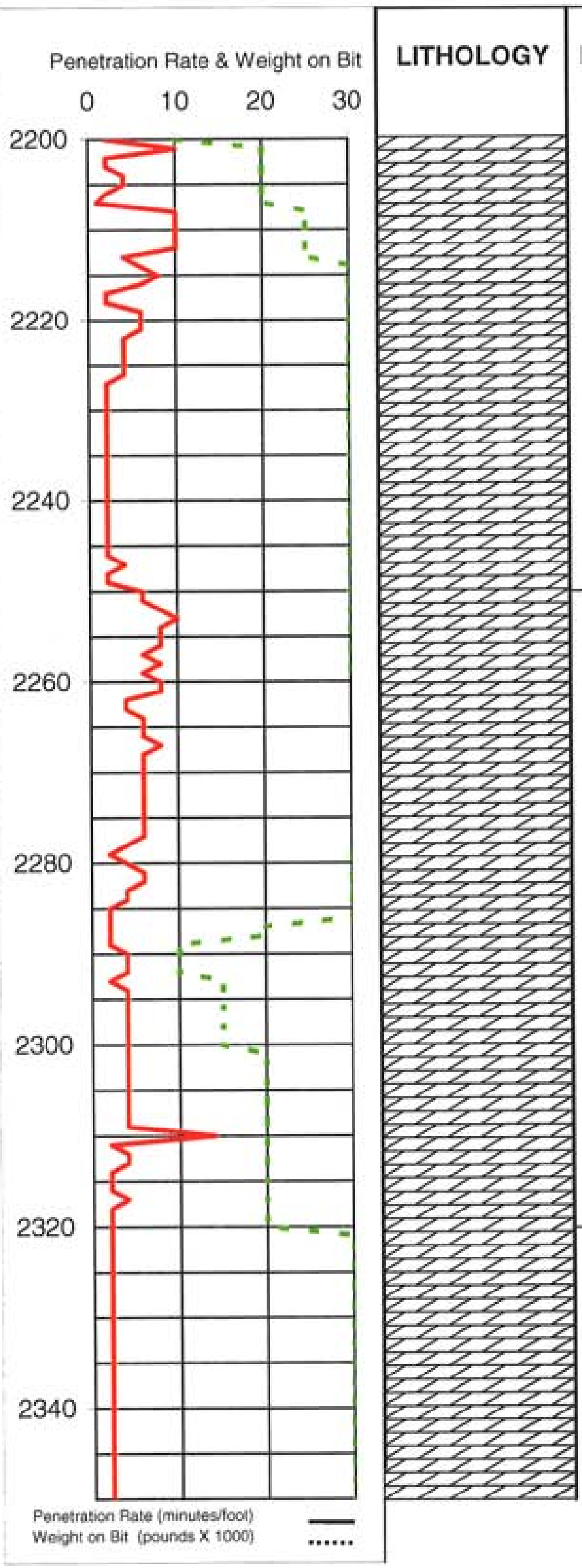
Color – light gray (5Y 8/1). Grains – fine to medium grained. Texture – grains loosely cemented, appears oolitic or pelitic. Cement/Matrix – calcium carbonate. Porosity – high. Permeability – moderate to high. Hardness – soft.

DOLOMITE 80%:

As 2087 to 2100 above.

PACKSTONE 20%:

Color – light gray (5Y 8/1). Grains – fine to medium grained. Texture – grains loosely cemented, appears oolitic or pelitic. Cement/Matrix – calcium carbonate. Porosity – high. Permeability – moderate to high. Hardness – soft to very soft.



DEPTH

LITHOLOGIC DESCRIPTION

DOLOMITIC SAND 80%:

Color – grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6). Texture – moderately lithified to loose. Grains – fine to medium grained dolomite. Cement/Matrix – dolomitic. Porosity – high to very high. Permeability - high to very high, produces water with strong sulfur odor. Hardness – soft to very soft where unconsolidated (bit fell freely between 2218 to 2228 feet), moderately hard to hard and roughly fractured in competent dolomites. Fossils – coral, shell fragments?

DOLOMITE 20%:

Color – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

2050

DOLOMITE 80%:

As 2200 to 2250 above.

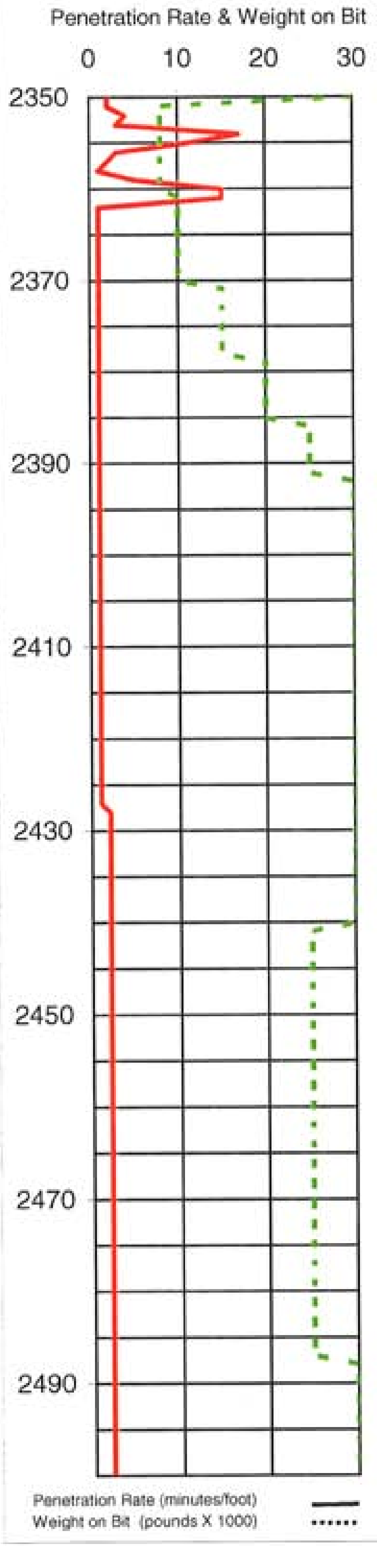
DOLOMITIC SAND 20%:

As 2200 to 2250 above.

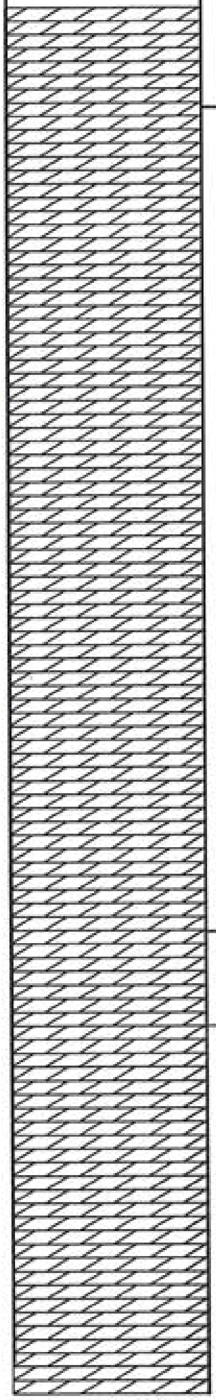
2320

DOLOMITE 90%:

Color – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). Texture – packstone to wackestone, highly fractured/vuggy. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?



LITHOLOGY



DEPTH

LITHOLOGIC DESCRIPTION

DOLOMITIC SAND 10%:

As 2200 to 2250 above.

2360

DOLOMITIC SAND 95%:

Color – grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6). Texture – moderately lithified to loose. Grains – fine to medium grained dolomite. Cement/Matrix – dolomitic. Porosity – high to very high. Permeability - high to very high. Hardness – very soft. Fossils – coral, shell fragments?

DOLOMITE 5%:

Color – grayish orange (10Y 7/4). Grains – fine to medium grained. Texture – grains loosely cemented, appears oolitic or pelitic. Cement/Matrix – calcium carbonate. Porosity – high. Permeability – moderate to high. Hardness – soft to very soft.

2450

DOLOMITE 100%:

Color – moderate pale brown (10YR 6/2). Texture – packstone to wackestone. Highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – hard.

2460

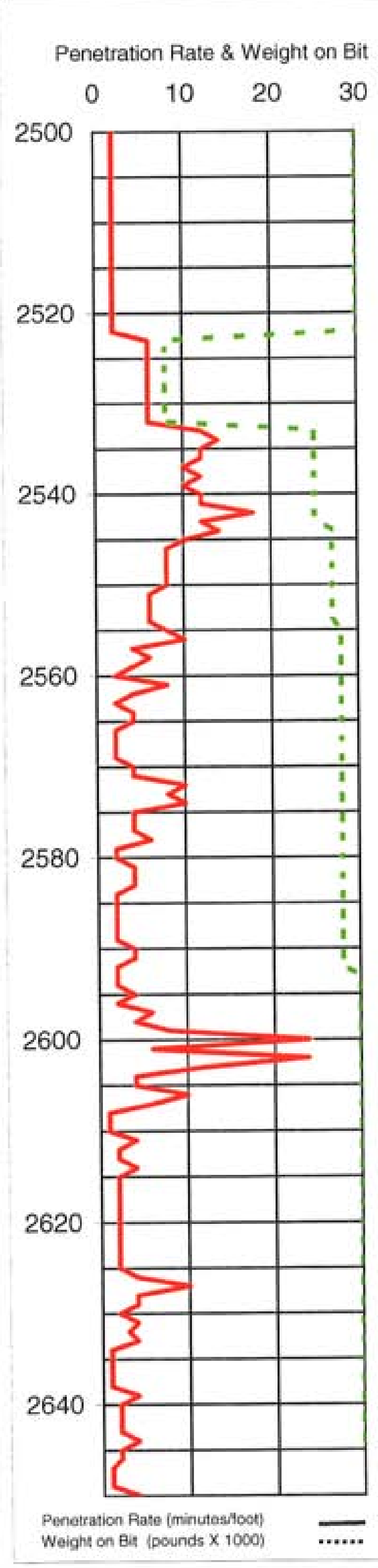
DOLOMITIC SAND 90%:

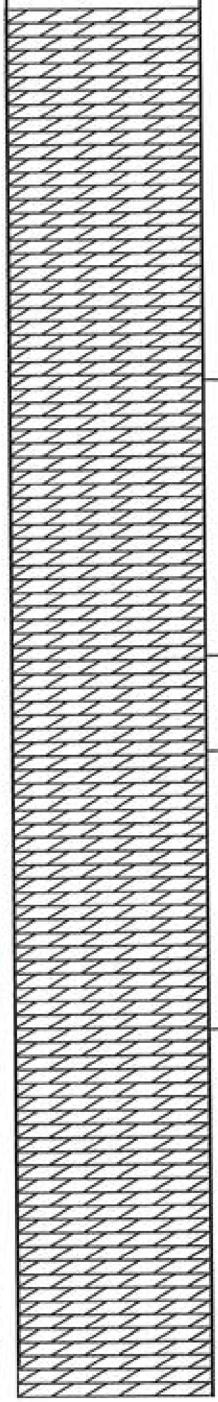
As 2360 to 2450 above.

DOLOMITE 10%:

As 2320 to 2360 above.

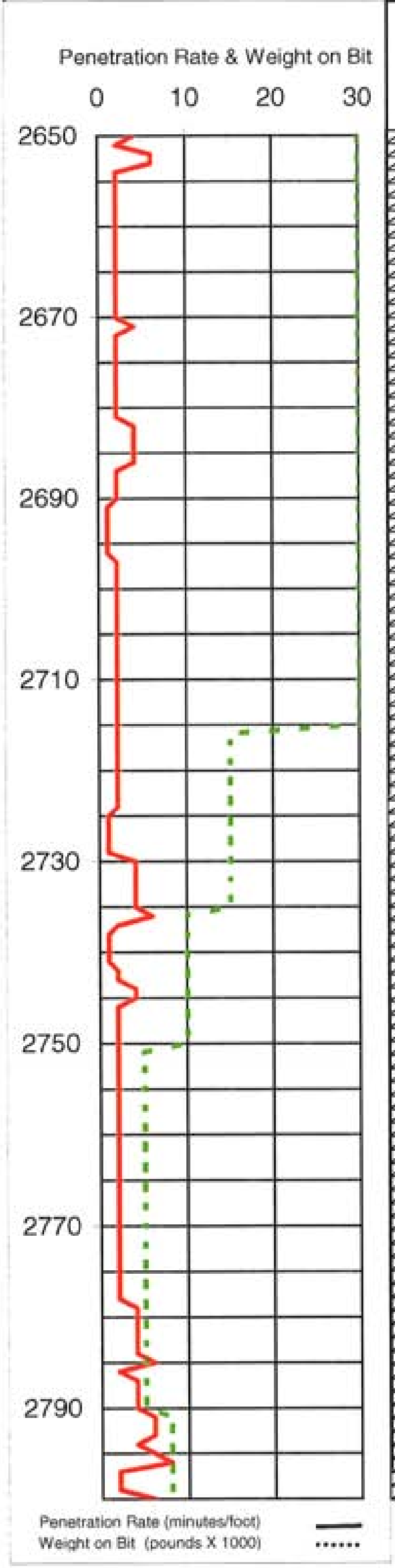
WELL: **Lake Region DIW**



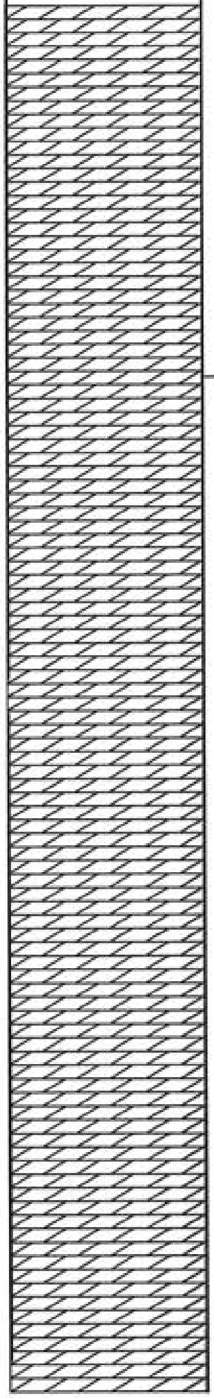


LITHOLOGY	DEPTH	LITHOLOGIC DESCRIPTION
	2540	
		DOLOMITIC SAND 95%: As 2360 to 2450 above. **DOLOMITE 5%:** As 2360 to 2450 above.
	2570	
	2580	**DOLOMITIC SAND 90%:** As 2360 to 2450 above. **DOLOMITE 10%:** As 2460 to 2540 above.
		DOLOMITIC SAND 95%: As 2360 to 2450 above. **DOLOMITE 5%:** As 2540 to 2570 above.
	2610	
		DOLOMITIC SAND 90%: As 2360 to 2450 above. **DOLOMITE 10%:** As 2570 to 2580 above.

WELL: **Lake Region DIW**



LITHOLOGY



DEPTH

LITHOLOGIC DESCRIPTION

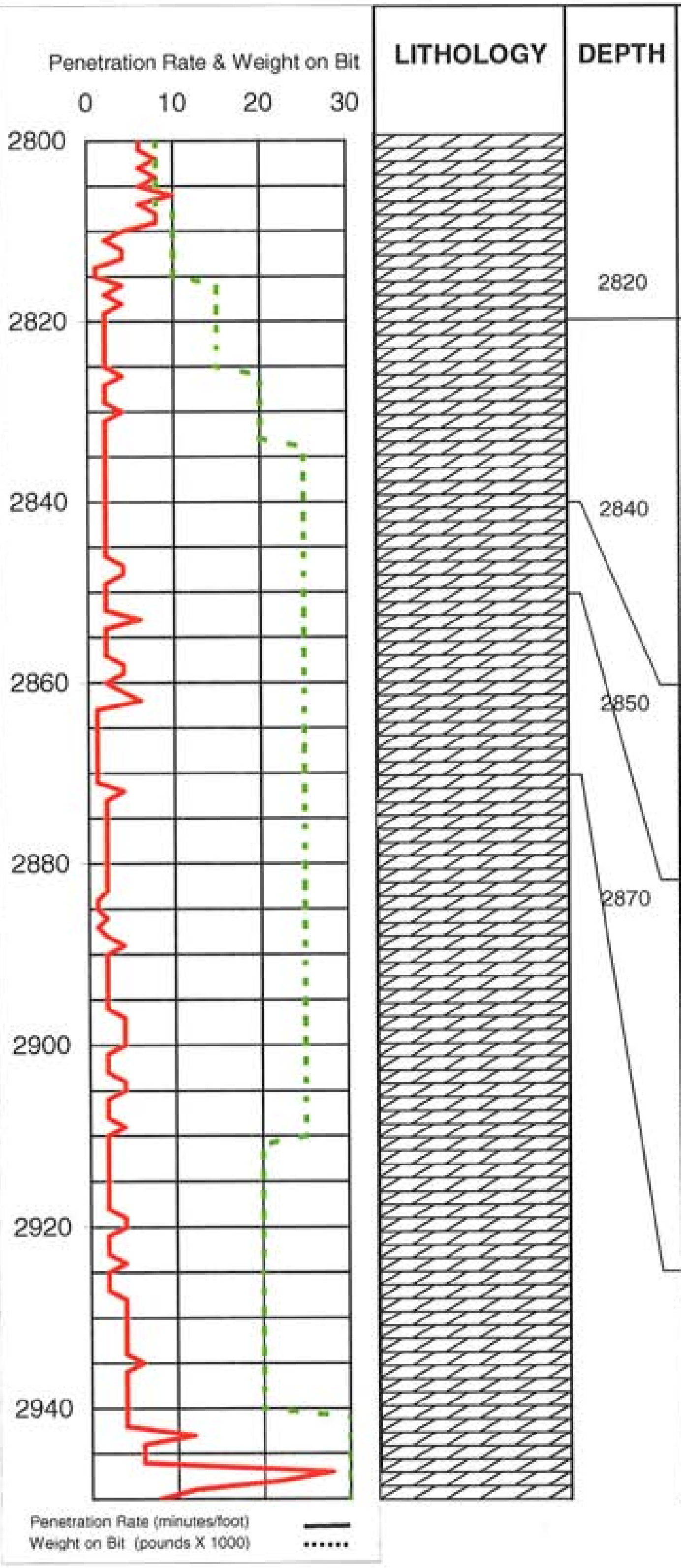
2690

DOLOMITIC SAND 90%:

As 2360 to 2450 above.

DOLOMITE 10%:

As 2320 to 2360 above.



LITHOLOGIC DESCRIPTION

DOLOMITIC SAND 90%:

Color – pinkish grayish (5YR 8/1). Texture – moderately lithified to loose. Grains – fine to medium grained dolomite. Cement/Matrix – dolomitic. Porosity – high to very high. Permeability - high to very high. Hardness – soft. Fossils – coral, shell fragments?

DOLOMITE 10%:

Color – pinkish grayish (5YR 8/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITE 100%:

Color – moderate olive brown (5YR 4/4). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITIC SAND 60%:

Color – tan/buff grayish (10YR 8/2) to pale brown (10YR 6/2). Texture – moderately lithified to loose. Grains – medium to very coarse grained limestone and dolomite, sub-rounded. Cement/Matrix – calcite. Porosity – high to very high, Permeability - high to very high. Hardness – medium. Fossils – coral, shell fragments?

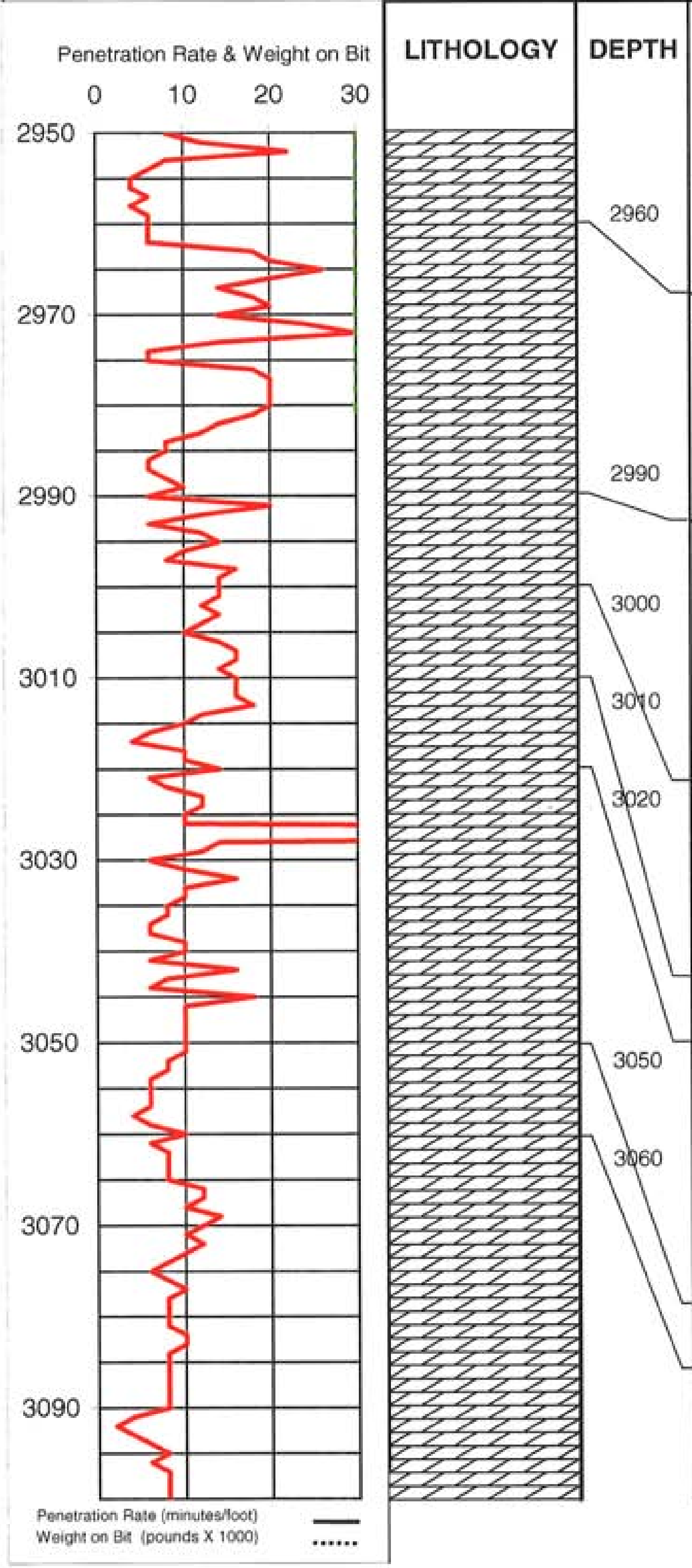
LIMESTONE/DOLOMITE 40%:

Color – tan/buff grayish (10YR 8/2 to 10YR 6/2). Texture – grainstone to boundstone, fractured, some pieces effervesce more than others. Cement/Matrix – calcite. Porosity – low to moderate. Permeability - moderate, higher in fractured zones. Hardness – moderately hard to hard. Fossils – shell fragments.

DOLOMITIC SAND 85%:

Color – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). Texture – moderately lithified to loose. Grains – fine to medium grained dolomite and some limestone, some grains effervesce, sub-rounded. Cement/Matrix – calcite. Porosity – high to very high. Permeability - high to very high. Hardness – medium. Fossils – shell fragments.

LIMESTONE/DOLOMITE 15%:



LITHOLOGIC DESCRIPTION

Color – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). Texture – grainstone to boundstone, fractured, some pieces effervesce more than others. Cement/Matrix – calcite. Porosity – low to moderate. Permeability - moderate, higher in fractured zones. Hardness – moderately hard to hard. Fossils – shell fragments.

DOLOMITE 100%:

Color – light olive gray (5YR 6/1) to medium dark gray (N4) to brownish gray (5YR 4/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITIC SAND 90%:

As 2870 to 2960 above.

LIMESTONE/DOLOMITE 10%:

Color – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). Texture – grainstone to boundstone, fractured, some pieces effervesce more than others. Cement/Matrix – calcite. Porosity – low to moderate. Permeability - moderate, higher in fractured zones. Hardness – moderately hard to hard. Fossils – shell fragments.

DOLOMITE 100%:

Color – light olive gray (5YR 6/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITIC SAND 100%:

As 2870 to 2960 above.

DOLOMITE 90%:

Color – olive gray (5YR 4/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITIC SAND 10%:

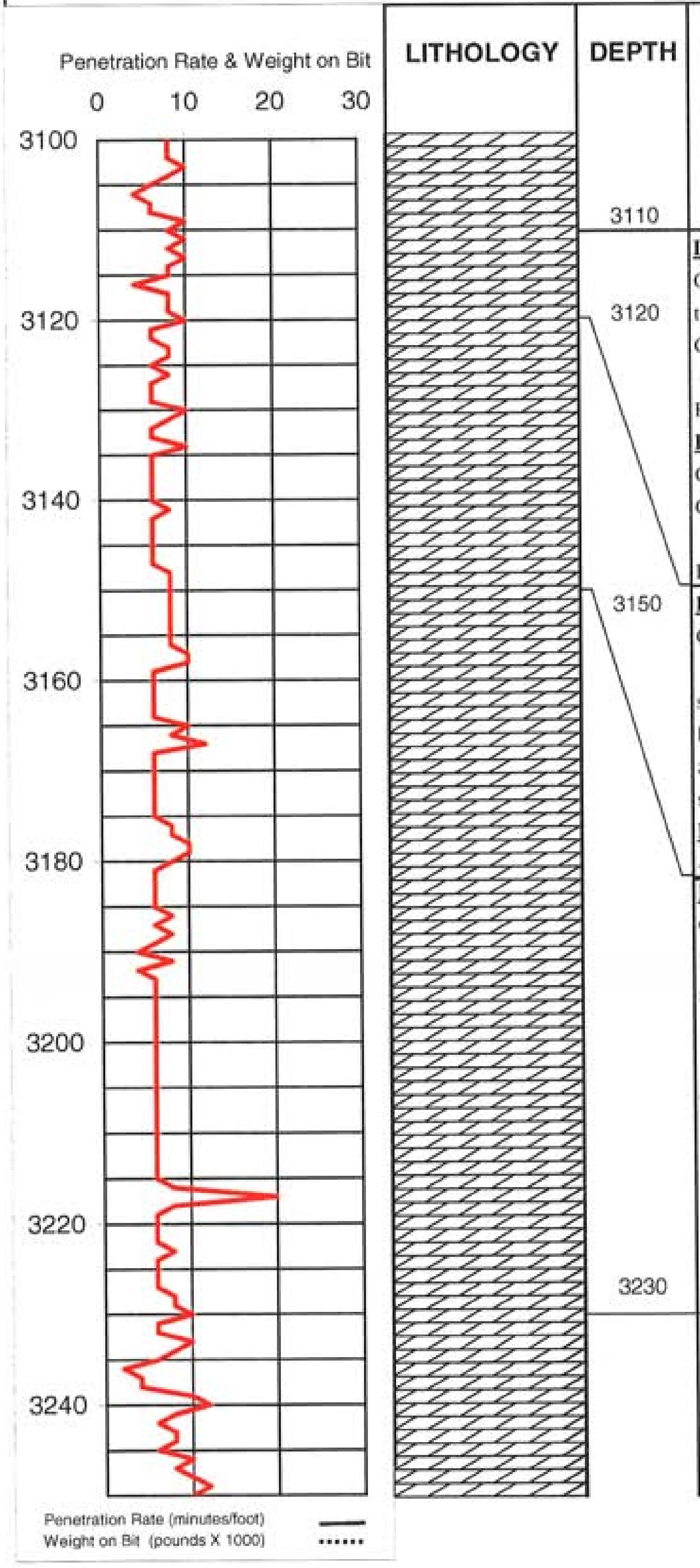
As 2870 to 2960 above.

DOLOMITIC SAND 100%:

As 2870 to 2960 above.

DOLOMITE 100%:

As 3000 to 3010 above.



LITHOLOGIC DESCRIPTION

DOLOMITE SAND 95%:

Color – light olive gray (5YR 6/1). Texture – moderately lithified to loose, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability – low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITE 5%:

Color – light olive gray (5YR 6/1). Texture – packstone to wackestone. Cement/Matrix – dolomitic. Porosity – low to moderate, Permeability – low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITE 90%:

Color – medium light gray (N6) to brownish gray (5YR 4/1). Texture – packstone to wackestone, highly fractured. Grains – fine to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITIC SAND 10%:

As 3110 to 3120 above.

DOLOMITIC SAND 90%:

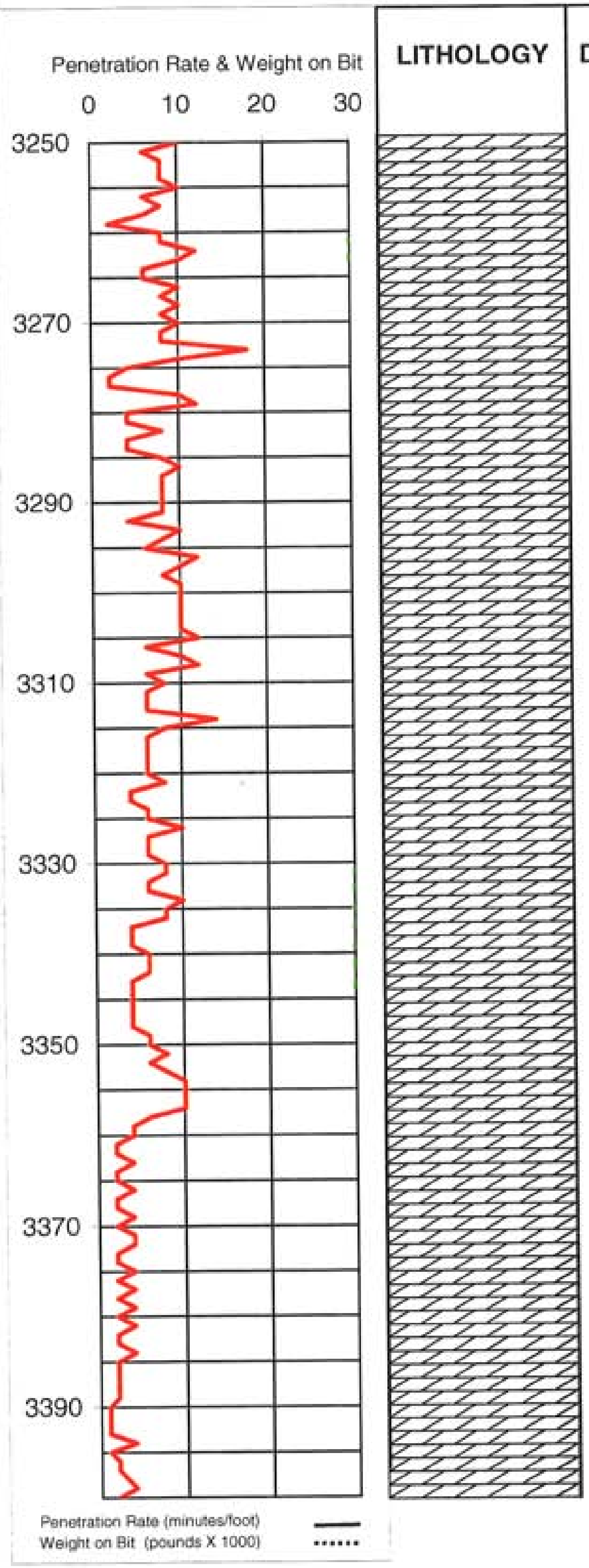
Color – olive gray (5Y 4/1). Texture – moderately lithified to loose. Grains – fine to medium grained dolomite and some limestone, some grains effervesce, sub-rounded. Cement/Matrix – calcite. Porosity – high to very high. Permeability - high to very high. Hardness – medium. Fossils – shell fragments.

DOLOMITE 10%:

Color – brownish gray (5YR 4/1). Texture – packstone to wackestone. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate in matrix, moderate to high in fractured zones. Hardness – moderately hard to hard. Fossils – coral, shell fragments?

DOLOMITE 95%:

Color – pale yellowish brown (10YR 6/2) to brownish gray (5YR 4/1) to olive gray (5Y 4/1). Texture – packstone to wackestone to massive to sucrosic, druzy crystals on surfaces of some pieces indicate vuggy nature or fractures in material, some surfaces contain heavy mineral



DEPTH

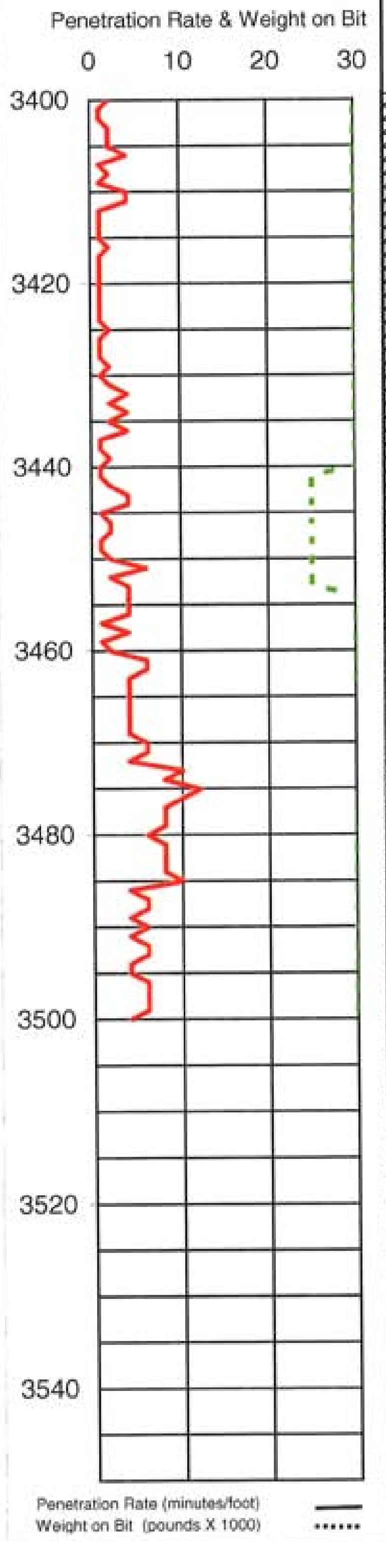
LITHOLOGIC DESCRIPTION

stains (black) as well, course angular fragments, well lithified/cemented. Grains – microcrystalline to medium sand-sized. Cement/Matrix – dolomitic. Porosity – low. Permeability - low in matrix, moderate to high in fractured zones. Hardness – hard to very hard.

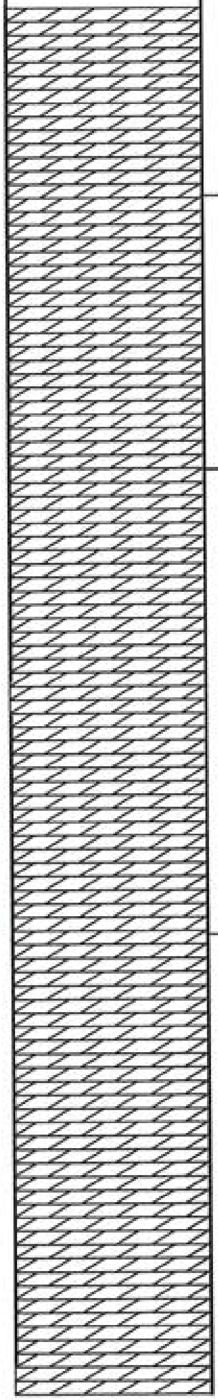
Chert 5%:

Color – very light gray (N8) to pale yellowish brown (10YR 6/2).

Texture – microcrystalline. Hardness – very hard, non-friable.



LITHOLOGY



DEPTH	LITHOLOGIC DESCRIPTION
3420	
3450	**DOLOMITE 100%:** Color – pale yellowish brown (10YR 6/2) to very pale orange (10YR 8/2). Texture – packstone to wackestone. Grains – microcrystalline to fine sand-sized. Cement/Matrix – dolomitic. Porosity – low to moderate. Permeability - low to moderate. Hardness – soft to moderately hard.
3500	**DOLOMITE 90 %** Same as 3420 to 3450 above. **GYPSUM 5 %** Color: white (N9). Hardness 2, found as infillings in dolomitic porosity – intergranular, vugular, and fractures. **CHERT 5%:** Color – very pale orange (10YR 8/2). Texture – microcrystalline. Hardness – very hard, non-friable.

LITHOLOGIC DESCRIPTION

Well:	Lake Region Deep Injection Well
Total Depth:	3,500 feet
County:	Palm Beach
Location:	Belle Glade
Owner:	Palm Beach County Water Utilities Department
Driller:	Youngquist Brother's, Inc.
Date Drilled:	February 2, 2006 through April 4, 2006

HYDROLOGIC UNITS

0 to 190 feet	Surficial Aquifer
190 to 848 feet	Upper Confining Unit – Hawthorn Group
848 to 1,625 feet	Upper Floridan Aquifer
2,950 to 3,500 feet	Lower Floridan Aquifer

DEPTH	DESCRIPTION
0'-10'	**SHELL ROCK/LIMEROCK FILL 100%:** **Color** – white (N9) to very light gray (N8). **Grains** – medium grained, moderately rounded, moderately sorted, contains limestone fragments and some organics. **Cement/Matrix** – none. **Porosity** – high. **Permeability** – high. **Hardness** – unconsolidated.
10'-30'	**LIMESTONE 40%:** **Color** – very light gray (N8) to light gray (N7). **Grains** – medium to coarse grained, sub-rounded/sub-angular, poorly sorted. **Texture** – microcrystalline, pockmarked. **Cement/Matrix** – none. **Porosity** – high. **Permeability** – high. **Hardness** – moderate. **SHELL 60%:** **Color** – very pale orange (10YR 8/2) to white (N9). **Grains** – fragmented, broken, and angular.
30'-60'	**LIMESTONE/COQUINA 50%:** **Color** – medium dark gray (N4) to medium gray (N5). **Grains** – coarse grained, sub rounded. **Texture** – coquina-like with fine shell particles. **Cement/Matrix** – micritic limestone. **Porosity** – high. **Permeability** – high. **Hardness** – moderately hard. **SHELL 50%:** **Color** – white to very pale orange (10YR 8/2) to grayish orange (10YR 7/4). **Grains** – fragmented, broken, and angular gastropods, bivalves.
60'-80'	**SHELL 100%:** **Color** – white to very pale orange (10YR 8/2) to medium dark gray (N4). **Grains** – poorly sorted coarse grained fragmented, broken, and angular with assorted complete shells – gastropods, bivalves.

DEPTH	DESCRIPTION
80'-100'	**SHELL 65%:** **Color –** Same as 60'- 80'. **Grains –** poorly sorted very coarse grained broken angular fragments with occasional whole polished shells, bivalves and gastropods. **LIMESTONE 35%:** **Color** – yellowish gray (5Y 8/1). **Grains** – coarse grained, sub rounded. **Texture** – coquina like, shell fragments tightly cemented. **Cement/Matrix** – micritic limestone. **Porosity** – moderate. **Permeability** – moderate. **Hardness** – hard.
100'-110'	**CLAY 50%:** **Color** – medium light gray (N6) to greenish gray (5GY 6/1). **Texture** – unconsolidated clay/mud, plastic. **Grains** – silt to clay sized carbonate. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft. **SHELL 25%:** Same as 60'- 80' above. **LIMESTONE 25%:** As 80 to 100 above.
110'-120'	**SHELL 60%:** Same as 60'- 80' above. **LIMESTONE 40%:** **Color** – light gray (5Y 8/1). **Grains** – fine grained sub-rounded fragments. **Texture** – coquina-like, shell fragments tightly cemented. **Cement/Matrix** – micritic limestone. **Porosity** – moderate. **Permeability** – moderate. **Hardness** – hard.
120'-140'	**SHELL 45%:** Same as 60'- 80' above. **LIMESTONE 45%:** Same as 110'- 120' above. **CLAY 10%:** Same as 100'- 110' above.
140'-150'	**CLAY 50%:** Same as 100'- 110' above. **LIMESTONE 40%:** **Color** – light gray (5Y 8/1) to dusky yellow green (5GY 5/2). **Grains** – fine grained sub-rounded fragments. **Texture** – coquina-like, shell fragments tightly cemented. **Cement/Matrix** – micritic limestone. **Porosity** – moderate. **Permeability** – moderate. **Hardness** – hard. **SHELL 10%:** **Color** – white to very pale orange (10YR 8/2) to medium dark gray (N4). **Grains** – poorly sorted coarse grained fragmented, broken, and angular.

DEPTH	DESCRIPTION
150’-170’	**CLAY 40%:** **Color –** dusky yellow green (5GY 5/2). **Texture –** unconsolidated clay/mud. **Grains –** silt to clay sized carbonate. **Cement/Matrix –** none. **Porosity –** low. **Permeability** – low. **Hardness** – soft. **LIMESTONE 50%:** Same as 140’- 150’ above. **SHELL 10%:** Same as 140’- 150’ above.
170’-180’	**CLAY 70%:** **Color –** grayish olive green (5GY 3/2). **Texture –** unconsolidated clay/mud. **Grains –** silt to clay sized carbonate. **Cement/Matrix –** none. **Porosity –** low. **Permeability** – low. **Hardness** – soft. **SHELL 30%:** **Color –** shell fragments stained from the mud difficult to tell actual color. **Grains –** very coarse grained shell fragments, angular.
180’-190’	**CLAY 90%:** **Color –** medium light gray (N6). **Texture –** unconsolidated clay/mud, plastic. **Grains –** clay sized carbonate. **Cement/Matrix –** none. **Porosity –** low. **Permeability –** low. **Accessories –** none. **Hardness –** soft. **SHELL 10%:** Same as 170’- 180’ above.
190’-200’	**CLAY 100%:** **Color –** light gray (N7) to grayish olive green (5GY 3/2). **Texture –** unconsolidated clay/mud, plastic. **Grains –** clay sized carbonate. **Cement/Matrix –** none. **Porosity** – low. **Permeability** – low. **Accessories** – none. **Hardness** – soft.
200’-330’	**CLAY 100%:** **Color** – grayish olive green (5GY 3/2). **Texture** – unconsolidated clay/mud, plastic. **Grains** – clay sized carbonate. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Accessories** – none. **Hardness** – soft.
330’-340’	**CLAY 80%:** **Color** – dusky yellow green (5GY 5/2). **Texture** – unconsolidated clay/mud plastic. **Grains** – clay sized carbonate. **Cement/Matrix –** none. **Porosity** – low. **Permeability** – low. **Hardness** – soft. **SHELL 20%:** **Color** – shell fragments stained from the mud difficult to tell actual color. **Grains –** very coarse grained shell fragments, angular up to ¾ inch long.

DEPTH	DESCRIPTION
340’-410’	**CLAY 100%:** **Color** – dusky yellow green (5GY 5/2). **Texture –** unconsolidated clay/mud plastic. **Grains –** clay sized carbonate with occasional silty nodules. **Cement/Matrix –** none. **Porosity** – low. **Permeability** – low. **Hardness –** soft.
410’-420’	**SHELL 60%:** Same as 170’- 180’ above. **CLAY 40%:** **Color** – greenish gray (5GY 6/1). **Texture –** unconsolidated clay/mud. **Grains –** mostly clay sized carbonate with some silt and very fine sand. **Cement/Matrix –** none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
420’-450’	**CLAY 80%:** Same as 410’- 420’ above. **SHELL 20%:** Same as 170’- 180’ above.
450’-490’	**CLAY 100%:** **Color** – greenish gray (5GY 6/1) to light olive gray (5Y 5/2). **Texture** – unconsolidated clay/mud. **Grains** – mostly clay sized carbonate with some silt/very fine sand nodules and fine grained shell fragments or tiny whole gastropods. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
490’-500’	**CLAY 80%:** **Color** – yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Grains** – clay, some silt and very fine sand sized carbonate particles. **Cement/Matrix –** none. **Porosity** – low. **Permeability** – low. **Hardness** – soft. **SHELL 20%:** Same as 170’- 180’ above.
500’-520’	**CLAY 70%:** Same as 490’ – 500’ above. **SAND 30%:** **Color** – yellowish gray (5Y 8/1). **Grains** – fine to medium grained quartz limestone and phosphate, sub-rounded fragments. **Texture** – wackestone to packstone, friable. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
520’-530’	**CLAY 100%:** **Color** – yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Grains** – silty/sandy clay sized carbonate particles. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.

DEPTH	DESCRIPTION
530’-550’	**CLAY 60%:** As 520 to 530 above. **SHELL 40%:** Same as 170’- 180’ above.
550’-560’	**CLAY 100%:** **Color** – light olive gray (5Y 5/2). **Texture** – unconsolidated clay/mud. **Grains** – silty/sandy clay sized carbonate particles. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
560’-570’	**CLAY 100%:** As 520 to 530 above.
570’-580’	**CLAY 100%:** **Color** – light olive gray (5Y 5/2). **Texture** – unconsolidated clay/mud. **Grains** – silty/sandy clay sized carbonate particles, <1% shell fragments. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
580’-640’	**CLAY 95%:** As 520 to 530 above. **SHELL 5%:** Same as 170’- 180’ above.
640’-680’	**CLAY 100%:** **Color** – yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Grains** – silt and clay sized particles, <1% shell fragments. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
680’-710’	**MARL 80%:** **Color –** yellowish gray (5Y 7/2). **Texture** – unconsolidated clay/mud. **Porosity –** low. **Permeability –** low. **Hardness –** soft. **SAND/SILT 20%**: **Grains –** fine to coarse grained sand particles – quartz and calcite- sub rounded, <1% phosphate grains.
710’-730’	**CLAY 90%:** As 520 to 530 above. **SAND and SHELL 20%**: **Grains –** fine to coarse grained sand particles – quartz and calcite – sub rounded, and shell fragments – angular, <1% phosphate grains.

DEPTH	DESCRIPTION
730’-770’	<u>**CLAY 100%:**</u> **Color** – yellowish gray (5YR 7/2) to light olive gray (5Y 5/2). **Texture** – unconsolidated mud/clay, tacky and plastic. **Grains –** <1% medium grained sand and shell particles. **Cement/Matrix** – none. **Porosity** – low. **Permeability** – low. **Hardness** – soft.
770’-780’	<u>**MARL 80%:**</u> Same as 680’- 710’ above. <u>**SAND/SILT 20%**</u>: Same as 680’- 710’ above.
780’-800’	<u>**MARL 50%:**</u> **Color** – medium light gray (N5-N6). **Texture –** unconsolidated clay/mud. **Grains –** silt sized grains. **Cement/Matrix –** none. **Porosity –** low. **Permeability –** low. **Hardness** – soft. <u>**SAND/SILT 50%:**</u> **Color –** light gray (N7-N6). **Texture –** wackestone to packstone, friable. **Grains –** fine to very coarse grained sand particles – quartz and calcite- sub rounded, <1% phosphate grains.
800’– 830’	<u>**LIMESTONE 100%:**</u> **Color** - light Gray (N7) to Olive Gray (5Y 4/1). **Texture** – wackestone to packstone. **Grains** - fine grained, moderately rounded. **Porosity** – medium. **Permeability** - medium. **Hardness** – hard.
830’- 850’	<u>**LIMESTONE 100%:**</u> **Color** - very pale orange (10YR 8/2). **Texture –** unconsolidated, fine grained, micritic limestone. **Cement/Matrix** – none. **Grains** - fine grained, sub rounded. **Porosity** – medium. **Permeability** - medium. **Hardness** – hard.
850’-890’	<u>**LIMESTONE 50%:**</u> **Color -** very pale orange (10YR 8/2). **Texture** - friable to unconsolidated. **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. <u>**CLAY 30%:**</u> **Color** - medium light gray (N6). **Texture** - unconsolidated clay/mud. **Grains** - silt to clay sized. <u>**LOOSE FOSSILS AND SHELL FRAGMENTS 20%:**</u> **Color -** very pale orange (10YR 8/2). **Grains -** whole to broken, fragmented, shell and discoid fossils (foraminifera and possibly econoderms).

DEPTH	DESCRIPTION
890'-1070'	**LIMESTONE 90%:** **Color -** very pale orange (10YR 8/2). **Texture** - friable to unconsolidated. **Grains** - coarse to fine grained, poorly sorted. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **FOSSIL FRAGMENTS 5%:** **Color –** very pale orange (10YR 8/2). **Grains –** whole to broken, fragmented, shell, discoid fossils. **CLAY 5%:** **Color** – medium light gray (N6). **Texture** – compact uncemented clay/mud. **Grains** – silt to clay sized.
1070'-1260'	**LIMESTONE 100%:** Same as 890'- 1070' above.
1260'-1400'	**LIMESTONE 85%:** Same as 890'- 1070' above. **CLAY 15%:** **Color** - medium light gray (N6). **Texture** - compact unconsolidated clay/mud. **Grains** - silt to clay sized.
1400'-1630'	**LIMESTONE 100%:** As 890 to 1070 above. **90%**, **Texture** - coarse grained. **Hardness** – soft, friable. **10 % Texture** - fine grained. **Hardness** - friable. Note: foraminifera present in samples from 1520-1560.
1630'-1640'	**LIMESTONE 97%:** As 1400 – 1630 above. **CHERT 3%:** **Color** - yellowish brown (10YR 6/2). **Texture** – microcrystalline. **Hardness** – very hard, non-friable.
1640'-1680'	**DOLOMITE 95%:** **Color –** dark yellowish brown (10YR 4/2). **Texture** – microcrystalline. **Cement/Matrix** – none. **Porosity** – high. **Permeability** - high. **Hardness** – very hard. **Note:** some small solution pitting seen. **CLAY 1%:** **Color** – very pale orange (10 YR 8/2). **Texture** - fine grained. **Hardness** - well indurated, friable. **CLAY 1%:** **Color** - medium light gray (N6). **Texture** - Well indurated, hard. **LIMESTONE 3%:** **Color -** pale yellowish brown (10YR 6/2). **Texture –** fine to medium grained with well rounded grains. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** - moderate.

DEPTH	DESCRIPTION
1680'-1750'	**LIMESTONE 100%:** **Color -** very pale orange (10YR 8/2). **Texture** - medium grained. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – soft, friable.
1750'-1760'	**LIMESTONE 95%:** **Color -** pale yellowish brown (10YR 6/2). **Texture –** fine to medium grained with well rounded grains. **Cement/Matrix** – calcite. **Porosity** – medium. **Permeability** - medium. **Hardness** – moderate. **DOLOMITE 5%:** **Color –** dark yellowish brown (10YR 4/2). **Texture** – microcrystalline. **Hardness** - very hard**.**
1760'-1840'	**LIMESTONE 100%:** As 1680 to 1750 above.
1840'-1850'	**LIMESTONE 85%:** As 1750 to 1760 above. **DOLOMITE 15%:** As 1750 to 1760 above.
1850'-1860'	**LIMESTONE 65%:** As 1750 to 1760 above. **DOLOMITE 30%:** As 1750 to 1760 above. **CLAY 5%:** **Color**- medium light gray (N6). **Texture**- well indurated, hard.
1860'-1870'	**LIMESTONE 85%:** As 1850 – 1860 above. **DOLOMITE 15%:** As 1850 – 1860 above.
1870'-1880'	**LIMESTONE 60%:** As 1850 – 1860 above. **DOLOMITE 40%:** As 1850 – 1860 above.
1880'-1890'	**DOLOMITE 90%:** As 1850 – 1860 above. **LIMESTONE 10%:** As 1850 – 1860 above.

DEPTH	DESCRIPTION
1890'-1990'	**<u>DOLOMITE 100%:</u>** **Color** – moderate yellowish brown (10YR 5/4). **Texture** – micritic to packstone, thinly bedded. Some moderate thickness fractured zones. **Grains** – massive to very finely crystalline. **Cement/Matrix** – dolomitic. **Porosity** – very low (<5%), **Permeability -** low in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – none observed.
1990'-2000'	**<u>DOLOMITE 85%:</u>** As 1890 to 1990 above. **<u>CLAY 15%:</u>** **Color** – pale yellowish brown (10YR 6/2). **Texture** – slightly to moderately plastic. May fill dolomite fractures or found as thin mudstone beds. **Grains** – some fine sand. **Cement/Matrix** – dolomitic. **Porosity** – moderate to high. **Permeability -** low. **Hardness** – very soft. **Fossils** – none observed.
2000'-2040'	**<u>DOLOMITE 95%:</u>** As 1890 to 1990 above. **<u>CLAY 5%:</u>** As 1890 to 1990 above.
2040'-2087'	**<u>DOLOMITE 100%:</u>** As 1890 to 1990 above.
2087'-2100'	**<u>DOLOMITE 80%:</u>** **Color** – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). **Texture** – micritic to packstone, thinly bedded. Some fractured zones. **Grains** – massive to very finely crystalline. **Cement/Matrix** – dolomitic. **Porosity** – very low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – none observed. Thinly interbedded with: **<u>PACKSTONE 20%:</u>** **Color** – light gray (5Y 8/1). **Grains** – fine to medium grained. **Texture** – grains loosely cemented, appears oolitic or pelitic. **Cement/Matrix** – calcium carbonate. **Porosity** – high. **Permeability** – moderate to high. **Hardness** – soft.
2100'-2200'	**<u>DOLOMITE 80%:</u>** As 2087 to 2100 above. **<u>PACKSTONE 20%:</u>** **Color** – light gray (5Y 8/1). **Grains** – fine to medium grained. **Texture** – grains loosely cemented, appears oolitic or pelitic. **Cement/Matrix** – calcium carbonate. **Porosity** – high. **Permeability** – moderate to high. **Hardness** – soft to very soft. **Note:** thin to very thin dolomite interbeds from 2130 to 2140, and 2180-2200.

DEPTH	DESCRIPTION
2200’-2250’	**DOLOMITIC SAND 80%:** **Color** – grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6). **Texture** – moderately lithified to loose. **Grains** – fine to medium grained dolomite. **Cement/Matrix** – dolomitic. **Porosity** – high to very high. **Permeability -** high to very high, produces water with strong sulfur odor. **Hardness** – soft to very soft where unconsolidated (bit fell freely between 2218 to 2228 feet), moderately hard to hard and roughly fractured in competent dolomites. **Fossils** – coral, shell fragments? **DOLOMITE 20%:** **Color** – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). **Texture** – packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
2250’-2320’	**DOLOMITE 80%:** As 2200 to 2250 above. **DOLOMITIC SAND 20%:** As 2200 to 2250 above.
2320’-2360’	**DOLOMITE 90%:** **Color** – moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1). **Texture** – packstone to wackestone, highly fractured/vuggy. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments? **DOLOMITIC SAND 10%:** As 2200 to 2250 above.
2360’-2450’	**DOLOMITIC SAND 95%:** **Color** – grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6). **Texture** – moderately lithified to loose. **Grains** – fine to medium grained dolomite. **Cement/Matrix** – dolomitic. **Porosity** – high to very high. **Permeability -** high to very high. **Hardness** – very soft. **Fossils** – coral, shell fragments? **DOLOMITE 5%:** **Color** – grayish orange (10Y 7/4). **Grains** – fine to medium grained. **Texture** – grains loosely cemented, appears oolitic or pelitic. **Cement/Matrix** – calcium carbonate. **Porosity** – high. **Permeability** – moderate to high. **Hardness** – soft to very soft.
2450’-2460’	**DOLOMITE 100%:** **Color** – moderate pale brown (10YR 6/2). **Texture** – packstone to wackestone. Highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – hard.

DEPTH	DESCRIPTION
2460'-2540'	**DOLOMITIC SANDS 90%:** As 2360 to 2450 above. **DOLOMITE 10%:** As 2320 to 2360 above.
2540'-2570'	**DOLOMITIC SAND 95%:** As 2360 to 2450 above. **DOLOMITE 5%:** As 2360 to 2450 above.
2570'-2580'	**DOLOMITIC SAND 90%:** As 2360 to 2450 above. **DOLOMITE 10%:** As 2460 to 2540 above.
2580'-2610'	**DOLOMITIC SAND 95%:** As 2360 to 2450 above. **DOLOMITE 5%:** As 2540 to 2570 above.
2610'-2690'	**DOLOMITIC SAND 90%:** As 2360 to 2450 above. **DOLOMITE 10%:** As 2570 to 2580 above.
2690'-2820'	**DOLOMITIC SAND 90%:** As 2360 to 2450 above. **DOLOMITE 10%:** As 2320 to 2360 above.
2820'-2840'	**DOLOMITIC SAND 90%:** **Color** – pinkish grayish (5YR 8/1). **Texture** – moderately lithified to loose. **Grains** – fine to medium grained dolomite. **Cement/Matrix** – dolomitic. **Porosity** – high to very high. **Permeability -** high to very high. **Hardness** – soft. **Fossils** – coral, shell fragments? **DOLOMITE 10%:** **Color** – pinkish grayish (5YR 8/1). **Texture** – packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?

DEPTH	DESCRIPTION
2840'-2850'	**DOLOMITE 100%:** **Color** – moderate olive brown (5YR 4/4). **Texture** – packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
2850'-2870'	**DOLOMITIC SAND 60%:** **Color** – tan/buff grayish (10YR 8/2) to pale brown (10YR 6/2). **Texture** – moderately lithified to loose. **Grains** – medium to very coarse grained limestone and dolomite, sub-rounded. **Cement/Matrix** – calcite. **Porosity** – high to very high, **Permeability -** high to very high. **Hardness** – medium. **Fossils** – coral, shell fragments? **LIMESTONE/DOLOMITE 40%:** **Color** – tan/buff grayish (10YR 8/2 to 10YR 6/2). **Texture** – grainstone to boundstone, fractured, some pieces effervesce more than others. **Cement/Matrix** – calcite. **Porosity** – low to moderate. **Permeability -** moderate, higher in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – shell fragments.
2870'-2960'	**DOLOMITIC SAND 85%:** **Color** – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). **Texture** – moderately lithified to loose. **Grains** – fine to medium grained dolomite and some limestone, some grains effervesce, sub-rounded. **Cement/Matrix** – calcite. **Porosity** – high to very high. **Permeability -** high to very high. **Hardness** – medium. **Fossils** – shell fragments. **LIMESTONE/DOLOMITE 15%:** **Color** – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). **Texture** – grainstone to boundstone, fractured, some pieces effervesce more than others. **Cement/Matrix** – calcite. **Porosity** – low to moderate. **Permeability -** moderate, higher in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – shell fragments.
2960'-2990'	**DOLOMITE 100%:** **Color** – light olive gray (5YR 6/1) to medium dark gray (N4) to brownish gray (5YR 4/1). **Texture** – packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
2990'-3000'	**DOLOMITIC SAND 90%:** As 2870 to 2960 above. **LIMESTONE/DOLOMITE 10%:** **Color** – tan/buff grayish (10YR 8/2 to 6/2)) to light gray (N6). **Texture** – grainstone to boundstone, fractured, some pieces effervesce more than others. **Cement/Matrix** – calcite. **Porosity** – low to moderate. **Permeability -** moderate, higher in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – shell fragments.

DEPTH	DESCRIPTION
3000’-3010’	**<u>DOLOMITE 100%:</u>** **Color** – light olive gray (5YR 6/1). **Texture –** packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix –** dolomitic. **Porosity** – low to moderate. **Permeability –** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
3010’-3020’	**<u>DOLOMITIC SAND 100%:</u>** As 2870 to 2960 above.
3020’-3050’	**<u>DOLOMITE 90%:</u>** **Color** – olive gray (5YR 4/1). **Texture** – packstone to wackestone, highly fractured. **Grains –** fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity –** low to moderate. **Permeability –** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments? **<u>DOLOMITIC SAND 10%:</u>** As 2870 to 2960 above.
3050’-3060’	**<u>DOLOMITIC SAND 100%:</u>** As 2870 to 2960 above.
3060’-3110’	**<u>DOLOMITE 100%:</u>** As 3000 to 3010 above.
3110’-3120’	**<u>DOLOMITE SAND 95%:</u>** **Color** – light olive gray (5YR 6/1). **Texture** – moderately lithified to loose, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability –** low to moderate in matrix, moderate to high in fractured zones. **Hardness –** moderately hard to hard. **Fossils –** coral, shell fragments? **<u>DOLOMITE 5%:</u>** **Color** – light olive gray (5YR 6/1). **Texture** – packstone to wackestone. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate, **Permeability –** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
3120’-3150’	**<u>DOLOMITE 90%:</u>** **Color** – medium light gray (N6) to brownish gray (5YR 4/1). **Texture** – packstone to wackestone, highly fractured. **Grains** – fine to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability –** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments? **<u>DOLOMITIC SAND 10%:</u>** As 3110 to 3120 above.

DEPTH	DESCRIPTION
3150'-3230'	**<u>DOLOMITIC SAND 90%:</u>** **Color** – olive gray (5Y 4/1). **Texture –** moderately lithified to loose. **Grains –** fine to medium grained dolomite and some limestone, some grains effervesce, sub-rounded. **Cement/Matrix** – calcite. **Porosity** – high to very high. **Permeability -** high to very high. **Hardness** – medium. **Fossils –** shell fragments. **<u>DOLOMITE 10%:</u>** **Color** – brownish gray (5YR 4/1). **Texture –** packstone to wackestone. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate in matrix, moderate to high in fractured zones. **Hardness** – moderately hard to hard. **Fossils** – coral, shell fragments?
3230'-3420'	**<u>DOLOMITE 95%:</u>** **Color** – pale yellowish brown (10YR 6/2) to brownish gray (5YR 4/1) to olive gray (5Y 4/1). **Texture** – packstone to wackestone to massive to sucrosic, druzy crystals on surfaces of some pieces indicate vuggy nature or fractures in material, some surfaces contain heavy mineral stains (black) as well, course angular fragments, well lithified/cemented. **Grains** – microcrystalline to medium sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low. **Permeability -** low in matrix, moderate to high in fractured zones. **Hardness** – hard to very hard. **<u>CHERT 5%:</u>** **Color** – very light gray (N8) to pale yellowish brown (10YR 6/2). **Texture** – microcrystalline. **Hardness** – very hard, non-friable.
3420'-3450'	**<u>DOLOMITE 100%:</u>** **Color** – pale yellowish brown (10YR 6/2) to very pale orange (10YR 8/2). **Texture** – packstone to wackestone. **Grains** – microcrystalline to fine sand-sized. **Cement/Matrix** – dolomitic. **Porosity** – low to moderate. **Permeability -** low to moderate. **Hardness** – soft to moderately hard.
3450'-3500'	**<u>DOLOMITE 90 %</u>** Same as 3420 to 3450 above. **<u>GYPSUM 5 %</u>** **Color:** white (N9)**. Hardness** 2, found as infillings in dolomitic porosity – intergranular, vugular, and fractures. **<u>CHERT 5%:</u>** **Color** – very pale orange (10YR 8/2). **Texture –** microcrystalline. **Hardness –** very hard, non-friable.

Appendix H
Video Logs

DZMW

VIDEO SURVEY

DATE(S): 3-Jul-06

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

VIDEO CONTRACTOR: Florida Geophysical

TOTAL DEPTH:

DESCRIPTION OF OPERATIONS: Final Video Log - 6 5/8-inch FRP monitoring tubing and open hole

DEPTH IN FEET							
From	**To**	**OBSERVATIONS**					
0		Ground Level					
14		Stainless Steel to Fiberglass Reinforced Pipe					
24	**2038**	Casing joints	24	453	892	1333	1773
			52	482	922	1362	1802
			80	512	951	1392	1832
			109	540	980	1421	1861
			138	570	1010	1451	1890
			166	599	1039	1480	1920
			195	628	1068	1510	1949
			223	657	1097	1539	1979
			252	686	1127	1568	2008
			281	716	1156	1598	2038
			309	745	1185	1627	
			337	774	1215	1656	
			366	804	1244	1685	
			394	833	1274	1714	
			423	862	1303	1744	
2068		Bottom of FRP.					
2074		Bottom of packer.					
2075		Vertical fracture, vugs and holes.					
2080		Radial fracture - flow zone.					
2087		Total depth.					

VIDEO SURVEY

DATE(S): 21-Jun-06

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

VIDEO CONTRACTOR: Florida Geophysical

TOTAL DEPTH:

DESCRIPTION OF OPERATIONS: Final Video Log - monitoring intervals

DEPTH IN FEET		OBSERVATIONS
From	**To**	
1937		Bottom of casing (12-inch).
1937	**1949**	Large borehole - washout at base of casing.
1949		Gauge borehole.
1961		Vugs.
1964		Vugs.
1966		Vugs.
1979		Vertical fractures.
1984		Vugs.
2008		Vertical fracture.
2011		Vertical fracture.
2013		Vugs.
2032		Big hole.
2038	**2039**	Hole.
2042	**2042.5**	Hole.
2044	**2045**	Hole.
2050		Holes.
2060		Formation change.
2070		Holes.
2072		Holes.
2074		Holes.
2077		Radial fracture - flow zone.
2085		Holes.
2094		Bedding plane.
2094		Total depth.

IW

VIDEO SURVEY

DATE(S): 14-Jun-06

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

VIDEO CONTRACTOR: Florida Geophysical

TOTAL DEPTH:

DESCRIPTION OF OPERATIONS: Final Video Log - 13 3/8-inch FRP injection tubing and open hole

DEPTH IN FEET		**OBSERVATIONS**					
From	**To**						
0		Ground Level					
16		Stainless Steel to Fiberglass Reinforced Pipe					
42	**2936**	Casing joints	42	633	1238	1816	2416
			57	662	1267	1844	2444
			86	691	1296	1871	2473
			114	720	1325	1900	2502
			143	748	1353	1929	2530
			172	777	1382	1957	2559
			201	806	1411	1984	2588
			230	835	1440	2013	2617
			258	863	1468	2042	2646
			287	892	1468	2071	2675
			316	921	1497	2099	2703
			345	949	1526	2128	2733
			373	978	1555	2157	2762
			402	1007	1584	2185	2791
			431	1036	1613	2214	2820
			459	1065	1642	2243	2849
			488	1094	1671	2272	2878
			517	1123	1700	2301	2907
			546	1152	1729	2329	2936
			575	1181	1758	2358	
			604	1210	1786	2387	
2936		YBI Packer					

DEPTH IN FEET		OBSERVATIONS
From	**To**	
2938		Bottom of packer assembly
2938.2		Steel Casing joint - YBI packer to tailpipe
2953		Concentric reducer (18 x 16)
2955		Bottom of 16-inch tailpipe
2967		Fractures
2970		Fractures and voids
2985		Fresh water - salt water interface
2991		Fractures and voids
3011		Fractures and voids
3022	**3023**	Fractures and voids
3060	**3065**	Large void - hole
3092	**3097**	Fractures and voids
3123		Voids
3129		Fractures
3135	**3143**	Voids
3150	**3152**	Voids
3156	**3166**	Voids
3190		Bedding plane
3207		Bedding plane
3218	**3232**	Voids
3246	**3255**	Voids
3266		Voids
3270		Voids
3288	**3290**	Voids
3298		Bedding plane
3303		Voids
3315	**3322**	Fractures
3333	**3360**	Borehole becomes rugose
3377		Voids
3382		Voids
3385		Voids
3388		Voids
3392		Voids
3399	**3400**	Voids
3412	**3418**	Rough Hole
3432		Bedding plane
3440	**3446**	Holes and vugs

DEPTH IN FEET		OBSERVATIONS
From	To	
3478	**3490**	Anhydrite filled voids
3490		Total Depth - Bottom of borehole

VIDEO SURVEY

DATE(S): 22-May-06

PROJECT: LAKE REGION DEEP INJECTION WELL

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

VIDEO CONTRACTOR: Florida Geophysical

TOTAL DEPTH:

DESCRIPTION OF OPERATIONS: Final Video Log - 18-inch Final Casing

DEPTH IN FEET		**OBSERVATIONS**					
From	**To**						
0		Ground Level					
21	**2939**	Casing joints	21	634	1243	1871	2487
			56	665	1280	1909	2521
			72	703	1317	1945	2560
			127	735	1354	1981	2696
			161	773	1392	2018	2629
			198	811	1429	2054	2665
			235	847	1465	2091	2702
			271	884	1502	2127	2735
			307	920	1539	2162	2773
			341	957	1575	2198	2806
			378	990	1613	2232	2842
			416	1026	1649	2271	2878
			453	1062	1685	2304	2916
			490	1098	1723	2341	2939
			527	1135	1762	2377	
			564	1170	1799	2413	
			604	1206	1833	2448	
2939		Top of YBI Positive Seal Packer					

Appendix I
Core Logs and Lab Results

Core Logs

IW-1 CORE LOG

DATE(S): 3/8/06

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT **LAKE REGION DIW**

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 1

TOTAL DEPTH:	1,964	feet
DRILLING METHOD:	Diamond Drilling	
DRILLER(S):	Wayne Fargo	
DATUM POINT:	Pad Level	
DATUM POINT ELEVATION:		
HYDROLOGIC UNITS:	Avon Park Limestone	
% RECOVERY	90.0 %	
CORED INTERVAL	1,954 – 1,964	

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
1,954	to	1,959	5.0	**DOLOMITE 100%:** **Color** – moderate yellowish brown (10YR 5/4). **Texture** – micritic to packstone, thinly bedded. **Grains** – massive to very finely crystalline. **Cement/Matrix** – dolomitic. **Porosity** – very low (<5%), **Permeability** low, primarily secondary. **Hardness** – moderately hard to hard. **Fossils** – none observed.	Coring Times: 1954-1955: 12 minutes. 1955-1956: 40 minutes 1956-1957: 41 minutes 1957-1958: 30 minutes 1958/-1959: 58 minutes
1,959	to	1,964	5.0	**BRECCIATED DOLOMITE 100%:** **Color** – pale brown (5YR 5/2). **Texture** – brecciated fine gravel clasts of angular packstone dolomite, in dolomite matrix. **Grains** – fine gravel clasts. **Cement/Matrix** – dolomite. **Porosity** – low (5%-10%)-mainly secondary. **Permeability** – low primary permeability, moderate to high secondary permeability, including void between 1,959 and 1,960.. **Hardness** – moderately hard to hard. **Fossils** – none observed.	Coring Times: 1959-1960: 13 minutes. 1960-1961: 60 minutes 1961-1962: 41 minutes 1962-1963: 44 minutes 1963-1964: 12 minutes

Observer's initials _______________

IW-1 CORE LOG

DATE(S): 3/28/2006

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT **LAKE REGION DIW**

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 3

TOTAL DEPTH:	2,532	feet
DRILLING METHOD:	Diamond Drilling	
DRILLER(S):	Phillip Shand	
DATUM POINT:	Pad Level	
DATUM POINT ELEVATION:		
HYDROLOGIC UNITS:		
% RECOVERY	100%	
CORED INTERVAL	2,522 – 2,532	

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
2,522	to	2,532	10.0	**LIMESTONE 100%:** **Color** – very pale orange (10YR 8/2). **Texture** – wackestone, massive, thin laminasions present. **Grains** – very fine grained. **Cement/Matrix** – calcite mud. **Porosity** – very low, **Permeability -** very low to none. **Hardness** – moderately hard to very hard,. **Fossils** – none. **Accessories** – laminations and small inclusions present. Very fine grained phosphate grains present (<1%).	Coring Times: 2522-2523: 14 minutes. 2523-2524: 20 minutes 2524-2525: 20 minutes 2525-2526: 20 minutes 2526-2527: 22 minutes 2527-2528: 24 minutes 2528-2529: 22 minutes 2529-2530: 24 minutes 2530-2531: 22 minutes 2531-2532: 20 minutes

Observer's initials _______________

IW-1 CORE LOG

DATE(S): 3/26/2006

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT **LAKE REGION DIW**

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 2

TOTAL DEPTH: 2,360 feet
DRILLING METHOD: Diamond Drilling
DRILLER(S): Wayne Fargo
DATUM POINT: Pad Level
DATUM POINT ELEVATION:
HYDROLOGIC UNITS:
% RECOVERY 60%
CORED INTERVAL 2,350 – 2,360

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
2,350	to	2,360	10.0	**DOLOMITE 100%:** **Color** – moderate reddish orange (10R 6/6). **Texture** – packstone, thinly bedded. Closely fractured, vuggy, some layers weathered to clay to fine sand. **Grains** – fine grained. **Cement/Matrix** – dolomitic. **Porosity** – moderate, **Permeability -** low to moderate, primarily secondary. **Hardness** – soft to hard,. **Fossils** – foraminifera.	Coring Times: 2350-2351: 4 minutes. 2351-2352: 6 minutes 2352-2353: 17 minutes 2353-2354: 9 minutes 2354-2355: 3 minutes 2355-2356: 2 minutes 2356-2357: 1 minute 2357-2358: 5 minutes 2358-2359: 17 minutes 2359-2360: 15 minutes

Observer's initials _______________

IW-1 CORE LOG

DATE(S): 3/30/2006

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT

LAKE REGION DIW

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 4

TOTAL DEPTH: 2,796 feet
DRILLING METHOD: Diamond Drilling
DRILLER(S): Wayne Fargo
DATUM POINT: Pad Level
DATUM POINT ELEVATION:
HYDROLOGIC UNITS:
% RECOVERY 100%
CORED INTERVAL 2,786 – 2,796

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
2,786	to	2,796	10.0	**LIMESTONE 100%:** **Color** – very pale orange (10YR 8/2). **Texture** – packestone to wackestone. **Grains** – fine to medium grained. **Cement/Matrix** – calcite mud. **Porosity** – low to very low, **Permeability -** low to very low. **Hardness** – moderately hard. **Fossils** – none. **Accessories** – Very fine grained phosphate grains present (<1%)	Coring Times: 2786-2787: 4 minutes. 2787-2788: 4 minutes 2788-2789: 4 minutes 2789-2790: 4 minutes 2790-2791: 6 minutes 2791-2792: 6 minutes 2792-2793: 6 minutes 2793-2794: 4 minutes 2794-2795: 6 minutes 2795-2796: 8 minutes

Observer's initials _______________

IW-1 CORE LOG

DATE(S): 3/30/2006

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT **LAKE REGION DIW**

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 5

TOTAL DEPTH: 2,809 feet
DRILLING METHOD: Diamond Drilling
DRILLER(S): Phillip Shand
DATUM POINT: Pad Level
DATUM POINT ELEVATION:
HYDROLOGIC UNITS:
% RECOVERY 40%
CORED INTERVAL 2,799 – 2,809

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
2,799	to	2,809	10.0	**LIMESTONE 100%:** **Color** – white (N9). **Texture** – packestone to wackestone. **Grains** – medium grained, some recrystallization. **Cement/Matrix** – calcite mud. **Porosity** – moderate with some vuggular porosity and shell clasts. **Permeability -** moderate. **Hardness** – moderately hard. **Fossils** – foraminifera, gastropods, and broken shells. **Accessories** – Very fine grained phosphate grains present (<1%)	Coring Times: 2799-2800: 6 minutes. 2800-2801: 6 minutes 2801-2802: 8minutes 2802-2803: 6 minutes 2803-2804: 8 minutes 2804-2805: 6 minutes 2805-2806: 10 minutes 2806-2807: 6 minutes 2807-2808: 8 minutes 2808-2809: 8 minutes

Observer's initials _______________

IW-1 CORE LOG

DATE(S): 3/31/2006

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT

LAKE REGION DIW

WUD Project No.: 03-169

CONTRACTOR: Youngquist Brothers, Inc.

Core Number 6

TOTAL DEPTH: 2,820 feet
DRILLING METHOD: Diamond Drilling
DRILLER(S): Phillip Shand
DATUM POINT: Pad Level
DATUM POINT ELEVATION:
HYDROLOGIC UNITS:
% RECOVERY 100%
CORED INTERVAL 2,810 – 2,820

DEPTH (feet below pad)			DEPTH INTERVAL	DESCRIPTION	DRILLING COMMENTS
2,810	to	2,814	4.0	**LIMESTONE 100%:** **Color** – very pale orange (10YR 8/2). **Texture** – packestone to wackestone. **Grains** – medium grained, some recrystallization. **Cement/Matrix** – calcite mud. **Porosity** – moderate with some vuggular porosity. **Permeability -** moderate. **Hardness** – moderately hard. **Fossils** – none. **Accessories** – Very fine grained phosphate grains present (<1%)	Coring Times: 2810-2811: 4 minutes. 2811-2812: 4 minutes 2812-2813: 4minutes 2813-2814: 8 minutes
2,814	to	2,820	6.0	**LIMESTONE 100%:** **Color** – white (N9). **Texture** – packestone to grainstone. **Grains** – medium to coarse grained, some recrystallization. **Cement/Matrix** – calcite mud. **Porosity** – high with some vuggular porosity and shell clasts. **Permeability -** high. **Hardness** – moderately hard. **Fossils** – foraminifera, gastropods, and broken shells. **Accessories** – Very fine grained phosphate grains present (<1%) and recrystalized calcite crystals.	2814-2815: 8 minutes 2815-2816: 8 minutes 2816-2817: 6 minutes 2817-2818: 6 minutes 2818-2819: 8 minutes 2819-2820: 6 minutes

Observer's initials _______________

Test Data

Resistivity of Belle Glades Carbonates from Deep Injection Well-1

Report prepared for
Ardaman and Associates, Inc.
September 26, 2006

by

New England Research, Inc.
331 Olcott Drive, Ste L1
White River Junction, VT 05001

Summary

Ardaman and Associates, Inc. delivered ten whole core samples of carbonate for measurement of resistivity. The samples were cored from the Belle Glades deep injection well and ranged in depth from 1956.4 feet to 2819.2 feet (596.3 m to 859.3 m).

The samples were gray to buff carbonate, primarily limestone. Ten right circular cylinder plugs were sub-cored from each whole core. The grain density of the samples ranged from 2.55 to 2.77 g/cc. Sample porosity as a volume fraction ranged from 0.045 to 0.26.

The samples were saturated with brine containing either 15 or 42 grams of sodium chloride per liter of water. Complex impedance of each sample was measured over a frequency range of 0.01 Hz to 100 kHz.

Temperature corrections were applied to the brine conductivity. The frequency response of most of the samples' impedance was uniform over the frequency range of 0.1 to 10,000 Hz. No cable corrections were applied.

The resisivities of the samples were quite low with the exception of the samples from Cores 2, 3 and 4, which were low but two orders of magnitude higher than six of the other seven samples in the Belle Glades group. Cores 3 and 4 have the lowest porosity of the Belle Glades group. The samples were vuggy and the higher resistivity indicates poorer pore space connectivity. Low resistivity generally indicates good pore space connectivity.

The cementation factor for individual samples varies from a low of 1.3 for Core 11 to a high of 2.65 for Core 2. The high cementation factors for Cores 2, 3 and 4 are consistent with the vuggy porosity that each contain. However the data for Core 3 are anomalous and the use of any of the results for that sample carry risks. Core 11 shows signs of fracturing that may be responsible for its low resistivity (high fluid connectivity through the fracture), low formation factor and low cementation coefficient. The average cementation factor for the Belle Glades group is computed from a fit to a graph of the logarithm of formation factor to the logarithm of porosity (Figure 1). The cementation factor for the group is 2.15.

The data from Core sample 3 should be used with extreme caution because of the samples anomalous behavior. Data below 1000 Hz only should be used for Cores 2 and 4.

Resistivity of Belle Glades Carbonates from Deep Injection Well 1

Resistivity of Belle Glades Carbonates from Deep Injection Well 1

Introduction

Ardaman and Associates, Inc. delivered ten whole core samples of carbonate for measurement of resistivity. The samples were cored from the Belle Glades deep injection well and ranged in depth from 1956.4 feet to 2819.2 feet (596.3 m to 859.3 m).

Procedures and Techniques

Sample Description

The ten cylindrical samples of carbonate were approximately 10 cm in diameter and 5 cm thick. The samples were gray to buff carbonate, primarily limestone but some samples contained dolomite. Ten right circular cylinder plugs were sub-cored from each whole core. The plugs were cored vertically, that is, normal to the diametral plane of the whole core.

Sample Preparation

The ten right circular cylinder plugs were approximately 2.54 cm diameter and 2.54 cm in length. The ends of the plugs were ground smooth and parallel to a tolerance of 0.001 in/in.

The sample plugs were dried in an oven at 40 degrees centigrade for 24 hours. Sample dimensions and mass were measured and the dry bulk density was computed.

The samples were vacuum saturated for 4 hours in brine containing either 15 grams or 42 grams of NaCl per liter of distilled water.

Petrophysical Data

After saturation, the porosity was determined by taking the difference between the saturated bulk density and dry bulk density and dividing by the density of the saturant.

The grain density ρ_g was estimated from the formula $\rho_{\mathbf{g}} = \rho_{\mathbf{b}} / (1 - \phi)$, where ρ_b is the dry bulk density and ϕ is the porosity. The grain density of the samples ranged from 2.554 g/cc to 2.771 g/cc. Sample porosity as a volume fraction ranged from 0.045 to 0.263. All sample mass and volumetric data are reported in Table 1.

Resistivity Tests

Four electrode complex electrical impedance measurements were performed on the samples in the AutoLab 1000 system. The saturated sample was jacketed in viton and mounted in the four-electrode core holder. Figure 1 diagrams the coreholder used in the four-electrode measurement. The core holder is inserted in the pressure vessel of the

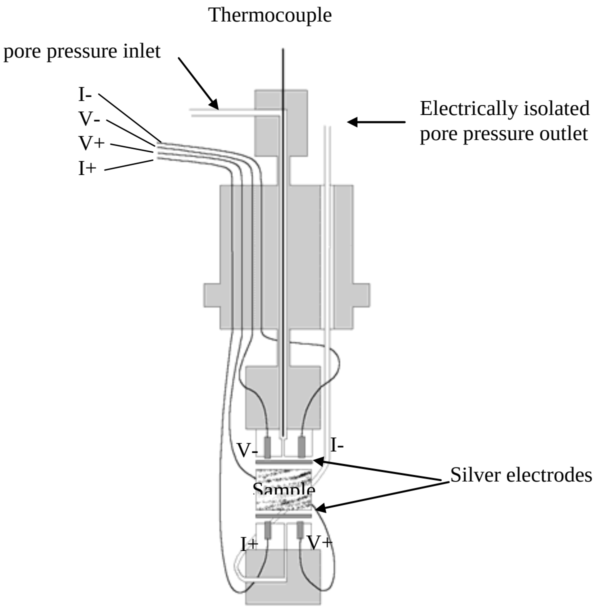


Figure 1. Four-electrode resistivity coreholder

AutoLab 1000 that provides accurate computer-ontrolled implementation of the loading path, in this case hydrostatic loading (confining pressure) and pore pressure maintenance. A function generator is used to apply a sinusoidal current across the sample. The current varied in frequency from 0.01 Hz to 100,000 Hz. The amplitude and phase of the voltage drop across the sample is compared to the amplitude and phase of the voltage drop across a reference resistor, and the values are used to compute the complex impedance at a given frequency.

The samples were confined at a pressure consistent with their depth, assuming an overburden gradient of approximately 1.0 psi/ft and a normal hydrostatic fluid pressure gradient of approximately 0.46 psi/ft. Thus the sample of Belle Glades Core 1 had an applied confining pressure of 1953 psi (13.47 MPa) and a pore pressure of 902 psi (6.22 MPa).

A temperature correction was applied to the brine conductivity but no cable corrections were applied.

Discussion

Resistivity Data

Resistivity data and formation factors for each sample are compiled in the Resistivity Measurement Report in Section II.

The frequency response of complex resistivity was fairly flat over the frequency range for most of the samples. The one exception was the sample from Core 3. Core 3 is a low porosity carbonate containing vugs and possibly dolotomized zones. The sample may contain other minerals that are responsible for the uncharacteristic frequency response (that is, not flat over the frequency range). Samples 3 and 4, which were also low porosity, vuggy rock with high grain density (possibly due to dolomite), had a resistivity that fell off rapidly after 1000 Hz.

Formation Factor and Cementation Coeficient

A cementation factor can be calculated from Archie's empirical formation factor-porosity relationship (Archie, 1942),

$$F = \alpha * \phi^{-m}.$$

F is the formation factor (ratio of the resistivity of the rock to the resistivity of the saturating brine), α is the tortuosity parameter, ϕ is the porosity and m is the cementation factor. If we assume that the α parameter is 1 (an assumption often made for carbonates) the cementation factor can be computed from the measured porosity and formation factor.

The cementation parameters were computed for individual samples assuming a tortuosity parameter equal to one. The formation factor at 20 kHz was used to compute the cementation factor for all samples except 2, 3 and 4. We used the formation factor at 100 Hz to compute the cementation factor for Core 3 and the formation factor at 1000 Hz for samples 3 and 4. Cementation factors are reported in Table 1.

Conclusions

Complex impedance was measured on ten samples of carbonate. The frequency response of the impedance was relatively flat for most of the samples over the measured frequency range with the exception of samples from Core 3.

The resitivities of the samples were quite low with the exception of the samples from Cores 2, 3 and 4, which were low but two orders of magnitude higher than six of the other seven samples in the Belle Glades group. Cores 3 and 4 have the lowest porosity of the Belle Glades group. The samples were vuggy and dolomitized and the higher resistivity indicates poorer pore space connectivity. Low resistivity generally indicates good pore space connectivity.

The cementation factor for individual samples varies from a low of 1.3 for Core 11 to a high of 2.65 for Core 2. The high cementation factors for Cores 2, 3 and 4 are consistent with vuggy porosity that both samples contain. However, the data for Core 3 are anomalous and use of any of the results from that sample carries risks. Core 11 shows signs of fracturing that may be responsible for its low resistivity (high fluid connectivity through the fracture), low formation factor and low cementation coefficient.

The cementation factor for the Belle Glades group is computed from a fit to a graph of the logarithm of formation factor to the logarithm of porosity (Figure 1). The cementation factor for the group is 2.15.

The data from Core sample 3 should be used with extreme caution because of the samples anomalous behavior. Data below 1000 Hz only should be used for Cores 2 and 4.

References

Archie, G. E. The electrical resistivity log as an aid in determining some reservoir characteristics. Trans., AIME, (1942), **146**, p 54.

Lucia, F. J. Carbonate Reservoir Characterization, Springer-Verlag, Berlin, 1999.

Section II: Data

Table 1
Data Summary
Belle Glades DIW

	Core Depth Feet	Length (cm)	Diameter (cm)	Bulk Volume (cm^3)	PreTest Dry Mass (g)	PreTest Dry Bulk Density (g/cm^3)	PreTest Sat. Mass (g)	PreTest Sat. Bulk Density (g/cm^3)	Average Grain Density (g/cm^3)	Porosity Vol. Fraction
Core 1	1956.40	2.543	2.537	12.86	27.998	2.178	30.790	2.395	2.771	0.214
Core 2	1959.00	2.526	2.548	12.88	32.967	2.560	33.798	2.624	2.733	0.064
Core 3	2354.50	2.591	2.545	13.18	33.914	2.573	34.538	2.620	2.696	0.045
Core 4	2359.40	2.555	2.543	12.98	33.211	2.559	34.033	2.623	2.725	0.061
Core 5	2522.00	2.541	2.527	12.74	29.529	2.317	31.169	2.446	2.644	0.124
Core 6	2531.50	2.530	2.532	12.74	29.484	2.314	31.342	2.460	2.691	0.140
Core 7	2788.10	2.535	2.508	12.52	25.740	2.055	28.881	2.306	2.707	0.241
Core 8	2793.50	2.525	2.527	12.66	24.459	1.931	27.925	2.205	2.619	0.263
Core 9	2807.70	2.205	2.543	11.20	25.277	2.257	26.635	2.378	2.554	0.116
Core 10	2812.00	2.527	2.541	12.81	24.759	1.932	28.248	2.204	2.616	0.261
Core 11	2819.20	2.553	2.540	12.94	29.118	2.251	31.328	2.422	2.692	0.164

	Core Depth Feet	Brine Concentration (g/liter)	Corrected Brine Conductivity (mS/cm)	Resistivity at 100 Hz (ohm-m)	Resistivity at 1000 Hz (ohm-m)	Resistivity at 20 kHz (ohm-m)	Formation Factor at 100 Hz	Formation Factor at 1000 Hz	Formation Factor at 20 kHz	Cementation Factor at 20 kHz
Core 1	1956.40	15.000	23.800	7.60	7.59	7.56	7.54	18.05	17.94	1.872
Core 2	1959.00	15.000	23.800	822.00	631.00	67.90	1956.00	1501.00	161.70	2.654
Core 3	2354.50	42.000	54.400	198.00	186.00	52.90	1086.00	1016.00	289.30	2.240
Core 4	2359.40	42.000	55.100	242.00	241.00	189.00	1333.00	1326.00	1041.00	2.568
Core 5	2522.00	42.000	55.300	7.13	7.09	6.90	39.41	39.21	38.17	1.741
Core 6	2531.50	42.000	55.600	6.69	6.67	6.62	37.22	37.08	36.84	1.834
Core 7	2788.10	42.000	58.700	2.46	2.44	2.43	14.44	14.34	14.27	1.866
Core 8	2793.50	42.000	58.600	2.12	2.10	2.08	12.43	12.29	12.21	1.872
Core 9	2807.70	42.000	58.900	11.80	11.80	11.70	69.44	69.21	68.74	1.967
Core 10	2812.00	42.000	59.200	3.96	3.95	3.92	23.46	23.36	23.24	2.344
Core 11	2819.20	42.000	58.900	1.89	1.87	1.86	11.12	11.01	10.94	1.323

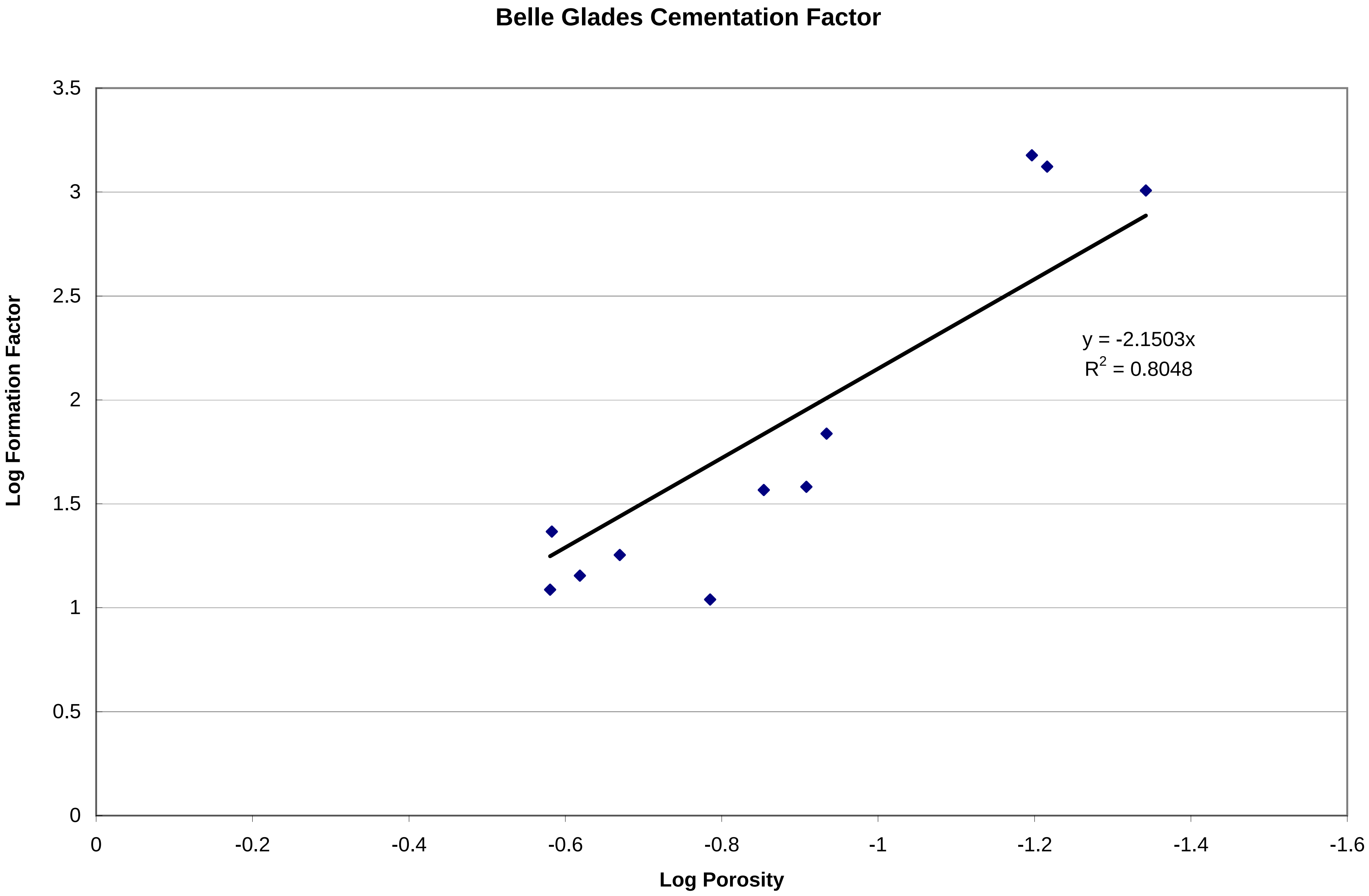

Belle Glades Cementation Factor
Log Formation Factor
3.5
3
2.5
2
1.5
1
0.5
0
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
Log Porosity
y = -2.1503x
$R^2 = 0.8048$

Figure 1

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.1			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	1956.4 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.17	Porosity:	21.4%
Sat. bulk density:	2.391	Pore fluids:	15,000 ppm NaCl
Diameter:	1.000 in	Entered Length:	1.000 in

Comments:	User: ner on elk at Fri Aug 4 2:10 2006
Expt name:	Resistivity at in-situ
Expt date:	Fri Aug 04 14:35:43 2006
Print date:	Thu Sep 28 14:50:45 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.1					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	1953	902	—	21.9

Resistivity for File Ardaman.BelleGlades.1							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	7.66	-0.0253	2.55e+04	2.38e+04	18.23
0	10.0	12.6	7.63	-0.0191	2.55e+04	2.38e+04	18.15
0	100.	100.	7.60	-0.0106	2.55e+04	2.38e+04	18.09
0	1.00e+03	796.	7.59	-0.0190	2.55e+04	2.38e+04	18.05
0	1.00e+04	1.26e+04	7.56	-0.104	2.55e+04	2.38e+04	17.99
0	2.00e+04	2.52e+04	7.54	-0.188	2.55e+04	2.38e+04	17.94

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.2			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	1959.0 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.56	Porosity:	6.4%
Sat. bulk density:	2.624	Pore fluids:	15,000 ppm NaCl
Diameter:	1.003 in	Entered Length:	0.994 in

Comments:	User: ner on elk at Fri Aug 4 3:05 2006
Expt name:	Resistivity at in-situ
Expt date:	Fri Aug 04 15:29:53 2006
Print date:	Thu Sep 28 14:51:38 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.2					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	1971	908	—	22.0

Resistivity for File Ardaman.BelleGlades.2							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	*C*	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	852.	-2.21	2.55e+04	2.38e+04	2027.
0	10.0	12.6	837.	-10.6	2.55e+04	2.38e+04	1992.
0	100.	100.	822.	-58.4	2.55e+04	2.38e+04	1956.
0	1.00e+03	796.	631.	-308.	2.55e+04	2.38e+04	1501.
0	1.00e+04	1.26e+04	101.	-118.	2.55e+04	2.38e+04	240.9
0	2.00e+04	2.52e+04	67.9	-89.7	2.55e+04	2.38e+04	161.7

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.3			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2354.5 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.59	Porosity:	4.5%
Sat. bulk density:	2.62	Pore fluids:	42,000 ppm NaCl
Diameter:	1.002 in	Entered Length:	1.020 in

Comments:	User: ner on elk at Mon Aug 7 11:30 2006
Expt name:	Resistivity at in-situ
Expt date:	Mon Aug 07 11:56:18 2006
Print date:	Thu Sep 28 14:52:26 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.3

Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2369	964	—	20.9

Resistivity for File Ardaman.BelleGlades.3

Event	Requested Frequency	Actual Frequency	Impedance R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	257.	-36.6	6.00e+04	5.47e+04	1408.
0	10.0	12.6	222.	-20.8	6.00e+04	5.47e+04	1216.
0	100.	100.	198.	-13.1	6.00e+04	5.47e+04	1086.
0	1.00e+03	796.	186.	-29.7	6.00e+04	5.47e+04	1016.
0	1.00e+04	1.26e+04	91.9	-64.8	6.00e+04	5.47e+04	502.8
0	2.00e+04	2.52e+04	52.9	-64.9	6.00e+04	5.47e+04	289.3

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.4			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2359.4 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.56	Porosity:	6.1%
Sat. bulk density:	2.623	Pore fluids:	42,000 ppm NaCl
Diameter:	1.001 in	Entered Length:	1.006 in

Comments:	User: ner on elk at Mon Aug 7 1:35 2006
Expt name:	Resisitivity at in-situ
Expt date:	Mon Aug 07 14:00:20 2006
Print date:	Thu Sep 28 14:54:02 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.4					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2366	964	—	21.2

Resistivity for File Ardaman.BelleGlades.4							
Event	Requested Frequency	Actual Frequency	Impedance R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	244.	-3.42	6.00e+04	5.51e+04	1347.
0	10.0	12.6	241.	-2.56	6.00e+04	5.51e+04	1330.
0	100.	100.	242.	-2.08	6.00e+04	5.51e+04	1333.
0	1.00e+03	796.	241.	-5.56	6.00e+04	5.51e+04	1326.
0	1.00e+04	1.26e+04	223.	-59.2	6.00e+04	5.51e+04	1227.
0	2.00e+04	2.52e+04	189.	-99.3	6.00e+04	5.51e+04	1041.

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.5			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2522.0 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.32	Porosity:	12.4%
Sat. bulk density:	2.446	Pore fluids:	42,000 ppm NaCl
Diameter:	0.995 in	Entered Length:	1.000 in

Comments:	User: ner on elk at Mon Aug 7 2:35 2006
Expt name:	Resistivity at in-situ
Expt date:	Mon Aug 07 15:02:55 2006
Print date:	Thu Sep 28 14:54:44 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.5					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2521	964	—	21.4

Resistivity for File Ardaman.BelleGlades.5							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	7.29	-0.0883	6.00e+04	5.53e+04	40.34
0	10.0	12.6	7.17	-0.0531	6.00e+04	5.53e+04	39.66
0	100.	100.	7.13	-0.0342	6.00e+04	5.53e+04	39.41
0	1.00e+03	796.	7.09	-0.0461	6.00e+04	5.53e+04	39.21
0	1.00e+04	1.26e+04	7.00	-0.341	6.00e+04	5.53e+04	38.68
0	2.00e+04	2.52e+04	6.90	-0.601	6.00e+04	5.53e+04	38.17

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.6			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2531.5 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.31	Porosity:	14.0%
Sat. bulk density:	2.460	Pore fluids:	42,000 ppm NaCl
Diameter:	0.997 in	Entered Length:	0.996 in

Comments:	User: ner on elk at Tues Aug 8 10:15 2006
Expt name:	Resistivity at in-situ
Expt date:	Tue Aug 08 10:45:43 2006
Print date:	Thu Sep 28 14:55:39 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.6					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2546	964	—	21.6

Resistivity for File Ardaman.BelleGlades.6							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	6.83	-0.00342	6.00e+04	5.56e+04	38.00
0	10.0	12.6	6.74	-0.0303	6.00e+04	5.56e+04	37.46
0	100.	100.	6.69	-0.0248	6.00e+04	5.56e+04	37.22
0	1.00e+03	796.	6.67	-0.0200	6.00e+04	5.56e+04	37.08
0	1.00e+04	1.26e+04	6.64	-0.108	6.00e+04	5.56e+04	36.94
0	2.00e+04	2.52e+04	6.62	-0.196	6.00e+04	5.56e+04	36.84

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.7			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2788.1 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.06	Porosity:	24.1%
Sat. bulk density:	2.306	Pore fluids:	42,000 ppm NaCl
Diameter:	0.987 in	Entered Length:	0.998 in

Comments:	User: ner on elk at Tues Aug 8 11:00 2006
Expt name:	Resisitivity at in-situ
Expt date:	Tue Aug 08 11:29:22 2006
Print date:	Thu Sep 28 14:57:20 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.7					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
1	zmeter4	2796	963	—	21.8

Resistivity for File Ardaman.BelleGlades.7							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
1	1.00	0.795	2.56	-0.0279	6.30e+04	5.87e+04	15.04
1	10.0	12.6	2.50	-0.0322	6.30e+04	5.87e+04	14.65
1	100.	100.	2.46	-0.0192	6.30e+04	5.87e+04	14.44
1	1.00e+03	796.	2.44	-0.0103	6.30e+04	5.87e+04	14.34
1	1.00e+04	1.26e+04	2.43	-0.0122	6.30e+04	5.87e+04	14.28
1	2.00e+04	2.52e+04	2.43	-0.0194	6.30e+04	5.87e+04	14.27

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.8			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2793.5 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	1.93	Porosity:	26.3%
Sat. bulk density:	2.205	Pore fluids:	42,000 ppm NaCl
Diameter:	0.995 in	Entered Length:	0.994 in

Comments:	User: ner on elk at Tues Aug 8 1:20 2006
Expt name:	Resisitivity at in-situ
Expt date:	Tue Aug 08 13:46:36 2006
Print date:	Thu Sep 28 14:58:09 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.8					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2792	964	—	21.8

Resistivity for File Ardaman.BelleGlades.8							
Event	Requested Frequency	Actual Frequency	Impedance R	X	*C*	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	2.17	0.0254	6.30e+04	5.86e+04	12.71
0	10.0	12.6	2.16	-0.0266	6.30e+04	5.86e+04	12.66
0	100.	100.	2.12	-0.0214	6.30e+04	5.86e+04	12.43
0	1.00e+03	796.	2.10	-0.0126	6.30e+04	5.86e+04	12.29
0	1.00e+04	1.26e+04	2.08	-0.0108	6.30e+04	5.86e+04	12.22
0	2.00e+04	2.52e+04	2.08	-0.0165	6.30e+04	5.86e+04	12.21

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.9			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2807.7 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.26	Porosity:	11.6%
Sat. bulk density:	2.378	Pore fluids:	42,000 ppm NaCl
Diameter:	1.001 in	Entered Length:	0.868 in

Comments:	User: ner on elk at Tues Aug 8 1:55 2006
Expt name:	Resisitivity at in-situ
Expt date:	Tue Aug 08 14:19:57 2006
Print date:	Thu Sep 28 15:00:18 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.9					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2813	964	—	22.0

Resistivity for File Ardaman.BelleGlades.9							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	*C*	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	12.1	0.0181	6.30e+04	5.89e+04	71.09
0	10.0	12.6	11.9	-0.0929	6.30e+04	5.89e+04	70.15
0	100.	100.	11.8	-0.0602	6.30e+04	5.89e+04	69.44
0	1.00e+03	796.	11.8	-0.0423	6.30e+04	5.89e+04	69.21
0	1.00e+04	1.26e+04	11.7	-0.143	6.30e+04	5.89e+04	68.85
0	2.00e+04	2.52e+04	11.7	-0.254	6.30e+04	5.89e+04	68.74

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.10			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2812.0 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.08	Porosity:	26.1%
Sat. bulk density:	2.204	Pore fluids:	42,000 ppm NaCl
Diameter:	0.965 in	Entered Length:	0.995 in

Comments:	User: ner on elk at Tues Aug 8 2:20 2006
Expt name:	Resisitivity at in-situ
Expt date:	Tue Aug 08 14:45:50 2006
Print date:	Thu Sep 28 15:01:00 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.10

Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2821	964	—	22.0

Resistivity for File Ardaman.BelleGlades.10

Event	Requested Frequency	Actual Frequency	Impedance R	Impedance X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	1.94	0.00602	6.30e+04	5.89e+04	11.44
0	10.0	12.6	1.91	-0.0203	6.30e+04	5.89e+04	11.26
0	100.	100.	1.89	-0.0151	6.30e+04	5.89e+04	11.12
0	1.00e+03	796.	1.87	-0.00935	6.30e+04	5.89e+04	11.01
0	1.00e+04	1.26e+04	1.86	-0.00781	6.30e+04	5.89e+04	10.95
0	2.00e+04	2.52e+04	1.86	-0.0112	6.30e+04	5.89e+04	10.94

Resistivity Measurement Report

Sample and Experiment Information for File Ardaman.BelleGlades.11			
Well:	Belle Glades DIW	Organization:	Ardaman
Depth:	2819.2 ft		
Formation:	Unknown	Rock type:	Carbonate
Dry bulk density:	2.25	Porosity:	16.4%
Sat. bulk density:	2.422	Pore fluids:	42,000 ppm NaCl
Diameter:	1.000 in	Entered Length:	1.005 in

Comments:	User: ner on elk at Tues Aug 8 2:50 2006
Expt name:	Resistivity at in-situ
Expt date:	Tue Aug 08 15:17:33 2006
Print date:	Thu Sep 28 15:01:33 2006
A2D File:	

Pressure Information for File Ardaman.BelleGlades.11					
Event	System	Conf	Pore	Diff	Temp
		psi	psi	pounds	°C
0	zmeter4	2835	964	—	22.2

Resistivity for File Ardaman.BelleGlades.11							
	Requested	Actual	Impedance				
Event	Frequency	Frequency	R	X	C	$C_{corrected}$	F
	Hz	Hz	Ωm	Ωm	μS/cm	μS/cm	
0	1.00	0.795	4.00	-0.00440	6.30e+04	5.92e+04	23.67
0	10.0	12.6	3.99	-0.0184	6.30e+04	5.92e+04	23.63
0	100.	100.	3.96	-0.0163	6.30e+04	5.92e+04	23.46
0	1.00e+03	796.	3.95	-0.0130	6.30e+04	5.92e+04	23.36
0	1.00e+04	1.26e+04	3.93	-0.0200	6.30e+04	5.92e+04	23.26
0	2.00e+04	2.52e+04	3.92	-0.0326	6.30e+04	5.92e+04	23.24

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

August 18, 2006
File Number 06-120

RECEIVED
AUG 21 2006

Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft. Myers, FL 33908

Attention: Jay Swartznetruber

Subject: Rock Core Testing, Palm Beach County Water Utilities Department, Lake Region Deep Injection Well, Belle Glades, Florida

Gentlemen:

As requested, vertical and horizontal permeability and specific gravity tests have been completed on seven of the eleven limestone rock cores provided for testing by your firm. The samples were received on 06/20/06. The designations of the seven samples are listed below.

Core	Depth (feet)
1	1956.4 - 1957.2
6	2531.5 - 2532.0
7	2788.1 - 2788.7
8	2793.5 - 2794.0
9	2807.7 - 2808.2
10	2812.0 - 2812.5
11	2819.2 - 2819.6

The permeability tests were performed in general accordance with ASTM Standard D 5084 "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter" using the constant head test method (Method A). The permeability test results are presented on the attached test reports

The measured mineral specific gravities are presented on the attached reports. The specific gravity tests were performed in general accordance with ASTM Standard D 854 "Specific Gravity of Soil Solids by Water Pycnometer".

The specimens were reported to be from the samples designated herein. The test results are indicative of only the specimens that were actually tested. The test results presented are based upon accepted industry practice as well as test method(s) listed. Ardaman & Associates, Inc. neither accepts responsibility for, nor makes claims to the final use and purpose of the material.

If you have any questions about the test results or require additional information, please contact us. We will forward additional test results as the tests are completed.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Thomas S. Ingra, P.E.
Laboratory Director
Florida License No. 31987

TSI/ed

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/07/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 1, 1956.4-1957.2'

LABORATORY IDENTIFICATION NO.: 06120/C1/kV

SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:

☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 95 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 13

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 8.3 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.87 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.64	10.10	612.26	5.8	150.6	0.159	88	30	160	59.6	3.1	3	1477.1	6.3	95	$4.0\text{x}10^{-9}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/28/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 1, 1956.4-1957.2'**

LABORATORY IDENTIFICATION NO.: 06120/C1/kH

SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 84 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 10, 14

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No

As-Received Length (inch): 8.3 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.87 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.28	5.01	143.66	6.1	149.5	0.165	88	30	160	48.1	3.1	2	344.13	6.3	91	3.9×10^{-5}

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/06/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 6, 2531.5-2532.0'**

LABORATORY IDENTIFICATION NO.: 06120/C6/kV

SAMPLE DESCRIPTION: Light brown dolomitic limestone

ASTM D 5084 TEST METHOD:

- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 80 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 13

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No

As-Received Length (inch): 11.6 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.78 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
10.23	10.11	820.59	6.2	142.4	0.179	79	30	160	74.1	1.5	7	1872.2	7.3	93	1.1×10^{-9}

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 5.0" and 6.6".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/27/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 6, 2531.5-2532.0'

LABORATORY IDENTIFICATION NO.: 06120/C6/kH

SAMPLE DESCRIPTION: Light brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 75 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 6, 9

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No

As-Received Length (inch): 11.6 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.78 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.81	5.01	154.16	7.3	142.6	0.178	94	30	160	67.6	0.7	8	352.18	7.3	94	$3.2\text{x}10^{-9}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By:

Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/08/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 7, 2788.1-2788.7'

LABORATORY IDENTIFICATION NO.: 06120/C7/kV

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 95 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 3, 6, 11

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No

As-Received Length (inch): 8.0 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.75 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions						Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.23	10.10	658.82	15.2	118.0	0.312	92	30	160	40.5	14.1	1	1245.8	15.5	95	$3.6\text{x}10^{-5}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 5.3" and 2.7".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/27/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 7, 2788.1-2788.7'**

LABORATORY IDENTIFICATION NO.: 06120/C7/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 95 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 5, 8, 12, 16

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 8.0 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.75 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions						Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.56	5.02	149.35	15.3	118.6	0.309	94	30	160	38.7	5.0	1	283.90	15.5	95	5.5×10^{-5}

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 06/30/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 8, 2793.5-2794.0'**

LABORATORY IDENTIFICATION NO.: 06120/C8/kV

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:
☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 90 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 5, 8, 12

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 5.9 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.77 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
10.12	10.10	810.62	14.4	121.8	0.295	95	30	160	17.3	1.5	2	1582.5	14.4	95	$1.1\text{x}10^{-5}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 4.4" and 1.5".

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/28/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 8, 2793.5-2794.0'**

LABORATORY IDENTIFICATION NO.: 06120/C8/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 100 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 10, 14

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 5.9 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.77 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.44	5.01	146.74	14.4	121.3	0.298	94	30	160	48.3	0.9	2	285.32	14.4	94	1.0×10^{-5}

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 08/18/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/07/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 9, 2807.7-2808.2'

LABORATORY IDENTIFICATION NO.: 06120/C9/kV

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 89 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 12

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No

As-Received Length (inch): 6.4 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.74 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\overline{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.12	10.10	650.75	10.7	128.40	0.249	88	30	160	33.1	44.4	10	1339.1	10.7	88	3.6×10^{-4}

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 3.9" and 2.5".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\overline{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TW Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/27/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 9, 2807.7-2808.2'**

LABORATORY IDENTIFICATION NO.: 06120/C9/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 100 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 7, 9, 13

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No

As-Received Length (inch): 6.4 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.74 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.47	5.01	147.42	10.7	130.5	0.237	94	30	160	46.8	35.7	2	308.28	10.7	94	$3.2\text{x}10^{-4}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/08/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 10, 2812.0-2812.5'**

LABORATORY IDENTIFICATION NO.: 06120/C10/kV

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:
☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 100 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 8, 11

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 9.0 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.76 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.87	10.03	701.03	14.8	118.8	0.311	91	30	160	37.1	40.4	3	1333.7	15.6	96	$1.5\text{x}10^{-4}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 5.1" and 3.9".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 08/18/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/30/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 10, 2812.0-2812.5'

LABORATORY IDENTIFICATION NO.: 06120/C10/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 87 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4, 6, 10

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No

As-Received Length (inch): 9.0 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.76 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.04	5.01	158.34	15.5	118.8	0.310	95	30	160	29.4	3.8	2	301.42	15.6	95	$1.4\text{x}10^{-4}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 08/18/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120
DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/06/06
DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: **Core 11, 2819.2-2819.6'**
LABORATORY IDENTIFICATION NO.: 06120/C11/kV
SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 100 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 4

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 6.3 Length Trimmed: ☒ Yes ☐ No
TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.79 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.61	10.02	678.92	9.4	133.7	0.232	86	30	160	26.9	9.1	3	1454.4	9.4	87	3.4×10^{-5}

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 3.0" and 3.3".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 08/18/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/27/06

DATE REPORTED: 08/18/06

INCOMING LABORATORY SAMPLE NO.: Core 11, 2819.2-2819.6'

LABORATORY IDENTIFICATION NO.: 06120/C11/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:
☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: -
☐ Beginning of Test;
☐ End of Test

$\Delta\sigma_c$ (psi):

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 6.3 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.79 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.18	5.02	142.12	9.3	133.8	0.301	86	30	160	47.4	1.6	1	304.70	9.4	87	1.2×10^{-5}

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TW

Date: 08/18/06

Form SR-2B: Rev. 0

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

October 30, 2006
File Number 06-120

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Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft. Myers, FL 33908

Attention: Jay Swartznetruber

Subject: Rock Core Testing, Palm Beach County Water Utilities Department, Lake Region Deep Injection Well, Belle Glades, Florida

Gentlemen:

As requested, vertical and horizontal permeability and specific gravity tests have been completed on the four remaining limestone rock cores provided for testing by your firm. The samples were received on 06/20/06. The designations for four samples are listed below.

Core	Depth (feet)
2	1959.0 - 1959.8
3	2354.5 - 2355.0
4	2359.4 - 2360.0
5	2522.0 - 2522.5

The permeability tests were performed in general accordance with ASTM Standard D 5084 "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter" using the constant head test method (Method A). The permeability test results are presented on the attached test reports

The measured mineral specific gravities are presented on the attached reports. The specific gravity tests were performed in general accordance with ASTM Standard D 854 "Specific Gravity of Soil Solids by Water Pycnometer".

The specimens were reported to be from the samples designated herein. The test results are indicative of only the specimens that were actually tested. The test results presented are based upon accepted industry practice as well as test method(s) listed. Ardaman & Associates, Inc. neither accepts responsibility for, nor makes claims to the final use and purpose of the material.

New England Research has completed the resistivity testing of the eleven cores and their results are included in both the enclosed report and CD.

If you have any questions about the test results or require additional information, please contact us. With this submittal all permeability testing is now complete.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Thomas S. Ingra, P.E.
Laboratory Director
Florida License No. 31987

TSI/ed

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8008 S. Orange Avenue 32809, Post Office Box 593003, Orlando, Florida 32859-3003 Phone (407) 855-3860 FAX (407) 859-8121
Offices in: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/05/06

DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 2, 1959.0-1959.8'

LABORATORY IDENTIFICATION NO.: 06120/C2/kV

SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 96 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 3

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No

As-Received Length (inch): 10.7 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.87 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.78	10.13	707.31	0.7	162.7	0.091	19	30	160	20.3	5.3	2	1844.5	2.3	65	5.8x10^{-5}*

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 7.3" and 3.4".

* Sample had vertical fissures/cracks that resulted in increased hydraulic conductivity.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 10/30/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120
DATE SAMPLE RECEIVED: 06/20/06 SET UP: 08/13/06
DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 2, 1959.0-1959.8'
LABORATORY IDENTIFICATION NO.: 06120/C2/kH
SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 73 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 2, 6, 9, 11

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 10.7 Length Trimmed: ☒ Yes ☐ No
TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.87 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions						Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
4.23	5.02	83.67	2.2	163.2	0.089	64	30	160	96.2	15.3	45	218.85	2.3	67	$3.6x10^{-9}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 10/30/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120
DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/05/06
DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 3, 2354.5-2355.0'
LABORATORY IDENTIFICATION NO.: 06120/C3/kV
SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 100 % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 2, 5, 10

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 4 .6 Length Trimmed: ☒ Yes ☐ No
TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal
SPECIFIC GRAVITY, G_s: 2.89 ☐ Assumed ☒ Measured (ASTM D 854)
PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions						Final Conditions			Hydraulic Conductivity k_{20} (cm/sec)
H (cm)	D (cm)	V (cm^3)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm^3)	t (days)	WDS (g)	w_c (%)	S (%)	
10.13	10.14	817.77	1.6	160.0	0.113	36	30	160	72.0	2.8	15	2096.2	1.8	41	$1.9x10^{-7}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 4.6" and <1.0".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 10/30/06
Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120
DATE SAMPLE RECEIVED: 06/20/06 SET UP: 08/14/06
DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 3, 2354.5-2355.0'
LABORATORY IDENTIFICATION NO.: 06120/C3/kH
SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 87 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 3, 7, 11, 14

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 4.6 Length Trimmed: ☒ Yes ☐ No
TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.89 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\overline{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
2.96	5.02	58.48	1.8	163.5	0.093	50	30	160	119.7	0.1	36	153.27	1.8	51	$2.4\text{x}10^{-10}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\overline{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 10/30/06
Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120
DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/05/06
DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 4, 2359.4-2360.0'
LABORATORY IDENTIFICATION NO.: 06120/C4/kV
SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 93 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 5, 10, 14

SPECIMEN DATA:
As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No
As-Received Length (inch): 4.7 Length Trimmed: ☒ Yes ☐ No
TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal
SPECIFIC GRAVITY, G_s: 2.86 ☐ Assumed ☒ Measured (ASTM D 854)
PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity k_{20} (cm/sec)
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	
9.93	10.13	799.86	2.8	160.0	0.103	69	30	160	102.1	5.7	20	2051.1	3.1	76	2.5×10^{-10}

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 3.7" and 1.0".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 10/30/06
Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 08/16/06

DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 4, 2359.4-2360.0'

LABORATORY IDENTIFICATION NO.: 06120/C4/kH

SAMPLE DESCRIPTION: Brown dolomitic limestone

ASTM D 5084 TEST METHOD:
- ☒ A - Constant Head
- ☐ B - Falling Head; Constant Tailwater
- ☐ C - Falling Head; Rising Tailwater
- ☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 93 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 3, 5, 9, 11

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No

As-Received Length (inch): 4.7 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.86 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
8.07	5.01	159.17	3.0	160.9	0.099	79	30	160	86.3	0.8	6	410.38	3.1	80	$7.5x10^{-10}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: Date: 10/30/06

Form SR-2B: Rev. 0

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ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/05/06

DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 5, 2522.0-2522.5'

LABORATORY IDENTIFICATION NO.: 06120/C5/kV

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 70 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 5, 9, 13

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☐ Yes ☒ No

As-Received Length (inch): 12.9 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☒ Vertical ☐ Horizontal

SPECIFIC GRAVITY, G_s: 2.78 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions						Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
10.43	10.23	857.77	4.0	139.2	0.198	45	30	160	54.3	7.1	7	1913.6	6.9	78	$2.1\text{x}10^{-9}$

COMMENTS: (1) Core sample selected for permeability testing was cut to length, air-dried, deaired under vacuum for a minimum of 24 hours, and then saturated with deaired tap water from the bottom up while still under vacuum. (2) Final w_c from horizontal permeability test specimen. WDS calculated from measured wet weight and final w_c. (3) Received two sections of core with usable lengths of 7.2" and 5.7".

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 10/30/06

Form SR-2B: Rev. 0

ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
ROCK CORE HYDRAULIC CONDUCTIVITY TEST REPORT

CLIENT: Youngquist Brothers, Inc.

PROJECT: Lake Region Deep Injection Well - Belle Glades

FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06 SET UP: 07/28/06

DATE REPORTED: 10/30/06

INCOMING LABORATORY SAMPLE NO.: Core 5, 2522.0-2522.5'

LABORATORY IDENTIFICATION NO.: 06120/C5/kH

SAMPLE DESCRIPTION: Light brown limestone

ASTM D 5084 TEST METHOD:

☒ A - Constant Head
☐ B - Falling Head; Constant Tailwater
☐ C - Falling Head; Rising Tailwater
☐ F - Constant Volume; Falling Head - Rising Tailwater

B-FACTOR: 72 (stable) % ☐ Beginning of Test; ☒ End of Test

$\Delta\sigma_c$ (psi): 3, 5, 10

SPECIMEN DATA:

As-Received Diameter (inch): 4 Diameter Trimmed: ☒ Yes ☐ No
As-Received Length (inch): 12.9 Length Trimmed: ☒ Yes ☐ No

TEST SPECIMEN ORIENTATION: ☐ Vertical ☒ Horizontal

SPECIFIC GRAVITY, G_s: 2.78 ☐ Assumed ☒ Measured (ASTM D 854)

PERMANENT: ☒ Deaired Tap Water ☐ Other

Initial Conditions							Test Conditions					Final Conditions			Hydraulic Conductivity
H (cm)	D (cm)	V (cm³)	w_c (%)	γ_d (pcf)	n	S (%)	$\bar{\sigma}_c$ (psi)	u_b (psi)	i_{avg}	Q (cm³)	t (days)	WDS (g)	w_c (%)	S (%)	k_{20} (cm/sec)
7.30	5.02	144.33	6.9	142.4	0.179	89	30	160	59.2	0.6	20	329.40	6.9	89	$6.1\text{x}10^{-9}$

COMMENTS: (1) Horizontal permeability test specimen was cross-cored from the corresponding vertical test specimen.

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; V = Volume; WDS = Dry mass; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\bar{\sigma}_c$ = Isotropic effective confining stress; u_b = Back-pressure; i_{avg} = Average hydraulic gradient; Q = Flow volume; t = Test duration; k_{20} = Saturated hydraulicconductivity at 20°C; n = Total porosity; and G_s = Specific gravity.

Checked By: TM Date: 10/30/06

Form SR-2B: Rev. 0

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

November 8, 2006
File Number 06-120

RECEIVED
NOV 13 2006

Youngquist Brothers, Inc.
15465 Pine Ridge Road
Ft. Myers, FL 33908

Attention: Jay Swartznetruber

Subject: Rock Core Testing, Palm Beach County Water Utilities Department, Lake Region Deep Injection Well, Belle Glades, Florida

Gentlemen:

As requested, unconfined compression tests have been completed on seven limestone rock cores provided for testing by your firm. The samples were received on 06/20/06. The designations for the seven samples are listed below.

Core	Depth (feet)
1	1956.4-1957.2
2	1959.0-1959.8
5	2522.0-2522.5
6	2531.5-2532.0
7	2788.1-2788.7
9	2807.7-2808.2
10	2812.0-2812.5

The unconfined compression tests were performed in general accordance with ASTM Standard D 7012 "Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures" using the unconfined test method (Method C). The unconfined compression test results are presented on the attached test reports

The specimens were reported to be from the samples designated herein. The test results are indicative of only the specimens that were actually tested. The test results presented are based upon accepted industry practice as well as test method(s) listed. Ardaman & Associates, Inc. neither accepts responsibility for, nor makes claims to the final use and purpose of the material.

If you have any questions about the test results or require additional information, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Thomas S. Ingra, P.E.
Laboratory Director
Florida License No. 31987

TSI/ed
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8008 S. Orange Avenue 32809, Post Office Box 593003, Orlando, Florida 32859-3003 Phone (407) 855-3860 FAX (407) 859-8121
Offices in: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

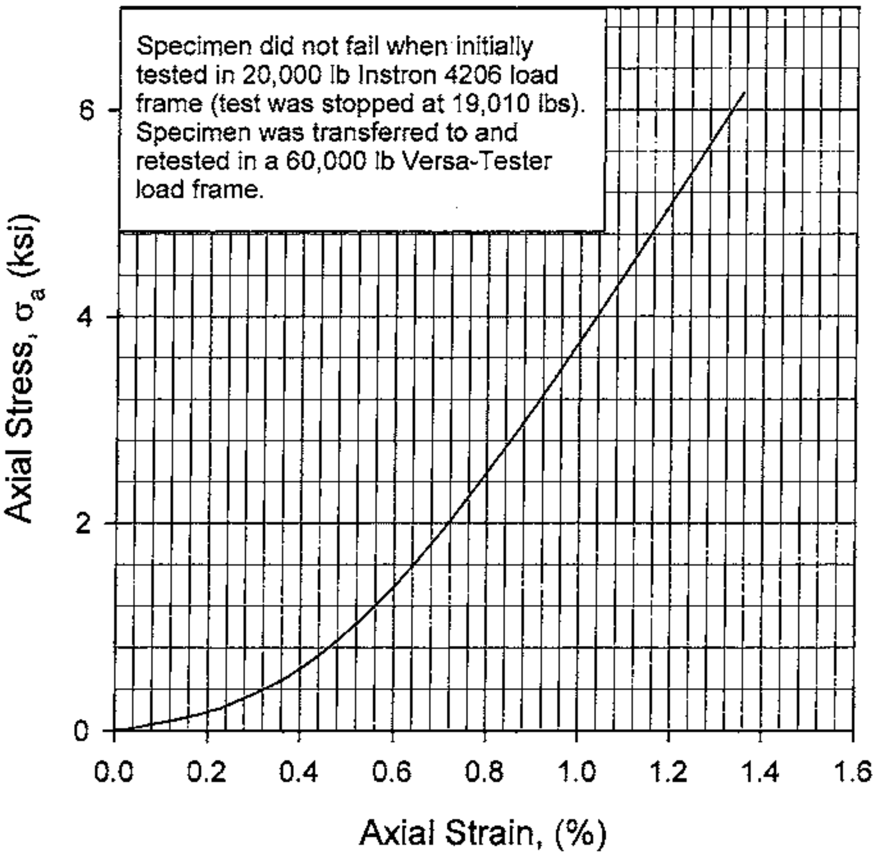
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: **Core 1, 1956.4-1957.2'**
BORING Core 1 SAMPLE -
DEPTH 1956.4-1957.2 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C1
SAMPLE DESCRIPTION: Light brown dolomitic limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.27	5.03	2.0	0.2	133.0	2	0.013	0.13	10.8	6,330	6.7x10^5



Specimen did not fail when initially tested in 20,000 lb Instron 4206 load frame (test was stopped at 19,010 lbs). Specimen was transferred to and retested in a 60,000 lb Versa-Tester load frame.

TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material:
☐ None
☒ Lab-Stone
☐ Sulfur

Comments: Maximum load in Versa-Tester load frame was 19,500 lb. Equivalent time to failure based on loading rate of 0.013 cm/minute.

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.87 ☐ Assumed ☒ Measured

FAILURE SKETCH

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

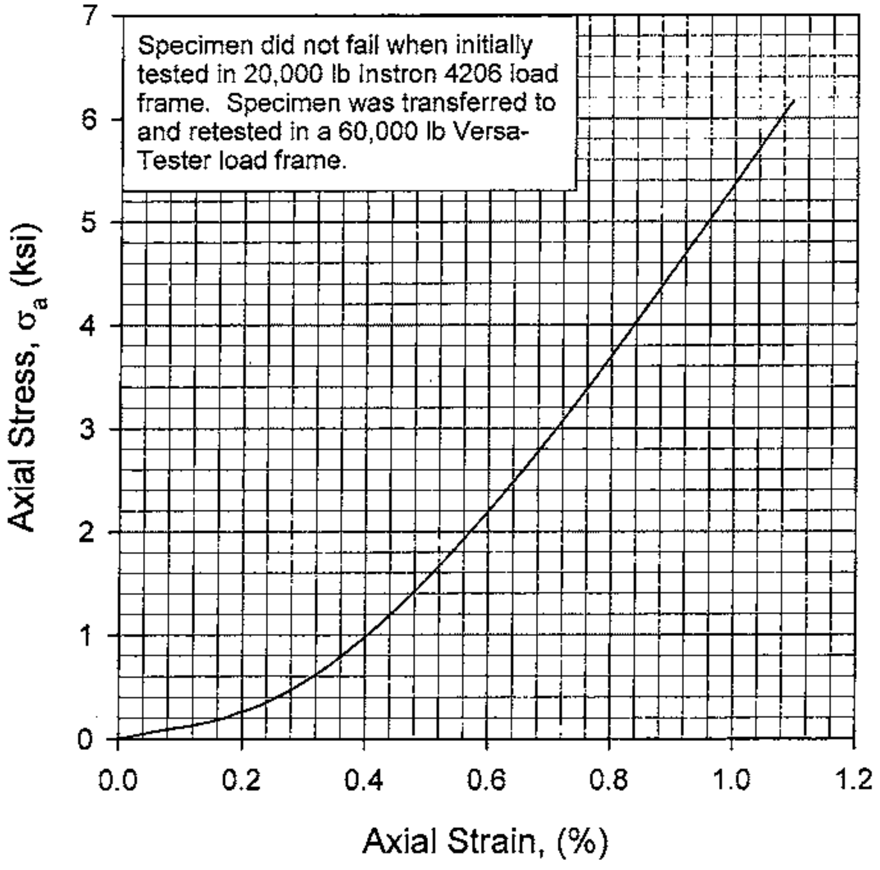
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: **Core 2, 1959.0-1959.8'**
BORING Core 2 SAMPLE -
DEPTH 1959.0-1959.8 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C2
SAMPLE DESCRIPTION: Light brown dolomitic limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.49	5.03	2.1	0.5	166.3	20	0.013	0.12	12.8	10,190	8.3 x10^5



Specimen did not fail when initially tested in 20,000 lb Instron 4206 load frame. Specimen was transferred to and retested in a 60,000 lb Versa-Tester load frame.

TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments: Maximum load in Versa-Tester load frame was 31,400 lb. Equivalent time to failure based on loading rate of 0.013 cm/minute.

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.87 ☐ Assumed
☒ Measured

FAILURE SKETCH

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

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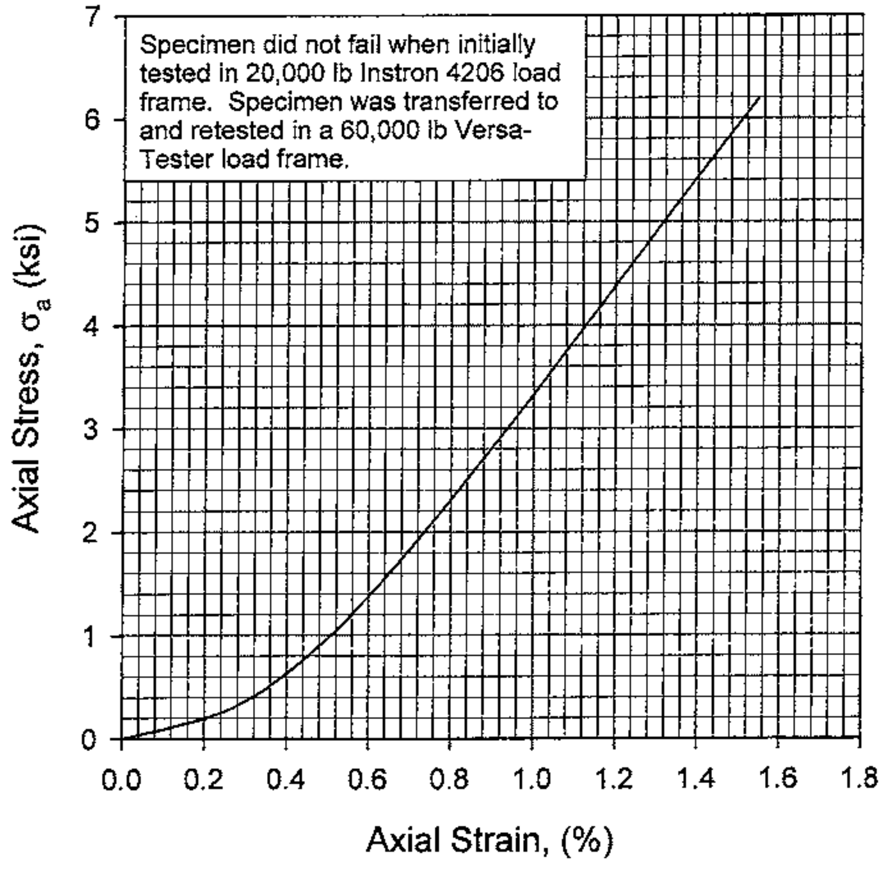
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: Core 5, 2522.0-2522.5'
BORING Core 5 SAMPLE -
DEPTH 2522.0-2522.5 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C5
SAMPLE DESCRIPTION: Light brown limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.27	5.02	2.0	1.9	147.7	26	0.013	0.13	15.3	8,240	5.3x10^5



Specimen did not fail when initially tested in 20,000 lb Instron 4206 load frame. Specimen was transferred to and retested in a 60,000 lb Versa-Tester load frame.

TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments: Maximum load in Versa-Tester load frame was 25,300 lb. Equivalent time to failure based on loading rate of 0.013 cm/minute.

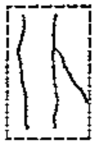
SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.78 ☐ Assumed
☒ Measured

FAILURE SKETCH



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Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

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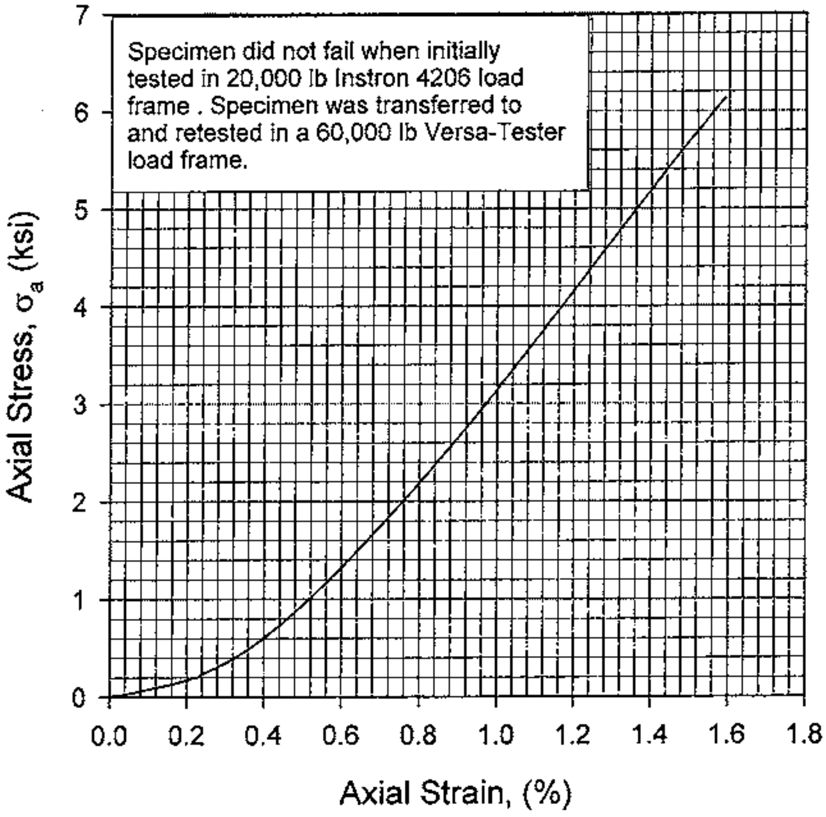
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: Core 6, 2531.5-2532.0'
BORING Core 6 SAMPLE -
DEPTH 2531.5-2532.0 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C6
SAMPLE DESCRIPTION: Light brown limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.21	5.02	2.0	1.1	147.0	18	0.013	0.13	13.5	6,850	5.1×10^5



Specimen did not fail when initially tested in 20,000 lb Instron 4206 load frame . Specimen was transferred to and retested in a 60,000 lb Versa-Tester load frame.

TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments: Maximum load in Versa-Tester load frame was 21,050 lb. Equivalent time to failure based on loading rate of 0.013 cm/minute.

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.78 ☐ Assumed
☒ Measured

FAILURE SKETCH

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: M Date: 11/08/06

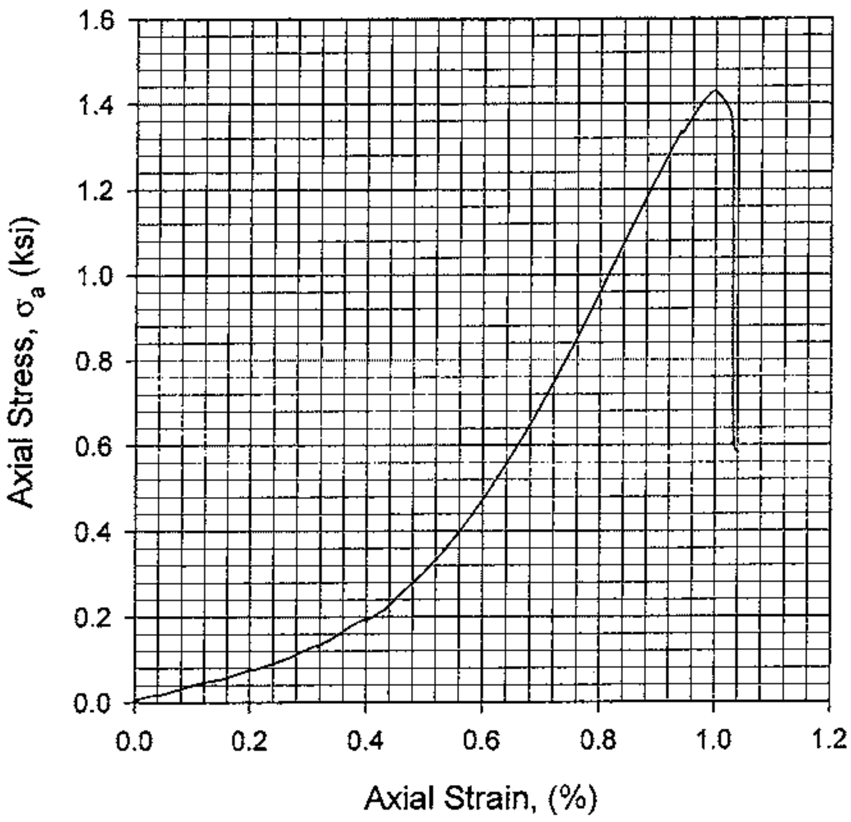
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: **Core 7, 2788.1-2788.7'**
BORING Core 7 SAMPLE -
DEPTH 2788.1-2788.7 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C7
SAMPLE DESCRIPTION: Light brown limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.36	5.03	2.1	6.8	123.5	48	0.013	0.13	7.7	1,430	2.7×10^5



TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments:

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.75 ☐ Assumed
☒ Measured

FAILURE SKETCH

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

C:\Documents and Settings\jan.wildman\Documents\Projects\06\06-120\Oct 17 -UC.wpd

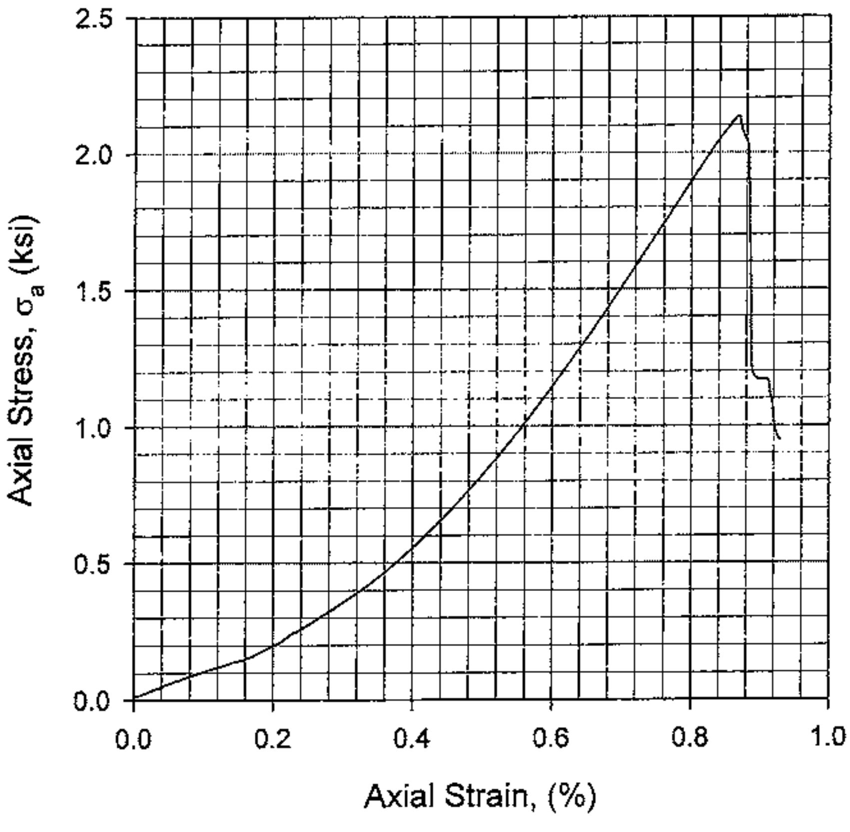
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: **Core 9, 2807.7-2808.2'**
BORING Core 9 SAMPLE -
DEPTH 2807.7-2808.2 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C9
SAMPLE DESCRIPTION: Light brown limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.21	5.02	2.0	4.0	132.6	37	0.013	0.13	6.7	2,130	3.9×10^5



TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments:

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.74 ☐ Assumed
☒ Measured

FAILURE SKETCH

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

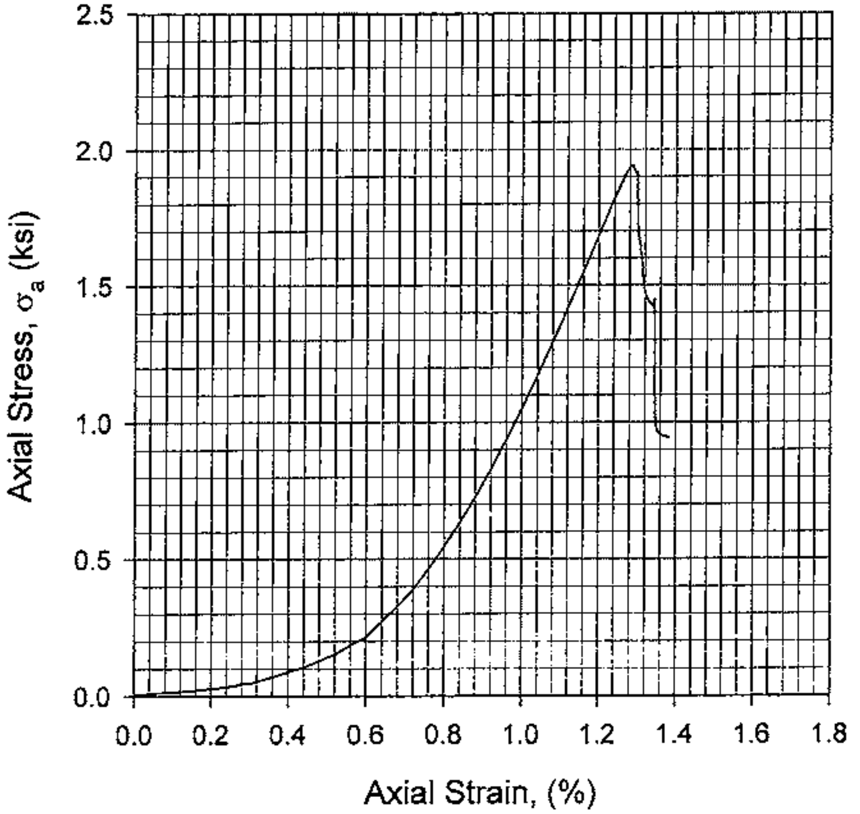
ARDAMAN & ASSOCIATES, INC. GEOTECHNICAL TESTING LABORATORY
INTACT ROCK CORE UNCONFINED COMPRESSION TEST REPORT

CLIENT: Youngquist Brothers, Inc.
PROJECT: Lake Region Deep Injection Well - Belle Glades
FILE NO.: 06-120

DATE SAMPLE RECEIVED: 06/20/06
DATE TEST SET-UP: 10/10/06
DATE REPORTED: 11/08/06

INCOMING SAMPLE NO.: **Core 10, 2812.0-2812.5'**
BORING Core 10 SAMPLE -
DEPTH 2812.0-2812.5 ☒ ft; ☐ m
LABORATORY IDENTIFICATION NO.: 06120/C10
SAMPLE DESCRIPTION: Light brown limestone

Specimen Dimensions			Initial Conditions			Rate of Loading		Time to Failure (minutes)	Unconfined Compressive Strength, σ_a(ult) (lb/in^2)	Young's Modulus, E (lb/in^2)
H (cm)	D (cm)	H/D	w_c (%)	γ_d (lb/ft^3)	S (%)	$\dot{\varepsilon}$ (cm/minute)	$\dot{\varepsilon}$ (%/minute)			
10.30	5.01	2.1	6.3	125.8	47	0.013	0.13	10.7	1,940	3.3x10^5



TEST PROCEDURES

☒ ASTM Standard D 7012, Method C

Air Temperature (°C): 20.0

Capping Material: ☐ None
☒ Lab-Stone
☐ Sulfur

Comments:

SPECIMEN PREPARATION

Original Core Diameter (inch): 4

Specimen Sub-Cored for Testing:
☒ Yes
☐ No

G_s: 2.76 ☐ Assumed
☒ Measured

FAILURE SKETCH

The test data and all associated project information presented hereon shall be held in confidence and disclosed to other parties only with the authorization of the Client or Ardaman & Associates, Inc. Physical and electronic records of each project are kept for a minimum of 7 years. Test samples are kept in storage for at least 10 working days after mailing of the test report, prior to being discarded, unless a longer storage period is requested in writing and accepted by Ardaman & Associates, Inc.

Where: H = Specimen height; D = Specimen diameter; w_c = Moisture content (ASTM D 2216); γ_d = Dry density; S = Saturation; $\dot{\varepsilon}$ = Vertical displacement rate; and G_s = Specific gravity.

Checked By: TM Date: 11/08/06

Appendix J
Packer Tests

Lab Reports

Page 1 of 1

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 129-022206
LOCATION: 1901-1915
ADDITIONAL DATA: BPLRIWI
SAMPLED BY: JAY
SUBMITTED BY: JOE PINKOCZE
DATE SAMPLED: 060221 0400
DATE REPORTED: MAR. 6 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060222 1547
SAMPLE MATRIX: W

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
MAGNESIUM	EPA 200.7	279	mg/l	.0020	.006	060227 1312	IN-FTL	
SODIUM	EPA 200.7	3100	mg/l	.0050	.015	060227 1528	IN-FTL	160
CALCIUM	EPA 200.7	320	mg/l	.0010	.003	060227 1307	IN-FTL	
POTASSIUM	EPA 200.7	200	mg/l	.0040	.012	060227 1312	IN-FTL	
AMMONIA NITROGEN	350.1	1.3	mg/l	.0200	.060	060303 1230	JGT-FTL	
T KJELDAHL NIT.	351.2	1.4	mg/l	.2000	.600	060302 1617	JGT-FTL	
TOTAL PHOSPHORUS	365.4	1.4	mg/l	.0550	.165	060302 1700	JGT-FTL	
DISSL SOLIDS	EPA 160.1	13300	mg/l	1.0000	3.000	060228 1057	CJM-FTL	500
CHLORIDE	SM4500 CLB	7900	mg/l	.2000	.600	060301 1159	MAY-FTL	250
ALKALINITY,TOTAL	310.1	168	mg/l	1.0000	3.000	060301 1315	EMS-FTL	
SULFATE	SM 4500SO4E	36.1	mg/l	1.0000	3.000	060227 1406	TMN-FTL	250
CONDUCTIVITY	EPA 120.1	21700	umhos/cm	20.0000	60.000	060228 0850	EMS-FTL	
pH (LAB)	EPA 150.1	6.76Q			.000	060301 1318	TMN-FTL	6.5-8.5
BICARBONATE(HCO3)	EPA 310	164	mg/l	1.0000	3.000	060301 1852	JGT-FTL	

LYLE A. JOHNSON
Laboratory Manager
Contact Phone: (954) 978-6400

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Page ___ of ___

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 058-022706
LOCATION: TEST #2 1851-1871
ADDITIONAL DATA: PBLR IW 1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060225 0515
DATE REPORTED: MAR. 6 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060227 1330
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T DISSL SOLIDS	EPA 160.1	7128	mg/l	1.0000	3.000	060301 0918	MAY-FTL	500
CHLORIDE	SM4500 CLB	3600	mg/l	.2000	.600	060301 1713	MAY-FTL	250
MAGNESIUM	EPA 200.7	225	mg/l	.0020	.006	060302 1113	IN-FTL	
ALKALINITY,TOTAL	310.1	170	mg/l	1.0000	3.000	060301 1315	EMS-FTL	
SULFATE	SM 4500SO4E	358	mg/l	1.0000	3.000	060228 1446	TMN-FTL	250
CALCIUM	EPA 200.7	164	mg/l	.0010	.003	060302 1110	IN-FTL	
CONDUCTIVITY	EPA 120.1	12020	umhos/cm	20.0000	60.000	060302 1157	TMN-FTL	
MMONIA NITROGEN	350.1	0.90	mg/l	.0200	.060	060303 1227	JGT-FTL	
TOTAL PHOSPHORUS	365.4	1.5	mg/l	.0550	.165	060302 1700	JGT-FTL	
pH (LAB)	EPA 150.1	7.05Q			.000	060301 1402	TMN-FTL	6.5-8.5
BICARBONATE(HCO3)	EPA 310	168	mg/l	1.0000	3.000	060301 1852	JGT-FTL	
SODIUM	EPA 200.7	1880	mg/l	.0050	.015	060302 1115	IN-FTL	160
POTASSIUM	EPA 200.7	100	mg/l	.0040	.012	060302 1113	IN-FTL	
T KJELDAHL NIT.	351.2	1.0	mg/l	.2000	.600	060302 1651	JGT-FTL	

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Page 1 of 1

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 059-022706
LOCATION: TEST #3 1791-1811
ADDITIONAL DATA: PBLR IW 1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060226 2255
DATE REPORTED: MAR. 6 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060227 1330
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T DISSL SOLIDS	EPA 160.1	6188	mg/l	1.0000	3.000	060301 0918	MAY-FTL	500
CHLORIDE	SM4500 CLB	2920	mg/l	.2000	.600	060301 1714	MAY-FTL	250
MAGNESIUM	EPA 200.7	192	mg/l	.0020	.006	060302 1113	IN-FTL	
ALKALINITY,TOTAL	310.1	252	mg/l	1.0000	3.000	060301 1315	EMS-FTL	
SULFATE	SM 4500SO4E	838	mg/l	1.0000	3.000	060228 1446	TMN-FTL	250
CALCIUM	EPA 200.7	172	mg/l	.0010	.003	060302 1110	IN-FTL	
CONDUCTIVITY	EPA 120.1	10200	umhos/cm	20.0000	60.000	060302 1159	TMN-FTL	
MONIA NITROGEN	350.1	1.0	mg/l	.0200	.060	060303 1230	JGT-FTL	
OTAL PHOSPHORUS	365.4	1.9	mg/l	.0550	.165	060302 1700	JGT-FTL	
pH (LAB)	EPA 150.1	7.73Q			.000	060301 1402	TMN-FTL	6.5-8.5
BICARBONATE(HCO3)	EPA 310	246	mg/l	1.0000	3.000	060301 1852	JGT-FTL	
SODIUM	EPA 200.7	1460	mg/l	.0050	.015	060302 1115	IN-FTL	160
POTASSIUM	EPA 200.7	81.9	mg/l	.0040	.012	060302 1113	IN-FTL	
T KJELDAHL NIT.	351.2	1.1	mg/l	.2000	.600	060302 1651	JGT-FTL	

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RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 108-030106
LOCATION: PACKER TEST #4 1776-1796
ADDITIONAL DATA: PBLR IW 1
SAMPLED BY: RENE
SUBMITTED BY: RENE
DATE SAMPLED: 060228 0415
DATE REPORTED: MAR. 14 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060301 1330
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T DISSL SOLIDS	EPA 160.1	5644	mg/l	1.0000	3.000	060302 1422	MAY-FTL	500
CHLORIDE	SM4500 CLB	2640	mg/l	.2000	.600	060302 1156	MAY-FTL	250
MAGNESIUM	EPA 200.7	200	mg/l	.0020	.006	060308 0938	IN-FTL	
ALKALINITY,TOTAL	310.1	240	mg/l	1.0000	3.000	060303 1456	EMS-FTL	
SULFATE	SM 4500SO4E	630	mg/l	1.0000	3.000	060303 1518	TMN-FTL	250
CALCIUM	EPA 200.7	157	mg/l	.0010	.003	060307 1748	IN-FTL	
CONDUCTIVITY	EPA 120.1	8970	umhos/cm	20.0000	60.000	060302 1153	TMN-FTL	
AMMONIA NITROGEN	350.1	1.8	mg/l	.0200	.060	060303 1226	JGT-FTL	
TOTAL PHOSPHORUS	365.4	0.12	mg/l	.0550	.165	060313 1106	JGT-FTL	
pH (LAB)	EPA 150.1	7.86			.000	060302 1200	TMN-FTL	6.5-8.5
RBONATE		1.26	mg/l		.000	060310 1457	JGT-FTL	
DIUM	EPA 200.7	1372	mg/l	.0050	.015	060308 0940	IN-FTL	160
POTASSIUM	EPA 200.7	80.0	mg/l	.0040	.012	060307 1751	IN-FTL	
T KJELDAHL NIT.	351.2	1.9	mg/l	.2000	.600	060313 1107	JGT-FTL	

Lyle A. Johnson

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Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 109-030106
LOCATION: PACKER TEST #5 1630-1650
ADDITIONAL DATA: PBLR IW 1
SAMPLED BY: RENE
SUBMITTED BY: RENE
DATE SAMPLED: 060301 0400
DATE REPORTED: MAR. 14 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060301 1331
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T DISSL SOLIDS	EPA 160.1	5220	mg/l	1.0000	3.000	060302 1424	MAY-FTL	500
CHLORIDE	SM4500 CLB	2340	mg/l	.2000	.600	060302 1157	MAY-FTL	250
MAGNESIUM	EPA 200.7	178	mg/l	.0020	.006	060308 0938	IN-FTL	
ALKALINITY,TOTAL	310.1	232	mg/l	1.0000	3.000	060303 1456	EMS-FTL	
SULFATE	SM 4500SO4E	500	mg/l	1.0000	3.000	060303 1518	TMN-FTL	250
CALCIUM	EPA 200.7	145	mg/l	.0010	.003	060307 1748	IN-FTL	
CONDUCTIVITY	EPA 120.1	7970	umhos/cm	20.0000	60.000	060302 1153	TMN-FTL	
AMMONIA NITROGEN	350.1	1.6	mg/l	.0200	.060	060303 1226	JGT-FTL	
TOTAL PHOSPHORUS	365.4	0.10	mg/l	.0550	.165	060313 1107	JGT-FTL	
H (LAB)	EPA 150.1	7.76			.000	060302 1200	TMN-FTL	6.5-8.5
RBONATE		1.56	mg/l		.000	060310 1457	JGT-FTL	
SODIUM	EPA 200.7	1218	mg/l	.0050	.015	060308 0940	IN-FTL	160
POTASSIUM	EPA 200.7	67.5	mg/l	.0040	.012	060307 1751	IN-FTL	
T KJELDAHL NIT.	351.2	1.7	mg/l	.2000	.600	060313 1108	JGT-FTL	

Lyle A Johnson

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Laboratory Manager
Contact Phone: (954) 978-6400

RESULTS OF ANALYSIS

CLIENT: YOUNGQUIST BROTHERS INC.
SAMPLE NUMBER: 094-031006
LOCATION: PACKER TEST #6 1939-1964
ADDITIONAL DATA: PBLR IW-1
SAMPLED BY: JAY SWARTZENTRUBER
SUBMITTED BY: ALBERTO POZO
DATE SAMPLED: 060310 0930
DATE REPORTED: MAR. 28 2006
REVISION: 0

FT LAUD(FTL): E86006
BABSON PK(BP): E84404
SAVANNAH(SAV): E87671, 833
EPA: #FL00095

DATE RECEIVED: 060310 1611
SAMPLE MATRIX: GW

Parameter	Method	Results (- = <)	Units	Detection Limit	PQL	Analysis Date and Time	Analyst	MCL
T DISSL SOLIDS	EPA 160.1	15008	mg/l	1.0000	3.000	060313 1924	MAY-FTL	500
CHLORIDE	SM4500 CLB	8250	mg/l	.2000	.600	060313 1937	MAY-FTL	250
MAGNESIUM	EPA 200.7	490	mg/l	.0020	.006	060316 1136	IN-FTL	
ALKALINITY,TOTAL	310.1	380	mg/l	1.0000	3.000	060313 1050	RENE-FT	
SULFATE	SM 4500SO4E	797.7	mg/l	1.0000	3.000	060315 1509	RENE-FT	250
CALCIUM	EPA 200.7	220	mg/l	.0010	.003	060316 1118	IN-FTL	
CONDUCTIVITY	EPA 120.1	24900	umhos/cm	20.0000	60.000	060313 0944	RENE-FT	
AMMONIA NITROGEN	350.1	0.42	mg/l	.0200	.060	060317 1842	JGT-FTL	
TOTAL PHOSPHORUS	365.4	U	mg/l	.0550	.165	060322 1141	JGT-FTL	
pH (LAB)	EPA 150.1	7.0			.000	060313 0933	RENE-FT	6.5-8.
BICARBONATE(HCO3)	EPA 310	380	mg/l	1.0000	3.000	060313 1722	JGT-FTL	
SODIUM	EPA 200.7	3970	mg/l	.0050	.015	060316 1211	IN-FTL	160
POTASSIUM	EPA 200.7	179	mg/l	.0040	.012	060316 1134	IN-FTL	
T KJELDAHL NIT.	351.2	0.91	mg/l	.2000	.600	060322 1142	JGT-FTL	

Client Services Manager
Contact Phone: (954) 978-6400

Report To:
Jay Swartzentruber
Youngquist Brothers Drilling
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 1 of 2
Report Printed: 04/20/06
Submission # 604000203
Order # 1338

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

Sample I.D.: Packer Test #7 2917-2938
Collected: 04/07/06 18:15
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

LABORATORY ANALYSIS REPORT

PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Specific Conductance (grab)	54100		Ω*cm.	0.10	0.30	120.1	04/11 15:22	04/11 15:22	MAY
pH	5.76	Q	units	0.10	0.30	150.1	04/11 08:52	04/11 08:52	RJT
Total Dissolved Solids (TDS)	36368		mg/L	0.82	2.46	EPA 160.1	04/11 16:03	04/11 16:03	MAY
Alkalinity, Total (CaCO3) Endpoint 4.3	338		mg/L	0.10	0.30	310.1	04/11 14:29	04/11 14:29	EMS
Bicarbonate	327		mg/L	0.01	0.03	310.1	04/11 14:34	04/11 14:34	EMS
Nitrogen (Ammonia) as N	0.60		mg/L	0.1	0.3	350.1	04/12 16:50	04/12 16:50	JGT
Nitrogen (Kjeldahl) as "N"	0.79		mg/L	0.03	0.09	351.2	04/19 18:30	04/19 18:30	JGT
Phosphorus, Total as "P"	1.6		mg/L	0.003	0.009	365.4	04/12 09:38	04/12 09:38	RJT
Sulfide	0.008	U	mg/L	0.01	0.03	376.1	04/11 14:17	04/11 14:17	EMS
Chloride	20800		mg/L	2.50	7.50	SM4500CL-B	04/11 16:08	04/11 16:08	MAY
Sulfate	1900		mg/L	0.20	0.60	SM4500	04/12 15:04	04/12 15:04	RJT
Calcium	720		mg/L	0.02	0.06	200.7	04/12 13:05	04/12 13:05	IMN
Magnesium	1460		mg/L	0.50	1.50	200.7	04/12 13:05	04/12 13:05	IMN
Potassium	825		mg/L	0.02	0.06	200.7	04/12 13:06	04/12 13:06	IMN
Sodium	11840		mg/L	0.250	0.750	200.7	04/12 13:06	04/12 13:06	IMN

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

Authorized CSM Signature
Florida Environmental;Certification # E86006

Report To:
Jay Swartzentruber
Youngquist Brothers Drilling
15465 Pine Ridge Road
Ft Myers, FL 33908

Page 2 of 2
Report Printed: 04/20/06
Submission # 604000203
Order # 1339

Sample I.D.: Packer Test #8 2780-2801
Collected: 04/09/06 05:35
Received: 04/10/06 15:20
Collected by: Jay Swartzentruber

Project: PBLR IW-1
Site Location: Belle Glade
Matrix: Water

LABORATORY ANALYSIS REPORT

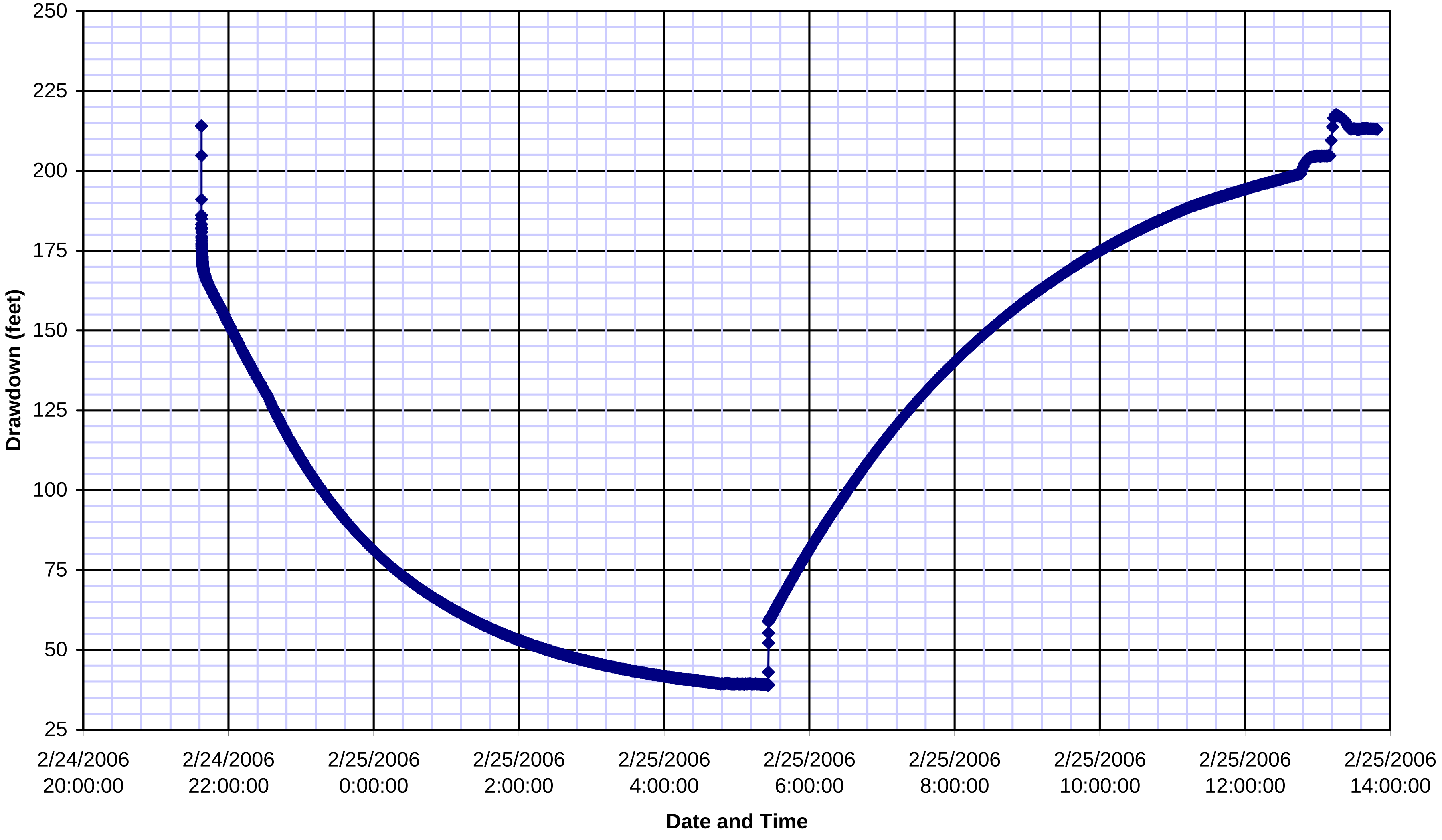
PARAMETER	RESULT	QC	UNITS	MDL	PQL	METHOD	DATE EXT.	DATE ANALY.	ANALYST
Specific Conductance (grab)	53600		Ω*cm.	0.10	0.30	120.1	04/11 15:23	04/11 15:23	MAY
pH	6.50	Q	units	0.10	0.30	150.1	04/11 08:52	04/11 08:52	RJT
Total Dissolved Solids (TDS)	36328		mg/L	0.82	2.46	EPA 160.1	04/11 16:03	04/11 16:03	MAY
Alkalinity, Total (CaCO3) Endpoint 4.3	130		mg/L	0.10	0.30	310.1	04/11 14:29	04/11 14:29	EMS
Bicarbonate	127		mg/L	0.01	0.03	310.1	04/11 14:34	04/11 14:34	EMS
Nitrogen (Ammonia) as N	0.43		mg/L	0.1	0.3	350.1	04/12 16:52	04/12 16:52	JGT
Nitrogen (Kjeldahl) as "N"	0.58		mg/L	0.03	0.09	351.2	04/19 18:30	04/19 18:30	JGT
Phosphorus, Total as "P"	1.4		mg/L	0.003	0.009	365.4	04/12 09:38	04/12 09:38	RJT
Sulfide	0.020	I	mg/L	0.01	0.03	376.1	04/11 14:17	04/11 14:17	EMS
Chloride	20150		mg/L	2.50	7.50	SM4500CL-B	04/11 16:09	04/11 16:09	MAY
Sulfate	2410		mg/L	0.20	0.60	SM4500	04/12 15:04	04/12 15:04	RJT
Calcium	740		mg/L	0.02	0.06	200.7	04/12 13:06	04/12 13:06	IMN
Magnesium	1380		mg/L	0.50	1.50	200.7	04/12 13:06	04/12 13:06	IMN
Potassium	800		mg/L	0.02	0.06	200.7	04/12 13:07	04/12 13:07	IMN
Sodium	11340		mg/L	0.250	0.750	200.7	04/12 13:07	04/12 13:07	IMN

QC=Qualifier Codes as defined by DEP 62-160
Unless indicated, soil results are reported based on actual (wet) weight basis.
Analytes not currently NELAC certified denoted by *.
Work performed by outside (subcontract) labs denoted by Cert.ID in Analyst Field.

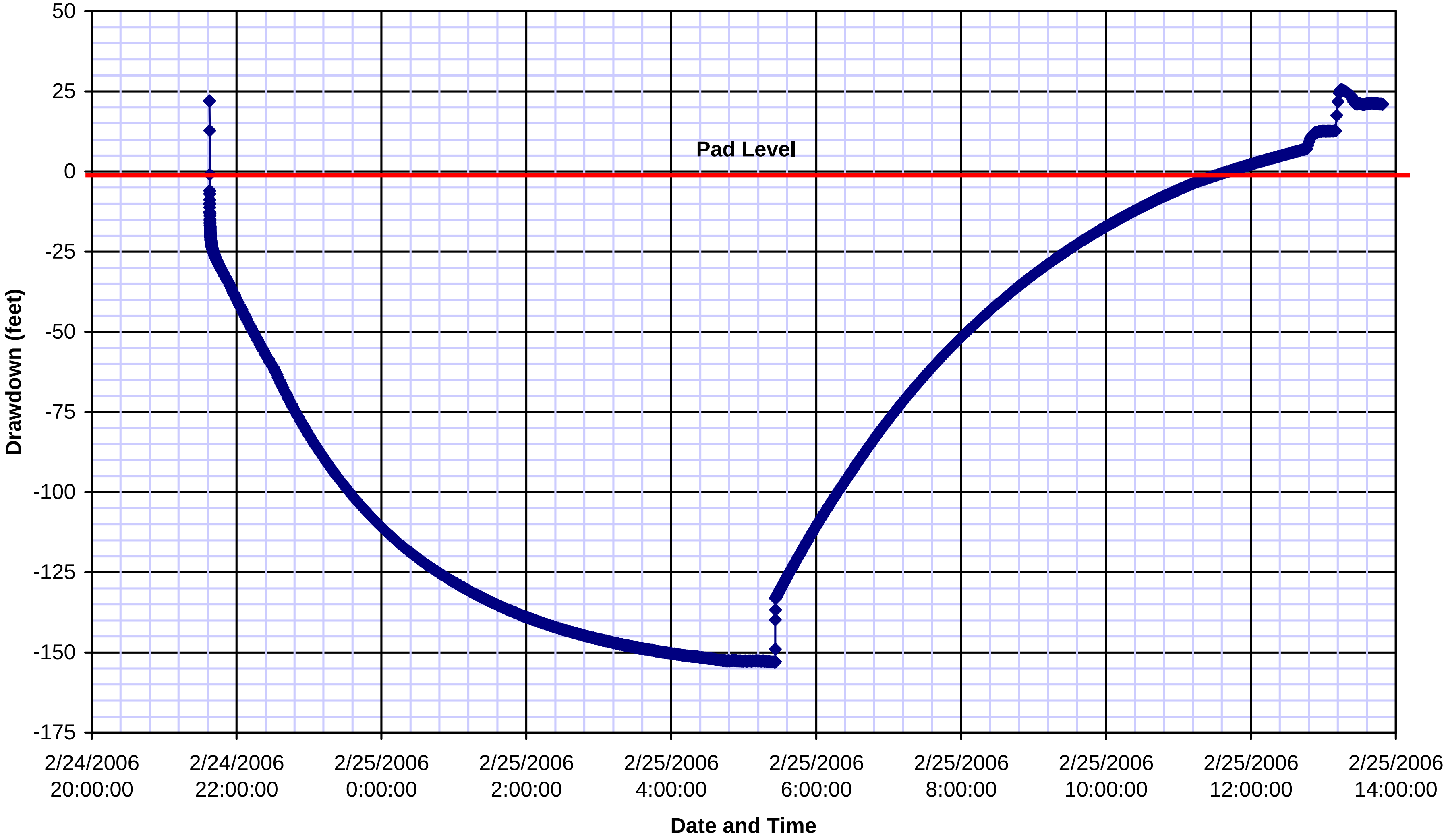
Authorized CSM Signature
Florida Environmental;Certification #E86006

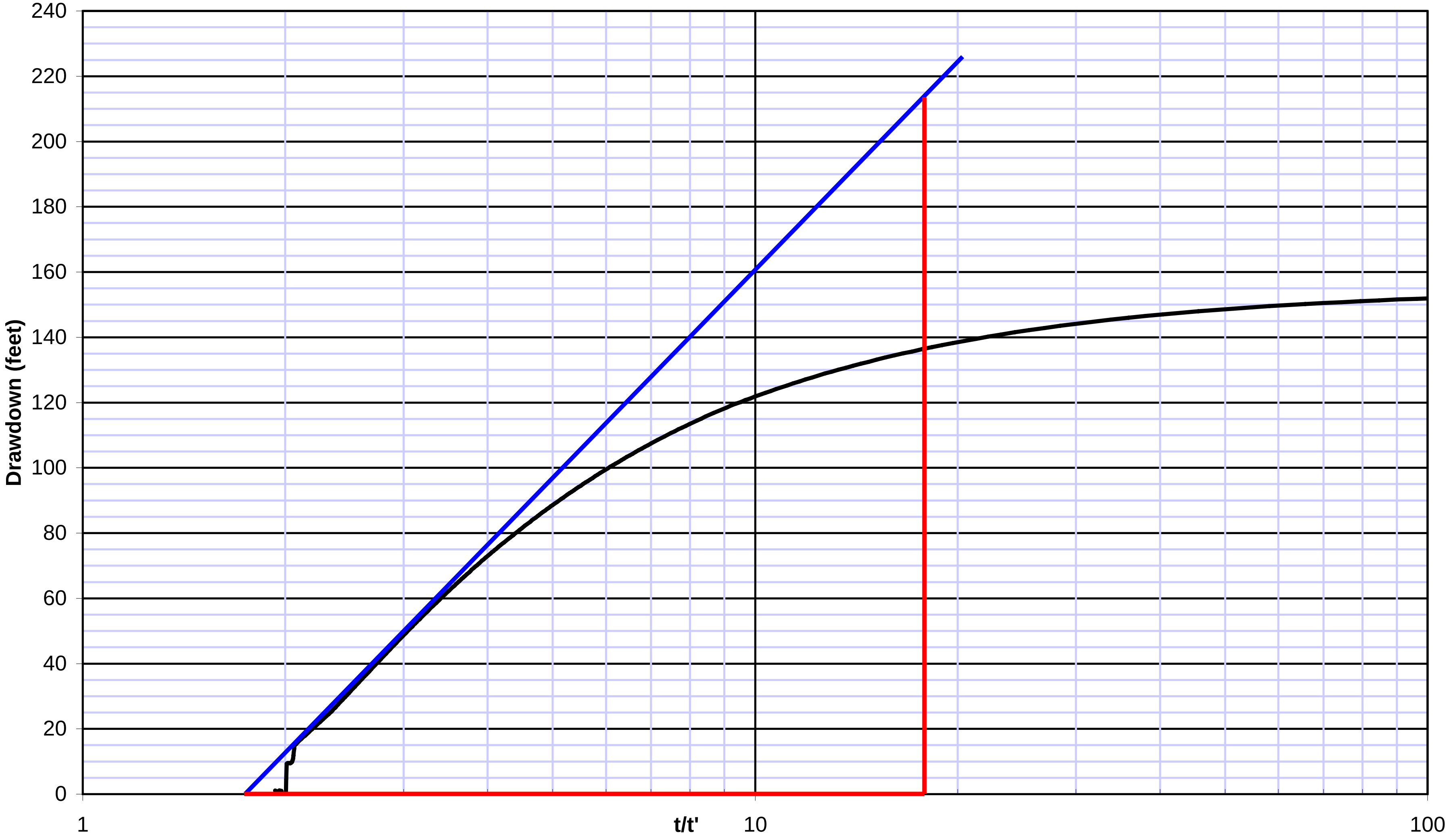
Packer Test Charts

Palm Beach County
Lake Region DIW
Packer Test #2
1851 - 1871



Palm Beach County
Lake Region DIW
Packer Test #2
1851 - 1871





Palm Beach County
Lake Region DIW
Packer Test #2 (1851 - 1871)
Theis Recovery Method

Theis Recovery Method

Palm Beach County
Lake Region DIW
Packer Test #2 (1851 -1871)

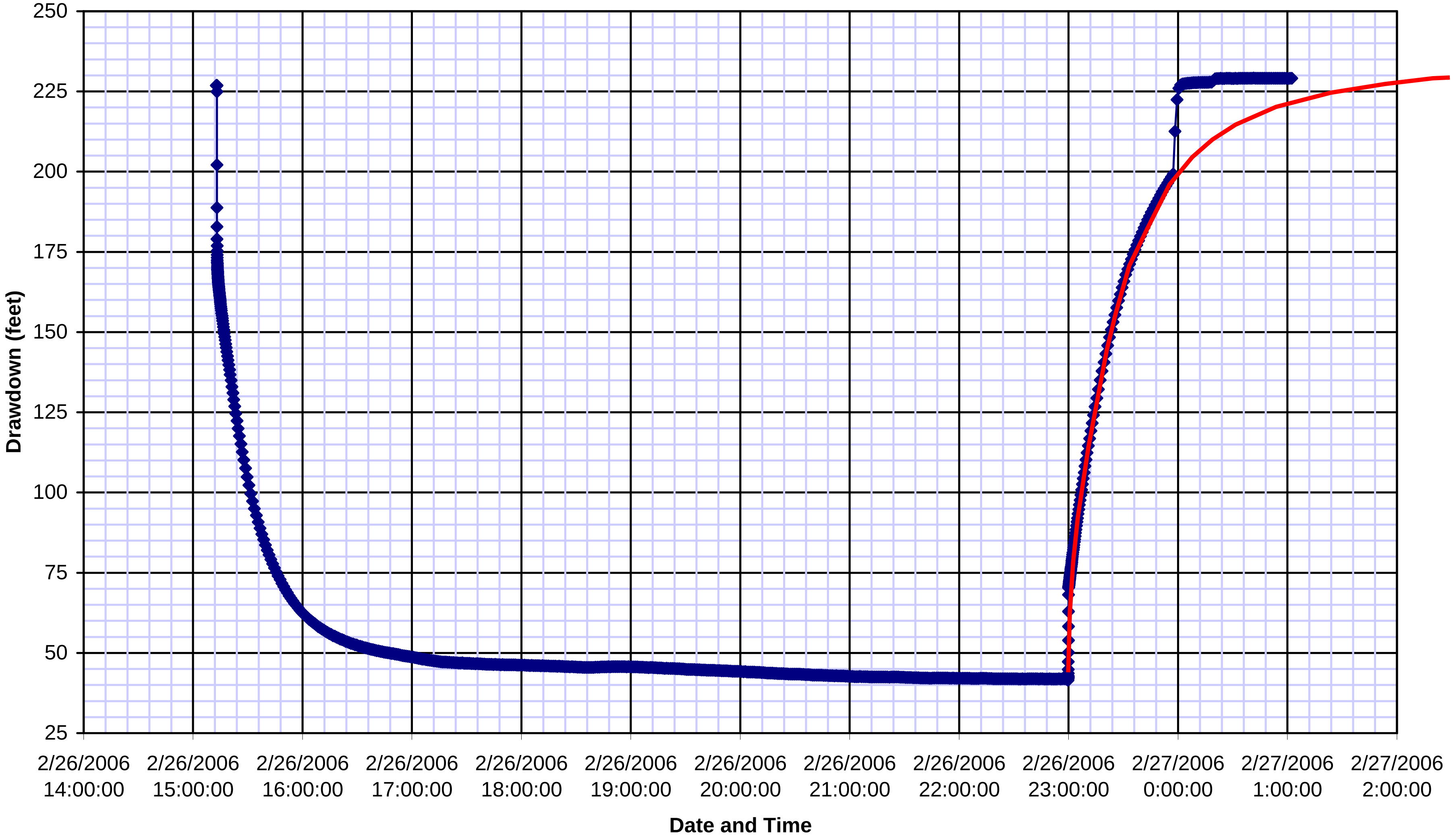
$\Delta S = 215.0 - 0.0 = 215.0\, feet$ *Drawdown per log cycle*

$$T = \frac{264Q}{\Delta S} = \frac{(264)(1.25)}{215.0} = 1.535\, gpd / ft$$

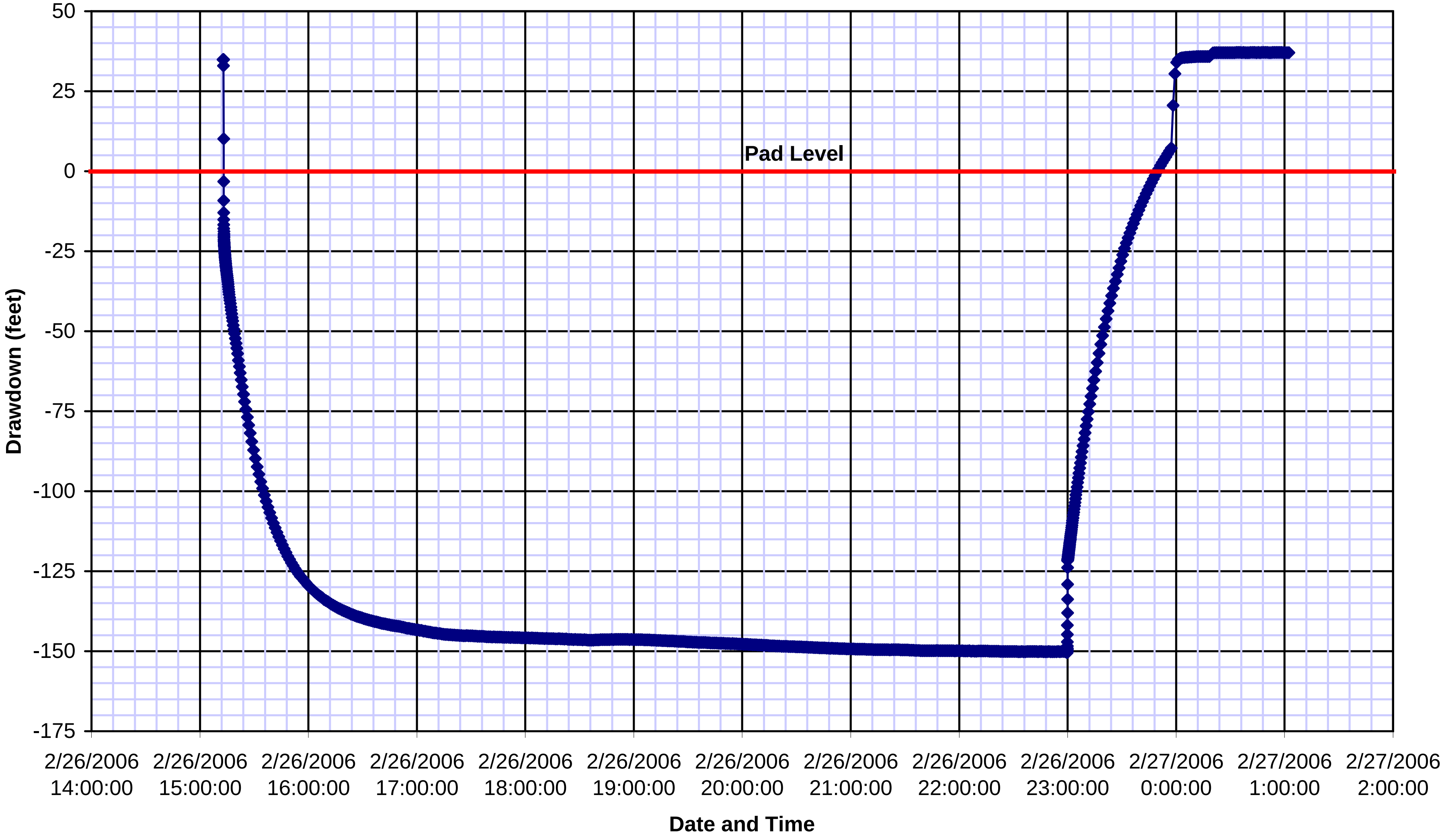
$T = Transmissivity$

$Q = Pumping\ Rate\ in\ Gallons\ per\ Minute$

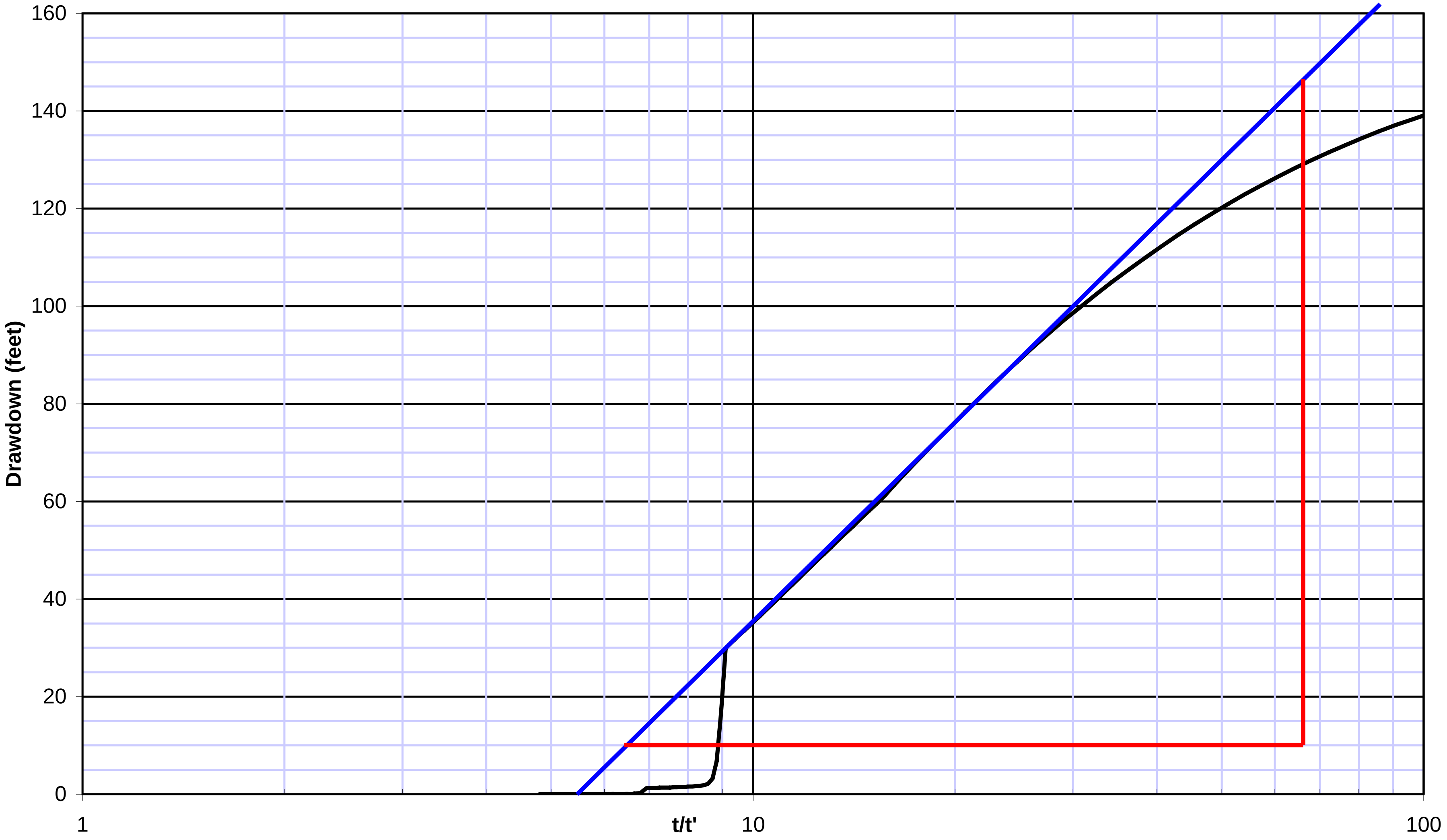
Palm Beach County
Lake Region DIW
Packer Test #3
1791 - 1811



Palm Beach County
Lake Region DIW
Packer Test #3
1791 - 1811



Palm Beach County
Lake Region DIW
Packer Test #3 (1791 - 1811)
Theis Recovery Method



Theis Recovery Method

Palm Beach County
Lake Region DIW
Packer Test #3 (1791 -1811)

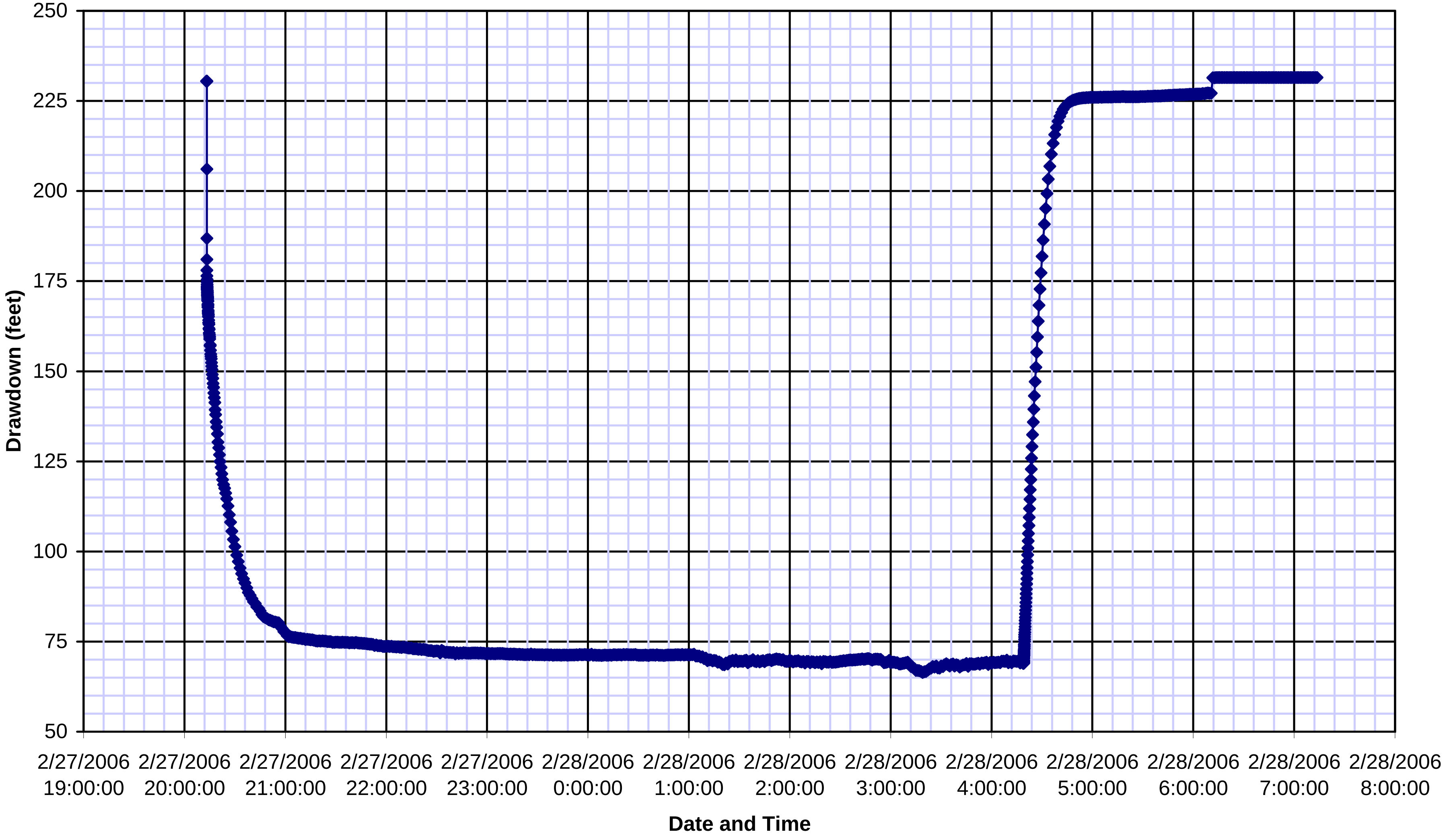
$\Delta S = 147.0 - 10.0 = 137.0\ feet$ *Drawdown per log cycle*

$$T = \frac{264Q}{\Delta S} = \frac{(264)(8.0)}{137.0} = 15.42\ gpd/ft$$

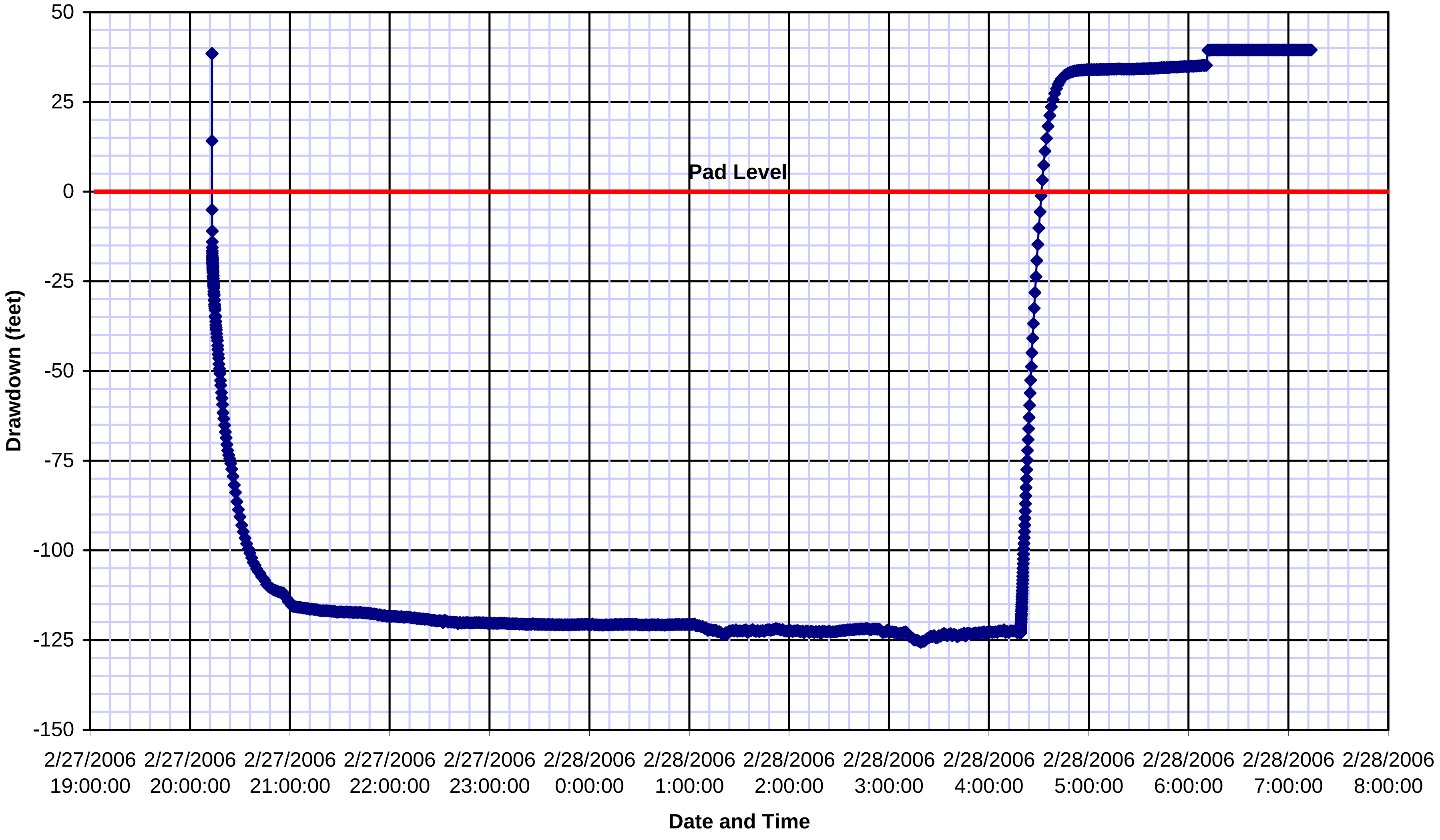
$T =$ *Transmissivity*

$Q =$ *Pumping Rate in Gallons per Minute*

Palm Beach County
Lake Region DIW
Packer Test #4
1776 - 1796



Palm Beach County
Lake Region DIW
Packer Test #4
1776 - 1796



Palm Beach County
Lake Region DIW
Packer Test #4 (1776 - 1796)
Theis Recovery Method

Theis Recovery Method

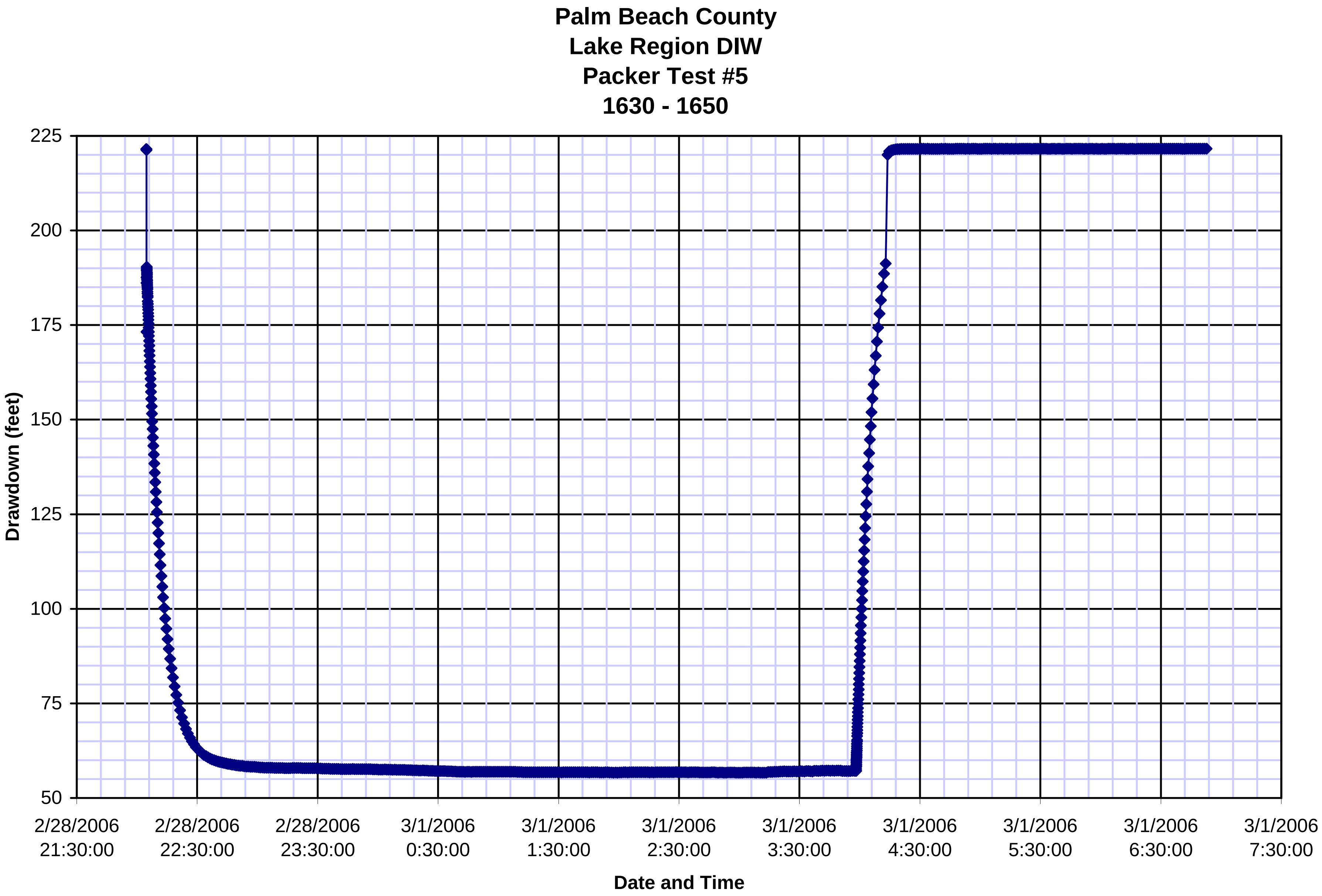
Palm Beach County
Lake Region DIW
Packer Test #4 (1776 -1796)

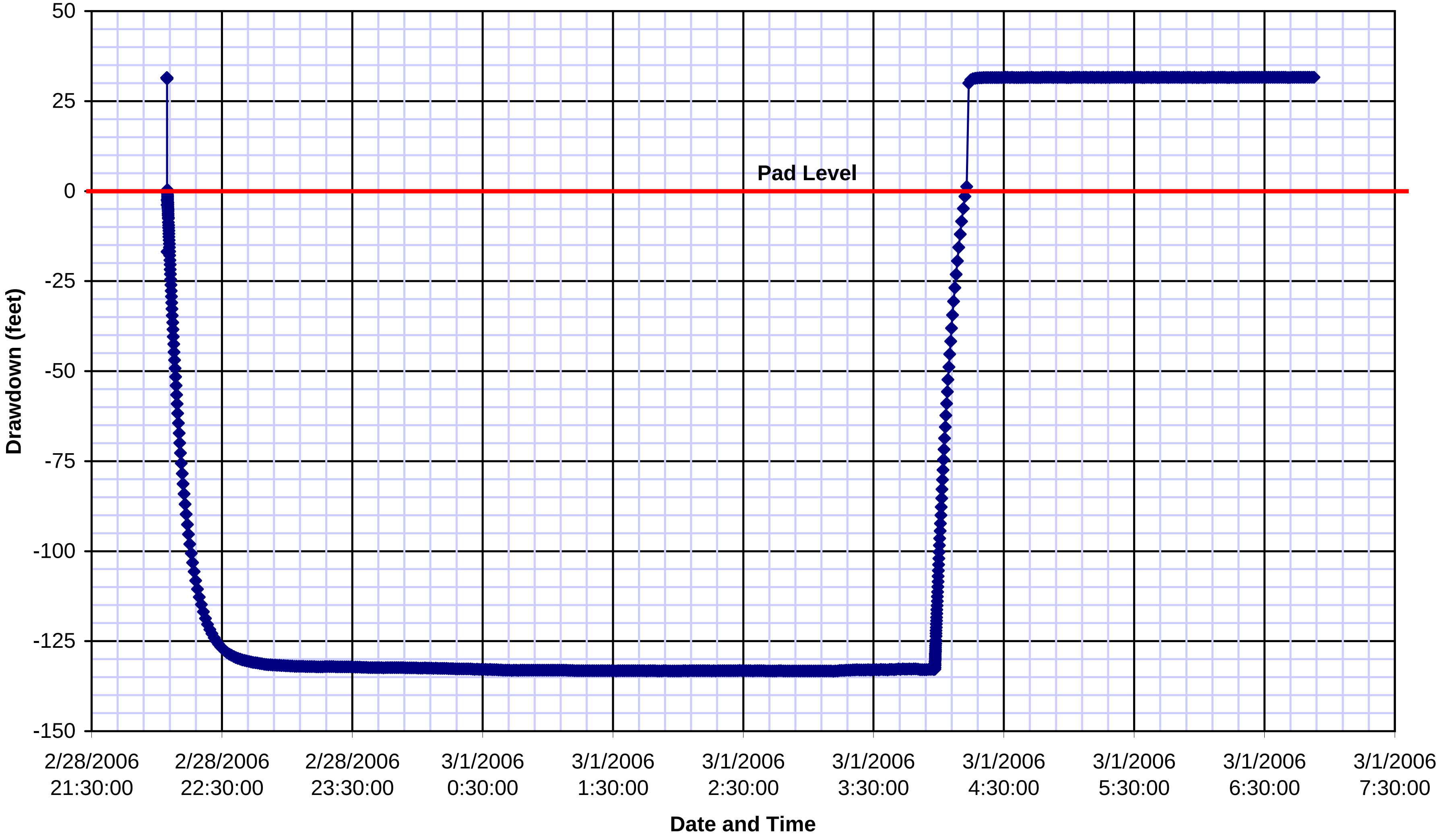
$\Delta S = 178.0 - 0.0 = 178.0\, feet$ *Drawdown per log cycle*

$$T = \frac{264Q}{\Delta S} = \frac{(264)(15.0)}{178.0} = 22.25\, gpd/ft$$

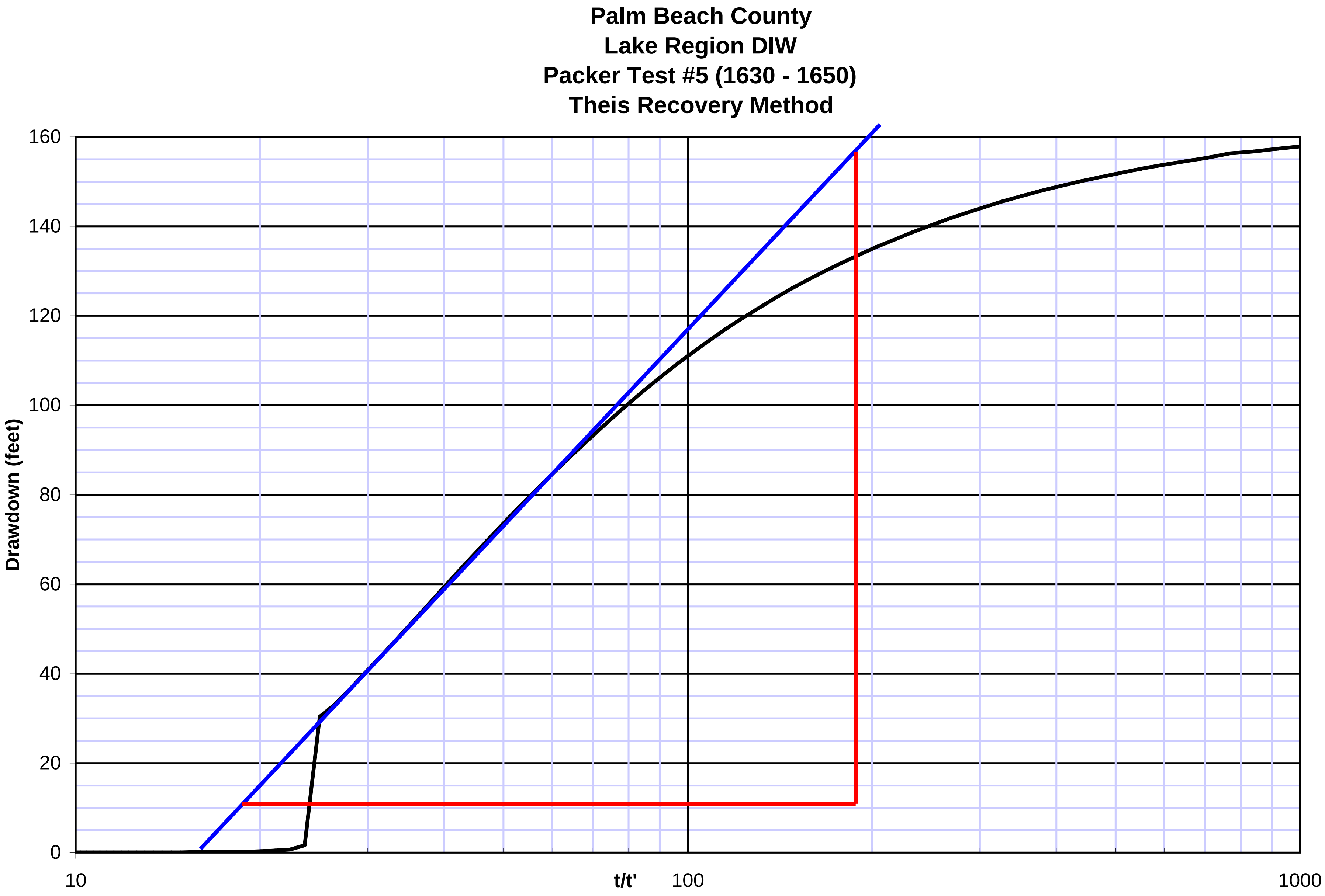
$T =$ *Transmissivity*

$Q =$ *Pumping Rate in Gallons per Minute*


Palm Beach County
Lake Region DIW
Packer Test #5
1630 - 1650
Drawdown (feet)
225
200
175
150
125
100
75
50
2/28/2006 21:30:00
2/28/2006 22:30:00
2/28/2006 23:30:00
3/1/2006 0:30:00
3/1/2006 1:30:00
3/1/2006 2:30:00
3/1/2006 3:30:00
3/1/2006 4:30:00
3/1/2006 5:30:00
3/1/2006 6:30:00
3/1/2006 7:30:00
Date and Time



Palm Beach County
Lake Region DIW
Packer Test #5
1630 - 1650



Palm Beach County
Lake Region DIW
Packer Test #5 (1630 - 1650)
Theis Recovery Method

Theis Recovery Method

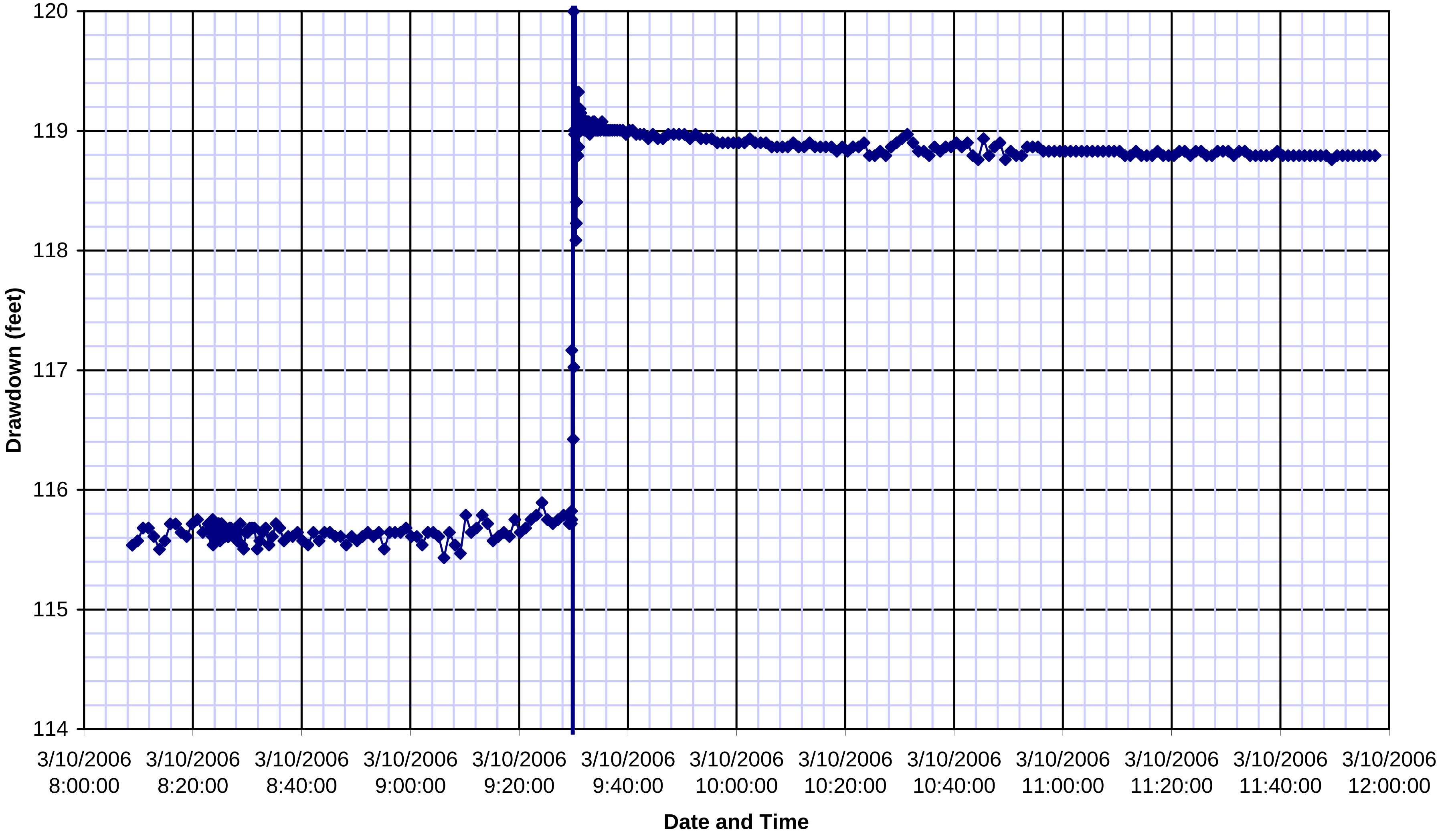
Palm Beach County
Lake Region DIW
Packer Test #5 (1630 -1650)

$\Delta S = 157.0 - 10.0 = 147.0\ feet$ *Drawdown per log cycle*

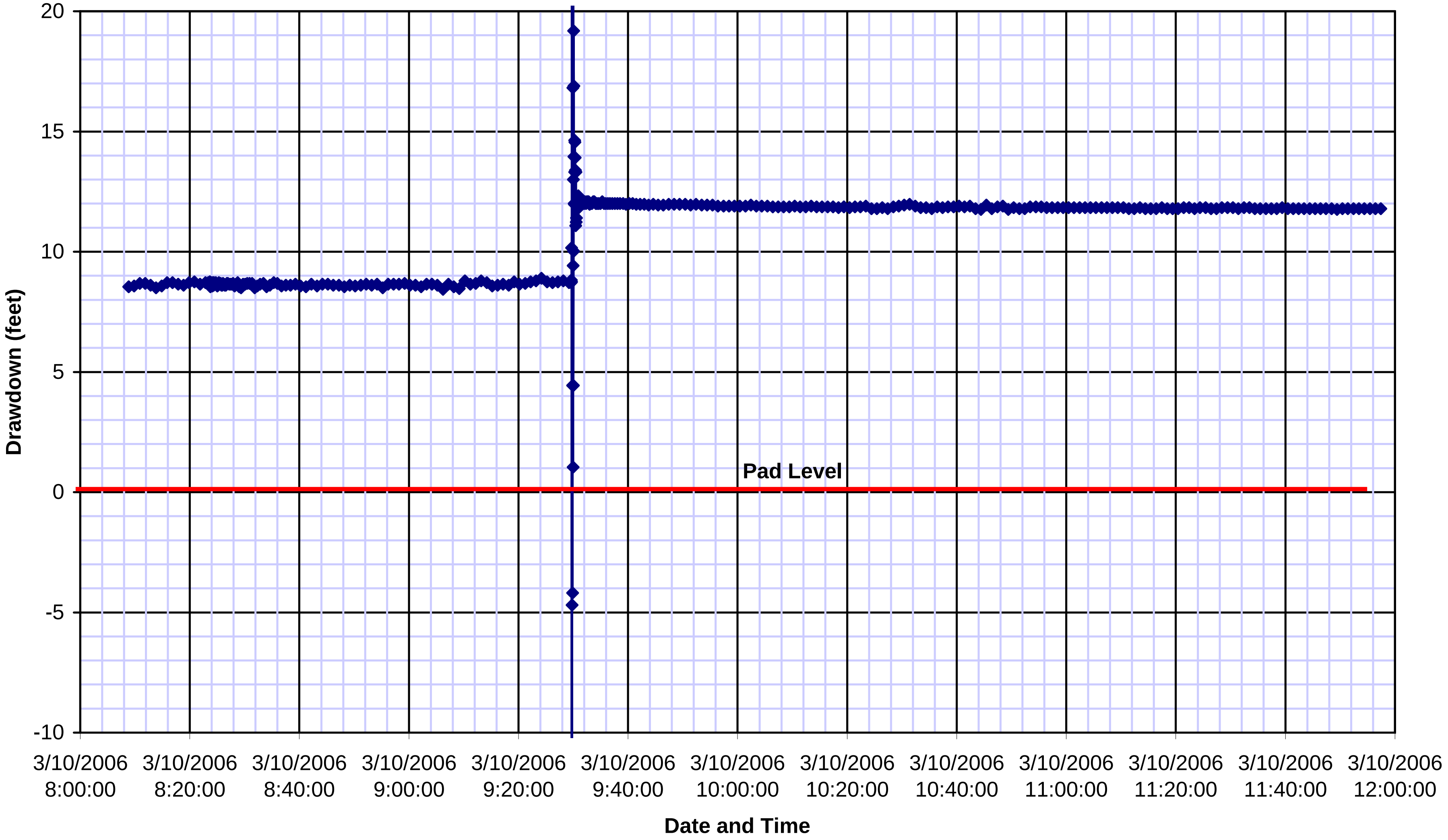
$$T = \frac{264Q}{\Delta S} = \frac{(264)(26.0)}{147.0} = 46.69\ gpd / ft$$

T = Transmissivity
Q = Pumping Rate in Gallons per Minute

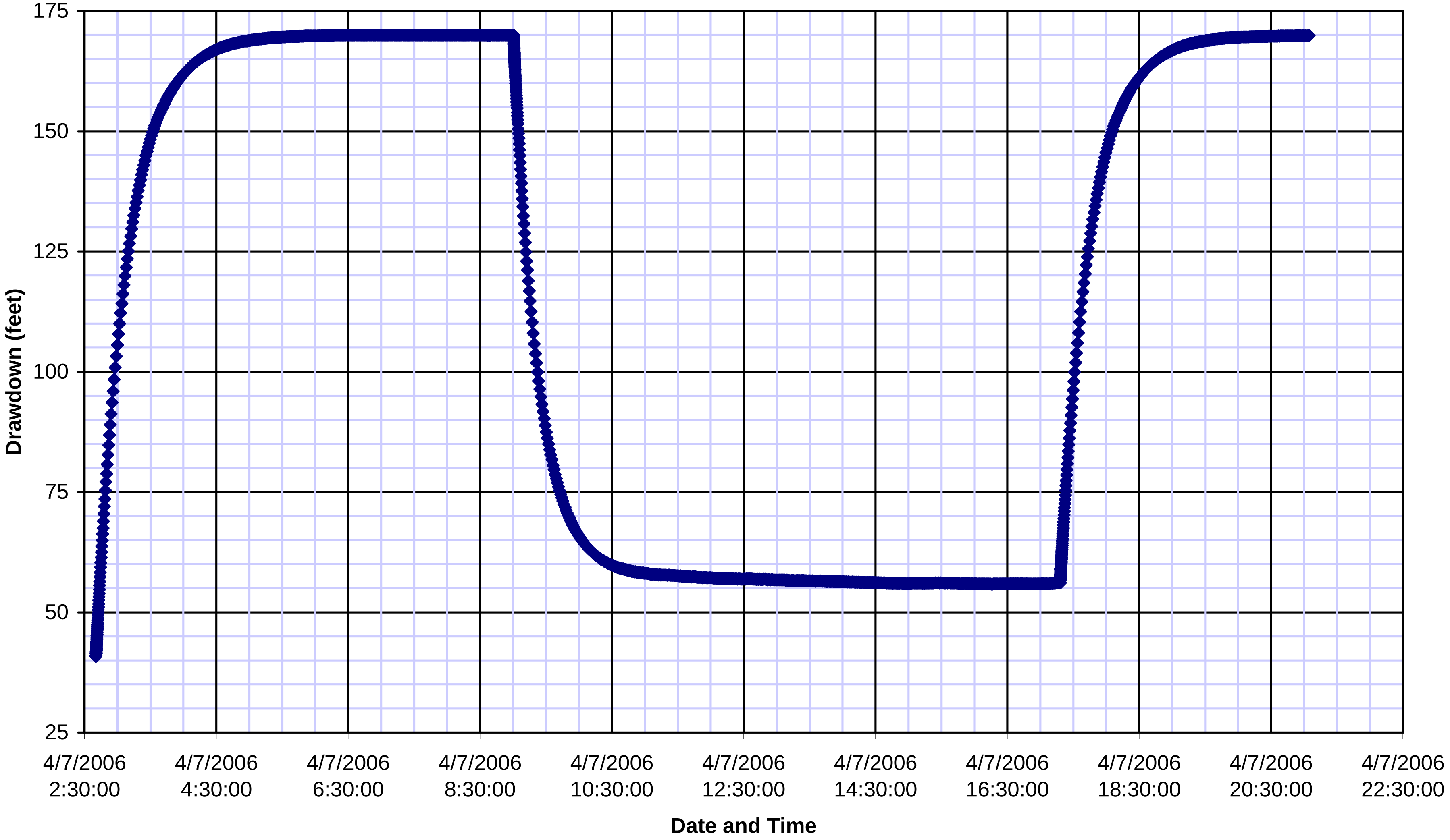
Palm Beach County
Lake Region DIW
Packer Test #6
1939 - 1964



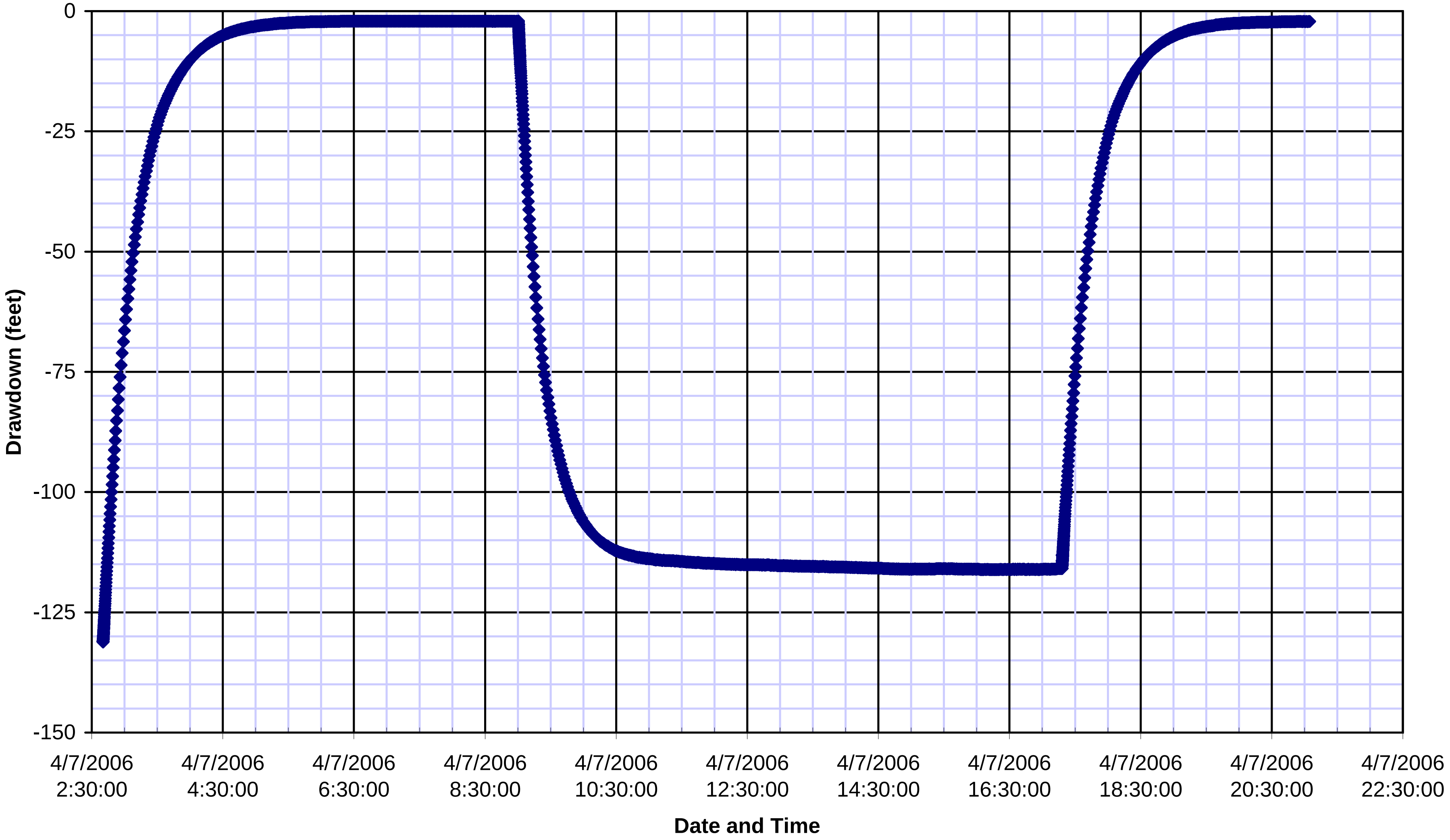
Palm Beach County
Lake Region DIW
Packer Test #6
1939 - 1964



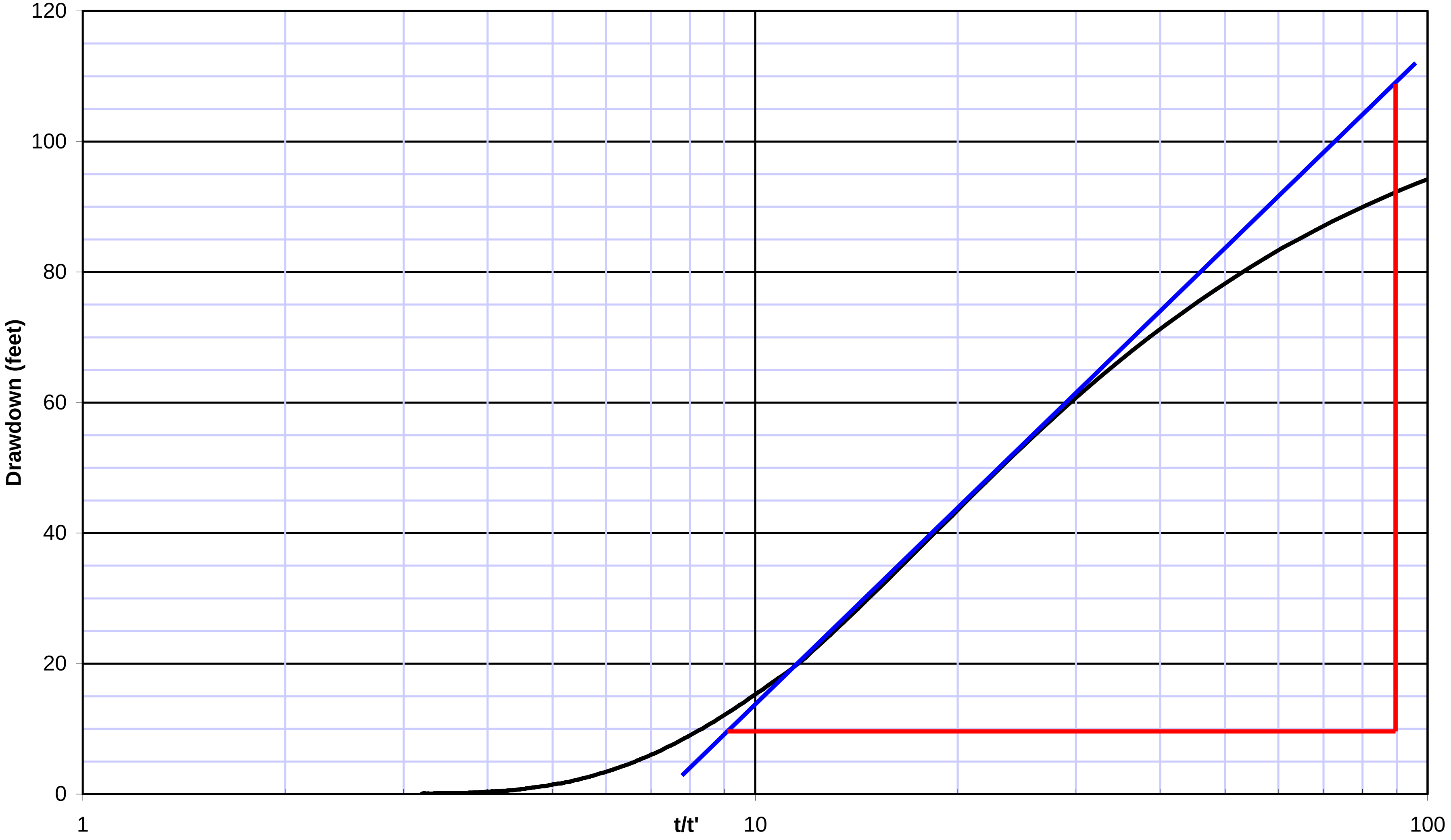
Palm Beach County
Lake Region DIW
Packer Test #7
2917 - 2938



Palm Beach County
Lake Region DIW
Packer Test #7
2917 - 2938



Palm Beach County
Lake Region DIW
Packer Test #7 (2917 - 2938)
Theis Recovery Method



Theis Recovery Method

Palm Beach County
Lake Region DIW
Packer Test #7 (2917 -2938)

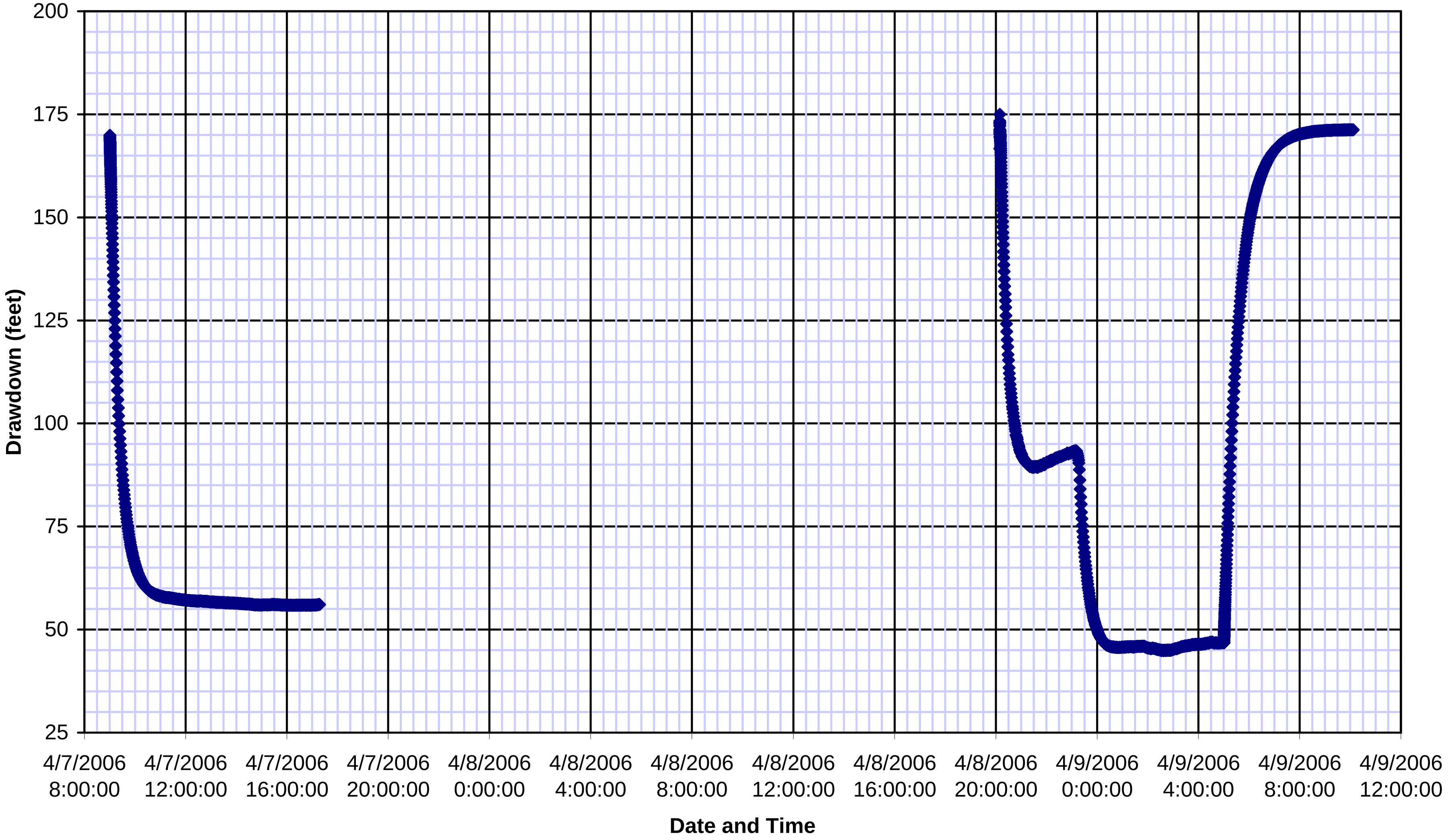
$\Delta S = 119.0 - 18.0 = 101.0\, feet$ *Drawdown per log cycle*

$$T = \frac{264Q}{\Delta S} = \frac{(264)(5.5)}{101.0} = 14.38\, gpd/ft$$

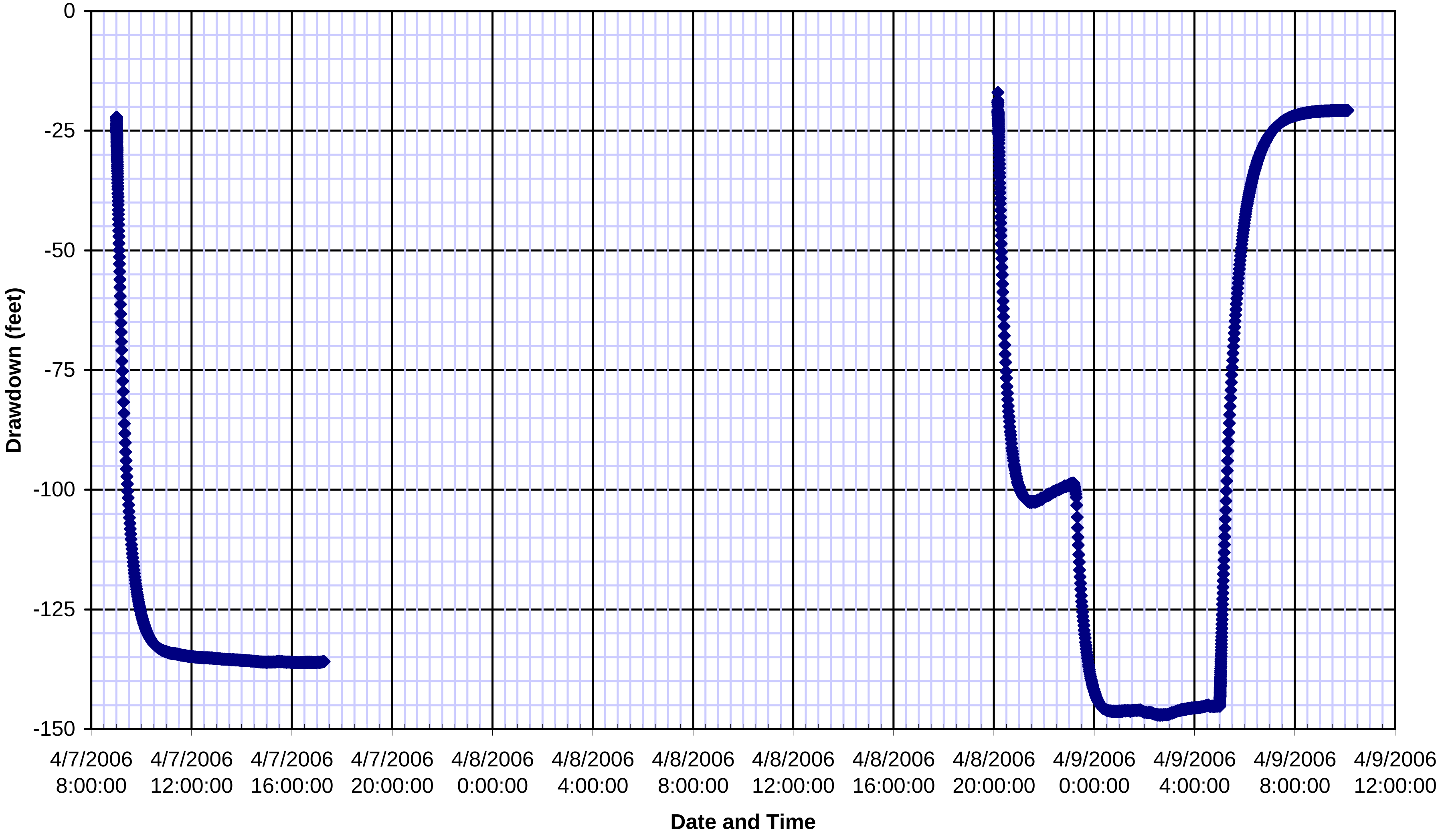
$T =$ *Transmissivity*

$Q =$ *Pumping Rate in Gallons per Minute*

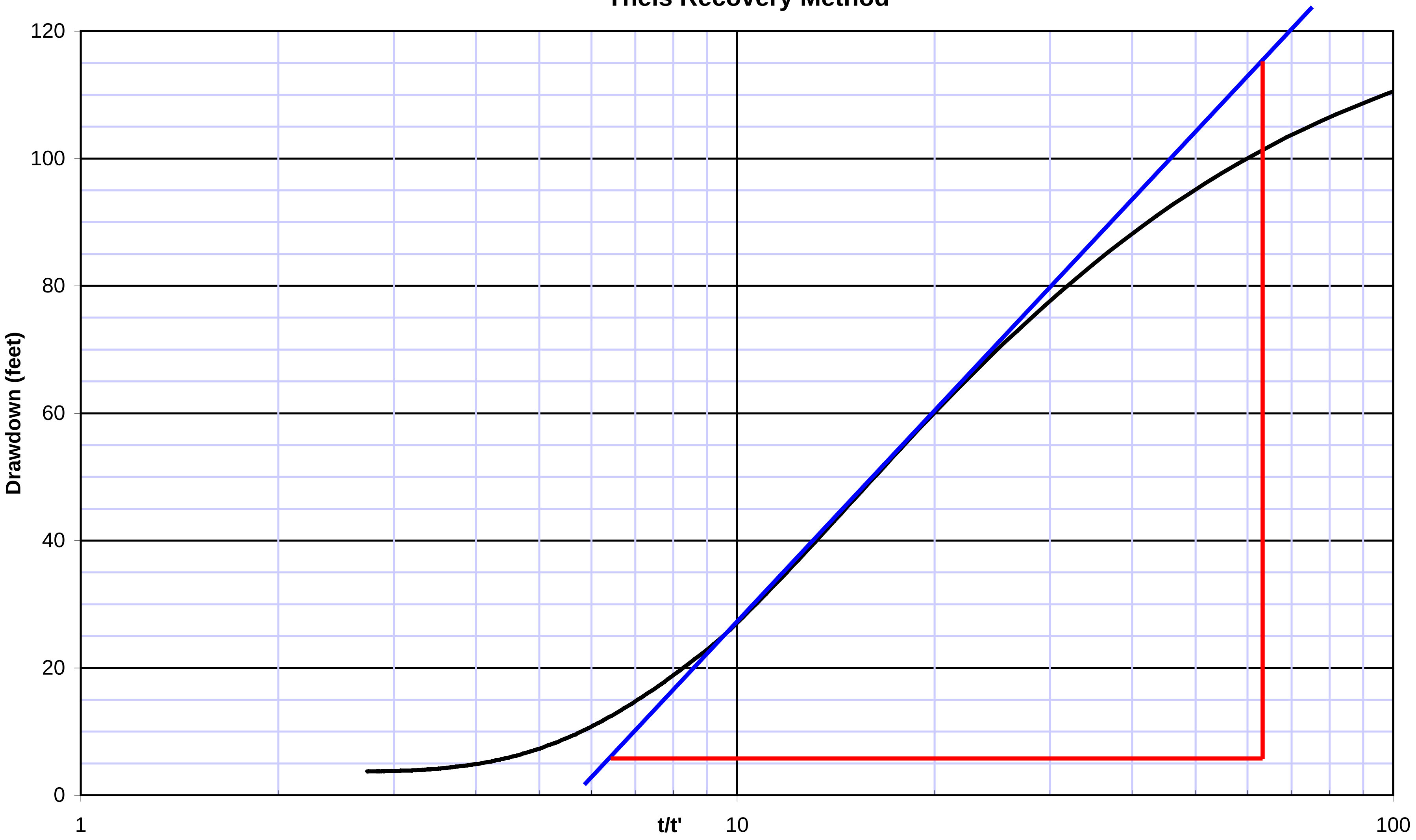
Palm Beach County
Lake Region DIW
Packer Test #8
2780 - 2801



Palm Beach County
Lake Region DIW
Packer Test #8
2780 - 2801



Palm Beach County
Lake Region DIW
Packer Test #8 (2780 - 2801)
Theis Recovery Method



Theis Recovery Method

Palm Beach County
Lake Region DIW
Packer Test #8 (2780 -2801)

$\Delta S = 116.0 - 5.0 = 111.0\ feet$ Drawdown per log cycle

$$T = \frac{264Q}{\Delta S} = \frac{(264)(5.0)}{111.0} = 11.89\ gpd/ft$$

$T =$ Transmissivity

$Q =$ Pumping Rate in Gallons per Minute

Packer LR DIW Test Results

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT

Lake Region DIW

PACKER TEST RESULTS
Lab Water Quality

Test #	Interval	Span (feet)	Conductivity (micromhos/cm)	Chlorides (mg/l)	Drawdown (feet)	Rate (gpm)	Specific Capacity (gpm/ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (ft/d)
5	1630 - 1650	20	7970	2340	165	26	0.16	46.69	0.31
4	1776 - 1796	20	8970	2640	161	15	0.09	22.25	0.15
3	1791 - 1811	20	10200	2920	186	8	0.04	15.42	0.10
2	1851 - 1871	20	12020	3600	176	1.25	0.01	1.53	0.01
1	1901 - 1915	14	21700	7900	NA	175	NA	NA	NA
6	1939 - 1964	25	24900	8250	NA	46	NA	NA	NA
9	2525 - 2546	21	NA	NA	NA	0	0	0	0
8	2780 - 2801	21	53600	20150	122	5	0.04	11.89	0.08
7	2917 - 2938	21	54100	20800	114	5.5	0.05	14.38	0.09

SC & T Calcs
with WQ

Packer Test Specific Capacities and Transmisivity Calculations

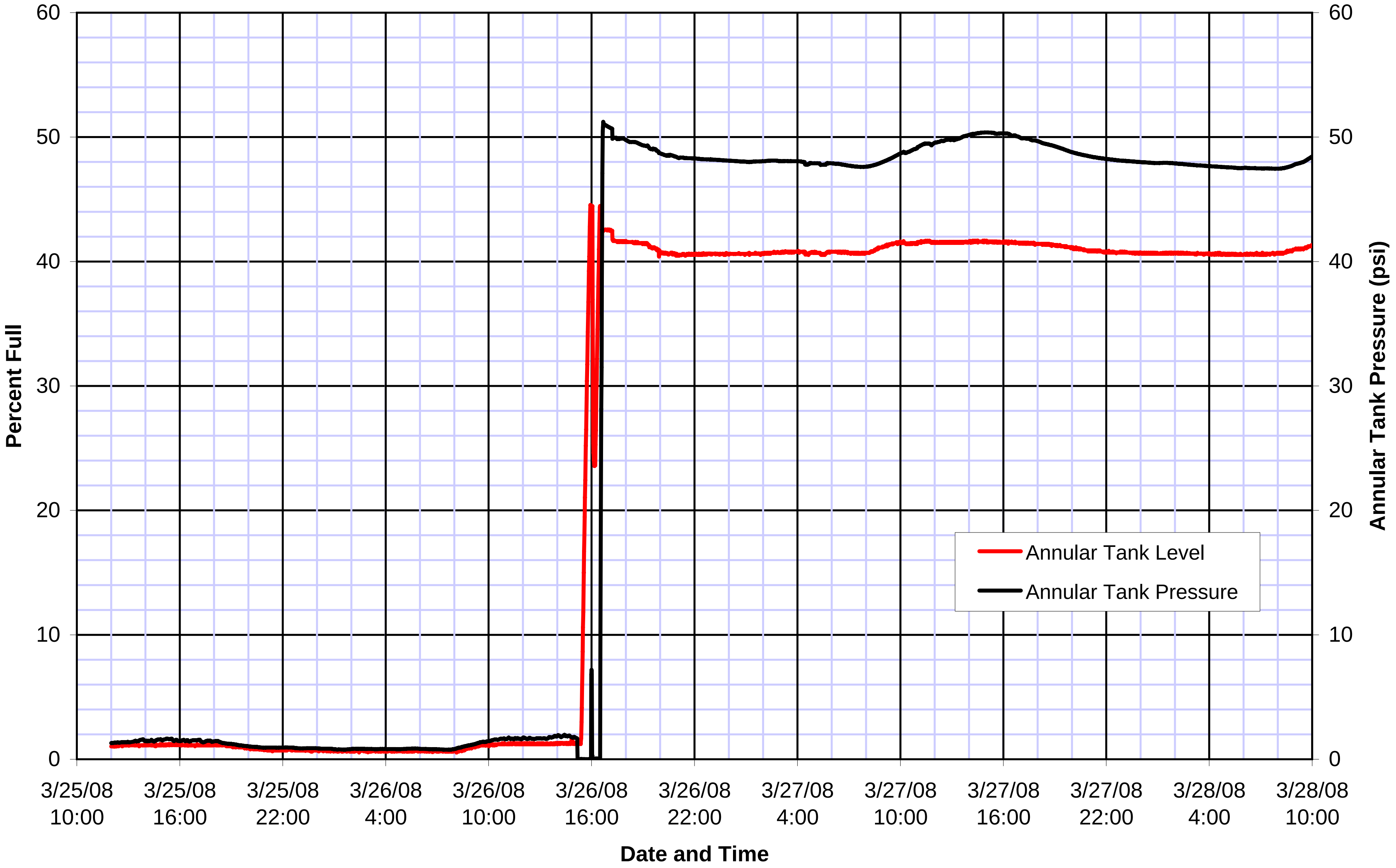
Packer Test Number	Packer Test Interval	Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/ft)	Transmisivity (from graphs) (gpm/ft)
5	1630 - 1650	26	165	0.16	46.69
4	1776 - 1796	15	161	0.09	22.25
3	1791 - 1811	8	186	0.04	15.42
2	1851 - 1871	1.25	176	0.01	1.53
1	1901 - 1915	175	NA	NA	NA
6	1939 - 1964	46	NA	NA	NA
9	2525 - 2546	0	NA	0.00	0.00
8	2780 - 2801	5	122	0.04	11.89
7	2917 - 2938	5.5	114	0.05	14.38

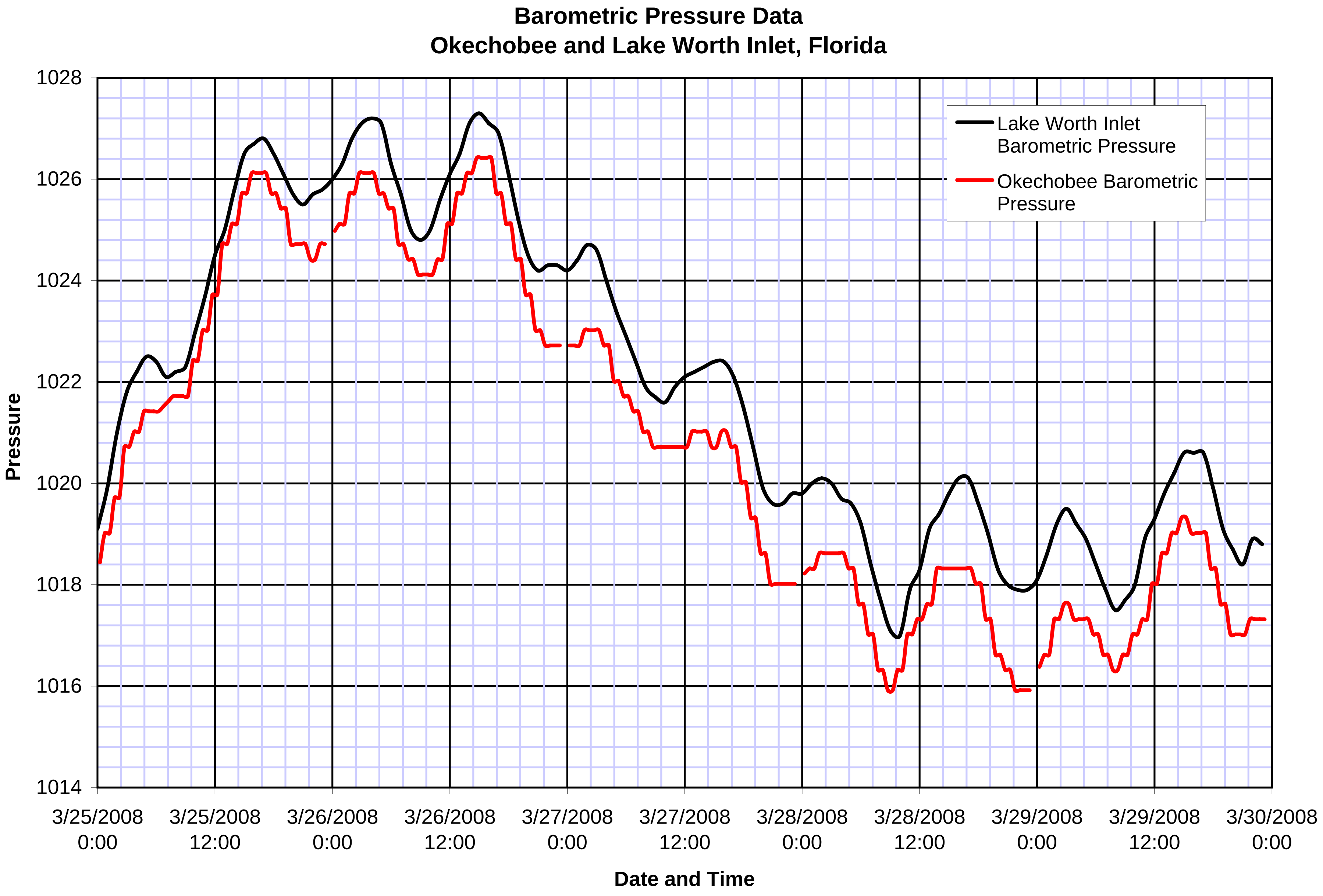
Packer Test Water Quality

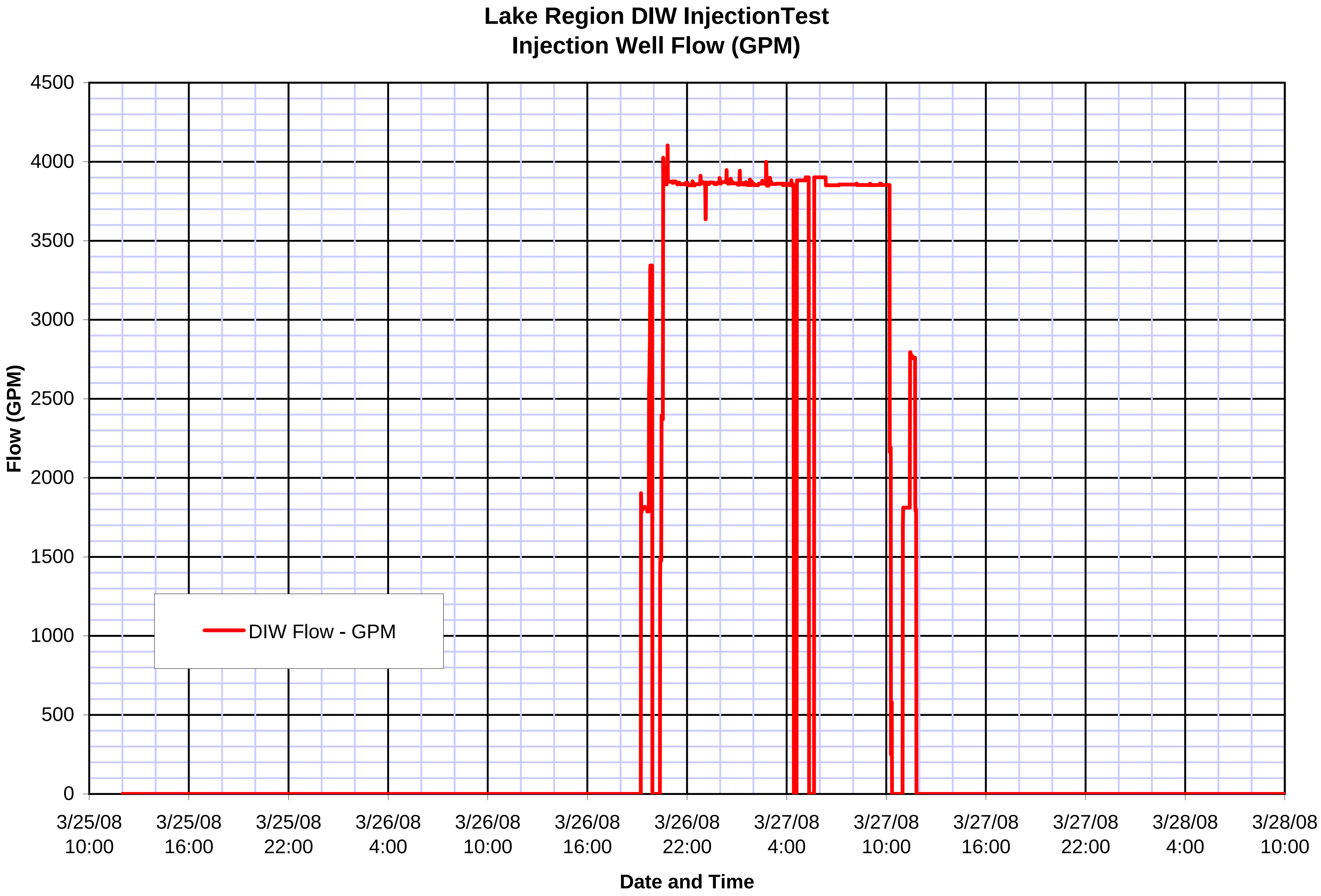
Packer Test Number	Packer Test Interval	Chloride	Cond	TDS	Sulfate	Magnesium	Sodium	Calcium	Potassium
5	1630 - 1650	2220	7960	4300					
		2340	7970	5220	500	178	1218	145	67.5
4	1776 - 1796	2460	9050	4940					
		2640	8970	5644	630	200	1372	157	80
3	1791 - 1811	2580	9470	5180					
		2920	10200	6188	838	192	1460	172	81.9
2	1851 - 1871	3320	11390	6320					
		3600	12020	7128	358	225	1880	164	100
1	1901 - 1915	5940	19600	11100					
		7900	21700	13300	36.1	279	3100	320	200
6	1939 - 1964	7260	22500	12700					
		8250	24900	15008	797.7	490	3970	220	179
9	2525 - 2546	No water sample collected - NO FLOW							
		No water sample collected - NO FLOW							
8	2780 - 2801	17429	52500	32248					
		20150	53600	36328	2410	1380	11340	740	800
7	2917 - 2938	17564	52900	32495					
		20800	54100	36368	1900	1460	11840	720	825

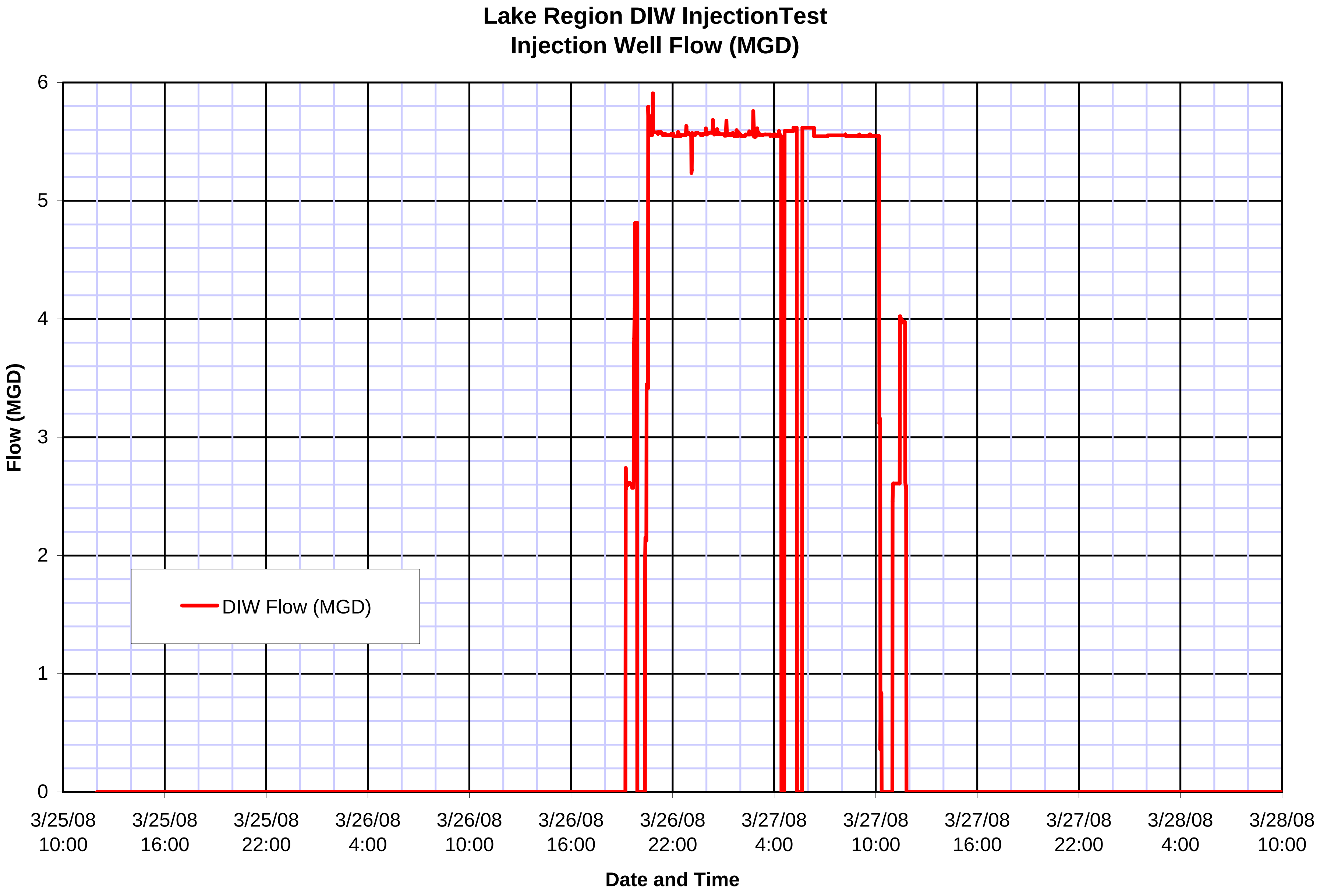
Appendix K
Injection Test

Lake Region DIW InjectionTest
Annular Tank Data

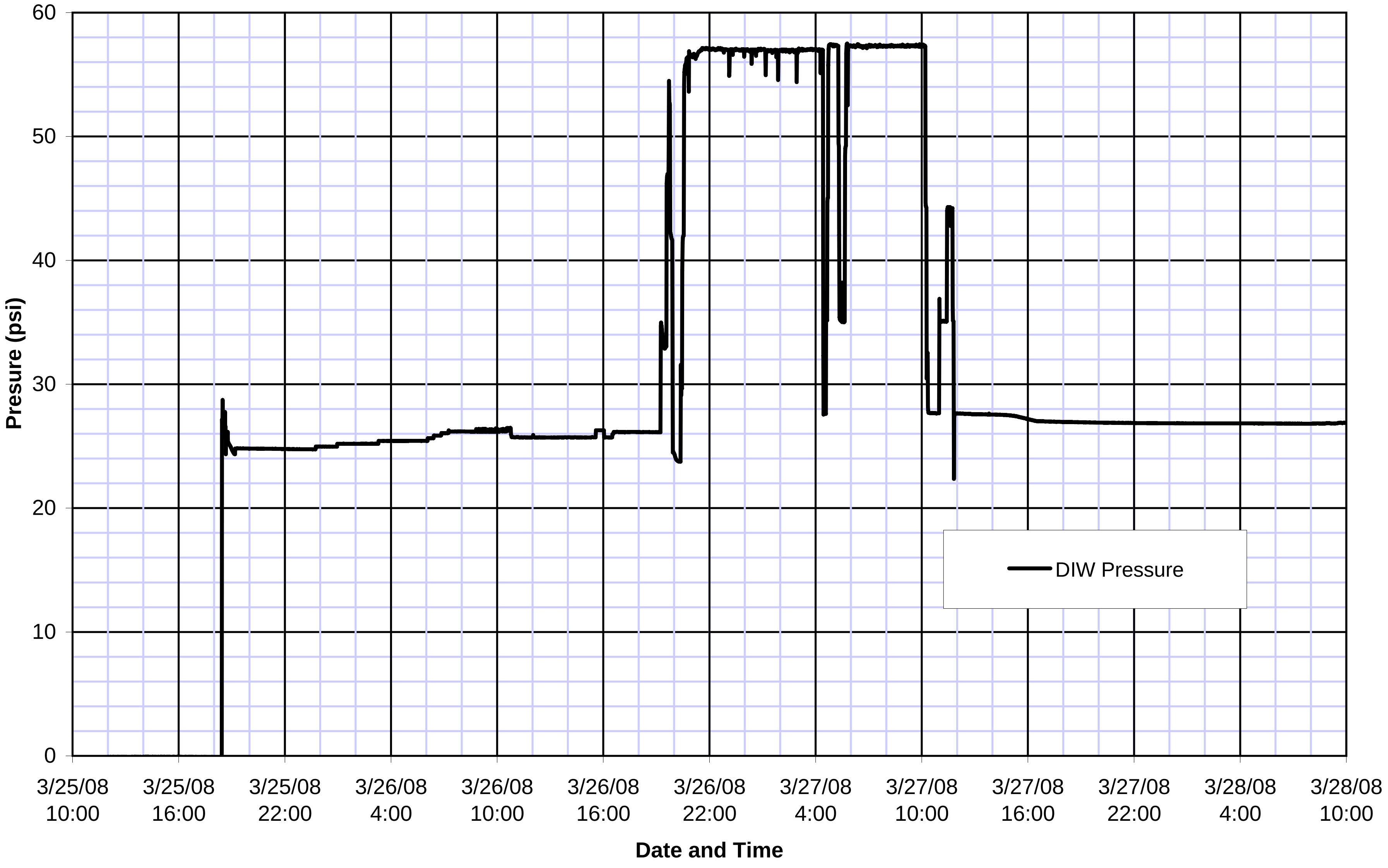


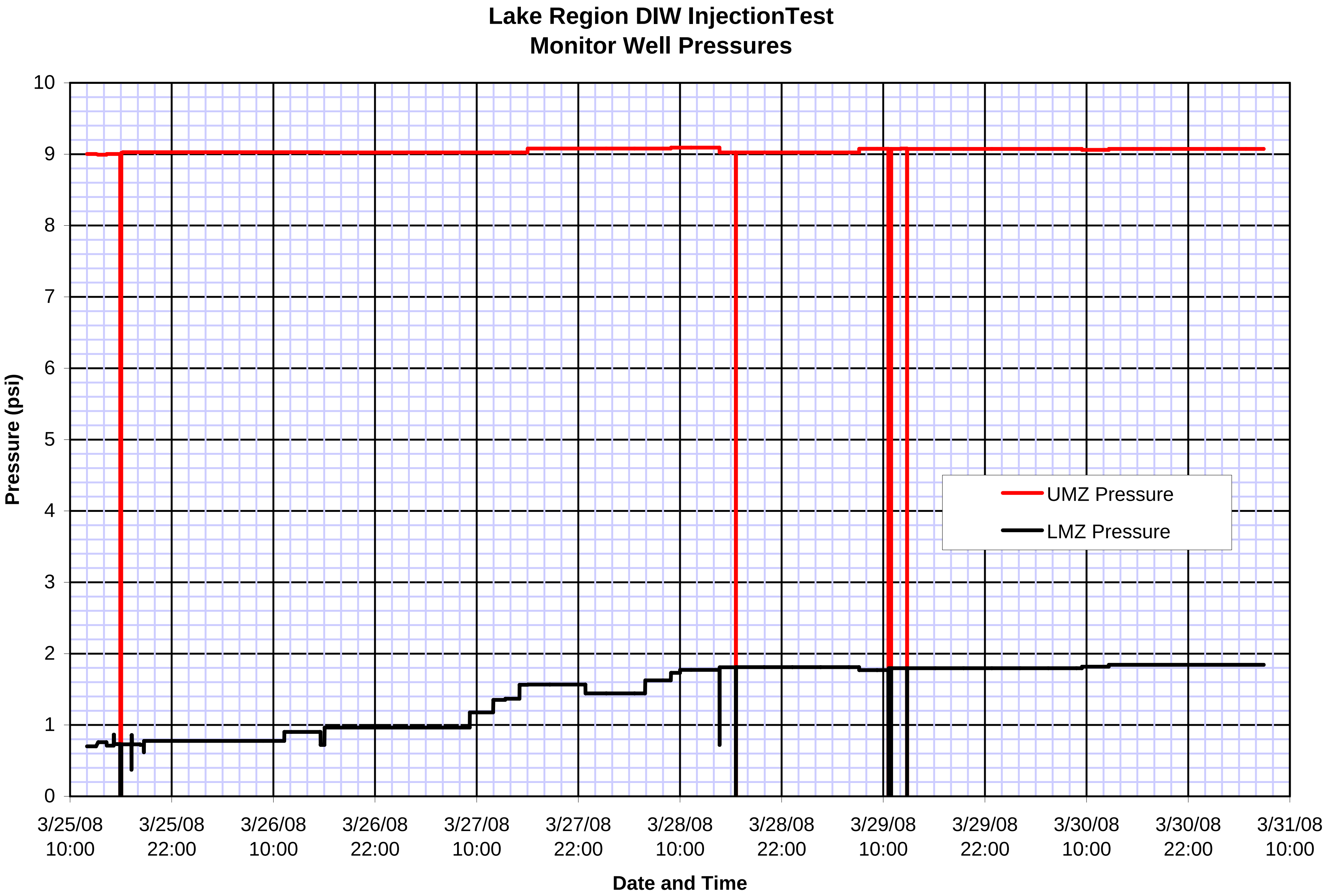

Barometric Pressure Data
Okechobee and Lake Worth Inlet, Florida
Pressure
1028
1026
1024
1022
1020
1018
1016
1014
3/25/2008 0:00
3/25/2008 12:00
3/26/2008 0:00
3/26/2008 12:00
3/27/2008 0:00
3/27/2008 12:00
3/28/2008 0:00
3/28/2008 12:00
3/29/2008 0:00
3/29/2008 12:00
3/30/2008 0:00
Date and Time
Lake Worth Inlet Barometric Pressure
Okechobee Barometric Pressure

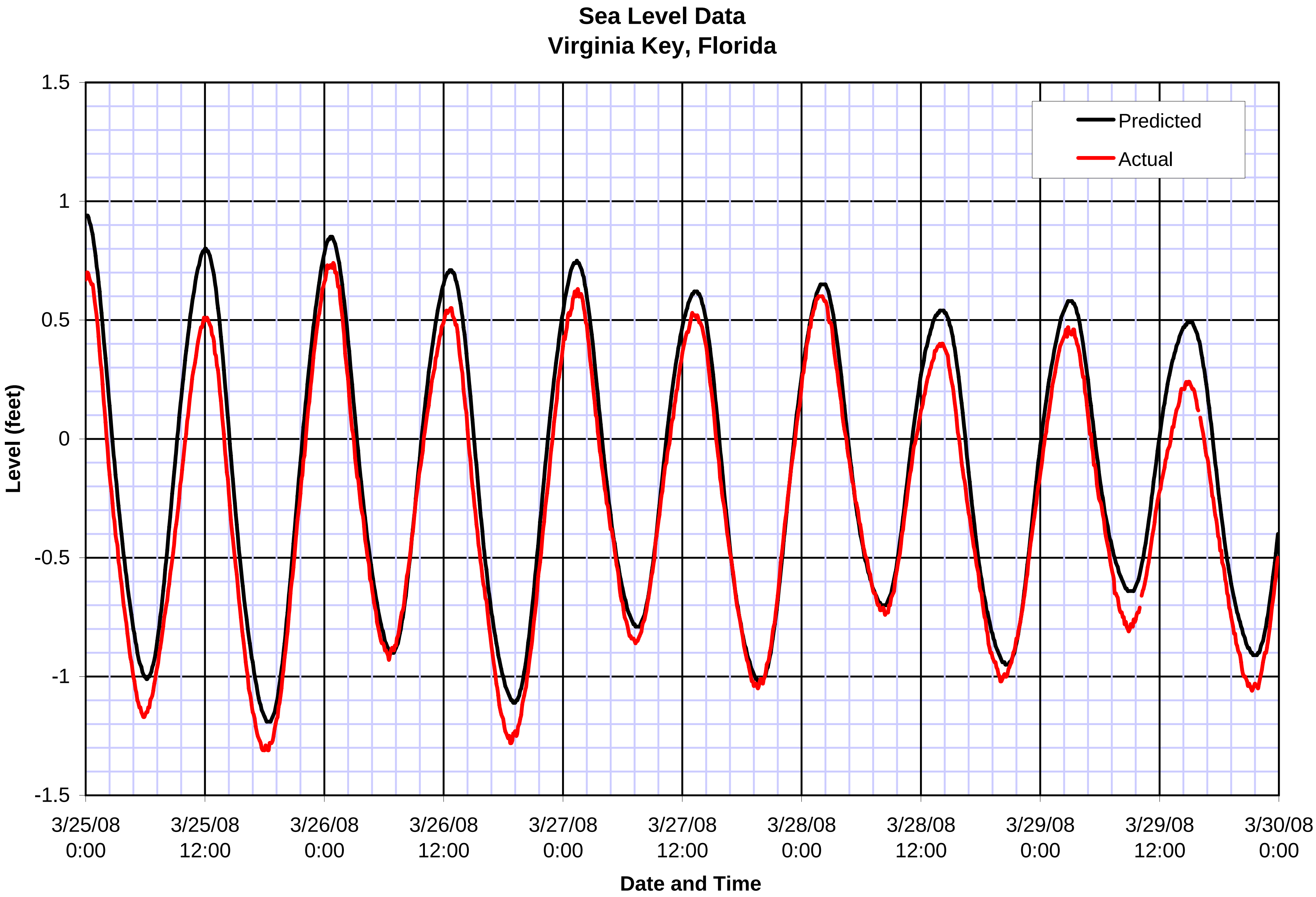

Lake Region DIW InjectionTest
Injection Well Flow (GPM)
Flow (GPM)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
DIW Flow - GPM
3/25/08 10:00
3/25/08 16:00
3/25/08 22:00
3/26/08 4:00
3/26/08 10:00
3/26/08 16:00
3/26/08 22:00
3/27/08 4:00
3/27/08 10:00
3/27/08 16:00
3/27/08 22:00
3/28/08 4:00
3/28/08 10:00
Date and Time


Lake Region DIW InjectionTest
Injection Well Flow (MGD)
Flow (MGD)
6
5
4
3
2
1
0
DIW Flow (MGD)
3/25/08 10:00
3/25/08 16:00
3/25/08 22:00
3/26/08 4:00
3/26/08 10:00
3/26/08 16:00
3/26/08 22:00
3/27/08 4:00
3/27/08 10:00
3/27/08 16:00
3/27/08 22:00
3/28/08 4:00
3/28/08 10:00
Date and Time

Lake Region DIW InjectionTest
Injection Well Pressure




Lake Region DIW InjectionTest
Monitor Well Pressures
Pressure (psi)
10
9
8
7
6
5
4
3
2
1
0
3/25/08 10:00
3/25/08 22:00
3/26/08 10:00
3/26/08 22:00
3/27/08 10:00
3/27/08 22:00
3/28/08 10:00
3/28/08 22:00
3/29/08 10:00
3/29/08 22:00
3/30/08 10:00
3/30/08 22:00
3/31/08 10:00
Date and Time
UMZ Pressure
LMZ Pressure


Sea Level Data
Virginia Key, Florida
Level (feet)
1.5
1
0.5
0
-0.5
-1
-1.5
Predicted
Actual
3/25/08 0:00
3/25/08 12:00
3/26/08 0:00
3/26/08 12:00
3/27/08 0:00
3/27/08 12:00
3/28/08 0:00
3/28/08 12:00
3/29/08 0:00
3/29/08 12:00
3/30/08 0:00
Date and Time

Appendix L
Pressure Test Data

DZMW

APPENDIX

DUAL ZONE MONITOR WELL PRESSURE TEST

6 5/8" Lower Monitor Casing

Location: Palm Beach County
Well: Lake Region DIW

Date: June 30, 2006
Contractor Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure
10:00	60.0	210
10:05	60.0	210
10:10	60.0	210
10:15	60.0	210
10:20	60.0	210
10:25	60.0	210
10:30	60.0	210
10:35	60.0	210
10:40	60.0	210
10:45	60.0	210
10:50	60.0	210
10:55	60.0	210
11:00	60.0	210

Pressure Gaauge Information

Gauge Type:
McDaniel 6"

Gauge Range:
0 - 200 psi

Serial Number:
032905-2

Calibration Date:
6/8/2006

Witnessed By: ______________________
Gardner Strasser, P.G., FDEP

Pressure Decrease: 0.00%

Certified By: ______________________
Thomas G. Uram, P.G., PBCWUD

Palm Beach County
Water Utilities

APPENDIX

DUAL ZONE MONITOR WELL PRESSURE TEST
12 3/4" Upper Monitor Casing

Location: Palm Beach County
Well: Lake Region DIW
Date: June 19, 2006
Contractor: Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure
12:30	126.0	
12:35	126.0	
12:40	126.0	
12:45	126.0	
12:50	126.0	
12:55	126.1	
13:00	126.1	
13:05	126.1	
13:10	126.1	
13:15	126.0	
13:20	126.0	
13:25	125.8	
13:30	125.5	

Pressure Gaauge Information

Gauge Type:
McDaniel 6"

Gauge Range:
0 - 300 psi

Serial Number:
325681

Calibration Date:
4/20/2006

Witnessed By: ______________________
Gardner Strasser, P.G., FDEP

Pressure Decrease: 0.40%

Certified By: ______________________
Thomas G. Uram, P.G., PBCWUD

IW

APPENDIX

INJECTION WELL ANNULAR PRESSURE TEST
13 3/8" Injection Tubing and 18" Final Casing

Location: Palm Beach County
Well: Lake Region DIW

Date: June 13, 2006
Contractor Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure
9:00	151.9	
9:05	151.9	
9:10	151.9	
9:15	151.8	
9:20	151.8	
9:25	151.8	
9:30	151.8	
9:35	151.7	
9:40	151.7	
9:45	151.7	
9:50	151.7	
9:55	151.7	
10:00	151.7	

Pressure Gaauge Information

Gauge Type:
McDaniel 6"

Gauge Range:
0 - 300 psi

Serial Number:
325681

Calibration Date:
4/20/2006

Witnessed By: ______________________________
Gardner Strasser, P.G., FDEP

Pressure Decrease: 0.13%

Certified By: ______________________________
Thomas G. Uram, P.G., PBCWUD

APPENDIX

INJECTION WELL PRESSURE TEST
18" FINAL CASING

Location: Palm Beach County
Well: Lake Region DIW
Date: May 12, 2006
Contractor: Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure	Time	Casing Pressure	Packer Pressure
9:30	154.0				
9:35	154.0				
9:40	154.0				
9:45	154.0				
9:50	154.0				
9:55	154.0				
10:00	154.0				
10:05	154.0				
10:10	154.0				
10:15	154.0				
10:20	154.0				
10:25	154.0				
10:30	154.0				

Witnessed By: ______________________
Gardner Strasser, P.G., FDEP

Pressure Decrease: 0.00%

Certified By: ______________________
Roger Simon

Pressure Gauge Calibration

BR
BLUE
RIBBON

Blue Ribbon Sales & Services
1940 Howell Branch Rd.
Winter Park, FL 32792

Phone: (877) 677-8899
Fax: (407) 657-6622
www.blueribboncorp.com

CALIBRATION CERTIFICATE

04/20/06

Youngquist Brothers, Inc.
15465 Pineridge Road
FT. Myers, FL 33908

P.O. 19580

S/N: 325681

This certificate will certify that your gauge authorized for calibration on your Purchase Order 19580, tested this date, and is in calibration. The gauge tested is identified as a McDaniel 6", gauge 0-300 psi.

This gauge was tested on a Mansfield & Green Deadweight Tester model T-100 Serial Number 11353, certified by QUALITY SYSTEMS LAB, INC., on August 11, 2005 to be accurate to within +/-.25%, traceable to NIST standards.

The subject gauge performed to within +/-1.5% accuracy.

Sincerely,

Julio Matos
Julio Matos

Appendix M

Tracer Assay and Flowmeter Calibration

WATER METER
ACCURACY TEST REPORT

4/17/2006

#	MAKE	SERIAL#	LOW FLOW	INT. FLOW	HIGH FLOW
1	*2"*	*4739630*	*97.5*	*101.0*	*102.0*
2	*USG*	*5096434*	*94.1*	*101.1*	*101.8*
3	*MJ*	*2363373*	*100.1*	*99.4*	*98.5*
4	*METERS*				
5			*2 GPM*	*8 GPM*	*65 GPM*
6					
7		*USAGE*			
8		*17437*			
9		*15338*			
10		*800*			
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MASTER METER

101 Regency Parkway
Mansfield ,Texas
817 -842-8000
(800) 765-6518
FAX# 817-842-8100
RMA# 15021

CUSTOMER: YOUNGQUIST BROTHER,IN
TEST DATE: 4/17/2006
TESTER: STEVE WHITE

NOTE:
Accuracy limits according to AWWA C708-96

*** 97% - 103% for Low Flows**

*** 98.5% - 101.5% for Intermediate and High Flows**

***Accuracy limits for meters removed from service according to M-6 Manual Table 5-1**

***80% - 104.0% for Low Flows**

***96% - 102.0% for Intermediate and High Flows**

CAUTION

RADIOACTIVE
MATERIALS

RX#011084
I – 131 Liquid
Youngquist Brothers Inc.
08:00
PER PHYSICIAN ORDER
10 mCi
06/15/2006 08:00
Container: 002

CAUTION
RADIOACTIVE
MATERIALS

RX#011084
I – 131 Liquid
10 mCi
Cal Date 06/15/2006
Cal Time 08:00
PER PHYSICIAN ORDER

MedTech Diagnostic Services (239) 277 – 0990
1840 Boy Scout Drive Fort Myers, FL 33907
RX#011084

Account Name: Youngquist Brothers Inc.
Delivery D/T: 06/13/2006 06:00 Container:002

CAUTION
RADIOACTIVE
MATERIALS

Patient ————: PER PHYSICIAN ORDER
Product ————: I – 131 Liquid
Procedure ——: Pipe Leak Test
Physician ——: Clay Ferguson
Ordered Amount: 10 mCi Quantity: 1 Inj. Amt: mCi
Cal Date/Time – : 06/15/2006 08:00
Actual Amount – : 10.272 mCi Quantity: 1 Volume: 10.00 ml
Exp Date/Time – : 07/06/2006 23:00
Filled By ————: Michelle Baker NPh
Lot #(s): I052902906C 0.021
NOTES: MEDICINAL GRADE, IANB DYE BLUE
CAUTION: TO BE USED UNDER THE DIRECT SUPERVISION OF A PHYSICIAN