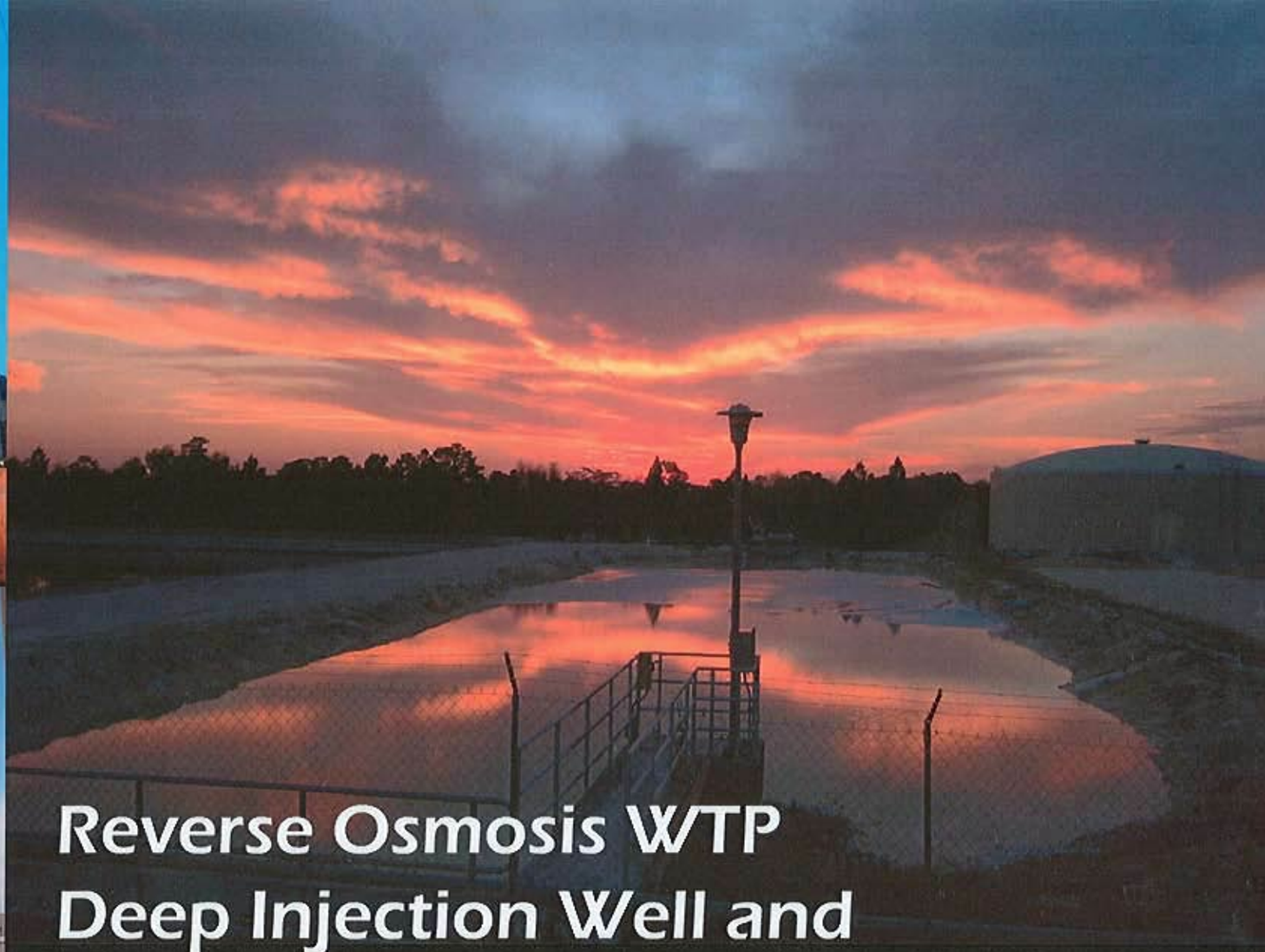

Reverse Osmosis WTP Deep Injection Well and Facilities Engineering Report

VOLUME I

Prepared for:

Bonita Springs Utilities, Inc.

Prepared by:

CH2MHILL

April 2004

M1020040ST.PA

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CH2MHILL

November 5, 2004

163954

Mr. Jack Myers, P.G.
Underground Injection Control
TAC Chairperson
Florida Department of Environmental Protection
2295 Victoria Avenue
Suite 364 West
Fort Myers, Florida 33901

Subject: Reverse Osmosis WTP Deep Injection Well and Facilities Engineering Report
Permit No. 186015-001-UC

Dear Mr. Myers:

Enclosed please find a report entitled *Reverse Osmosis WTP Deep Injection Well and Facilities Engineering Report* prepared for Bonita Springs Utilities, Inc (BSU). This report is submitted in hard copy and electronically as a CD. Note that the CD contains only Volume I and Volume II of the report. Volume III is the video cassette tapes of the borehole video logging and is only provided in the hard copies submitted to BSU, FDEP and USGS recipients. Additional copies of the video tapes are available by request at the CH2MHILL Tampa office.

Please contact me or Pete Larkin at the CH2MHILL Tampa office (813-874-0777) if you have any questions or require further information regarding this submittal.

Sincerely,

CH2M HILL

Michael L. Weatherby

Mike Weatherby, P.G.

cc: Joe Haberfeld/FDEP, Tallahassee
Ron Reese/USGS
Nancy Marsh/USEPA
Steve Anderson/SFWMD
Patrick Jennings/Bonita Springs Utilities, Inc.
Bill Bedow/CH2MHILL
Pete Larkn/CH2MHILL

Professional Engineer

The engineering features of the "Reverse Osmosis WTP Deep Injection Well and Facilities Engineering Report," prepared for Bonita Springs Utilities, Inc. April 2004, were prepared by, or reviewed by a Licensed Professional Engineer in the State of Florida.

William D. Beddow, P.E.

11/2/04

Date

52581

License No.

Professional Geologist

The geological evaluation and interpretations contained in the "Reverse Osmosis WTP Deep Injection Well and Facilities Engineering Report," prepared for Bonita Springs Utilities, Inc. April 2004, were prepared by, or reviewed by, a Licensed Professional Geologist in the State of Florida.

Michael L. Weatherby, P.G.

11/1/2004

Date

2178

License No.

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Volume I

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List of Acronyms

API	American Petroleum Institute units
Bbl	Barrel
BSU	Bonita Springs Utilities, Inc.
bpl	below pad level
bls	below land surface
CBL	cement bond log
CCL	casing collar locator
CFU	Colony Forming Units
cm/sec	centimeters per second
cu ft	cubic feet
DZMW	Dual Zone Monitor Well
EPA	U.S. Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FGS	Florida Geological Survey
FRP	fiberglass reinforced plastic
ft^2/d	feet squared per day
gpm	gallons per minute
gpm/ft	gallons per minute per foot
gpd/ft	gallons per day per foot
GRB	gamma ray lower (bottom)
GRM	gamma ray middle
GRT	gamma ray upper (top)
I^{-131}	Iodine 131
ID	inside diameter
in	inches
RO IW	Reverse Osmosis Injection Well
mCi	milliCurie
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
mg/L	milligrams per liter
MIT	mechanical integrity testing
ND	No Detection

O&M	operation and maintenance
OD	outside diameter
pCi/L	Picacurries/liter
PCU	Platinum Cobalt Units
psi	pounds per square inch
PSP	positive seal packer
PVC	polyvinyl chloride
RO WTP	Reverse Osmosis Water Treatment Plant
RTS	radioactive tracer survey
SFWMD	South Florida Water Management District
s.u.	standard units
TAC	Technical Advisory Committee
TON	Threshold Odor Number
TDS	total dissolved solids
toc	top of casing
UIC	Underground Injection Control
USDW	Underground Source of Drinking Water
USGS	U.S. Geological Survey
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter

Section 1
Introduction

Bonita Springs Utilities, Inc.

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SECTION 1

Introduction

1.1 Background Information

A deep injection well was constructed to serve as a disposal mechanism for brine concentrate produced at the Bonita Springs Utilities, Inc. (BSU) reverse-osmosis water treatment plant (RO WTP). The RO WTP is located in Bonita Springs, Florida. A site location map showing the location of the RO WTP is presented in Figure 1-1. The overall site plan of the RO WTP and injection well system is presented in Figure 1-2.

A permit application for the construction of a RO injection well (RO IW-1) and a dual zone monitoring well (DZMW-1) was submitted to the Florida Department of Environment Protection (FDEP) in June, 2001. An FDEP Underground Injection Control (UIC) permit (Construction Permit No. 186015-001-UC) was issued on April 3, 2002. A copy of the construction permit is provided in Appendix A.

The injection well facilities construction was completed at the end of April 2003. An operational testing permit was obtained from FDEP on January 5, 2004. The injection well facilities were started up on April 1, 2004, and has been in operation since then. The injection well facilities operational testing permit is also provided in Appendix A.

1.2 Scope

This report summarizes the construction and testing of the injection well and dual zone monitor well for the BSU RO WTP. Construction and testing of the wells were performed in accordance with Chapter 62-528, Florida Administrative Code (FAC), the recommendations of the Technical Advisory Committee (TAC), and the provisions of the FDEP construction permit. The wells and appurtenances were constructed following the contract documents for the "Bonita Springs Utilities Reverse Osmosis Water Treatment Plant and Water Reclamation Facility Injection Wells" (CH2M HILL, 2002).

1.3 Project Description

Youngquist Brothers, Inc. of Fort Myers, Florida was the selected contractor for construction of the injection well system. The Notice-to-Proceed was issued on August 15, 2002. Construction activities of the deep injection well system included installation of a temporary steel drilling pad, construction of four temporary shallow pad monitor wells, construction of the injection well, and construction of the dual zone monitor well.

The TAC consisted of local, state, and federal agencies, including FDEP state and local representatives, the South Florida Water Management District (SFWMD), the U.S. Environmental Protection Agency (EPA), and the U.S. Geological Survey (USGS).

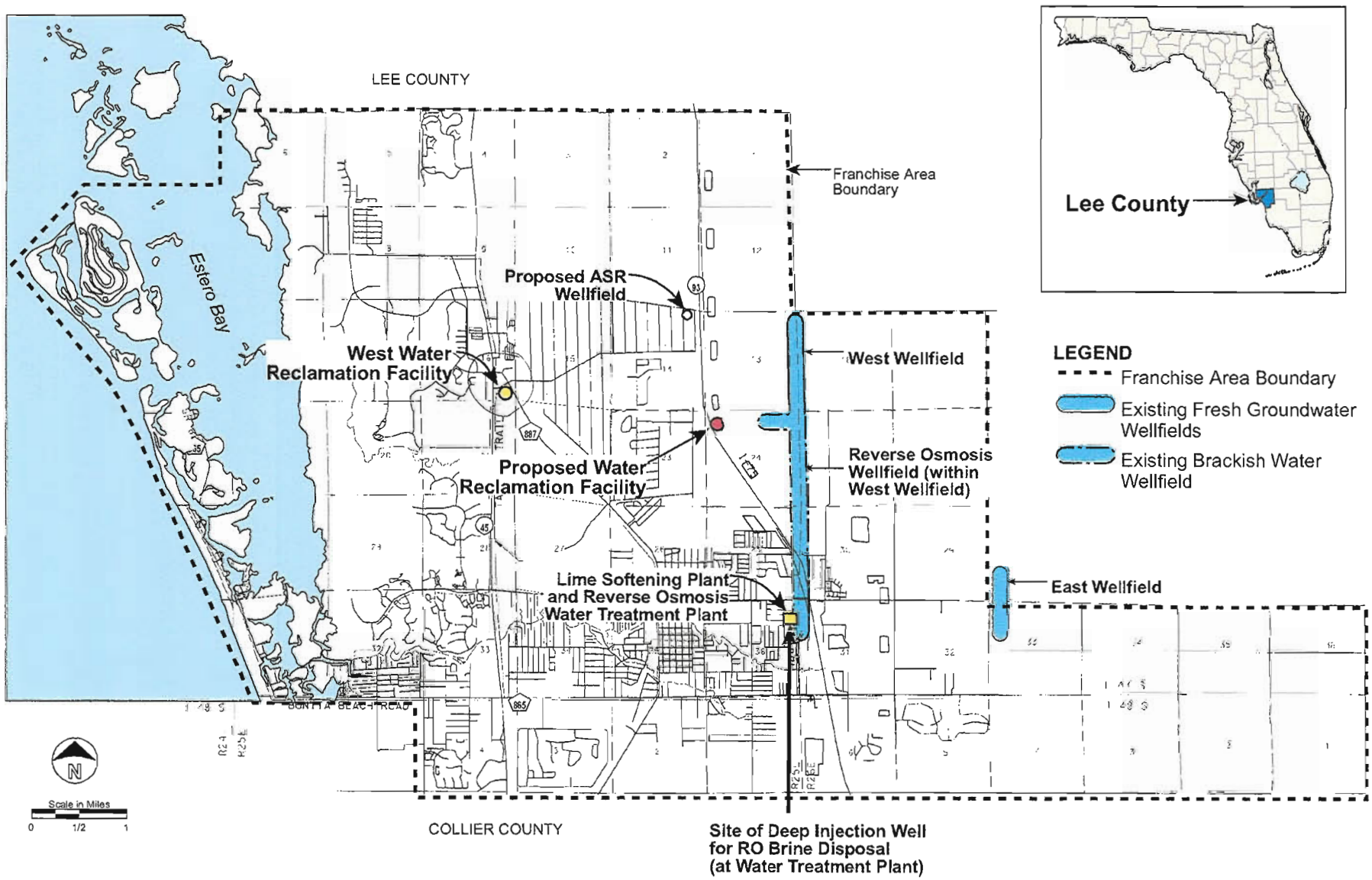


FIGURE 1-1
Franchise Area Location Map
Bonita Springs Utilities, Inc. RO IW-1

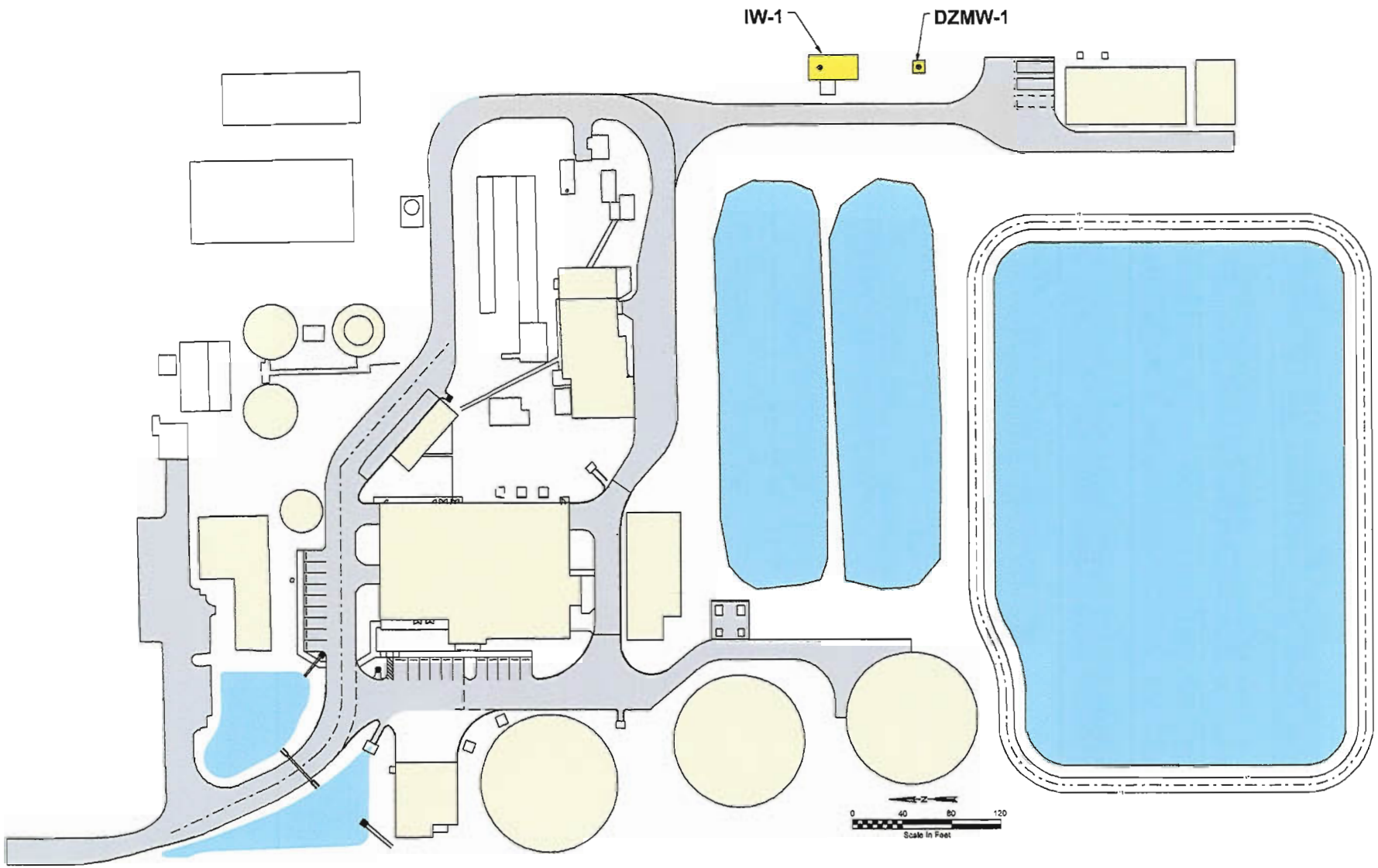


FIGURE 1-2
Location of IW-1 and DZMW-1, and RO WTP Generalized Site Plan
Bonita Springs Utilities, Inc. RO IW-1

Section 2
Well Construction

Bonita Springs Utilities, Inc.

W10200-0005TPA

SECTION 2

Well Construction

Construction of the injection well system included construction of four temporary surficial aquifer monitor wells, a deep injection well, and a dual zone monitor well. Prior to beginning drilling activities, a temporary steel drilling pad and mud/water containment system was constructed around the injection well and the mud tank system. This steel pad was later removed and a smaller, permanent 20-ft x 45-ft concrete pad was constructed around the injection well. The dual zone monitor well has a 10-ft x 10-ft final concrete pad.

This section describes the construction, drilling, and testing activities and collected data associated with the construction of RO IW-1 and DZMW-1. A summary of the construction activities for each well is provided in Appendix B. The weekly construction summaries for the entire project are included as Appendix C.

2.1 Surficial Aquifer Monitor Well Construction

As required by the FDEP construction permit, four surficial aquifer (or pad) monitor wells were installed and sampled before the start of construction at RO IW-1. The pad monitor wells were installed at locations surrounding the well construction area to monitor potential surficial aquifer contamination during construction. Following installation of the pad monitor wells and prior to RO IW-1 drilling activities, samples were collected from each well and analyzed to establish background water quality data. Figure 2-1 presents a typical pad monitor well construction diagram. Water quality data from the wells are provided in Section 4 of this report.

2.2 Injection Well (RO IW-1) Construction

Drilling of the injection well began on September 26, 2002. Mud-rotary drilling techniques were used to drill through the surficial aquifer and clay intervals that make up the Hawthorn Group. Reverse-air drilling techniques were used during subsequent drilling to a total depth of 3,206 feet below land surface (bls) to remove drill cuttings from the borehole, collect water samples, and conduct specific capacity tests. A closed drilling fluid circulation system was used during reverse-air drilling in order contain all fluids.

The drilling schedule and casing setting depths were designed to conform to the hydrogeological features observed at the site, as well as regulatory agency requirements. Geologic formation samples were collected and described at 10-foot intervals during the drilling of the pilot hole. Data from the pilot hole interval (formation samples, water samples, air-lift specific capacity tests, packer tests, and geophysical logs) were evaluated to assist in the selection of the casing setting depths and to interpret the site lithology and hydrogeology.

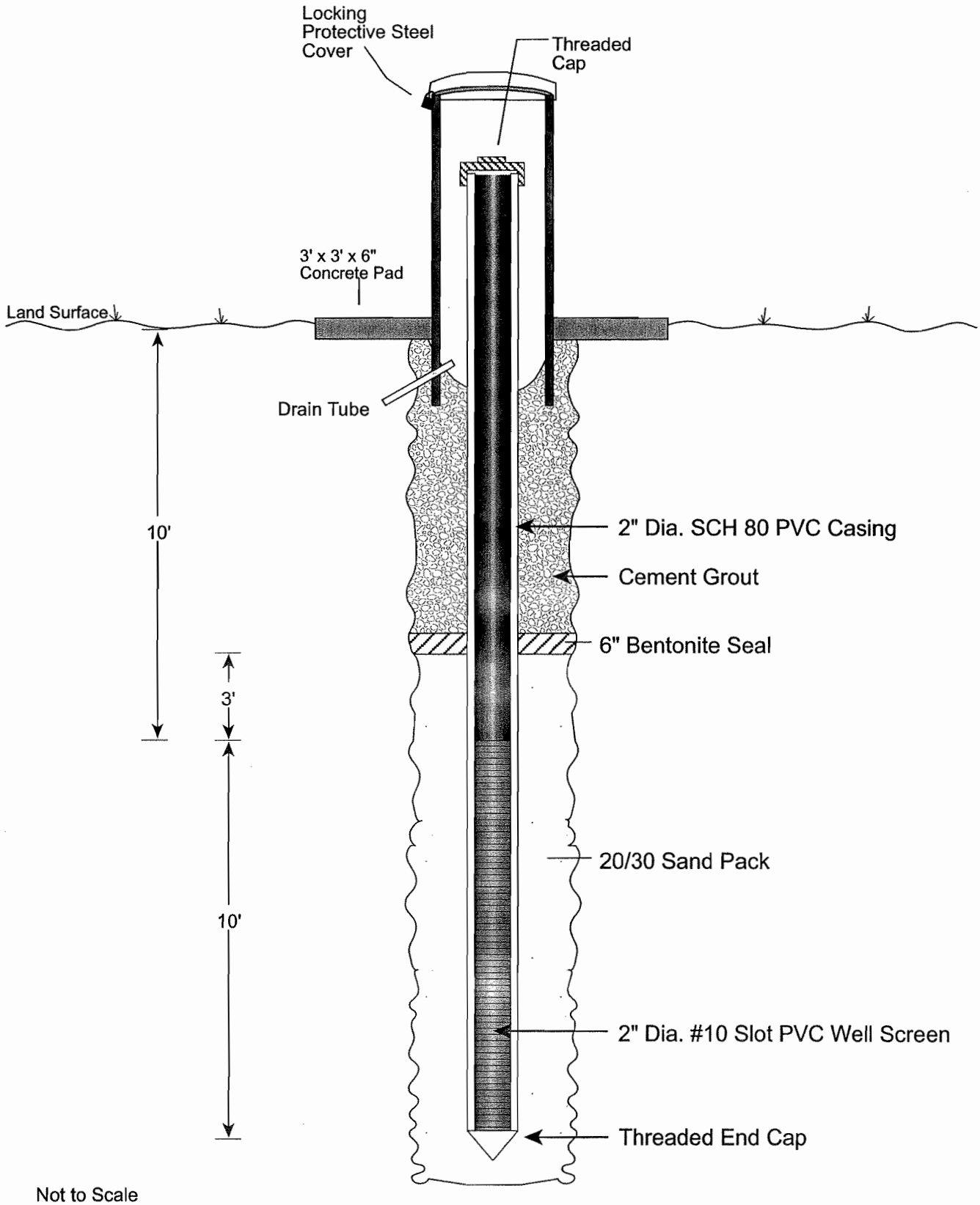


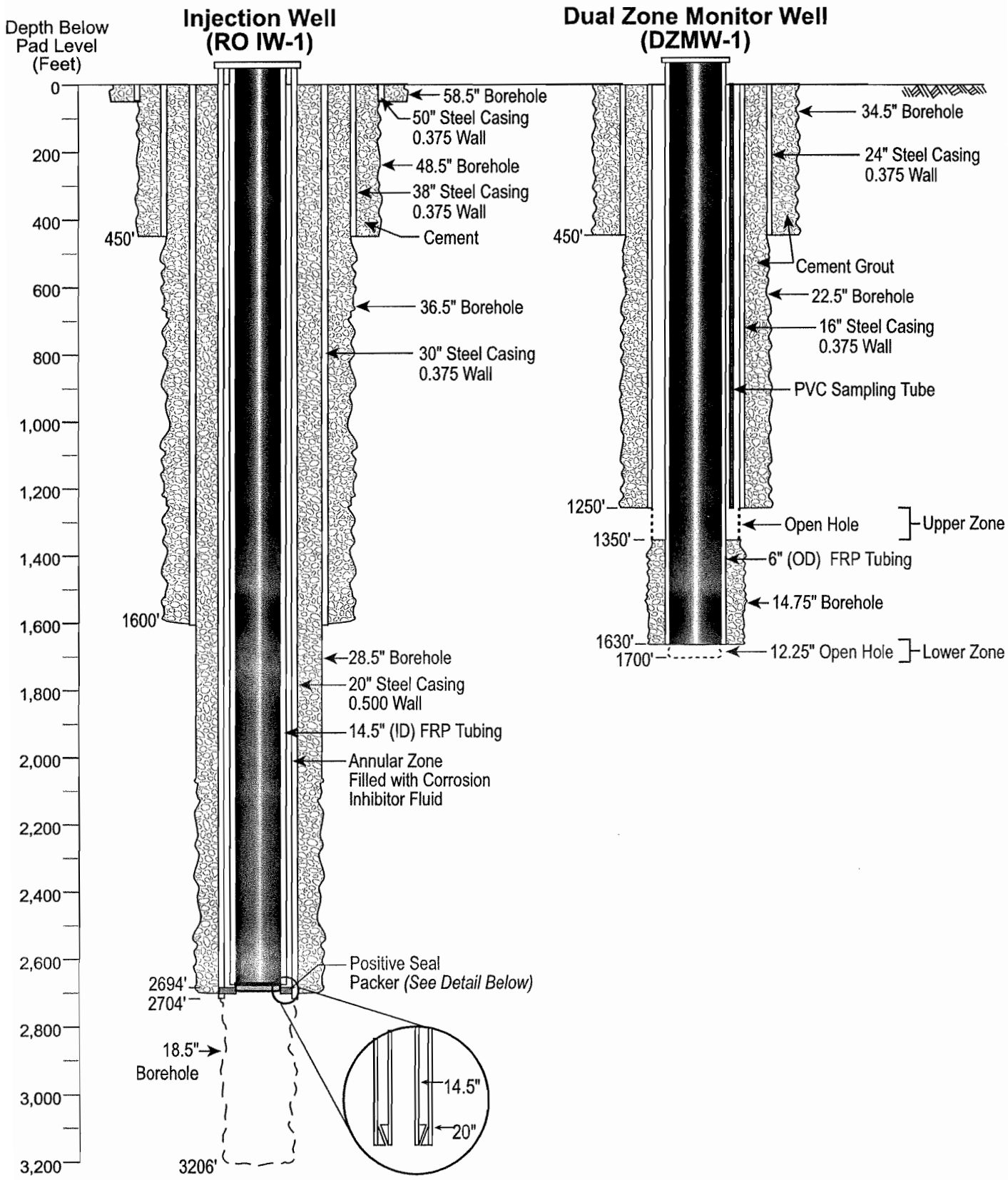
FIGURE 2-1
Typical Pad Monitor Well Construction Diagram
Bonita Springs Utilities, Inc. RO IW-1

Four concentric steel casings and one fiberglass reinforced plastic (FRP) tubing were used to construct RO IW-1. The casing depths and the types and quantities of cement used during the construction of RO IW-1 are summarized in Table 2-1. Completion details of RO IW-1 are depicted in Figure 2-2. The mill certificates for each of the steel casing strings are provided in Appendix D.

TABLE 2-1
Summary of Casing Setting Depths and Cement Quantities - RO Deep Injection Well (RO IW-1)
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Casing	Casing Material	Outside Diameter (in)	Inside Diameter (in)	Casing Thickness (in)	Casing Depth (ft bls)	Date	Cement Stage	Type of Cement	Quantity of Cement (bbls)
Pit	Steel	50.00	49.25	0.375	48	8/27/02	#1	Neat	59
						Remark:	Pressure grout from bottom of casing.		
Surface	Steel	38.00	37.25	0.375	450	10/7/02	#1	4%	360
								Neat (tail)	96
						Remark:	Pressure grout from bottom of casing.		
Intermediate	Steel	30.00	29.25	0.375	1,600	12/5/02	#1	4%	308
								Neat (tail)	60
						Remark:	Pressure grout from bottom of casing.		
						12/6/02	#2	4%	92
						Remark:	Tremied into annulus from 1,020 ft bls.		
						12/6/02	#3	4%	75
						Remark:	Tremied into annulus from 762 ft bls.		
						12/6/02	#4	4%	80
						Remark:	Tremied into annulus from 635 ft bls.		
						12/7/02	#5	4% [1]	112
						Remark:	Tremied into annulus from 478 ft bls.		
						12/7/02	#6	4% [1]	118
						Remark:	Tremied into annulus from 260 ft bls.		
Final	Steel	20.00	19.00	0.500	2,704	2/18/03	Plug #1	Neat [1]	3
							Tremied into annulus from 2,700 ft bls.		
						2/19/03	Plug #2	Neat [1]	7
							Tremied into annulus from 2,695 ft bls.		
						2/19/03	#1	Neat	71
							Tremied into annulus from 2,675 ft bls.		
						2/19/03	#2	4%	220
							Tremied into annulus from 2,550 ft bls.		
						2/20/03	#3	4%	202
							Tremied into annulus from 2,312 ft bls.		
						2/20/03	#4	4%	228
							Tremied into annulus from 2,016 ft bls.		
						2/20/03	#5	4%	177
							Tremied into annulus from 1,675 ft bls.		
						2/21/03	#6	4%	226
							Tremied into annulus from 1,311 ft bls.		
						2/21/03	#7	12%	230
							Tremied into annulus from 794 ft bls.		
						2/26/03	#8	12%	117
							Tremied into annulus from 273 ft bls.		
Final Tubing	FRP	16.10	14.48	0.81	2,694	3/2/03	N/A	N/A	N/A
							Total Volume Neat:		296 bbls
							Total Volume 4%:		2,198 bbls
							Total Volume 12%:		347 bbls

Abbreviations:
in = inches
ft = feet
bls = below land surface
bbls = Barrel
1 Barrel = 42 gal = 5.6 cuft
FRP = Fiberglass Reinforced Plastic
Notes:
[1] Calcium chloride additive



Not to Scale

FIGURE 2-2
Injection Well and Monitor Well Completion Details
Bonita Springs Utilities, Inc. RO IW-1

CH2MHILL

Construction of RO IW-1 began with the installation of a 50-inch diameter steel casing to 48 feet bls. A 12.25-inch diameter pilot hole was then advanced to 500 feet bls using mud-rotary drilling methods. The pilot hole was then geophysically logged (caliper, gamma ray, spontaneous potential, and dual induction logs) and reamed to a nominal 48.5-inch diameter to a depth of 455 feet bls. Caliper and natural gamma logs were subsequently performed on the reamed hole and a 38-inch diameter casing was installed and cemented through the surficial and intermediate aquifers to a depth of 450 feet bls.

The pilot hole was then advanced using reverse-air drilling methods to a depth of 1,800 feet bls. Six 4-inch diameter cores were attempted between the interval of 1,500 feet and 1,798 feet bls during this phase of pilot hole drilling. Of the six coring attempts, only five cores were successfully recovered and submitted to a laboratory for a detailed analysis. The intervals analyzed were selected based on lithology and sample size. Core analyses and descriptions are provided in Section 4 of this report. Caliper, gamma ray, spontaneous potential, dual induction, borehole compensated sonic, fluid temperature, fluid conductivity, flowmeter, borehole video, and borehole televiewer logs were then conducted in the open-hole interval. Ten straddle packer tests were performed between the interval of 1,150 feet and 1,750 feet bls in order to provide confining characteristics of the tested intervals and identify the base of the Underground Source of Drinking Water (USDW), defined as water with a total dissolved solids (TDS) concentration less than 10,000 milligrams per liter (mg/L). The water quality and testing data are presented in Section 4.

Based on the results of packer testing, coring, geophysical logging, and formation sample analyses, a 30-inch diameter intermediate casing setting depth of 1,600 feet bls was recommended and approved by the TAC. The pilot hole was then plugged back with 12 percent bentonite cement and reamed to a nominal 36.5-inch diameter to a depth of 1,606 feet bls. A caliper log was then conducted on the reamed hole and the 30-inch diameter intermediate casing was installed below the base of the USDW to a depth of 1,600 feet bls.

After the intermediate casing installation, the pilot hole was advanced to 3,206 feet bls (total depth of the well). Seven 4-inch diameter cores were attempted between the interval of 1,900 feet and 2,323 feet bls during this phase of pilot hole drilling. Of these seven coring attempts, three core samples were submitted for laboratory analysis. Section 4 of this report presents core analyses including detailed descriptions. Caliper, gamma ray, spontaneous potential, dual induction, borehole compensated sonic, fluid temperature, fluid conductivity, borehole video, and flowmeter logs were then conducted on the entire open-hole interval. Five packer tests were subsequently conducted between the interval of 1,813 feet and 3,206 feet bls to determine the confining characteristics and water quality of the tested intervals.

Based on flow results of packer testing, coring, geophysical logging, and formation sample analyses, a 20-inch diameter final casing setting depth of 2,700 feet bls was recommended and approved by the TAC. A drillable bridge plug was installed at 2,675 feet bls and the borehole was plugged back with 12 percent bentonite cement between 2,675 feet and 1,600 feet bls prior to reaming the pilot hole.

Reaming of the pilot hole began at 1,600 feet bls with a 28.5-inch diameter drill bit. The bentonite grout that was used to plug back the pilot hole was encountered at 1,602 feet bls. Minimal to no cement returns were reported beyond 1,800 feet bls. When reaming reached

2,675 feet bls, the drillable bridge plug that had been installed was not encountered. It was concluded that the reamed hole had deviated from the original pilot hole at approximately 1,800 feet bls, although all deviation measurements of the reamed hole were consistently within the required limits. After reaming to 2,697 feet bls with the 28.5-inch diameter bit, an 18.5-inch diameter borehole was advanced from 2,697 feet to 3,206 feet bls. Caliper and video logs were conducted on the open borehole to determine the reamed hole characteristics and at which depth the reamed hole deviated from the pilot hole. The video log confirmed that the reamed borehole deviated from the pilot hole at approximately 1,770 feet bls by identifying tracking of the cement backplug.

Following caliper and video logging, a final off-bottom packer test was conducted between 2,728 feet and 3,206 feet bls to evaluate the injection capacity of the reamed borehole. After packer testing, the final 20-inch diameter casing and the stainless steel Positive Seal Packer (PSP) hanger (female portion) and external casing plug (ECP) were installed to a depth of approximately 2,704 feet bls. The approximate length between the bottom of the PSP hanger and the top of the external casing plug is six feet. The purpose of the ECP is to seal the casing to the borehole wall preventing the leakage of cement below the bottom of the reamed interval into the open borehole during grouting operations. The final casing was then cemented in several stages, using the tremie method, from 2,700 feet to 273 feet bls. Following a 24-hour waiting period, a cement bond log (CBL) was run from 2,690 feet to 273 feet bls. The CBL provided evidence of adequate cement behind the final 20-inch diameter casing. Following a pressure test of the casing, a final stage of cement was pumped around the casing to land surface using the tremie method.

A pressure test was conducted on the final 20-inch diameter casing string before cementing the casing to land surface. FDEP was onsite to witness the pressure test conducted on the final casing. On February 26, 2003 the casing was pressurized to 105.25 psi and indicated a 0.47 percent decrease in pressure during the first 60 minutes. The test was continued for an additional 60 minutes and ended with a total pressure decrease of 1.2 percent over the 120-minute period. The 14.5-inch diameter FRP injection tubing was then installed to 2,694 feet bls with the PSP (male portion) attached to the base of the tubing. Prior to seating the PSP, approximately 13,000 gallons of 1 percent Baracor 100 corrosion inhibitor fluid was pumped into the annulus. The FRP tubing and male end PSP assembly were then lowered into the female PSP hanger located at 2,694 feet bls.

Two pressure tests were conducted on the annular zone and the FRP casing. FDEP was onsite to witness the pressure test conducted on the annular zone. On March 3, 2003, the annulus was pressurized to 107 psi and indicated a 0.23 percent increase during the first 60 minutes. The test was continued for an additional 60 minutes and ended with a total pressure increase of 0.70 percent over the 120-minute period. The final pressure test was conducted on the inside of the FRP. Within the FRP, a temporary packer was installed to a depth of 2,679 feet bls and the FRP was pressurized to 106.25 psi. This test showed a pressure increase of 0.71 percent during the 120-minute testing interval.

A final video log was performed on May 7, 2003 to assess the internal mechanical integrity of the FRP tubing and to provide record of the completed well. A radioactive tracer survey (RTS) was performed to assess the external mechanical integrity of RO IW-1. The successful RTS test was conducted on May 15, 2003. The injection test was conducted on November 6, 2003 and the data is provided in Section 4.

Prior to the injection test, construction of the well head was completed with 16-inch diameter stainless steel piping fitted with a 16-inch diameter Venturi flowmeter, pressure transducer, pressure gauge, a 4-inch vacuum release valve, and 2-inch air release valve. The wellhead allows for sampling of the RO brine injectate and the injection of monitor well purge water during required sampling. Appendix E presents the record drawings for the RO IW-1 wellhead.

2.3 Dual Zone Monitoring Well (DZMW-1) Construction

Construction of DZMW-1 began on March 10, 2003, with the mud drilling of a 12.25-inch diameter pilot hole to 505 feet bls. The pilot hole was geophysically logged from land surface to 505 feet bls. Geophysical logs performed include caliper, gamma ray, spontaneous potential, and dual induction. The pilot hole was subsequently reamed to 455 feet bls using a 34.5-inch diameter drill bit. A caliper log was conducted to verify the reamed hole characteristics and the 24-inch diameter steel surface casing was set to 450 feet bls and cemented in place. After a 24-hour cement cure period, a 12.25-inch diameter pilot hole was advanced to 1,250 feet bls using the reverse-air method. Geophysical logs consisting of caliper, gamma ray, spontaneous potential, dual induction, borehole compensated sonic, fluid temperature, fluid conductivity, and flowmeter logs were then conducted on the open hole interval. After logging activities were complete, the pilot hole was reamed to 1,252 feet bls using a 22.5-inch diameter drill bit. A caliper log was then performed to evaluate the reamed hole characteristics. The 16-inch diameter intermediate casing was then installed to 1,250 feet bls, with TAC approval, and cemented to land surface. Following a 24-hour curing period after the last cement stage, a 14.75-inch diameter pilot hole was advanced to 1,620 feet bls. A 12.25-inch diameter pilot hole was continued between 1,620 feet and 1,700 feet bls. Geophysical logs consisting of caliper, gamma ray, spontaneous potential, dual induction, borehole compensated sonic, fluid temperature, fluid conductivity, and flowmeter logs were then conducted on the open hole interval. After many attempts were made to conduct a borehole video, however, the turbidity of the formation water was too high for an acceptable video from being completed. After the video log attempt, the 6-inch diameter FRP casing and packer assembly was installed to 1,630 feet bls. A 5.5-foot long stainless steel packer was installed at the base of the FRP casing to serve as a seal between the borehole wall and the FRP casing. The seal would allow the cementing of the FRP, via the tremie method, without the loss of cement into the lower monitor zone. After seating the FRP assembly to 1,630 feet bls, the annulus was cemented from 1,630 feet to 1,350 feet bls. The finished dual zone monitor well includes both upper and lower zones. The upper zone is completed between 1,250 feet and 1,350 feet bls, and the lower zone between 1,630 feet and 1,700 feet bls.

The casing depths and the types and quantities of cement used for construction of DZMW-1 are summarized in Table 2-2. The DZMW-1 well completion details are provided in Figure 2-2 (presented previously).

TABLE 2-2
Summary of Casing Setting Depths and Cement Quantities - Dual Zone Monitor Well (DZMW-1)
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Casing	Casing Material	Outside Diameter (in)	Inside Diameter (in)	Casing Thickness (in)	Casing Depth (ft bls)	Date	Cement Stage	Type of Cement	Quantity of Cement (bbls)
Surface	Steel	24.00	23.25	0.375	450	3/5/03	#1	4%	220
								Neat (tail)	92
						Remark:	Pressure grout from bottom of casing.		
Intermediate	Steel	16.00	15.25	0.375	1250	3/26/03	#1	4%	180
								Neat (tail)	70
						Remark:	Pressure grout from bottom of casing.		
						3/26/03	#2	4%	225
						Remark:	Tremied into annulus from 707 ft bls.		
						3/27/03	#3	4%	31
						Remark	Tremied into annulus from 124 ft bls.		
Final	FRP *Red Box 1250*	5.97	5.43	0.27	1,630	4/5/03	Plug #1	Neat [1]	1.5
							Tremied into annulus from 1,630 ft bls.		
						4/5/03	Plug #2	Neat [1]	1
							Tremied into annulus from 1,619 ft bls.		
						4/6/03	#1	Neat	11
							Tremied into annulus from 1,607 ft bls.		
						4/6/03	#2	Neat	32
							Tremied into annulus from 1,554 ft bls.		
						4/7/03	#3	Neat	25
							Tremied into annulus from 1,447 ft bls.		
						4/7/03	#4	Neat	4
							Tremied into annulus from 1,366 ft bls.		
							Total Volume Neat:		236.5 bbls
							Total Volume 4%:		656 bbls

Abbreviations:
in = inches
ft = feet
bbl = Barrel
1 Barrel = 42 gal = 5.6 cuft
bls = below land surface
FRP = fiberglass reinforced plastic

Notes:
[1] Calcium chloride additive

After cementing of the annulus was complete, the FRP casing was pressure tested. The casing was pressurized to 51 psi and indicated a 1.5 percent decrease over the 1-hour test period. Following pressure testing activities, the DZMW-1 wellhead construction was finalized. The wellhead is completed with a 20-inch stainless steel flange approximately 1-foot above pad level. The upper monitor zone is completed with a 2-inch stainless steel pipe extending approximately 3 feet above the flange. The lower monitor zone is completed with 2-inch stainless stain pipe 2-foot above the flange. Both monitor zones are fitted with a submersible pump with PVC sampling tubes originating from each zone. Each respective zone is fitted with a 1-inch vacuum/air release valve, a magnetic flowmeter, a pressure transducer, and a pressure gauge. The wellhead allows for sampling of the individual monitor zones from a ½-inch diameter port and directs water generated during purging to the injection well via a 2-inch line from each monitor zone. The Dual Zone Wellhead record drawings are presented in Appendix E.

Section 3
Geology and Hydrogeology

Bonita Springs Utilities, Inc.

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SECTION 3

Geology and Hydrogeology

Groundwater in Lee County's aquifer systems are developed within a thick carbonate platform which overlies the Early Jurassic (150 to 195 million years old) basement rocks. Sediments within the carbonate platform range in age from Eocene to Recent. The sediments consist primarily of carbonates and Miocene age siliciclastics. The aquifer systems in Lee County are contained within sediments ranging in age from late Paleocene (55 million years old) to Holocene (recent) and include the Floridan Aquifer System, the Intermediate Aquifer System, and the Surficial Aquifer System.

In general, groundwater at the Bonita Springs Utilities, Inc. RO WTP injection well location becomes more mineralized with depth. Potable groundwater is found only in limited quantities within the surficial aquifer and the very upper portions of the Intermediate Aquifer System. A brief description of the geologic and hydrogeologic units encountered during construction is provided below.

3.1 Lithologic Descriptions

Sediments encountered during the construction of RO IW-1 and DZMW-1 range in age from Eocene to Holocene. A brief discussion of Holocene to Eocene age sediments and their relationship to the hydrostratigraphy of the site is presented below. The stratigraphic and hydrostratigraphic column of the site is provided in **Figure 3-1**.

3.1.1 Undifferentiated Holocene and Pleistocene Series

Quartz sand, shell beds, clay, and limestone of varying thickness make up the surficial undifferentiated Holocene and Pleistocene sediments at the site. These sediments, which comprise the Surficial Aquifer System, include the water table and Tamiami Aquifers. The water table aquifer extends to 20 feet bls at the RO injection well site. This aquifer yields moderate amounts of water and is highly utilized in the Bonita Springs area. A confining unit of silty clay divides the water table and Tamiami Aquifer. This confining layer extends between 20 feet and 50 feet bls at the site. The Tamiami Aquifer underlies the confining unit described above and extends between 50 feet and 100 feet bls. This aquifer yields moderate to large amounts of water and is also heavily utilized in the area. BSU currently utilizes the Tamiami Aquifer for its groundwater supply.

3.1.2 Miocene Series

Hawthorn Group. In Lee County, the Hawthorn Group is divided into two members. The upper member is the Peace River Formation, which is made up primarily of olive gray and phosphatic clay with interbedded sandy limestone. The top of the Peace River Formation was encountered at a depth of 100 feet bls and is approximately 310 feet thick at the site. The Sandstone Aquifer was present at the site between 100 feet and 240 feet bls. A confining unit of the Peace River Formation underlies the Sandstone Aquifer and extends from 240 feet to 410 feet bls. The lower member of the Hawthorn Group is the Arcadia Formation, which is a

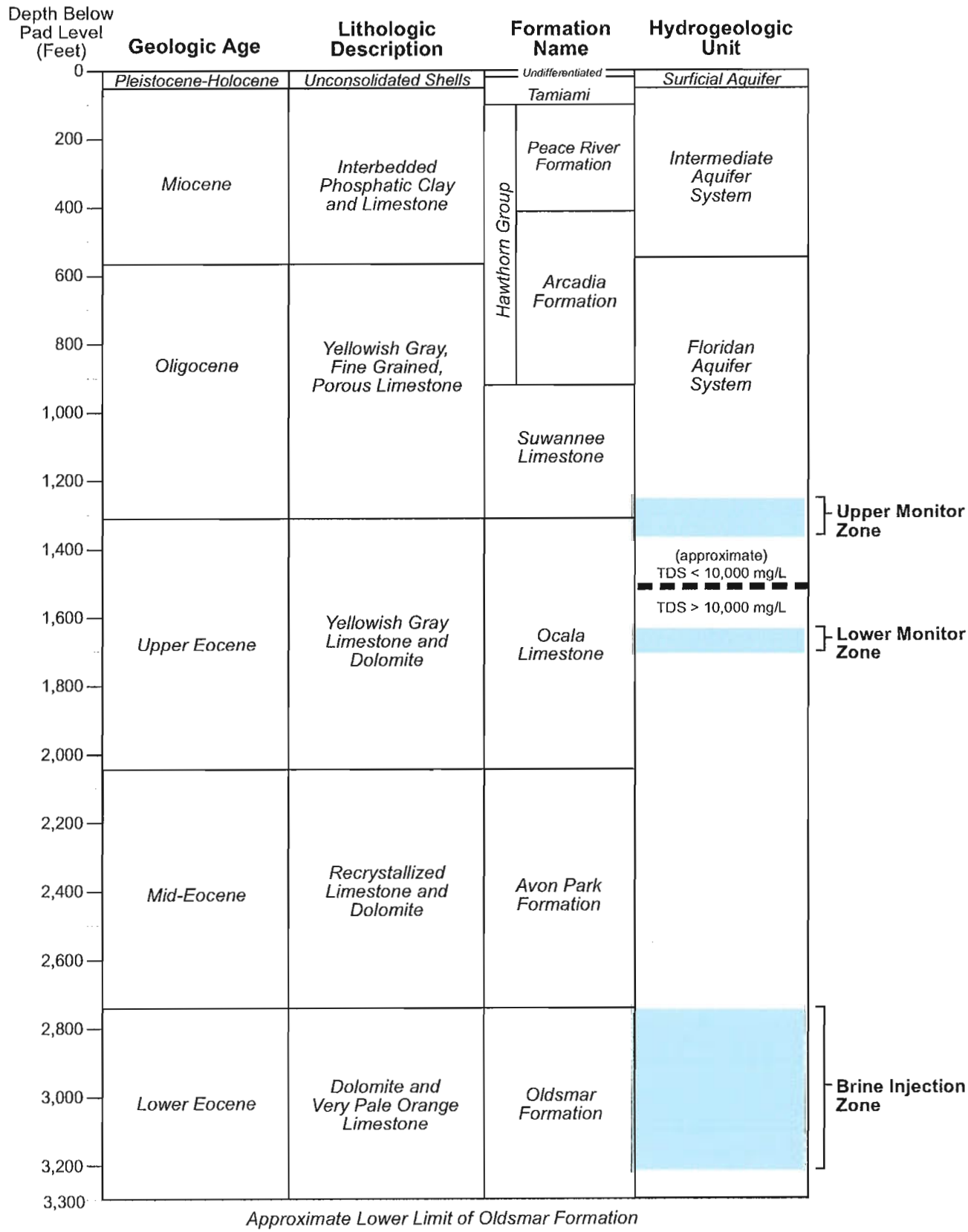

FIGURE 3-1
General Site Hydrogeology
Bonita Springs Utilities, Inc. RO IW-1

predominantly carbonate formation consisting of limestone and phosphatic limestone with interbedded phosphatic clay. The top of the Arcadia Formation was encountered at a depth of 410 feet bls. The Arcadia Formation is approximately 510 feet thick and is characterized by a low to high gamma ray signature (10 to 200 API units). Aquifers within the Hawthorn Group are collectively referred to as the Intermediate Aquifer System.

The Upper Floridan Aquifer includes the permeable strata in the lower part of the Arcadia Formation and the underlying Suwannee Limestone and the upper portion of the Ocala Limestone. The permeable portion of the Arcadia Formation is referred to locally as the Lower Hawthorn Aquifer.

3.1.3 Oligocene Series

Suwannee Limestone. The Oligocene-aged Suwannee Limestone is characterized by a yellowish gray to very pale orange, fine grained, porous limestone. The Suwannee Limestone is part of the Upper Floridan Aquifer System, and characteristically exhibits relatively high permeability and artesian pressure. The top of the Suwannee Limestone was encountered at approximately 920 feet bls and is approximately 390 feet thick at the site.

3.1.4 Eocene Series

Ocala Limestone. The Ocala Limestone consists of two units. The upper unit is generally composed of pale orange to yellowish gray foraminiferal and molluscan limestones. The lower unit is partially dolomitized and often forms an unconformable boundary with the underlying Avon Park Formation. The lower unit of the Ocala Limestone generally serves as a confining unit between the Upper Floridan and Lower Floridan Aquifers. The Ocala Limestone was encountered at a depth of 1,310 feet bls and is approximately 730 feet thick at the site.

Avon Park Formation. The Mid-Eocene Avon Park Formation occurs from a depth of 2,040 feet bls and is approximately 700 feet thick at the site. The Avon Park is characterized by yellowish-gray limestone and moderately permeable dolomitic sections. The upper portion of the Avon Park Formation typically exhibits permeability. The lower portion of the formation is often finer grained, has a lower porosity than the upper portion, and typically is confining in nature.

Oldsmar Formation. The Eocene Oldsmar Formation occurs from a depth of approximately 2,740 feet bls and is present through the total depth of the injection well to 3,206 feet bls. The Oldsmar Formation is predominately characterized by dolomite and interbedded recrystallized limestone. The Oldsmar Formation contains highly transmissive, fractured, and cavernous intervals often referred to as the "Boulder Zone." The Boulder Zone is utilized for RO concentrate wastewater injection in South Florida and comprises the injection zone for the Bonita Springs Utilities RO WTP brine concentrate.

Section 4
Hydrogeological Testing

Bonita Springs Utilities, Inc.

W102004005TPA

SECTION 4

Hydrogeological Testing

Testing during the construction of the injection well system included lithology sampling, reverse-air drilling water sampling, reverse-air drilling specific capacity testing, geophysical logging, coring, packer testing, and injection testing. Results of the testing were used to determine the lithologic and hydraulic characteristics of the geologic strata intercepted by the borehole, determine the location of the base of the Underground Source of Drinking Water, determine confining strata, and select an adequate injection zone for brine disposal. This section presents the results of testing during construction of the BSU RO WTP injection system.

4.1 Surficial Aquifer Monitor Well Water Quality

Throughout construction, water samples were collected on a weekly basis from the four Surficial Aquifer monitor wells (NE-1, NW-1, SE-1, and SW-1) surrounding the well construction area to demonstrate that the Surficial Aquifer was not impacted by construction activities. Water samples were field-analyzed for chlorides, conductivity, pH, and temperature. The water level at each well was recorded weekly during construction activities. Water quality and water level data recorded during the construction period is presented in Appendix F.

Prior to construction of the injection well, a water sample was collected from each monitor well to establish background groundwater conditions. The background chloride concentrations for the NE-1, NW-1, SE-1, and SW-1 monitor wells were 120 mg/L, 85 mg/L, 175 mg/L, and 78 mg/L, respectively. Water quality and water levels at each monitor well were variable throughout the construction period. Wells NE-1, NW-1, SE-1, and SW-1 had average chloride concentrations of 120 mg/L, 98 mg/L, 222 mg/L, and 99 mg/L, respectively. Based on these data, no adverse impacts to the surficial aquifer were observed during the well construction activities at the site.

4.2 Formation Sampling

Formation samples from RO IW-1 and DZMW-1 were collected every 10 feet from land surface to the total depth of each well and were characterized for rock type, color, consolidation, texture, porosity, and fossil appearance. Duplicate samples for RO IW-1 were submitted to the Florida Geological Survey (FGS) of Tallahassee, Florida for a more comprehensive analysis. A generalized summary of the geologic formations encountered during construction of the wells is provided in Table 4-1. Detailed lithologic descriptions of samples from RO IW-1 and DZMW-1 are provided in Appendix G.

TABLE 4-1
Generalized Lithologic Description of Drill Cuttings
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Interval (feet bls)	Generalized Description	Formation	Geologic Age
0-20	Limestone and shell fragments, poorly consolidated	Undifferentiated	Holocene to Pleistocene
20-50	Gray clay, sticky	Tamiami	Miocene
50-100	Limestone with minor shell fragments, moderately consolidated	Tamiami	Miocene
100-240	Sandy limestone and shell fragments, poorly consolidated	Peace River	Miocene
240-410	Green clay, high phosphates	Peace River	Miocene
410-920	Limestone with interbedded clay and marl, yellowish gray, minor shell fragments, phosphates	Arcadia (Hawthorn Group)	Miocene
920-1,310	Limestone, yellowish gray to very pale orange , sandy and friable	Suwannee	Oligocene
1,310-2,040	Limestone with interbedded dolomite, poorly to well consolidated, low porosity, friable to dense, foraminiferal	Ocala	Upper Eocene
2,040-2,740	Limestone and dolomite, poorly to well consolidated, low porosity, minor vugs	Avon Park	Mid-Eocene
2,740-3,206	Dolomite, dusky yellowish brown, well consolidated, dense, fractured, vuggy, microcrystalline	Oldsmar	Eocene

4.3 Pilot-Hole Water Quality

Water samples were collected at approximately 30-foot intervals during reverse-air drilling of RO IW-1 and DZMW-1. Samples were submitted to a certified laboratory and analyzed for chlorides, total dissolved solids, conductivity, and pH. Closed circulation reverse-air drilling techniques were used during pilot-hole drilling below a depth of 450 feet bls in both the injection well and dual zone monitor well. In all closed circulation systems pilot hole water quality reflects a mixture of formation fluids for the entire open borehole interval including any fresh water which may have been used to begin reverse-air drilling. The mixing of pilot hole water from multiple zones results in diluted changes in water quality with depth and does not accurately represent the water quality near the bottom of the borehole.

Analytical results from the water quality testing of RO IW-1 and DZMW-1 showed an overall increase in concentration with depth for most parameters. Laboratory total dissolved solids (TDS) data for RO IW-1 are presented in Figure 4-1. As shown in the figure, a sharp increase in TDS concentration is noted at approximately 1,800 feet bls and steadily increases beyond this depth. The reverse-air water quality suggests that the base of the USDW (10,000 mg/L interface) was encountered at approximately 1,900 feet bpl, however, this interface does not accurately represent the base of the USDW because the reverse-air water samples are diluted with closed circulation formation water. Tabulated summaries of the laboratory water quality data for RO IW-1 and DZMW-1 are presented in Table 4-2 and Table 4-3, respectively. Laboratory water quality data reports are for both wells are presented in Appendix H.

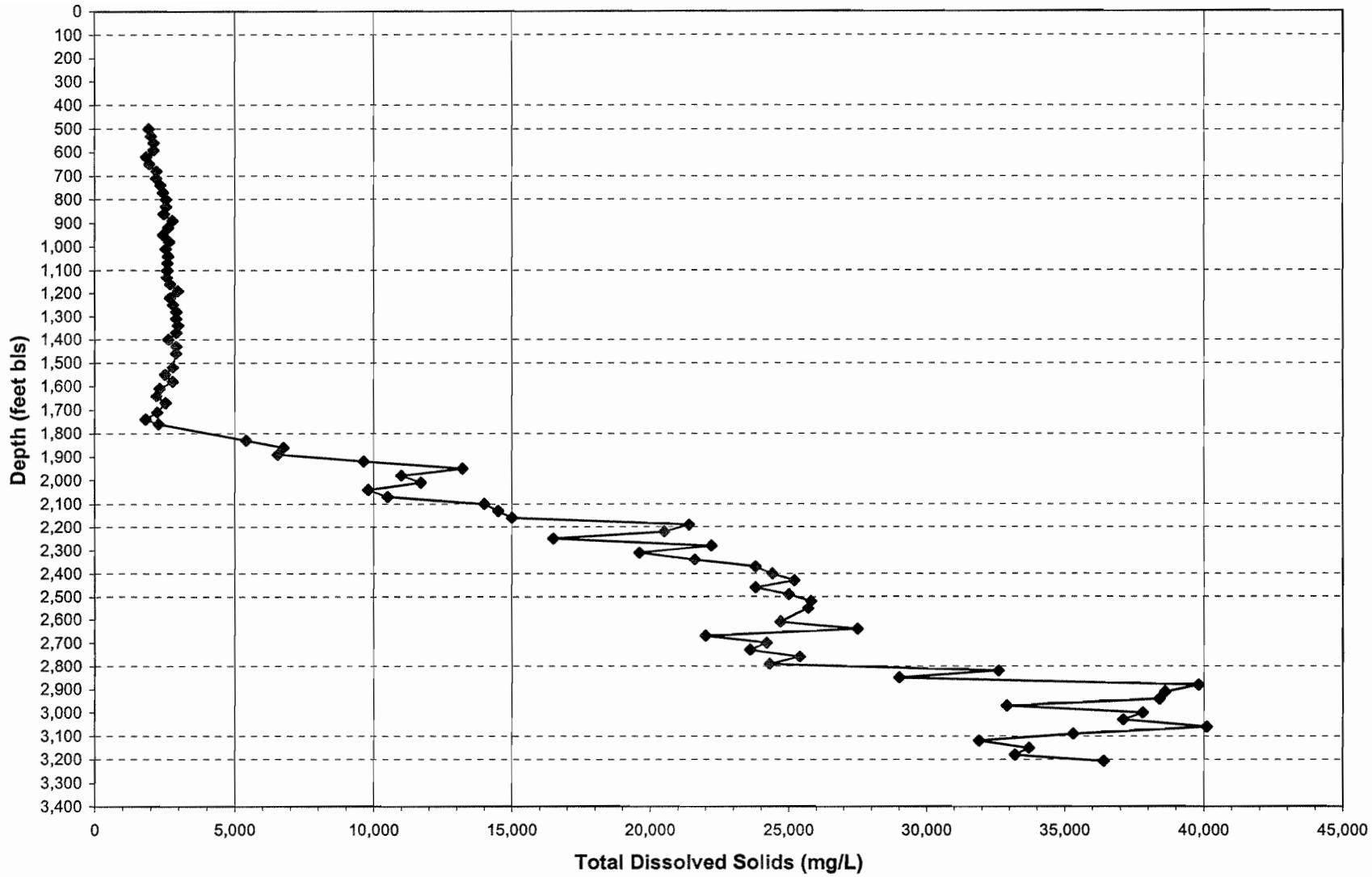

Figure 4-1

RO IW-1 Reverse-air Laboratory Water Quality Data - TDS

TABLE 4-2
Injection Well Pilot Hole Water Quality
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Pilot Hole Depth (ft bls)	Chloride (mg/L)	TDS (mg/L)	Conductivity (µmhos/cm)
500	730	1,920	3,640
530	700	2,000	3,400
560	800	2,100	3,650
590	850	2,100	3,600
620	825	1,840	3,470
650	775	1,950	3,560
680	1,150	2,200	3,660
710	650	2,190	3,930
740	900	2,340	4,080
770	950	2,430	4,260
800	975	2,550	4,310
830	1,000	2,550	4,510
860	1,020	2,470	4,620
890	1,170	2,770	4,970
920	1,050	2,620	4,600
950	975	2,430	4,360
980	1,020	2,650	4,520
1,010	1,000	2,530	4,480
1,040	1,000	2,610	4,620
1,070	900	2,590	4,600
1,100	1,050	2,590	4,770
1,130	1,050	2,580	4,740
1,160	1,070	2,680	4,740
1,190	1,200	2,960	5,220
1,220	1,120	2,690	4,780
1,250	1,070	2,790	4,780
1,280	1,120	2,910	5,020
1,310	1,120	2,900	4,920
1,340	1,150	2,970	4,940
1,370	1,070	2,910	4,920
1,400	1,150	2,630	4,910
1,430	1,170	2,910	5,010
1,460	1,170	2,900	5,060
1,520	1,200	2,780	4,900
1,550	725	2,510	4,200
1,580	1,080	2,780	4,600
1,610	900	2,320	4,040
1,640	900	2,210	3,920
1,670	875	2,530	4,050
1,710	800	2,230	3,750
1,740	650	1,820	3,350
1,760	700	2,280	3,680
1,830	2,250	5,400	11,500
1,860	5,700	6,750	12,400
1,890	5,750	6,540	12,200
1,920	4,700	9,640	14,800
1,950	6,670	13,200	19,700
1,980	5,100	11,000	16,800

TABLE 4-2 (CONTINUED)
Injection Well Pilot Hole Water Quality
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Pilot Hole Depth (ft bls)	Chloride (mg/L)	TDS (mg/L)	Conductivity (µmhos/cm)
2,010	5,650	11,700	17,500
2,040	5,200	9,800	15,700
2,070	7,000	10,500	16,000
2,100	8,750	14,000	23,000
2,130	8,380	14,500	23,700
2,160	8,000	15,000	23,800
2,190	13,500	21,400	34,000
2,220	12,200	20,500	32,400
2,250	9,620	16,500	26,500
2,280	13,200	22,200	34,100
2,310	10,500	19,600	28,600
2,340	13,500	21,600	33,000
2,370	13,500	23,800	35,000
2,400	13,800	24,400	35,300
2,430	14,000	25,200	36,300
2,460	13,200	23,800	35,000
2,490	14,800	25,000	35,600
2,520	14,000	25,800	37,500
2,550	14,500	25,700	37,300
2,610	13,500	24,700	37,500
2,640	16,500	27,500	37,300
2,670	13,500	22,000	36,200
2,700	14,500	24,200	37,500
2,730	14,500	23,600	36,100
2,760	15,000	25,400	37,700
2,790	15,000	24,300	41,800
2,820	19,000	32,600	46,900
2,850	18,500	29,000	51,400
2,880	18,500	39,800	52,300
2,910	20,000	38,600	50,700
2,940	17,000	38,400	53,300
2,970	20,500	32,900	52,400
3,000	20,000	37,800	53,200
3,030	21,500	37,100	52,900
3,060	21,500	40,100	52,800
3,090	21,000	35,300	52,200
3,120	20,500	31,900	53,000
3,150	20,000	33,700	53,300
3,180	19,000	33,200	52,900
3,206	22,000	36,400	53,000

Notes:
ft bls = feet below land surface
mg/L = milligrams per liter
µmhos/cm = micromhos per centimeter

TABLE 4-3
DZMW-1 Pilot Hole Water Quality
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Pilot Hole Depth (ft bls)	Chloride (mg/L)	TDS (mg/L)	Conductivity (µmhos/cm)
540	750	1,180	3,120
570	900	1,660	3,610
600	1,050	1,640	4,120
630	1,100	1,420	4,080
660	850	2,360	4,750
690	1,150	2,140	4,810
720	1,300	2,340	4,770
750	1,100	3,000	4,470
780	1,150	2,800	4,520
800	1,250	2,520	4,650
830	1,250	3,220	5,010
860	1,300	2,800	4,970
890	1,400	3,480	5,180
920	1,250	2,920	4,980
950	1,250	3,200	4,980
980	1,200	3,080	4,930
1,010	1,150	3,020	5,010
1,040	1,150	2,940	4,910
1,070	1,200	3,540	4,930
1,100	1,200	2,480	4,900
1,130	1,250	3,460	4,980
1,160	1,200	3,020	4,950
1,190	1,200	3,140	5,050
1,220	1,400	3,420	5,100
1,250	1,300	3,500	5,160
1,260	900	2,640	5,250
1,290	950	2,660	5,360
1,320	1,750	4,120	6,890
1,350	1,050	2,720	5,530
1,380	2,200	4,860	8,350
1,410	2,350	5,420	8,590
1,440	1,800	4,540	7,150
1,470	1,950	5,140	8,100
1,500	1,800	3,800	7,130
1,530	1,800	4,500	7,240
1,560	2,200	5,700	8,460
1,590	2,000	4,880	7,620
1,620	2,200	4,820	8,240
1,650	2,250	4,780	8,550
1,680	2,000	4,500	8,010
1,700	2,000	4,980	7,980

Notes:
ft bls = feet below land surface
mg/L = milligrams per liter
µmhos/cm = micromhos per centimeter

4.4 Air-Lift Specific Capacity Tests

Air-lift specific capacity tests were conducted at approximately 80-foot intervals from 450 feet to 3,206 feet bls at RO IW-1 to provide information on the specific capacity of the open hole interval of the well. In DZMW-1, specific capacity tests were conducted in 80-foot intervals from 450 feet to 1,680 feet bls. Each test was conducted for approximately 15 minutes, during which time water level and approximate flow rate measurements were taken to provide data for specific capacity calculations.

The air-lift specific capacity data for RO IW-1 and DZMW-1, are presented in Table 4-4 and Table 4-5, respectively. The air-lift specific capacity and normalized air-lift specific capacity data for the injection well is presented in Figure 4-2 and Figure 4-3, respectively. The normalized air-lift specific capacity data were derived by calculating the specific capacity of the given interval divided by length of the test interval. The normalized data allows an evaluation of the productivity of the borehole which is unbiased by the amount of open borehole during testing.

4.5 Formation Coring

Formation core samples were collected at selected intervals while drilling the injection well pilot hole to correlate with drill cuttings and geophysical logs, and to more thoroughly determine the hydrogeological properties of the formation. The core samples are typically collected in geological zones of suspected low permeability. Samples were obtained by a 4-inch diameter, 20-foot core barrel. A total of 13 cores were attempted between 1,500 feet and 2,323 feet bls. A generalized geologic description and recovery of each core is presented in Table 4-6.

The cores were first examined and described on site. Selected cores were then shipped to a testing laboratory for a detailed geotechnical and hydrogeological analysis. The testing laboratory, Ardaman & Associates, Inc. of Orlando, Florida (Ardaman), analyzed the selected cores for hydrogeological parameters. Eight representative core samples over the interval from 1,500 feet to 2,323 feet bls were analyzed to determine the specific gravity, total porosity, and vertical and horizontal permeability. Of these, representative core samples from 1501 feet and 1651.5 feet were analyzed to determine unconfined compressive strength.

Results of the laboratory hydraulic conductivity and porosity analyses conducted by Ardaman are summarized in Table 4-7. The analysis reports are provided in Appendix I. The laboratory analysis reports indicated that the cores varied in vertical hydraulic conductivity from 1.0×10^{-3} cm/sec to 1.1×10^{-8} cm/sec. All of the core samples sent to the laboratory exhibited low permeability. A detailed description of the cores and laboratory methods used for hydraulic conductivity and porosity determinations, along with the laboratory results are provided in Appendix I. Results of hydraulic conductivity laboratory analyses demonstrate varying degrees of confining characteristics throughout the intervals tested.

TABLE 4-4
RO IW-1 Air-Lift Specific Capacity Tests
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Test Date	Test Interval (ft bls)	Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/ft)
10/11/02	450-560	690	48	14
10/11/02	450-640	641	49	13
10/11/02	450-720	598	43	14
10/12/02	450-800	374	38	10
10/12/02	450-880	449	34	13
10/12/02	450-960	528	27	20
10/12/02	450-1,040	528	25	21
10/12/02	450-1,120	561	22	25
10/12/02	450-1,200	541	23	23
10/13/02	450-1,280	449	20	23
10/13/02	450-1,360	449	15	30
10/13/02	450-1,440	374	16	23
10/15/02	450-1,520	345	19	18
10/16/02	450-1,580	408	19	21
10/18/02	450-1,680	561	20	28
10/21/02	450-1,760	427	21	20
12/10/02	1,600-1,840	598	163	4
12/12/02	1,600-1,930	374	167	2
12/14/02	1,600-2,000	390	177	2
12/16/02	1,600-2,080	500	127	4
12/20/02	1,600-2,160	579	8.5	68
12/20/02	1,600-2,240	690	5.6	123
12/22/02	1,600-2,323	598	5.0	121
12/22/02	1,600-2,400	575	3.9	148
12/22/02	1,600-2,480	598	3.8	160
12/23/02	1,600-2,560	598	4.2	144
12/24/02	1,600-2,640	579	4.6	126
12/24/02	1,600-2,720	579	4.6	126
12/24/02	1,600-2,800	570	0.45	1,287
12/24/02	1,600-2,880	665	0.30	2,216
12/28/02	1,600-2,960	641	0.73	878
12/28/02	1,600-3,040	598	0.35	1,710
12/29/02	1,600-3,120	641	0.80	801
12/30/02	1,600-3,206	641	0.62	1,034

gpm = gallons per minute
gpm/ft = gallons per minute per foot of drawdown
ft = foot

TABLE 4-5
DZMW-1 Air-Lift Specific Capacity Tests
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Test Date	Test Interval (ft bls)	Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/ft)
3/18/03	450-560	561	17	34
3/18/03	450-640	544	27	20
3/19/03	450-720	579	39	15
3/19/03	450-800	598	41	15
3/19/03	450-880	561	30	19
3/19/03	450-960	528	21	25
3/19/03	450-1,040	598	19	31
3/19/03	450-1,120	499	17	29
3/19/03	450-1,200	513	15	35
3/28/03	450-1,360	641	49	13
3/28/03	450-1,440	598	55	11
3/28/03	450-1,520	598	41	14
3/28/03	450-1,600	528	61	9
3/29/03	450-1,680	528	102	5

gpm= gallons per minute
ft = feet
gpm/ft = gallons per minute per foot of drawdown

TABLE 4-6
RO IW-1 Generalized Core Descriptions
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Interval (ft bls)	Recovery (%)	Generalized Description
1500-1512	100	LIMESTONE, yellowish gray (5Y 8/1), fine grained, very well consolidated, low porosity
1560-1573	92	LIMESTONE, yellowish gray (5Y 8/1), very fine grained, well consolidated, low porosity, soft to friable
1650-1663	100	LIMESTONE, yellowish gray (5Y 8/1), fine grained, very well consolidated, low porosity
1700-1710	80	LIMESTONE, yellowish gray (5Y 8/1), very fine grained, well consolidated, low porosity, soft to friable
1750-1760	0	No recovery
1780-1798	44	LIMESTONE, yellowish gray (5Y 8/1), very fine grained, well consolidated, low porosity, soft to friable; trace of gray dolomite
1,900-1,910	30	LIMESTONE, yellowish gray (5Y 8/1) with stratified dark yellowish brown (10YR 4/2), very fine grained, well consolidated, low porosity, silty texture
1,930-1,940	10	LIMESTONE, moderate yellowish brown (10YR 5/4) with stratified dark yellowish brown (10YR 4/2), fine grained, well consolidated, dense; DOLOMITE, moderate yellowish brown (10YR 5/4), low porosity, dense, microcrystalline
1,982-1,992	50	LIMESTONE, moderate yellowish brown (10YR 5/4), fine grained, moderately consolidated, dense, stratified layers of microcrystalline DOLOMITE
2,047-2,059	67	DOLOMITE, dusky yellowish brown (10YR 2/2) with mottled black (N1), low porosity, dense, fractured, microcrystalline
2,125-2,142	0	No recovery
2,155-2,171	25	DOLOMITE, pale yellowish brown (10YR 6/2) with mottled black (N1), well consolidated, low porosity, dense; LIMESTONE, pale yellowish brown (10YR 6/2), well consolidated, fine grained, soft to friable
2,315-2,323	87	DOLOMITE, dusky brown (5YR 2/2), very well consolidated, low to medium porosity, dense, microcrystalline, vuggy

Notes:
Lithologic color designations are based on the *Rock-Color Chart*, distributed by the Geological Society of America, 1984.
ft = feet

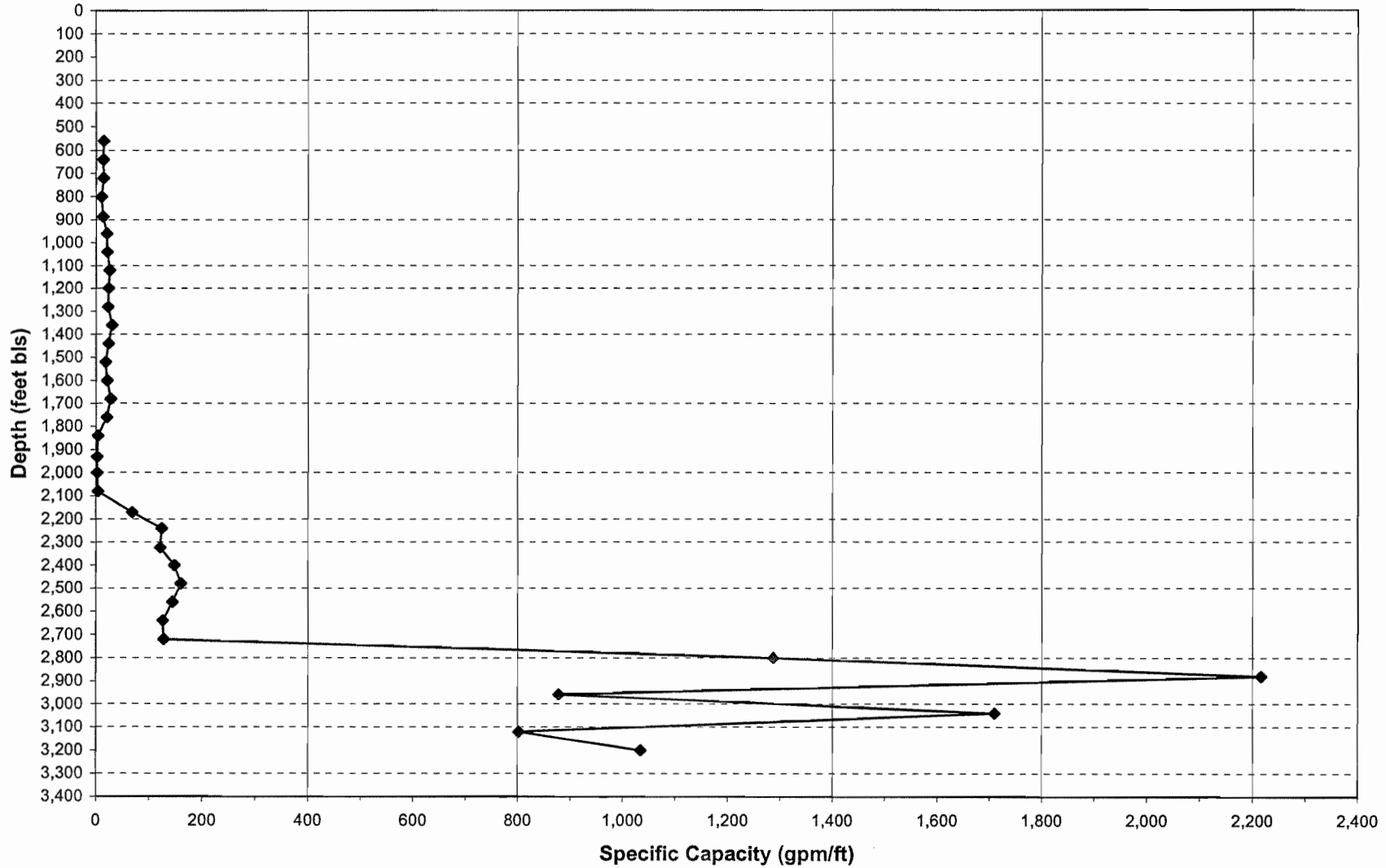

Figure 4-2

RO IW-1 Air-Lift Specific Capacity Data

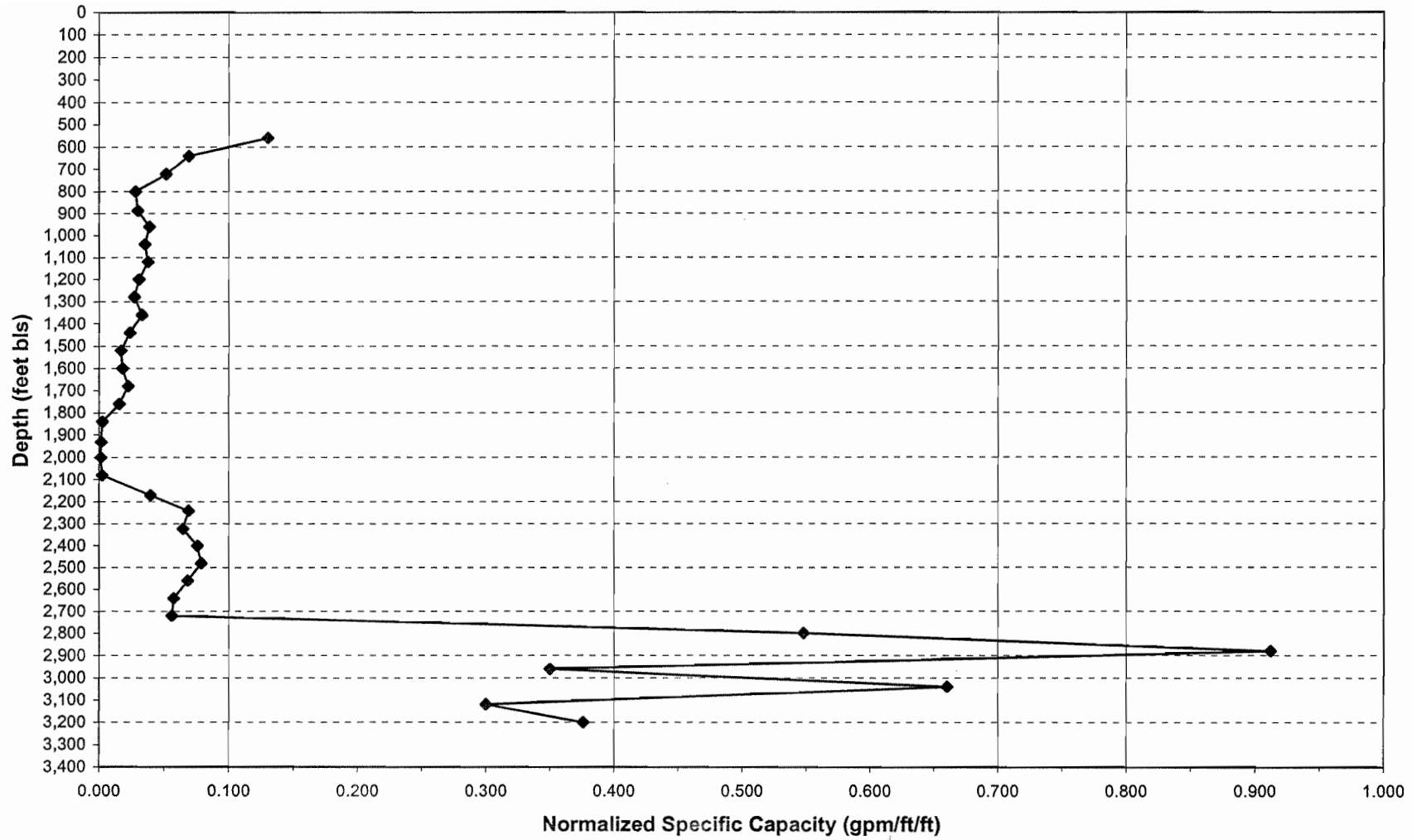

Figure 4-3

RO IW-1 Normalized Air-Lift Specific Capacity Data

TABLE 4-7
RO IW-1 Generalized Core Laboratory Analyses
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Core Depth (ft bls)	Test Specimen Orientation	Specific Gravity	Total Porosity (%)	Effective Porosity (%)	Hydraulic Conductivity (cm/sec)
1,501 to 1,502	Vertical	2.72	0.35	0.31	6.3×10^{-6}
	Horizontal		0.36		6.6×10^{-6}
1,565.5 to 1,566	Vertical	2.75	0.34	0.29	6.8×10^{-6}
	Horizontal		0.34		5.8×10^{-6}
1,651.5 to 1,652.5	Vertical	2.72	0.34	0.24	1.0×10^{-3}
	Horizontal		0.35		2.3×10^{-3}
1,706.5 to 1,706.8	Vertical	2.72	0.33	0.32	1.3×10^{-5}
	Horizontal		0.34		1.7×10^{-5}
1,787 to 1,787.5	Vertical	2.73	0.32	0.26	9.1×10^{-6}
	Horizontal		0.32		1.0×10^{-5}
1,901.5 to 1,902	Vertical	2.72	0.25	0.22	5.6×10^{-7}
	Horizontal		0.26		6.7×10^{-7}
2,049 to 2,050	Vertical	2.73	0.07	0.05	1.1×10^{-8}
	Horizontal		0.06		8.6×10^{-9}
2,318 to 2,318.5	Vertical	2.73	0.19	0.12	9.5×10^{-7}
	Horizontal		0.27		2.3×10^{-3}

cm/sec = centimeters per second
ft = feet

4.6 Packer Tests

After the completion of the injection well pilot hole, 14 straddle packer tests and two off-bottom packer tests were conducted at RO IW-1 to determine water quality and hydraulic characteristics of the open borehole. Packer Tests were conducted using both straddle and off-bottom packer tests. Fourteen straddle and two off-bottom packer test were conducted.

4.6.1 Injection Well (RO IW-1)

The straddle packer tests consist of two inflatable packers with the tested zone of the formation between the packers. The off-bottom packer tests consist of a single packer with the tested zone between the single packer and the bottom of the well bore. Each packer test consisted of pumping the tested interval at a predetermined rate and recording water level changes (drawdown) over time. Preliminary pumping tests were conducted to determine the optimal pumping rate for each interval. Since these zones were selected due to a low permeability characteristic, the pumping rates are relatively low. The testing periods were long enough to observe the drawdowns become near steady state (small water level changes) or, at a minimum, long enough to evacuate three well volumes. This was done to make sure the selected formation interval is influenced and a representative water sample was collected.

Data from the pumping portion of each packer test was used to determine the specific capacity, transmissivity, and storativity of the test interval. Water level recovery measurements were taken immediately following the pumping period to provide data for transmissivity estimates. Water levels during the packer tests and recovery periods were measured using submersible pressure transducers and recorded by an *In-Situ Hermit 3000*

series data logger. Water levels in the annular space between the well casing and the packer drop pipe were also monitored and recorded with a pressure transducer and *Hermit 3000 data logger* to determine if the upper packers were leaking, indicated by a water level change in the annular space above the packers. Pressures in the zone below the bottom packer were recorded with a device called a memory gauge. This is a pressure transducer with a mechanical timer which records pressure data over time steps. Packer test water level data plots for the test interval and annular zone are presented in Appendix J. The data plots also present the memory gauge data recorded at the packer seating depth during each test. Table 4-8 summarizes packer test flow rates, drawdown, calculated specific capacity, transmissivity, and storativity. Cooper Jacob and Theis recovery curves used to estimate aquifer parameters are presented in Appendix K.

Water samples were collected throughout the pumping portion of each packer test and analyzed for conductivity and chloride concentration to demonstrate that water quality had stabilized before collecting a final water sample for laboratory analysis. Final water samples were then collected at the end of the pumping period to evaluate water quality within the test interval to help identify the base of the USDW. Water quality data from the straddle packer tests demonstrated that the base of the USDW is located within the interval from 1,500 feet to 1,508 feet bls. Below this interval, water quality degrades quickly to TDS concentrations of approximately 30,000 mg/L. The water quality data obtained from the packer test closely correlate to the geophysical log interpretations. Water quality data for packer tests conducted at the injection well are summarized in Table 4-9. The packer test water quality laboratory analytical reports are provided in Appendix H.

4.7 Geophysical Logs

Geophysical logs were performed in the pilot hole intervals of RO IW-1 and DZMW-1 to correlate data obtained by different mechanisms and to provide additional geologic water quality information from the boreholes. The geophysical logs were compared to the formation lithology samples taken during drilling to identify formation boundaries, as well as to obtain specific geologic and hydrogeologic data pertaining to the geologic formations. This geophysical data was then utilized in the evaluation of cores and packer testing intervals, identification of specific water-producing geologic zones, and the optimum casing setting depths for each well. Reamed borehole caliper logs were also performed prior to casing installation to confirm borehole size and appropriate casing setting depths. The geophysical logs are provided in Appendix L.

4.7.1 Injection Well (RO IW-1)

Geophysical logging below 450 feet bls took place in two stages. The interval from 450 feet to 1,800 feet bls underwent geophysical logging on October 25, 2002. The interval from 1,600 feet to 3,206 feet bls underwent geophysical logging on January 2, 2003. The geophysical logging included caliper, natural gamma ray, spontaneous potential, dual induction, sonic porosity, flowmeter, fluid conductivity, fluid temperature, borehole video, and borehole televiewer. The geophysical logging activities at the injection well are summarized in Table 4-10. Video log summaries are provided as Appendix M. Copies of the video logs are provided in Appendix N.

TABLE 4-8
Summary of RO IW-1 Packer Test Results
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

PT #	Packer Test Interval	Pump Duration (hours)	Discharge (gpm)	Drawdown (feet)	Specific Capacity (gpm/ft)	Transmissivity (gpd/ft)	Transmissivity (ft^2/d)	Storativity	Analysis Method
10	~~1,150 to 1,250~~	1	45	17	2.65	---	---	---	---
9	~~1,250 to 1,350~~	1	63	18	3.50	---	---	---	---
2	1,459 to 1,500	8.5	2.25	129	0.017	6.23	0.83	0.05	CJ
						5.68	0.76		TR
1	1,508 to 1,549	6.3	0.40	75	0.005	2.16	0.29	0.01	CJ
						1.33	0.18		TR
3	1,589 to 1,620	6.8	1.75	100	0.017	7.31	0.98	0.04	CJ
						4.82	0.64		TR
4	1,634 to 1,665	5.6	45	98	0.460	180	24	0.05	CJ
						50	6.7		TR
5	1,664 to 1,720	4.8	20	94	0.210	76	10	0.04	CJ
						82	11		TR
8	1,664 to 1,749	4.4	10	51	0.196	68	9.1	0.05	CJ
						62	8.3		TR
7	1,679 to 1,705	5	4	106	0.038	12	1.6	0.05	CJ
						12	1.6		TR
6	1,726 to 1,750	5	3.5	99	0.035	12	1.6	0.04	CJ
						11	1.5		TR
14	1,813 to 1,845	17.9	0.3	110	0.003	1	0.13	0.04	CJ
						0.62	0.08		TR
12	1,949 to 1,976	4.4	4.5	57	0.078	27	3.6	0.05	CJ
						23	3.1		TR
11	2,228 to 2,255	3.7	3	43	0.07	24	3.2	0.06	CJ
						22	2.9		TR
13	2,618 to 2,645	16.1	0.6	104	0.006	1.86	0.25	0.07	CJ
						1.15	0.15		TR
15	2,723 to 3,206	3	215	0.07 [1]	3,071	---	---	---	---

CJ Cooper-Jacob Method (straight line method)
TR Theis Recovery Method
--- Value cannot be determined from data
gpm gallons per minute
ft^2/d square feet per day
gpd/ft gallons per day per foot
[1] Memory Gauge Data
--- Value could not be determined

TABLE 4-9
RO IW-1 Packer Test Water Quality Results
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Packer Test Interval (feet bls)	Conductivity (µmhos/cm)	pH (s.u.)	Chloride (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
1,150 to 1,250	8,190	7.75	2,400	934	4,740
1,250 to 1,350	9,840	7.71	3,050	708	5,880
1,459 to 1,500	8,870	7.57	2,580	576	5,090
1,508 to 1,549	17,800	7.26	6,500	687	12,200
1,589 to 1,620	25,000	7.31	10,500	848	16,300
1,634 to 1,665	41,800	7.32	13,500	1,930	27,700
1,664 to 1,720	42,200	7.22	17,000	1,870	28,800
1,664 to 1,749	41,800	7.05	15,300	1,910	28,300
1,679 to 1,705	43,800	7.22	15,300	1,910	29,900
1,726 to 1,750	45,700	7.20	16,800	2,080	31,300
1,813 to 1,845	48,800	6.32	17,000	2,420	33,100
1,949 to 1,976	48,000	7.07	18,800	2,630	33,600
2,228 to 2,255	50,500	7.00	18,200	2,640	35,400
2,618 to 2,645	34,700	6.50	15,000	1,740	24,000
2,723 to 3,206	54,700	7.25	20,500	2,640	36,900

Notes:
µmhos/cm = micromhos per centimeter
mg/L = milligrams per Liter
s.u. = standard units

TABLE 4-10
RO IW-1 Geophysical Logging Activity Summary
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Logging Event	Date	Well Progress and Casing Depth	Type of Log Run1	Purpose
1	9/30/02 10/01/02	12.25-inch pilot hole to 500 feet bls.	C, NGR, DI, SP	Determine surface casing seating depth
2	10/7/02	48.5-inch reamed hole to 455 feet bls	C, NGR	Confirm reamed hole characteristics
3	10/25/02 to 10/29/02	38-inch casing to 450 feet bls; 12.25-inch pilot hole to 1,800 feet bls	C, NGR, DI, SP, SFC, SFT, SFM, BCS/VDL, DFC, DFT, DFM, BV, BTV	Determine intermediate casing setting depth
4	12/4/02	36.5-inch reamed hole to 1,606 feet bls	C, NGR	Confirm reamed hole characteristics
5	1/2/03	30-inch casing to 1,600 feet bls; 12.25-inch pilot hole to 3,206 feet bls	C, NGR, DI, SP, SFC, SFT, SFM, BCS/VDL, DFC, DFT, DFM, BV	Determine final casing setting depth.
6	2/13/03	28.5-inch reamed hole to 2,697 feet bls; 18.5-inch reamed hole to 3,206 feet bls	C, NGR, BV	Confirm reamed hole characteristics
7	2/19/03 to 2/21/03	20-inch casing to 2,704 feet bls; 18.5-inch reamed hole to 3,206 feet bls	SFT	Logs were run following each cement stage to determine lift and water temperature
8	2/22/03	20-inch casing cemented to 273 feet bls; 18.5-inch reamed hole to 3,206 feet bls	CBL	Determine cement-to-casing bond quality
9	5/7/03	14.5-inch FRP to 2,694 feet bls; 18.5-inch reamed hole to 3,206 feet bls	C, NGR, BV	Examine final well characteristics and casing quality
10	5/15/03	14.5-inch FRP to 2,694 feet bls; 18.5-inch reamed hole to 3,206 feet bls	RTS, SFT	Examine final well mechanical integrity

Legend:
C – X-Y Caliper
NGR – Natural Gamma ray
DI – Dual Induction
SP – Spontaneous Potential
SFC – Static Fluid Conductivity
SFT – Static Fluid Temperature
SFM – Static Flow Meter
DFC – Dynamic Fluid Conductivity
DFT – Dynamic Fluid Temperature
DFM – Dynamic Flow Meter
BCS/VDL – Borehole Compensated Sonic/Variable Density Log
CBL/VDL – Cement Bond Log/ Variable Density Log
BV – Borehole Video
BTV – Borehole Televiewer
RTS – Radioactive Tracer Survey

In general, the geophysical logs correlate well to each other and to the drill cuttings, cores, and packer test data. Evaluation of the geophysical logs suggests that the interval below the intermediate casing (1,600 feet bls) to the total depth of the injection well of 3,206 feet bls can be divided into eight distinct zones. A hydrogeological interpretation of these zones is presented in **Table 4-11**.

TABLE 4-11
Hydrogeological Interpretation of Lithology Encountered
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Interval (feet bls)	Comments
1,600 to 2,040	Confinement Zone- This interval is considered to be confining. A non-uniform borehole ranging from 13-inches to 25-inches in diameter, low gamma responses of less than 15 API, and a consistent resistivity response on the dual induction log. Sonic porosity of this interval is generally low (less than 40 percent) and decreases with depth. However, an increase in porosity to 55 percent is noted near 1,700 feet bls and 1,900 feet bls.
2,040 to 2,190	Confinement Zone- This interval is considered to be confining. A non-uniform borehole ranging from 13-inches to 19-inches in diameter (but relatively gauged between 2,050 feet and 2,080 feet bls), low gamma responses of less than 20 API, a sudden increase in induction resistivity is noted at 2,050 feet bls but then decreases and remains relatively consistent beyond this depth. Sonic porosity is very low (less than 5 percent) near 2,040 feet bls and 2,070 feet bls but then increases to 30 percent beyond this depth.
2,190 to 2,280	Confinement Zone- This interval is considered to be confining. A non-uniform borehole ranging from 14-inches to 19-inches in diameter, low gamma responses of less than 15 API, a consistent resistivity response as shown on the dual induction log, and a low sonic porosity of approximately 25 percent.
2,280 to 2,360	Confinement Zone- This interval is considered to be confining. A relatively gauged borehole of 14-inches in diameter with low gamma responses of 10 API or less. A sudden increase in induction resistivity is noted near 2,320 feet bls with slight to modest divergences between long and short normal resistivity. Sonic porosity is generally less than 25 percent through this interval.
2,360 to 2,560	Confinement Zone- This interval is considered to be confining. The borehole diameter gradually increases from 14-inches to 19-inches in diameter with increasing depth. Gamma responses are generally at or near 10 API. A slight but gradual decrease in induction resistivity is noted between 2,360 and 2,500 feet bls. Resistivity increases beyond 2,500 feet bls. Sonic porosity is generally less than 25 percent. However, a sudden increase in porosity to 40 percent is noted at 2,540 feet bls and 2,550 feet bls.
2,560 to 2,730	Confinement Zone- This interval is considered to be confining. A non-uniform borehole ranging from 14-inces to 23-inches in diameter with low gamma responses near 10 API (an isolated increase to 30 API is noted at 2,600 feet bls). A strong divergence between long and short-normal resistivity is noted at 2,600 feet bls with a gradual decrease in resistivity beyond this depth. The sonic log indicates a sudden increase in porosity to 75 percent at 2,600 feet bls but then decreases less to 25 percent between 2,620 feet and 2,660 feet bls. Porosity then increases to 40 percent beyond 2,600 feet bls.
2,730 to 3,050	Main Injection Zone- This highly transmissive interval is considered to be the injection zone. A highly fractured and cavernous borehole ranging from 13-inches to 42-inches in diameter, gamma responses are generally at 10 API with elevated counts of 20 to 50 API between 2,800 and 2,970 feet bls. The dual induction log shows several strong divergences between long and short normal resistivity throughout this interval. Sonic porosity increases to 100 percent at several points and the flow log indicates that the majority of borehole flow is produced from this zone.
3,050 to 3,206	Lower Injection Zone- This interval is considered to be slightly transmissive and serves as the lower portion of the injection zone. A relatively gauged borehole of 13-inches in diameter with gamma counts of less than 20 API. Several moderate divergences between long and short-normal resistivity are noted in this interval. The sonic porosity is very low (less than 5 percent) between 3,050 feet and 3,120 feet bls but suddenly increases to 75 percent near 3,150 feet bls, then decreases to less than 25 percent beyond this depth. The flow log indicates minimal borehole flow is produced from this zone.

4.7.2 Dual Zone Monitoring Well (DZMW-1)

In general, the geophysical logs correlate well to the other logs for the injection well and the drill cuttings to a depth of 3,206 feet bls. Geophysical logging conducted during the construction of the well DZMW-1 is summarized in Table 4-12. A video log summary is provided in Appendix M. A copy of the video log is provided in Appendix N.

TABLE 4-12
DZMW-1 Geophysical Logging Activity Summary
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

Logging Event	Date	Well Progress and Casing Depth	Type of Log Run	Purpose
1	3/12/03	12.25-inch pilot hole to 505 feet bls	C, NGR, DI, SP	Determine shallow casing setting depth
2	3/15/03	34.5-inch reamed hole to 455 feet bls	C, NGR	Confirm reamed hole characteristics
3	3/21/03	12.25-inch pilot hole to 1,250 feet bls	C, NGR, DI, SP, SFC, SFT, SFM, BCS/VDL, DFC, DFT, DFM	Confirm properties of shallow monitoring zone
4	3/22/03	22.5-inch reamed hole to 1,252 feet bls	C, NGR	Confirm reamed hole characteristics
5	3/31/03	14.75-inch borehole to 1,620 feet bls; 12.25-inch borehole to 1,700 feet bls	C, NGR, DI, SP, SFC, SFT, SFM, BCS/VDL, DFC, DFT, DFM	Confirm properties of deep monitoring zone
6	4/14/03 to 4/16/03	6-inch FRP to 1,630 feet bls; 12.25-inch borehole to 1,700 feet bls	C, NGR, BV	Confirm final deep zone characteristics

Legend:
C – X-Y Caliper
NGR – Natural Gamma Ray
DI – Dual Induction
SP – Spontaneous Potential
SFC – Static Fluid Conductivity
SFT – Static Fluid Temperature
SFM – Static Flow Meter
DFC – Dynamic Fluid Conductivity
DFT – Dynamic Fluid Temperature
DFM – Dynamic Flow Meter
BCS/VDL – Borehole Compensated Sonic/Variable Density Log
CBL/VDL – Cement Bond Log/ Variable Density Log
BV – Borehole Video
RTS – Radioactive Tracer Survey

4.8 Summary of USDW Location

The reverse-air water quality samples, the packer test water quality samples and the resistivity and dual induction geophysical logs were used to determine the location of the base of the USDW, as mentioned previously. Waters with concentrations less than 10,000 mg/L TDS are defined as a USDW by state and federal regulations, and are provided protection for their potential as a future source of drinking water.

The results from the reverse-air water samples during drilling identified a noticeable deterioration of water quality near 1,800 feet bls and beyond, suggesting that the USDW is located at or above this depth. The packer test water quality suggested that the USDW existed between 1,500 feet and 1,508 feet bls. Finally, while the borehole was static for a period of time allowing for natural water quality stratification, a combination of the resistivity and dual induction geophysical logs were utilized to locate the USDW at a more precise depth of 1,510 feet bls. A plot of this combination log is provided in Appendix O.

It was not unexpected that the reverse-air water quality data was not accurate in identifying the base of the USDW. As stated earlier in this section, the water samples collected during pilot hole drilling represent a mixture of formation water from the entire open borehole. The mixing of pilot hole water from multiple zones resulted in diluted changes in water quality with depth.

4.9 Selection of Injection and Monitoring Zones

All of the data collected were used to determine the final casing setting depths of all wells. As the injection zone was identified, the upper and lower monitoring zones were also identified which satisfied FDEP's UIC construction permit requirements. All of the selected formation injection and monitoring zones were approved by FDEP prior to cementing any final casings in place.

4.9.1 Injection Zone of RO IW-1

The formation samples, geophysical logs, and packer test data show that a distinct change in hydrogeology occurs at a depth of approximately 2,740 feet bls. The zone below 2,740 feet bls consists of hard, vuggy dolomite with extensive fractures and large cavernous zones. This zone also shows a rapid deterioration of water quality and increase in production capacity. The zone immediately above 2,740 feet bls consists of soft, low porosity limestone with good confining characteristics, capable of preventing vertical fluid migration from the injection zone. The highly fractured and transmissive zone between 2,740 feet and 3,206 feet bls was determined to be the injection zone. After reviewing of all the available data, it was decided to set the final casing at a depth of 2,700 feet bls. This placed the final casing approximately 40 feet above the extensive fracturing present at 2,740 feet bls.

4.9.2 Upper Monitoring Zone of DZMW-1

The FDEP construction permit requires that the upper monitoring zone be completed into the lowermost permeable zone above the base of the USDW. Since the USDW was detected at approximately 1,510 feet bls, the lowermost permeable zone within the USDW was located at approximately 1,300 feet bls. Therefore, the upper monitoring zone was completed with an open interval between 1,250 feet and 1,350 feet bls. The water quality located within and below this zone can be seen in the geophysical dual induction and resistivity combination log presented in Appendix O.

4.9.3 Lower Monitoring Zone of DZMW-1

The FDEP construction permit requires that the lower monitoring zone be completed into the first permeable zone below the base of the USDW. The first permeable zone below the base of the USDW was located at approximately 1,630 feet bls. Well DZMW-1 was completed with an open interval between 1,630 feet and 1,700 feet bls. The water quality of this zone can be seen in the geophysical dual induction and resistivity combination log presented in Appendix O.

4.10 Background Water Sampling

Background water quality samples were collected from each well and analyzed for primary and secondary drinking water standards and FDEP's minimum criteria.

4.10.1 Injection Well (RO IW-1)

After construction on the well was completed, RO IW-1 was sampled for background water quality on February 27, 2003, after fully developing the well to establish true background conditions. The water sample was analyzed for all primary and secondary drinking water standards and FDEP's minimum criteria. The background sample had a TDS concentration of 36,000 mg/L, demonstrating that the injection zone is located below the base of the USDW. Ambient water quality data for RO IW-1 is summarized in Table 4-13. The certified laboratory results final report is contained in Appendix P.

TABLE 4-13
Ambient Water Quality Data
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

State Primary Drinking Water Standards: Inorganic				
Parameter	MCL[1] (mg/L)	RO IW-1	DZMW-1 (Upper)	DZMW-1 (Lower)
Antimony	0.006	<0.003	<0.003	<0.003
Arsenic	0.05	0.01	<0.001	0.001
Barium	2	<0.003	<0.003	<0.003
Beryllium	0.004	0.0024	0.0003	0.0016
Cadmium	0.005	<0.001	<0.001	<0.001
Chromium	0.1	0.025	<0.001	<0.001
Cyanide	0.2	<0.005	<0.005	<0.005
Fluoride	4	0.83	1.8	6.4
Lead	0.015	0.006	<0.001	0.001
Mercury	0.002	<0.001	<0.001	<0.001
Nickel	0.1	0.051	<0.002	<0.002
Nitrate (as N)	10	0.01	<0.01	<0.01
Nitrite (as N)	1	0.01	<0.01	<0.01
Selenium	0.05	<0.001	0.006	0.004
Sodium	160	15,000	1,640	9,290
Thallium	0.002	<0.002	<0.002	<0.002
State Primary Drinking Water Standards: Volatile Organics				
Parameter	MCL[1] (µg/L)	RO IW-1	DZMW-1 (Upper)	DZMW-1 (Lower)
1,1-Dichloroethene	7	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.3	<0.3	<0.3
1,1,2-Trichloroethane	5	<0.3	<0.3	<0.3
1,2-Dichloroethane	3	<0.2	<0.2	<0.2
1,2-Dichloropropane	5	<0.3	<0.3	<0.3
1,2,4-Trichlorobenzene	70	<0.5	<0.5	<0.5
Benzene	1	<0.5	<0.5	<0.5
Carbon Tetrachloride	3	<0.3	<0.3	<0.3
Cis-1,2-Dichloroethylene	70	<0.2	<0.2	<0.2
Dichloromethane (Methylene Chloride)	5	<0.5	<0.5	<0.5
Ethylbenzene	700	<0.5	<0.5	<0.5
Monochlorobenzene (Chlorobenzene)	100	<0.5	<0.5	<0.5
o-Dichlorobenzene (1,2-Dichlorobenzene)	600	<0.5	<0.5	<0.5
p-Dichlorobenzene (1,4-Dichlorobenzene)	75	<0.5	<0.5	<0.5
Styrene	100	<0.5	<0.5	<0.5
Tetrachloroethylene	3	<0.2	<0.2	1

TABLE 4-13 (CONTINUED)
Ambient Water Quality Data
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

State Primary Drinking Water Standards: Volatile Organics				
Parameter	**MCL[1] (µg/L)**	**RO IW-1**	**DZMW-1 (Upper)**	**DZMW-1 (Lower)**
Toluene	1,000	2.2	<0.5	1.3
Trans-1,2-Dichloroethylene	100	<0.5	<0.5	<0.5
Trichloroethylene	3	<0.2	<0.2	<0.2
Vinyl Chloride	1	<0.5	<0.5	<0.5
Xylenes (Total)	10,000	<0.5	<0.5	<0.5
State Primary Drinking Water Standards: Pesticides and PCB's				
Parameter	**MCL[1] (µg/L)**	**RO IW-1**	**DZMW-1 (Upper)**	**DZMW-1 (Lower)**
2,3,5-TP (Silvex)	50	<0.25	<0.25	<0.25
2,4-D	70	<1	<1	<1
Alachlor	2	<0.2	<0.2	<0.2
Atrazine	3	<0.06	<0.06	<0.06
Benzo(a)pyrene	0.2	<0.1	<0.1	<0.1
Carbofuran	40	<0.5	<0.5	<0.5
Chlordane	2	<0.05	<0.05	<0.05
Dalapon	200	<1	<1	<1
Di(2-ethylhexyl)adipate	400	<0.3	<0.3	<0.3
Di(2-ethylhexyl)phthalate (bis(2-ethylhexyl)phthalate)	6	12	<1	<1
Dibromochloropropane	0.2	<0.005	<0.005	<0.005
Dinoseb	7	<0.5	<0.5	<0.5
Dioxin	0.00003	<0.0000031	<0.000001	<0.0000012
Diquat	20	<1	<1	<1
Endothall	100	<20	<20	<20
Endrin	2	<0.1	<0.1	<0.1
1,2-Dibromoethane (Ethylene Dibromide – EDB)	0.02	<0.005	<0.005	<0.005
Parameter	**MCL[1] (µg/L)**	**RO IW-1**	**DZMW-1 (Upper)**	**DZMW-1 (Lower)**
Glyphosate (Roundup)	700	<10	<10	<10
Heptachlor	0.4	<0.08	<0.08	<0.08
Heptachlor Epoxide	0.2	<0.1	<0.1	<0.1
Hexachlorobenzene	1	<0.05	<0.05	<0.05
Hexachlorocyclopentadiene	50	<0.2	<0.2	<0.2
Lindane (G-BHC)	0.2	<0.06	<0.06	<0.06
Methyoxychlor	40	<0.05	<0.05	<0.05
Oxamyl (Vydate)	200	<0.5	<0.5	<0.5
Pentachlorophenol	1	<0.1	<0.1	<0.1
Picloram	500	<0.75	<0.75	<0.75
Polychlorinated Biphenyl (PCB)	0.5	<0.2	<0.2	<0.2
Simazine	4	<0.07	<0.07	<0.07
Toxaphene	3	<0.05	<0.5	<0.5
State Primary Drinking Water Standards: Radionuclides				
Parameter	**MCL[1] (pCi/L)**	**RO IW-1**	**DZMW-1 (Upper)**	**DZMW-1 (Lower)**
Radium 226[2]	5 pCi/L3[2]	15.9 ± 0.6	4.1± 0.3	8.8 ± 0.5
Radium 228[2]		1.7 ± 0.7	<0.9 ± 0.5	<0.8 ± 0.5
Gross Alpha	15 pCi/L	153 ± 63.7	27.9 ± 7.7	<46.2 ± 28.6
State Secondary Drinking Water Standards				
Parameter	**MCL[1] (mg/L)**	**RO IW-1**	**DZMW-1 (Upper)**	**DZMW-1 (Lower)**
Aluminum	0.2	<0.005	0.059	0.006
Chloride	250	19,500	2,450	14,700
Copper	1	0.009	<0.001	<0.001

TABLE 4-13 (CONTINUED)
Ambient Water Quality Data
Bonita Springs Utilities RO WTP Deep Injection Well and Facilities Engineering Report

State Secondary Drinking Water Standards				
Parameter	MCL[1] (mg/L)	RO IW-1	DZMW-1 (Upper)	DZMW-1 (Lower)
Fluoride	2	0.83	1.8	6.4
Iron	0.3	1.13	<0.006	0.014
Manganese	0.05	0.037	0.02	0.021
Silver	0.1	0.004	<0.001	<0.001
Sulfate	250	2,640	804	1,630
Zinc	5	0.009	0.005	0.009
Color	15 PCU	32	<1	<1
Odor	3 TON	<1	140	140
pH	6.5-8.5	7.02	7.77	7.47
Total Dissolved Solids (TDS)	500	34,300	5,400	26,000
Foaming Agents (MBAS)	0.5	<0.05	<0.05	<0.05
Microbiological				
Parameter	MCL[1] (CFU)	RO IW-1	DZMW-1 (Upper)	DZMW-1 (Lower)
Total Coliform	4	<1	<1	<1
Fecal Coliform	1	<1	<1	<1

Notes:
1 Maximum Contaminant Level (MCL) per Rules 62-550.310, FAC.
2 The MCL for Radium 226 and Radium 228 combined is 5 pCi/L
-Concentrations expressed in milligrams/liter (mg/L) or micrograms/liter (µg/L) unless otherwise indicated.
Abbreviations:

pCi/L:	Picacurries/liter	TON:	Threshold Odor Number
MDL:	Minimum Detection Limit	PCU:	Platinum Cobalt Units
MFL:	Million Fibers/Liter > 10 um.	CFU:	Colony Forming Units/100 mL
µg/L:	Micrograms/Liter	ND:	Non Detect

4.10.2 Dual Zone Monitoring Well (DZMW-1)

Both monitoring zones of DZMW-1 were sampled for background water quality analyses on April 14, 2003. Before sampling, both zones were fully developed. The samples were analyzed for primary and secondary drinking water standards and FDEP's minimum criteria. The background sample for the upper monitoring zone had a TDS concentration of 5,400 mg/L, demonstrating that the monitoring zone is located slightly above the base of the USDW. The TDS concentration of the lower monitoring zone sample was 26,000 mg/L, demonstrating that the lower monitoring zone is located below the base of the USDW. Water quality data for the upper and lower zones of DZMW-1 is summarized in Table 4-13 (presented previously). The certified laboratory results final reports for both DZMW-1 monitoring zones are presented in Appendix P.

4.11 Injection Testing

After the injection well wellhead was completed, a 12-hour injection test was conducted on November 6, 2003 to evaluate the hydraulic characteristics of the injection well and verify the integrity of the confining units between the injection zone and the specific monitoring intervals of DZMW-1.

The injection test was conducted at an average flow rate of approximately 5,100 gpm of brackish water from the new RO wellfield. Flowrate and injection pressure at RO IW-1 and the water level pressure in both zones of the Dual Zone monitoring well were monitored and recorded for the 1-day background period, 12-hour injection test, and a 3-day recovery/background period. The associated aquifer water pressures of the injection well and monitoring wells for the period from approximately 1 day prior to starting the injection test through approximately 3 days after completion of the injection test is presented in Figure 4-4. The injection test data is provided in Appendix Q.

Prior to injection testing the injection well wellhead was under static artesian pressure. To minimize any "water hammer" effects, the flow from the production wells to the injection well was gradually increased over a period of 4 hours to the target flow rate of 5,100 gpm. The flow was measured by a Panametrics ultrasonic flowmeter and checked with the individual production well flow meters. The recorded static wellhead pressure in RO IW-1 was approximately 12.5 psi prior to restarting the injection test. The 5,100 gpm flow rate was maintained for approximately 12 hours. During the test, the maximum injection pressure was approximately 46 psi during the 5,100 gpm flow rate portion of the injection test. At the end of the 12-hour injection test, the production wells were turned off one at a time to minimize potential damage to the injection well. Injection well wellhead pressures dropped to a new background pressure of 23.5 due to density differences from injecting lower saline water.

No noticeable pressure changes were evident in the lower monitoring zone of DZMW-1 during the injection test. The upper monitoring zone showed fluctuations in pressure (drawdown) for the period of the entire test. The reason for this pressure change is that a brackish water production well (Well 25) exists slightly greater than 500 feet away from the Dual Zone monitoring well. Evidence of drawdown in the upper monitoring zone during the background data prior to the injection test was due to Well 25 being pumped to collect water quality samples. Evidence of drawdown during the injection test was also from Well 25 being pumped to provide a portion of the 5,000 gpm injected water supply. Well 25 is constructed with an open borehole between 816 feet to 1,040 feet bls. The upper monitoring zone is constructed to monitor between 1,250 feet to 1,350 feet bls. This data shows that the upper zone pressure is hydraulically influenced by Well 25 pumping. Individual plots of the RO IW-1 wellhead pressure, upper zone pressure, and lower zone pressures, each with barometric data and tidal data are located in Appendix Q.

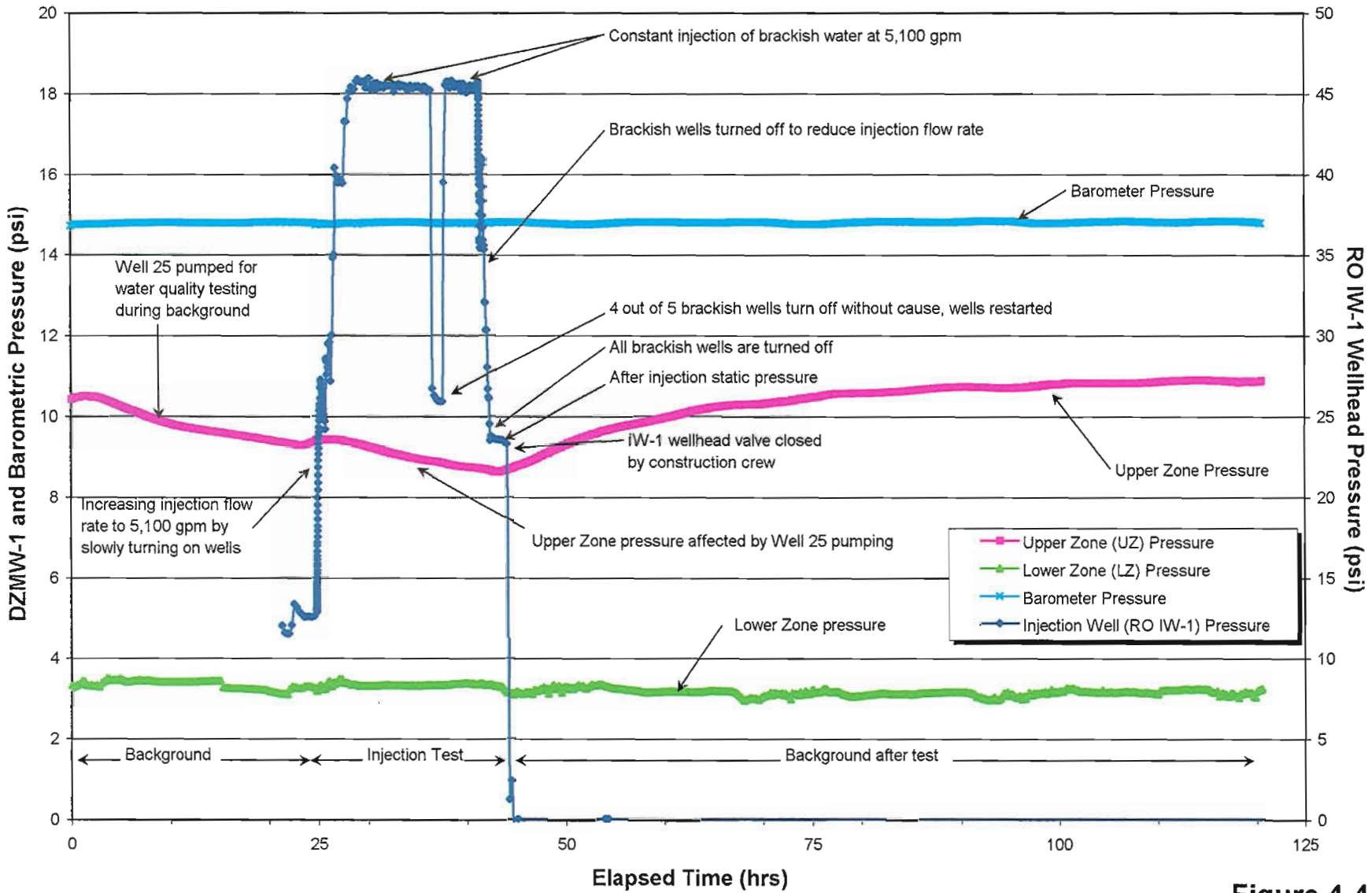

Figure 4-4

RO IW-1 Injection Test Data

Section 5
Mechanical Integrity Testing

Bonita Springs Utilities, Inc.

W0020040005T PA

SECTION 5

Mechanical Integrity Testing

Mechanical Integrity Testing (MIT) was conducted during the construction of the injection well RO IW-1 and monitor well DZMW-1. Testing of RO IW-1 was performed to evaluate the mechanical integrity of the well in accordance with standards set forth in Chapter 62-528, FAC. The MIT conducted on RO IW-1 included casing pressure tests, a video survey of the casing and borehole, temperature and cement bond geophysical logs, and radioactive tracer testing. The MIT conducted on DZMW-1 included a casing pressure test and a video survey of the final casing and borehole. Testing results demonstrated that both wells meet the requirements for internal and external MIT as set forth in Chapter 62-528.300(6), FAC.

5.1 MIT Results for the Injection Well (RO IW-1)

Several methods were conducted on RO IW-1 to test the mechanical integrity of the well. Mechanical integrity testing (MIT) included, pressure testing of the casings and annular zone, a video survey, a cement bond log, a temperature log, and radioactive tracer survey logs. The results of the testing is provided in the sections below.

5.1.1 Casing Pressure Tests

A total of three pressure tests were conducted on the injection well. These include the final 20-inch diameter casing string, 14.5-inch diameter FRP tubing, and the annular zone between them. The test results are discussed below and the pressure data sheets are provided in Appendix R. Pressure gauge calibration certificates are also presented in Appendix R.

5.1.1.1 Final 20-inch Diameter Steel Casing Pressure Test

The first pressure test was conducted on February 26, 2002, on the final 20-inch diameter steel casing prior to installing the FRP tubing. The pressure test began at 105.25 psi and dropped to 104 psi after the 120-minute testing period. Jack Myers/FDEP was onsite to witness the first 60 minutes of the testing period. After 60 minutes, the pressure dropped to 104.75 psi, a change of 0.47 percent, below the 5 percent loss over a 60-minute period allowable by FDEP. The pressure test continued for an additional 60 minutes. At the conclusion of the 120-minute test, the pressure dropped to 104 psi. The pressure loss of 1.25 psi resulted in a change of 1.2 percent over the entire 120-minute testing period.

5.1.1.2 Annular Zone Pressure Test

On March 3, 2003, a pressure test was successfully conducted on the annular zone of RO IW-1 following the installation of the YBI packer and FRP tubing. The wellhead pressure was monitored for a 120-minute period with a calibrated 200 psi pressure gauge. Pressure readings were recorded manually every minute during the 120-minute test. During the test, the pressure increased from 107 psi to 107.75 psi. The 0.75 psi gain (a gain of 0.70 percent)

over 120 minutes was within the ± 5 percent limit allowed by FDEP for a 60-minute pressure test.

5.1.1.3 Installed 12-inch Diameter FRP Injection Tubing Pressure Test

On May 8, 2003, a pressure test was successfully conducted on the installed FRP injection tubing. The pressure test was conducted with an inflatable packer set at 2,679 feet bls. The casing was pressurized with water to 106.25 psi using a high-pressure pump. During the test, the pressure increased from 106.25 psi to 107 psi during the 120-minute test. The 0.75 psi gain (a gain of 0.71 percent) was within the ± 5 percent limit allowed by FDEP for a 60-minute test.

5.1.2 Video Survey

A color camera video survey was conducted on the completed injection well (RO IW-1) on May 7, 2003. The video survey was conducted to a depth of 3,204 feet bls. The video log summary sheet is provided in Appendix M.

The survey showed no inconsistencies, and the FRP tubing appeared to be in good condition. The base of the 20-inch diameter casing was identified at a depth of 2,704 feet bls. The YBI packer was encountered at a depth of 2,694 feet bls. A broken off piece of 4-inch diameter PVC casing was identified at 3,163 feet bls and continued to the total depth of the injection well. The video survey was terminated after logging up the completed borehole and into the base of the 20-inch diameter casing.

5.1.3 Geophysical Logging

Cement bond and high resolution temperature logs were performed on injection well RO IW-1 by Youngquist Brothers, Inc., on February 22, 2003 and May 15, 2003, respectively.

The CBL was conducted to assess the quality of the cement-to-casing bond of the final casing of RO IW-1. The log was performed before cementing the upper 273 feet of the 20-inch diameter casing to allow the tool to be calibrated to uncemented casing (above 273 feet bls) and cemented casing (below 273 feet bls). The CBL demonstrated an adequate cement bond exists around the final 20-inch diameter casing from 2,690 feet bls to the base of the logged interval. Above 273 feet bls, the cement bond log confirms that the casing was uncemented at the time of the logging event. The interval from land surface to 273 feet bls was cemented following completion of the cement bond log. The cement bond log is provided in Appendix L.

The temperature log (run from land surface to a total depth of 3,206 feet bls) indicated a temperature between 80.6 °F and 101.1 °F from 20 feet to 3,206 feet bls. Results of temperature logging give no indication of leaks in the 14.5-inch diameter FRP tubing.

5.1.4 Radioactive Tracer Survey

5.1.4.1 Summary of Testing

On May 15, 2003, an external RTS was performed on RO IW-1 after pumping 47,000 gallons of potable water into the well. The survey was conducted by Youngquist Brothers, Inc., in the presence of Mr. Dan Jablonski (CH2M HILL).

In preparation for RTS logging, a gamma ray log was conducted to establish background conditions on the entire well. Using the Casing Colar Locator (CCL), the base of the 14.5-inch diameter FRP and top of the positive seal packer was delineated at 2,694 feet bls. The base of 20-inch diameter casing was identified at 2,704 feet bls. The base of the FRP and/or 20-inch diameter casing was identified by using the CCL during each logging run throughout the RTS.

One static test and two dynamic tests were performed. The tracer fluid (Iodine 131[I^{-131}]) was placed in an RTS tool equipped with an ejector, upper, middle, and lower gamma ray detectors, and a CCL. The upper (top) gamma ray detector (GRT) is located 10.5 feet above the ejector on the tool. The middle (GRM) and lower (bottom) (GRB) gamma ray detectors are located 3.0 feet and 12.3 feet, respectively, below the ejector. A schematic diagram of the radioactive tracer tool used during the test is presented in Figure 5-1.

During the static test, the ejector was located 1 foot below the base of the 20-inch diameter casing. For the dynamic tests, the ejector was positioned 5 feet above the base of the casing at a depth of 2,699 feet bls. For each test, the RTS tool was placed in time drive for 1 minute prior to ejecting tracer to ensure the detectors were functioning properly. Following the one-minute detector test, 1 milliCurie (mCi) of I^{-131} was ejected under both static and dynamic conditions. Gamma ray activity was monitored for 60 minutes after release of the tracer during the static and first dynamic test. Gamma ray activity was monitored for 30 minutes during the second dynamic test. Following each monitoring period, a log out of position was performed to 200 feet above the highest point at which elevated gamma counts were detected. This was followed by a flush of potable water (approximately 85 gpm) for a period of 15 to 20 minutes. The two dynamic tests were performed at injection rates of 42 gpm and 43 gpm, respectively, of potable water.

The background gamma log that was run from ground level to a total depth of 3,206 feet bls is identified at the bottom of the RTS log sheet as BACKGROUND GAMMA RAY. Following the background gamma log, a log was performed to verify the base of the 14.5-inch diameter FRP tubing and 20-inch diameter casing. This log pass is identified on the log sheet as CASING TIE-IN. The log verified the base of the FRP at 2,694 feet bls. The base of the 20-inch diameter casing was not located by the CCL during the CASING TIE-IN log. However, the base of the 20-inch casing was identified at 2,704 feet bls during the DYANMIC #1 L.A.F log.

5.1.4.2 Static Test – Ejection No. 1

The first static test began by positioning the ejector 1 foot below the base of the 20-inch diameter casing at a depth of 2,705 feet bls. After 1 minute of time drive logging to ensure that the detectors were functioning properly, 1 mCi of tracer was ejected. The output of the three gamma detectors during the 1-minute background monitoring and the hour following ejection of 1 mCi of tracer is displayed in log file STATIC PASS. Increased gamma ray activity was not evident at any of the three detectors indicating no movement of the I^{-131} in the casing.

After the first static test, a log out of position was conducted. The output of the three gamma detectors and the CCL during the log out of position is displayed in the log file titled STATIC L.O.P. Elevated gamma activity related to staining of the casing is evident on the

log out of position. Slight residual staining is evident on the middle and bottom detectors. Gamma ray activity is similar to the background gamma ray log above a depth of 2,490 feet bls.

As shown on log file titled STATIC L.A.F., the log out of position following the casing flush indicates that little residual stain from the I^{131} was present on the middle and bottom detectors.

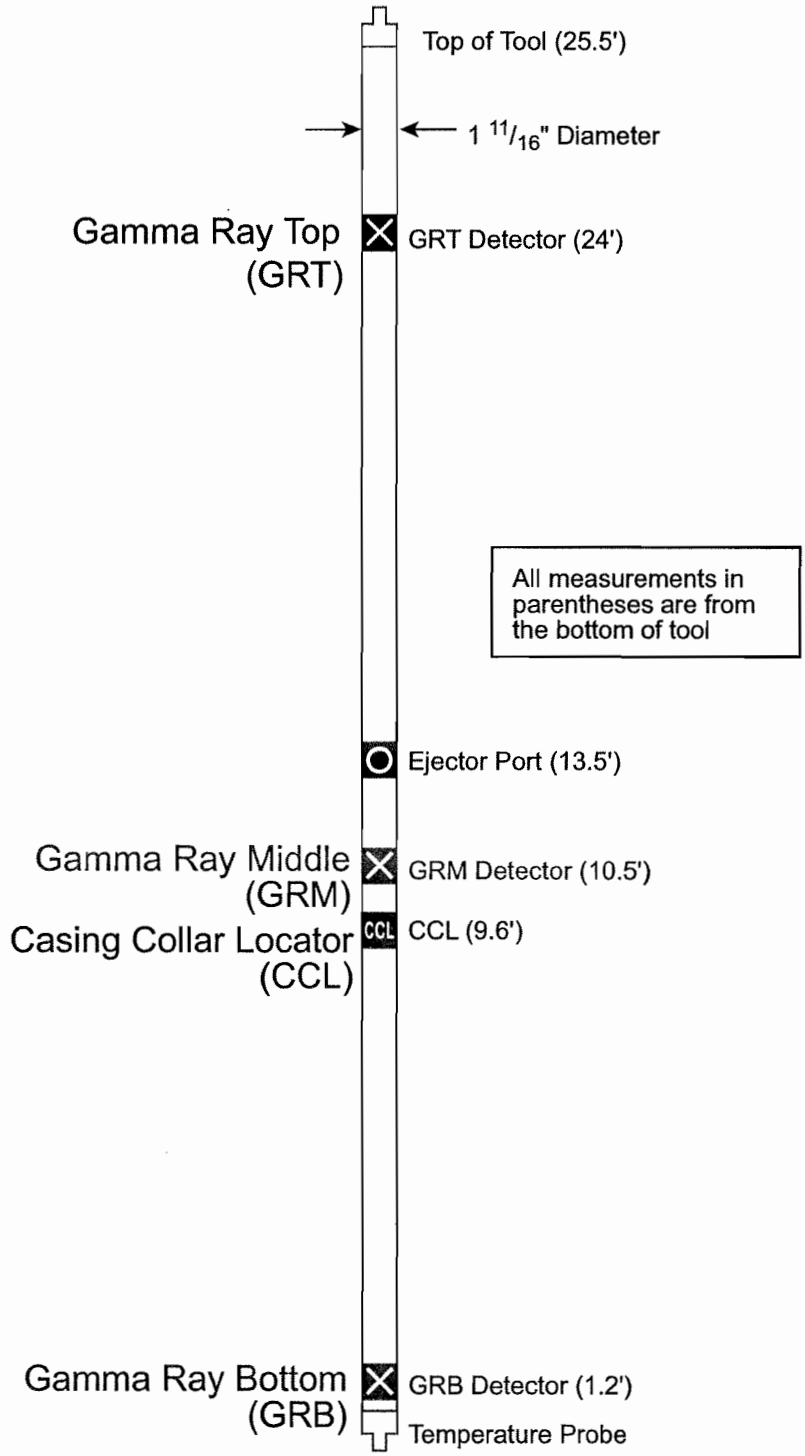

FIGURE 5-1
Radioactive Tracer Survey (RTS) Tool Diagram
Bonita Springs Utilities, Inc. RO IW-1

5.1.4.3 First Dynamic Test - Ejection No. 2

The second ejection was conducted under dynamic conditions to verify the integrity of the grout seal around the base of the 20-inch diameter casing. Potable water was pumped into the well at a rate of 42 gpm (5 feet per minute). The ejector of the tool was positioned 5 feet above the base of the casing (2,699 feet bls) and 1 mCi of tracer was released following 1 minute of time drive logging. The gamma ray response from each detector is shown on log file DYNAMIC #1 (42 GPM). An increased gamma ray response was evident at the middle detector approximately 0.3 minutes following the release of the tracer. The tracer was then detected at the lower detector after approximately 3.3 minutes. Elevated gamma responses were not detected at the upper detector during the first dynamic test conducted for 60 minutes.

Following the first dynamic test, the tool was logged out of position while continuing to inject at 42 gpm. The output of the three gamma detectors and the CCL during the log out of position is displayed in the log file titled DYNAMIC #1 L.O.P. The log out of position shows that the base of casing had some residual tracer staining. Increased gamma ray activity was not encountered above a depth of 2,698 feet bls as shown on the middle and bottom detectors. The casing was then flushed with approximately 1,200 gallons of water before lowering the RTS tool to the base of the casing.

As shown on log file titled DYNAMIC #1 L.A.F., the log out of position following the casing flush indicates that a residual stain from the I^{-131} was present on the middle and bottom detectors.

The results of the first dynamic test indicate no upward migration of radioactive tracer, therefore, confirming external mechanical integrity.

5.1.4.4 Second Dynamic Test - Ejection No. 3

The third ejection was conducted under dynamic conditions to verify the results of the first dynamic test. Potable water was pumped into the well at a rate of 43 gpm (5 feet per minute). The ejector of the tool was positioned 5 feet above the base of the casing (2,699 feet bls) and 1 mCi of tracer was released following 1 minute of time drive logging. The gamma ray response from each detector is shown on log file DYNAMIC #2 (43 GPM). An increased gamma ray response was evident at the middle detector approximately 0.3 minutes following the release of the tracer. The tracer was then detected at the lower detector after approximately 2.3 minutes. Elevated gamma response was not detected at the upper detector during the second dynamic test conducted for 30 minutes.

Following the second dynamic test, the tool was logged out of position while continuing to inject at 43 gpm. The output of the three gamma detectors and the CCL during the log out of position is displayed in the log file titled DYNAMIC #2 L.O.P. The log out of position middle and bottom detectors showed that there was residual staining at the base of the 20-inch diameter casing. Increased gamma ray activity was not encountered above a depth of 2,698 feet bls as shown on the middle and bottom detectors. The casing was then flushed with more than 560 gallons of water before lowering the RTS tool to a depth of 2,850 feet bls and ejecting the remaining tracer into the open borehole. The tool was then raised to 2,780 feet bls and cycled with water to flush out any remaining I^{-131} from the ejector.

Following the water cycling through the ejector port, the well was logged to ground level as shown on log file titled FINAL BACKGROUND. The log out of position following the casing flush indicates the residual tracer stain at the bottom of the 20-inch casing was reduced by the casing flush. Gamma ray activity at the top and bottom detectors is similar to the background gamma ray log above 2,698 feet bls.

The results of the second dynamic test and the entire RTS survey indicate no upward migration of radioactive tracer inside or outside of casing.

5.2 Dual Zone Monitor Well (DZMW-1)

Mechanical integrity testing of DZMW-1 included pressure testing of the casing, and a video survey. The results of the testing is discussed in the sections below.

5.2.1 Casing Pressure Test

On April 11, 2003, a casing pressure test was successfully conducted on the final 6-inch diameter casing of DZMW-1. The pressure test was conducted with an inflatable packer set at 1,623 feet bls after cementing to 1,351 feet bls. The wellhead pressure was monitored for a 60-minute period with a calibrated 150-psi pressure gauge. Pressure readings were recorded manually every minute during the 60-minute test. During the test, the pressure decreased from 51 psi to 50.25 psi. The 0.75 psi loss was within the FDEP allowable 5 percent limit for a 60-minute pressure test. The test results are discussed below and the pressure data sheets are provided in Appendix R.

5.2.2 Video Survey

A color camera video survey was completed on DZMW-1 on April 16, 2003 by Youngquist Brothers, Inc., after air and pump developing the lower monitor zone. The video survey was conducted to a depth of 1,700 feet bls. The video log summary sheet is provided in Appendix M. The survey showed no inconsistencies, and the casing appeared to be in good condition.

Section 6
Summary and Conclusions

Bonita Springs Utilities, Inc.

W10200405ST PA

SECTION 6

Summary and Conclusions

A deep injection well was constructed to serve as a disposal mechanism for brine concentrate produced at the BSU RO WTP. Construction of the injection well facilities began on September 26, 2002, and was substantially completed on April 16, 2003. Final completion of the project, including system startup, occurred on April 1, 2004.

The injection well RO IW-1 was constructed with a final 20-inch diameter steel casing string set to a depth of 2,704 feet bls and a 502-foot open hole interval to a total depth of 3,206 feet bls. The well was completed with a 14.5-inch inside diameter FRP tubing with a stainless steel packer assembly. The annulus between the final 20-inch diameter steel casing and the 14.5-inch diameter FRP is filled with a corrosion inhibitor fluid and is pressurized.

One dual zone monitoring well was constructed as part of the injection well facilities. The dual zone monitoring well, DZMW-1, was constructed as a nominal 6-inch diameter FRP well with an upper open borehole interval between 1,250 feet and 1,350 feet bls and lower open borehole interval between 1,630 feet and 1,700 feet bls. Construction and testing were conducted in accordance with FDEP Construction Permit No. 186015-001-UC, the applicable sections of Chapter 62-528, FAC, and the construction contract documents prepared by CH2M HILL.

The construction and testing program was approved by the FDEP and the TAC before issuance of the construction permit. A comprehensive testing program was conducted during construction of the injection well system to evaluate the site hydrogeology and assist in selection of the casing setting depths. The testing program consisted of collecting formation lithology samples, cores, pilot hole water samples, geophysical logging, air-lift specific capacity tests, packer tests, an injection test, and background water quality samples.

Packer tests identified the base of the USDW between 1,500 feet and 1,508 feet bls. Interpretation of the geophysical logs correlates with the data obtained during packer testing and suggests that the base of the USDW is located at approximately 1,510 feet bls. These data were used to ensure that the lower monitoring zone of DZMW-1 was constructed below the base of the USDW and upper monitoring zone of DZMW-1 was constructed just above the base of the USDW.

The testing program identified the top of the injection zone at 2,740 feet bls. The injection zone is characterized by extremely high transmissivity, highly fractured and cavernous dolomite with intervals of lower transmissivity limestone. Confining units were identified above the injection zone over the interval from 1,459 feet and 2,645 feet bls. Additional layers of confinement are present above 1,459 feet bls.

Geophysical logging, casing pressure testing, a video survey, and an RTS survey were performed to demonstrate mechanical integrity of RO IW-1. Mechanical integrity of the 6-inch diameter FRP final casing of DZMW-1 was verified through geophysical logging, casing pressure testing, and video surveys. All testing confirmed that the final casing of both wells demonstrated mechanical integrity and met the standards established in

Chapter 62-528, FAC. A 12-hour injection test was conducted with raw water from the RO wellfield. The well RO IW-1 was tested at a consistent flow rate of 5,100 gpm. The resulting wellhead pressure at this flow rate was approximately 46 psi.

Operational testing permission was granted from FDEP on January 5, 2004, after a site inspection. The wellhead facilities control floor was completed by December 10, 2003. The completed injection well system was started on April 1, 2004. At the time of startup, the initial brine flow to the injection well was approximately 820 gpm and the injection wellhead pressure was 14.5 psi, resulting in a wellhead pressures increase of 2 psi from the static wellhead pressure of 12.5 psi observed at the injection well prior to testing activities.

An Operation and Maintenance (O&M) Manual was completed to satisfy the conditions of the operational permit to be applied for after this operational testing phase. This O&M Manual is provided as Appendix S. This manual will be updated as needed to remain current on the operational procedures of this system.

Section 7
Bibliography and References Cited

Bonita Springs Utilities, Inc.

WU0200-40051 P A

SECTION 7

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Appendixes

Bonita Springs Utilities, Inc.

W102004005TPA

APPENDIX A

Injection Well Permits

APPENDIX A.1

FDEP IW-1 Construction Permit and Construction Modification Permit

Department of Environmental Protection

COPY

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

David B. Struhs
Secretary

August 7, 2002

Mr. Fred Partin, General Manager
Bonita Springs Utilities
11860 East Terry Street
Bonita Springs, FL 34135-0000

Re: Lee County – UIC
FDEP File No. 50210-219-UC
Bonita Springs Utilities RO WTP
IW-1 Class I Injection Well
Minor Modification

Dear Mr. Partin:

Please be advised that in response to the June 27, 2002 application for a Minor Modification by CH2MHILL, the department hereby approves the request to modify the following:

1. Reduce the size of the injection tubing from 18-inch inside diameter to 14.5-inch inside diameter FRP tubing.
2. Reduce the steel casing sizes down to: final casing of 20-inch diameter, intermediate casing of 30-inch diameter, and surface casing of 38-inch diameter.
3. Reduce the permitted injection rate to 7.4 MGD.

This letter is to be attached to the existing construction permit (FDEP Number 186015-001-UC) and becomes a permanent part thereof.

Should you have questions, please call Jack Myers, P.G. at (239) 332-6975, Ext. 120.

Sincerely,

Abdul B. Ahmadi, Ph.D., P.E.
Water Facilities Administrator

JBM/mjf

Copies furnished to:
William D. Beddow – CH2MHILL - Tampa
TAC

BSU IW PERMIT - RO WTP IW-1 163954.A1.04

COPY

Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

David B. Struhs
Secretary

CERTIFIED MAIL NO: 7001 0360 0000 8682 6898
RETURN RECEIPT REQUESTED

In the Matter of an
Application for Permit by:

Fred Partin, General Manager
Bonita Springs Utilities
11860 East Terry Street
Bonita Springs, FL 34135-0000

Lee County – UIC/IW
FDEP File No. 186015-001-UC
Bonita Springs Utilities WTP
Reverse Osmosis IW-1
Class I Injection Well

NOTICE OF PERMIT ISSUANCE

Enclosed is Permit Number 186015-001-UC to construct one Class I injection well, issued pursuant to Section(s) 403.087, Florida Statutes.

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, 3900 Commonwealth Boulevard, Mail Station 35, 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.

Executed in Fort Myers, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Gordon Romeis for

Richard W. Cantrell
Director of
District Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this PERMIT and all copies were mailed by certified mail before the close of business on April 3, 2002 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT

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

Janice L Ingram 4-3-02
Clerk Date

RWC/JBM/mjf

Enclosures

Copies furnished to:

Charles Davault – FDEP Fort Myers
William Beddow, P.E. – CH2MHILL – Tampa
TAC

Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

David B. Struhs
Secretary

PERMIT

PERMITTEE:

Bonita Springs Utilities
11860 East Terry Street
Bonita Springs, FL 34135-0000

Permit/Certification
Number: 186015-001-UC
Date of Issue: April 3, 2002
Expiration Date: April 2, 2007
County: Lee
Latitude: 26° 20' 36" N
Longitude: 81° 45' 19" W
Section/Town/Range: 36/47S/25E
Project: Bonita Springs Utilities Reverse Osmosis WTP
IW-1 Class I Injection Well

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Rules 62-4, 62-520, 62-528, 62-550, and 62-660. The above named permittee is hereby authorized to perform the work or operate 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:

Construct one nominal 18 inch diameter tubing and packer Class I injection well (IW-1), with cemented 22" steel casing to approximately 2,500 feet below land surface (bls) and a total depth of approximately 3,200 feet bls. Injection is into the Oldsmar Formation for the primary means of disposal of non-hazardous, reverse osmosis concentrate from the Bonita Springs Utilities Reverse Osmosis Water Treatment Plant (BSUROWTP) and non-hazardous treated domestic wastewater from the Bonita Springs Utilities Water Reclamation Facility (BSUWRF) at 25051 Tamiami Trail on emergency backup situations, for a maximum disposal of 10.2 million gallons per day (MGD). The maximum injection rate for each well shall not exceed 7083 gpm. The dual zone monitoring well (DZMW-1) will be completed from approximately 1000 to 1100 feet bls and from approximately 1600 to 1650 feet bls.

The Application to Construct/Operate/Abandon Class I, III, or V Injection well System, DEP Form 62-528.900(1), was received June 27, 2001, with supporting documents and additional information last received October 5, 2001. The Certificate of Demonstration of Financial Responsibility was approved September 7, 2001. Project is located at 11860 East Terry Street, Bonita Springs, Florida.

Subject to Specific Conditions 1-13.

SPECIFIC CONDITIONS:

1. GENERAL CRITERIA

a. 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.

b. 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.

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

d. Proper operation and maintenance includes effective performance, adequate funding, adequate operator assurance procedures.

e. This permit may be modified, revoked and reissued, or terminated for cause. 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.

f. When requested by the Department, the permittee shall furnish, within the time specified, any information needed to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

g. Signatories and Certification Requirements

1. 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.

2. 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 upon 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."

h. The permittee shall notify the Department and obtain approval prior to any physical alterations or additions to the injection or monitor well, including removal of the well head.

i. 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.

j. 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 an underground source of drinking water; or

SPECIFIC CONDITIONS:

2. 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.

   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 5 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.

k. No underground injection is allowed that causes or allows movement of fluid into an underground source of drinking water.

l. 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 33ging 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.

m. 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.

2. Site Requirements

a. A drilling pad shall be provided to collect spillage of contaminants and to support the heaviest load that will be encountered during drilling.

b. The disposal of drilling fluids, cuttings, formation water or waste shall be in a sound environmental manner that avoids violation of surface and ground water quality standards. The disposal method shall be approved by the Department prior to start of construction.

c. Specific drilling pad dimensions and design details shall be provided to and approved by the Department prior to commencing construction (and shortly after selection of drilling contractor).

d. The four water table monitoring wells surrounding the injection well pad shall be sampled and analyzed prior to drilling this injection well and then weekly thereafter. Sampling shall include specific conductance, pH, chloride, temperature and water level.

e. Pursuant to Rule 62-528.455(1)(c)6., F.A.C., a survey indicating the exact location in metes and bounds of all wells authorized by this permit shall be provided prior to issuance of an operating permit.

3. Construction and Testing Requirements

a. The permittee shall contact the Technical Advisory Committee (TAC) chairman so that he may schedule progress review meetings at appropriate times with the TAC, the U.S. Environmental Protection Agency (USEPA), and permittee for the purpose of reviewing the results of tests, geophysical logging, surveys, drilling records and construction problems.

b. All drilling shall be inside a blow out preventer upon penetration of the Floridan Aquifer.

SPECIFIC CONDITIONS:

c. Mechanical integrity testing is a two-part demonstration which includes a pressure test to demonstrate that no leaks are present in the casing, tubing or packer and a temperature or noise log and radioactive tracer survey to demonstrate the absence of leaks behind the casing. Verification of pressure gauge calibration must be provided at the scheduled tests.

d. Department approval and Technical Advisory Committee (TAC) and USEPA review pursuant to F.A.C. Rule 62-528 is required for the following stages of construction:

(1) Intermediate casing seat selection for injection and monitor wells.
(2) Final casing seat selection for injection and monitor wells.
(3) Prior to operational (long term) testing with effluent.

The permittee shall submit all necessary supporting documentation/data, with interpretation, to the TAC and USEPA for review.

e. The cementing program, as required in Section 62-528.410(5), Florida Administrative Code, shall be submitted to the Department, the USEPA, and the Technical Advisory Committee for review. Cementing shall not commence prior to approval being granted.

f. All temperature surveys (except for mechanical integrity demonstration) shall be run within 48 hours after cementing.

g. TAC meetings are scheduled on the first Tuesday of each month subject to a five working day prior notice and timely receipt of critical data by all TAC members and the USEPA. Emergency meetings may be arranged when justified to avoid undue construction delay.

h. The Permittee shall insure that safe internal pressures are maintained during the cementing of all casings.

i. The background water quality of the injection zone and monitoring zones shall be established prior to commencement of any injection testing. Parameters to be measured are the primary and secondary drinking water standards (except asbestos). These parameters are contained in Section 5 in the June 2001 application document.

j. The injection and monitor well(s) at the site shall be abandoned when no longer usable for their intended purpose, or when posing potential threat to the quality of the waters of the State. Within 180 days of well abandonment, the permittee shall submit to the Department, the USEPA, and the TAC the proposed plugging method, pursuant to Rule 62-528.435, F.A.C.

k. All salt used in well drilling shall be stored in an environmentally sound manner. Accurate records shall be kept on the amount of salt used.

l. All dual induction, sonic and caliper geophysical logs run on the pilot holes of the injection well shall be submitted with scales of one inch equals one hundred feet (1"=100'), two inches equals one hundred feet (2"=100'), and five inches equals one hundred feet (5"=100')

m. An engineering drawing showing the drill pad construction (including material used) and locations of the injection well, dual zone monitor well, and the four water table monitor wells shall be provided for Department approval prior to pad construction and well construction.

SPECIFIC CONDITIONS:

4. Quality Assurance/Quality Control Requirements

a. This permit approval is based upon evaluation of the data contained in the application dated June 27, 2001, and the plans and/or specifications submitted in support of the application. Any proposed modifications to this permit shall be submitted in writing to the Underground Injection Control program manager, the TAC, and USEPA for review and clearance prior to implementation. Changes of negligible impact to the environment and staff time will be reviewed by the program manager, cleared when appropriate and incorporated into this permit. Changes or modifications other than those described above will require submission of a completed application and appropriate processing fee as per Rule 62-4.050, F.A.C.

b. A professional engineer registered pursuant to Chapter 471, Florida Statutes shall be retained throughout the construction period to be responsible for the construction operation and to certify the application, specifications, completion report and other related documents. The Department shall be notified immediately of any change of engineer.

c. Where required by Chapter 471 (P.E.) or Chapter 492 (P.G.) F.S., applicable portions of permit applications and supporting documents, which are submitted to the Department for public record, shall be signed and sealed by the professional(s) who approved or prepared them.

d. The Department shall be notified immediately of any problems that may seriously hinder compliance with this permit, construction progress, or good construction practice. The Department may require a detailed written report describing the problem, remedial measures taken to assure compliance and measures taken to prevent recurrence of the problem.

e. Issuance of a Class I Test/Injection well construction and testing permit does not obligate the Department to authorize operation of the injection well system, unless the wells qualify for an operation permit applied for by the permittee and issued by the Department.

5. Reporting Requirements

a. All reports and surveys required by this permit must be submitted concurrently to all the members of the TAC and the USEPA. The TAC and USEPA consists of representatives from these agencies:

Florida Department of Environmental Protection
South District
P.O. Box 2549
Fort Myers, FL 33902-2549

Florida Department of Environmental Protection
Bureau of Water Facilities Regulation
UIC Program, MS 3530
2600 Blair Stone Rd.
Tallahassee, FL 32399-2400

South Florida Water Management District
P.O. Box 24860
West Palm Beach, FL 33416-4860

United States Environmental Protection Agency, Region IV
UIC Section
61 Forsythe Street, SW
Atlanta, Georgia 30303-8909

SPECIFIC CONDITIONS:

United States Geological Survey
9100 NW 36th Street, Suite 107
Miami, FL 33178

b. Members of the TAC and the USEPA shall receive a weekly summary of the daily log kept by the contractor. The weekly reporting period shall run Friday through Thursday and reports shall be mailed each Friday. The report shall include but is not limited to the following:

(1) Description of daily footage drilled by diameter of bit or size of hole opener or reamer being used;
(2) Description of formation and depth encountered; and specific conductance of water samples collected during drilling. Description of work during installation and cementing of casings; include amounts of casing and actual cement used versus calculated volume required.
(3) Lithological description of drill cuttings collected every ten (10) feet or at every change in formation. Description of work and type of testing accomplished, geophysical logging, pumping tests, deviation survey results, and coring results.
(4) Description of any construction problems that develop and their status to include a description of what is being done or has been done to correct the problem.
(5) Description of the amount of salt used.
(6) Results of any water quality analyses performed as required by this permit, including pad monitor wells
(7) Copies of the driller's log are to be submitted with the weekly summary.

c. The Department must be notified seventy-two (72) hours prior to all testing for mechanical integrity on the injection well. Testing should begin during daylight hours Monday through Friday.

d. Annotated copies of geophysical logs, lithologic descriptions and logs and water quality data (from drilling and packer tests) must be submitted to TAC and the USEPA, with interpretation, for intermediate and final casing seat selection approvals by the Department.

e. An interpretation of all test results must be submitted with all test data and geophysical logs.

f. After completion of construction and testing, a final report shall be submitted to the Department, the TAC, and the USEPA. The report shall include, but not be limited to, all information and data collected under Rule 62-528.450(2) and Rule 62-528.450(3), F.A.C., with appropriate interpretations. Mill certificates for the casing(s) shall be included in this report. To the extent possible, the transmissivity of the injection zone and maximum injection rate within safe pressure limits shall be estimated.

6. The construction permit includes a period of temporary injection operation for the purposes of long term testing. Prior to commencement of operational testing:
   a. Construction of the injection well shall be complete and the permittee shall submit a notice of completion of construction to the Department.
   b. 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 the operating pressure.
   c. The permittee shall submit the following information to each member of the Technical Advisory Committee:
      1) A copy of the borehole television survey(s),
      2) Geophysical logs,
      3) Mechanical integrity test data,
      4) Data obtained during the short term injection testing conducted pursuant to Rules 62-528.405(3)(a) and 62-528.410(7)(e), and 62-528.450(3)(a)2., F.A.C., above,
      5) Confining zone data,
      6) Background water quality data for the injection and monitor zones,
      7) Wastestream analysis,

8) As-built well construction specifications,
9) Draft operation and maintenance manual with emergency procedures, and
10) Other data obtained during well construction needed by the Department to evaluate whether the well will operate in compliance with Department rules.

d. The emergency discharge method shall be fully operational and no emergency discharge shall occur until the permittee has obtained all necessary permits.
e. Any corrective action required under Rule 62-528.300(5)(c)2., F.A.C., has been completed.
f. Written authorization shall be obtained from the Department. Authorization shall be for up to two years or the expiration date of the construction permit, whichever is less, and is nonrenewable. The authorization shall specify the conditions under which operational testing is approved. The authorization shall include:
   1) Injection pressure limitation,
   2) Injection flow rate limitation,
   3) Monthly specific injectivity testing,
   4) Reporting requirements, and
   5) An expiration date for the operational testing period not to exceed two years.
g. Before authorizing operational testing the Department shall conduct an inspection of the facility to determine if the conditions of the permit have been met.

7. Operational Testing Requirements

(a). Operational Testing Conditions - Injection Well System

The injection system shall be monitored in accordance with rule 62-528.425(1)(g) and 62-528.430(2), F.A.C.

The following injection well performance data shall be recorded and reported at the frequency indicated from the injection well instrumentation in the Monthly Operating Report as indicated below. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The permittee shall use continuous indicating and recording devices to monitor injection flow rate and injection pressure and annular pressure. In the case of operational failure of any of these instruments for a period of more than 48 hours, the permittee shall report to the Department in writing the remedial action to be taken and the date when the failure will be corrected.

INJECTION WELL IW-I

The proposed specifications for the injection wells are as follows:

Casing Diameter (OD)	Depth (bls) Cased	Open Hole (bls)
38"Steel	700'	
32"Steel	1350'	
22" Steel	2500'	
18" Steel Tbg	2500'	2500-3200'

Parameters	Reporting Frequency
Injection Pressure (p.s.i)	Daily/Monthly
Maximum Injection Pressure	Daily/Monthly
Minimum Injection Pressure	Daily/Monthly
Average Injection Pressure	Daily/Monthly
Flow Rate (g.p.m.)	Daily/Monthly

SPECIFIC CONDITIONS:

Maximum Flow Rate	Daily/Monthly
Average Flow Rate	Daily/Monthly
Minimum Flow Rate	Daily/Monthly
Annular Pressure (p.s.i.)	Daily/Monthly
Maximum Annular Pressure	Daily/Monthly
Minimum Annular Pressure	Daily/Monthly
Average Annular Pressure	Daily/Monthly
Annular Fluid added/removed (gallons)	Daily/Monthly
Annular Pressure added/removed (p.s.i.)	Daily/Monthly
Total Volume WTP Concentrate Injected (gallons)	Daily
Total Volume WTP Concentrate Injected (gallons)	Monthly
Total Volume WWTP Effluent Injected (gallons)	Daily
Total Volume WWTP Effluent Injected (gallons)	Monthly

Injectate Water Quality

WWTP Effluent

TKN (mg/L)	Monthly
Ammonia as N (mg/L)	Monthly
Nitrate and Nitrite as N (mg/l)	Monthly
Primary and Secondary Drinking Water Standards *	
Minimum Criteria *	

* These analyses shall be provided prior to operational testing or testing with effluent.

WTP Concentrate Water Quality

TKN (mg/L)	Monthly
pH (std. units)	Monthly
Specific Conductance (µmhos/cm)	Monthly
Chloride (mg/L)	Monthly
Sulfate (mg/L)	Monthly
Field Temperature (deg. C)	Monthly
Total Dissolved Solids (mg/L)	Monthly
Sodium (mg/L)	Monthly
Calcium (mg/L)	Monthly
Potassium (mg/L)	Monthly
Magnesium (mg/L)	Monthly
Iron (mg/L)	Monthly
Carbonate (mg/L)	Monthly
Bicarbonate (mg/L)	Monthly
Gross Alpha	Monthly
Radium 226	Monthly
Radium 228	Monthly
Primary and Secondary Drinking Water Standards **	

** These analyses shall be provided prior to operational testing or testing with concentrate.

SPECIFIC CONDITIONS:

(b). Operational Testing Conditions - Monitor Well System

The monitor well system will consist of one Dual Zone Monitor Well as described below:

Well Number	Casing Dia. (OD)	Depth (bls) Cased	Open Hole(bls)
DZMW-1	24" Steel	700'	
	16" Steel	1000'	1000-1100'
	6" FRP	1600'	1600-1650'

All monitor wells shall be monitored in accordance with rule 62-528.425 and 62-528.430, F.A.C. The following monitor well performance data shall be recorded and reported at the frequency indicated from the monitor well instrumentation in the Monthly Operating Report as indicated below. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The permittee shall use continuous indicating and recording devices to monitor the monitor zone pressures or water levels. In the case of operational failure of any of these instruments for a period of more than 48 hours, the permittee shall report to the Department in writing the remedial action to be taken and the date when the failure will be corrected.

DZMW-1 Parameters	Reporting Frequency
Maximum Water Level/Pressure	Daily/Monthly
Minimum Water Level/Pressure	Daily/Monthly
Average Water Level/Pressure	Daily/Monthly
Water Quality	
TKN (mg/L)	Weekly
Specific Conductance (μmhos/cm)	Weekly
Total Dissolved Solids (mg/L)	Weekly
pH (std. units)	Weekly
Chloride (mg/L)	Weekly
Sulfate (mg/L)	Weekly
Field Temperature (°C)	Weekly
Ammonia (mg/l)	Weekly
Sodium (mg/L)	Monthly
Calcium (mg/L)	Monthly
Potassium (mg/L)	Monthly
Magnesium (mg/L)	Monthly
Iron (mg/L)	Monthly
Carbonate (mg/L)	Monthly
Bicarbonate (mg/L)	Monthly
Gross Alpha	Monthly (deep monitor zone only)
Radium 226	Monthly (deep monitor zone only)
Radium 228	Monthly (deep monitor zone only)

Water quality data may be reduced to monthly analyses after a minimum six months of data if the conditions of Rule 62-528.450(3)(d), F.A.C., have been met and with Department approval.

(c). The permittee shall calibrate all pressure gauge(s), flow meter(s), chart recorder(s), and other related equipment associated with the injection well system on a semi-annual basis. 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 EPA guidelines as expressed in Standard Methods for the Examination of Water and Wastewater. The pressure gauge(s), flow meter(s), and chart recorder(s) shall be calibrated using standard engineering methods.

(d). The permittee shall submit monthly to the Department the results of all injection well and monitor well data required by this permit 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, P.O. Box 2549, Fort Myers, Florida 33902-2549. 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.

(e). The Engineer of Record or designated qualified representative must be present for the start-up operations and the Department must be notified in writing of the date operational testing commenced for the well.

8. Abnormal Events

a. In the event the permittee is temporarily unable to comply with any conditions of this permit due to breakdown of equipment, power outages, and destruction by hazard of fire, wind, or by other cause, the permittee shall notify the Department. Notification shall be made in person, by telephone or by telegraph within 24 hours of breakdown or malfunction to the UIC Program staff, South District office.

b. A written report of any noncompliance referenced in 1) above shall be submitted to the South District office within five days after its occurrence. The report shall describe the nature and cause of the breakdown or malfunction, the steps being taken or planned to be taken to correct the problem and prevent its reoccurrence, emergency procedures in use pending correction of the problem, and the time when the facility will again be operating in accordance with permit conditions.

9. Emergency Disposal

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

b. Any changes in emergency disposal methods must be submitted for Technical Advisory Committee (TAC) and USEPA review and Department approval.

c. The permittee shall notify the Department within 24 hours whenever an emergency discharge has occurred (Rule 62-528.415(4)(c)1., F.A.C.). Written notification shall be provided to the Department within 5 days after each occurrence. The Permittee shall indicate the location and duration of the discharge and the volume of fluid discharged.

10. Financial Responsibility

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

b. The permittee shall review annually the plugging and abandonment cost estimates. The permittee shall resubmit documentation necessary to demonstrate financial responsibility using the revised cost estimates on or before March 31 of each year.

c. In the event that 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

d. such invalidation. The permittee shall, 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.

11. Mechanical Integrity

a. Injection is prohibited until the permittee affirmatively demonstrates that the well has mechanical integrity. Prior to operational testing the permittee shall establish, and thereafter maintain, 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. Unless the Department requires the immediate cessation of injection, within 48 hours of receiving written notice from the department that the well lacks mechanical integrity the permittee shall cease injection into the well unless the Department allows continued injection pursuant to (d) below.

d. The Department may allow the permittee to continue operation of a well that lacks mechanical integrity if the permittee demonstrates that fluid movement into or between underground sources of drinking water is not occurring.

12. The permittee is reminded of the necessity to comply with the pertinent regulations of any other regulatory agency, as well as any county, municipal, and federal regulations applicable to the project. These regulations may include, but not limited to, those of the Federal Emergency Management Agency in implementing flood control measures. This permit should not be construed to imply compliance with the rules and regulations of other regulatory agencies.

13. The permittee shall be aware of and operate under the general conditions in Rule 62-528.307(1)(a) through (x) and Rule 62-528.307(2)(a) through (f), F.A.C. These general conditions are binding upon the permittee and enforceable pursuant to Chaper 403 of the Florida Statutes.

Note: In the event of an emergency the permittee shall contact the Department by calling (850) 413-9911. During normal business hours, the permittee shall call (941) 332-6975.

Issued this 3rd day of April____, 2002.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Gordon Romeis for

Richard W. Cantrell
Director of
District Management

RWC/JBM/mjf

APPENDIX A.2

IW-1 Operational Testing Permit

Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

David B. Struhs
Secretary

BY ELECTRONIC MAIL TO:
fpartin@bonitaspringsutilities.com

In the Matter of an
Application for Permit by:

Fred Partin, General Manager
Bonita Springs Utilities
11860 East Terry Street
Bonita Springs, FL 34135-0000
_____/

Lee County – UIC/IW
FDEP File No: 186015-001-UC
Bonita Springs Utilities
Water Treatment Plant IW-1
Class I Injection Well

Dear Mr. Partin:

The Department has received and hereby approves the request by the Bonita Springs Utilities Water Treatment Plant to begin operational testing of injection well IW-1 for the Reverse Osmosis Water Treatment Plant. The Bonita Springs Utilities Water Treatment Plant may commence operational testing in accordance with specific condition 7 of construction permit 186015-001-UC and the specific testing and reporting conditions listed below:

Operational Testing Conditions

a. A qualified representative of the Engineer of Record must be present for the start-up operations and the Department must be notified in writing of the date operation began for the subject well.

b. Only non-hazardous reverse osmosis concentrate from the Bonita Springs Utilities Water Treatment Plant and non-hazardous treated domestic wastewater from the Bonita Springs Utilities Water Reclamation Facility may be injected.

c. Continuous recording of water levels in monitor well DZMW-1 shall begin at least 48 hours prior to the start of operational testing

d. Flow to the injection well shall be monitored at all times to ensure the maximum sustained pressure at the wellhead does not exceed 71 psi on the final casing and a maximum injection rate of 5100 gpm (7.34 MGD).

e. The Permittee shall calibrate all pressure gauge(s), flow meter(s), chart recorder(s), and other related equipment associated with the injection well system on a semiannual basis. 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 EPA guidelines as expressed in standard methods for the examination of water and wastewater. The pressure gauge(s), flow meter(s), and chart recorder(s) shall be calibrated using standard engineering methods.

f. Injection Well IW-1

The specifications for the injection well are as follows:

Casing Diameter (OD)	Depth (bls) Cased/Total	Open Hole (bls)
38" Steel	450'	
30" Steel	1600'	
20 Steel	2704'	2704-3206'
14.5" FRP Tbg	2695'	

The injection well shall be monitored in accordance with the parameters and frequency listed below. The Permittee shall submit a Summary of the Monthly Monitoring Data developed from the injection well instrumentation. Injection pressure, annular pressure, and injection flow rate shall be monitored continuously and reported at the frequency indicated below. The report shall include the following data:

Parameters	Reporting Frequency
Injection Pressure (p.s.i.)	**Daily/Monthly**
Maximum Injection Pressure	Daily/Monthly
Minimum Injection Pressure	Daily/Monthly
Average Injection Pressure	Daily/Monthly
Flow Rate (g.p.m.)	**Daily/Monthly**
Maximum Flow Rate	Daily/Monthly
Average Flow Rate	Daily/Monthly
Minimum Flow Rate	Daily/Monthly
Annular Pressure (p.s.i.)	**Daily/Monthly**
Maximum Annular Pressure	Daily/Monthly
Minimum Annular Pressure	Daily/Monthly
Average Annular Pressure	Daily/Monthly
Annular Fluid added/removed (gallons)	Daily/Monthly
Annular Pressure added/removed (p.s.i.)	Daily/Monthly
Total Volume WTP Concentrate Injected (gallons)	Daily
Total Volume WTP Concentrate Injected (gallons)	Monthly
Total Volume WWTP Effluent Injected (gallons)	Daily
Total Volume WWTP Effluent Injected (gallons)	Monthly

Injectate Water Quality

WWTP Effluent

TKN (mg/l)	Monthly
Ammonia as N (mg/l)	Monthly
Nitrate and Nitrite as N (mg/l)	Monthly

WTP Concentrate

TKN (mg/L)	Monthly
pH (std. units)	Monthly
Specific Conductivity (μmhos/cm)	Monthly
Chloride (mg/L)	Monthly
Sulfate (mg/L)	Monthly
Field Temperature (°C)	Monthly
Total Dissolved Solids (mg/L)	Monthly
Sodium (mg/L)	Monthly
Calcium (mg/L)	Monthly
Potassium (mg/L)	Monthly
Magnesium (mg/L)	Monthly
Iron (mg/L)	Monthly
Carbonate (mg/L)	Monthly
Bicarbonate (mg/L)	Monthly
Gross Alpha	Monthly
Radium 226	Monthly
Radium 228	Monthly
Primary and Secondary Drinking Water Standards**	

**These analyses shall be provided within 45 days after the commencement of testing with concentrate

g. Monitor Well System

The monitor well system consists of one dual zone monitor well as described below:

Well Number	Casing Dia. (OD)	Depth (bls) Cased/Total
DZMW-1	24" Steel	450'
	16" Steel	1250'/1350'
	6" FRP Tbg	1630'/1700'

All monitor wells shall be monitored in accordance with Rule 62-528.615, F.A.C. The following monitor well performance data shall be recorded and reported at the frequency indicted from the monitor well instrumentation in the Monthly Operating Report as indicated below. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The Permittee shall use continuous indicating and recording devices to monitor the monitor zone pressure or water levels. In the case of operational failure of any of these instruments for a period of more than 48 hours, the Permittee shall report to the Department in writing the remedial action to be taken and the date when the failure will be corrected.

DZMW-1

Parameters	Reporting Frequency
Maximum Water Level/Pressure	Daily/Monthly
Minimum Water Level/Pressure	Daily/Monthly
Average Water Level/Pressure	Daily/Monthly

Water Quality

TKN (mg/L)	Weekly
Specific Conductivity (μmhos/cm)	Weekly
Total Dissolved Solids (mg/L)	Weekly
pH (std. units)	Weekly
Chloride (mg/L)	Weekly
Sulfate (mg/L)	Weekly
Field Temperature (°C)	Weekly
Ammonia (mg/l)	Weekly
Sodium (mg/L)	Monthly
Calcium (mg/L)	Monthly
Potassium (mg/L)	Monthly
Magnesium (mg/L)	Monthly
Iron (mg/L)	Monthly
Carbonate (mg/L)	Monthly
Bicarbonate mg/L)	Monthly
Gross Alpha **(Deep Zone Only)**	Monthly
Radium 226 **(Deep Zone Only)**	Monthly
Radium 228 **(Deep Zone Only)**	Monthly

Water quality data may be reduced to monthly analyses after a minimum six months of data if the conditions of Rule 62.528.450(3)(d), F.A.C., have been met and with Department approval.

h. A specific injectivity test shall be performed monthly on the injection well as required by Rule 62-528.430(2)(b)1.b., F.A.C. Pursuant to Rule 62-528.430(2)(d), F.A.C., the specific injectivity test shall be performed with the pumping rate to the well set at a predetermined level and reported as the specific injectivity index (gallons per minute/specific pressure). The pumping rate to be used shall be based on the expected flow, the design of the pump types, and the type of pump control used. As part of this test, the well shall be shut-in for a period of time necessary to conduct a valid observation of pressure fall-off. The specific injectivity test and pressure fall-off data shall be submitted along with the monitoring results of the injection and monitoring well data.

i. The Permittee shall submit monthly to the Department the results of all injection well and monitor well data required by this permit 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, P.O. Box 2549, Fort Myers, Florida, 33902-2549. 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.

j. Operational testing of this injection well system shall cease upon expiration of this permit, unless the Department has issued an intent to issue an operation permit, or a timely renewal application (Rule 6204.090.F.A.C.) for this construction permit has been submitted to the Department. However, under no circumstances shall the duration of the operational testing period exceed two years as specified in Rule 62-528.450(3)(e), F.A.C.

k. Financial responsibility must be maintained in accordance with specific condition 10 of the construction permit.

l. Abnormal Events

(1) In the event the Permittee is temporarily unable to comply with any conditions of this permit due to breakdown of equipment, power outages, destruction by hazard or fire, wind, or by other cause, the Permittee shall notify the Department. Notification shall be made in person, by telephone or by telegraph within 24 hours of breakdown or malfunction to the UIC Program staff, South District office.

(2) A written report of any noncompliance referenced in the paragraph above shall be submitted to the South District office within five days after its occurrence. The report shall describe the nature and cause of the breakdown or malfunction, the steps being taken or planned to be taken to correct the problem and prevent its reoccurrence, emergency procedures in use pending correction of the problem, and the time when the facility will again be operating in accordance with permit conditions.

m. Emergency Disposal

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

(2) Any changes in emergency disposal methods must be submitted for Technical Advisory Committee (TAC) and USEPA review and Department approval.

(3) The Permittee shall notify the Department within 24 hours whenever an emergency discharge has occurred (Rule 62-528.415(4)(c)1, F.A.C.). Written notification shall be provided to the Department within five days after each occurrence. The Permittee shall indicate the location and duration of the discharge and the volume of liquid discharged.

n. Certification. Reports required by this permit and applications should contain the proper signatories and certification language contained in Rule 62-528.340, F.A.C. (See specific condition 1.g of the construction permit).

This letter must be attached to your permit and becomes a part of that permit.

Sincerely,

Jon M. Iglehart
Acting Director of
District Management

JMI/JBM/mjf

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APPENDIX B

Summary of Construction Activity at IW-1 and DZMW-1

APPENDIX B.1

IW-1 Summary of Construction Activity

Bonita Springs Utilities
Summary of Construction Activities

Date	Deep Injection Well IW-1 Construction Activity
9/26/02	Drilling of a 12.25-inch pilot hole was advanced to 52 feet bls using mud-rotary. The pilot hole was reamed to 50 feet bls using a 58.5-inch bit.
9/27/02	The 50-inch steel pit casing was installed to 48 feet bls.
9/29/02	A 12.25-inch pilot hole was advanced to 180 feet bls using mud-rotary.
9/30/02	The pilot hole was advanced to 500 feet bls and then geophysically logged. Logs performed include caliper, gamma, dual induction, and spontaneous potential.
10/1/02	The pilot hole was reamed to 140 feet bls using a 48.5-inch bit.
10/2/02	The 48.5-inch reamed hole was advanced to 269 feet bls.
10/3/02	The 48.5-inch reamed hole was advanced to 324 feet bls.
10/4/02	The 48.5-inch reamed hole was advanced to 344 feet bls.
10/5/02	The 48.5-inch reamed hole was advanced to 388 feet bls.
10/6/02	The 48.5-inch reamed hole was advanced to 455 feet bls.
10/7/02	The 48.5-inch reamed hole was geophysically logged. Logs performed include caliper (with borehole calculated volume) and gamma. The 38-inch steel surface casing was installed to 450 feet bls. A total of 360 bbls of 4% gel cement followed by 96 bbls of neat cement were used to pressure grout the casing to surface.
10/10/02	A 12.25-inch pilot hole was advanced to 480 feet bls using reverse-air.
10/11/02	The pilot hole was advanced to 777 feet bls. Specific capacity tests were conducted at 560 feet bls, 640 feet bls, and 720 feet bls. Respective specific capacities are 14 gpm/ft, 13 gpm/ft, and 14 gpm/ft.
10/12/02	The pilot hole was advanced to 1,225 feet bls. Specific capacity tests were conducted at 800 feet bls, 888 feet bls, 960 feet bls, 1,040 feet bls, 1,120 feet bls, and 1,200 feet bls. Respective specific capacities are 10 gpm/ft, 13 gpm/ft, 20 gpm/ft, 21 gpm/ft, 25 gpm/ft, and 23 gpm/ft.
10/13/02	The pilot hole was advanced to 1,500 feet bls. Specific capacity tests were conducted at 1,280 feet bls, 1,360 feet bls, and 1,440 feet bls. Respective specific capacities are 22 gpm/ft, 30 gpm/ft, and 23 gpm/ft.
10/14/02	A core sample was collected from 1,500 feet bls to 1,512 feet bls.
10/15/02	The pilot hole was advanced to 1,560 feet bls. A specific capacity test was conducted at 1,520 feet bls. The specific capacity is 18 gpm/ft. A core sample was recovered from 1,560 feet bls to 1,572 feet bls.
10/16/02	The pilot hole was advanced to 1,650 feet bls. A specific capacity test was conducted at 1,580 feet bls. The specific capacity is 21 gpm/ft.
10/17/02	A core sample was collected from 1,650 feet bls to 1,663 feet bls.
10/18/02	The pilot hole was advanced to 1,700 feet bls. A specific capacity test was conducted at 1,680 feet bls. The specific capacity is 28 gpm/ft.
10/19/02	A core sample was collected from 1,700 to 1,708 feet bls.
10/20/02	The pilot hole was advanced to 1,750 feet bls. An attempt was made to recovery a core from 1,750 feet bls to 1,760 feet bls. Zero-percent of the core was recovered.
10/21/02	The pilot hole was advanced to 1,780 feet bls. A specific capacity test was conducted at 1,760 feet bls. The specific capacity is 20 gpm/ft.
10/22/02	A core sample was recovered from 1,780 to 1,789 feet bls. The pilot hole was advanced to 1,800 feet bls.
10/25/02	Static and dynamic geophysical logs were conducted to 1,800 feet bls. Static logs performed include caliper, gamma, dual induction, spontaneous potential, flow meter, fluid resistivity, fluid temperature, and sonic porosity/variable density. Dynamic logs performed include flow meter, fluid resistivity, and fluid temperature.

10/27/02	A single packer was set to 1,627 feet bls and air developed in an attempt to clear the well. A borehole video log was run from 1,627 to 1,750 feet bls.
10/28/02	A single packer was set to 1,745 feet bls and air developed in an attempt to clear the well. A borehole video log was run from 1,745 to 1,762 feet bls.
10/29/02	A single packer was set to 1,489 feet bls and air developed in an attempt to clear the well. A borehole video log was run from 1,489 to 1,675 feet bls. A borehole televiewer log was run from 450 to 1,754 feet bls.
10/30/02 to 10/31/02	The Packer Test 1 monitor interval (1,508 to 1,549 feet bls) was air developed at a rate of 1 gpm.
11/2/02	Conducted Packer Test 1 at a rate of 0.4 gpm. The observed drawdown was 75 feet, yielding a specific capacity of 0.005 gpm/ft.
11/3/02	The Packer Test 2 monitor interval (1,459 to 1,500 feet bls) was air developed at a rate of 2.5 gpm.
11/4/02 to 11/5/02	Conducted Packer Test 2 at a rate of 2.25 gpm. The observed drawdown was 129 feet, yielding a specific capacity of 0.017 gpm/ft.
11/6/02 to 11/7/02	The Packer Test 3 monitor interval (1,589 to 1,620 feet bls) was air developed at a rate of 2 gpm.
11/8/02	Conducted Packer Test 3 at a rate of 1.75 gpm. The observed drawdown was 100 feet, yielding a specific capacity of 0.017 gpm/ft.
11/9/02	The Packer Test 4 monitor interval (1,634 to 1,665 feet bls) was air developed at a rate of 30 gpm.
11/10/02	Conducted Packer Test 4 at a rate of 45 gpm. The observed drawdown was 98 feet, yielding a specific capacity of 0.46 gpm/ft.
11/11/02 to 11/12/02	The Packer Test 5 monitor interval (1,664 to 1,720 feet bls) was air developed a rate of 22 gpm. Conducted Packer Test 5 at a rate of 20 gpm. The observed drawdown was 94 feet, yielding a specific capacity of 0.21 gpm/ft.
11/13/02 to 11/14/02	The Packer Test 6 monitor interval (1,724 to 1,750 feet bls) was air developed at a rate of 5 gpm. Conducted Packer Test 6 at a rate of 3.5 gpm. The observed drawdown was 99 feet, yielding a specific capacity of 0.035 gpm/ft.
11/15/02 to 11/16/02	The Packer Test 7 monitor interval (1,679 to 1,705 feet bls) was air developed at a rate of 5 gpm. Conducted Packer Test 7 at a rate of 4 gpm. The observed drawdown was 106 feet, yielding a specific capacity of 0.038 gpm/ft.
11/18/02	The Packer Test 8 monitor interval (1,664 to 1,749 feet bls) was air developed at a rate of 5 gpm.
11/19/02	Conducted Packer Test 8 at a rate of 10 gpm. The observed drawdown was 51 feet, yielding a specific capacity of 0.196 gpm/ft.
11/21/02	Conducted Packer Tests 9 and 10. The monitor interval for Packer Test 9 was 1,250 to 1,350 feet bls and the monitor interval for Packer Test 10 was 1,150 to 1,250 feet bls. Packer Test 9 was completed at a rate of 63 gpm. The observed drawdown was 18 feet, yielding a specific capacity of 3.7 gpm/ft. Packer Test 10 was completed at a rate of 45 gpm. The observed drawdown was 17 feet, yielding a specific capacity of 2.6 gpm/ft.
11/22/02	Back plugged the pilot hole from 1,760 to 454 feet bls using 305 bbls of 12-percent gel cement.
11/25/02	Began reaming the pilot hole using a 36.5-inch reamer bit. The reamed hole was advanced to 636 feet bls.
11/26/02	The 36.5-inch reamed hole was advanced to 871 feet bls.
11/27/02	The 36.5-inch reamed hole was advanced to 1,045 feet bls.
11/30/02	The 36.5-inch reamed hole was advanced to 1,188 feet bls.
12/1/01	The 36.5-inch reamed hole was advanced to 1,343 feet bls.
12/2/02	The 36.5-inch reamed hole was advanced to 1,526 feet bls.
12/3/02	The 36.5-inch reamed hole was advanced to 1,606 feet bls and geophysically logged. Logs performed include caliper (with borehole calculated volume) and gamma.

12/4/02	The 30-inch steel intermediate casing was installed to 1,600 feet bls.
12/5/02	Begin cementing of the 30-inch casing. Stage 1: 308 bbls of 4% gel cement followed by 60 bbls of neat cement.
12/6/02	Tagged Stage 1 cement at 1,020 feet bls. Resumed cementing – Stage 2: 92 bbls of 4% gel cement. Tagged Stage 2 cement at 762 feet bls. Resumed cementing – Stage 3: 75 bbls of 4% gel cement. Tagged Stage 3 cement at 635 feet bls. Resumed cementing – Stage 4: 80 bbls of 4% gel cement.
12/7/02	Tagged Stage 4 cement at 478 feet bls. Resumed cementing – Stage 5: 112 bbls of 12% gel cement with 3% CaCl additive. Tagged Stage 5 cement at 260 feet bls. Resumed cementing – Stage 6: 118 bbls of 12% gel cement with 1% CaCl additive.
12/9/02	Drilled out the cement plug and advanced a 12.25-inch pilot hole to 1,640 feet bls using reverse-air drilling methods.
12/10/02	Advanced the pilot hole to 1,900 feet bls. A specific capacity test was conducted at 1,840 feet bls. The specific capacity at 1,840 feet bls is 4 gpm/ft.
12/11/02	A core sample was attempted between 1,900 and 1,910 feet bls.
12/12/02	Advanced the pilot hole to 1,930 feet bls. A core sample was attempted between 1,930 and 1,940 feet bls.
12/13/02	Advanced the pilot hole to 1,982 feet bls. A core sample was attempted between 1,982 and 1,992 feet bls.
12/14/03	Advanced the pilot hole to 2,047 feet bls. A specific capacity test was conducted at 2,000 feet bls. The specific capacity at 2,000 feet bls is 2.1 gpm/ft.
12/16/03	A core sample was attempted between 2,047 and 2,059 feet bls. Advanced the pilot hole to 2,080 feet bls. The specific capacity at 2,080 feet bls is 4 gpm/ft.
12/17/02	Advanced the pilot hole to 2,125 feet bls.
12/18/02	A core sample was attempted between 2,125 and 2,142 feet bls. Advanced the pilot hole to 2,155 feet bls.
12/19/02	A core sample was attempted between 2,155 and 2,171 feet bls.
12/20/02	Advanced the pilot hole to 2,315 feet bls. Specific capacity tests were conducted at 2,160 and 2,240 feet bls. Respective specific capacities are 68 gpm/ft and 123 gpm/ft.
12/21/02	A core sample was attempted between 2,315 and 2,323.5 feet bls.
12/22/02	Advanced the pilot hole to 2,480 feet bls. Specific capacity tests were conducted at 2,320, 2,400, and 2,480 feet bls. Respective specific capacities are 120 gpm/ft, 147 gpm/ft, and 160 gpm/ft.
12/23/02	Advanced the pilot hole to 2,560 feet bls. A specific capacity test was conducted at 2,560 feet bls. The specific capacity at 2,560 feet bls is 144 gpm/ft.
12/24/02	Advanced the pilot hole to 2,880 feet bls. Specific capacity tests were conducted at 2,640, 2,720, 2,800, and 2,880 feet bls. Respective specific capacities are 126 gpm/ft, 127 gpm/ft, 1,287 gpm/ft, and 2,200 gpm/ft.
12/28/02	Advanced the pilot hole to 3,105 feet bls. A specific capacity test was conducted at 3,040 feet bls. The specific capacity at 3,040 feet bls is 1,710 gpm/ft.
12/29/02	Advanced the pilot hole to 3,150 feet bls. A specific capacity test was conducted at 3,120 feet bls. The specific capacity at 3,120 feet bls is 800 gpm/ft.
12/30/02	Advanced the pilot hole to 3,206 feet bls. A specific capacity test was conducted at 3,206 feet bls. The specific capacity at 3,206 feet bls is 1,034 gpm/ft.
1/2/03	Static and dynamic geophysical logs were conducted to 3,206 feet bls. Static logs performed include caliper, gamma, dual induction, spontaneous potential, flow meter, fluid resistivity, fluid temperature, and sonic porosity/variable density. Dynamic logs performed include flow meter, fluid resistivity, and fluid temperature. A borehole video was also performed on the pilot hole to 3,206 feet bls.
1/3/03	The Packer Test 11 monitor interval (2,228 to 2,255 bls) was air developed at a rate of 10 gpm.
1/4/03	Conducted Packer Test 11 at a rate of 3.0 gpm. The observed drawdown was 43 feet, yielding a specific capacity of 0.07 gpm/ft.

1/5/03	The Packer Test 12 monitor interval (1,949 to 1,976) was air developed at a rate of 10 gpm.
1/6/03	Conducted Packer Test 12 at a rate of 4.5 gpm. The observed drawdown was 57 feet, yielding a specific capacity of 0.08 gpm/ft.
1/7/03 to 1/11/03	The Packer Test 13 monitor interval (2,618 to 2,645) was air developed at a rate of 10 gpm.
1/12/03	Conducted Packer Test 13 at a rate of 0.6 gpm. The observed drawdown was 104 feet, yielding a specific capacity of 0.006 gpm/ft.
1/13/03 to 1/16/03	The Packer Test 14 monitor interval (1,813 to 1,845) was air developed at a rate of 1.25 gpm.
1/17/03 to 1/18/03	Conducted Packer Test 14 at a rate of 0.3 gpm. The observed drawdown was 110 feet, yielding a specific capacity of 0.003 gpm/ft.
1/20/03 to 1/21/03	Conducted Packer Test 15 at a rate of 215 gpm. The memory gauge drawdown was 0.07 feet, yielding a specific capacity of 3,071 gpm/ft.
1/22/03	Installed drillable bridge plug to 2,675 feet bls.
1/23/03 to 1/25/03	Backplugged the pilot hole with 524 bbls of 12-percent bentonite cement. A total of 5 cement stages were required to grout the pilot hole between 2,675 and 1,602 feet bls.
1/26/03	Began reaming the pilot hole using a 28.5-inch reamer bit. The reamed hole was advanced to 1,913 feet bls.
1/27/03	The 28.5-inch reamed hole was advanced to 2,054 feet bls.
1/28/03	The 28.5-inch reamed hole was advanced to 2,128 feet bls.
1/29/03	The 28.5-inch reamed hole was advanced to 2,287 feet bls.
1/30/03	The 28.5-inch reamed hole was advanced to 2,315 feet bls.
1/31/03	The 28.5-inch reamed hole was advanced to 2,363 feet bls.
2/1/03	The 28.5-inch reamed hole was advanced to 2,505 feet bls.
2/2/03	The 28.5-inch reamed hole was advanced to 2,660 feet bls.
2/3/03	The 28.5-inch reamed hole was advanced to 2,697 feet bls. Advanced an 18.5-inch reamed hole from 2,697 feet to 2,735 feet bls.
2/4/03	The 18.5-inch reamed hole was advanced to 2,801 feet bls.
2/5/03	The 18.5-inch reamed hole was advanced to 2,876 feet bls.
2/6/03	The 18.5-inch reamed hole was advanced to 2,921 feet bls.
2/7/03	The Contractor installed a new 18.5-inch drilling bit.
2/8/03	The 18.5-inch reamed hole was advanced to 2,969 feet bls.
2/9/03	The 18.5-inch reamed hole was advanced to 3,024 feet bls.
2/10/03	The 18.5-inch reamed hole was advanced to 3,106 feet bls.
2/11/03	The 18.5-inch reamed hole was advanced to 3,185 feet bls.
2/12/03	The 18.5-inch reamed hole was advanced to 3,206 feet bls.
2/13/03	A caliper and borehole video log was conducted between 1,600 feet and 3,206 feet bls.
2/14/03	Conducted Packer Test 16 between 2,728 feet and 3,206 feet bls. At a flow rate of 210 gpm, the memory gauge drawdown was 0.0 feet.
2/15/03 to 2/18/03	Installed the 20-inch final casing to 2,700 feet bls.
2/18/03	Begin cementing of the 20-inch final casing. 1st attempt to establish the boot plug: 3 bbls of neat cement with 2% CaCl additive. Tagged cement at 2,695 feet bls.
2/19/03	Resumed cementing – 2nd attempt to establish the plug: 7 bbls of neat cement with 2% CaCl additive. Tagged cement at 2,675 feet bls. Resumed cementing – Stage 1: 71 bbls of neat cement. Tagged Stage 1 cement at 2,550 feet bls. Resumed cementing – Stage 2: 220 bbls of 4% gel cement.
2/20/03	Tagged Stage 2 cement at 2,312 feet bls. Resumed cementing – Stage 3: 202 bbls of 4% gel cement. Tagged Stage 3 cement at 2,016 feet bls. Resumed pumping – Stage 4: 228 bbls of 4% gel cement. Tagged Stage 4 at 1,675 feet bls. Resumed pumping –

	Stage 5: 177 bbls of 4% gel cement.
2/21/03	Tagged Stage 5 cement at 1,311 feet bls. Resumed pumping – Stage 6: 226 bbls of 4% gel cement. Tagged Stage 6 at 794 feet bls. Resumed pumping – Stage 7: 230 bbls of 12% gel cement.
2/22/03	Performed a cement bond log of the 20-inch casing between 273 feet and 2,690 feet bls
2/26/03	Pressure tested the 20-inch casing at a start pressure of 105.25 psi. A pressure loss of 1.25 psi was reported over the 2-hour test period. Resumed cementing of the 20-inch casing – Stage 8: 117 bbls of 12% gel cement. Cement returns were observed at land surface.
2/27/03	Collected background primary and secondary water samples from the injection zone.
2/28/03 to 3/2/03	Installed the 14.5-inch FRP to 2,694 feet bls. Performed a video log to confirm the YBI packer seal.
3/2/03	Pumped 13,000 gallons of 1% Baracor down the FRP annulus.
3/3/03	Pressure tested the FRP annulus at a start pressure of 107 psi. A pressure gain of 0.75 psi was reported over the 2-hour test period.
11/6/2003	Complete 12-hour injection test.

Notes:	bls – below land surface gpm/ft – gallons per minute per foot of drawdown bbls – barrels cf – cubic feet FRP – fiber reinforced plastic psi – pounds per square inch PSP – positive seal packer

APPENDIX B.2

DZMW-1 Summary of Construction Activity

Bonita Springs Utilities
Summary of Construction Activities

Date	Dual Zone Monitor Well DZMW-1 Construction Activity
3/10/03	Drilling of a 12.25-inch pilot hole was advanced to 180 feet bls using mud-rotary.
3/11/03	The pilot hole was advanced to 505 feet bls.
3/12/03	The pilot hole was geophysically logged to 505 feet bls. Logs performed include X-Y caliper, gamma ray, dual induction, and spontaneous potential. The pilot hole was reamed to 150 feet bls using a 34.5-inch drill bit.
3/13/03	The 34.5-inch reamed hole was advanced to 370 feet bls.
3/14/03	The 34.5-inch reamed hole was advanced to 455 feet bls. The 34.5-inch reamed hole was geophysically logged. Logs performed include caliper (with borehole calculated volume) and gamma.
3/15/03	The 24-inch steel surface casing was installed to 450 feet bls. A total of 220 bbls of 4% gel cement followed by 92 bbls of neat cement were used to pressure grout the casing to surface.
3/18/03	Advanced a 12.25-inch pilot hole between 450 feet and 720 feet bls using reverse-air. Specific capacity tests were conducted at 560 feet bls and 640 feet bls. Respective specific capacities are 34 gpm/ft and 20 gpm/ft.
3/19/03	The pilot hole was advanced to 1,250 feet bls. Specific capacity tests were conducted at 720 feet bls, 800 feet bls, 880 feet bls, 960 feet bls, 1,040 feet bls, 1,120 feet bls, and 1,200 feet bls. Respective specific capacities are 15 gpm/ft, 15 gpm/ft, 19 gpm/ft, 25 gpm/ft, 31 gpm/ft, 29 gpm/ft, and 35 gpm/ft.
3/21/03	Static and dynamic geophysical logs were conducted to 1,250 feet bls. Static logs performed include X-Y caliper, gamma ray, dual induction, spontaneous potential, flow meter, fluid resistivity, fluid temperature, and sonic porosity/variable density. Dynamic logs performed include flow meter, fluid resistivity, and fluid temperature.
3/22/03	The pilot hole was reamed to 950 feet bls using a 22.5-inch drill bit.
3/23/03	The 22.5-inch reamed hole was advanced to 1,100 feet bls.
3/24/03	The 22.5-inch reamed hole was advanced to 1,252 feet bls. The 22.5-inch reamed hole was geophysically logged. Logs performed include caliper (with borehole calculated volume) and gamma.
3/25/03	The 16-inch intermediate casing was installed to 1,250 feet bls.
3/26/03	The 16-inch casing was cemented pressure grouted in place – Stage 1: 180 bbls of 4% gel cement followed by 70 bbls of neat. Tagged Stage 1 at 707 feet bls. Resumed pumping – Stage 2: 225 bbls of 4% gel cement.
3/27/03	Tagged the Stage 2 cement at 124 feet bls. Resumed pumping – Stage 3: 31 bbls of 4% gel cement. Cement returns observed at land surface.
3/28/03	Advanced a 14.75-inch pilot hole to 1,620 feet bls using reverse-air method. Specific capacity tests were conducted at 1,360 feet bls, 1,440 feet bls, 1,520 feet bls, and 1,600 feet bls. Respective specific capacities are 13 gpm/ft, 11 gpm/ft, 14 gpm/ft, and 9 gpm/ft.
3/29/03	Advanced a 12.25-inch pilot hole between 1,620 feet and 1,700 feet bls using reverse-air method. A specific capacity test was conducted at 1,680 feet bls. The specific capacity at 1,680 feet bls is 5 gpm/ft.
3/31/03	Static and dynamic geophysical logs were conducted to 1,700 feet bls. Static logs performed include X-Y caliper, gamma ray, dual induction, spontaneous potential, flow meter, fluid resistivity, fluid temperature, and sonic porosity/variable density. Dynamic logs performed include flow meter, fluid resistivity, and fluid temperature.
4/1/03	An attempt was made to video log the well, however, poor visibility of the formation water prevented an acceptable video from being performed.
4/4/03 to 4/5/03	Installed the 6-inch FRP casing to 1,630 feet bpl. Begin cementing of the 6-inch FRP casing. 1st attempt to establish the packer: 1.5 bbls of neat cement with 2% CaCl

	additive. Tagged cement at 1,619 feet bls. Resumed cementing – 2nd attempt to establish the packer: 1 bbl of neat cement with 2% CaCl additive.
4/6/03	Tagged the cement at 1,607 feet bls. Resumed cementing – Stage 1: 11 bbls of neat cement. Tagged the Stage 1 cement at 1,554 feet bls. Resumed cementing – Stage 2: 32 bbls of neat cement.
4/7/03	Tagged the Stage 2 cement at 1,447 feet bls. Resumed cementing – Stage 3: 25 bbls of neat cement. Tagged the Stage 3 cement at 1,366 feet bls. Resumed cementing – Stage 4: 4 bbls of neat cement.
4/8/03	Tagged the Stage 4 cement at 1,351 feet bls.
4/9/03	Pump developed the lower monitor zone at 35 gpm.
4/10/03	Pump developed the upper and lower monitor zones at 85 gpm and 15 gpm, respectively.
4/11/03	Pressure tested the 6-inch FRP casing at a start pressure of 51.00 psi. A pressure loss of 0.75 psi was reported over the 1-hour test period.
4/12/03 to 4/13/03	Pump developed the upper and lower monitor zones at 70 gpm and 15 gpm, respectively.
4/14/03	Collected background water samples form the upper and lower monitor zones. Conducted a caliper and video log of the completed lower monitor zone and FRP casing.
4/15/03 to 4/16/03	Air developed and pumped the lower monitor zone at rates of 5 bbls/min and 15 gpm, respectively..
4/16/03	Completed the video and caliper/gamma ray log to 1,693 feet bls.
4/17/03	Begin demobilization.
5/13/03	Installed 2-inch PVC sampling tube in the upper monitor zone to 1,250 feet bls.

Notes:	bls – below land surface gpm/ft – gallons per minute per foot of drawdown bbls – barrels cf – cubic feet FRP – fiber reinforced plastic psi – pounds per square inch PSP – positive seal packer

APPENDIX C

Weekly Construction Summaries

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: September 27, 2002

SUBJECT: Weekly Summary No. 1
September 20 to September 26, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

No drilling or testing activities were performed at the injection well until Thursday, September 26, when a 12.25-inch diameter pilot hole was advanced to 50 feet below pad level (bpl) using mud-rotary methods. The pilot hole was subsequently reamed to 52 feet bpl using a 58.5-inch diameter drill bit. No other drilling activities were recorded for this reporting period.

On Friday, September 27, the Contractor will install a 50-inch diameter pit casing to 50 feet bpl. Pilot hole and reaming activities will subsequently commence. It is anticipated that the 38-inch diameter steel surface casing will be installed by the end of next week's reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: October 4, 2002

SUBJECT: Weekly Summary No. 2
September 27 to October 3, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, September 27, the Contractor installed 48 feet of 50-inch diameter steel pit casing. No drilling or testing activities were performed the following day. On Sunday, a 12.25-inch diameter pilot hole was advanced to 180 feet below pad level (bpl) using mud-rotary drilling methods. The pilot hole was advanced to 500 feet bpl by Monday. Geophysical logs were subsequently performed in the pilot hole. Logs performed include caliper, gamma ray, dual induction, and spontaneous potential. After reviewing the logs, it was decided to seat the 38-inch diameter surface casing to +/- 450 feet bpl. The Contractor initiated the reaming of a 48.5-inch diameter borehole on Tuesday. The total depth of reaming reached 324 feet bpl by the end of this week's reporting period.

During the next reporting period, it is anticipated that the 38-inch diameter surface casing will be set to +/- 450 feet bpl and cemented in place. Reverse-air pilot hole drilling will commence thereafter.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality
Geophysical Logs

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: October 11, 2002

SUBJECT: Weekly Summary No. 3
October 4 to October 10, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, October 4, the Contractor continued to advance the 48.5-inch diameter reamed hole using mud-rotary methods. By Sunday, the reamed hole was advanced to 455 feet below pad level (bpl). The next day, the reamed hole was geophysically logged from 0 feet bpl to 455 feet bpl to evaluate borehole integrity. Logs performed include caliper and gamma ray. After reviewing the logs, the 38-inch diameter steel surface casing was seated at 450 feet bpl and cemented in place. A total of 360 barrels (bbls) of 4% bentonite cement and 96 bbls of neat cement were used to grout the casing to land surface. No drilling or testing activities were performed at the injection well on Tuesday or Wednesday. On Thursday, the Contractor air-developed the initial pilot hole from 450 feet bpl to 480 feet bpl.

During the next reporting period, it is anticipated the Contractor will initiate reverse-air pilot hole drilling, coring, and packer testing activities.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: October 18, 2002

SUBJECT: Weekly Summary No. 4
October 11 to October 17, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, October 11, the Contractor initiated reverse-air pilot hole drilling using a 12.25-inch diameter drill bit. The pilot hole was advanced from 480 feet below pad level (bpl) to 777 feet bpl. By Sunday, the pilot hole was advanced to 1,500 feet bpl. A total of three 4-inch diameter cores were subsequently recovered between 1,500 feet bpl and 1663 feet bpl. The coring intervals include 1,500 to 1,550 feet bpl, 1,560 to 1,572 feet bpl, and 1,650 to 1673 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that one to two additional core samples will be collected between 1,700 and 1,750 feet bpl. Geophysical logs will subsequently be performed on the pilot hole to identify appropriate packer testing intervals.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Injection Well Lithologic Descriptions
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: October 25, 2002

SUBJECT: Weekly Summary No. 5
October 18 to October 24, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, October 18, the Contractor continued reverse-air pilot hole drilling using a 12.25-inch diameter drill bit. The pilot hole was advanced from 1,650 feet below pad level (bpl) to 1700 feet bpl. On Sunday the pilot hole was advanced to 1,750 feet, on Monday 1,780 feet and on Tuesday 1,800 feet. Two core samples were recovered, a 4-inch sample between 1,700 feet bpl and 1,750 feet bpl and a 6-inch sample between 1,780 feet bpl and 1,800 feet bpl. Well was developed on Wednesday 10/23 and Thursday, 10/24 using reverse air open circulation. Well was shut in Wednesday evening in preparation for logging Thursday evening. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that geophysical logs will be performed on the pilot hole to identify the upper limits of the Underground Source of Drinking Water (USDW) and appropriate packer testing intervals.

Attachments:
- Engineer's Daily Reports
- Driller's Daily Reports
- Injection Well Lithologic Descriptions
- Pad Monitor Well Water Quality
- Deviation Survey Table

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: November 1, 2002

SUBJECT: Weekly Summary No. 6
October 25 to October 31, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, October 25, the Contractor performed static and dynamic geophysical logs to 1,800 feet below pad level (bpl). Static logs performed include caliper, gamma, dual induction, spontaneous potential, flow meter, fluid temperature, fluid resistivity, and sonic porosity/variable density. Dynamic logs performed include flow meter, fluid temperature, and fluid resistivity. The remaining portion of the day was spent air developing the borehole in preparation of a video log. The Contractor air developed the borehole from Saturday through Tuesday in an attempt to clear the well prior to running a video log. The borehole was successfully logged from 1,489 feet bpl to 1,745 feet bpl. During Tuesday's night shift, a borehole televiewer was run from 450 feet bpl to 1,753 feet bpl. On Wednesday, the Contractor set a straddle packer between 1,508 feet bpl and 1,549 feet bpl and began air developing the test interval. Air development continued through Thursday. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that several packer tests will be performed in the open borehole to identify the upper limits of the Underground Source of Drinking Water (USDW).

Attachments:
- Engineer's Daily Reports
- Driller's Daily Reports
- Pad Monitor Well Water Quality
- Geophysical Logs
- Borehole Televiewer Log

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: November 8, 2002

SUBJECT: Weekly Summary No. 7
November 1 to November 7, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Two packer tests were conducted during this week's reporting period. Packer Test 1 monitored the interval between 1,508 and 1,549 feet below pad level (bpl) and was completed on Saturday, November 2. At a flow rate of 0.4 gallons per minute (gpm), the drill stem drawdown was 75 feet, yielding a specific capacity of 0.005 gpm/ft. Packer Test 2 monitored the interval between 1,459 and 1,500 feet bpl and was completed on Tuesday, November 5. At a flow rate of 2.25 gpm, the drill stem drawdown was 129 feet, yielding a specific capacity of 0.017 gpm/ft. Laboratory water samples were collected near the end of each packer test, however, the results will not be available until next week's reporting period. The Contractor spent Wednesday and Thursday air developing the Packer Test 3 monitoring interval (1,589 to 1,620 feet bpl). No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that two to three additional packer tests will be performed to further evaluate the hydrogeological properties of the open borehole.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: November 15, 2002

SUBJECT: Weekly Summary No. 8
November 8 to November 14, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Four packer tests were conducted during this week's reporting period. These include Packer Tests 3 through 6. Packer Test 3 monitored the interval between 1,589 and 1,620 feet below pad level (bpl) and was completed on Friday, November 8. At a flow rate of 1.75 gallons per minute (gpm), the drill stem drawdown was 100 feet, yielding a specific capacity of 0.017 gpm/ft. Packer Test 4 monitored the interval between 1,634 and 1,665 feet bpl and was completed on Sunday, November 10. At a flow rate of 45 gpm, the drill stem drawdown was 98 feet, yielding a specific capacity of 0.46 gpm/ft. Packer Test 5 monitored the interval between 1,664 and 1,720 feet bpl and was completed on Wednesday. At a flow rate of 20 gpm, the drill stem drawdown was 94 feet, yielding a specific capacity of 0.21 gpm/ft. Packer Test 6 monitored the interval between 1,726 and 1,750 feet bpl and was completed on the last day of this week's reporting period. At a flow rate of 4 gpm, the drill stem drawdown was 99 feet, yielding a specific capacity of 0.035 gpm/ft. Laboratory water samples were collected near the end of each packer test, however, the results are currently unavailable. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that one to two additional packer tests will be performed to further evaluate the hydrogeological properties of the open borehole.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: November 22, 2002

SUBJECT: Weekly Summary No. 9
November 15 to November 21, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Four packer tests were conducted during this week's reporting period. These include Packer Tests 7 through 10. Packer Test 7 monitored the interval between 1,679 and 1,705 feet below pad level (bpl) and was completed on Saturday, November 16. At a flow rate of 4 gallons per minute (gpm), the drill stem drawdown was 106 feet, yielding a specific capacity of 0.038 gpm/ft. Packer Test 8 monitored the interval between 1,664 and 1,749 feet bpl and was completed on Tuesday. At a flow rate of 10 gpm, the drill stem drawdown was 51 feet, yielding a specific capacity of 0.196 gpm/ft. Packer Tests 9 and 10 monitored the intervals between 1,250 and 1,350 feet bpl and between 1,150 and 1,250 feet bpl, respectively. Both tests were completed during the last day of this week's reporting period. The drill stem drawdown during Packer Test 9 was 18 feet, At a flow rate of 63 gpm, the resulting specific capacity is 3.5 gpm/ft. The drill stem drawdown during Packer Test 10 was 17 feet. At a flow rate of 45 gpm, the resulting specific capacity is 2.6 gpm/ft. Laboratory water samples were collected near the end of each packer test, however, the results are currently unavailable. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated the pilot hole will be backplugged with 12-percent gel cement from 1,800 feet bpl to the base of the 38-inch surface casing (450 feet bpl). Reaming of the pilot hole will subsequently commence.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: December 2, 2002

SUBJECT: Weekly Summary No. 10
November 22 to November 28, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, November 22, the injection well pilot hole was plugged back with 12-percent bentonite cement between the interval of 1,760 feet below pad level (bpl) and 454 feet bpl. No drilling or testing activities were performed Saturday or Sunday as the Contractor was servicing the drilling rig and preparing for reaming activities. On Monday, the Contractor began reaming the pilot hole using a 36.5-inch diameter reamer bit. The reamed hole was advanced to 636 feet bpl by the end of the Monday night shift. Reaming activities continued Tuesday and Wednesday. The total depth of reaming by Wednesday was 1,045 feet bpl. No drilling or testing activities were performed on Thursday due to the Thanksgiving Holiday.

During next week's reporting period, it is anticipated that the reamed hole will be advanced to +/- 1,600 feet bpl. The 30-inch diameter intermediate casing will then be seated to 1,600 feet bpl and cemented in place. The intermediate casing seating depth of 1,600 feet bpl was approved by the FDEP on November 26, 2002.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Reamed Hole Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: December 6, 2002

SUBJECT: Weekly Summary No. 11
November 29 to December 5, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

No drilling or testing activities were performed on Friday, November 29, due to the Thanksgiving Holiday. On Saturday, the 36.5-inch diameter reamed hole was advanced from 1,045 feet below pad level (bpl) to 1,188 feet bpl. By Monday, the reamed hole was advanced to 1,606 feet bpl and then geophysically logged to land surface. Logs performed include caliper and natural gamma ray. After reviewing the logs, the 30-inch diameter intermediate casing was immediately seated to 1,600 feet bpl and pressure grouted in place using 308 barrels (bbls) of 4-percent gel cement followed by 60 bbls of neat cement. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that the 30-inch diameter intermediate casing will be grouted to land surface. Pilot hole drilling will subsequently commence. Coring, packer testing, reverse-air water sampling, and short-term specific capacity testing be conducted in concurrence with pilot hole drilling activities.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Reamed Hole Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: December 16, 2002

SUBJECT: Weekly Summary No. 12
December 6 to December 12, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, December 6, the cementing of the 30-inch diameter intermediate casing continued. By Saturday, the 30-inch diameter casing was grouted to approximately 20 feet below pad level (bpl). No drilling or testing activities were performed on Sunday to allow for the cement to properly cure. On Monday, the casing cement plug was drilled out using a 12.25-inch diameter pilot bit. The following day, the pilot hole was advanced to 1,900 feet bpl. On Wednesday, a 4-inch diameter core was attempted between 1,900 and 1,910 feet bpl. On Thursday, the pilot hole was advanced to 1,930 feet bpl. A 4-inch diameter core was subsequently attempted between 1,930 and 1,940 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that three to four additional cores will be attempted in concurrence with the advancement of the pilot hole.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Lithologic Descriptions
Borehole Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: December 20, 2002

SUBJECT: Weekly Summary No. 13
December 13 to December 19, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, December 13th, the 12.25-inch diameter pilot hole was advanced from 1,930 feet below pad level (bpl) to 1,982 feet bpl. A 4-inch diameter core sample was subsequently attempted between 1,982 feet bpl and 1,992 feet bpl. By Sunday, the pilot hole was advanced to 2,047 feet bpl. On Monday, a core sample was attempted between 2,047 feet bpl and 2,059 feet bpl. By Tuesday, the pilot hole was advanced to 2,125 feet bpl. The following day, a core sample was attempted between 2,125 feet bpl and 2,142 feet bpl. After recovering the core, the pilot hole was advanced to 2,155 feet bpl. On Thursday, a core sample was attempted between 2,155 feet bpl and 2,171 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that two additional core samples will be attempted in concurrence with the pilot hole advancement. No drilling or testing activities will be performed on December 24th or 25th in observance of the Christmas holiday.

Attachments:
- Engineer's Daily Reports
- Driller's Daily Reports
- Lithologic Descriptions
- Borehole Deviation Survey Record
- Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: December 30, 2002

SUBJECT: Weekly Summary No. 14
December 20 to December 26, 2002

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, December 20th, the 12.25-inch diameter pilot hole was advanced from 2,171 feet below pad level (bpl) to 2,315 feet bpl. The following day, a 4-inch diameter core was attempted between 2,315 feet bpl and 2,323 feet bpl. Pilot hole drilling resumed on Sunday. By Monday, the pilot hole was advanced to 2,560 feet bpl. No drilling or testing activities were performed on Tuesday or Wednesday in observance of the Christmas holiday. On Thursday, the pilot hole was advanced to 2,880 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that the pilot hole will be advanced to 3,200 feet bpl, the total depth of the well bore. A full suite of static and dynamic geophysical logs will then be performed. No drilling or testing activities will be performed on Wednesday, January 1st, in observance of New Year's Day.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Lithologic Descriptions
Borehole Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: January 6, 2003

SUBJECT: Weekly Summary No. 15
December 27, 2002 to January 2, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, December 27th, the 12.25-inch diameter pilot hole was advanced from 2,880 feet below pad level (bpl) to 3,010 feet bpl. Pilot drilling activities continued through Saturday and Sunday. By Monday, the pilot hole was advanced to 3,206 feet bpl, the total depth of the injection well. The Tuesday day shift was spent servicing the drilling rig and preparing for geophysical logging. No drilling or testing activities were performed on Wednesday in observance of New Year's Day. On Thursday, a full suite of static and dynamic geophysical logs was performed on the pilot hole to 3,206 feet bpl. Logs performed include caliper, gamma, dual induction, spontaneous potential, static fluid resistivity and temperature, dynamic fluid resistivity and temperature, static and dynamic flow meter, borehole compensated sonic/variable density, and borehole video. Copies of the geophysical logs and borehole video will be submitted next week in concurrence with the final casing recommendation letter.

During next week's reporting period, it is anticipated that five packer tests will be conducted on the pilot hole at various intervals to further evaluate aquifer confinement and background water quality.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Lithologic Descriptions
Borehole Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: January 10, 2003

SUBJECT: Weekly Summary No. 16
January 3 to January 9, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Two packer tests were completed during this week's reporting period. Packer Test 11 monitored the interval between 2,228 and 2,255 feet below pad level (bpl) and was completed on Saturday, January 4th. At a flow rate of 3 gallons per minute (gpm), the drill stem drawdown was 43 feet, yielding a specific capacity of 0.07 gpm/ft. Packer Test 12 monitored the interval between 1,949 to 1,976 feet bpl and was completed on Monday, January 6th. At a flow rate of 4.5 gpm, the drill stem drawdown was 57.4 feet, yielding a specific capacity of 0.08 gpm/ft. Laboratory water samples were collected near the end of each packer test, however, the results will not be available until next week's reporting period. The Contractor spent Tuesday through Thursday air developing the Packer Test 13 monitoring interval (2,618 to 2,645 feet bpl). No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that two additional packer tests will be performed to further evaluate the hydrogeological properties of the open borehole. Static and dynamic geophysical logs performed during last week's reporting period are attached for review. A copy of the borehole video will be submitted in concurrence with the final casing recommendation letter.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality
Geophysical Logs

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: January 17, 2003

SUBJECT: Weekly Summary No. 17
January 10 to January 16, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

One packer test was completed during this week's reporting period. Packer Test 13 monitored the interval between 2,618 and 2,645 feet below pad level (bpl) and was completed on the morning shift of Monday, January 13th. At a flow rate of 0.6 gallons per minute (gpm), the drill stem drawdown was 104 feet, yielding a specific capacity of 0.006 gpm/ft. The Contractor spent Monday through Wednesday air developing the Packer Test 14 monitoring interval (1,813 to 1,845 feet bpl). No drilling or testing activities were performed on Thursday.

Packer Test 14 is anticipated to be complete by Saturday, January 18th. A final off-bottom packer test will be conducted near the bottom portion of the well bore to determine the hydraulic characteristics of the proposed injection zone. After packer testing is complete, a temporary bridge plug will be seated immediately above the injection zone and the pilot hole will be cemented back to the base of the intermediate casing (1,600 feet bpl). Reaming of the cemented pilot hole will commence thereafter.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO: Mike Liggins/BSU
Jack Myers/FDEP
Joe Haberfeld/FDEP
Nancy Marsh/USEPA
Steve Anderson/SFWMD
Ron Reese/USGS
Bill Beddow/CH2M HILL
Don Klose/CH2M HILL
Gary Giordano/CH2M HILL
Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: January 27, 2003

SUBJECT: Weekly Summary No. 18
January 17 to January 23, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Two packer tests were completed during this week's reporting period. Packer Test 14 monitored the interval between 1,813 and 1,845 feet below pad level (bpl) and was completed on the night shift of Friday, January 17th. Packer Test 14 was accomplished using a straddle packer assembly. At a flow rate of 0.3 gallons per minute (gpm), the drill stem drawdown was 110 feet, yielding a specific capacity of 0.003 gpm/ft. Packer Test 15 monitored the interval between 2,723 and 3,206 feet bpl and was completed on Tuesday, January 21st. Packer Test 15 was accomplished using a single packer assembly with a memory gauge installed below the base of the single packer. At a flow rate of 215 gpm, the memory gauge drawdown was 0.07 feet, yielding a specific capacity of 3,071 gpm/ft. On Wednesday, a temporary cement bridge plug was successfully installed to 2,676 feet bpl. By Thursday, the initial 12.25-inch diameter pilot hole was cemented from 2,676 feet bpl to 2,092 feet bpl using 12-percent bentonite gel cement. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that the pilot hole will be plugged back to 1,600 feet bpl (intermediate casing depth). After backplugging activities are complete, reaming of the cemented pilot hole will commence in preparation of the final casing installation.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: January 31, 2003

SUBJECT: Weekly Summary No. 19
January 24 to January 30, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, January 24th, the 12.25-inch diameter pilot hole was plugged back with 12-percent bentonite cement between the interval of 2,092 feet below pad level (bpl) and 1,764 feet bpl. On Saturday, the pilot hole was plugged between 1,764 feet bpl and 1,602 feet bpl. On Sunday, a 28.5-inch diameter reamed hole was advanced from 1,602 feet bpl to 1,913 feet bpl. Reaming continued from Monday through Wednesday. By Thursday, the reamed hole was advanced to 2,314 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

A total of 120 sacks (80 pounds per sack) of salt was used to kill the well during this week's reporting period.

During next week's reporting period, it is anticipated that the 28.5-inch diameter reamed hole will be advanced to 2,697 feet bpl. An 18.5-inch diameter reamed borehole will then be advanced from 2,697 feet bpl to 3,206 feet bpl. After reaming activities are complete, the borehole will undergo geophysical logging and the final 20-inch diameter casing will be installed to 2,700 feet bpl and cemented in place.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: February 7, 2003

SUBJECT: Weekly Summary No. 20
January 31 to February 6, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, January 31st, the 18.5-inch diameter reamed hole was advanced from 2,315 feet below pad level (bpl) to 2,363 feet bpl. Reaming continued from Saturday through Wednesday. By Thursday, the reamed hole was advanced to 2,921 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

A total of 157 sacks (80 pounds per sack) of salt was used to kill the well during this week's reporting period.

During next week's reporting period, it is anticipated that the 18.5-inch diameter reamed hole will be advanced to 3,206 feet bpl, the total depth of the well. After reaming activities are complete, the borehole will undergo geophysical logging and the final 20-inch diameter casing will be installed to 2,700 feet bpl and cemented in place.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: February 17, 2003

SUBJECT: Weekly Summary No. 21
February 7 to February 13, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, February 7th, the 18.5-inch diameter reamed hole was advanced to 2,921 feet below pad level (bpl). Reaming activities continued from Saturday through Tuesday. By Wednesday, the reamed hole was advanced to 3,206 feet bpl, the total depth of the injection well. On Thursday, a caliper and borehole video log was performed on the injection well between 1,595 feet and 3,202 feet bpl. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, the Contractor will conduct an off-bottom packer test between 2,728 feet and 3,202 feet bpl to evaluate the hydraulic characteristics of the injection zone. After packer testing is complete, installation of the 20-inch diameter final casing will commence.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: February 23, 2003

SUBJECT: Weekly Summary No. 22
February 14 to February 20, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, February 14th, an off-bottom packer test was conducted between 2,728 feet and 3,206 feet below pad level (bpl). At a flow rate of 210 gallons per minute (gpm), 0.0 feet of drawdown was reported below the bottom packer. Installation of the final 20-inch diameter steel casing began the following day. By Tuesday, the final casing was installed to 2,704 feet bpl and cemented in place. Cementing of the final casing continued through Thursday. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that the cementing of the final 20-inch diameter casing will be completed to +/- 200 feet bpl. A cement bond log and internal pressure test of the casing will subsequently commence. After these tests are complete, the final casing will be cemented to land surface. It is anticipated that the installation of the 14.5-inch diameter FRP tubing will commence late next week.

A total of 70 sacks of salt was used to kill the well during this week's reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO: Mike Liggins/BSU
Jack Myers/FDEP
Joe Haberfeld/FDEP
Nancy Marsh/USEPA
Steve Anderson/SFWMD
Ron Reese/USGS
Bill Beddow/CH2M HILL
Don Klose/CH2M HILL
Gary Giordano/CH2M HILL
Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: March 3, 2003

SUBJECT: Weekly Summary No. 23
February 21 to February 27, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, February 21st, the 20-inch diameter final casing was cemented from 1,311 feet to 273 feet below pad level (bpl). A cement bond log (CBL) was subsequently performed from 2,690 feet bpl to land surface. A copy of the CBL is attached for review. Saturday and Sunday were spent cooling the 20-inch diameter casing using reverse-air circulation. The Contractor spent Monday and Tuesday preparing for the 20-inch diameter casing pressure test. On Wednesday, the 20-inch diameter casing pressure test was conducted at a starting pressure of 105 pounds per square inch (psi). Jack Myers of the FDEP was onsite to witness the first hour of the 2-hour test. A pressure loss of 0.50 psi was reported at the end of the first hour of testing, which is within FDEP's limit of +/- 5% (or +/- 5.25 psi) loss over one hour. A pressure loss of 1.25 psi was reported at the end of two hours. After tripping out the packer assembly from the well, the 20-inch diameter casing was cemented from 273 feet to 10 feet bpl using 117 barrels of 12-percent bentonite cement. On Thursday, a full suite of primary and secondary water samples was collected from the injection well. No other drilling and testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that the 14.5-inch fiberglass reinforced plastic (FRP) tubing will be installed to 2,694 feet bpl (top of the female positive seal packer). After installation of the corrosion inhibitor fluid, the annulus between the 20-inch diameter casing and the 14.5-inch diameter FRP tubing will be pressure tested at a nominal pressure of 105 psi. Mobilization to the dual zone monitoring well (DZMW-1) site is anticipated to commence late next week.

A total of 70 sacks of salt was used to kill the well during this week's reporting period.

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: March 10, 2003

SUBJECT: Weekly Summary No. 24
February 28 to March 6, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

On Friday, February 28th, the Contractor began the installation of the 14.5-inch diameter fiberglass reinforced plastic (FRP) tubing. Installation of the FRP tubing continued through Saturday and was completed by Sunday. The male end of the positive seal packer was successfully seated at +/- 2,694 feet below pad level (bpl). On Monday, the annular zone between the FRP tubing and the 20-inch diameter steel casing was pressure tested at a starting pressure of 107 pounds per square inch (psi). Jack Myers of the FDEP was onsite to witness the first hour of the 2-hour test. A pressure gain of 0.25 psi was reported at the end of the first hour of testing, which is within FDEP's limit of +/- 5% (or +/- 5.35 psi) over one hour. A pressure gain of 0.75 psi was reported at the end of two hours. The Contractor spent Tuesday through Thursday demobilizing the drilling rig and equipment from the injection well site. No other drilling or testing activities were performed during this week's reporting period.

It is anticipated that pilot hole drilling of the dual zone monitor well (DZMW-1) will commence early to mid-next week. The pilot hole will be advanced to +/- 500 feet bpl prior to conducting geophysical logs.

No salt was used to kill the injection well this reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Pete Larkin and Mike Weatherby/CH2M HILL

DATE: March 14, 2003

SUBJECT: Weekly Summary No. 25
March 7 to March 13, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log

Between Friday, March 7 through Sunday, March 9, the Contractor continued mobilization of the rig to the DZMW-1 site. Late Monday evening, March 10, the pilot hole drilling started on DZMW-1, using mud rotary method.

Drilling of the pilot hole continued through Tuesday, March 11 until a total depth of 505 feet below pad level (bpl). Geophysical logs were conducted on Wednesday, March 12. The reaming activities commenced on Wednesday evening and continued through Thursday, March 13. No other activities were performed during this week's reporting period.

It is anticipated that reaming of the pilot hole for the dual zone monitor well (DZMW-1) will be completed Friday night, March 14, to a depth of 455 feet bpl. The 24-inch diameter steel casing will be installed to a depth of 450 feet on Saturday, March 15 and cemented to ground surface.

No salt was used to kill the injection well this reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality
Deviation Survey Data

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: March 21, 2003

SUBJECT: Weekly Summary No. 26
March 14 to March 20, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log : Dual Zone Monitor Well (DZMW-1)

On Friday, March 14th, the 34.5-inch diameter reamed hole was advanced from 370 feet below pad level (bpl) to 455 feet bpl. Geophysical logs (X-Y caliper and natural gamma) were subsequently performed to confirm the reamed hole characteristics. On Saturday, the 24-inch diameter steel casing was installed to 450 feet bpl and pressure grouted in place. A total of 200 barrels (bbls) of 4-percent gel cement and 92 bbls of neat cement were used to grout the casing to land surface. The Contractor spent Sunday and Monday rigging up for reverse-air pilot hole drilling. On Tuesday, the 12.25-inch diameter pilot hole was advanced to 720 feet bpl. By Wednesday, the pilot hole was advanced to 1,250 feet bpl. No drilling or testing activities were performed on Thursday as the Contractor spent the day preparing for static and dynamic geophysical logs.

During next week's reporting period, it is anticipated that static and dynamic geophysical logs will be completed to 1,250 feet bpl. Reaming activities using a nominal 23-inch diameter drill bit will subsequently commence. After FDEP approval, the 16-inch diameter casing will installed to +/- 1,250 feet bpl and cemented in place. The Contractor will resume pilot hole drilling after cementing operations are complete.

No salt was used to kill the monitor well this reporting period.

Attachments:
- Engineer's Daily Reports
- Driller's Daily Reports
- Lithologic Descriptions
- Deviation Survey Record
- Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/US	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: March 28, 2003

SUBJECT: Weekly Summary No. 27
March 21 to March 27, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log : Dual Zone Monitor Well (DZMW-1)

On Friday, March 21st, static and dynamic geophysical logs were performed from 1,250 feet bpl to land surface. Static logs performed include X-Y caliper, gamma ray, dual induction, spontaneous potential, fluid resistivity and conductivity, borehole compensated sonic, and flow meter. Dynamic logs include fluid resistivity, fluid conductivity, and flow meter. A copy of the logs were submitted along with the upper monitor zone approval request letter, submitted to the FDEP on March 21st, 2003. Reaming of the pilot hole began on Saturday using a 22.5-inch diameter drill bit. Reaming continued through Sunday. By Monday, the reamed hole was advanced to 1,252 feet bpl. A caliper log was subsequently performed to confirm the reamed hole characteristics. On Tuesday, the 16-inch diameter intermediate casing was installed to 1,250 feet bpl and pressure grouted in place. Two additional cement stages were required to grout the casing to land surface. Grouting of the 16-inch diameter casing was completed Thursday morning. The well remained undisturbed for the remaining portion of the day to allow the cement to properly cure, before resuming pilot hole drilling. No other drilling or testing activities were performed during this week's reporting period.

During next week's reporting period, it is anticipated that a nominal 15-inch diameter pilot hole will be advanced to +/- 1620 feet bpl. A nominal 12-inch diameter pilot hole will then be advanced between 1,620 feet and 1,700 feet bpl. A full suite of static and dynamic geophysical logs will then be conducted to evaluate the proposed upper and lower monitor zones of DZMW-1. After FDEP approval, the 6-inch diameter FRP casing will be installed to +/- 1,630 feet bpl.

No salt was used to kill the monitor well this reporting period.

MEMORANDUM

CH2MHILL

TO: Mike Liggins/BSU, Jack Myers/FDEP, Joe Haberfeld/FDEP, Nancy Marsh/USEPA, Steve Anderson/SFWMD, Ron Reese/USGS, Bill Beddow/CH2M HILL, Don Klose/CH2M HILL, Gary Giordano/CH2M HILL, Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: April 4, 2003

SUBJECT: Weekly Summary No. 28
March 28 to April 3, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log : Dual Zone Monitor Well (DZMW-1)

On Friday, March 28th, the 14.75-inch diameter pilot hole was advanced between 1,246 feet and 1,620 feet below pad level (bpl). The next day, the pilot hole was advanced to 1,700 feet bpl, the total depth of the well. No drilling or testing activities were performed on Monday. On Tuesday, the pilot hole was geophysically logged between 1,250 feet and 1,700 feet bpl. Static logs performed include X-Y caliper, natural gamma, dual induction, spontaneous potential, sonic porosity/variable density, fluid temperature, fluid conductivity, and flow meter. Dynamic logs include fluid temperature, fluid conductivity, and flow meter. A borehole video was attempted on Tuesday after pumping the well for 24 hours. However, the high turbidity of the formation water prevented an acceptable video log from being performed. No drilling or testing activities were performed on Wednesday or Thursday as the Contractor was on standby for FDEP approval of the DZMW-1 lower monitor zone.

During next week's reporting period, it is anticipated that the 6-inch diameter FRP casing will be installed to 1,630 feet bpl and cemented up to +/- 1,350 feet bpl, pending FDEP approval. Background water samples will be collected from both upper and lower monitor zones after well development activities are complete.

No salt was used to kill the monitor well this reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Lithologic Descriptions
Deviation Survey Record
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: April 11, 2003

SUBJECT: Weekly Summary No. 29
April 4 to April 10, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log : Dual Zone Monitor Well (DZMW-1)

Installation of the 6-inch diameter FRP casing began on Friday, April 4th, and continued through Saturday, April 5th. The FRP was seated to 1,630 feet below pad level (bpl) and cemented in place. Cementing operations continued through Tuesday. On Wednesday, the final stage of annular cement was tagged at 1,351 feet bpl. Both the upper and lower monitor zones (1,250 feet to 1,350 feet bpl and 1,630 feet to 1,700 feet bpl, respectively) were then pump developed in preparation of background water sampling. Pump development continued through the last day of this reporting period.

It is anticipated that background water samples will be collected from both monitor zones early next week. The 6-inch diameter FRP casing will then be pressure tested at 50 psi for a period of 60 minutes. Geophysical logs of the completed well will be performed shortly thereafter.

No salt was used to kill the monitor well this reporting period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

MEMORANDUM

CH2MHILL

TO:	Mike Liggins/BSU	Ron Reese/USGS
	Jack Myers/FDEP	Bill Beddow/CH2M HILL
	Joe Haberfeld/FDEP	Don Klose/CH2M HILL
	Nancy Marsh/USEPA	Gary Giordano/CH2M HILL
	Steve Anderson/SFWMD	Kevin Greuel/YBI

FROM: Dan Jablonski and Mike Weatherby/CH2M HILL

DATE: April 21, 2003

SUBJECT: Weekly Summary No. 30
April 11 to April 17, 2003

PROJECT: **Bonita Springs Utilities RO Deep Injection Well System**
FDEP UIC Permit Number 43980-010-UC

Summary of Engineer's/Driller's Log : Dual Zone Monitor Well (DZMW-1)

On Friday, April 11th, the 6-inch diameter fiberglass reinforced plastic (FRP) casing was internally pressure tested at a starting pressure of 51.00 pounds per square inch (psi). A pressure loss of 0.75 psi was reported at the end of the 1-hour test, which is within FDEP's limit of +/- 5-percent (or +/- 2.55 psi) over 1 hour. Saturday and Sunday were spent air developing the upper and lower monitor zones. On Monday, background water samples were collected from both upper and lower monitor zones. The Contractor spent Tuesday through Wednesday developing the lower monitor zone and conducting geophysical logs. Logs performed include X-Y caliper, gamma ray, and borehole video. Copies of the logs and borehole video will be provided with the final well completion report. No drilling or testing activities were performed on Thursday as the Contractor began demobilizing from the monitor well site.

Subsequent weekly summary reports will not be submitted to the FDEP as the injection well and dual zone monitor well are deemed substantially complete.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Well Water Quality

APPENDIX D

Well Casing Mill Certificates and FRP Specifications

APPENDIX D.1

IW-1 Casing Mill Certificates and FRP Specifications

APPENDIX D.1.1

50-Inch Diameter Steel Casing

TELEPHONE: (416) 259-1113
FAX: (416) 259-6951

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF 1065781 ONTARIO LIMITED
259 HORNER AVENUE
ETOBICOKE, ONTARIO,
CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE May 15/01 CUSTOMER

SPECIFICATION A139B CUSTOMER'S P.O 6631

DIA. & WALL 50" O D X .375 WT PHOENIX REF.# 01-3646

HYDROTEST 420 PSI FOR 1 Min.

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD	TENSILE	% ELONGATION	TRANSVERSE WELD TENSILE	BREAK LOCATION
2843T	4	51300	75600	37.5	78700	PM
2840T	2	50600	74300	37.5	77500	PM

LADLE ANALYSIS CHEMICAL COMPOSITION

HEAT NO	C	MN	S	P	SI	CR	NI	CU	MO	AL
2843T	.17	.88	.005	.007	.24	.03	.01	.02	.01	.036
2840T	.18	.80	.003	.007	.21	.01	.01	.01	.01	.033

The material listed on this report has been tested in accordance with the specification shown above.

Authorized Approval

APPENDIX D.1.2

38-Inch Diameter Steel Casing

TELEPHONE: (416) 259-1113
FAX: (416) 259-9951

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF 1045791 ONTARIO LIMITED
259 HORNER AVENUE
ETOBICOKE, ONTARIO,
CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE Sept.6/02 CUSTOMER Pipe & Piling Supplies

SPECIFICATION A139B CUSTOMER'S P.O 6921

DIA. & WALL 38" O.D. X .375 WT PHOENIX REF.# 02-3825

HYDROTEST 555 PSI FOR 10 Sec.

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD	TENSILE	% ELONGATION	TRANSVERSE WELD TENSILE	BREAK LOCATION
T013314	2	52300	71000	31.0	74400	PM
T013031	5	49300	67300	31.0	71600	PM
T023232	8	50400	70500	29.0	74100	PM
T023263	15	48000	67700	30.0	74500	PM

LADLE ANALYSIS **CHEMICAL COMPOSITION**

HEAT NO	C	MN	S	P	SI	CR	NI	CU	MO	AL
T013314	.16	.70	.03	.025	.20					
T013031	.15	.70	.029	.024	.22					
T023232	.17	.73	.030	.017	.18					
T023263	.17	.70	.028	.013	.21					

The material listed on this report has been tested in accordance with the specification shown above.

Authorized Approval

APPENDIX D.1.3

30-Inch Diameter Steel Casing

Att: Ed Mellen

TELEPHONE: (416) 259-1113
FAX: (416) 259-6351

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF 1061791 ONTARIO LIMITED
269 HORNER AVENUE
ETOBICOKE, ONTARIO,
CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE Oct 11/02 CUSTOMER

SPECIFICATION A1398 CUSTOMER'S P.O. 6921

DIA. & WALL 30" O.D. X .375 WT PHOENIX REF.# 02-3825

HYDROTEST 700 PSI FOR 10 Sec.

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD	TENSILE	% ELONGATION	TRANSVERSE WELD TENSILE	BREAK LOCATION
T033284	1	54200	73800	30.0	77200	PM
T013314	3	52300	71000	31.0	74600	PM
T023263	7	47900	67700	30.0	71200	PM
T033389	10	54500	72300	31.0	75500	PM
T013317	13	52200	70600	27.0	74200	PM
T013418	17	55700	74200	31.0	77600	PM

LADLE ANALYSIS CHEMICAL COMPOSITION

HEAT NO	C	MN	S	P	SI	CR	NI	CU	MO	AL
T033284	.16	.70	.027	.021	.19					
T013314	.16	.70	.030	.025	.20					
T023263	.17	.70	.028	.013	.21					
T033389	.19	.71	.028	.021	.20					
T013317	.16	.73	.027	.015	.17					
T013418	.17	.71	.027	.013	.16					

The material listed on this report has been tested in accordance with the specification shown above.

Authorized Approval

Tony Vasile

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: 10/22/02

SHIPPER NO.: 61743 RELEASE NO.: 26729

FROM: VASS

ADDRESS:

TO: VASS

ADDRESS:

SHIPPED FROM: Truck # 26574 H-15

SIZE: 30X375 WEIGHT: 118.6 GRADE: X42 COUPLING:

RANGE: 3 THREAD: PEB MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	40	7	5GF037						
2	40	7	5G8117						
3	40	7	5G8116						
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIED BY

TOTAL JOINTS 3

TOTAL FOOTAGE 122.1

REMARKS:

TRUCK NO.:

DRIVER:

HTI 001

SAW PIPES USA, Inc
PO Box 2349
Baytown, TX 77522-2349

Metallurgical and Pipe Test Report

PO Date:	PO Number:	This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.	MTR NUMBER
3/25/02	P0042000 30/OW		2692

Customer:

Approved: [signature] Date: 7/2/02

Weld seam inspected by fluoroscopic NDE method.

Ship to Address:

CUSTOMER PICK-UP

API 5L January 2000 42nd Ed.

Diameter	Wall	Grade	Heat Number
30	.375	B/X42 PSL1	5GB187

Hydrotest Results

HYDRO PSI:	HYDRO TIME:
950	10 Seconds (Min)

Physical Testing Results

Trans Body Tensile	Weld Tensile	Guided Bend (weld)	
Yield PSI	Tensile PSI	Root	Face
54525	67664	OK	OK
Tensile PSI	C Width		
66871	1.474		
Elongation-%			
38			
C Width			
1.484			

Weld Tensile Fracture location:
Base Metal

Comments

MEETS NACE MR 0175
DSAW MATERIAL

CERTIFIED COPY

Chemical Analysis Results

Heat	C:	Mn:	P:	S:	Si:	Cu:	Ni:	Cr:	Mo:	Al:	V:	Ti:	Nb:	C.E.
5GB187	0.11	1.01	0.022	0.012	0.21	0.01	0.01	0.02	0.001	0.029	0.006	0.001	0.004	0.29
Product 1	0.09	1.01	0.021	0.014	0.21	0.015	0.011	0.021	0	0.031	0.001	0.002	0.001	0.26
Product 2	0.1	1.01	0.021	0.014	0.21	0.016	0.011	0.021	0	0.032	0.001	0.002	0.001	0.27

Metallurgical and Pipe Test Report

Page 1 of 1

Supplemental Testing Results

PO Date:	PO Number:	This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.	MTR NUMBER
3/25/02	F0042000		26924

Customer:	Ship to Address:	Approved:	Date:
	CUSTOMER PICK-UP		7/7/02

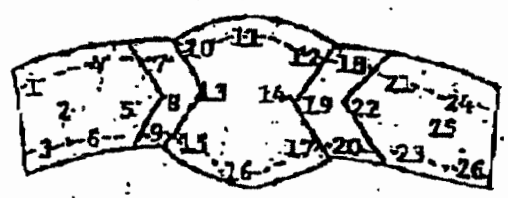
Weld seam inspected by fluoroscopic weld method.

Diameter	Wall	Grade	Heat Number
.30	.375	B/X42 PSL1	5G8187

API 5L January 2000 42nd Edition

CERTIFIED COPY

Hardness Testing Results



Values in Rockwell "B"

01:	77	06:	78	11:	91	16:	81	21:	83	26:	78
02:	80	07:	79	12:	91	17:	80	22:	77		
03:	75	08:	80	13:	89	18:	79	23:	77		
04:	82	09:	85	14:	89	19:	78	24:	81		
05:	84	10:	90	15:	78	20:	76	25:	82		

This page is a supplement to the Metallurgical and Pipe Testing Report. Any distribution of this page must be accompanied by the Metallurgical and Pipe Testing report reflecting matching MTR and HEAT numbers.

SAW PIPES USA, Inc
PO Box 2349
Baytown, TX 77522-2349

Metallurgical and Pipe Test Report

PO Date:	PO Number:	MTR NUMBER
3/25/02	P0042000 30104	26904

This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.

Customer:

Approved: Date: 7/30

Weld seam inspected by fluoroscopic NDE method.

Ship to Address:

CUSTOMER PICK-UP

API 5L January 2000 42nd Ed.

Diameter	Wall	Grade	Heat Number
30	.375	B/X42 PSL1	5G8037

Hydrotest Results

HYDRO PSI:	HYDRO TIME:
950	10 Seconds (Min)

Physical Testing Results

Trans Body Tensile	Weld Tensile	Guided Bend (weld)	
Yield PSI	Tensile PSI	Root	Face
52567	68426	OK	OK
Tensile PSI	C Width		
67885	1.485		
Elongation-%			
38			
C Width			
1.5			

Weld Tensile Fracture location:
Base Metal

Comments

MEETS NACE MR 0175

DSAW MATERIAL

CERTIFIED COPY

Chemical Analysis Results

Heat	C:	Mn:	P:	S:	Si:	Cu:	Ni:	Cr:	Mo:	Al:	V:	Ti:	Nb:	C.E.
5G8037	0.11	1.09	0.024	0.015	0.23	0.01	0.02	0.03	0.001	0.027	0.007	0.001	0.004	0.30
Product 1	0.11	1.08	0.022	0.016	0.22	0.012	0.012	0.023	0.001	0.032	0.002	0.002	0.001	0.30
Product 2	0.11	1.09	0.021	0.017	0.23	0.012	0.012	0.028	0.001	0.004	0.002	0.002	0.001	0.30

Metallurgical and Pipe Test Report

Supplemental Testing Results

PO Date:	PO Number:	This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.	MTR NUMBER
9/25/02	P0042000		26904
Customer:	Ship to Address:	Approved:	Date:
	CUSTOMER PICK-UP		7/3/02

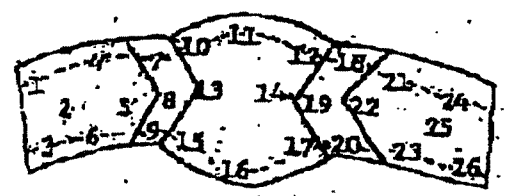
Weld seam inspected by fluoroscopic weld method.

Diameter	Wall	Grade	Heat Number
30	.375	B/X42 PSL1	5G8037

API 5L January 2000 41nd Edition

CERTIFIED COPY

Hardness Testing Results



Values in Rockwell "B"

01:	78	05:	75	11:	91	15:	91	21:	85	28:	76
02:	81	07:	81	12:	90	17:	86	22:	76		
03:	77	08:	80	13:	90	18:	89	23:	80		
04:	84	09:	82	14:	86	19:	79	24:	78		
05:	76	10:	91	15:	82	20:	80	25:	80		

This page is a supplement to the Metallurgical and Pipe Testing Report. Any distribution of this page must be accompanied by the Metallurgical and Pipe Testing report reflecting matching MTR and HEAT numbers.

SAW PIPES USA, Inc
PO Box 2349
Baytown, TX. 77522-2349

Metallurgical and Pipe Test Report

PO Date:	PO Number:	This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.	MTR NUMBER
3/25/02	P0042000 30/ou		26964

Customer:

Approved — Date: 7/2/02

Weld seam inspected by fluoroscopic NDE method.

Ship to Address:

CUSTOMER PICK-UP

API 5L January 2000 42nd Ed.

Diameter	Wall	Grade	Heat Number
30	.375	B/X42 PSL1	5G8117

Hydrotest Results

HYDRO PSI:	HYDRO TIME:
950	10 Seconds (Min)

Physical Testing Results

Trans Body Tensile	Weld Tensile	Guided Bend (weld)	
Yield PSI	Tensile PSI	Root	Face
55869	67923	OK	OK
Tensile PSI	C Width		
69402	1.48		
Elongation-%			
36			
C Width			
1.497			

Weld Tensile Fracture location:
Base Metal

Comments

MEETS NACE MR 0175

DSAW MATERIAL

CERTIFIED COPY

Chemical Analysis Results

Heat	C:	Mn:	P:	S:	Si:	Cu:	Ni:	Cr:	Mo:	Al:	V:	Ti:	Nb:	C.E.
5G8117	0.11	1.1	0.013	0.011	0.24	0.02	0.01	0.01	0.001	0.055	0.006	0.001	0.004	0.30
Product 1	0.09	1.02	0.014	0.009	0.2	0.028	0.016	0.022	0	0.051	0.001	0.002	0.001	0.27
Product 2	0.03	1.04	0.014	0.013	0.2	0.029	0.016	0.022	0	0.052	0.001	0.002	0.001	0.21

12/03/02 TUE 10:07 FAX 8414894545 YOUNGQUIST BROTHERS INC 003
OCT. 22. 2002 3:35PM VASS. PIPE NO. 7510 P. 9

Metallurgical and Pipe Test Report

Supplemental Testing Results

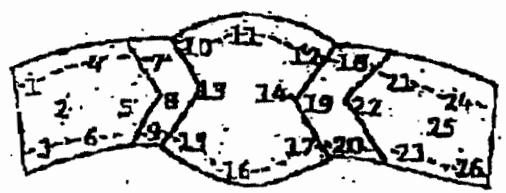
PO Date:	PO Number:	This is to certify that the product described herein was manufactured, sampled and tested in accordance with the specifications and requirements in such specifications.	MTR NUMBER
3/25/02	FD042000		26961
Customer:	Ship to Address:	Approved:	Date:
	CUSTOMER PICK-UP		3/29/02
		Weld seam inspected by fluoroscopic weld method.	

Diameter	Wall	Grade	Heat Number
30	.375	B/X42 PSL1	5G8117

API 5L January 2000 42nd Edition

CERTIFIED COPY

Hardness Testing Results



Values in Rockwell "B"

01:	81	06:	77	11:	92	16:	88	21:	85	26:	78
02:	83	07:	83	12:	91	17:	87	22:	80		
03:	77	08:	81	13:	88	18:	84	23:	92		
04:	75	09:	83	14:	87	19:	81	24:	80		
05:	77	10:	82	15:	87	20:	78	25:	84		

This page is a supplement to the Metallurgical and Pipe Testing Report. Any distribution of this page must be accompanied by the Metallurgical and Pipe Testing report reflecting matching MTR and HEAT numbers.

APPENDIX D.1.4

20-Inch Diameter Steel Casing

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

NOV 19 2002

DATE: 11/6

SHIPPER NO.: 813031

RELEASE NO.: 2752

FROM: Vaz

ADDRESS:

TO:

ADDRESS:

SHIPPED FROM:
Achilles
D-18

SIZE: 10X500 WEIGHT: 104.1 GRADE: API 5CT COUPLING:

RANGE: 3 THREAD: PEB MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	37	-	818541	✓					
2	36	8	818598	✓					
3	43	5	818699	✓					
4	~~40~~	9	818551	✓					
5	37	2	818559	✓					
6	36	3	818592	✓					
7	~~40~~	6	818583	✓					
8	37	6							
9	41	3							
10	41	4							
11	41	7							
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIED BY

TOTAL JOINTS: 11

TOTAL FOOTAGE: 4383

REMARKS:

TRUCK NO.: 02 DRIVER: Jose Flores

HOUSTON TUBULARS INC

HTI

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

NOV 20 2002

DATE: __/__/__

SHIPPER NO. 613080

RELEASE NO.: 27057 #2

FROM: Vass

ADDRESS:

TO:

ADDRESS:

SHIPPED FROM: AlAnyA 58

SIZE: 20 X 500 WEIGHT: 104.1 GRADE: API5L-B COUPLING:

RANGE: 3 THREAD: PEB MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	41	1			✓				
2	41	5							
3	40	3							
4	41	9							
5	42	4							
6	40	7							
7	42								
8	36	5							
9	42	6							
10	42								
11	41	6							
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIED BY Julio TOTAL JOINTS 11 TOTAL FOOTAGE 452.6

REMARKS:

TRUCK NO.: T-129 DRIVER: James Ste

HTI 001

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: NOV 20 2002

SHIPPER NO.: 613108

RELEASE NO.: 20052

FROM: Vaad

ADDRESS:

TO:

ADDRESS:

SHIPPED FROM: Alayna E8

SIZE: 20x.500 WEIGHT: 104.1 GRADE: A106 COUPLING:

RANGE: DRL THREAD: MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	41	6	818614		V				
2	40	-	818766		V				
3	39	5	4		V				
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIED BY

TOTAL JOINTS 3

TOTAL FOOTAGE 121

REMARKS:

TRUCK NO.: HTI 001

DRIVER:

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: NOV 20 2002

SHIPPER NO.: B13108

RELEASE NO.: 27052

FROM: Vass

ADDRESS:

TO:

ADDRESS:

SHIPPED FROM: Achilles D18

SIZE: 20x500 WEIGHT: 104.1 GRADE: A106 COUPLING:

RANGE: DRL THREAD: MAKE: TYPE:

	TIER NO.	TIER NO.	TIER NO.	TIER NO.	TIER NO.
1	37 -	818694	✓		
2	42-5	818597	✓		
3	42-4	818557	✓		
4	40 5	818583	✓		
5	41 5				
6	41 9				
7	36 7				
8	42 1				
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
TL					

TALLIED BY

TOTAL JOINTS 8

TOTAL FOOTAGE 324.8

REMARKS:

TRUCK NO.: DRIVER: Tim Dunn

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1138/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 Piéces 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 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818592 ✓	8	322,4 (98,27)	33607 (15244)

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
818592	0,20	0,71	0,30	0,024	0,013	0,19	0,09	0,17
	Mo 0,05	V 0,00	Al 0,062	Ti 0,003	Nb 0,0000	Ce 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 № 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
818592/14975	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E**	45252 (312)	78465 (541)	36,4			

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 1890 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.

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 вушеименованных 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	
ODDZIAŁ TECHNICZNY ROCH LIBOR		dn. 02.07. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1046/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818561 √	9	348,6 (106,24)	36332 (16480)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la vété 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
818561	0,18	0,97	0,35	0,016	0,008	0,13	0,13	0,22
	Mo 0,06	V 0,00	Al 0,035	Ti 0,003	Nb 0,0000	Ce 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 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
818561/13466	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	51633 (356)	80351 (554)	38,2			

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 1890 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.

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 вушеименованных Испытаний признан годным.

Kontrola Jakości Contróle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	Dyrekcja Huty Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH LIBOR		dn. 18.06. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1047/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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 № и число заказа	Nr zlecenia Ordre No Manuf. Order No Auftrag No № наряда	Nr awizu Avis No Advice No Versandanzeige No № извещения	Nr wagonu Wagen No Car No Wagon No № вагона
PL/271936361/22/1041	4228533/02		

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 - PSL1/2000/ ASTM - A106/A 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818551 √	7	271,0 (82,59)	28243 (12811)

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 Bestellung wurde von der Fabrikationskontrolle durchgeführt. Die Ergebnisse der Proben sind nachstehend angeführt.
Технический контроль вышеупомянугого 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
818551	0,18	0,96	0,34	0,019	0,009	0,06	0,07	0,16
	Mo	V	Al	Ti	Nb	Ce		
	0,02	0,00	0,040	0,003	0,0000	0,36		

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
818551/13476	Hardnes Isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	51343 (354)	78320 (540)	43,9			

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 1890 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.

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	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH LIBOR		dn. 18.06. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1048/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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. mtr.) c. mtr. 1. M. пог. м	Kg lb (kg) кг
Seamless steel pipes acc.to API 5L - PSL1/2000/ ASTM - A106/A 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818559 ✓	8	333,9 (101,77)	34804 (15787)

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 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
818559	0,18	0,96	0,35	0,012	0,006	0,16	0,20	0,18
	Mo 0,04	V 0,00	Al 0,035	Ti 0,003	Nb 0,0000	Ce 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 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
818559/13486	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	52359 (361)	82671 (570)	43,9			

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 1890 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.

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 вушенменованных Испытаний признан годным.

Kontrola Jakości Contróle de Fabrication Control of Manufacture Fabrikationskontrolle Технический контроль	Dyrekcja Huty Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH LIBOR	[illegible]	dn. 18.06. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU № 1137/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818694 ✓	9	376,7 (114,81)	39261 (17809)

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 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
818694	0,18	0,96	0,37	0,017	0,008	0,16	0,12	0,26
	Mo 0,06	V 0,00	Al 0,034	Ti 0,005	Nb 0,0000	Ce 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 Ng 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
818694/14966	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	52359 (361)	82236 (567)	39,4			

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 1890 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.

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 вушеименованных 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	
ROCH LISOR		dn. 01.07. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU № 1049/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41 m)	B / C / X42	818583 ✓	8	324,3 (98,84)	33801 (15332)

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 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
818583	0,18	0,96	0,38	0,013	0,006	0,14	0,08	0,19
	Mo 0,03	V 0,00	Al 0,032	Ti 0,005	Nb 0,0000	Ce 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 treatement Therm. Bearbeitung Термич. обработка	Re psi (MPa)	Rm psi (MPa)	A 2" %	Z %	U	Twardość Dureté Hardness Härte Твердость
818583/13496	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	49458 (341)	80641 (556)	45,9			

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 1890 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.

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	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH LIBOR		dn. 19.06. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1287/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41m)	B / C / X42	818766 ✓	7	284,6 (86,74)	29663 (13455)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Contrôle. 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 würde 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
818766	0,19	0,97	0,37	0,019	0,007	0,05	0,08	0,21
	Mo 0,02	V 0,00	Al 0,038	Ti 0,004	Nb 0,0000	Ce 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
818766/16860	**Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E**	51923 (358)	80206 (553)	43,7			

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 1890 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.

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 вушеименованных 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	
ODBIÓR TECHNICZNY		dn. 23.07. 2002 r.

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1288/EXP/R/02

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/22/1041	4228533/02		

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 - PSL1/2000/ ASTM - A106/A 53/99/ ASME SA 106/01/ SA 53/98. Diameter tolerances +/- 1%. Bevelled ends Acc .to API - 5L Outside surface double lacquered.	20" x 0,500" (508 x 12,7 mm) 36 - 44 ft (10,97 - 13,41m)	B / C / X42	818614 ✓	10	408,2 (124,42)	42548 (19300)

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
Le controle technique de la été exécute par le Service de Contrôle. 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
818614	0,22	0,93	0,33	0,014	0,009	0,06	0,11	0,20
	Mo 0,03	V 0,00	Al 0,039	Ti 0,004	Nb 0,0000	Ce 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 № 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
818614/16870	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transferse Type E	54697 (377)	83687 (577)	38,8			

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 1890 psi - positive results time 5 s

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

Powierzchnię i wymiary zbadano w 100% - Surface et dimensions ont ète 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.

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 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	
ROCH LIBOR		dn. 23.07. 2002 r.

UNITED STATES STEEL

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

TIME: 14:15:21

MILL ORDER/ITEM NO.	SHIPPERS NO	PO NUMBER	
DI05807 03			

MATERIAL COND: AS ROLLED

O.D. 20.000(508.000) in (mm) WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	PLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING											
					DIR	TEST LOC	TEMP	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
X25326 2M3005	OK		XX END OF DATA THIS SHEET XX							*NOTE A							

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

TESTING / INSPECTION INFORMATION

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

ADDITIONAL NOTES/COMMENTS

MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.
*NOTE A SEE ATTACHED REPORT FOR IMPACT RESULTS.
PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C

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

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

DATE 12/13/02

Huta
„BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1995/EXP/R/01

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/nr normy/

Zamawiający STALEXPORT S.A. - KATOWICE
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/271936361/21/1009	4248505/01 LOT NR 3		

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 - PSL 1 / 2000/ ASTM -A 106/ 97/ A53/99/ ASME SA106/ SA53/98. Diameter tolerances + /- 1 %. Bevelled ends acc.to API 5 L. Outside surface double lacquered. Pipes hot finished > 850 st.C. and cooled in still air. Melting proces of the steel : E.	20" x 0,500" (508 x 12,7mm) 10 - 13 m	B/X42	816763	9	347,8 (106,01)	36252 (16444)

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
816763	0,19	0,96	0,35	0,015	0,006	0,10	0,09	0,18
	Mo 0,03	V 0,00	Al 0,036	Ti 0,004	Nb 0,0000			

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
816763/32582	Hardnes isn't Higher than 22 HRe.Pipes in accordance to NACE MR 01-75 Test transferse Type E	51633 (356)	80351 (554)	43,1			

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 1890 psi (13,1 MPa) - 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 – Le material est marqué – Material marked – Das Material wurde bezeichnet – Материал обозначен

Mill's symbol . Seamless, Acc.to API 5 L/ A106/ A53./SA106 / SA53/ B/X42 / PSL 1.
Size in inches. Heat number.

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 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	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH LIBOR	PEŁNOMOCNIK ZARZĄDU Z-CA KIER. DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII mgr inż. MAŁGORZATA ZUZEWICZ	dn. 3.12. 2001 r.

UNITED STATES STEEL

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

TIME: 06:32:40

MILL ORDER/ITEM NO.	SHIPPER'S NO.	PO NUMBER	
0105807-03		113216	

MATERIAL COND: AS ROLLED — OD: 20.000(508.000) in (mm) — WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	SLM COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP DEG F	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
133227 2L3115	OK				T	B	+ 32	FULL	AR	80	84	86	83	40	60	50	50
			** END	OF DATA	THIS	SHEET	**										

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

TESTING / INSPECTION INFORMATION

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

ADDITIONAL NOTES/COMMENTS

MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.
PIPE ALSO MEET THE REQUIRCEMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C

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

PREPARED BY THE OFFICE OF R. AWADELL - MANAGER, Q.A.

DATE 01/24/03

2241225

Huta „BATORY" S.A.
UL. Dyrekcyjna 6
41-506 Chorzów
POLAND

ŚWIADECTWO ODBIORU No 1015/EXP/R/01

CERTYFICAT DE RECEPTION INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS СЕРТИФИКАТ
acc.to EN 10204/3.1.B
/or norm/

Zamawiający STALEXPORT S.A. - KATOWICE
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 № и число заказа	Nr zlecenia Ordre No Manuf. Order No Auftrag No No наряда	Nr awizu Avis No Advice No Versandanzeige No № извещения	Nr wagonu Wagon No Car No Wagon No № вагона
PL/271936361/11/1018	4228503/01		

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'exection (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 Dimension 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. c. mr. c. mr. l. M. пог. м	kg кг
Seamless steel pipes acc.to API 5L - PSL 1 / 2000/ ASTM -A 106/ 97/ A53/97/ ASME SA106/95/ SA53/98 Diameter tolerances +/- 1 %. Bevelled ends acc.to API 5 L. Outside surface double lacquered. Pipes hot finished > 850 st.C. and cooled in still air. Melting proces of the steel : E.	20" x 0,500" 10 - 13 m (508 x 12,7mm)	B/X42	815061	10	123,43	19146

Kontrolę techniczną powyższego zamówienia przeprowadził Oddział Technicznej Kontroli. Wyniki badań podano niżej.
La controle technique de la été exécuté 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 CHEMIQUE - CHEMIKAL COMPOSITION - CHEMISCHE ZUSAMMENSETZUNG ХИМИЧЕСКИЙ СОСТАВ

Wytop Coulée Heat Abstich Плавка	C	Mn	Si	P	S	Cr	Ni	Cu
815061	0,19	0,94	0,35	0,008	0,007	0,07	0,10	0,16
	Mo	V	Al	Ti	Nb			
	0,04	0,00	0,041	0,004	0,00			

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(TYPE 3.1B - IN ACCORDANCE WITH ISO 10474 / EN10204 / DIN50049)

TIME: 06:32:40

MILL ORDER/ITEM NO.	SHIPPER'S NO.	P.O. NUMBER	VEHICLE ID
010507-03		113216	

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

SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-*42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-*99B ASTM A106-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | OD: 20.000(508.000) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE / ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % IN 2"	HARDNESS SCALE: HRB	[illegible] PSI	[illegible]
				MIN 42000 MAX 65000		MIN 70000 MAX 110000	MAX:	MIN: 30.0	MIN: MAX 99.0	1090	5
U33227 2L3119	STRIP/T/B	AR	1.500	48600	.50	78000	0.62	40.0	B 82.0	1090	5
		**	END OF DATA THIS SHEET **								

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

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.* MAX .43
U33227	HEAT		21	608	009	003	24	01	04	02	01	034		001			003					.39
U33227 2L3119	PROD		22	611	008	000	24	01	00	02	01	030		002			001					.42
U33227 2L3119	PROD		20	608	007	007	24	01	01	02	01	033		001			001					.39
				** END OF DATA THIS SHEET **																		

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

APPENDIX D.1.5

14.5-Inch Diameter FRP Tubing

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/BS EN 10204)

TIME: 14:15:21

MILL ORDER/ITEM NO	SHIPPERS NO	P.O. NUMBER	VEHICLE ID	
0I05807 03				

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

SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-*42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-*99B ASTM A106-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | OD: 20.000(508.000) mm (nom) | WALL: 0.500 (12.700) mm (nom)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % IN 2"	HARDNESS SCALE HRB	MIN HYDRO PSI	DATE/SEC
			IN	MIN 42000 MAX 65000		MIN 70000 MAX 110000	MAX	MIN 30.0	NOM MAX 99.0	1890	5
X25326 2M3005	STRIP/T/B	AR	1.500	49300	.50	78500	0.62	43.0	B 85.7	1890	5
			END OF DATA THIS SHEET								

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

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	CE-MAX 2.43
X25326	HEAT	19	108	007	004	26	01	01	02	01	038		001			002		.38
X25326 2M3005	PROD	22	109	007	007	26	01	00	02	01	041		001			001		.41
X25326 2M3005	PROD	22	109	007	007	26	01	00	02	01	039		002			001		.41
		END OF DATA THIS SHEET																

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

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

PAGE 1 OF

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

Nr wytopu lub próby No de la coulée ou De l'éprouvette Heat No Or. Test No Abstich Oder Probe No No плавки или пробы	Stan obróbki Termicznej Traitement thermique Heat treatment Therm. Bearbeitung Термич. обработка	Re Mpa	Rm Mpa	A 2" %	Z %	U	Twardość Dureté Hardness Härte Твердость
815061/16020	Hardnes isn't Higher than 22 HRc.Pipes in accordance to NACE MR 01-75 Test transfers Type E	366	560	39,8			

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 13,1 MPa - positive results time 5 s

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

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

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

Mill's symbol . Seamless, Acc.to API 5 L/ A106/ A53 /SA106 / SA53/ B/X42 / PSL 1.
Size in Inches. Heat number.

Na podstawie wyżej przeprowadzonych prób materiał zwolniono – Sur base des essais ci-dessus le matériel est délivré According to the carried out test the material released – Untersuchungen wurde das Material freigegeben – На основании вышеизложенных испытаний материал годен.

Kontrola Jakości Contrôle de Fabrication Control of Manufacture Fabrikationskontrolle Техническая контроль	Dyrekcja Huty Direction de l'Usine Works Management Hütten - Direktion Дирекция Завода	
KIEROWNIK ODBIORÓW TECHNICZNYCH ROCH UBER	PEŁNOMOCNIK ZARZĄDU Z-CA KIER. DZIAŁU KONTROLI JAKOŚCI I TECHNOLOGII mgr inż. MAŁGORZ...	dn. 22.06. 2001 r.

COMPRESSION EFFECT

COMPRESSION (INPUT)	10,000
MODULUS OF ELASTICITY	2.00E+06
PIPE ID	14.48
PIPE OD	16.05
INTERNAL AREA SQ IN	164.67
EXTERNAL AREA SQ IN	202.32
CROSS SECT AREA SQ IN	37.65
STRESS	266
STRAIN	1.33E-04
DEFL PER FOOT (INCHES)	1.59E-03
DEFL OVER FULL STRING PER 10,000 LBS	**4.29 INCHES**
WT ON BOTTOM PER INCH OF COMPRESSION	**2,331 LBS**

LENGTH AND SPACE OUT

PIPE TALLY:	
THREADS OFF TOTAL	2,721.33
LESS: PUP JOINT	14.83
BOX BY BOX THREAD	0.44
NET FOR 91 FULL JOINTS	2,706
AVERAGE MADE UP LENGTH/JT	29.74
SURFACE TO TOP PACKER	2,694
STINGER EXPOSED HEIGHT FT	0.92
SURFACE TO TOP OF STINGER LESS THREADS	2,693
AVERAGE JOINT LENGTH	29.74
LENGTH OF 90 JOINTS	2,676
LENGTH OF PUP	14.83
TOTAL FIBERGLASS LENGTH AMBIENT	2,691.16
EXPANSION AFTER INSTALL TEMP	0.48
TOTAL FIBERGLASS LENGTH INSTALL	2,691.64
90 JTS & PUP WILL LAND BELOW SURFACE BY:	**1.44 FEET**
AFTER COOLING WILL SHRINK TO:	**1.93 FEET**

TEMPERATURE EFFECT

BOTTOM HOLE TEMP	110	
AMBIENT	80	
DELTA T	15	
TEMPERATURE COEFF OF EXP/FT	1.44E-04	
TOTAL GLASS LENGTH	2,691	
CONTRACTION DUE TO TEMP FULL STRING	**5.81**	**INCHES**
FULL STRING CONTRACTION PER DEGREE F	**0.388**	**INCHES**

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(TYPE B - IN ACCORDANCE WITH EN 10204/3.1B)

DATE: 01/24/03
TIME: 06:25:01

MILL ORDER/ITEM NO.	SHIPPER'S NO.	P.O. NUMBER
0105807 03		113215

MATERIAL CODE: AS ROLLED

O.D.: 20.000(508.000) | WALL: 0.500 (12.700)

PRODUCT IDENTIFICATION	FLAW	BEND	GRAIN SIZE	WELD COLLAPSE	CHARPY V-NOTCH IMPACT TESTING											
					DIR	TEST LOC	TEMP	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
X2S323 2M3006	OK			XX END OF DATA THIS SHEET XX	T	B	+ 32	FULL	AR	68	72	49	63	20	40	30	30

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

TESTING / INSPECTION INFORMATION

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

ADDITIONAL NOTES/COMMENTS

MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.
PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C

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

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

DATE 01/24/03

003

	JOINT NUMBER		CPLG NUMBER		THREADS OFF LENGTH
8401	57		7/17		29.44
8428	32		7/6		30.08
8401	64		8/12		28.56
8401	80		8/17		29.42
8401	75		8/5		29.40
8401	72		8/3		29.42
8401	12		9/15		29.47
8401	53		9/14		29.38
8401	21		9/17		29.45
8401	65		9/8		29.51
8401	74		9/7		29.38
8401	61		9/6		29.95
8401	35		9/5		29.46
8428	56		7/8		30.11
8401	83		9/11		29.51
8401	40		9/4		29.51
8401	25		8/2		29.44
8401	13		8/4		29.93
8401	10		9/18		29.91
8428	59		7/10		30.10

	JOINT NUMBER		CPLG NUMBER		THREADS OFF LENGTH
8401	70		9/10		29.95
8428	30		7/3		30.08
8401	45		9/9		29.45
8401	62		9/15		29.97
8401	16		8/15		29.46
8401	36		1/4		29.93
8428	69		7/13		30.08
8401	63		3/10		29.92
8401	46		9/3		29.41
8401	42		8/7		29.36
8401	81		9/16		29.34
8401	6		8/9		29.13
8401	60		9/12		29.93
8428	105		8/8		29.44
8401	66		8/13		29.45
8401	84		9/13		29.41
8401	9		8/14		29.30
8401	67		8/10		29.40
8401	19		2/13		29.91
8401	73		5/12		29.93

	JOINT NUMBER		CPLG NUMBER		THREADS OFF LENGTH	
8428	20		3/11		29.94	
8401	7		3/15		29.95	
8401	14		5/7		29.95	
8401	26		3/2		29.94	
8401	3		1/2		29.10	
8401	20		5/14		29.92	
8428	23		3/5		29.93	
8401	15		2/1		29.47	
8401	22		5/5		29.93	
8401	49		3/4		29.92	
8401	18		3/9		29.90	
8428	45		7/18		30.02	
8401	71		3/1		29.93	
8401	1		5/15		28.49	
8428	21		2/6		29.93	
8428	17		2/7		29.93	
8401	55		1/5		29.92	
8401	78		5/2		29.90	
8401	30		7/9 2/16		30.91	END TO END
8401	76		5/8		29.92	

DUNGQUIST BROTHERS
16" RB 1250
JOB: 8401/8428 TRDS OFF REQU 2,680.00
PIPE TALLEY (41.33)
91 FULL LENGTH
1 PUP JNT TOTAL FOOTAGE 2,721.33

	JOINT NUMBER		CPLG NUMBER		THREADS OFF LENGTH
8401	24		3/10		29.94
8428	11		2/9		29.95
8401	38		2/3		29.96
8428	18		2/8		29.92
8401	33		2/10		29.92
8428	16		1/7		29.93
8428	10		1/6		29.94
8401	5		2/5		29.52
8428	15		3/8		29.92
8401	58		3/4		29.93
8401	32		2/12		29.98
8428	19		1/10		29.97
8401	41		5/6		29.94
8401	48		2/11		29.95
8401	69		2/2		29.93
8428	47		7/11		30.07
8428	102		8/11		29.32

VOLUME AND DISPLACEMENT

PIPE AVERAGE BODY ID:	14.48	
PIPE AVERAGE LENGTH LESS J/JT INCHES	356.44	
PIPE BODY VOLUME/JT CU FT	33.97	
J LENGTH	0.40	
J ID	15.77	
J VOLUME/JT	0.05	
TOTAL INTERNAL VOLUME/JT	34.01	
INTERNAL VOLUME PER FOOT OF GLASS	**1.14**	**CU FT**
CPLG OD	18.20	
CPLG LENGTH	11.30	
CPLG VOLUME	1.70	
UPSET OD	16.60	
UPSET LENGTH	54.75	
UPSET VOLUME	6.86	
BODY OD	16.10	
BODY LENGTH	290.79	
BODY VOLUME	34.26	
TOTAL VOLUME PER GLASS JT	42.82	
STEEL CASING ID	19.00	
STEEL INTERNAL VOLUME PER FT	1.97	CU FT

	CU FT	**GAL**
FIBERGLASS ID VOLUME PER FT	**1.14**	**8.56**
FIBERGLASS OD VOLUME PER FT	**1.44**	**10.77**
CASING VOLUME PER FT	**1.97**	**14.73**
ANULAR VOLUME PER FT	**0.53**	**3.96**

WEIGHT

FIBERGLASS MATL VOLUME/JT	8.80	
S.G.	1.95	
PIPE WEIGHT/JT	1,072	
DISPLACED WATER WEIGHT FRESH	550	
PIPE WEIGHT SUBMERGED FRESH/JT	522	
PIPE WEIGHT SUBMERGED FRESH/FT	**17.56**	**LBS**
FULL STRING SUBMERGED FRESH WT	**47,257**	**LBS**
FIBERGLASS MATL VOLUME	8.80	
S.G.	1.95	
PIPE WEIGHT IN AIR/JT	1,071.85	
BRINE WEIGHT PER CU FT	65.44	
DISPLACED WATER WEIGHT BRINE/JT	576.17	
PIPE WEIGHT SUBMERGED BRINE/JT	**495.68**	**LBS**
FULL STRING SUBMERGED FRESH WT	**44,859**	**LBS**

	JOINT NUMBER		CPLG NUMBER		THREADS OFF LENGTH	
8428	12		2/4		29.97	
8401	2		1/4		29.47	
8401	17		5/9		29.92	
8401	77		5/1		29.92	
8401	52		2/15		29.94	
8401	28		6/14		29.96	
8428	22		1/13		29.90	
8401	56		2/14		29.91	
8401	68		3/3		28.68	
8401	51		5/17		29.94	
8401	79		3/16		29.92	
8401	23		5/13		29.93	
8401	59		5/10		29.85	
8401	1		7/5		14.83	PUP JOINT
8401	82		3/17		29.92	

APPENDIX D.2

DZMW-1 Casing Mill Certificates and FRP Specifications

APPENDIX D.2.1

24-Inch Diameter Steel Casing

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: 1.3.03

SHIPPER NO.: C97

RELEASE NO.: 27434

FROM: Vass

ADDRESS:

TO: Vass

ADDRESS:

SHIPPED FROM:
Angara V7
Pitch 3/E16

SIZE: 24 X375 WEIGHT: 94.62 GRADE: A53B COUPLING:

RANGE: 3 THREAD: PEB MAKE: TYPE:

Suggested heat #s

	TIER NO.	TIER NO.	TIER NO.	TIER NO.	TIER NO.
1	42 2	~~59176 L~~	59179L ✓		59171L ✓
2	X	~~92952L~~	92751L ✓		92753L ✓
3	4	608779 ✓			59172L ✓
4		608791Q ✓			
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17		TALLIES PROVIDED BY VASS PIPE & STEEL CO.			
18					
19					
20					
TL					

TALLIED BY

TOTAL JOINTS 4

TOTAL FOOTAGE 168.8

REMARKS:

TRUCK NO.: 2537L DRIVER: Michael Williams

Form No. : 18A
Revision : 5

Serie B No. : 0984145

MILL'S INSPECTION CERTIFICATE

Bakrie Pipe Industries

Jl. Raya Pejuang
Medan Satria 17131
Bekasi, Indonesia

Article Specification : NEW PRIME ERW STEEL PIPE PER API 5LX-42(PSL 1)/API 5LB/ ASTM A53B/ASME SA53B QUADRUPLE STENCILED, BLACK PLAIN BEVELED END, BLACK VARNISH COATED

Customer :

Contract No. : P.O.No.#: 11183-NJ-HIN-1 GULF COAST, HOUSTON, TEXAS

SPMB No.: B.2.1599/ ✓
M/C No. : 3799/QAE/VI/02
Date : June 13,2002

Shipper : ANGARA V.007

Item No.	Mill Work No.	Test No.	Ordered Sizes			Delivered Quantity		Description of Inspection & Test							
			Inside/Outside Diameter	Thickness	Length	No. of Pieces & Total Length	Net Weight	Surface & Dimension	Hydrostatic Kg/cm/PSI/BAR	Flattening	Ultrasonic	Weld Ductility	Impact	Ratio Yield to Tensile Strenght	Heat Treatment
1 to 219			24" or 609.6mm	0.500" or 12.70mm	42.Feet per Piece	219 Pcs 9,198.000 Feet	524,091 Kgs	Sound	Sound	Sound	Sound	Sound	-	Sound	Sound

Test No.	Heat No.	Yield Strength PSI/MPa	Tensile Strength PSI/MPa	Gauge Length In	Elongation %	Hardness (HRB/HV 10)	Chemical Analysis (%) C	Si	Mn	P	S	Mo	Cr	V	Ni	Remarks
		See Attachment to Mill's Inspection Certificate														
		Attachment Products Analysis														
Standard	MAX															
	MIN															

We hereby certify that material described herein has been duly inspected in accordance with the above specification.

PT. Bakrie Pipe Industries

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

Ir. Endang Kusnadi
QA / QC Manager

CUSTOMER (ORIGINAL)

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3799/QAEM/02
Date : June ,13, 2002
Page : 1 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength (Psi)	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)												
				Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
1	421919 000001 000003	92753L	48528	-	66505	76831	2	42.13	1580	0.160	0.185	1.000	0.012	0.005	0.046	0.025	0.038	0.008	0.006	0.001	0.003	0.115
										0.150	0.189	1.010	0.012	0.006	0.048	0.035	0.038	0.008	0.006	0.002	0.005	0.127
2	421919 000003 000040	03839L	51003	-	67814	77059	2	43.50	1580	0.110	0.193	0.950	0.017	0.003	0.030	0.025	0.035	0.008	0.005	0.001	0.002	0.095
										0.100	0.194	0.952	0.017	0.003	0.030	0.023	0.035	0.008	0.005	0.002	0.004	0.093
3	421919 000004 000052	93161L	50974	-	65368	76092	2	40.35	1580	0.120	0.198	0.892	0.012	0.005	0.045	0.037	0.039	0.007	0.004	0.007	0.004	0.125
										0.130	0.199	0.892	0.012	0.005	0.045	0.036	0.039	0.007	0.005	0.002	0.004	0.125
4	421919 000006 000077	59179L	48658	-	66676	76575	2	41.34	1580	0.110	0.196	0.956	0.016	0.003	0.031	0.027	0.035	0.008	0.005	0.002	0.004	0.098
										0.140	0.201	0.949	0.016	0.003	0.031	0.038	0.038	0.008	0.005	0.005	0.007	0.110
5	421919 000007 000095	81234Q	45883	-	65922	75224	2	40.35	1580	0.130	0.213	0.911	0.015	0.007	0.039	0.026	0.038	0.008	0.005	0.001	0.003	0.108
										0.120	0.215	0.904	0.015	0.007	0.040	0.026	0.038	0.007	0.006	0.002	0.005	0.110
6	421919 000008 000108	96165L	51145	-	67544	73161	2	41.34	1580	0.130	0.217	0.858	0.015	0.009	0.024	0.021	0.035	0.008	0.005	0.001	0.002	0.085
										0.120	0.220	0.851	0.015	0.009	0.024	0.028	0.035	0.008	0.004	0.002	0.003	0.091
7	421919 000009 000124	59172L	47219	-	67302	75267	2	39.93	1580	0.140	0.218	0.885	0.014	0.005	0.016	0.022	0.031	0.007	0.005	0.001	0.005	0.074
										0.140	0.217	0.884	0.013	0.005	0.016	0.026	0.031	0.007	0.005	0.001	0.004	0.077
8	421919 000011 000154	58942L	45541	-	67871	73958	2	38.98	1580	0.120	0.213	0.867	0.008	0.005	0.053	0.017	0.043	0.009	0.005	0.003	0.003	0.118
										0.150	0.214	0.874	0.008	0.005	0.053	0.020	0.043	0.009	0.005	0.002	0.004	0.121
9	421919 000015 000210	59180L	51529	-	68824	77059	2	41.73	1580	0.100	0.210	0.864	0.015	0.007	0.028	0.032	0.037	0.007	0.005	0.001	0.004	0.102
										0.100	0.209	0.859	0.015	0.008	0.028	0.029	0.036	0.007	0.005	0.001	0.004	0.098
10	421919 000016 000224	59171L	43308	-	65524	74300	2	39.76	1580	0.110	0.197	0.956	0.016	0.003	0.031	0.029	0.035	0.008	0.005	0.002	0.004	0.100
										0.110	0.197	0.957	0.016	0.004	0.031	0.024	0.034	0.008	0.005	0.002	0.004	0.094
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			29.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			29.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.060	-	-	1.000
	2000 year edition	MIN	35000		60000			29.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.060	-	-	1.000
	2000 year edition	MIN	35000		60000			29.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejtang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3799/QAE/VI/02
Date : June ,13, 2002
Page : 2 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)													
			(Psi)	Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
11	421919 000017 000232	58935L	44759	-	65951	74655	2	42.52	1580	0.170 0.160	0.215 0.210	0.886 0.894	0.010 0.009	0.007 0.006	0.024 0.024	0.026 0.016	0.035 0.034	0.007 0.007	0.005 0.005	0.003 0.001	0.008 0.004	0.090 0.078
12	421919 000018 000251	58938L	42469	-	64913	74058	2	42.13	1580	0.180 0.170	0.218 0.215	0.859 0.852	0.007 0.007	0.005 0.005	0.041 0.041	0.047 0.040	0.036 0.035	0.012 0.012	0.005 0.005	0.002 0.002	0.005 0.004	0.129 0.121
13	421919 000019 000260	59175L	49239	-	68340	76746	2	39.76	1580	0.130 0.130	0.208 0.210	0.879 0.871	0.015 0.015	0.007 0.007	0.021 0.021	0.014 0.021	0.030 0.031	0.006 0.006	0.004 0.005	0.001 0.002	0.002 0.004	0.069 0.078
14	421919 000022 000306	03840L	51173	-	65937	74456	2	41.93	1580	0.130 0.120	0.229 0.227	0.849 0.859	0.010 0.010	0.005 0.005	0.037 0.038	0.034 0.031	0.059 0.059	0.009 0.009	0.005 0.004	0.001 0.001	0.004 0.004	0.135 0.132
15	421919 000023 000320	59011L	45399	-	64201	74271	2	41.54	1580	0.160 0.140	0.231 0.232	0.873 0.874	0.010 0.009	0.007 0.006	0.030 0.030	0.016 0.017	0.033 0.033	0.007 0.008	0.005 0.005	0.002 0.001	0.004 0.004	0.084 0.085
16	421919 000024 000333	81235Q	48528	-	67188	74740	2	43.70	1580	0.150 0.150	0.235 0.249	0.865 0.845	0.011 0.009	0.006 0.006	0.022 0.022	0.014 0.042	0.032 0.034	0.006 0.007	0.004 0.004	0.001 0.004	0.006 0.007	0.072 0.102
17	421919 000026 000362	92903L	44674	-	65368	74897	2	38.09	1580	0.130 0.130	0.229 0.231	0.872 0.874	0.009 0.009	0.006 0.006	0.030 0.029	0.022 0.023	0.034 0.034	0.008 0.008	0.005 0.005	0.002 0.002	0.008 0.008	0.091 0.091
18	421919 000027 000376	77822L	51116	-	72223	79021	2	39.76	1580	0.160 0.140	0.246 0.245	0.914 0.917	0.016 0.016	0.008 0.009	0.038 0.038	0.023 0.021	0.037 0.036	0.007 0.007	0.010 0.013	0.002 0.002	0.007 0.007	0.108 0.108
19	421919 000028 000390	60187Q	51131	-	63476	71199	2	42.13	1580	0.150 0.150	0.245 0.249	0.871 0.860	0.009 0.010	0.004 0.004	0.035 0.035	0.009 0.018	0.039 0.040	0.007 0.007	0.003 0.004	0.003 0.004	0.004 0.006	0.086 0.097
20	421919 000029 000403	60866Q	42682	-	64016	74200	2	33.86	1580	0.080 0.100	0.229 0.233	0.875 0.873	0.008 0.010	0.005 0.005	0.037 0.029	0.014 0.016	0.035 0.034	0.007 0.007	0.005 0.004	0.002 0.002	0.005 0.005	0.091 0.083
Standard API 5LB		MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
2000 year edition		MIN	35000		60000			29.00														
Standard API 5LX-42		MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
2000 year edition		MIN	42000		60000			29.00														
Standard ASTM A53B		MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
2000 year edition		MIN	35000		60000			29.00														
Standard ASME SA53B		MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
2000 year edition		MIN	35000		60000			29.00														

ote :1-> Cu+Cr+Ni+V = 1.000 %

ve materials has been manufactured, sampled tested, and inspected in accordance with
ls specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3799/QAE/VI/02
Date : June ,13, 2002
Page : 3 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)													
			(Psi)	Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
21	421919 000030 000415	60867Q	47035	-	64102	73759	2	40.26	1580	0.130	0.228	0.876	0.006	0.001	0.041	0.015	0.035	0.008	0.004	0.002	0.003	0.095
										0.130	0.231	0.869	0.007	0.001	0.040	0.022	0.035	0.008	0.005	0.003	0.003	0.102
22	421919 000032 000439	60196Q	51444	-	72308	79263	2	39.96	1580	0.160	0.364	1.116	0.012	0.005	0.040	0.011	0.038	0.008	0.009	0.002	0.002	0.098
										0.140	0.368	1.112	0.012	0.005	0.041	0.016	0.038	0.008	0.009	0.003	0.003	0.104
23	421919 000033 000454	80625Q	51728	-	69962	80287	2	41.54	1580	0.130	0.311	1.141	0.014	0.006	0.065	0.023	0.038	0.007	0.005	0.003	0.005	0.131
										0.140	0.315	1.140	0.015	0.006	0.065	0.027	0.038	0.007	0.005	0.003	0.006	0.135
24	421919 000035 000484	80559Q	52354	-	70289	78680	2	40.75	1580	0.140	0.232	0.883	0.007	0.001	0.041	0.027	0.036	0.006	0.005	0.002	0.003	0.109
										0.140	0.232	0.883	0.007	0.001	0.040	0.024	0.036	0.008	0.005	0.002	0.004	0.105
25	421919 000036 000500	58381L	52325	-	69663	77997	2	43.41	1580	0.120	0.273	0.843	0.020	0.004	0.063	0.028	0.040	0.009	0.005	0.002	0.002	0.136
										0.120	0.278	0.836	0.020	0.004	0.063	0.037	0.040	0.009	0.006	0.040	0.005	0.146
26	421919 000037 000510	77769L	51913	-	71640	79277	2	41.14	1580	0.140	0.245	0.892	0.014	0.002	0.030	0.013	0.034	0.007	0.009	0.002	0.003	0.086
										0.160	0.247	0.887	0.014	0.003	0.029	0.020	0.034	0.007	0.009	0.003	0.004	0.092
27	421919 000038 000525	80739Q	51984	-	71128	81326	2	38.19	1580	0.160	0.366	1.115	0.012	0.004	0.040	0.012	0.038	0.008	0.009	0.002	0.002	0.099
										0.140	0.368	1.108	0.012	0.005	0.041	0.016	0.038	0.008	0.009	0.003	0.004	0.104
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			29.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			29.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			29.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			29.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

PT. Bakrie Pipe Industries
P.T. BAKRIE PIPE INDUSTRIES JAKARTA
(Ir. Erdang Kusnadi)
QA/QC Manager

Form No. : 18A
Revision : 5

Serie B No. : 0984144

MILL'S INSPECTION CERTIFICATE

Bakrie Pipe Industries

Jl. Raya Pejuang
Medan Satria 17131
Bekasi, Indonesia

Article Specification : NEW PRIME ERW STEEL PIPE PER API 5LX-42(PSL 1)/API 5LB/ ASTM A53B/ASME SA53B QUADRUPLE STENCILED, BLACK PLAIN BEVELED END, BLACK VARNISH COATED

Customer :

Contract No. : P.O.No.#: 11183-NJ-HIN-1 GULF COAST, HOUSTON, TEXAS

SPMB No.: B.2.1599/ ✓
M/C No. : 3661/QAE/VI/02
Date : June 8,2002

Shipper : ANGARA V.007

Item No.	Mill Work No.	Test No.	Ordered Sizes: Inside/Outside Diameter	Ordered Sizes: Thickness	Ordered Sizes: Length	Delivered Quantity: No. of Pieces & Total Length	Delivered Quantity: Net Weight	Description of Inspection & Test: Surface & Dimension	Hydrostatic Kg/cm/PSI/BAR	Flattening	Ultrasonic	Weld Ductility	Impact	Ratio Yield to Tensile Strenght	Heat Treatment
1 to 211			✓ 24" or 609.6mm	0.375" or 9.52mm	42 Feet per Piece	211 Pcs 8,862.000 Feet	380,724 Kgs	Sound	Sound	Sound	Sound	Sound	-	Sound	Sound

Test No.	Heat No.	Yield Strength PSI/MPa	Tensile Strength PSI/MPa	Gauge Length In	Elongation %	Hardness (HRB/HV 10)	Chemical Analysis (%): C	Si	Mn	P	S	Mo	Cr	V	Ni	Remarks
			See Attachment to Mill's Inspection Certificate													
			Attachment Products Analysis													
Standard	MAX															
	MIN															

We hereby certify that material described herein has been duly inspected in accordance with the above specification.

PT. Bakrie Pipe Industries

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

Ir. Endang Kusnadi
QA / QC Manager

CUSTOMER (ORIGINAL)

PT: BAKRIE PIPE INDUSTRIES
JL. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3661/QAE/W02
Date : June ,08, 2002

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength (Psi)	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)												
				Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	I
1	421918 000001 000007	59179L	48642	-	69990	72052	2	36.22	1180	0.140	0.207	0.886	0.007	0.003	0.032	0.032	0.034	0.008	0.004	0.001	0.001	0.102
										0.140	0.209	0.906	0.008	0.003	0.033	0.033	0.034	0.008	0.004	0.001	0.001	0.104
2	421918 000004 000079	60875Q	49196	-	70218	75053	2	36.02	1180	0.095	0.205	0.866	0.010	0.004	0.056	0.103	0.039	0.008	0.006	0.004	0.004	0.204
										0.130	0.196	0.869	0.011	0.004	0.055	0.090	0.039	0.009	0.009	0.004	0.004	0.193
3	421918 000007 000121	92751L	43493	-	65638	74029	2	38.58	1180	0.110	0.223	0.913	0.007	0.004	0.038	0.020	0.037	0.008	0.005	0.002	0.002	0.100
										0.120	0.228	0.920	0.007	0.004	0.039	0.025	0.038	0.009	0.005	0.002	0.002	0.107
4	421918 000011 000190	58935L	47404	-	66186	76177	2	36.81	1180	0.130	0.258	1.018	0.013	0.002	0.030	0.026	0.037	0.008	0.006	0.002	0.002	0.099
										0.140	0.259	1.022	0.013	0.002	0.030	0.028	0.036	0.008	0.006	0.003	0.003	0.100
5	421918 000013 000244	58938L	47603	-	66249	74556	2	40.16	1180	0.150	0.209	0.904	0.007	0.002	0.041	0.069	0.041	0.019	0.005	0.002	0.002	0.178
										0.140	0.213	0.903	0.007	0.003	0.042	0.097	0.041	0.020	0.005	0.003	0.003	0.185
6	421918 000016 000288	58933L	48002	-	68824	78637	2	38.09	1180	0.120	0.225	0.955	0.009	0.004	0.023	0.077	0.039	0.012	0.004	0.004	0.004	0.143
										0.160	0.219	0.960	0.009	0.004	0.023	0.061	0.037	0.012	0.005	0.004	0.004	0.126
7	421918 000021 000381	81235Q	45029	-	67544	72664	2	37.99	1180	0.160	0.239	0.896	0.009	0.004	0.022	0.029	0.034	0.008	0.005	0.004	0.007	0.090
										0.160	0.238	0.898	0.009	0.004	0.022	0.033	0.034	0.008	0.005	0.004	0.006	0.094
8	421918 000022 000396	92903L	43152	-	67302	76874	2	37.99	1180	0.160	0.228	0.909	0.008	0.005	0.030	0.019	0.033	0.009	0.005	0.003	0.003	0.087
										0.140	0.229	0.903	0.008	0.005	0.030	0.020	0.033	0.009	0.005	0.007	0.014	0.088
9	421918 000023 000417	58943L	44986	-	67871	72294	2	38.19	1180	0.150	0.240	0.845	0.012	0.009	0.064	0.069	0.040	0.009	0.006	0.005	0.007	0.179
										0.150	0.227	0.866	0.011	0.007	0.063	0.036	0.038	0.008	0.005	0.007	0.007	0.142
10	421918 000026 000468	03425L	42441	-	64657	77898	2	37.99	1180	0.110	0.240	0.925	0.006	0.004	0.034	0.036	0.035	0.009	0.005	0.005	0.007	0.110
										0.120	0.240	0.920	0.006	0.004	0.035	0.035	0.035	0.009	0.004	0.004	0.007	0.109
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with his specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3661/QAEA/I/02
Date : June ,08, 2002
Page : 3 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)												
			(Psi)	Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
21	421918 000055 001037	93165L	45427	-	68340	75437	2	40.16	1180	0.160	0.216	0.902	0.009	0.004	0.036	0.024	0.046	0.009	0.005	0.002	0.002	0.111
										0.160	0.218	0.907	0.009	0.004	0.036	0.023	0.046	0.010	0.005	0.002	0.003	0.110
22	421918 000057 001079	93167L	42626	-	64145	73560	2	41.54	1180	0.120	0.204	0.885	0.008	0.003	0.042	0.026	0.037	0.009	0.005	0.002	0.002	0.110
										0.120	0.207	0.880	0.009	0.003	0.042	0.031	0.037	0.009	0.005	0.003	0.003	0.115
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

PT. Bakrie Pipe Industries

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

(Ir. Tedjang Kusnadi)
QA/QC Manager

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1699
Mill No. : 3661/QAE/VI/02
Date : June ,08, 2002
Page : 2 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength (Psi)	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)													
				Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
11	421918 000027 000486	60876Q	45627	-	68824	77741	2	39.37	1180	0.130	0.239	0.943	0.011	0.004	0.066	0.024	0.041	0.009	0.005	0.003	0.003	0.136
										0.150	0.242	0.925	0.011	0.004	0.067	0.037	0.041	0.009	0.005	0.007	0.007	0.150
12	421918 000031 000561	60877Q	42498	-	65524	74681	2	39.96	1180	0.150	0.227	0.864	0.011	0.007	0.063	0.027	0.037	0.009	0.004	0.003	0.003	0.131
										0.150	0.225	0.879	0.011	0.007	0.063	0.023	0.038	0.009	0.004	0.002	0.003	0.128
13	421918 000034 000617	60871Q	46466	-	65126	74484	2	39.57	1180	0.110	0.247	0.906	0.008	0.004	0.027	0.028	0.034	0.008	0.005	0.006	0.006	0.094
										0.130	0.246	0.870	0.008	0.005	0.026	0.032	0.034	0.008	0.005	0.010	0.010	0.097
14	421918 000038 000699	60866Q	45513	-	69066	75679	2	38.48	1180	0.150	0.242	0.881	0.009	0.005	0.034	0.028	0.034	0.009	0.005	0.003	0.005	0.101
										0.160	0.242	0.878	0.009	0.004	0.035	0.035	0.034	0.009	0.006	0.004	0.050	0.109
15	421918 000039 000714	92752L	42782	-	64770	75836	2	41.73	1180	0.120	0.244	0.930	0.007	0.002	0.065	0.019	0.038	0.009	0.005	0.002	0.003	0.127
										0.120	0.244	0.924	0.007	0.002	0.065	0.024	0.039	0.009	0.005	0.002	0.003	0.133
16	421918 000043 000784	60188Q	45427	-	69919	77343	2	40.16	1180	0.120	0.201	0.884	0.007	0.003	0.043	0.021	0.037	0.008	0.005	0.002	0.002	0.106
										0.130	0.203	0.881	0.008	0.003	0.043	0.023	0.037	0.009	0.005	0.002	0.002	0.108
17	421918 000044 000796	03839L	42498	-	66321	74797	2	41.93	1180	0.130	0.187	0.975	0.015	0.003	0.029	0.026	0.034	0.009	0.005	0.002	0.001	0.094
										0.140	0.187	0.964	0.014	0.003	0.030	0.029	0.035	0.009	0.005	0.004	0.004	0.099
18	421918 000045 000813	59176L	45171	-	68554	70915	2	34.25	1180	0.150	0.227	0.866	0.008	0.009	0.021	0.042	0.033	0.009	0.005	0.005	0.005	0.101
										0.140	0.227	0.880	0.008	0.009	0.020	0.034	0.033	0.008	0.005	0.004	0.004	0.092
19	421918 000048 000879	93159L	43991	-	64600	73688	2	42.13	1180	0.140	0.202	0.885	0.008	0.003	0.042	0.022	0.037	0.009	0.006	0.003	0.002	0.106
										0.140	0.210	0.849	0.008	0.004	0.041	0.039	0.036	0.009	0.004	0.004	0.007	0.120
20	421918 000054 001018	93164L	44631	-	63676	75537	2	37.99	1180	0.150	0.217	0.904	0.009	0.004	0.036	0.028	0.047	0.010	0.005	0.002	0.008	0.116
										0.150	0.218	0.904	0.008	0.004	0.035	0.027	0.047	0.010	0.004	0.002	0.002	0.113
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

Serie B No. : 0986821

Form No. : 18A
Revision : 5

Bakrie Pipe Industries

A. Raya Pejuang
Medan Satria 17131
Bekasi, Indonesia

MILL'S INSPECTION CERTIFICATE

Article Specification : NEW PRIME ERW STEEL PIPE PER API 5LX-42 (PSL 1)/API 5LB (PSL 1) ASTM A53B/ASME SA53B QUADRUPLE STENCILED, BLACK PLAIN END BEVELED (30 DEGREE) BLACK VARNISH COATED

Customer :

Contract No. : Order No. PO #: 12412-NJ
GULF COAST, HOUSTON, TEXAS

SPMB No.: B.2.2628
M/C No. : 5889/QAB/VIII/0
Date : August 30, 2002

Shipper : MV. YOU SHENG V-003

Item No.	Mill Work No.	Test No.	Ordered Sizes: Inside/Outside Diameter	Ordered Sizes: Thickness	Ordered Sizes: Length	Delivered Quantity: No. of Pieces & Total Length	Delivered Quantity: Net Weight	Description of Inspection & Test: Surface & Dimension	Hydrostatic Kg/cm2/PSI/BAR	Flattening	Ultrasonic	Weld Ductility	Impact	Ratio Yield to Tensile Strenght	Heat Treatment
1 to 83			24" or 609.6mm	0.375" or 9.52mm	42 Feet per Piece	83 Pcs 3,486.000 Feet	149,763 Kgs	Sound	Sound	Sound	Sound	Sound	-	-	Sound

Test No.	Heat No.	Yield Strength PSI/MPa	Tensile Strength PSI/MPa	Gauge Length In	Elongation %	Hardness (HRB/HV 10)	Chemical Analysis (%): C	Si	Mn	P	S	Mo	Cr	V	Ni	Remarks
			See Attachment to Mill's Inspection Certificate													
			Attachment Products Analysis													
Standard	MAX															
	MIN															

We hereby certify that material described herein has been duly inspected in accordance with the above specification.

PT. Bakrie Pipe Industries
P.T. BAKRIE PIPE INDUSTRIES JAKARTA
Ir. Endang Kusnadi
QA / QC Manager

YOUNGQUIST BROTHERS, INC.
H... viewed This Shop Drawing/Submittal
Y... ection No. # 02674-11-A
Tr... mittal No. # Date: 3/12/03
Signature

CUSTOMER (ORIGINAL)

AKRIE PIPE INDUSTRIES
,taya Pejuang
dan Setia 17131-Bekasi, Indonesia

SPMB : B.2.2628
Mill No. : 5889/QAEA/III/02
Date : Aug ,30, 2002
Page : 1 of 2

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength (Psi)	Tensile Strength (Psi)			Gauge Length (inc)	Elong (%)	Hydro (Psi)	Chemical Analysis (%)												
				Long	Trans	Weld				C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
1	423032 000001 000010	69382L	43735	-	69592	73389	2	37.60	1180	0.180	0.260	0.888	0.012	0.004	0.022	0.036	0.042	0.008	0.009	0.004	0.004	0.109
										0.170	0.262	0.908	0.012	0.004	0.022	0.034	0.042	0.008	0.009	0.004	0.003	0.107
2	423032 000002 000031	04368Q	42953	-	66406	71583	2	38.19	1180	0.160	0.231	0.857	0.015	0.005	0.021	0.042	0.043	0.008	0.009	0.002	0.004	0.115
										0.160	0.231	0.858	0.015	0.005	0.022	0.046	0.043	0.009	0.009	0.008	0.006	0.120
3	423032 000004 000074	04368Q	42313	-	70659	73475	2	37.50	1180	0.130	0.246	0.943	0.013	0.004	0.033	0.042	0.043	0.009	0.013	0.008	0.004	0.131
										0.150	0.246	0.945	0.013	0.005	0.033	0.043	0.043	0.009	0.013	0.008	0.007	0.132
4	423032 000009 000161	69489L	42213	-	64500	75380	2	41.54	1180	0.170	0.225	0.896	0.021	0.007	0.029	0.045	0.039	0.008	0.008	0.004	0.004	0.121
										0.170	0.224	0.895	0.021	0.007	0.029	0.041	0.039	0.008	0.008	0.004	0.004	0.117
5	423032 000012 000217	60866Q	42554	-	68795	76163	2	37.20	1180	0.210	0.259	0.879	0.012	0.006	0.033	0.045	0.033	0.009	0.007	0.005	0.005	0.118
										0.210	0.262	0.880	0.013	0.006	0.033	0.048	0.033	0.009	0.008	0.005	0.009	0.122
6	423032 000014 000246	61451Q	43209	-	68989	73489	2	38.22	1180	0.140	0.196	0.887	0.014	0.004	0.012	0.035	0.037	0.008	0.004	0.011	0.004	0.088
										0.140	0.196	0.892	0.014	0.004	0.012	0.029	0.037	0.008	0.004	0.012	0.004	0.082
7	423032 000016 000282	61453Q	42199	-	63689	71782	2	40.16	1180	0.170	0.255	0.854	0.014	0.006	0.033	0.035	0.032	0.009	0.005	0.008	0.004	0.105
										0.170	0.258	0.860	0.012	0.006	0.033	0.039	0.032	0.009	0.005	0.008	0.006	0.109
8	423032 000019 000336	93165L	42256	-	67359	74058	2	38.39	1180	0.170	0.235	0.905	0.012	0.007	0.036	0.045	0.048	0.010	0.005	0.002	0.006	0.134
										0.170	0.236	0.900	0.012	0.007	0.036	0.043	0.047	0.010	0.005	0.003	0.007	0.131
9	423032 000020 000360	93736Q	43408	-	66889	73475	2	37.20	1180	0.140	0.234	0.873	0.016	0.006	0.024	0.044	0.044	0.008	0.010	0.002	0.004	0.122
										0.160	0.235	0.873	0.017	0.006	0.024	0.047	0.044	0.008	0.010	0.002	0.006	0.125
10	423032 000022 000398	93738Q	42355	-	64429	74257	2	37.50	1180	0.180	0.197	0.921	0.007	0.009	0.026	0.034	0.044	0.008	0.006	0.003	0.004	0.110
										0.170	0.197	0.920	0.007	0.009	0.026	0.033	0.044	0.008	0.006	0.002	0.006	0.108
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

materials has been manufactured, sampled tested, and inspected in accordance with specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

...KRIE PIPE INDUSTRIES
...taya Pejuang
...dan Sakra 17131-Bekasi, Indonesia

SPMB : B.2.2628
Mill No.: 5889/QAE/III/02
Date : Aug ,30, 2002
Page : 2 of 2

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength (Psi)	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)													
				Long	Trans	Weld	(inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
11	423032 000024 000436	93739Q	42057	-	65695	71896	2	40.16	1180	0.160	0.227	0.977	0.007	0.007	0.028	0.033	0.043	0.009	0.006	0.008	0.005	0.110
12	423032 000026 000468	94993L	42554	-	66818	73702	2	38.39	1180	0.160	0.226	0.977	0.008	0.009	0.028	0.039	0.043	0.009	0.006	0.008	0.005	0.116
13	423032 000027 000487	81518Q	43578	-	67956	74115	2	37.50	1180	0.170	0.249	0.952	0.007	0.004	0.029	0.040	0.045	0.009	0.006	0.002	0.005	0.120
14	423032 000028 000508	81707Q	42554	-	64827	74058	2	41.93	1180	0.160	0.249	0.943	0.007	0.004	0.029	0.034	0.044	0.010	0.006	0.002	0.005	0.113
15	423032 000029 000627	93164L	43735	-	67501	73019	2	39.96	1180	0.160	0.225	0.849	0.014	0.006	0.022	0.033	0.042	0.007	0.009	0.006	0.005	0.105
16	423032 000030 000545	95383L	42085	-	68610	73347	2	37.40	1180	0.180	0.223	0.965	0.007	0.008	0.028	0.034	0.043	0.008	0.006	0.010	0.009	0.111
17	423032 000043 000839	59668L	43479	-	71014	74982	2	40.16	1180	0.170	0.226	0.969	0.007	0.008	0.028	0.034	0.042	0.009	0.006	0.010	0.009	0.110
18	423032 000045 000874	59667L	43351	-	67601	74584	2	36.70	1180	0.160	0.260	0.822	0.012	0.002	0.023	0.033	0.043	0.008	0.006	0.010	0.009	0.111
										0.160	0.260	0.920	0.012	0.004	0.023	0.031	0.042	0.008	0.009	0.002	0.003	0.107
										0.150	0.215	0.895	0.010	0.004	0.025	0.038	0.041	0.008	0.009	0.002	0.004	0.104
										0.150	0.210	0.875	0.010	0.005	0.026	0.036	0.015	0.003	0.004	0.007	0.004	0.082
										0.170	0.198	0.926	0.012	0.008	0.041	0.042	0.020	0.003	0.004	0.006	0.004	0.084
										0.160	0.185	0.961	0.012	0.007	0.035	0.040	0.024	0.006	0.004	0.004	0.003	0.111
																	0.021	0.040	0.005	0.004	0.005	0.101
Standard API 5LB 2000 year edition		MAX																				
		MIN	35000	60000				28.00		0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
Standard API 5LX-42 2000 year edition		MAX																				
		MIN	42000	60000				28.00		0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
Standard ASTM A53B 2000 year edition		MAX																				
		MIN	35000	60000				28.00		0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
Standard ASME SA53B 2000 year edition		MAX																				
		MIN	35000	60000				28.00		0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000

ote 1-> Cu+Cr+Ni+V = 1.000 %

...e materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

PT. Bakrie Pipe Industries
P.T. BAKRIE PIPE INDUSTRIES JAKARTA
(Ir. Endang Kusnadi)
QA/QC Manager

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-8334
FAX: 713-465-0587

DATE: 10/22/02

SHIPPER NO.: B11743

RELEASE NO.: 26779

FROM: VASS

ADDRESS:

TO: VASS

ADDRESS:

SHIPPED FROM: Angara V-07 NY35

SIZE: 24X375 WEIGHT: 94.62 GRADE: A53B COUPLING:

RANGE: 3 THREAD: PEB MAKE: TYPE:

	TIER NO.	TIER NO.	TIER NO.	TIER NO.	TIER NO.
1	42 2	589432			
2		92972			
3		601886			
4		~~607646~~	608760		
5		931652			
6					
7					
8	42 2				
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
TL					

TALLIES PROVIDED BY VASS PIPE & STEEL CO.

TALLIED BY [redacted]

TOTAL JOINTS 8

TOTAL FOOTAGE 337.6

TRUCK NO.

DRIVER [signature]

TOTAL P.03

Form No. : 18A
Revision : 5

Serie B No. : Q984144

MILL'S INSPECTION CERTIFICATE

Bakrie Pipe Industries

Jl. Raya Pejuang
Medan Satria 17131
Bekasi, Indonesia

Article Specification : *NEW PRIME ERW STEEL PIPE PER API 5LX-42(PSL 1)/API 5LB/ ASTM A53B/ASME SA53B QUADRUPLE STENCILED, BLACK PLAIN BEVELED END, BLACK VARNISH COATED*

Customer :

Contract No. : *P.O.No.#: 11183-NJ-HTN-1 GULF COAST, HOUSTON, TEXAS*

SPMB No. : *B.2.1599/*
M/C No. : *3661/QAE/VI/02*
Date : *June 8,2002*

Shipper : *ANGARA V.007*

Item No.	Mill Work No.	Test No.	Ordered Sizes: Inside/Outside Diameter	Ordered Sizes: Thickness	Ordered Sizes: Length	Delivered Quantity: No. of Pieces & Total Length	Delivered Quantity: Net Weight	Description of Inspection & Test: Surface & Dimension	Hydrostatic Kg/cm²/PSI/BAR	Flattening	Ultrasonic	Weld Ductility	Impact	Ratio Yield to Tensile Strenght	Heat Treatment
1 to 211			*24" or 609.6mm*	*0.375" or 9.52mm*	*42 Feet per Piece*	*211 Pcs 8,862.000 Feet*	*380,724 Kgs*	*Sound*	*Sound*	*Sound*	*Sound*	*Sound*	–	*Sound*	*Sound*

Test No.	Heat No.	Yield Strength PSI/MPa	Tensile Strength PSI/MPa	Gauge Length In	Elongation %	Hardness (HR&HV 10)	Chemical Analysis (%) C	Si	Mn	P	S	Mo	Cr	V	Ni	Remarks
			See Attachment to Mill's Inspection Certificate													
			Attachment Products Analysis													
Standard	MAX															
	MIN															

We hereby certify that material described herein has been duly inspected in accordance with the above specification.

PT. Bakrie Pipe Industries

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

Ir. Endang Kusnadi
QA / QC Manager

CUSTOMER (ORIGINAL)

PT: BAKRIE PIPE INDUSTRIES
Jl. Raya Pejuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3661/QAEA/II/02
Date : June ,08, 2002
Page : 1 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)													
			(Psi)	Long	Trans	Yield	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	1
1	421918 000001 000007	59178L	48642	-	69990	72052	2	36.22	1160	0.140	0.207	0.886	0.007	0.003	0.032	0.032	0.034	0.008	0.004	0.001	0.001	0.102
										0.140	0.209	0.905	0.008	0.003	0.033	0.033	0.034	0.008	0.004	0.001	0.001	0.104
2	421918 000004 000079	60575Q	49196	-	70218	75053	2	36.02	1160	0.095	0.205	0.866	0.010	0.004	0.056	0.103	0.039	0.008	0.005	0.004	0.004	0.204
										0.130	0.198	0.869	0.011	0.004	0.055	0.090	0.039	0.009	0.009	0.004	0.004	0.193
3	421918 000007 000121	92751L	43493	-	65636	74029	2	38.58	1160	0.110	0.223	0.913	0.007	0.004	0.038	0.020	0.037	0.008	0.005	0.002	0.002	0.100
										0.120	0.228	0.920	0.007	0.004	0.039	0.025	0.038	0.009	0.005	0.002	0.002	0.107
4	421918 000011 000190	58935L	47404	-	66186	76177	2	36.81	1160	0.130	0.258	1.018	0.013	0.002	0.030	0.026	0.037	0.008	0.006	0.002	0.002	0.099
										0.140	0.259	1.022	0.013	0.002	0.030	0.028	0.036	0.008	0.006	0.003	0.003	0.100
5	421918 000013 000244	58938L	47693	-	66249	74556	2	40.16	1160	0.150	0.209	0.904	0.007	0.002	0.041	0.089	0.041	0.019	0.005	0.002	0.002	0.176
										0.140	0.213	0.903	0.007	0.003	0.042	0.097	0.041	0.020	0.005	0.003	0.003	0.185
6	421918 000016 000288	58933L	48002	-	68824	78637	2	38.09	1160	0.120	0.225	0.855	0.009	0.004	0.023	0.077	0.039	0.012	0.004	0.004	0.004	0.143
										0.160	0.219	0.950	0.009	0.004	0.023	0.061	0.037	0.012	0.005	0.004	0.004	0.126
7	421918 000021 000381	81235Q	46029	-	67544	72664	2	37.99	1160	0.160	0.239	0.895	0.008	0.004	0.022	0.029	0.034	0.008	0.005	0.004	0.007	0.090
										0.160	0.238	0.898	0.009	0.004	0.022	0.033	0.034	0.008	0.005	0.004	0.006	0.094
8	421918 000022 000396	92903L	43152	-	67302	76874	2	37.99	1160	0.160	0.228	0.909	0.008	0.005	0.039	0.019	0.033	0.009	0.005	0.003	0.003	0.087
										0.140	0.229	0.903	0.008	0.005	0.030	0.020	0.033	0.009	0.005	0.007	0.014	0.068
9	421916 000023 000417	58943L	44986	-	67871	72294	2	38.19	1160	0.150	0.240	0.845	0.012	0.009	0.064	0.069	0.040	0.009	0.006	0.005	0.007	0.179
										0.150	0.227	0.865	0.011	0.007	0.063	0.036	0.038	0.008	0.005	0.007	0.007	0.142
10	421918 000026 000468	03426L	42441	-	64657	77898	2	37.99	1160	0.110	0.240	0.925	0.006	0.004	0.034	0.036	0.035	0.009	0.005	0.005	0.007	0.110
										0.120	0.240	0.920	0.006	0.004	0.035	0.035	0.035	0.009	0.004	0.004	0.007	0.109
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with his specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

PT. BAKRIE PIPE INDUSTRIES
JL. Raya Pejueng
Medan Satria 17131-Bekasi, Indonesia

SPMB : B.2.1599
Mill No. : 3661/QAEA/I/02
Date : June ,08, 2002

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)												
			(Psi)	Long	Trans	Weld	(inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	
11	421918 000027 000486	60876Q	45627	-	68824	77741	2	39.37	1160	0.130	0.239	0.943	0.011	0.004	0.066	0.024	0.041	0.009	0.005	0.003	0.003	0
										0.150	0.242	0.925	0.011	0.004	0.067	0.037	0.041	0.009	0.005	0.007	0.007	0
12	421918 000031 000561	60877Q	42498	-	65824	74681	2	39.86	1180	0.150	0.227	0.864	0.011	0.007	0.063	0.027	0.037	0.009	0.004	0.003	0.003	0.1
										0.150	0.225	0.879	0.011	0.007	0.063	0.023	0.038	0.009	0.004	0.002	0.003	0.1
13	421918 000034 000617	60871Q	46466	-	65126	74484	2	39.57	1160	0.110	0.247	0.906	0.008	0.004	0.027	0.028	0.034	0.008	0.005	0.008	0.006	0.0
										0.130	0.246	0.870	0.008	0.005	0.026	0.032	0.034	0.008	0.005	0.010	0.010	0.0
14	421918 000038 000690	60866Q	46513	-	69066	75679	2	38.48	1180	0.150	0.242	0.881	0.009	0.005	0.034	0.028	0.034	0.009	0.005	0.003	0.005	0.1
										0.160	0.242	0.878	0.009	0.004	0.035	0.035	0.034	0.009	0.005	0.004	0.050	0.1
15	421918 000039 000714	92752L	42782	-	64770	75835	2	41.73	1180	0.120	0.244	0.930	0.007	0.002	0.065	0.019	0.038	0.009	0.005	0.002	0.003	0.1
										0.120	0.244	0.924	0.007	0.002	0.065	0.024	0.039	0.009	0.005	0.002	0.003	0.1
16	421918 000043 000764	60188Q	45427	-	69919	77343	2	40.16	1160	0.120	0.201	0.884	0.007	0.003	0.043	0.021	0.037	0.008	0.005	0.002	0.002	0.1
										0.130	0.203	0.881	0.008	0.003	0.043	0.023	0.037	0.009	0.005	0.002	0.002	0.1
17	421918 000044 000795	03839L	42498	-	66321	74787	2	41.93	1180	0.130	0.187	0.975	0.015	0.003	0.029	0.026	0.034	0.009	0.005	0.002	0.001	0.0
										0.140	0.197	0.964	0.014	0.003	0.030	0.029	0.035	0.009	0.005	0.004	0.004	0.0
18	421918 000045 000813	59176L	45171	-	68554	76915	2	34.26	1180	0.150	0.227	0.866	0.008	0.009	0.021	0.042	0.033	0.009	0.005	0.005	0.005	0.1
										0.140	0.227	0.850	0.008	0.009	0.020	0.034	0.033	0.008	0.005	0.004	0.004	0.0
19	421918 000048 000879	93159L	43991	-	64600	73688	2	42.13	1180	0.140	0.202	0.685	0.008	0.003	0.042	0.022	0.037	0.009	0.005	0.003	0.002	0.1
										0.140	0.210	0.849	0.008	0.004	0.041	0.039	0.036	0.009	0.004	0.004	0.007	0.1
20	421918 000054 001018	93164L	44631	-	63675	75537	2	37.99	1180	0.150	0.217	0.904	0.009	0.004	0.036	0.028	0.047	0.010	0.005	0.002	0.008	0.1
										0.150	0.218	0.904	0.008	0.004	0.035	0.027	0.047	0.010	0.004	0.002	0.002	0.1
Standard API 5LB		MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
2000 year edition		MIN	35000	60000				28.00														
Standard API 5LX-42		MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
2000 year edition		MIN	42000	60000				28.00														
Standard ASTM A53B		MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.0
2000 year edition		MIN	35000	60000				28.00														
Standard ASME SA53B		MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.0
2000 year edition		MIN	35000	60000				28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

PT. BAKRIE PIPE INDUSTRIES
Jl. Raya Pajuang
Medan Satria 17131-Bekasi, Indonesia

SPMB : 8.2.1599
Mill No. : 3661/QAEM/02
Date : June ,08, 2002
Page : 3 of 3

ATTACHMENT TO MILL'S INSPECTION CERTIFICATE (Product Analysis)

No	Test Number	Heat Number	Yield Strength	Tensile Strength (Psi)			Gauge Length	Elong	Hydro	Chemical Analysis (%)												
			(Psi)	Long	Trans	Weld	(Inc)	(%)	(Psi)	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	Ti	Nb	
21	421918 000055 001037	93165L	45427	-	68340	75437	2	40.16	1180	0.160	0.216	0.902	0.009	0.004	0.036	0.024	0.046	0.009	0.005	0.002	0.002	0.
										0.160	0.218	0.907	0.009	0.004	0.036	0.023	0.046	0.010	0.005	0.002	0.003	0.11
22	421918 000057 001079	93167L	42626	-	64145	73560	2	41.54	1180	0.120	0.204	0.885	0.008	0.003	0.042	0.026	0.037	0.009	0.005	0.002	0.002	0.11
										0.120	0.207	0.880	0.009	0.003	0.042	0.031	0.037	0.009	0.005	0.003	0.003	0.11
	Standard API 5LB	MAX								0.260	-	1.200	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	35000		60000			28.00														
	Standard API 5LX-42	MAX								0.260	-	1.300	0.030	0.030	-	-	-	-	-	-	-	-
	2000 year edition	MIN	42000		60000			28.00														
	Standard ASTM A53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														
	Standard ASME SA53B	MAX								0.300	-	1.200	0.050	0.045	0.400	0.400	0.400	0.150	0.080	-	-	1.000
	2000 year edition	MIN	35000		60000			28.00														

Note 1-> Cu+Cr+Ni+V = 1.000 %

The materials has been manufactured, sampled tested, and inspected in accordance with this specification (including year of issue), and has been found to meet the requirements.

PT. Bakrie Pipe Industries

P.T. BAKRIE PIPE INDUSTRIES JAKARTA

(Ir. Endang Kusnadi)
QA/QC Manager

APPENDIX D.2.2

16-Inch Diameter Steel Casing

Customer: COMMERCIAL METALS COMPANY

Commodity: PRIME BPE SEAMLESS STEEL PIPES

EN 10204/3.1.B.

Pangang Group Chengdu Seamless Steel Tube Co Ltd

Specifications: ASTM A53B/A106 GR. B/API 5L GR.B/X42 WITH NACE MR0175

Date: JULY 25, 2002

Total: 1018 Pcs., 40720.00Feet, 796.139 Mts

Heat No.	Size	Quantity			Test Piece No.	Mechanical Properties			Workmanship Test					Chemical Analysis (%)								
		Pcs.	Length(Feet)	Mt		Y.S.(Mpa)	T.S.(Mpa)	EL.(%)	1	2	3	4	5	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V
0281919	10"x.500"x40'	36	1440.00	35.784	142060065 A	345	500	40	G			G		0.15	0.48	1.11	0.013	0.020	0.02	0.05	0.020	0.120	0.01
					142060065 B	370	510	41														
0281942	6"xSCH80x40'	50	2000.00	25.950	132060074 A	390	515	36	G			G		0.22	0.20	0.54	0.016	0.012	0.01	0.04	0.010	0.080	0.01
					132060074 B	365	510	37														
0281957	6"xSCH40x40'	182	7280.00	62.712	142060080 A	340	495	34	G			G		0.20	0.26	0.58	0.014	0.015	0.03	0.05	0.010	0.080	0.01
					142860080 B	370	495	31														
0281958	6"xSCH40x40'	182	7280.00	62.712	142060081 A	345	500	33	G			G		0.20	0.22	0.62	0.018	0.016	0.03	0.06	0.010	0.100	0.01
					142060081 B	365	505	34														
0282150	8"xSCH80x40'	24	960.00	18.912	122060275 A	400	510	43	G			G		0.16	0.44	1.18	0.016	0.012	0.03	0.03	0.030	0.080	0.01
					122060275 B	355	515	44														
0282205	12"x.375"x40'	80	3200.00	72.000	112060322 A	300	495	40	G			G		0.22	0.24	0.53	0.018	0.018	0.03	0.04	0.020	0.080	0.01
					112060322 B	290	475	35														
0282206	12"x.375"x40'	70	2800.00	63.000	122060323 A	355	480	36	G			G		0.20	0.24	0.60	0.019	0.014	0.02	0.04	0.010	0.080	0.01
					122060323 B	350	480	37														
0282220	12"x.500"x40'	49	1960.00	58.212	132060329 A	360	530	38	G			G		0.16	0.42	1.12	0.016	0.014	0.03	0.04	0.020	0.080	0.01
					132060329 B	310	525	38														
0282221	12"x.500"x40'	22	880.00	26.136	132060330 A	335	515	38	G			G		0.14	0.40	1.03	0.017	0.011	0.03	0.03	0.020	0.090	0.01
					132060330 B	340	530	37														
P0214443	14"x.375"x40'	100	4000.00	99.100	232060809 A	310	450	47	G			G		0.18	0.22	0.46	0.013	0.020	0.01	0.03	0.010	0.030	0.01
					232060809 B	305	450	44														
P0233363	14"x.375"x40'	53	2120.00	52.523	242060811 A	310	465	43	G			G		0.21	0.22	0.48	0.014	0.017	0.03	0.03	0.010	0.030	0.01
					242060811 B	315	455	43														
P0234182	14"x.500"x40'	25	1000.00	32.725	212060357 A	295	455	44	G			G		0.18	0.22	0.48	0.010	0.016	0.02	0.04	0.010	0.030	0.01
					212060357 B	310	465	44														
P0256061	16"x.500"x40'	59	2360.00	88.677	242060636 A	300	455	44	G			G		0.19	0.22	0.50	0.007	0.012	0.02	0.03	0.010	0.030	0.01
					242060636 B	310	450	47														
S0220946	16"x.375"x40'	27	1080.00	30.672	622060114 A	360	485	40	G			G		0.19	0.22	0.52	0.009	0.013	0.04	0.09	0.010	0.080	0.01
					622060114 B	350	485	41														
S0220951	16"x.375"x40'	24	960.00	27.264	642060189 A	355	485	39	G			G		0.21	0.24	0.56	0.008	0.019	0.04	0.02	0.010	0.100	0.01
					642060189 B	350	490	44														
S0220958	16"x.375"x40'	27	1080.00	30.672	612060176 A	360	480	42	G			G		0.18	0.26	0.55	0.014	0.016	0.03	0.02	0.010	0.110	0.01
					612060176 B	365	480	42														
S0220977	16"x.375"x40'	8	320.00	9.088	622070204 A	340	465	41	G			G		0.21	0.28	0.42	0.014	0.013	0.04	0.03	0.010	0.130	0.01
					622070204 B	355	470	40														

Notes:
1. Flattening test
2. Bending test
3. Pipe flaring test
4. Hydrostatic test
5. Non-destructive test

Remarks: 1. Condition of supply: hot rolled
2. Tubes delivered in theoretical weight
3. G——Good

Inspector: Cheng Yu

攀钢集团成都无缝钢管有限责任公司
PANGANG GROUP CHENGDU SEAMLESS STEEL TUBE CO.,LTD.

PANGANG GROUP CHENGDU SEAMLESS STEEL TUBE CO.,LTD.

0182975	6-5/8"xSTDx40'	182	7280.00	62712	1410802S8 A	355	510	30	G			G		0.16	0.43	1.05	0.016	0.013	0.04	0.04	0.010	0.060	0.01
					1410802S8 B	365	520	32															
S0128983	16"xSTDx40'	26	1040.00	29536	631070012 A	370	485	35	G			G		0.20	0.26	0.46	0.014	0.012	0.08	0.11	0.020	0.180	0.01
					631070012 B	365	485	36															
S0121057	12-3/4"xSTDx40'	100	4000.00	90000	2310801I6 A	310	460	40	G			G		0.19	0.24	0.46	0.024	0.017	0.04	0.05	0.010	0.100	0.01
					2310801I6 B	335	465	41															
S0121206	16"xSTDx40'	26	1040.00	29536	641070221 A	340	505	40	G			G		0.28	0.23	0.51	0.010	0.015	0.05	0.06	0.010	0.100	0.01
					641070221 B	350	485	39															
S0121211	16"xSTDx40'	23	920.00	26128	641070253 A	335	495	38	G			G		0.20	0.25	0.53	0.011	0.010	0.06	0.07	0.010	0.120	0.01
					641070253 B	370	500	42															

Notes: 58000.00

1. Flattening test
2. Bending test
3. Pipe flaring test
4. Hydrostatic test
5. Non-destructive test

Remarks:

1. Condition of supply: hot rolled
2. Tubes delivered in theoretical weight
3. G——————Good

Inspector: Cheng Yu

WE CONFIRM THAT THE MATERIAL MEETS THE SPECIFICATIONS STIPULATED IN TRANSACTION NO. ST-PH 0467

攀钢集团成都无缝钢管有限责任公司
PANGANG GROUP CHENGDU SEAMLESS STEEL TUBE CO.,LTD.

Contract No. 38331

EN 10204/3.1.B.

Specifications: ASTM A53B/A106 GR.B/API 5L GR.B/X42 WITH NACE MR0175

Commodity: PRIME BPE SEAMLESS STEEL PIPES

Pangang Group Chengdu Seamless Steel Tube Co Ltd

Heat No.	Size	Quantity			Test Piece No.	Mechanical Properties			Workmanship Test					Chemical Analysis (%)								
		Pcs	Length(Feet)	Mt		Y.S.(Mpa)	T.S.(Mpa)	EL.(%)	1	2	3	4	6	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V
0281919	10"x.500"x40'	36	1440.00	35.784	142060065 A	345	500	40	G			G		0.15	0.48	1.11	0.013	0.020	0.02	0.05	0.020	0.120	0.01
					142060065 B	370	510	41														
0281942	6"xSCH80x40'	50	2000.00	25.950	132060074 A	390	515	36	G			G		0.22	0.20	0.54	0.018	0.012	0.01	0.04	0.010	0.080	0.01
					132060074 B	365	510	37														
0281957	6"xSCH40x40'	182	7280.00	62.712	142060080 A	340	495	34	G			G		0.20	0.26	0.58	0.014	0.015	0.03	0.05	0.010	0.080	0.01
					142060080 B	370	495	31														
0281958	6"xSCH40x40'	182	7280.00	62.712	142060081 A	345	500	33	G			G		0.20	0.22	0.62	0.018	0.016	0.03	0.06	0.010	0.100	0.01
					142060081 B	365	505	34														
0282150	8"xSCH80x40'	24	960.00	18.912	122060275 A	400	510	43	G			G		0.16	0.44	1.18	0.016	0.012	0.03	0.03	0.030	0.060	0.01
					122060275 B	355	515	44														
0282205	12"x.375"x40'	80	3200.00	72.000	112060322 A	300	495	40	G			G		0.22	0.24	0.53	0.018	0.018	0.03	0.04	0.020	0.080	0.01
					112060322 B	290	475	35														
0282206	12"x.375"x40'	70	2800.00	63.000	122060323 A	355	480	36	G			G		0.20	0.24	0.60	0.019	0.014	0.02	0.04	0.010	0.080	0.01
					122060323 B	350	480	37														
0282220	12"x.500"x40'	49	1960.00	58.212	132060329 A	360	530	38	G			G		0.16	0.42	1.12	0.016	0.014	0.03	0.04	0.020	0.080	0.01
					132060329 B	310	525	38														
0282221	12"x.500"x40'	22	880.00	26.136	132060330 A	335	515	38	G			G		0.14	0.40	1.03	0.017	0.011	0.03	0.03	0.020	0.090	0.01
					132060330 B	340	530	37														
P0214443	14"x.375"x40'	100	4000.00	99.100	232060809 A	310	450	47	G			G		0.18	0.22	0.46	0.013	0.020	0.01	0.03	0.010	0.038	0.01
					232060809 B	305	450	44														
P0233363	14"x.375"x40'	53	2120.00	52.523	242060811 A	310	465	43	G			G		0.21	0.22	0.48	0.014	0.017	0.03	0.03	0.010	0.030	0.01
					242060811 B	315	455	43														
P0234182	14"x.500"x40'	25	1000.00	32.725	212060357 A	295	455	44	G			G		0.18	0.22	0.48	0.010	0.016	0.02	0.04	0.010	0.030	0.01
					212060357 B	310	465	44														
P0256061	16"x.500"x40'	59	2360.00	88.677	242060636 A	300	455	44	G			G		0.19	0.22	0.50	0.007	0.012	0.02	0.03	0.010	0.030	0.01
					242060636 B	310	450	47														
S0220946	16"x.375"x40'	27	1080.00	30.672	622060114 A	360	485	40	G			G		0.19	0.22	0.52	0.009	0.013	0.04	0.09	0.010	0.080	0.01
					622060114 B	350	485	41														
S0220953	16"x.375"x40'	24	960.00	27.264	642060189 A	355	485	39	G			G		0.21	0.24	0.56	0.008	0.019	0.04	0.02	0.010	0.100	0.01
					642060189 B	350	490	44														
S0220958	16"x.375"x40'	27	1080.00	30.672	612060176 A	360	480	42	G			G		0.18	0.26	0.55	0.014	0.016	0.03	0.02	0.010	0.110	0.01
					612060176 B	365	480	42														
S0220977	16"x.375"x40'	8	320.00	9.088	622070204 A	340	465	41	G			G		0.21	0.28	0.42	0.014	0.013	0.04	0.03	0.010	0.130	0.01
					622070204 B	355	470	40														

Notes:
1. Flattening test
2. Bending test
3. Pipe flaring test
4. Hydrostatic test
5. Non-destructive test

Remarks: 1. Condition of supply: hot rolled
2. Tubes delivered in theoretical weight
3. G——Good

Inspector: Cheng Yu

攀钢集团成都无缝钢管有限责任公司
PANGANG GROUP CHENGDU SEAMLESS STEEL TUBE CO.,LTD.

NO. 5125 P. 2

Commodity: SEAMLESS STEEL PIPE

L/C NO. : I315756

MILL TEST CERTIFICATE

EN 10204/3.1.B.

Certificate No.: 2001141003-1

SPECIFICATIONS: ASTM-A53/ASME SA 53/ASME SA106 /API 5L, B/X42 TOLERANCE TO A53 ONLY IN SIZES 16" AND ABOVE WITH ALL OTHERS TO API.

Paogang Group Chengde Seamless Steel Tube Co., Ltd.

LOT NO. 3

Heat No.	Size	Quantity			Test Piece No.	Mechanical Properties			Workmanship Test					Chemical Analysis (%)								
		Pcs.	Length(Feet)	Weight(Kg)		Y.S.(Mpa)	T.S.(Mpa)	EL.(%)	1	2	3	4	5	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V
0170655	14"xXHYx40'	25	6000.00	32725	2310803 69 A	335	510	45	G			G		0.14	0.49	1.15	0.012	0.023	0.02	0.04	0.020	0.060	0.01
					2310803 69 B	310	505	45														
0182248	14"xSTDx40'	86	3440.00	85226	2310702 75 A	305	460	43	G			G		0.21	0.20	0.53	0.021	0.016	0.01	0.06	0.010	0.100	0.01
					2310702 75 B	305	490	40														
0182336	8-5/8"xSTDx40'	85	3400.00	44098	1310801 37 A	365	520	40	G			G		0.13	0.42	1.26	0.018	0.012	0.02	0.04	0.010	0.100	0.01
					1310801 37 B	350	520	39														
0182461	10-3/4"xSTDx40'	6	240.00	4410	1310701 85 A	355	510	34	G			G		0.15	0.42	1.10	0.017	0.014	0.03	0.05	0.040	0.120	0.01
					1310701 85 B	365	505	32														
0182462	10-3/4"xSTDx40'	96	3840.00	70560	1310701 86 A	350	520	33	G			G		0.15	0.42	1.11	0.011	0.015	0.02	0.05	0.020	0.100	0.01
					1310701 86 B	355	510	32														
0182466	10-3/4"xXHYx40'	72	2880.00	71568	1410701 99 A	310	500	40	G			G		0.16	0.42	1.10	0.019	0.013	0.03	0.1	0.010	0.120	0.01
					1410701 99 B	340	515	39														
0182500	12-3/4"xSTDx40'	50	2000.00	45000	2410801 23 A	345	495	40	G			G		0.20	0.23	0.54	0.021	0.016	0.04	0.05	0.030	0.150	0.01
					2410801 23 B	325	490	38														
0182520	80-3/4"xXHYx40'	33	1320.00	12802	1310702 11 A	330	500	43	G			G		0.15	0.40	1.02	0.015	0.017	0.02	0.04	0.020	0.110	0.01
					1310702 11 B	325	500	44														
0182567	16"xXHYx40'	38	1520.00	57114	2110707 18 A	340	510	42	G			G		0.16	0.46	1.05	0.006	0.012	0.02	0.04	0.010	0.070	0.01
					2110707 18 B	340	505	42														
0182863	8-5/8"xXHYx40'	75	3000.00	59100	1110801 78 A	350	525	45	G			G		0.14	0.46	1.13	0.013	0.013	0.02	0.05	0.030	0.120	0.01
					1110801 78 B	350	535	44														
0182868	8-5/8"xSTDx40'	85	3400.00	44098	1210801 44 A	355	515	41	G			G		0.16	0.40	1.06	0.018	0.014	0.02	0.05	0.010	0.090	0.01
					1210801 44 B	385	530	38														
0182876	8-5/8"xSTDx40'	125	5000.00	64850	1410801 39 A	365	525	37	G			G		0.15	0.43	1.07	0.017	0.013	0.03	0.04	0.020	0.090	0.01
					1410801 39 B	365	530	42														
0182945	6-5/8"xXHYx40'	135	5400.00	70065	1210802 35 A	345	510	38	G			G		0.14	0.41	1.09	0.012	0.013	0.02	0.03	0.010	0.080	0.01
					1210802 35 B	350	520	35														
0182965	6-5/8"xSTDx40'	182	7280.00	62712	1210802 63 A	350	515	39	G			G		0.15	0.42	1.05	0.020	0.013	0.02	0.05	0.010	0.070	0.01
					1210802 63 B	370	525	33														

[illegible]

Shipper: *

Attn – Billy

VASS PIPE & STEEL CO., INC.

158 Third Street
Mineola, NY 11501
Phone 516 741 8398
Toll Free 800 272 8277
Fax 516 741 8210

BILL OF LADING- PACKING LIST

Ref # 27316 WO(I)

Ref Date 12-17-02

Released by Ricky

Freight ☒ Prepaid ☐ Collect

Invoice Date | P.O. # 218039-08

To:
Youngquist Bros.
C/O Bonita Springs Utilities RO Plant
11950 E. Terry St.
Bonita Springs, Fl.
See Map

Date Shipped 12-23 | F.O.B. Point Bonita Springs, Fl.

Sales Person S | Terms 30

ISSUED FOR ACCOUNT OF VASS PIPE & STEEL AS SPECIFIED

Shipped via Flatbed ✓ | Freight | Miles

Quantity	DESCRIPTION OF PIPE TO BE RELEASED: Bundles	Pcs/Bundle	Length S/R or D/R	Size and Type	B/L # MILL	Ship Name	Specific Instructions	Unit Price	Total
1203.	–	28	DR	20" BPE-500W API5LB Smls	USS	RAIL CAR			
160.8	–	4	40.2	16" BPE-375W API5LB Smls	CHENGDU	Rel# 5843	✓		
*	–	(3)	Truck	Loads					
				Load# 1	Load #2		Load #3		
				(10) pcs of 20"	(10) pcs of 20"		(8) pcs of 20" &		
							(4) pcs of 16" Pipes		

Special Instructions:

Received in good condition by _____ PRINT NAME _____ SIGNATURE _____ DATE

SIGNED BILL OF LADING MUST ACCOMPANY FREIGHT INVOICE FOR PROMPT PAYMENT

Shipper:

Load # 3

Date Shipped | F.O.B. Point

Sales Person | Terms

VASS PIPE & STEEL CO., INC.
158 Third Street
Mineola, NY 11501
Phone 516 741 8398
Toll Free 800 272 8277
Fax 516 741 8210

BILL OF LADING- PACKING LIST

Ref # 27316 Wi

Ref Date

Released by

Freight ☒ Prepaid ☐ Collect

ISSUED FOR ACCOUNT OF VASS PIPE & STEEL AS SPECIFIED

Invoice Date | P. O. # 218039-08

To:
Youngquist Bros.
C/O Bonita Springs Utilities RO Plant
11950 E. Terry St.
Bonita Springs, Fl.
See Map

Shipped via fedex Freight | Miles

Quantity	DESCRIPTION OF PIPE TO BE RELEASED				B/L #	Ship Name	Specific Instructions	Unit Price	Total
	Bundles	Pcs/Bundle	Length S/R or D/R	Size and Type					
		8	DR	20 BPE XH .500w API5lb Smls					
		4	40.2	16 BPE .375w API5lb Smls	✓				

Special Instructions:

Received in good condition by _____ PRINT NAME _____ SIGNATURE _____ DATE

SIGNED BILL OF LADING MUST ACCOMPANY FREIGHT INVOICE FOR PROMPT PAYMENT

Shipper:

—

Date Shipped 3-6 | F.O.B. Point Bonita Springs, FL.

Sales Person S | Terms 30

VASS PIPE & STEEL CO., INC.

158 Third Street
Mineola, NY 11501
Phone 516 741 8398
Toll Free 800 272 8277
Fax 516 741 8210

BILL OF LADING - PACKING LIST

Ref # 27963 HT

Ref Date 2-25-03

Released by Parker

Freight ☒ Prepaid ☐ Collect

Invoice Date | P. O. # 218039-08

To:
Youngquist Bros.
C/O Bonita Springs Utilities RO Plant
11950 E. Terry St.
Bonita Springs, Fl.
See Map

Shipped via Sonic | Freight | Miles

ISSUED FOR ACCOUNT OF VASS PIPE & STEEL AS SPECIFIED

Quantity	DESCRIPTION OF PIPE TO BE RELEASED				BAT MILL	Ship Name	Specific Instructions	Unit Price	Total
	Bundles	Pcs/Bundle	Length S/R or D/R	Size and Type					
569.1	—	13	D/R	16" BPE Std (.375w) A106B Smls	PETROTUB	GEORGELYRAS			
42.2	—	1	42.2'	24" BPE Std (.375w) A53B ERW	BAKRIE	YOU SHENG			

Special Instructions:

Received in good condition by _____ PRINT NAME _____ SIGNATURE _____ DATE _____

SIGNED BILL OF LADING MUST ACCOMPANY FREIGHT INVOICE FOR PROMPT PAYMENT

MAR. 7. 2003 4:13PM VASS pipe NO. 8793 P. 2

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: 3,6,03

SHIPPER NO.: C2261

RELEASE NO.: 27963

FROM: HTi c/o VASS

ADDRESS:

TO: VASS

ADDRESS:

SHIPPED FROM: M/V George Vass A-15

SIZE: 16X375 WEIGHT: 62.64 GRADE: A106B COUPLING:

RANGE: 3 THREAD: MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	40	0	50764						
2	39	7	50849						
3	40	4	50799						
4	37	3	50845						
5	40	1	50798						
6	40	5	50789						
7	37	7	50848						
8	40	3	50841						
9	40	2							
10	40	2							
11	40	3							
12	36	4							
13	36	6							
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIES PROVIDED BY VASS PIPE & STEEL CO.

TALLIED BY

TOTAL JOINTS 13

TOTAL FOOTAGE 509.7

REMARKS:

TRUCK NO.: DRIVER Stephen McCoy 3/6/03

HTI 001

HOUSTON TUBULARS INC

10497 TOWN & COUNTRY WAY
SUITE 350
HOUSTON, TEXAS 77024
TEL: 713-465-6334
FAX: 713-465-0587

DATE: 3.6.03

SHIPPER NO.: C2261

RELEASE NO.: 27963

FROM: Hti % VASS

ADDRESS:

TO: VASS

ADDRESS:

SHIPPED FROM: m/v You Sheng

NY

SIZE: 24X375 WEIGHT: 94.71 GRADE: A53B COUPLING:

RANGE: 3 THREAD: MAKE: TYPE:

	TIER NO.		TIER NO.		TIER NO.		TIER NO.		TIER NO.
1	42	2	043690						
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIES PROVIDED BY VASS PIPE & STEEL CO.

TALLIED BY

TOTAL JOINTS 1

TOTAL FOOTAGE 42

REMARKS:

TRUCK NO.: DRIVER: Steve McC

TOTAL PAGE

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN ,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 674

Date: 25.06.2002

Buyer:

Description of goods:
PRIME QUALITY, NEWLY PRODUCED SEAMLESS STEEL PIPES IN STRICT CONFORMITY WITH PURCHASE ORDER NBR. SF 2046 DJ

Quantity: 95212 KGS

Total Length: 1020.83 MTRS 3349.18 FT

Contract No. SF 2046 LOT DJ

Standard
API 5L /2000; ASTM A106/99; ASTM A53/99; ASME SA 106/2001; ASME SA 53/2001; NACE MR 01-75/2000

85 PCS

Item	Size [inches]	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	Nb x100	Ti x100	D x100	Rp [PSI] :1000	Rm [PSI] :1000	A %	HB max 236	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
	16" STD	Gr.B/	50846	5			1670	12	67	27	17	28	17	12	24	3	0.0	0.0	0.0	0.02	57.0	77.0	34.2	148; 150	7; 6	OK
	16" X 0.375"	X42						11	68	27	17	30	17	11	23	3	0.0	0.0	0.0	0.02	52.2	73.5	35.2	151; 148	7; 6	
		PSL1 ✓	50789	6				11	63	25	13	24	11	11	23	2	0.0	0.0	0.0	0.02	54.9	75.3	37.4	156; 158	8; 8	OK
	ϕ 406.4 x							11	63	26	12	23	10	11	23	3	0.0	0.0	0.0	0.02	56.1	77.2	35.6	157; 160	7; 6	
	9.53 mm	✓	50841	5				11	61	30	19	16	10	8	22	3	0.0	0.0	0.0	0.01	50.4	68.2	33.4	163; 161	9; 9	OK
								11	60	28	18	15	9	8	22	2	0.0	0.0	0.0	0.00	56.7	76.4	33.2	160; 161	8; 9	
			50797	9				17	66	26	12	16	8	11	21	3	0.0	0.0	0.0	0.02	54.4	74.6	36.0	142; 144	6; 6	OK
	Lg: DRL							18	65	26	12	16	8	12	22	2	0.0	0.0	0.0	0.02	54.6	75.0	37.0	145; 144	7; 6	
		✓	50848	15				19	67	28	10	14	9	8	29	2	0.0	0.0	0.0	0.00	53.2	71.9	33.6	150; 153	7; 6	OK
								18	68	27	9	13	8	7	28	1	0.0	0.0	0.0	0.00	52.5	70.8	36.0	151; 151	7; 6	
			50851	8				19	69	30	12	14	18	11	25	1	0.0	0.0	0.0	0.00	52.1	70.4	34.4	169; 170	8; 9	OK
								18	68	29	11	15	17	10	24	2	0.0	0.0	0.0	0.00	54.2	69.1	38.4	171; 170	7; 9	
			50839	5				15	60	31	25	19	19	14	23	1	0.0	0.0	0.0	0.00	56.3	76.1	31.4	168; 168	9; 9	OK
								14	59	31	24	18	18	13	22	2	0.0	0.0	0.0	0.00	52.1	70.2	37.2	166; 165	9; 8	
		✓	50849	9				11	66	30	21	20	16	11	25	3	0.0	0.0	0.1	0.04	53.8	72.7	32.6	146; 145	6; 7	OK
								10	65	28	19	18	17	10	26	3	0.0	0.0	0.1	0.04	55.7	75.1	34.6	148; 148	7; 6	
		✓	50845	4				14	64	28	16	15	9	7	21	2	0.0	0.0	0.0	0.02	55.3	74.7	37.8	167; 168	7; 7	OK
								15	64	28	15	16	10	8	22	2	0.0	0.0	0.0	0.02	50.8	71.5	36.6	166; 166	8; 8	

EMARKS: Hydrostatic test hold for 5 sec. No leakage noticed.

'e state on our sole responsability that the product conforms to the quirements mentioned at "Standard" heading of the present rtificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolae Constantin

QA Office
Eng. Motoianu M.

A.

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
2,I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 674

Date: 25.06.2002

Item	Size [inches]	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	Nb x100	Ti x100	B x100	Rp [PSI] :1000	Rm [PSI] :1000	A %	HB max 236	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
	16" STD 16" X 0.375" ϕ 406.4 x 9.53 mm Lg: DRL	Gr.B/ X42 PSL1	50799	1			1670	14	65	30	12	20	14	11	21	2	0.0	0.0	0.1	0.00	50.8	72.9	34.62	167; 166	8; 8	OK
			50776	1				14	65	31	12	21	14	11	21	2	0.0	0.0	0.1	0.00	52.2	74.9	33.26	167; 168	9; 7	
			50762	4				18	66	26	16	17	14	7	24	3	0.0	0.0	0.0	0.02	57.9	78.2	35.2	156; 153	7; 8	OK
			50786	1				17	65	26	17	17	13	7	25	3	0.0	0.0	0.0	0.02	49.1	69.1	32.8	155; 155	8; 9	
			50767	1				17	67	20	13	19	18	10	24	2	0.0	0.0	0.0	0.02	56.5	76.4	34.0	146; 145	6; 8	OK
			50795	2				16	69	20	13	19	19	11	26	2	0.0	0.0	0.0	0.02	56.3	78.9	34.8	148; 146	6; 6	
			50766	2				17	61	23	17	15	15	10	28	2	0.0	0.0	0.2	0.02	52.8	71.9	34.65	165; 168	8; 8	OK
			50768	1				17	61	24	18	14	15	10	27	2	0.0	0.0	0.3	0.02	57.8	75.1	33.39	165; 166	6; 7	
			50780	3				14	59	23	22	16	12	10	24	3	0.0	0.0	0.2	0.01	52.2	71.1	35.00	167; 168	9; 8	OK
			50771	3				15	59	24	22	16	12	10	25	3	0.0	0.0	0.2	0.01	57.2	75.0	31.14	167; 169	8; 9	
								12	64	30	12	10	13	8	21	1	0.0	0.0	0.2	0.00	49.7	71.4	37.03	167; 168	9; 8	OK
								12	65	30	12	11	13	8	21	1	0.0	0.0	0.2	0.00	48.5	69.6	35.78	165; 166	8; 9	
								16	79	24	20	17	12	10	28	2	0.0	0.0	0.3	0.04	55.3	80.9	35.51	170; 167	9; 9	OK
								16	78	24	19	17	12	10	29	2	0.0	0.0	0.3	0.04	50.1	70.4	35.09	168; 168	8; 9	
								11	71	28	14	19	17	19	20	2	0.0	0.0	0.0	0.06	52.1	71.0	31.64	169; 164	9; 8	OK
								11	71	27	14	18	17	19	20	2	0.0	0.0	0.0	0.06	54.5	74.4	35.16	171; 170	9; 8	
								10	62	28	17	16	15	11	24	2	0.0	0.0	0.2	0.00	53.5	72.8	33.86	171; 168	7; 7	OK
								10	61	29	17	16	15	9	24	2	0.0	0.0	0.2	0.00	55.7	72.4	30.13	170; 170	8; 8	
								18	72	32	7	18	13	11	23	2	0.0	0.0	0.3	0.04	54.7	80.0	35.79	165; 162	7; 7	OK
								18	73	32	6	18	13	11	22	2	0.0	0.0	0.3	0.04	53.7	75.5	29.39	164; 164	8; 7	

We state on our sole responsability that the product conforms to the requirements mentioned at "Standard" heading of the present certificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Mihăianu M.

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 674

Date: 25.06.2002

US examination on automatic equipment – satisfactory.		M.P.I. - satisfactory		Electromagnetical examination on automatic equipment – satisfactory.	
HEAT NO.	PCS.	HEAT NO.	PCS.	HEAT NO.	PCS.
50846	2	50846	1	50846	2
50789	1	50789	5	50789	-
50841	-	50841	5	50841	-
50797	-	50797	-	50797	9
50848	-	50848	-	50848	15
50851	-	50851	-	50851	8
50839	-	50839	-	50839	5
50849	1	50849	-	50849	8
50845	2	50845	-	50845	2
50799	1	50799	-	50799	-
50776	1	50776	-	50776	-
50762	4	50762	-	50762	-
50786	1	50786	-	50786	-
50767	-	50767	1	50767	-
50795	2	50795	-	50795	-
50766	2	50766	-	50766	-
50768	1	50768	-	50768	-
50780	3	50780	-	50780	-
50771	3	50771	-	50771	-

: state on our sole responsability that the product conforms to the
uirements mentioned at "Standard" heading of the present
ificate.

GENERAL MANAGER
Dr. Ing. Marian Romano Darel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Marcinuc M.

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN ,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO.
D 674

Date:
25.06.2002

GAUGE TRANSVERSAL

Heat No.	Standard	Length Inch	Width Inch	Thickness Inch
50846	API 5L	2	1.503	0.362
	ASTM/ASME	2	1.501	0.372
50789	API 5L	2	1.503	0.397
	ASTM/ASME	2	1.502	0.371
50841	API 5L	2	1.500	0.377
	ASTM/ASME	2	1.498	0.355
50797	API 5L	2	1.503	0.401
	ASTM/ASME	2	1.503	0.381
50848	API 5L	2	1.500	0.358
	ASTM/ASME	2	1.497	0.384
50851	API 5L	2	1.500	0.366
	ASTM/ASME	2	1.496	0.394
50839	API 5L	2	1.500	0.338
	ASTM/ASME	2	1.497	0.387
50849	API 5L	2	1.500	0.354
	ASTM/ASME	2	1.501	0.361
50845	API 5L	2	1.500	0.374
	ASTM/ASME	2	1.496	0.383
50799	API 5L	2	1.503	0.370
	ASTM/ASME	2	1.502	0.360
50776	API 5L	2	1.496	0.358
	ASTM/ASME	2	1.500	0.395
50762	API 5L	2	1.500	0.366
	ASTM/ASME	2	1.503	0.370
50786	API 5L	2	1.500	0.385
	ASTM/ASME	2	1.503	0.367

We state on our sole responsability that the product conforms to the requirements mentioned at "Standard" heading of the present certificate.

GENERAL MANAGER
Dr. Ing. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Nicolau Mihai

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 674

Date: 25.06.2002

GAUGE TRANSVERSAL

Heat No.	Standard	Length Inch	Width Inch	Thickness Inch
50767	API 5L	2	1.500	0.389
	ASTM/ASME	2	1.496	0.369
50795	API 5L	2	1.503	0.377
	ASTM/ASME	2	1.498	0.388
50766	API 5L	2	1.503	0.381
	ASTM/ASME	2	1.501	0.402
50768	API 5L	2	1.503	0.393
	ASTM/ASME	2	1.501	0.399
50780	API 5L	2	1.496	0.381
	ASTM/ASME	2	1.499	0.381
50771	API 5L	2	1.503	0.385
	ASTM/ASME	2	1.500	0.375

Heat No.	Chemical Composition Bulletin No.	Mechanical Properties Bulletin No.	Hardness Test HB Bulletin No.	Hardness Test HRC Bulletin No.	Flattening Test Bulletin No.
50846	1602	868; 398B	191	481	270
50789	1601	867; 397B	193	483	272
50841	1577	857; 395B	189	477	268
50797	1601	867; 397B	193	483	272
50848	1577	857; 395B	190	477	268
50851	1577	857; 395B	190	477	268
50839	1577	857; 395B	189	477	268
50849	1577	857; 395B	190	477	268
50845	1603	868; 398B	191	481	270
50799	1149	636; 273B	99	369	179
50776	1602	868; 398B	191	481	270

'e state on our sole responsability that the product conforms to the quirements mentioned at "Standard" heading of the present rtificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolae Constantin

QA Office
Eng. Mo[illegible]

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 674

Date: 25.06.2002

Heat No.	Chemical Composition Bulletin No.	Mechanical Properties Bulletin No.	Hardness Test HB Bulletin No.	Hardness Test HRC Bulletin No.	Flattening Test Bulletin No.
50762	1603	869; 399B	192	480	269
50786	1150	621; 267B	102	371	172
50767	1149	621; 267B	102	371	172
50795	1149	636; 273B	999	369	179
50766	1147	639; 277B	100	370	180
50768	1131	623; 269B	125	361	171
50780	1149	621; 267B	102	371	172
50771	1147	639; 277B	100	370	180

We state on our sole responsability that the product conforms to the requirements mentioned at "Standard" heading of the present certificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Mavrodiu M.

Manufacturer:
S.C. PETROTUB S.A,
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO.
D 562

Date:
28.06.2002

Buyer:

Description of goods:

PRIME QUALITY, NEWLY PRODUCED SEAMLESS STEEL PIPES IN STRICT CONFORMITY WITH PURCHASE ORDER NBR. SF 2046 C3

Quantity:
59759 KGS

Total Length:
640.71 MTRS
2102.07 FT

53 PCS

Contract No.
SF 2046 LOT C3

Standard
API 5L /2000; ASTM A106/99; ASTM A53/99; ASME SA 106/2001;
ASME SA 53/2001; NACE MR 01-75/2000

Item	Size [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	Nb x100	Ti x100	B x100	Rp [PSI] :1000	Rm [PSI] :1000	A %	HB max 236	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
	16"x 0.375"	Gr.B/	50776	9			1670	17	68	26	18	17	14	8	24	1	0.0	0.2	0.1	0.02	59.3	80.7	29.66	169;174	8;8	OK
	ϕ 406.4 x	X42						17	68	27	17	16	14	8	24	1	0.0	0.2	0.1	0.03	58.3	79.6	32.81	173;171	8;7	
	9.53 mm	PSL1	50798 ✓	7				20	62	27	16	16	14	11	27	2	0.0	0.0	0.3	0.04	51.6	75.4	38.83	179;175	9;8	OK
	Lg: DRL							20	61	27	16	15	15	11	27	2	0.0	0.0	0.3	0.03	50.6	71.2	30.37	177;178	8;9	
			50771	4				18	72	32	7	18	13	11	23	2	0.0	0.0	0.3	0.04	54.7	80.0	35.79	165;162	7;7	OK
								18	73	32	6	18	13	11	22	2	0.0	0.0	0.3	0.04	53.7	75.5	29.39	164;164	8;7	
			50796	2				14	64	26	16	17	8	8	25	2	0.0	0.0	0.2	0.02	51.1	74.7	38.09	183;183	8;8	OK
								14	64	26	15	17	8	8	25	2	0.0	0.0	0.2	0.02	51.8	72.8	31.10	185;185	7;8	
			50780	9				10	62	28	17	16	15	11	24	2	0.0	0.0	0.2	0.00	53.5	72.8	33.86	171;168	7;7	OK
								10	61	29	17	16	15	9	24	2	0.0	0.0	0.2	0.00	55.7	72.4	30.13	170;170	8;8	
			50799 ✓	3				14	65	30	12	20	14	11	21	2	0.0	0.0	0.1	0.00	50.8	72.9	34.62	167;166	8;8	OK
								14	65	31	12	21	14	11	21	2	0.0	0.0	0.1	0.00	52.2	74.9	33.26	167;168	9;7	
			50783	1				11	53	22	20	15	10	8	24	2	0.0	0.0	0.3	0.04	54.2	79.2	34.56	171;170	9;9	OK
								11	54	21	20	15	10	8	25	2	0.0	0.0	0.2	0.03	48.9	68.7	33.15	168;170	9;8	

REMARKS: Hydrostatic test hold for 5 sec. No leakage noticed.

We state on our sole responsibility that the product conforms to the requirements mentioned at "Standard" heading of the present certificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Moroianu M.

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 562

Date: 28.06.2002

Item	Size (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	Nb x100	Ti x100	B x100	Rp [PSI] :1000	Rm [PSI] :1000	A %	HB max 236	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
	16"x 0.375"	Gr.B/	50762	2			1670	17	69	20	13	19	18	10	24	3	0.0	0.0	0.2	0.01	50.3	68.6	36.22	171;170	7;8	OK
	ϕ 406.4 x	X42						17	69	21	14	19	18	11	25	3	0.0	0.0	0.2	0.00	52.9	68.8	32.22	171;171	7;8	
	9.53 mm	PSL1	50764 ✓	5				11	62	28	12	15	9	10	19	2	0.0	0.2	0.2	0.04	57.3	78.0	32.24	180;179	8;9	OK
	Lg: DRL							11	62	28	12	14	9	10	19	2	0.0	0.2	0.2	0.04	59.4	81.2	31.45	172;174	9;7	
			50791	6				19	67	25	13	18	13	10	22	2	0.0	0.0	0.2	0.00	52.5	75.3	35.78	168;165	7;7	OK
								18	67	24	13	19	13	10	23	2	0.0	0.0	0.1	0.00	51.3	73.6	34.06	166;165	8;8	
			50795	1				12	64	30	12	10	13	8	21	1	0.0	0.0	0.2	0.00	49.7	71.4	37.03	167;168	9;8	OK
								12	65	30	12	11	13	8	21	1	0.0	0.0	0.2	0.00	48.5	69.6	35.78	165;166	8;9	
			50773	1				21	67	32	14	15	18	16	23	3	0.0	0.0	0.2	0.04	53.0	74.1	35.53	163;165	9;9	OK
								21	67	31	14	15	18	16	24	3	0.0	0.0	0.2	0.03	62.3	77.8	29.27	166;164	8;9	
			50760	2				19	55	21	27	15	15	11	22	2	0.0	0.0	0.3	0.03	52.1	76.2	36.87	169;170	7;7	OK
								19	55	20	28	16	15	11	22	2	0.0	0.0	0.3	0.03	52.5	73.8	31.98	171;170	8;8	
			50768	1				11	71	28	14	19	17	19	20	2	0.0	0.0	0.0	0.06	52.1	71.0	31.64	169;164	9;8	OK
								11	71	27	14	18	17	19	20	2	0.0	0.0	0.0	0.06	54.5	74.4	35.16	171;170	9;8	

US examination on automatic equipment – satisfactory

Heat no.	Pcs.
50776	1
50798	7
50771	4
50796	-
50780	-
50799	-
50783	-
50762	-

M.P.I. – satisfactory

Heat no.	Pcs.
50776	8
50798	-
50771	-
50796	2
50780	9
50799	3
50783	1
50762	2

'e state on our sole responsibility that the product conforms to the quirements mentioned at "Standard" heading of the present rtificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romeo Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Mihoiranu M.

Manufacturer:
S.C. PETROTUB S.A.
AV. ROMAN – IASI, KM 333
Z.I.P. 5550 - ROMAN,
ROMANIA

MILL TEST REPORT
to E.N. 10204/3.1.B

NO. D 562

Date: 28.06.2002

US examination on automatic equipment – satisfactory		M.P.I. – satisfactory	
Heat no.	Pcs.	Heat no.	Pcs.
50764	5	50764	-
50791	6	50791	-
50795	-	50795	1
50773	-	50773	1
50760	-	50760	2
50768	-	50768	1

GAUGE TRANSVERSAL

Heat No.	Standard	Length Inch	Width Inch	Thickness Inch
50776	API 5L	2	1.503	0.346
	ASTM/ASME	2	1.496	0.375
50798	API 5L	2	1.503	0.409
	ASTM/ASME	2	1.503	0.398
50771	API 5L	2	1.503	0.385
	ASTM/ASME	2	1.500	0.375
50796	API 5L	2	1.503	0.413
	ASTM/ASME	2	1.502	0.389
50780	API 5L	2	1.496	0.381
	ASTM/ASME	2	1.499	0.381
50799	API 5L	2	1.503	0.370
	ASTM/ASME	2	1.503	0.360
50783	API 5L	2	1.503	0.389
	ASTM/ASME	2	1.501	0.412
50762	API 5L	2	1.496	0.405
	ASTM/ASME	2	1.496	0.402

/e state on our sole responsibility that the product conforms to the equirements mentioned at "Standard" heading of the present rtificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Mihoianu M.

Manufacturer:	MILL TEST REPORT	NO.	Date:
S.C. PETROTUB S.A. AV. ROMAN – IASI, KM 333 Z.I.P. 5550 - ROMAN, ROMANIA	to E.N. 10204/3.1.B	D 562	28.06.2002

GAUGE TRANSVERSAL

Heat No.	Standard	Length Inch	Width Inch	Thickness Inch
50764	API 5L	2	1.503	0.358
	ASTM/ASME	2	1.501	0.366
50791	API 5L	2	1.503	0.358
	ASTM/ASME	2	1.500	0.367
50795	API 5L	2	1.503	0.377
	ASTM/ASME	2	1.498	0.388
50773	API 5L	2	1.496	0.381
	ASTM/ASME	2	1.496	0.388
50760	API 5L	2	1.503	0.405
	ASTM/ASME	2	1.502	0.383
50768	API 5L	2	1.503	0.393
	ASTM/ASME	2	1.501	0.399

Heat No.	Chemical Composition Bulletin No.	Mechanical Properties Bulletin No.	Hardness Test HB Bulletin No.	Hardness Test HRC Bulletin No.	Flattening Test Bulletin No.
50776	1131	623;269B	125	361	171
50798	1147	639;277B	100	370	180
50771	1147	639;277B	100	370	180
50796	1147	639;277B	101	370	180
50780	1149	621;267B	102	371	172
50799	1149	636;273B	99	369	179
50783	1147	639;277B	101	370	180
50762	1149	621;267B	102	371	172
50764	1131	623;269B	124	361	171
50791	1149	636;273B	99	369	179
50795	1149	636;273B	99	369	179
50773	1150	621;267B	102	371	172
50760	1147	639;277B	100	370	180
50768	1131	623;269B	125	361	171

e state on our sole responsibility that the product conforms to the quirements mentioned at "Standard" heading of the present rtificate.

GENERAL MANAGER
Dr. Eng. Bârsan Romano Dorel

Chief Inspection Dept.
Eng. Nicolau Constantin

QA Office
Eng. Morolanu M.

APPENDIX D.2.3

6-Inch Diameter FRP Tubing

TUBULAR FIBERGLASS CORPORATION
11811 Proctor Road • Houston, Texas 77038
Phone: (281) 847-2987 • Fax: (281) 847-1931
Email: tfc@cwix.com • website: www.tubularfiberglass.com

ISO 9001
CERTIFIED FIRM

August 1999

RED BOX 1250

FIBERGLASS TUBING, CASING, AND LINERS

AROMATIC AMINE CURED EPOXY RESIN

DIMENSIONAL SPECIFICATIONS

Nominal Size (inches)	Nominal O.D. (inches)	Nominal I.D. (inches)	Minimum Drift Dia (inches)	Pin Upset O.D. (inches)	Max Box O.D. (inches)	Nominal Wall (inches)	Nominal Weight (lbs/ft)	(lbs/jt)	Connection Type API 5B, Table 14*, 7**, 6*** Fourteenth Edition August 96
2-3/8	2.21	2.00	1.91	2.69	3.35	0.10	0.8	24	2-3/8" 8Rd EUE Long*
2-7/8	2.71	2.47	2.37	3.19	3.88	0.12	1.0	29	2-7/8" 8Rd EUE Long*
3-1/2	3.30	3.00	2.90	3.85	4.66	0.15	1.5	44	3-1/2" 8Rd EUE Long*
4-1/2	4.38	3.98	3.89	4.85	5.67	0.20	2.5	74	4-1/2" 8Rd EUE Long*
5-1/2	4.87	4.42	4.33	5.60	6.78	0.23	3.2	97	5-1/2" 8Rd Csg Long**
6-5/8	5.97	5.43	5.33	6.73	8.00	0.27	4.8	144	6-5/8" 8Rd Csg Long**
7	6.83	6.21	6.11	7.10	8.50	0.31	5.8	173	7" 8Rd Csg Long**
7-5/8	6.83	6.21	6.11	7.73	9.23	0.31	6.3	190	7-5/8" 8Rd Csg Long**
9-5/8	8.64	7.84	7.75	9.73	11.60	0.40	10.4	313	9-5/8" 8Rd Csg Long**
10-3/4	9.74	8.85	8.76	10.85	13.00	0.45	13.2	397	10-3/4" 8Rd Csg Short***

30 ft Standard Joint Length

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

Nominal Size	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	1,550	600	10,100	0.459
2-7/8	1,250	1,550	600	13,900	0.336
3-1/2	1,250	1,550	600	21,400	0.218
4-1/2	1,250	1,550	600	36,600	0.127
5-1/2	1,250	1,550	600	46,600	0.100
6-5/8	1,250	1,550	600	68,200	0.068
7	1,250	1,550	600	86,400	0.053
7-5/8	1,250	1,550	600	89,000	0.053
9-5/8	1,250	1,550	600	119,400	0.032
10-3/4	1,250	1,550	600	133,500	0.026

Where: P = Tensile Load (1,000 lbs)
L = String Length (1,000 ft)

MECHANICAL AND PHYSICAL PROPERTIES

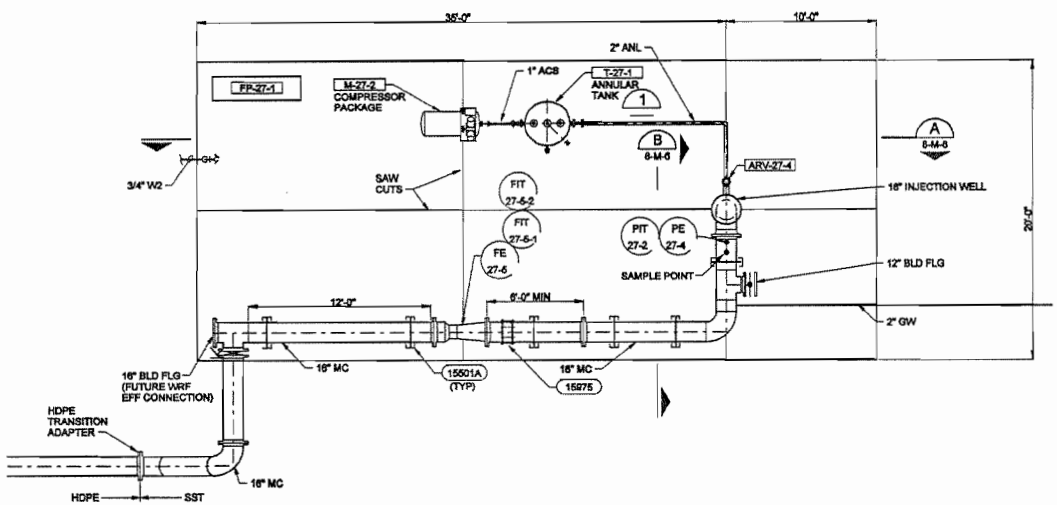
PROPERTY	VALUE	UNIT	TEST METHOD
Tensile Strength, Hoop	31,300	psi	ASTM D1599
Tensile Strength, Axial	30,000	psi	ASTM D2105
Modulus of Elasticity, Axial	3.0	10E + 06 psi	ASTM D2105
Long Term Hydrostatic Strength at 20 Years	16,646	psi	ASTM D2992 (B)
Specific Gravity	1.9	---	ASTM D792
Density	0.07	lbs/in^3	ASTM D792
Thermal Conductivity	2.4	$Btu/hr/ft^2/in/degF$	ASTM D177
Thermal Expansion Coefficient (Linear)	1.1	10E - 05in/in/degF	ASTM D696
Flow Factor	150	---	Hazen Williams

APPENDIX E

Injection Well System Record Drawing

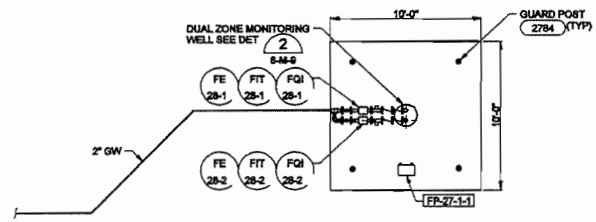
APPENDIX E.1

IW-1 Wellhead Record Drawings



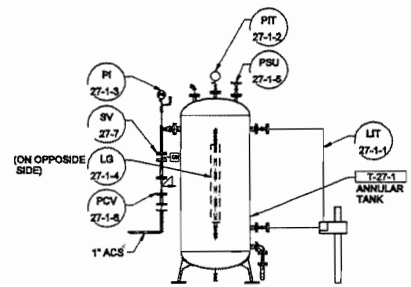
DEEP INJECTION WELL-PLAN

1/4"=1'-0"



MONITORING WELL - PLAN

1/4"=1'-0"



ANNULAR TANK - DETAIL 1

NTS

NOTE:

1. WELL DRILLING CONTRACTOR TO PROVIDE FOUR (4) TEMPORARY 4" DIAMETER SURFICIAL AQUIFER MONITORING WELLS, LOCATED APPROXIMATELY 4 FEET FROM THE CORNER OF THE DRILLING AREA. COMPLETE EACH TEMPORARY SURFICIAL AQUIFER MONITORING WELL TO APPROXIMATELY 25 BLS
2. CONTRACTOR SHALL CLOSE OFF THE TOP OF THE SHALLOW MONITORING WELLS WITH A BLIND FLANGE.

RECORD DRAWINGS

Revisions Drawn By SMP Date 10/2003

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

APPENDIX E-1

RO IW-1 and Monitor Well Plan and Annular Tank Detail Record Drawings

DSGN M. MCGEE, A. AMAYA	NO.	DATE	REVISION	BY	APVD
DR 395412m06d.dgn, R. SCHOL					
CHK R. VOORHEES					
APVD R. VOORHEES					

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2MHILL
3011 SW WILLISTON ROAD
GAINESVILLE, FLORIDA 32608
ES0000072 AAC001992

BONITA SPRINGS REVERSE OSMOSIS WATER TREATMENT PLANT IMPROVEMENTS
BONITA SPRINGS UTILITIES, INC.
BONITA SPRINGS, FLORIDA

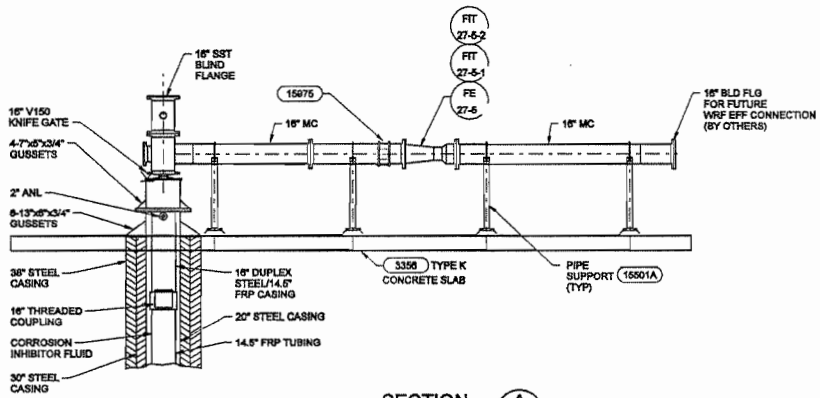
MECHANICAL
8-M-5
AND MONITORING WELL
ENLARGED PLAN AND DETAIL

DWG 8-M-5
DATE OCT 2003
PROJ 163954.A1

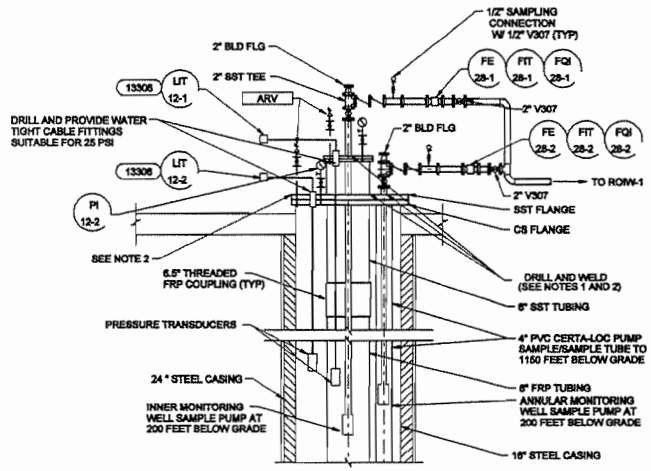
05-NOV-2003 10:20:43 395412m06d.dgn

APPENDIX E.2

DZMW-1 Wellhead Record Drawings

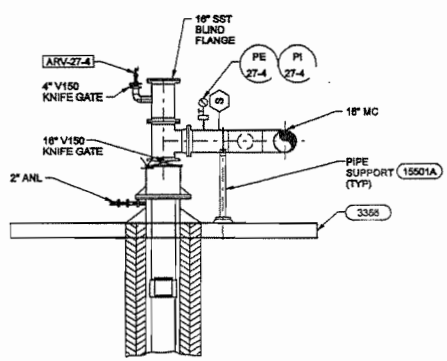


SECTION A
1/4"=1'-0" 8-M-5



DUAL ZONE MONITORING WELL DETAIL 2
NTS 8-M-5

FOR ACTUAL ORIENTATION OF PIPING SEE DRAWING 8-M-5



SECTION B
1/4"=1'-0" 8-M-5

NOTES:

1. DRILL 6" TYPE 316L SST BLIND FLANGE FOR 2" TYPE 316L PIPE AND WELD PIPE ALL AROUND TO FLANGE.
2. DRILL 16" TYPE 316SS BLIND FLANGE FOR 2" AND 6" 316SS PIPES AND WELD PIPES ALL AROUND TO FLANGE PROVIDE FOUR 3/4-INCH CENTERED TAPS IN FLANGE FOR POWER, TRANSMITTER, ETC. INSTALL THREADED SST PLUGS IN UNUSED TAPS.

RECORD DRAWINGS

Revisions Drawn By SMP Date 10/2003

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

APPENDIX E-2
RO IW Section and Monitor Well Detail
Record Drawings

DSGN M. McGEE; A. AMAYA						VERIFY SCALE	CH2MHILL
DR 396412m08d.dgn; R. BOHON						BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	3011 SW WILLISTON ROAD GAINESVILLE, FLORIDA 32608
CHK R. VOORHEES							EB0000072 AAC001992
APVD R. VOORHEES	NO.	DATE	REVISION	BY	APVD		

BONITA SPRINGS REVERSE OSMOSIS WATER TREATMENT PLANT IMPROVEMENTS
BONITA SPRINGS UTILITIES, INC.
BONITA SPRINGS, FLORIDA

MECHANICAL
8-M-6
AND MONITORING WELL SECTION

DWG 8-M-6
DATE OCT 2003
PROJ 163954.A1

06-NOV-2003 10:19:02 396412m08d.dgn

RECORD DRAWINGS

REUSE OF DOCUMENTS: THIS DOCUMENT AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL.

© CH2M HILL

APPENDIX F

Pad Monitor Well Water Quality Data

Pad Monitor Well Water Quality Data
Northeast Monitor Well (NE-1)

Date	Time	Depth to Water (feet bmp)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (µmhos/cm)	Chloride (mg/L)	Temperature (degrees C)	pH (S.U.)	Comments	Sampled By
09/25/2002	1600	5.60	16.29	10.69	1131	120	31.2	6.97	Background Sample	YBI/CH2M
10/03/2002	1400	5.92	16.29	10.37	1180	110	30.1	7.22		YBI/CH2M
10/10/2002	0030	6.37	16.29	9.92	932	104	23.8	7.30		YBI/CH2M
10/17/2002	0900	5.82	16.29	10.47	935	88	28.7	6.97		YBI/CH2M
10/24/2002	1725	6.20	16.29	10.09	789	210	12.9	6.87	refrigerated sample	YBI/CH2M
11/01/2002	1115	6.64	16.29	9.65	986	83	30.3	6.95		YBI/CH2M
11/07/2002	1145	7.00	16.29	9.29	780	85	22.0	6.87		YBI/CH2M
11/14/2002	1920	7.53	16.29	8.76	876	87	22.3	6.91		YBI/CH2M
11/22/2002	1000	7.02	16.29	9.27	862	81	22.1	6.86		YBI/CH2M
11/30/2002	1700	7.52	16.29	8.77	645	65	19.5	7.08		YBI/CH2M
12/06/2002	1520	7.24	16.29	9.05	741	75	22.5	7.01		YBI/CH2M
12/16/2002	0830	7.35	16.29	8.94	821	82	24.9	7.10		YBI/CH2M
12/20/2002	1145	7.55	16.29	8.74	895	88	23.5	6.98		YBI/CH2M
12/27/2002	2300	7.80	16.29	8.49	917	92	23.9	7.58		YBI/CH2M
01/06/2003	0300	7.42	16.29	8.87	945	65	25.3	7.01		YBI/CH2M
01/09/2003	0800	7.50	16.29	8.79	955	106	21.2	7.05		YBI/CH2M
01/16/2003	1100	8.00	16.29	8.29	1142	185	19.1	6.96		YBI/CH2M
01/24/2003	1100	8.32	16.29	7.97	1075	135	24.2	7.20		YBI/CH2M
01/31/2003	1350	8.40	16.29	7.89	1053	95	28.7	7.36		YBI/CH2M
02/07/2003	1000	8.70	16.29	7.59	1174	110	31.0	7.08		YBI/CH2M
02/14/2003	1115	9.11	16.29	7.18	1268	180	22.2	6.88		YBI/CH2M
02/24/2003	0930	8.42	16.29	7.87	1370	185	27.2	6.94		YBI/CH2M
02/28/2003	0500	9.13	16.29	7.16	1256	175	21.9	7.42		YBI/CH2M
03/07/2003	1030	9.55	16.29	6.74	1029	160	25.5	7.23		YBI/CH2M
03/18/2003	1600	8.42	16.29	7.87	1282	175	22.9	6.91	Top of casing mp changed	YBI/CH2M
03/27/2003	1615	9.50	16.29	6.79	1132	140	23.7	7.50		YBI/CH2M
04/03/2003	1600	9.24	16.29	7.05	1310	135	24.3	7.10		YBI/CH2M
04/10/2003	1330	8.95	16.29	7.34	1181	157	22.7	7.07		YBI/CH2M
04/17/2003	1715	9.25	16.29	7.04	1058	120	28.0	7.20		YBI/CH2M

Notes:

feet bmp:	feet below measuring point
µmhos/cm:	micromhos per centimeter
mg/L:	milligrams per liter
C:	Celsius
S.U.:	standard units

Pad Monitor Well Water Quality Data
Northwest Monitor Well (NW-1)

Date	Time	Depth to Water (feet bmp)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (µmhos/cm)	Chloride (mg/L)	Temperature (degrees C)	pH (S.U.)	Comments	Sampled By
09/25/2002	1640	5.54	16.74	11.20	680	85	27.2	8.76	Background Sample	YBI/CH2M
10/03/2002	1420	6.08	16.74	10.66	724	80	29.6	8.91		YBI/CH2M
10/10/2002	0105	5.83	16.19	10.36	645	80	23.7	8.65		YBI/CH2M
10/17/2002	0930	5.21	16.19	10.98	658	92	27.5	6.97		YBI/CH2M
10/24/2002	0:00	5.50	16.19	10.69	551	140	13.0	9.44	refrigerated sample	YBI/CH2M
11/01/2002	1130	6.10	16.19	10.09	690	105	27.0	9.26		YBI/CH2M
11/07/2002	1215	6.30	16.19	9.89	609	76	22.5	9.15		YBI/CH2M
11/14/2002	1640	6.40	16.19	9.79	735	105	22.9	9.20		YBI/CH2M
11/22/2002	1100	6.00	16.19	10.19	575	101	22.1	8.81		YBI/CH2M
11/30/2002	1330	6.87	16.19	9.32	471	85	19.4	9.10		YBI/CH2M
12/06/2002	1600	5.50	16.19	10.69	521	85	22.5	8.82		YBI/CH2M
12/16/2002	1110	5.64	16.19	10.55	536	88	24.8	8.91		YBI/CH2M
12/20/2002	1215	6.40	16.19	9.79	584	94	23.6	9.10		YBI/CH2M
12/27/2002	2330	7.30	16.19	8.89	620	95	24.9	8.61		YBI/CH2M
01/06/2003	0615	6.15	16.19	10.04	583	70	18.8	9.73		YBI/CH2M
01/09/2003	0830	6.25	16.19	9.94	580	130	21.1	9.18		YBI/CH2M
01/16/2003	1700	6.70	16.19	9.49	582	145	19.0	10.43		YBI/CH2M
01/24/2003	1115	6.80	16.19	9.39	685	125	24.5	11.12		YBI/CH2M
01/31/2003	1440	6.75	16.19	9.44	1348	85	28.4	11.46		YBI/CH2M
02/07/2003	1145	6.72	16.19	9.47	1085	120	30.6	11.06		YBI/CH2M
02/14/2003	1200	7.12	16.19	9.07	1152	85	22.2	11.58		YBI/CH2M
02/24/2003	1000	6.94	16.19	9.25	1463	145	27.7	11.70		YBI/CH2M
02/28/2003	0550	6.79	16.19	9.40	483	82	22.5	8.28		YBI/CH2M
03/07/2003	1045	7.19	16.19	9.00	533	85	32.1	10.02		YBI/CH2M
03/18/2003	1615	6.83	16.19	9.36	500	88	23.1	8.76		YBI/CH2M
03/27/2003	1630	6.83	16.19	9.36	546	90	23.9	9.29		YBI/CH2M
04/03/2003	1620	6.80	16.19	9.39	535	105	24.5	9.17		YBI/CH2M
04/10/2003	1400	7.05	16.19	9.14	543	82	22.3	8.77		YBI/CH2M
04/17/2003	1730	7.09	16.19	9.10	665	80	27.7	11.05		YBI/CH2M

Notes:

feet bmp:	feet below measuring point
µmhos/cm:	micromhos per centimeter
mg/L:	milligrams per liter
C:	Celsius
S.U.:	standard units
N/A	The information is currently unavailable

Pad Monitor Well Water Quality Data
Southeast Monitor Well (SE-1)

Date	Time	Depth to Water (feet bmp)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (µmhos/cm)	Chloride (mg/L)	Temperature (degrees C)	pH (S.U.)	Comments	Sampled By
09/25/2002	1530	5.21	15.80	10.59	1320	175	27.6	7.03	Background Sample	YBI/CH2M
10/03/2002	1500	5.47	15.80	10.33	1584	252	26.7	6.97		YBI/CH2M
10/10/2002	0130	5.93	15.80	9.87	1258	185	23.7	7.63		YBI/CH2M
10/17/2002	1000	5.38	15.80	10.42	1567	264	29.5	6.88		YBI/CH2M
10/24/2002	1800	5.66	15.80	10.14	1586	370	12.7	6.62	refrigerated sample	YBI/CH2M
11/01/2002	1145	6.18	15.80	9.62	1666	230	30.8	6.94		YBI/CH2M
11/07/2002	1245	6.50	15.80	9.30	1443	247	21.9	6.92		YBI/CH2M
11/14/2002	1845	7.23	15.80	8.57	1357	215	22.3	7.09		YBI/CH2M
11/22/2002	1600	6.50	15.80	9.30	1403	290	22.1	6.82		YBI/CH2M
11/30/2002	1540	7.15	15.80	8.65	937	190	19.5	7.31		YBI/CH2M
12/06/2002	1645	6.65	15.80	9.15	1320	295	22.5	6.98		YBI/CH2M
12/16/2002	1210	6.60	15.80	9.20	1380	301	23.8	6.96		YBI/CH2M
12/20/2002	1255	6.83	15.80	8.97	1296	245	23.7	7.05		YBI/CH2M
12/27/2002	2200	7.30	15.80	8.50	1213	205	23.7	7.40		YBI/CH2M
01/06/2003	0330	7.02	15.80	8.78	1416	208	19.3	7.18		YBI/CH2M
01/09/2003	0930	7.08	15.80	8.72	1100	145	21.1	7.06		YBI/CH2M
01/16/2003	1600	7.57	15.80	8.23	1032	125	20.9	7.26		YBI/CH2M
01/24/2003	1145	7.82	15.80	7.98	1333	210	24.7	7.18		YBI/CH2M
01/31/2003	1600	8.00	15.80	7.80	1334	185	28.4	7.36		YBI/CH2M
02/07/2003	900	8.27	15.80	7.53	1406	180	31.6	7.10		YBI/CH2M
02/14/2003	1230	8.20	15.80	7.60	1453	240	22.3	7.15		YBI/CH2M
02/24/2003	1015	7.74	15.80	8.06	1480	220	26.9	6.89		YBI/CH2M
02/28/2003	0430	8.50	15.80	7.30	1339	162	22.5	7.38		YBI/CH2M
03/07/2003	1100	8.68	15.80	7.12	1597	235	28.3	6.99		YBI/CH2M
03/18/2003	1635	8.23	15.80	7.57	1247	185	23.1	6.91		YBI/CH2M
03/27/2003	1650	9.20	15.80	6.60	1691	195	24.2	7.22		YBI/CH2M
04/03/2003	1700	9.05	15.80	6.75	1535	205	24.6	6.89		YBI/CH2M
04/10/2003	1430	8.64	15.80	7.16	1651	225	23.0	6.96		YBI/CH2M
04/17/2003	1800	8.82	15.80	6.98	1932	240	28.0	6.90		YBI/CH2M

Notes:

feet bmp:	feet below measuring point
µmhos/cm:	micromhos per centimeter
mg/L:	milligrams per liter
C:	Celsius
S.U.:	standard units

Pad Monitor Well Water Quality Data
Southwest Monitor Well (SW-1)

Date	Time	Depth to Water (feet bmp)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (µmhos/cm)	Chloride (mg/L)	Temperature (degrees C)	pH (S.U.)	Comments	Sampled By
09/25/2002	1500	6.00	16.55	10.55	920	78	28.8	7.12	Background Sample	YBI/CH2M
10/03/2002	1445	6.22	16.55	10.33	869	83	27.1	7.31		YBI/CH2M
10/10/2002	0200	6.43	16.25	9.82	814	96	23.6	7.30		YBI/CH2M
10/17/2002	1030	5.95	16.25	10.30	833	87	26.9	7.11		YBI/CH2M
10/24/2002	1840	6.00	16.25	10.25	713	110	14.5	7.23	refrigerated sample	YBI/CH2M
11/01/2002	1200	6.70	16.25	9.55	886	85	29.3	7.18		YBI/CH2M
11/07/2002	1315	7.10	16.25	9.15	780	82	22.0	7.28		YBI/CH2M
11/14/2002	1745	7.60	16.25	8.65	796	80	22.6	7.23		YBI/CH2M
11/22/2002	1630	7.10	16.25	9.15	727	87	22.2	7.07		YBI/CH2M
11/30/2002	1430	7.65	16.25	8.60	608	75	19.2	7.28		YBI/CH2M
12/06/2002	1620	7.20	16.25	9.05	731	80	22.5	7.12		YBI/CH2M
12/16/2002	1140	7.40	16.25	8.85	657	77	24.7	7.22		YBI/CH2M
12/20/2002	1335	7.60	16.25	8.65	696	82	23.7	7.15		YBI/CH2M
12/27/2002	2230	7.90	16.25	8.35	709	85	24.8	7.46		YBI/CH2M
01/06/2003	0500	6.94	16.25	9.31	692	70	19.3	7.18		YBI/CH2M
01/09/2003	0900	7.58	16.25	8.67	823	105	21.3	7.17		YBI/CH2M
01/16/2003	1630	8.00	16.25	8.25	992	160	21.1	7.24		YBI/CH2M
01/24/2003	1200	8.40	16.25	7.85	976	150	24.3	7.32		YBI/CH2M
01/31/2003	1530	8.55	16.25	7.70	835	120	27.5	7.34		YBI/CH2M
02/07/2003	0800	8.70	16.25	7.55	860	88	30.0	7.28		YBI/CH2M
02/14/2003	1130	8.95	16.25	7.30	1260	198	22.3	6.88		YBI/CH2M
02/24/2003	1030	8.40	16.25	7.85	697	70	28.8	7.52		YBI/CH2M
02/28/2003	0345	9.13	16.25	7.12	617	62	22.4	7.79		YBI/CH2M
03/07/2003	1200	9.45	16.25	6.80	663	120	26.7	10.44		YBI/CH2M
03/18/2003	1650	8.32	16.25	7.93	610	110	23.1	9.92		YBI/CH2M
03/27/2003	1715	9.35	16.25	6.90	1418	200	23.9	7.36		YBI/CH2M
04/03/2003	1730	8.90	16.25	7.35	1055	75	24.1	11.88		YBI/CH2M
04/10/2003	1500	8.90	16.25	7.35	1671	105	22.7	11.62		YBI/CH2M
04/17/2003	1830	9.05	16.25	7.20	681	48	28.2	7.70		YBI/CH2M

Notes:

feet bmp:	feet below measuring point
µmhos/cm:	micromhos per centimeter
mg/L:	milligrams per liter
C:	Celsius
S.U.:	standard units

APPENDIX G

Well Lithologic Descriptions

APPENDIX G.1

IW-1 Lithologic Descriptions

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
0	10	LIMESTONE and SHELL FRAGMENTS, yellowish gray (5Y 8/1), poorly consolidated
10	20	LIMESTONE and SHELL FRAGMENTS, as above
20	30	CLAY, light olive gray (5Y 6/1), sticky
30	40	CLAY, as above
40	50	CLAY, as above
50	60	LIMESTONE (50%), medium bluish gray (5B 5/1), large fragments, moderate porosity; SHELLS AND SHELL FRAGMENTS (50%), moderately consolidated; phosphate present
60	70	LIMESTONE and SHELL FRAGMENTS, as above
70	80	LIMESTONE and SHELL FRAGMENTS, as above
80	90	LIMESTONE and SHELL FRAGMENTS, as above
90	100	LIMESTONE and SHELL FRAGMENTS, as above
100	110	SANDY LIMESTONE, light olive gray (5Y 6/1), small fragments, moderate porosity, poorly consolidated; some shell fragments
110	120	SANDY LIMESTONE, as above
120	130	SANDY LIMESTONE, as above
130	140	SANDY LIMESTONE, as above
140	150	SANDY LIMESTONE, as above
150	160	SANDY LIMESTONE, as above, color change to medium bluish gray (5B 5/1)
160	170	SANDY LIMESTONE, as above
170	180	SANDY LIMESTONE, as above
180	190	SANDY LIMESTONE, as above, medium to large fragments
190	200	SHELL FRAGMENTS, poorly consolidated
200	210	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated
210	220	LIMESTONE, as above, trace of marly green clay
220	230	LIMESTONE, as above
230	240	LIMESTONE, as above
240	250	CLAY, light olive gray (5Y 5/2), medium plasticity, sticky; trace of limestone
250	260	CLAY, as above
260	270	CLAY, as above
270	280	CLAY, as above
280	290	CLAY, as above
290	300	CLAY, as above
300	310	CLAY, as above, trace of phosphate
310	320	CLAY, as above
320	330	CLAY, dark greenish gray (5GY 4/1), medium plasticity, very sticky, trace of phosphate

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
330	340	CLAY, as above
340	350	CLAY, as above
350	360	CLAY, as above, very high phosphates
360	370	CLAY, as above
370	380	CLAY, as above, high phosphates
380	390	CLAY, as above
390	400	CLAY, as above, trace of limestone and shell fragments (10%)
400	410	CLAY, as above, increase in limestone and shell fragments to 50%
410	420	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of shell fragments and marly green clay, high phosphates
420	430	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of shell fragments and phosphates
430	440	LIMESTONE, as above
440	450	LIMESTONE, as above
450	460	LIMESTONE, as above
460	470	LIMESTONE, as above
470	480	LIMESTONE, as above
480	490	LIMESTONE, as above
490	500	LIMESTONE, as above
500	510	LIMESTONE, as above, large fragments
510	520	LIMESTONE, yellowish gray (5Y 7/2), medium fragments, moderate porosity, moderately consolidated, shell fragments, trace of light olive gray clay
520	530	CLAY, light olive gray (5Y 6/1), stiff, trace of limestone and shell fragments
530	540	LIMESTONE, yellowish gray (5Y 7/2), large fragments, moderate porosity, moderately consolidated
540	550	LIMESTONE, as above
550	560	LIMESTONE, as above
560	570	LIMESTONE, as above
570	580	LIMESTONE, as above
580	590	LIMESTONE, as above, trace of phosphate
590	600	LIMESTONE, as above, no phosphate
600	610	LIMESTONE, as above, harder with shell molds
610	620	LIMESTONE, as above
620	630	LIMESTONE, as above

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
630	640	CLAY, dark greenish gray (5GY 4/1), medium plasticity, slightly sticky
640	650	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, well consolidated
650	660	LIMESTONE, as above
660	670	LIMESTONE, as above
670	680	LIMESTONE, as above, medium to large fragments, trace of marly clay
680	690	LIMESTONE, as above
690	700	CLAY, yellowish gray (5Y 7/2), soft, marly, trace of phosphate
700	710	Same as above, increase in phosphate
710	720	LIMESTONE (80%), yellowish gray (5Y 7/2), small fragments, moderately consolidated; CLAY (20%), yellowish gray (5Y 7/2), marly, soft
720	730	CLAY, grayish olive (10Y 4/2), soft, marly, phosphate present, trace of limestone
730	740	CLAY, yellowish gray (5Y 7/2), soft, marly, trace of limestone
740	750	CLAY, as above
750	760	LIMESTONE (50%), yellowish gray (5Y 7/2), medium fragments, poorly consolidated; CLAY (50%), yellowish gray (5Y 7/2), marly, soft
760	770	CLAY, yellowish gray (5Y 7/2), soft, marly, trace of limestone
770	780	LIMESTONE, light olive gray (5Y 5/2), small to medium fragments, poorly consolidated, abundant phosphate, trace of clay
780	790	LIMESTONE, as above
790	800	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderately consolidated, trace of marly green clay
800	810	LIMESTONE, yellowish gray (5Y 7/2), medium fragments, moderate porosity, moderately consolidated
810	820	LIMESTONE, as above
820	830	LIMESTONE, as above
830	840	LIMESTONE, light gray (N7), medium fragments, moderate porosity, hard, shell molds
840	850	LIMESTONE, as above
850	860	LIMESTONE, as above
860	870	LIMESTONE, as above
870	880	LIMESTONE, as above
880	890	LIMESTONE, as above
890	900	LIMESTONE, as above
900	910	LIMESTONE, as above
910	920	LIMESTONE, as above
920	930	LIMESTONE, grayish orange (10YR 7/4), very small fragments, moderately consolidated
930	940	LIMESTONE, as above
940	950	LIMESTONE, as above, soft

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
950	960	LIMESTONE, as above
960	970	LIMESTONE, as above
970	980	LIMESTONE, as above, harder and small fragments
980	990	LIMESTONE, as above
990	1000	LIMESTONE, as above
1000	1010	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderately consolidated, trace of phosphate
1010	1020	LIMESTONE, as above, very small fragments, sandy, phosphate present
1020	1030	LIMESTONE, as above
1030	1040	LIMESTONE, as above
1040	1050	LIMESTONE, as above, no phosphate
1050	1060	LIMESTONE, as above
1060	1070	LIMESTONE, as above
1070	1080	LIMESTONE, light olive gray (5Y 5/2), small fragments, moderately consolidated, sandy
1080	1090	LIMESTONE, as above
1090	1100	LIMESTONE, as above
1100	1110	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, well consolidated, sandy, friable
1110	1120	LIMESTONE, as above, small to medium fragments, poorly consolidated
1120	1130	LIMESTONE, as above
1130	1140	LIMESTONE, as above
1140	1150	LIMESTONE, as above
1150	1160	LIMESTONE, as above
1160	1170	LIMESTONE, as above, very small to medium fragments
1170	1180	LIMESTONE, as above
1180	1190	LIMESTONE, as above
1190	1200	LIMESTONE, as above
1200	1210	LIMESTONE, as above
1210	1220	**No Sample**
1220	1230	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, moderately consolidated, friable
1230	1240	LIMESTONE, as above
1240	1250	LIMESTONE, as above
1250	1260	LIMESTONE, as above
1260	1270	LIMESTONE, as above
1270	1280	LIMESTONE, as above

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1280	1290	LIMESTONE and DOLOMITE, yellowish gray (5Y 7/2), medium to large fragments, low porosity, fractured
1290	1300	LIMESTONE and DOLOMITE, as above
1300	1310	LIMESTONE, yellowish gray (5Y 7/2), medium fragments, moderately consolidated, friable
1310	1320	LIMESTONE, very pale orange (10YR 8/2), very small to small fragments, soft to friable
1320	1330	LIMESTONE, as above
1330	1340	LIMESTONE, as above
1340	1350	LIMESTONE, yellowish gray (5Y 7/2), small to medium fragments, hard, shell molds, trace of dolomite or chert
1350	1360	LIMESTONE, grayish orange (10YR 7/4), small to medium fragments, poorly consolidated, sandy texture
1360	1370	LIMESTONE, as above
1370	1380	LIMESTONE, as above
1380	1390	LIMESTONE, as above
1390	1400	LIMESTONE, as above
1400	1410	LIMESTONE, very pale orange (10YR 7/4), small to medium fragments, moderately consolidated, foraminifera present
1410	1420	LIMESTONE, as above, small fragments
1420	1430	LIMESTONE, as above
1430	1440	LIMESTONE, as above
1440	1450	LIMESTONE, as above
1450	1460	LIMESTONE, yellowish gray (5Y 7/2), small to medium fragments, moderate to poorly consolidated, trace of foraminifera
1460	1470	LIMESTONE, as above
1470	1480	LIMESTONE, very pale orange (10YR 7/4), very small to small fragments, moderately consolidated, sandy
1480	1490	LIMESTONE, as above
1490	1500	LIMESTONE, yellowish gray (5Y 7/2), small to medium fragments, poorly consolidated, foraminifera present
1500	1510	LIMESTONE, as above
1510	1520	LIMESTONE, as above
1520	1530	LIMESTONE, as above
1530	1540	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, well consolidated
1540	1550	LIMESTONE, as above, small to medium fragments, moderately consolidated
1550	1560	LIMESTONE, as above
1560	1570	LIMESTONE, as above, small to large fragments
1570	1580	LIMESTONE, dark yellowish brown (10YR 4/2), medium fragments, well consolidated, sandy texture
1580	1590	LIMESTONE, yellowish gray (5Y 7/2), small to medium fragments, moderately consolidated, trace of marly clay
1590	1600	LIMESTONE, as above
1600	1610	LIMESTONE, as above
1610	1620	CLAY, yellowish gray (5Y 7/2), soft, marly

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1620	1630	LIMESTONE, very pale orange (10YR 7/4), small to medium fragments, moderately consolidated, sandy texture
1630	1640	LIMESTONE, as above, trace of moderate yellowish brown (10YR 5/4) dolomite
1640	1650	LIMESTONE (50%), very pale orange (10YR 7/4), small fragments, moderately consolidated; DOLOMITE (50%) dark yellowish brown, (10Y 4/2), moderately consolidated, low porosity
1650	1660	LIMESTONE, yellowish gray (5Y 7/2) to (5Y 8/1), small to large fragments, moderately consolidated, low prorosity.
1660	1670	LIMESTONE, as above
1670	1680	LIMESTONE, as above
1680	1690	LIMESTONE, as above
1690	1700	LIMESTONE, as above
1700	1710	LIMESTONE, as above
1710	1720	LIMESTONE, yellowish gray (5Y 7/2) to (5Y 8/1), very fine grained, loosely consolidated.
1720	1730	LIMESTONE, as above
1730	1740	LIMESTONE, as above, trace of pale bluish gray dolomite
1740	1750	LIMESTONE, yelllowish gray (5Y 7/2) to (5Y 8/1), well consolidated, hard, trace of brown dolomite
1750	1760	LIMESTONE, yelllowish gray (5Y 7/2), small to medium fragments, moderately consolidated, trace of brown dolomite
1760	1770	LIMESTONE, as above
1770	1780	LIMESTONE, yellowish gray (5Y 8/1), small to medium fragments, loose consolidation to tight consolidation
1780	1790	LIMESTONE, as above
1790	1800	LIMESTONE, as above, trace of grayish brown dolomite
1800	1810	LIMESTONE, light olive gray (5Y 5/2), small to medium fragments, moderately condolidated, trace of grayish brown dolomite
1810	1820	LIMESTONE, as above
1820	1830	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, well consolidated, dense, fractured, trace of white marl
1830	1840	LIMESTONE, yellowish gray 5Y 7/2), medium to large fragments, well consolidated, dense
1840	1850	LIMESTONE, moderate olive brown (5Y 4/4), small to large fragments, poorly consolidated, trace of dolomite
1850	1860	LIMESTONE, as above
1860	1870	LIMESTONE, as above
1870	1880	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, well consolidated, sandy texture
1880	1890	LIMESTONE, as above
1890	1900	LIMESTONE, light olive gray (5Y 5/2), small to medium fragments, moderately condolidated, sandy texture, friable
1900	1910	LIMESTONE, as above, mottled color
1910	1920	LIMESTONE, light olive gray (5Y 5/2) to moderate olive brown (5Y 4/4), small to large fragments, moderately consolidated, dense, fractured
1920	1930	LIMESTONE, as above
1930	1940	LIMESTONE, as above
1940	1950	LIMESTONE, moderate yellowish brown (10YR 5/4), small to large fragments, poorly consolidated, sandy texture, trace of dolomite
1950	1960	LIMESTONE, moderate yellowish brown (10YR 5/4), large fragments, moderately consolidated, very fine grained, dense
1960	1970	LIMESTONE, moderate yellowish brown (10YR 5/4), small to large fragments, poorly consolidated, fine grained, friable

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1970	1980	LIMESTONE, moderate yellowish brown (10YR 5/4), large fragments, moderately consolidated, fine grained, friable
1980	1990	LIMESTONE, as above
1990	2000	LIMESTONE, as above
2000	2010	LIMESTONE, as above
2010	2020	LIMESTONE, pale yellowish brown (10YR 6/2), medium to large fragments, well consolidated, fine grained, friable to dense, trace of brown dolomite
2020	2030	LIMESTONE, as above, moderately consolidated
2030	2040	LIMESTONE, as above, small to medium fragments, poorly consolidated
2040	2050	DOLOMITE, dusky brown (5YR 2/2), medium to large fragments, well consolidated, low porosity, dense, fractured
2050	2060	DOLOMITE, as above
2060	2070	DOLOMITE, as above, medium porosity, vuggy
2070	2080	DOLOMITE, dusky brown (5YR 2/2), medium to large fragments, well consolidated, low porosity, dense, fractured
2080	2090	LIMESTONE, pale yellowish brown (10YR 6/2), medium to large fragments, well consolidated, fine grained, friable to dense, trace of brown dolomite
2090	2100	DOLOMITE, dusky yellowish brown (10YR 2/2) and black (N1), small to medium fragments, moderately consolidated, low porosity, dense, fractured, trace of limestone
2100	2110	DOLOMITE, as above, medium to large fragments, microcrystalline
2110	2120	LIMESTONE, pale yellowish brown (10YR 6/2), medium to large fragments, moderately consolidated, fine grained, friable, trace of brown dolomite
2120	2130	DOLOMITE, dusky yellowish brown (10YR 2/2) and black (N1), medium to large fragments, well consolidated, low porosity, dense, microcrystalline
2130	2140	DOLOMITE, as above
2140	2150	DOLOMITE, pale yellowish brown (10YR 6/2) and black (N1), small to large fragments, poorly consolidated, low porosity; LIMESTONE (30%), pale yellowish brown (10YR 6/2), small to medium fragments, fine grained, soft to friable
2150	2160	DOLOMITE, dusky yellowish brown (10YR 2/2) and black (N1), mottled appearance, medium to large fragments, poorly to moderately consolidated, low porosity, dense, microcrystalline, trace of limestone
2160	2170	DOLOMITE, as above
2170	2180	DOLOMITE, as above
2180	2190	DOLOMITE, as above
2190	2200	LIMESTONE, yellowish gray (5Y 7/2), medium to large fragments, well consolidated, very fine grained, soft to dense
2200	2210	LIMESTONE, as above
2210	2220	LIMESTONE, as above
2220	2230	LIMESTONE, as above, poorly to moderately consolidated, trace of dusky yellowish brown (10YR 2/2) dolomite
2230	2240	LIMESTONE, as above
2240	2250	LIMESTONE, as above
2250	2260	LIMESTONE, as above, increase in dolomite to 50%
2260	2270	LIMESTONE, as above

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
2270	2280	LIMESTONE, as above
2280	2290	DOLOMITE, moderate yellowish brown (10YR 5/4) to dusky yellowish brown (10YR 2/2), small to large fragments, poorly consolidated, low porosity, dense, microcrystalline, minor vugs, trace of limestone
2290	2300	DOLOMITE, as above, very poorly consolidated
2300	2310	DOLOMITE, dusky yellowish brown (10YR 2/2), medium to large fragments, well consolidated, low porosity, fractured, dense, trace of limestone
2310	2320	DOLOMITE, dusky brown (5YR 2/2), medium to large fragments, very well consolidated, low porosity, fractured, dense, microcrystalline, vuggy
2320	2330	DOLOMITE, as above, dark yellowish brown (10YR 4/2)
2330	2340	DOLOMITE, as above
2340	2350	DOLOMITE, as above
2350	2360	DOLOMITE, as above
2360	2370	LIMESTONE (50%), yellowish gray (5Y 7/2), very small to medium fragments, very poorly consolidated, fine grained, soft to friable; DOLOMITE (50%), pale yellowish brown (10YR 6/2), small to large fragments, very poorly consolidated, dense
2370	2380	LIMESTONE and DOLOMITE, as above
2380	2390	LIMESTONE and DOLOMITE, as above
2390	2400	LIMESTONE and DOLOMITE, as above
2400	2410	LIMESTONE and DOLOMITE, as above
2410	2420	LIMESTONE and DOLOMITE, as above
2420	2430	LIMESTONE and DOLOMITE, as above
2430	2440	LIMESTONE and DOLOMITE, as above
2440	2450	LIMESTONE and DOLOMITE, as above, well consolidated
2450	2460	LIMESTONE and DOLOMITE, as above
2460	2470	LIMESTONE and DOLOMITE, as above
2470	2480	LIMESTONE and DOLOMITE, as above, color change in dolomite to light bluish gray (5B 7/1), vuggy
2480	2490	LIMESTONE, yellowish gray (5Y 7/2), very small to medium fragments, poorly consolidated, medium grained, friable, trace of dolomite
2490	2500	LIMESTONE, as above, very poorly consolidated
2500	2510	DOLOMITE, moderate yellowish brown (10YR 5/4), small to medium fragments with 180 degree cleavage, well consolidated, low porosity, fractured, dense
2510	2520	DOLOMITE, as above, moderately consolidated
2520	2530	LIMESTONE, pale olive (10Y 6/2), medium fragments, well consolidated, medium grained, medium porosity, soft to dense
2530	2540	LIMESTONE, as above, dense
2540	2550	LIMESTONE (50%), yellowish gray (5Y 7/2), small to medium fragments, poorly consolidated, fine grained, low porosity, dense; DOLOMITE (50%), dark yellowish brown (10YR 4/2), small to medium fragments, moderately consolidated, dense
2550	2560	LIMESTONE and DOLOMITE, as above, dolomite is mottled dark yellowish brown (10YR 4/2) and grayish black (N2)
2560	2570	LIMESTONE, yellowish gray (5Y 7/2), large fragments, well consolidated, medium grained, moderate porosity, sandy texture

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
2570	2580	LIMESTONE, as above, 10% yellowish gray (5Y 7/2) marl, small to medium fragments, poorly consolidated
2580	2590	LIMESTONE, pale yellowish brown (10YR 6/2), very small to small fragments, moderately consolidated, medium grained, sandy texture
2590	2600	LIMESTONE, dusky yellowish brown (10YR 2/2), medium fragments, moderatley consolidated, fine grained, low porosity, minor amounts of dusky yellowish brown (10YR 2/2) clay and grayish black (N2) lignite (180 degree cleavage)
2600	2610	LIMESOTNE, as above, increase in clay and lignite to 40%
2610	2620	LIMESTONE (80%), pale yellowish brown (10YR 6/2), small to medium fragments, poorly consolidated, medium grained, sandy texture; LIGNITE (20%), grayish black (N2), medium to large fragments, soft to friable, glossy luster, 180 cleavage
2620	2630	LIMESTONE and LIGNITE, as above
2630	2640	LIMESTONE, pale yellowish brown (10YR 6/2), medium to large fragments, well consolidated, medium grained, moderate porosity, sandy texture, trace of lignite
2640	2650	LIMESTONE, as above, increase in lignite to 40%
2650	2660	LIMESTONE, as above, decrease in lignite to 20%
2660	2670	LIMESTONE, pale yellowish brown (10YR 6/2), medium to large fragments, well consolidated, medium grained, moderate porosity, sandy texture
2670	2680	LIMESTONE, as above
2680	2690	LIMESTONE, as above, fine to medium grained, very small to medium fragments, poorly consolidated
2690	2700	LIMESTONE, as above
2700	2710	LIMESTONE, as above
2710	2720	LIMESTONE, as above
2720	2730	DOLOMITE, dark yellowish brown (10YR 4/2), small to large fragments, poorly consolidated, moderate porosity, dense, minor vugs, trace of limestone
2730	2740	DOLOMITE, as above
2740	2750	LIMESTONE (50%), yellowish gray (5Y 7/2), very small to small fragments, poorly consolidated, fine grained, soft to friable; DOLOMITE (50%), dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), very small to medium fragments, poorly consolidated, low to moderate porosity, dense
2750	2760	LIMESTONE and DOLOMITE, as above
2760	2770	LIMESTONE and DOLOMITE, as above, very poorly consolidated
2770	2780	LIMESTONE and DOLOMITE, as above
2780	2790	DOLOMITE, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), very small fragments, poorly consolidated, low to moderate porosity, sandy matrix, trace of limestone
2790	2800	DOLOMITE, as above
2800	2810	DOLOMITE, as above
2810	2820	DOLOMITE, as above, small to large fragments, moderately consolidated
2820	2830	DOLOMITE, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), very small fragments, poorly consolidated, low to moderate porosity, sandy matrix, trace of limestone

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
2830	2840	DOLOMITE, as above
2840	2850	DOLOMITE, as above, very small to medium fragments
2850	2860	DOLOMITE, as above, vuggy, microcrystalline
2860	2870	DOLOMITE, as above
2870	2880	DOLOMITE, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), very small fragments, poorly consolidated, low porosity, sandy matrix, microcrystalline
2880	2890	DOLOMITE, pale yellowish brown (10YR 6/2), small to large fragments, moderately consolidated, low to medium porosity, dense, vuggy, microcrystalline
2890	2900	DOLOMITE, as above
2900	2910	DOLOMITE, pale yellowish brown (10YR 6/2), medium fragments, well consolidated, low porosity, dense, fractured, microcrystalline
2910	2920	DOLOMITE, as above
2920	2930	DOLOMITE, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), very small fragments, poorly consolidated, low porosity, sandy matrix, microcrystalline
2930	2940	DOLOMITE, pale yellowish brown (10YR 6/2) and black (N1), small to large fragments, moderately consolidated, low to medium porosity, dense, vuggy, microcrystalline
2940	2950	DOLOMITE, as above
2950	2960	DOLOMITE, as above
2960	2970	DOLOMITE, as above, dusky yellowish brown (10YR 2/2), very small to large fragments, poorly consolidated, sandy matrix
2970	2980	DOLOMITE, as above
2980	2990	DOLOMITE, as above, dark yellowish brown (10YR 4/2)
2990	3000	DOLOMITE, as above, pale yellowish brown (10YR 6/2)
3000	3010	DOLOMITE, as above
3010	3020	DOLOMITE, dusky yellowish brown (10YR 2/2) to grayish black (N2), medium to large fragments, well consolidated, low porosity, dense, fractured
3020	3030	DOLOMITE, as above
3030	3040	DOLOMITE, pale yellowish brown (10YR 6/2) to dusky yellowish brown (10YR 2/2), medium to large fragments, well consolidated, low porosity, dense, fractured, vuggy, microcrystalline
3040	3050	DOLOMITE, as above
3050	3060	DOLOMITE, as above
3060	3070	DOLOMITE, as above
3070	3080	DOLOMITE, as above
3080	3090	DOLOMITE, as above
3090	3100	DOLOMITE, as above
3100	3110	DOLOMITE, as above, dusky yellowish brown (10YR 2/2)
3110	3120	DOLOMITE, as above
3120	3130	DOLOMITE, as above

Bonita Springs Utilities RO Deep Injection Well IW-1
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
3130	3140	DOLOMITE, pale yellowish brown (10YR 6/2) to dusky yellowish brown (10YR 2/2), very small to medium fragments, poorly consolidated, low porosity, sandy matrix, microcrystalline
3140	3150	DOLOMITE, as above
3150	3160	DOLOMITE, pale yellowish brown (10YR 6/2) to dusky yellowish brown (10YR 2/2), medium to large fragments, well consolidated, low porosity, dense, fractured, microcrystalline
3160	3170	DOLOMITE, as above
3170	3180	DOLOMITE, as above
3180	3190	DOLOMITE, pale yellowish brown (10YR 6/2) to black (N1), medium to large fragments, very well consolidated, very low porosity, dense, fractured, microcrystalline
3190	3206	DOLOMITE, as above

Notes:

bpl = below pad level

Lithologic color designations are based on the *Rock Color Chart*, distributed by the Geological Society of America, 1984.

APPENDIX G.2

DZMW-1 Lithologic Descriptions

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
0	10	LIMESTONE and SHELL FRAGMENTS, yellowish gray (5Y 8/1), poorly consolidated
10	20	LIMESTONE and SHELL FRAGMENTS, as above
20	30	LIMESTONE and SHELL FRAGMENTS, medium gray (N5), poorly consolidated
30	40	CLAY, yellowish gray (5Y 7/2), sticky
40	50	CLAY, light olive gray (5Y 5/2), sticky
50	60	LIMESTONE, light olive gray (5Y 5/2), large fragments, well consolidated, moderate porosity, shell fragments and large shell molds
60	70	LIMESTONE, as above
70	80	LIMESTONE (50%), medium bluish gray (5B 5/1), medium fragments, poorly consolidated; SHELLS AND SHELL FRAGMENTS (50%), moderately consolidated; phosphate present
80	90	LIMESTONE, yellowish gray (5Y 8/1), small to medium fragments, well consolidated, trace of shell fragments
90	100	SANDY LIMESTONE, yellowish gray (5Y 7/2), medium fragments, moderately consolidated
100	110	SANDY LIMESTONE, as above
110	120	SANDY LIMESTONE, as above
120	130	SANDY LIMESTONE, yellowish gray (5Y 7/2), medium fragments, poorly consolidated, trace of marly clay
130	140	SANDY LIMESTONE, as above
140	150	LIMESTONE and SHELL FRAGMENTS, yellowish gray (5Y 7/2), poorly consolidated, sandy texture
150	160	LIMESTONE and SHELL FRAGMENTS, as above
160	170	SHELL FRAGMENTS, yellowish gray (5Y 7/2), poorly consolidated
170	180	LIMESTONE and SHELL FRAGMENTS, yellowish gray (5Y 7/2), poorly consolidated
180	190	LIMESTONE, grayish orange (10YR 7/4), small to medium fragments, moderately consolidated, shell molds
190	200	LIMESTONE, as above
200	210	LIMESTONE, as above, color change to yellowish gray (5Y 7/2)
210	220	LIMESTONE, as above
220	230	LIMESTONE, as above
230	240	CLAY, very light gray (N8), low plasticity, marly texture, sticky
240	250	CLAY, olive gray (5Y 4/1), sticky
250	260	CLAY, greenish gray (5GY 6/1), low plasticity, sticky
260	270	CLAY, as above, trace of phosphate
270	280	CLAY, as above, marly texture
280	290	CLAY, dark greenish gray (5GY 4/1), sticky, high phosphates
290	300	CLAY, as above, trace of phosphate
300	310	CLAY, light olive gray (5Y 5/2), sticky, trace of phosphates
310	320	CLAY, as above
320	330	CLAY, as above

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
330	340	CLAY, dark greenish gray (5GY 4/1), sticky, high phosphates
340	350	CLAY, as above
350	360	CLAY, as above
360	370	CLAY, as above
370	380	CLAY, as above
380	390	CLAY, as above
390	400	CLAY, as above
400	410	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of shell fragments and marly green clay, high phosphates
410	420	LIMESTONE, as above
420	430	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of shell fragments and
430	440	LIMESTONE, as above
440	450	LIMESTONE, as above
450	460	LIMESTONE, as above
460	470	LIMESTONE, as above
470	480	LIMESTONE, as above
480	490	LIMESTONE, as above
490	500	LIMESTONE, as above
500	510	LIMESTONE, as above
510	520	LIMESTONE and SHELL FRAGMENTS (50%), yellowish gray (5Y 7/2), medium fragments, moderate porosity, moderately consolidated; CLAY (50%), olive gray (5Y 4/1), stiff
520	530	CLAY, light olive gray (5Y 6/1), stiff, trace of limestone and shell fragments
530	540	LIMESTONE and SHELL FRAGMENTS, yellowish gray (5Y 7/2), small to medium fragments, moderate porosity, moderately consolidated
540	550	LIMESTONE and SHELL FRAGMENTS, as above
550	560	LIMESTONE and SHELL FRAGMENTS, as above, large fragments
560	570	LIMESTONE and SHELL FRAGMENTS, as above, small fragments
570	580	LIMESTONE and SHELL FRAGMENTS, as above
580	590	LIMESTONE and SHELL FRAGMENTS, as above
590	600	LIMESTONE and SHELL FRAGMENTS, as above
600	610	LIMESTONE and SHELL FRAGMENTS, as above, well consolidated

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
610	620	LIMESTONE and SHELL FRAGMENTS, as above
620	630	LIMESTONE and SHELL FRAGMENTS, as above
630	640	LIMESTONE and SHELL FRAGMENTS, as above, increase in dark greenish gray (5GY 4/1) clay (30%)
640	650	LIMESTONE, yellowish gray (5Y 7/2), very small to medium fragments, moderate porosity, poorly consolidated, shell molds present
650	660	LIMESTONE, yellowish gray (5Y 7/2), very small fragments, moderate porosity, well consolidated, friable, trace of shell fragments
660	670	LIMESTONE, as above, small to large fragments, poorly consolidated
670	680	LIMESTONE, as above, very small fragments, well consolidated
680	690	LIMESTONE, as above
690	700	LIMESTONE, as above
700	710	LIMESTONE, as above
710	720	LIMESTONE, as above
720	730	LIMESTONE, as above, trace of marly clay
730	740	CLAY, dark greenish gray (5G 4/1), sticky
740	750	CLAY, as above
750	760	LIMESTONE, yellowish gray (5Y 7/2) and black (N1), medium fragments, well consolidated, dense, trace of dark greenish gray clay, high phosphates
760	770	LIMESTONE (50%), yellowish gray (5Y 7/2), medium fragments, moderately consolidated, dense, shell fragments; CLAY (50%), yellowish gray (5Y 7/2), marly texture
770	780	LIMESTONE, as above
780	790	LIMESTONE (80%), yellowish gray (5Y 7/2) and black (N1), medium fragments, well consolidated, dense; CLAY (20%), light gray (N7), marly texture
790	800	LIMESTONE, as above
800	810	LIMESTONE, yellowish gray (5Y 7/2), very small fragments, moderate porosity, moderately consolidated, trace of shell fragments
810	820	LIMESTONE, as above
820	830	LIMESTONE, as above, small fragments
830	840	LIMESTONE, as above
840	850	LIMESTONE, as above
850	860	LIMESTONE, as above, shell molds present

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
860	870	LIMESTONE, as above
870	880	LIMESTONE, as above
880	890	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of shell fragments
890	900	LIMESTONE, as above
900	910	LIMESTONE, as above
910	920	LIMESTONE, as above
920	930	LIMESTONE, as above
930	940	LIMESTONE, as above
940	950	LIMESTONE, grayish orange (10YR 7/4), small fragments, moderate porosity, moderately consolidated, soft to friable, sandy texture
950	960	LIMESTONE, as above
960	970	LIMESTONE, as above
970	980	LIMESTONE, as above
980	990	LIMESTONE, as above
990	1000	LIMESTONE, as above
1000	1010	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, soft to friable, sandy texture
1010	1020	LIMESTONE, as above
1020	1030	LIMESTONE, as above
1030	1040	LIMESTONE, as above
1040	1050	LIMESTONE, as above
1050	1060	LIMESTONE, as above, very small fragments
1060	1070	LIMESTONE, as above
1070	1080	LIMESTONE, as above, trace of phosphate
1080	1090	LIMESTONE, as above
1090	1100	LIMESTONE, as above, no phosphate
1100	1110	LIMESTONE, as above
1110	1120	LIMESTONE, as above
1120	1130	LIMESTONE, as above

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1130	1140	LIMESTONE, as above, small fragments
1140	1150	LIMESTONE, as above
1150	1160	LIMESTONE, as above
1160	1170	LIMESTONE, as above
1170	1180	LIMESTONE, as above
1180	1190	LIMESTONE, as above
1190	1200	LIMESTONE, as above
1200	1210	LIMESTONE, as above
1210	1220	LIMESTONE, as above, very small fragments
1220	1230	LIMESTONE, as above
1230	1240	LIMESTONE, as above
1240	1250	LIMESTONE, as above
1250	1260	LIMESTONE, as above
1260	1270	LIMESTONE, as above
1270	1280	LIMESTONE, as above
1280	1290	LIMESTONE, as above
1290	1300	LIMESTONE, as above, small fragments
1300	1310	LIMESTONE, as above
1310	1320	LIMESTONE, as above
1320	1330	LIMESTONE, as above
1330	1340	LIMESTONE, as above
1340	1350	LIMESTONE, as above
1350	1360	LIMESTONE, as above, trace of phosphate
1360	1370	LIMESTONE, as above
1370	1380	LIMESTONE, as above
1380	1390	LIMESTONE, as above, no phosphate
1390	1400	LIMESTONE, as above

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1400	1410	LIMESTONE, as above, very small fragments, trace of foraminifera
1410	1420	LIMESTONE, as above
1420	1430	LIMESTONE, as above
1430	1440	LIMESTONE, as above
1440	1450	LIMESTONE, as above
1450	1460	LIMESTONE, as above
1460	1470	LIMESTONE, as above
1470	1480	LIMESTONE, yellowish gray (5Y 7/2), small fragments, moderate porosity, moderately consolidated, trace of foraminifera
1480	1490	LIMESTONE, as above
1490	1500	LIMESTONE, as above
1500	1510	LIMESTONE, as above, very small fragments, sandy texture
1510	1520	LIMESTONE, as above
1520	1530	LIMESTONE, as above
1530	1540	LIMESTONE, as above
1540	1550	LIMESTONE, as above
1550	1560	LIMESTONE, as above
1560	1570	LIMESTONE, as above
1570	1580	LIMESTONE, as above
1580	1590	LIMESTONE, as above, small fragments
1590	1600	LIMESTONE, as above
1600	1610	LIMESTONE, as above, very small fragments, sandy texture
1610	1620	LIMESTONE, as above
1620	1630	LIMESTONE, as above
1630	1640	DOLOMITE, dark yellowish brown (10Y 4/2) and yellowish gray (5Y 7/2), large fragments, moderately consolidated, low porosity, dense, trace of soft limestone
1640	1650	NO SAMPLE - Sample washed out
1650	1660	NO SAMPLE - Sample washed out

Bonita Springs Utilities RO Dual Zone Monitor Well (DZMW-1)
Lithologic Sample Descriptions

Depth Logged (ft-bpl) From	To	Observer's Description
1660	1670	NO SAMPLE - Sample washed out
1670	1680	LIMESTONE, yellowish gray (5Y 7/2), very small fragments, moderate porosity, moderately consolidated, friable, sandy texture
1680	1690	LIMESTONE, as above
1690	1700	LIMESTONE, as above

Notes:

bpl = below pad level

Lithologic color designations are based on the *Rock Color Chart*, distributed by the Geological Society of America, 1984.