
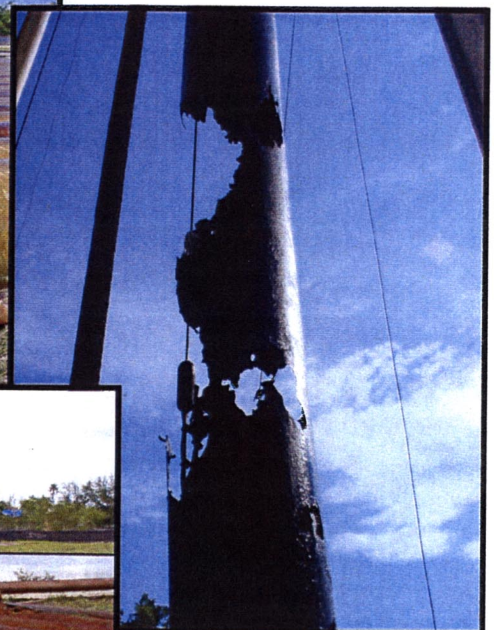


Palm Beach County Water Utilities Department

Southern Region Pumping Facility - Site 9 N
Concentrate Injection Well IW - 1
PBCWUD Project No. 04 – 032

Tubing Replacement Report

September 2006

Water Utilities Department
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September 5, 2006

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

SUBJECT: Palm Beach County Water Utilities Department
Southern Region Pumping Facility – Site 9 North
Major Permit Modification No. 0128339-003-UC
Tubing Replacement of Injection Well IW-1
and Mechanical Integrity Testing Final Report.

Dear Mr. May:

Palm Beach County Water Utilities Department (PBCWUD) is pleased to submit this Report regarding the tubing replacement and Mechanical Integrity Testing of Injection Well IW-1 at the Southern Region Pumping Facility – Site 9 North, to the Florida Department of Environmental Protection (FDEP). This report documents the 20-inch steel tubing removal and the installation of the replacement 16-inch Fiberglass Reinforced Pipe (injection tubing). Also included are the results of the mechanical integrity tests and the injection test.

If you should have any questions, please do not hesitate to contact Thomas G. Uram, P.G.

Respectfully submitted,

Thomas G. Uram

Thomas G. Uram, P.G.
Hydrologist

cc: Distribution List (see attached List)
Brian Shields, P.E., PBCWUD
File

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Palm Beach County
Water Utilities Department

Southern Region Pumping Facility – Site 9 North
Concentrate Injection Well IW - 1
PBCWUD Project No. 04 – 032

Tubing Replacement Report

September 2006

CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information 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."

Mr. Bevin A. Beaudet, P.E., Director
Palm Beach County Water Utilities Department

Table of Contents

Section 1
Introduction

BACKGROUND

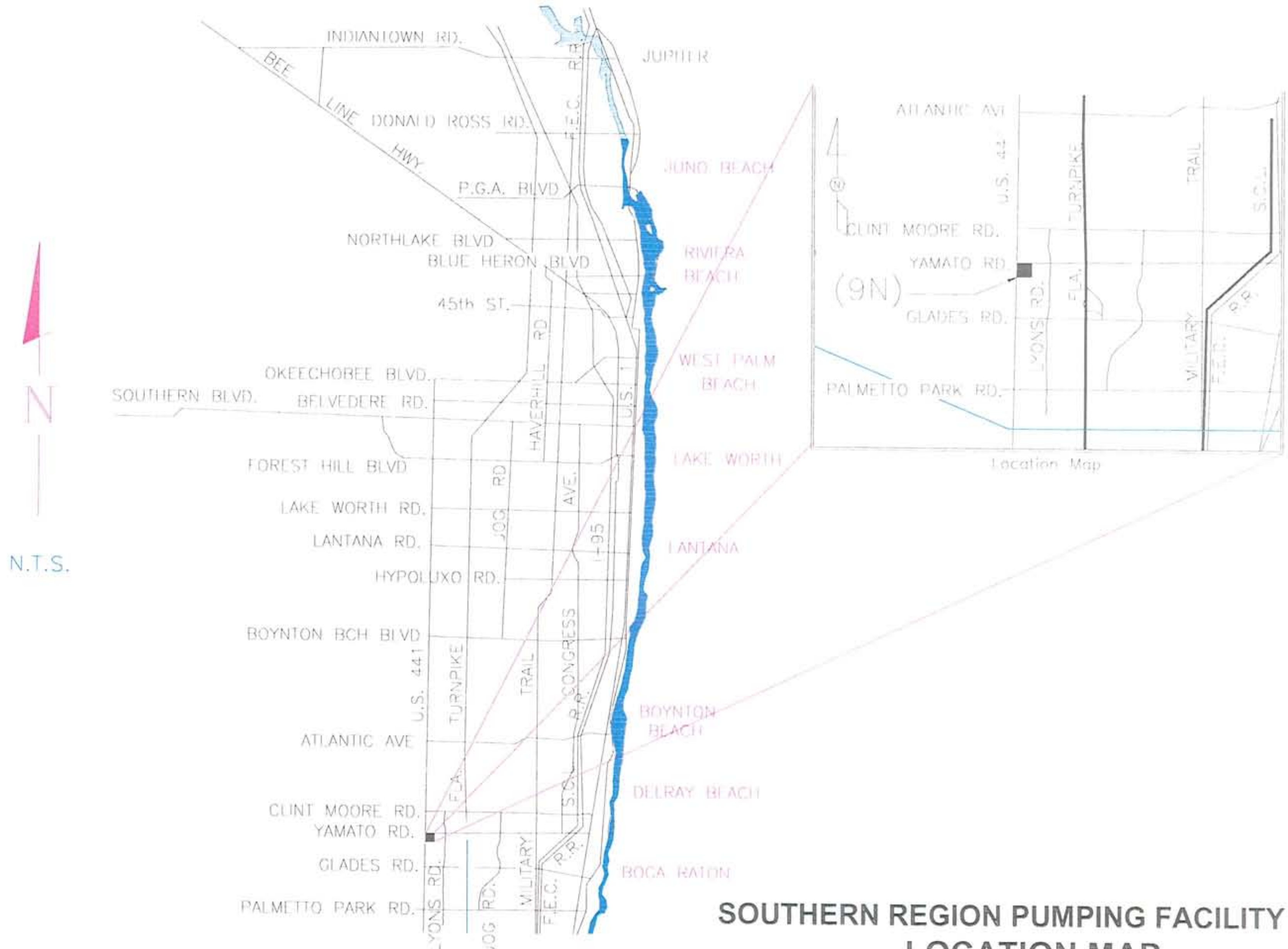
The Injection Well IW-1 at Southern Region Pumping Facility (SRPF - formerly 9 North) was originally constructed as a Class I Municipal Injection Well to facilitate the disposal of treated wastewater (effluent) from the Palm Beach County Water Utilities Department (PBCWUD) System 9 North Wastewater Treatment Plant. In 1997, the wastewater treatment plant was removed and replaced with a pumping station which pumps raw sewage from the site to the Palm Beach County Southern Region Water Reclamation Facility (SRWRF) in Delray Beach. In late 2000, the Municipal Injection Well IW-1 was retrofitted with a tubing and packer assembly to convert the injection well to a Class I Industrial Waste Injection Well (Permit No. 0128339-01-UC) to facilitate the disposal of concentrate (reject water) produced at the Membrane Nanofiltration Water Treatment Plant Number 9 (WTP No. 9).

During the period between the installation of the tubing and packer assembly and the start of the concentrate injection, potable water was flushed down the injection well on a monthly basis. The flushing kept the injection zone water from invading the tubing prior to the onset of concentrate disposal.

In November 2001 the Membrane Filtration WTP No. 9 was started and concentrate was pumped from the facility to the deep injection well. Injection continued without problems until October 2003 when the annular compensation tank or corrosion inhibitor tank level dropped. A visual inspection (video log) was performed and a leak in the tubing was discovered at 2038 feet below pad level. To compensate for the leak and continue using the well, the Florida Department of Environmental Protection (FDEP) approved a potable water source to be connected to the annular compensation tank and used to supply the annular space with potable water. The annular compensation tank pressure was then increased to approximately 50 psi (approximately 10 psi above the injection pressure) resulting in a flow of approximately 2 gallons per minute of potable water down the annular space and out the leak. In January 2004 the potable water flow increased and the pressure decreased indicating that the injection tubing had completely failed. The concentrate was then diverted to the SRWRF and the injection well was taken out of service. A FDEP Major Modification Permit 0128339-003-UC was applied for and granted to remove the existing 20-inch steel tubing and install Fiberglass Reinforced Pipe (FRP - injection tubing) which would have a cemented annular space.

PROJECT DESCRIPTION

The Palm Beach County Southern Region Pumping Facility is located in southern Palm Beach County, Florida at 19110 South State Road 7, in Boca Raton. **Figure 1-1** presents a project location map.



SOUTHERN REGION PUMPING FACILITY (9N)
LOCATION MAP
Figure 1-1

On July 6, 2005, the FDEP issued a Major Permit Modification (No. 0128339-003-UC) to remove the existing 20-inch OD seamless steel tubing and replace it with Red Box 16-inch FRP utilizing the existing YBI Positive Seal Packer. The replacement Re4d Box 16-inch FRP will be installed utilizing an alternative design consisting of a fully cemented injection tubing. A copy of the Major Permit Modification is contained in **Appendix A**.

The Palm Beach County Board of County Commissioners signed a contract on August 16, 2006 with Youngquist Brothers, Inc. (YBI) of Fort Myers, Florida to modify the injection well, and a Notice to Proceed was issued on August 22, 2005. Modification of IW-1 commenced on August 30, 2005. Modification of the injection well was completed by July 20, 2006.

The report is organized to present and discuss the background, methods, and results of the tubing replacement and testing program as they pertain to fulfillment of the Major Permit Modification requirements.

Section 2
Tubing Replacement Details

WELL CONSTRUCTION SEQUENCE

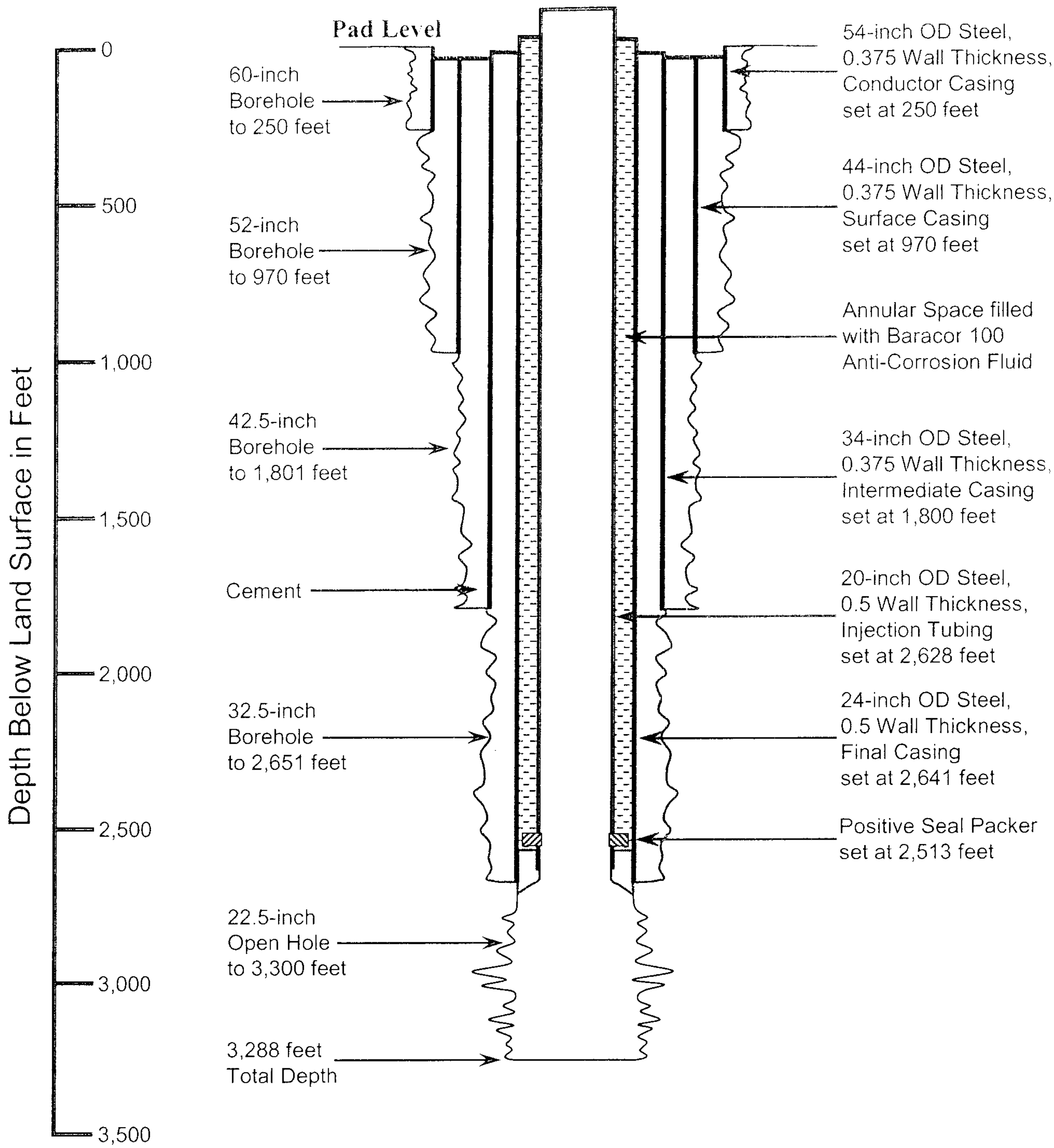
The tubing replacement for injection well IW-1 commenced on August 22, 2005 and work activities were conducted on a 12 hour per day, 5 day per week schedule. The tubing replacement was completed by July 20, 2006. Pre- and post-tubing replacement well diagrams are shown in **Figures 2-1 and 2-2** respectively.

A generalized sequence for tubing replacement activities and testing of the injection well consisted of the following sequence:

1. Kill well and remove and disassemble existing wellhead, piping, and instrumentation
2. Perform video log of 20-inch injection tubing
3. Remove the existing 20-inch injection tubing
4. Brush and clean the 24-inch final casing
5. Perform caliper log and video survey of 24-inch final casing
6. Perform pressure test of the 24-inch final casing
7. Install new Red Box 16-inch FRP injection tubing
8. Perform pre-cementing pressure test of the Red Box 16-inch FRP injection tubing
9. Perform pre-cementing cement bond log of the Red Box 16-inch FRP injection tubing
10. Cement annular space
11. Perform mechanical integrity tests consisting of a video survey, pressure test, cement bond log, temperature survey, and radioactive tracer survey
12. Reinstall wellhead, piping, and instrumentation
13. Perform injection test
14. Return well to service

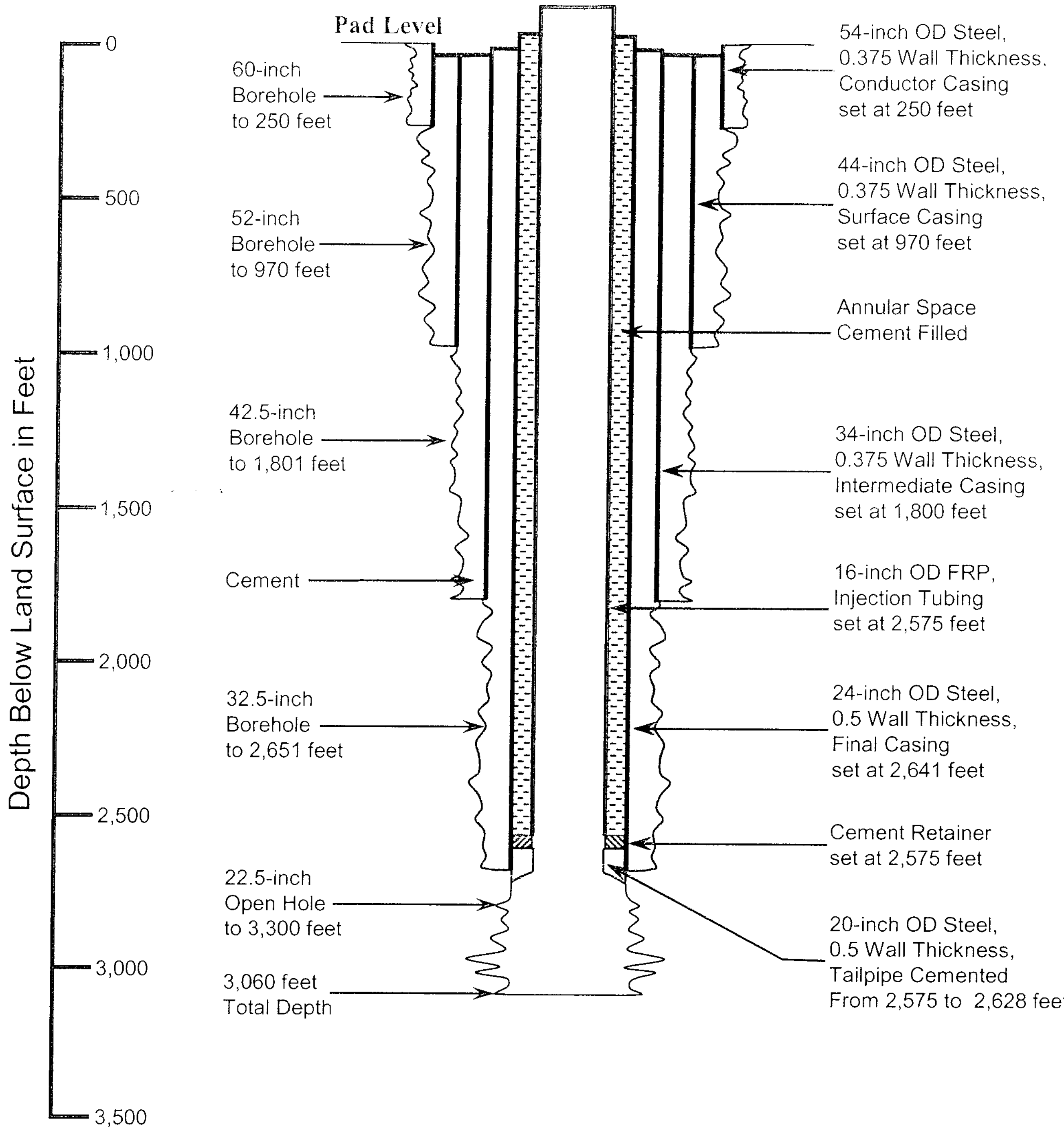
TUBING REPLACEMENT SUMMARY

Prior to any project activities, the existing four water table monitor wells were sampled and analyzed for chloride concentration, specific conductivity, temperature, and depth to water was measured. Results from the wells were used as a baseline for comparison



SOUTHERN REGION PUMPING FACILITY (9N)
RETROFIT INJECTION WELL
CONSTRUCTION DIAGRAM
Figure 2-1

Modified from CH2M Hill, January 1986



SOUTHERN REGION PUMPING FACILITY (9N)
INJECTION WELL TUBING REPLACEMENT
CONSTRUCTION DIAGRAM
Figure 2-2

Modified from CH2M Hill, January 1986

with pad monitor well water quality data from weekly field sampling. The pad monitor well water quality data can be found in **Appendix B**.

The injection well was killed, the piping and instrumentation was removed, and the video of the 20-inch steel injection tubing was performed. The video log was run from surface to 1142 feet below pad level (bpl) where large sections of tubing had bridged across the well. Numerous large diameter holes were visible throughout the tubing from surface to 375 feet bpl. The video log also showed that the tubing had deteriorated to such a degree that an entire section of tubing had corroded away. The missing section of 20-inch diameter tubing extended from approximately 375 feet to 1037 feet bpl. The wellhead was then removed and the top 375 feet of tubing was pulled from the well. The rig was configured for reverse air drilling and drilling of the tubing from 1037 feet bpl commenced.

Holes below the wellhead flange

Corroded Tubing at 200 feet

The removal of the 20-inch diameter injection tubing by drilling utilized numerous bit sizes, drill collars, and stabilizers. Initially, a 14 ¾-inch bit and 18-inch stabilizer were used to remove the tubing bridge and clean the top of the tubing at 1037 feet bpl. Drilling continued to a depth of 1200 feet when downward progress stopped. The drill string was removed from the well and approximately 40 feet of tubing was wrapped around the bit and stabilizer. The tubing was cut off the drill string then the drill string was tripped back to 1200 feet and drilling resumed. This method was repeated until a depth of 2575 feet was reached. Each time the drill string was removed from the well, 3 to 60 feet of tubing was recovered.

Corroded Tubing at 270 feet

In 2000, when the well was originally retrofitted with a tubing an packer design, the female section of the YBI Positive Seal Packer was set at 2515 feet bpl with 115 feet of 20-inch diameter tailpipe below. The tailpipe was cemented in place to with 10 feet of the bottom of the YBI female receptor. While attempting to separate the packer, the tailpipe tore at the top of the cement and the YBI packer was removed in one piece with approximately 10 feet of tubing connected above and below. Drilling of the cemented tailpipe continued to a depth of 2575 feet bpl. This depth was chosen as the new cement retainer setting depth.

Tubing wrapped around the stabilizer

Once the tubing was removed from the well, testing of the 24-inch final casing began. A caliper log and video survey were performed. These two services indicated that the 24-inch final casing was in excellent shape. A casing brush and packer were run to 2500 feet bpl, the packer was inflated, a pressure header was installed, and a pressure test was performed on the 24-inch final casing. The casing was pressured to 155.5 psi and held for one hour. At the end of the test the pressure was 154.0 psi, a drop of 1.5 psi. These tests indicate that the 24-inch final casing has maintained its mechanical integrity. At this point the excess drilling equipment was demobilized from the site and preparations were made for the installation of the 16-inch FRP injection tubing.

Continental sidewall cement retainer

On January 30, 2006, installation of the FRP injection tubing began. A cement retainer designed and built by YBI personnel was connected to the bottom of the tubing. The cement retainer consisted of a series of three Continental Tire sidewalls sandwiched between welded steel flanges for support. A small notch was cut in opposing sides of the rubber to allow water to flow as the tubing was pushed to the setting depth. The top of the tubing was finished with a 15 foot section of stainless steel for strength as it extended above the 24-inch final casing.

Once the tubing was set in place, a pre-cementing cement bond log was performed. A packer was then run to a depth of 2552 feet bpl, the packer was inflated, a pressure header was installed, and a pressure test was performed on the 16-inch FRP Injection tubing. The 16-inch FRP injection tubing was pressured to 156.0 psi and held for one hour. At the end of the test the pressure was 156.0 psi, a zero change in pressure. The packer was then deflated and removed from the well and preparations were made for cementing the annular space. The geophysical logs are contained in **Appendix C** and the pressure test data and gauge calibration certificates are contained in **Appendix D**.

The annular space between the 24-inch final casing and the 16-inch FRP injection tubing was cemented from the cement retainer at 2575 feet to surface in eleven stages with 4156 cubic feet of cement. Two types of cement (neat and 12 % gel) were used to cement the FRP in place. The bottom 196 feet of the annular space was cemented with neat cement (2575 feet to 2379 feet) and the remaining (2379 feet to surface) was cemented with 12 % gel cement. The cement was allowed to cure for approximately 24 hours then a post-cementing cement bond log was performed. The cementing record is contained in **Appendix E**.

Following the completion of the cement bond log, a packer was tripped to the bottom of the tubing at 2552 feet bpl and inflated. A pressure header was installed and a pressure test was performed on the cemented 16-inch FRP injection tubing. The 16-inch FRP injection tubing was pressured to 164.5 psi and held for one hour. At the end of the test the pressure was 157.7 psi, a 6.8 psi change in pressure. The packer was then deflated and removed from the well. The final wellhead was then constructed, the surface facilities were installed, preparations made for mechanical integrity testing, and the performance of an injection test.

Section 3
Mechanical Integrity Testing and Results

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

MECHANICAL INTEGRITY TESTING PROGRAM FOR IW-1

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

- 24-inch Final Casing Pressure Test
- 16-inch Injection Tubing Pressure Test
- Radioactive Tracer Survey (RTS)
- Background Cased Temperature
- Background Cased Gamma Ray
- Video Television Survey

Pressure Tests

24-inch Final Casing Pressure Test: The casing pressure test, designed to detect leaks in the final casing, was used to evaluate the integrity of the final casing string following removal of the corroded 20-inch injection tubing and prior to the installation of the 16-inch FRP injection tubing. Utilizing an inflatable packer set at the bottom of the casing, the casing was filled with water and pressurized to 155.5 psi. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.

16-inch Injection Tubing Pressure Test: The injection tubing pressure test utilized an inflatable packer set in the bottom of the injection tubing. The tubing was tested both before and after the tubing was cemented in place. The tubing was filled with water and pressurized to 156.0 psi and 164.5 psi respectively. A gauge on the wellhead was monitored, and the pressure changes were recorded over the period of one hour.

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

- Temperature fluctuations
- Leaks in the pressure test apparatus

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

Radioactive Tracer Survey (RTS)

The RTS was used to assist in determination of external mechanical integrity. This log was performed after the final 16-inch diameter injection tubing and cement retainer were cemented in place. The purpose of the survey was to determine if water pumped into the injection zone could readily migrate upwards adjacent to the well bore. This is accomplished by recording background gamma radiation in the well then adding a radioactive fluid (Iodide-131) that emits gamma radiation to the well at depth and measuring the levels of radiation in the well over time. Very small quantities of Iodide-131 are used in the survey. By strategic placement of three gamma ray detectors on the geophysical logging tool, it is possible to track the movement of the tracer fluid precisely as it disperses within the well bore.

The RTS consists of a gamma ray intensity record (log), measured after the ejection of a slug of radioactive tracer, Iodide-131, in the well. Two dynamic flow condition tests were completed in the presence of the FDEP. The radioactive tracer tool was configured with three detectors; Gamma Ray Top (GRT), Gamma Ray Middle (GRM), and Gamma Ray Bottom (GRB) arranged above and below the ejector.

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

- **An initial Gamma Ray/Casing Collar Locator Log:** The logs were run to determine background gamma ray emission and to precisely locate the bottom of the casing. The logs were run over the entire length of well.

- **Dynamic Test "A":** The RTS tool was positioned with ejection port set five feet above the bottom of the casing, as determined by the casing collar locator. A pumping rate of 75 gpm (5 feet per minute) was then established. A slug of radioactive Iodide-131 measuring 2 milliCuries (mCi) was ejected. The radioactive Iodide-131 slug movement was monitored for one hour. During this period, the tool was stationary and the injection rate held constant. After the one-hour monitoring period, a log out of position was performed between the ejection point and 200 feet above the highest movement of the slug. Upon completion of the logging section the well was flushed for approximately 15 minutes. After the completion of the well flushing, the tool was run to the base of the casing and an after-flush logging pass was performed over the same interval as described above.

- **Dynamic Test "B":** The second dynamic flow test was performed identically to the first except the monitoring interval was cut from one hour to 30 minutes. This test provides for a repeatability test for the first.

- **A post test Gamma Ray/Casing Collar Locator Log:** Following the completion of the dynamic sections of the RTS, a Gamma Ray/Casing Collar Log was run on the entire length of well as an after-flush final background pass.

Background Cased Temperature Log

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

Background Cased Gamma Ray Log

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

Video Television Survey

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

EVALUATION OF MECHANICAL INTEGRITY

Demonstration of mechanical integrity was performed on IW-1 to verify the integrity of the final casing and injection tubing, and confirm the effectiveness of the hydraulic seal at the base the casing. The final mechanical integrity test (MIT) on IW-1 required the performance of a pressure test to prove that there were no leaks in the casing and a video survey to provide visual inspection of the interior of the final casings. In order to demonstrate that there is no fluid movement behind the casing, a high resolution temperature log and RTS were also performed during the final MIT in the injection well. The FDEP was notified so that a representative would be present during testing.

Pressure Tests

IW-1 Final Casing Pressure Test: The pressure test of the 24-inch final casing string of IW-1 was performed on December 8, 2005. This pressure test used an inflatable packer set at 2,500 feet bpl near the bottom of the final casing to seal the base of the casing from the formation below. The top of casing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 155.5 psi. The valve then was shut, and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 154.0 psi, a 0.96 percent decrease in pressure from the start of the test. The pressure test was successfully completed within the 5 percent tolerance established by the FDEP. The test was witnessed and recorded by Thomas G. Uram, P.G. of PBCWUD. At the completion of the pressure test, the valve on the pressure head was opened and the excess water was collected. A total of 38 gallons of water was collected. The results of the pressure test and pressure gauge calibration certification are presented in **Appendix D**.

IW-1 Injection Tubing Pressure Test: The pressure test of the 16-inch FRP injection tubing of IW-1 was performed twice, once prior to and once following the cementing of the injection tubing in place. The pre-cementing pressure test was performed on February 3, 2006 and the post-cementing pressure test was performed on February 15, 2006.

The pre-cementing pressure test used an inflatable packer set at 2,552 feet bpl near the bottom of the injection tubing to seal the base of the tubing from the formation below. The top of casing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 156.0 psi. The valve then was shut, and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 156.0 psi, a 0.0 percent change in pressure from the start of the test. At the completion of the pressure test, the valve on the pressure head was opened and the excess water was collected. A total of 27 gallons of water was collected.

The post-cementing pressure test used the same inflatable packer set at 2,552 feet bpl near the bottom of the injection tubing to seal the base of the tubing from the formation below. The top of casing was sealed with a pressure head equipped with a pressure gauge and valve, and the pressure in the casing was increased to 164.5 psi. The valve then was shut, and the pressure was measured every five minutes for one hour. The pressure at the end of the hour was 157.7 psi, a 4.13 percent decrease in pressure from the start of the test. At the completion of the pressure test, the valve on the pressure head was opened and the excess water was collected. A total of 19 gallons of water was collected.

Both pressure tests were successfully completed within the 5 percent tolerance established by the FDEP. The tests were witnessed and recorded by Thomas G. Uram, P.G. of PBCWUD.

Radioactive Tracer Survey

The RTS, is a measure of the gamma ray intensity following the ejection of a radioactive tracer, usually Iodide-131, into the well. The RTS consists of 4 parts: an initial gamma ray/casing collar locator log for background readings, two dynamic well portions, and an after gamma ray/casing collar locator log for final background readings. A base temperature log is also performed along with the RTS. The radioactive tracer tool is configured with three gamma ray detectors; Gamma Ray Top (GRT), Gamma Ray Middle (GRM), and Gamma Ray Bottom (GRB), arranged above and below the ejector

The second and third portions of the RTS consisted of dynamic flow condition tests, "A" and "B". Both of these tests were identical in nature, with Test B used as a repeatability test of Test A. A constant fluid velocity of 5 feet per minute was attained using a pumping rate of 77 gpm into the well. The tool was positioned with the ejector port 5 feet above the bottom of the casing and the flow of water into the well was started. A slug of radioactive Iodide-131 measuring 2 mCi was ejected, and monitoring of the radioactive Iodide-131 slug movement was conducted for one hour. During this period, the tool was kept stationary and the injection rate was held constant. After the one-hour monitoring period, a log out of position was performed between the ejection point and 200 feet above the highest movement of the slug. Upon completion of the logging section, the well was flushed for approximately 15 minutes. After completion of the well flushing, the tool was run to the base of the casing, and an after-flush logging pass was performed over the same interval as described above. The second Dynamic flow test, Test B, was run in the same manner as Test A to prove repeatability but for half of the time. Following the completion of the dynamic sections of the RTS, a gamma ray/casing collar locator log was run on the entire length of well as an after-flush final background pass.

Dynamic Test "A" - One Hour Monitoring

A slug of tracer fluid (Iodine 131) was ejected into IW-1 at 08:28 AM under dynamic, or pumping, conditions at 2,634 feet bpl, 5 feet above the bottom of the casing. This 2 milliCurie slug was ejected over a 5 second interval while fresh water was pumped into the well at 77 gpm; pumping continued at that rate, approximately equal to 5 feet per minute, for the full hour of the dynamic test. **Table 3-1** below summarizes the data collected during this portion of the testing.

Detectors GRM and GRB both detect downward movement of the tracer fluid. The middle gamma ray detector, positioned 3 feet below the ejector port, detected the tracer fluid 20 seconds after the ejection. The bottom gamma ray detector, positioned 12.3 feet below the ejector port, showed elevated gamma ray readings within 1 minute 50 seconds of ejection. Both GRM and GRB returned to background gamma activity before the end of the monitoring period indicating that the slug of Iodide 131 is moving down into the injection zone. This result is substantiated by the lack of gamma activity seen at detector GRT. It continues at background readings for the entire hour of monitoring.

Table 3-1
Summarized Results of the First Dynamic Test "A"
One Hour Monitoring

RTS Tool Specifics		Sequence of Events During Test				
Detector/ Ejector	Depth (feet bpl)	Test Start	Response Time Since Start of Test			
		2 mCi tracer released at 08:28 hours	20 sec.	1 min. 50 sec.	None detected	Maximum Gamma Value (API units)
GRT	2,624.5				X	12
Ejector	2,634	X				---
GRM	2,637		X			1,800
GRB	2,646.3			X		1,742

Dynamic Test "A" - Log Out of Position

Following the monitoring period, a log-out-of-position was performed by moving the tool upward from its monitoring position to 2,430 feet bpl. This log was designed to detect the distance the tracer fluid traveled behind the casing during the monitoring period. None of the three detectors indicated any staining of tracer fluid on the wall of the casing at the ejection point. Both detectors GRM and GRB showed a slight increase above background at 2,583 feet bpl indicating that the RTS tool leaked. The detector GRT shows no indication of upward movement of fluid behind the casing wall.

Post Dynamic Test "A" - After Flush Pass

Following the log-out-of-position, fresh water was pumped into the well to flush the tracer fluid downhole into the formation and clear the well of all trace fluid.

Following the flushing of the casing, a log-after-flush pass was made from 2,650 feet bpl (10 feet below the base of the casing) to 2,430 feet bpl. All three gamma ray detector responses overlaid the background values indicating that no upward movement of trace material was observed.

Dynamic Test "B" - 30 Minute Monitoring

A second dynamic test was run to confirm the results of the previous test. The test method was exactly the same as the previous dynamic test with the exception of the monitoring time cut in half (30 minutes).

The second dynamic test commenced at 9:59 AM, with a second slug of tracer ejected into the injection well at 10:00 AM under dynamic, or pumping, conditions. The ejector port was located at 2,634 feet bpl, 5 feet above the bottom of the casing. This 2 milliCurie slug was ejected while fresh water was pumped into the well at 77 gpm and pumping continued at that rate, approximately equal to 5 feet per minute, for the 30 minute monitoring period of the dynamic test. **Table 3-2** below summarizes the data collected during this portion of the testing.

These results are nearly identical to those of Dynamic Test "A" showing repeatability.

Table 3-2
Summarized Results of the Second Dynamic Test "B"
30 Minute Monitoring

RTS Tool Specifics		Sequence of Events During Test				
Detector/ Ejector	Depth (feet bpl)	Test Start	Response Time Since Start of Test			
		2 mCi tracer released at 10:00 hours	15 sec.	1 min. 45 sec.	None detected	Maximum Gamma Value (API units)
GRT	2,624.5				X	11
Ejector	2,634	X				---
GRM	2,637		X			1,790
GRB	2,646.3			X		1,832

Dynamic Test "B" - Log Out of Position

Following the monitoring period, a log-out-of-position was performed by moving the tool upward from its monitoring position to 2,430 feet bpl. This log was designed to detect the distance which the tracer traveled behind the casing during the monitoring period. None of the three detectors indicated any staining of tracer fluid on the wall of the casing at the ejection point. Both detectors GRM and GRB showed slightly elevated readings above background from 2,590 feet to 2,580 feet bpl indicating that the RTS tool leaked. The detector GRT shows no indication of upward movement of fluid behind the casing wall.

After Flush/Final Background Check

Water was injected at a rate of 120 gpm to flush the well and clean the tracer tool. The tracer tool was also flushed of all excess tracer material below the base of the casing at 2,800 feet bpl. The well was logged from 3,030 feet bpl to surface to compare initial to final gamma radiation. The final background log was nearly identical to the initial background log with the exception of the well below the base of the casing. The section of the well from 2,650 feet bpl to 2,850 feet bpl showed elevated gamma radiation. This area corresponds to the point at which the tracer tool was flushed of excess tracer fluid.

Background Cased Temperature Log

A background cased temperature log was run in the final casing and open hole of IW-1 prior to the RTS. The log shows a gradual decrease in temperature with increase in depth to a depth of 2,400 feet bpl, a slight increase to 2,650 feet bpl, then three step-like sharp decreases at 2,670 feet, 2,818 feet, and 2,990 feet. The temperature log shows no abnormalities and will serve as background data for future mechanical integrity tests. The Radioactive Tracer Log and the High Resolution Temperature log can be found in **Appendix F.**

Video Television Surveys

Video television surveys were performed on the 24-inch final casing and 16-inc FRP injection tubing of Injection Well IW-1 on December 7, 2005 and April 11, 2006 respectively.

The 24-inch final casing video survey was performed to determine the integrity of the final casing as a result of the failure of the 20-inch injection tubing. The water was clear throughout the entire casing interval, however it contained a very small amount of particulate matter and scale flakes. A good image of the inside of the injection well final casing was observed. Casing welds were seen throughout the entire length of the casing string, at intervals of approximately every 36 to 41 feet. A small amount of the welds were obscured and hard to identify. The bottom of the casing was located at a depth of 2,641 feet bpl with total depth of the well not located during this video. No visible flaws were detected in the casing and welds.

The video television survey performed on the 16-inch FRP injection tubing and open hole section of Injection Well IW-1 was used to verify the integrity of the FRP injection tubing, locate the bottom of the well, and as a baseline for future MIT videos. The water was clear, however it contained a small amount of particulate matter. A good image of the inside of the injection tubing was observed. Tubing joints were seen throughout the entire length of the casing string, at intervals of approximately every 30 feet. The bottom of the tubing was observed at 2,575 feet bpl, and the bottom of the final casing was observed at 2,641 feet bpl. The video log was halted at the bottom of the well at 3,025 feet bpl. No visible flaws were detected in the casing and joints. Written video logs and the video tapes of the 24-inch final casing and the 16-inch FRP injection tubing can be found in **Appendix G**.

INJECTION TEST

An injection test was performed on Injection Well IW-1 on July 18, 2006 through July 21, 2006. The injection test was performed with 24 hours of static background data collection, followed by 12 hours of injection, and completed with 24 hours of recovery data. Pressure data was collected for the injection well, the deep monitoring interval, and the shallow monitoring interval for the entire injection test period. Flow data was also collected for the injection well during this same period. The water used for the injection test was a mixture of concentrate from WTP No. 9 and raw water from the WTP No. 9 wellfield through the use of the bypass or tune-up valve. To ensure that the concentrate/raw water mixture maintained a constant density, no changes were made to the water plant treatment process during the test.

The pressures in the two monitoring intervals remained relatively constant throughout the entire testing period. The deep monitoring well pressure was approximately 9.5 psi and the shallow monitoring well pressure was approximately 12.0 psi. The shut-in pressure (background and recovery) in the injection well was approximately 18.2 psi. During injection, the injection well pressure increased to a relatively constant 41.8 psi.

The rate at which the injection test was performed was based on 10 feet per second flow with an FRP tubing internal diameter of 14.47 inches. This equates to 5,125 gpm or 7.4 MGD. This rate was held constant throughout the 12 hour injection period. No adverse effects were observed during the injection test. The results of the injection test are contained in **Appendix H**.

SUMMARY

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

The casing pressure tests of the final casing and the annular pressure test of the cement retainer and injection tubing were successfully completed within the 5 percent tolerance established by the FDEP. No leaks were detected in either test indicating that casing integrity has been established and maintained.

The video television surveys indicate that no internal casing flaws exist within the 24-inch final casing or the 16-inch FRP injection tubing.

Department of Environmental Protection

Jeb Bush
Governor

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

Colleen M. Castille
Secretary

ELECTRONIC CORRESPONDENCE Juy 7, 2005

NOTICE OF MODIFICATION TO PERMIT

Bevin A. Beaudet, P.E.
Director
Palm Beach County Water Utilities Department
PO Box 16097
West Palm Beach, FL 33416

PALM BEACH COUNTY
UIC – Palm Beach County Southern Region
Pumping Facility (SRPF) (former 9N)
FILE: 128339-003-UC
Modification to Injection Well IW-1

Dear Mr. Beaudet:

Enclosed is Permit Number 128339-003-UC, to modify FDEP Permit 128339-001-UO for Palm Beach County Water Utilities Department, Palm Beach County Southern Region Pumping Facility (SRPF) (former 9N) located at 19110 S. State Road 7, Boca Raton, Palm Beach County, Florida. The modification is an alternative design to the standard Class I design for tubing installation, consisting of removing the existing steel injection tubing with a fluid filled annulus, and installing a fully cemented injection tubing, for injection well IW-1.

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

Should you have any questions, please contact Heidi Vandor, PG, or Joseph R. May, PG, of this office at (561) 681-6695 or (561) 681-6691, respectively.

Executed in West Palm Beach, Florida.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Kevin R. Neal

Kevin R. Neal
District Director
Southeast District

KRM/LAH/JRM/HV

cc: Richard Deuerling, FDEP/TLH
Steve Anderson, SFWMD/WPB
Hassan Hadjimiry, PBC/WUD/WPB
Nancy Marsh, USEPA/ATL
Heidi Vandor, FDEP/WPB
Ron Reese, USGS/MIA
Tom Lefevre, PBCHD/WPB

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF MODIFICATION TO PERMIT and all copies were mailed before the close of business on 7/7/05 to the listed persons.

Clerk Stamp

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

Clerk   Date 7/7/05

Department of Environmental Protection

Jeb Bush
Governor

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

Colleen M. Castille
Secretary

PERMITTEE:
Bevin A. Beaudet, PE
Director
Palm Beach County Water Utilities Department
PO Box 16097
West Palm Beach, FL 33416

PERMIT/CERTIFICATION NO: 128339-003-UC
DATE OF ISSUE: July 7, 2005
EXPIRATION DATE: July 6, 2007
COUNTY: Palm Beach
POSITION: 26° 23' 30" N / 80° 12' 12" W
PROJECT: Modification to Injection Well IW-1

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

TO MODIFY AND TEST: One Class I, industrial injection well, IW-1.The modification represents an alternative design to the standard Class I injection well design. The design consists of a fully cemented injection tubing composed of either FRP (Redbox 1250 fiberglass) tubing or stainless steel (Duplex 2205) casing, which will replace the existing steel injection tubing with a fluid filled annulus. The proposed fully cemented injection tubing is approximately 16-inch outside diameter (OD) injection casing to a depth of about 2628 below land surface (bls). The injection well system has an existing associated dual zone monitoring well, MW-1, which will not be altered, with monitoring intervals at 970 to 1105 feet bls and 1699 to 1800 feet bls. The base of the lowermost USDW was determined during well construction in 1986; was re-evaluated in 2000, and is currently reported by the permittee to be between 1730 feet and 1775 feet bls. The purpose of the well is for the disposal of injectate from the membrane softening drinking water facility. The injection of treated municipal wastewater effluent was terminated in August 1996. The final depth of the replacement tubing and the permitted flow rate under normal operating conditions will be based on the results of field testing.

The Department approves the modifications herein to FDEP Permit 128339-001-UC under FDEP Permit 128339-003-UC.

IN ACCORDANCE WITH: Application to Modify Class I Injection Well received March 16, 2004; Request for Information (RFI) for alternative design dated December 17, 2004; response to RFI (alternative design request) received on December 30, 2004; RFI dated January 10, 2005; response to RFI received on January 24, 2005; publication of the Notice of Draft Modification to Permit in Palm Beach Post newspaper on May 1, 2005; and in consideration of public comment received as a result of the public meeting held on June 1, 2005 at 10:00 am.

LOCATED AT: 19110 South State Road 7, Boca Raton, Palm Beach County, Florida

TO SERVE: Palm Beach County Southern Region Pumping Facility Service Area

SUBJECT TO: General Conditions 1-24 and Specific Conditions 1-9.

GENERAL CONDITIONS:

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

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

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

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

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

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

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

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

   a) Have access to and copy any records that must be kept under conditions of this permit;
   b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
   c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

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

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

   a) A description of and cause of noncompliance; and
   b) The period of noncompliance, including dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent the recurrence of the noncompliance. The permittee shall be responsible for any and all

damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

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

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

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

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

13) The permittee shall comply with the following;

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

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

c) Records of monitoring information shall include:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SPECIFIC CONDITIONS:

1. General Requirements

   a. This permit is to construct and test modifications to the Palm Beach County Southern Region Pumping Facility (SRPF) (former 9N) Class I injection well, IW-1, involving replacement of its existing steel tubing and fluid filled annulus with a cemented-in injection tubing. This permit does not authorize the construction or testing of any other well or wells associated with the SRPF injection well system.

   b. Approval of the alternative design is for the injection of membrane softening concentrate reject water from Palm Beach County Water Treatment Plant 9 only. A separate approval process will be required prior to the injection of any other fluid into the well and, if approved, may require additional monitoring and/or interim mechanical integrity testing which are not required as part of this approval.

   c. Four permanent surficial aquifer monitoring wells, identified as Pad Monitoring Wells (PMWs) are located at the corners of the injection well pad and identified by location number and pad location, i.e. NW, NE, SW and SE. The PMWs shall be sampled and analyzed prior to the onset of injection well modification. Initial analyses shall be submitted for Department approval prior to the initiation of work. The samples shall be analyzed for chlorides (mg/L), specific conductance (μmho/cm), temperature, total dissolved solids (TDS) and water level (relative to NAVD 1988). These monitor wells are to be retained in service, sampled weekly for the above parameters during the injection well modification and testing phases of the project, and quarterly during normal operations. In addition, these monitor wells shall be sampled 48 hours prior to any maintenance, testing (including mechanical integrity testing) or repairs to the system which represent an increased potential for accidental discharge to the surficial aquifer. The results of these analyses shall be submitted to the Department within 30 days of the completion of the activity. A summary sheet from the FDEP Southeast District is attached for your use when reporting the above information. If located in a traffic area the well head(s) must be protected by a traffic bearing enclosure and cover. The cover(s) must lock and be specifically marked to identify the well and its purpose. These wells may be properly plugged and abandoned upon written approval from the Department. The request for proper plugging and abandonment may be submitted, at the earliest, with the Final Report.

   d. Signatories

      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 on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Construction and Testing Requirements

a. The measurement points for drilling and logging operations shall be surveyed and referenced to NAVD 1988 prior to the onset of well construction modification activities for the injection well.

b. The Department shall be notified within 48 hours after work has commenced.

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

1) Secure all on-site salt and stockpiled additive materials to prevent surface and/or groundwater contamination.

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

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

e. Department approval is required prior to the following stages of construction and testing:

1) Final contract documents and project start-up date. Final contract documents are to include the final specifications of the FRP or stainless steel to be used for the injection casing.
2) A construction schedule shall be submitted prior to site preparation.
3) Final tubing seat (the installation and cementing) in the injection well.
4) Mechanical integrity testing. Minor deviations (if any) from the mechanical integrity test plans (that were submitted with the application for modification to permit) shall be included in the request to perform the mechanical integrity testing.
5) Short-term injection test.
6) Resumption of normal operations.

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

1) After the removal of the existing (steel) tubing:

- Caliper log
- Video survey (from 100 ft above the uppermost existing liner hanger packer to the bottom of the casing)
- Internal integrity pressure test

2) After the installation of the tubing and prior to cementing the annulus:

- Background cement bond log

3) After the cementing-in of the tubing:

- Cement bond log
- Mechanical Integrity Testing, including video survey (of entire well from the top of the tubing to the bottom of the borehole), pressure test, temperature survey and radioactive survey test (RTS)

4) Temperature logs shall be run after each stage of cementing on the tubing to identify the top of the cement.

g. Mechanical integrity of the injection well shall be determined pursuant to Rules 62-528.300(6)(b)2. and 62-528.300(6)(c), F.A.C.

1) The pressure test for the tubing shall be accepted if tested at a high enough pressure such that the well operating pressures will never exceed 66% of the test pressure. A test tolerance of not greater than + or - 5% in total must be certified by the engineer of record.

2) Verification of pressure gauge calibration, within the last six months must be provided to the Department representative at the time of the test and in the certified test report.

3) An interim pressure test to demonstrate internal mechanical integrity shall be required midway between the standard 5-year mechanical integrity tests. This pressure test shall be conducted for a minimum of one-hour at a minimum pressure of 1.5 times the permitted injection pressure. A test tolerance of not greater than ±5% in total must be certified by the engineer of record.

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

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

j. UIC-TAC meetings are scheduled on the 2nd and 4th Tuesday of each month subject to a five (5) working day prior notice and timely receipt of critical data by all UIC-TAC members and the USEPA, Region IV, Atlanta. Emergency meetings may be arranged when justified to avoid undue construction delays.

3. Quality Assurance/Quality Control Requirements

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

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

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

4. Reporting Requirements

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

- Department of Environmental Protection, West Palm Beach and Tallahassee
- United States Geological Survey (USGS), Miami
- South Florida Water Management District (SFWMD), West Palm Beach
- Palm Beach County Health Department (PBCHD)
- USEPA, Region IV, Atlanta.

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

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

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

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

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

d. Weekly progress reports shall be submitted throughout the period of modifications These reports shall be submitted no later than the seventh day immediately following the period of record, and shall include at a minimum the following information:

1) A cover letter summary of the daily engineer report, driller's log and a projection for activities in the next reporting period.
2) Daily engineers report and driller's/work log with detailed descriptions of all construction progress, cementing, testing, logging, and tubing installation activities.
3) Geophysical logs and water quality test results.
4) Interpretations shall be included with all test results and logs submitted under Items 2) and 3) above.
5) Detailed description of any unusual construction-related events that occur during the reporting period.
6) Weekly water quality analysis and water levels for the four pad monitor wells.
7) A certified evaluation of all logging and test results must be submitted with test data.
8) Details of cementing operations, including the number of cementing stages, and the following information for each stage of cementing: cement slurry composition, specific gravity, pumping rate, volume of cement pumped, theoretical fill depth, and actual tag depth. From both the physical tag and the geophysical logs, a percent fill shall be calculated. An explanation of any deviation between actual versus theoretical fill shall be provided. For each casing, laboratory analysis of dry cement composition of a sample taken during the neat cement stage emplaced at the base of the tubing.

e. The **request to install the tubing** shall include the following items, after steel tubing removal and subsequent investigative work:

1) Planned tubing depth

2) If field efforts and investigative work lead to the conclusion that the existing liner hanger packers should be left in the injection well, the relevant results of field efforts and investigative work (forming the basis for this conclusion) shall be submitted.

f. The **injection test request** shall contain the following justifications:

1) Evaluation of the cementing completed between the casing and FRP tubing for possible voids in the cement, and the potential for fluid movement behind the casing, including the following items (with interpretation):

a) Cement bond logs (prior to as well as following the cementing of the tubing)
b) Temperature log(s) performed after each cementing stage
c) Theoretical versus actual cement calculations

2) Mechanical integrity test results, with interpretation and certification of mechanical integrity, (including a copy of all logs and the final video survey)

3) Planned injection procedures

4) All weekly progress report information must be current (received at the Department).

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

h. Prior to authorization of normal operations under the current operation permit, a final report must be submitted within 90 days of injection test completion. This report shall be submitted for UIC-TAC and USEPA review and must be approved by the Department before Department approval is given for normal operations. The final report shall include, as a minimum, the following:

1) Geophysical logs with interpretations

2) A copy of the video survey of the injection well with interpretation

3) Certification of mechanical integrity and interpreted test data

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

- injection flow rate (MGD)
- injection wellhead pressure (psig)
- wellhead pressure with no flow (shut-in pressure in psig)

- monitor well pressures (upper and lower zones of MW-1)
- tidal data
- barometric pressure

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

6) Certification of completion of well construction.

7) Factory certificates (inspection certificates or mill test reports) for all tubing.

8) Record "as-built" engineering drawings including all modifications to: well construction, subsurface and surface piping and equipment, and appurtenances, certified by the Engineer of Record.

9) Calibration certificates for all new or replaced pressure gauges and flow meters.

10) Final revisions to the operation and maintenance manual, revised to reflect all modifications to the injection well.

5. Resumption of Normal Operation under existing FDEP permit

a. A resumption of normal operations of this Class I injection well system shall not commence without written authorization from the Department.

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

c. The Department shall be notified in writing of the date of commencement of normal operations.

d. Interim Mechanical Integrity: The permittee shall demonstrate Interim Mechanical Integrity (IMIT) at lease once every two and one half years from the date of the last complete mechanical integrity test. A plan describing the IMIT procedures shall be submitted for Department approval at least 180 days prior to the due date.

6. Surface Equipment

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

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

c. The injection well construction pad with impermeable perimeter retaining wall shall be maintained and retained in service for the life of the injection well. The injection and monitor well pad(s) are not, unless specific approval is obtained form the Department, to be used for storage of any material or equipment at any time. Any alteration or removal of these features must be with prior written Department approval.

d. The four surficial aquifer monitor wells installed at the corners of the injection well pad shall be secured, maintained, and retained in service. Any alteration or removal of these features must be with prior written Department approval. This approval to plug and abandon or otherwise secure these monitoring wells may be requested in the Final Report submittal upon completion of the work authorized under this modification.

7. Emergency Disposal

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

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

c. The emergency disposal method consists of diverting the flow to the on-site master wastewater pump station, which then pumps it to the Southern Region Water Reclamation Facility.

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

Issued this 7th day of July, 2005

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Kevin R. Neal

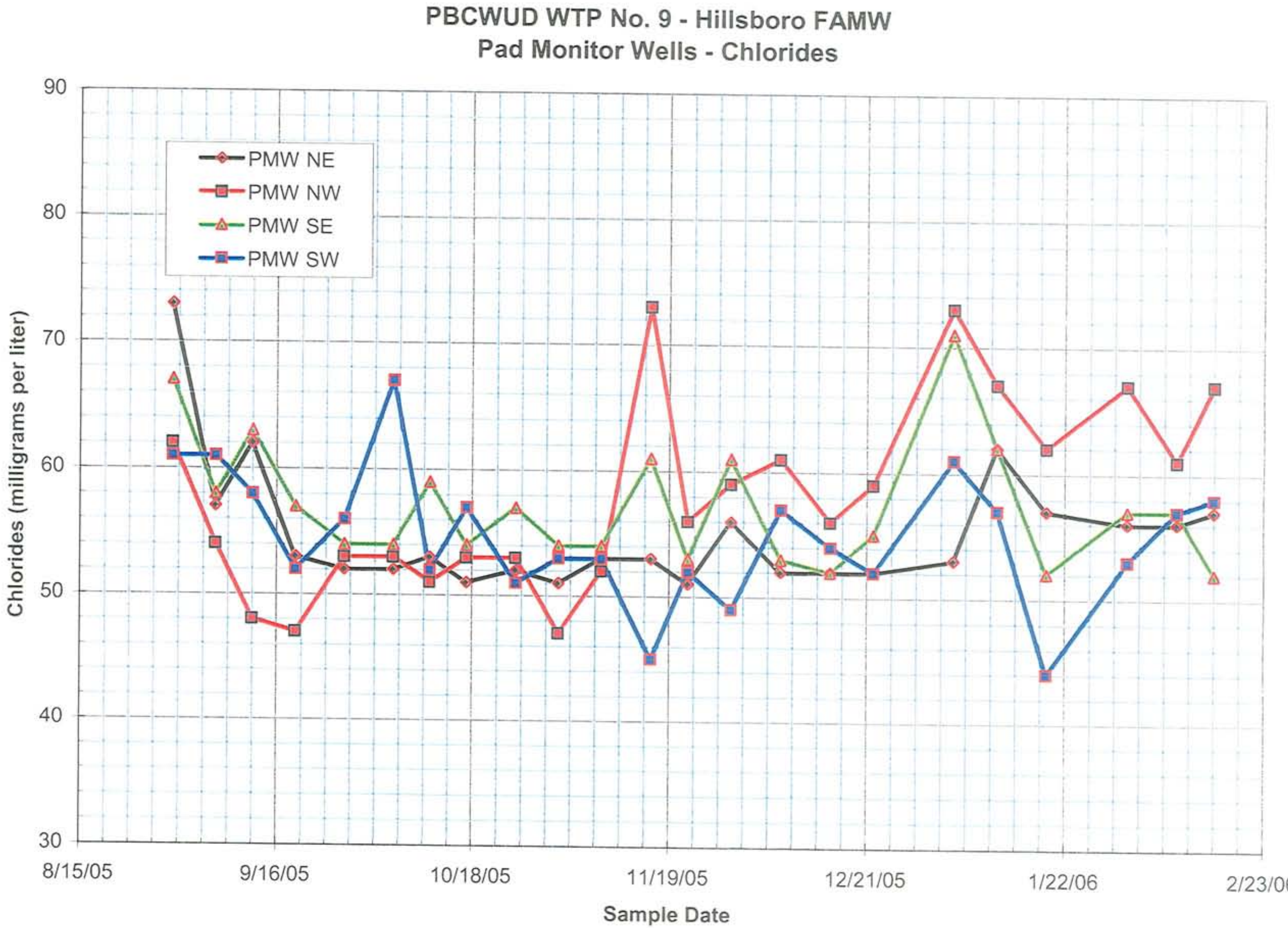
Kevin R. Neal
District Director
Southeast District

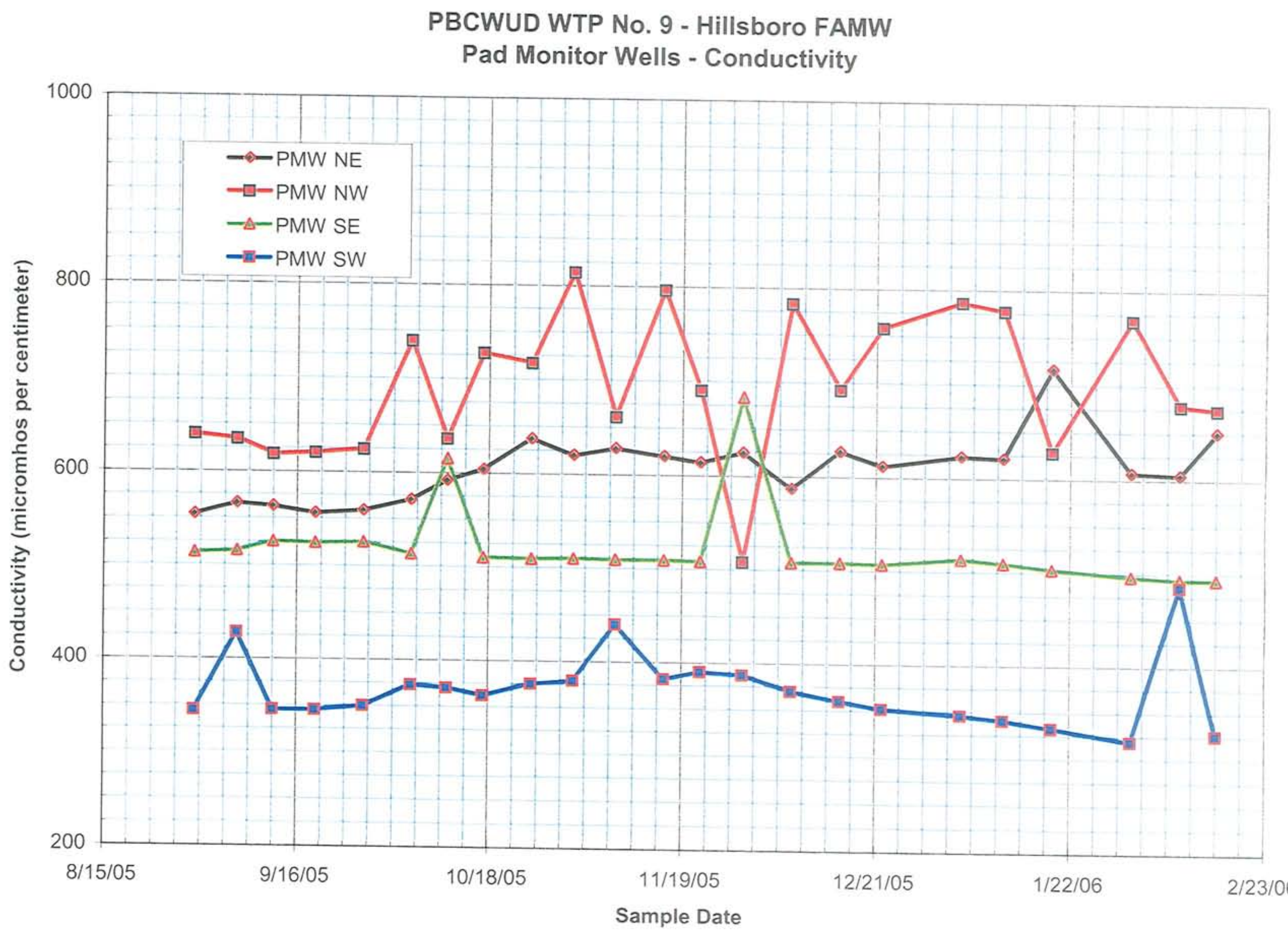
KRN/LAH/JRM/HV

PALM BEACH COUNTY WATER UTILITIES DEPARTMENT - - PAD MONITOR WELL WATER QUALITY DATA
SRPF - 9 NORTH INJECTION WELL

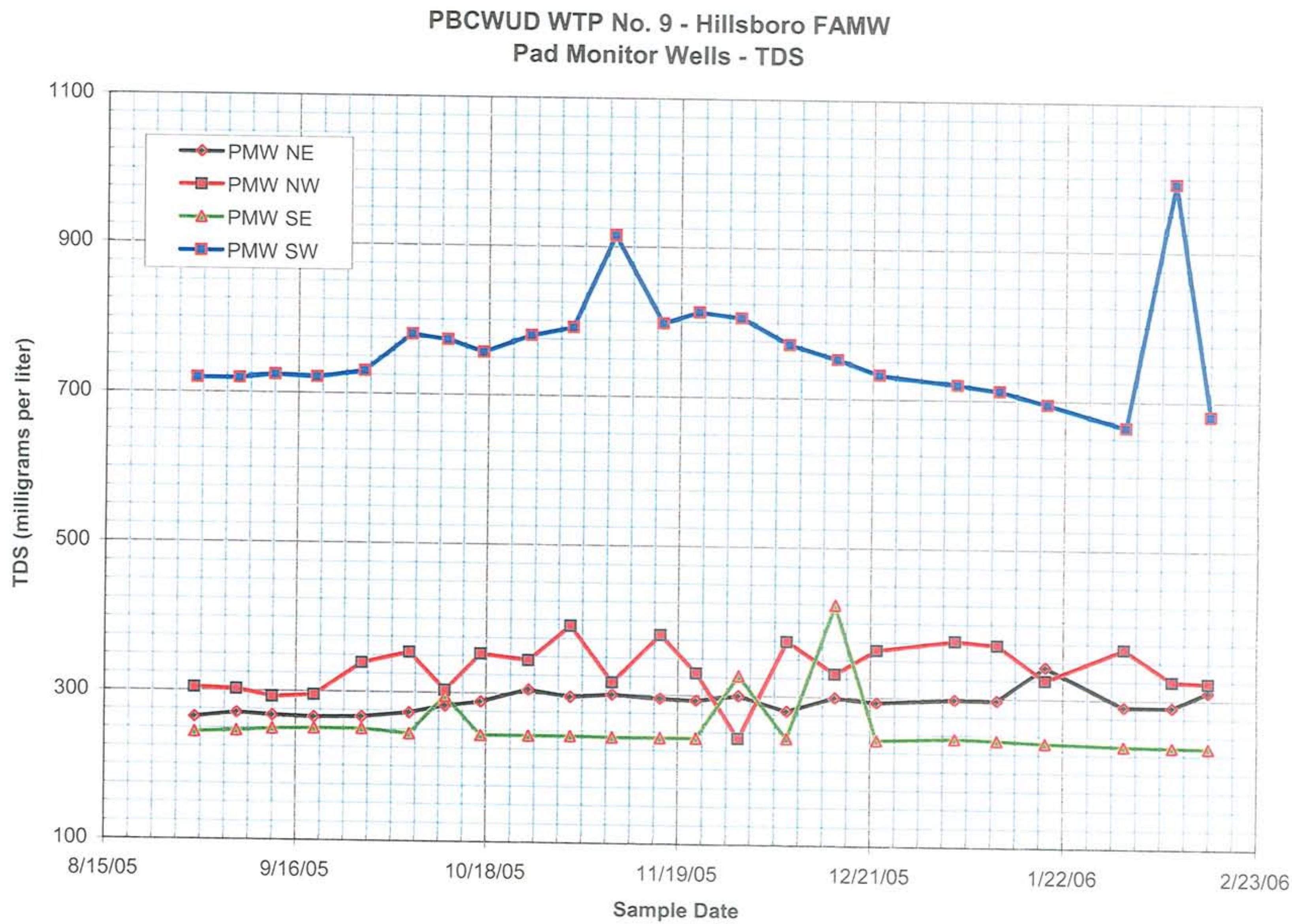
Sample	PMW NE						PMW NW					
	Elevation of Top of Casing					20.32	Elevation of Top of Casing					20.76
Date	Chlorides (mg/L)	TDS (mg/L)	Conductivity (umhos/cm)	Temperature (°C)	Depth to Water (feet BTOC)	W.L. (feet NGVD)	Chlorides (mg/L)	TDS (mg/L)	Conductivity (umhos/cm)	Temperature (°C)	Depth to Water (feet BTOC)	W.L. (feet NGVD)
8/30/2005	73	264	554	28.8	4.48	15.84	62	304	639	30.5	5.01	15.75
9/6/2005	57	270	566	27.4	3.35	16.97	54	302	634	27.5	3.81	16.95
9/12/2005	62	267	563	31.1	4.52	15.8	48	292	618	32.9	5.2	15.56
9/19/2005	53	265	556	27	5	15.32	47	295	620	29.2	5.77	14.99
9/27/2005	52	266	559	27.9	5.09	15.23	53	339	624	28.7	5.85	14.91
10/5/2005	52	272	571	28	4.71	15.61	53	354	739	29	5.47	15.29
10/11/2005	53	282	592	28.6	4.56	15.76	51	303	636	28.8	5.32	15.44
10/17/2005	51	288	604	27.9	4.93	15.39	53	353	727	29.2	5.73	15.03
10/25/2005	52	305	637	27.1	5.15	15.17	53	345	717	28.2	5.65	15.11
11/1/2005	51	296	620	27.4	4.98	15.34	47	392	814	27.7	5.7	15.06
11/8/2005	53	300	628	27	4.93	15.39	52	316	661	28.8	5.68	15.08
11/16/2005	53	295	620	27.9	4.95	15.37	73	381	796	30.7	5.75	15.01
11/22/2005	51	293	614	26.2	4.66	15.66	56	330	690	26.1	5.47	15.29
11/29/2005	56	300	625	26.5	5.01	15.31	59	242	508	25.8	5.81	14.95
12/7/2005	52	280	587	26.7	4.87	15.45	61	374	783	26.4	5.76	15
12/15/2005	52	299	627	25.8	5.09	15.23	56	331	692	26.5	5.9	14.86
12/22/2005	52	293	612	25.9	5.16	15.16	59	364	758	25.3	5.9	14.86
1/4/2006	53	298	623	26.1	5.31	15.01	73	377	786	26	6.1	14.66
1/11/2006	62	297	621	26.2	5.19	15.13	67	372	777	26.3	6.03	14.73
1/19/2006	57	343	716	25.6	5.26	15.06	62	325	628	25.6	6.09	14.67
2/1/2006	56	290	607	25.2	5.27	15.05	67	368	768	25.5	6.11	14.65
2/9/2006	56	290	605	23.9	4.75	15.57	61	325	678	24.6	5.47	15.29
2/15/2006	57	311	650	24.4	4.88	15.44	67	323	674	24.7	5.69	15.07

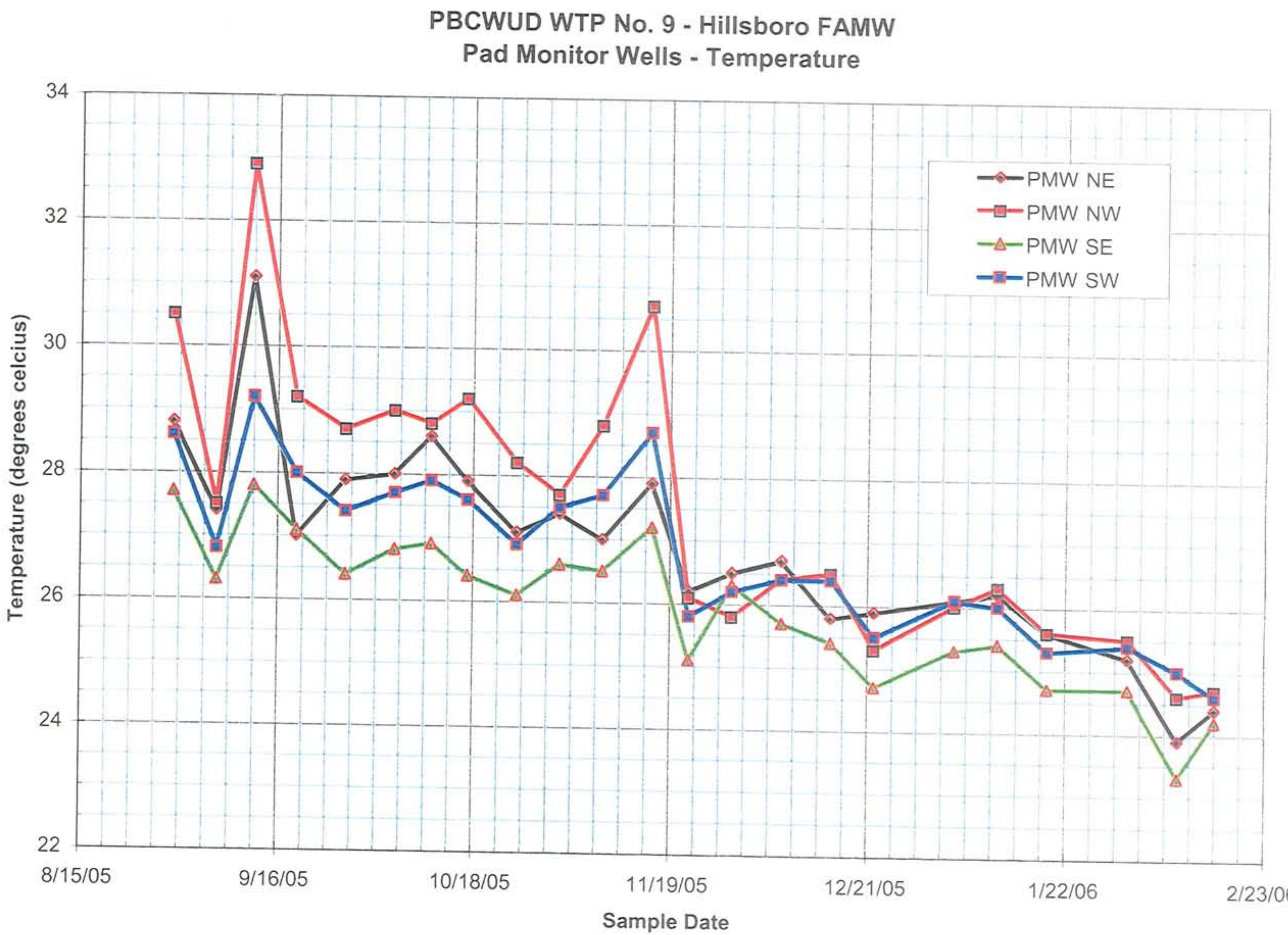
Sample	PMW SE						PMW SW					
	Elevation of Top of Casing					19.92	Elevation of Top of Casing					20.36
Date	Chlorides (mg/L)	TDS (mg/L)	Conductivity (umhos/cm)	Temperature (°C)	Depth to Water (feet BTOC)	W.L. (feet NGVD)	Chlorides (mg/L)	TDS (mg/L)	Conductivity (umhos/cm)	Temperature (°C)	Depth to Water (feet BTOC)	W.L. (feet NGVD)
8/30/2005	67	244	513	27.7	4.02	15.9	61	344	719	28.6	4.62	15.74
9/6/2005	58	246	515	26.3	2.97	16.95	61	428	719	26.8	3.42	16.94
9/12/2005	63	249	525	27.8	4.19	15.73	58	345	724	29.2	4.76	15.6
9/19/2005	57	250	524	27.1	4.5	15.42	52	345	721	28	5.32	15.04
9/27/2005	54	250	525	26.4	4.58	15.34	56	350	730	27.4	5.4	14.96
10/5/2005	54	244	513	26.8	4.24	15.68	67	373	780	27.7	5.01	15.35
10/11/2005	59	295	615	26.9	4.09	15.83	52	370	773	27.9	4.88	15.48
10/17/2005	54	243	510	26.4	4.47	15.45	57	362	757	27.6	5.28	15.08
10/25/2005	57	243	509	26.1	4.8	15.12	51	375	780	26.9	5.15	15.21
11/1/2005	54	243	510	26.6	4.5	15.42	53	379	791	27.5	5.27	15.09
11/8/2005	54	242	509	26.5	4.45	15.47	53	440	915	27.7	5.21	15.15
11/16/2005	61	242	509	27.2	4.48	15.44	45	382	798	28.7	5.32	15.04
11/22/2005	53	242	508	25.1	4.19	15.73	52	390	813	25.8	5.01	15.35
11/29/2005	61	327	683	26.3	4.53	15.39	49	387	806	26.2	5.37	14.99
12/7/2005	53	243	508	25.7	4.35	15.57	57	370	771	26.4	5.29	15.07
12/15/2005	52	424	508	25.4	4.59	15.33	54	360	752	26.4	5.48	14.88
12/22/2005	55	242	507	24.7	4.69	15.23	52	352	732	25.5	5.54	14.82
1/4/2006	71	245	513	25.3	4.8	15.12	61	346	720	26.1	5.65	14.71
1/11/2006	62	243	509	25.4	4.68	15.24	57	341	712	26	5.59	14.77
1/19/2006	52	240	503	24.7	4.79	15.13	44	333	695	25.3	5.65	14.71
2/1/2006	57	237	496	24.7	4.73	15.19	53	319	665	25.4	5.65	14.71
2/9/2006	57	236	493	23.3	4.28	15.64	57	485	992	25	5.04	15.32
2/15/2006	52	235	493	24.2	4.4	15.52	58	326	681	24.6	5.26	15.1

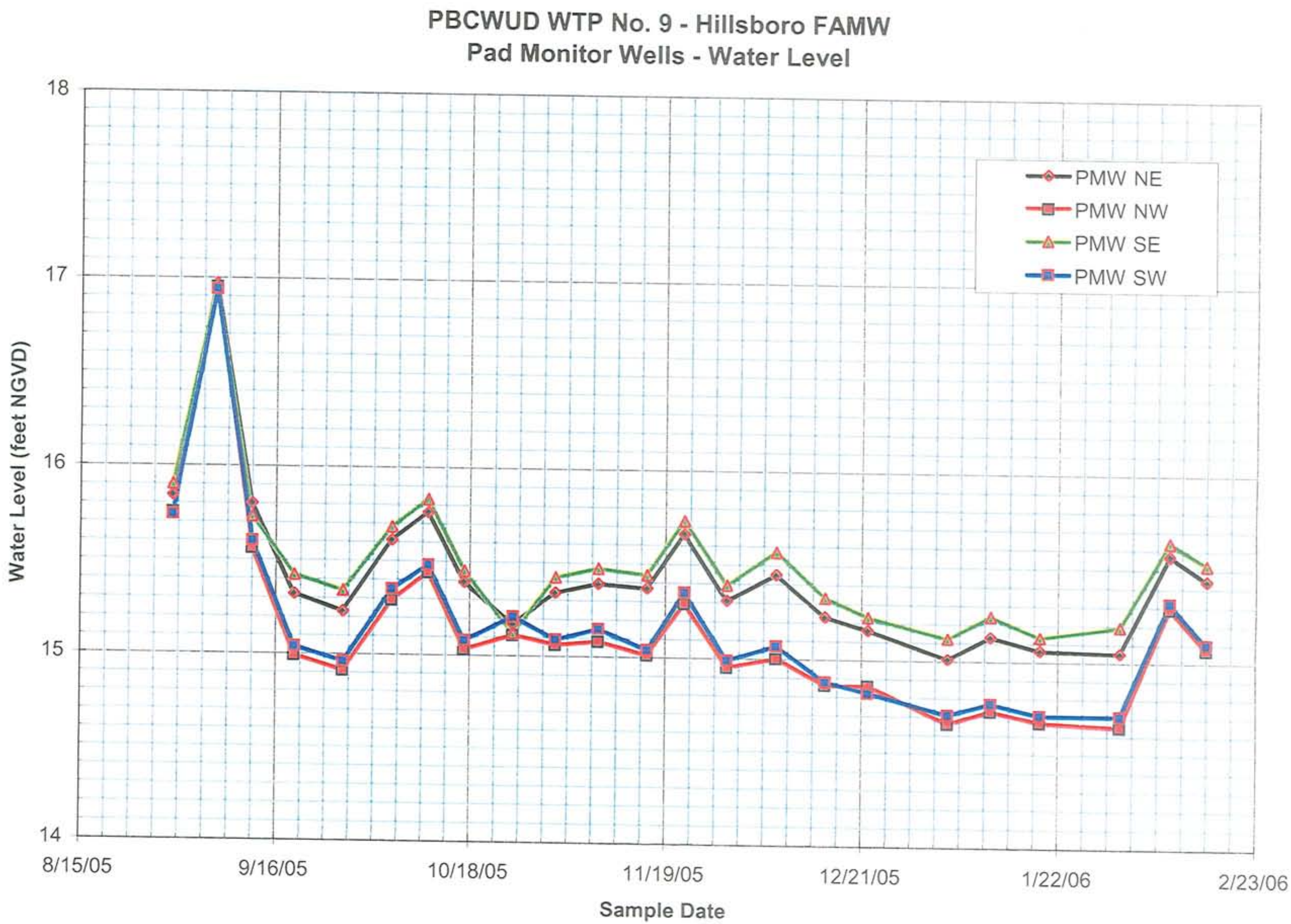

PBCWUD WTP No. 9 - Hillsboro FAMW
Pad Monitor Wells - Chlorides
90
80
70
60
50
40
30
PMW NE
PMW NW
PMW SE
PMW SW
Chlorides (milligrams per liter)
8/15/05
9/16/05
10/18/05
11/19/05
12/21/05
1/22/06
2/23/06
Sample Date



PBCWUD WTP No. 9 - Hillsboro FAMW
Pad Monitor Wells - Conductivity
PMW NE
PMW NW
PMW SE
PMW SW
Conductivity (micromhos per centimeter)
1000
800
600
400
200
8/15/05
9/16/05
10/18/05
11/19/05
12/21/05
1/22/06
2/23/06
Sample Date


PBCWUD WTP No. 9 - Hillsboro FAMW
Pad Monitor Wells - TDS
PMW NE
PMW NW
PMW SE
PMW SW
1100
900
700
500
300
100
TDS (milligrams per liter)
8/15/05
9/16/05
10/18/05
11/19/05
12/21/05
1/22/06
2/23/06
Sample Date


PBCWUD WTP No. 9 - Hillsboro FAMW
Pad Monitor Wells - Temperature
Temperature (degrees celcius)
34
32
30
28
26
24
22
PMW NE
PMW NW
PMW SE
PMW SW
8/15/05
9/16/05
10/18/05
11/19/05
12/21/05
1/22/06
2/23/06
Sample Date


PBCWUD WTP No. 9 - Hillsboro FAMW
Pad Monitor Wells - Water Level
18
17
16
15
14
Water Level (feet NGVD)
8/15/05
9/16/05
10/18/05
11/19/05
12/21/05
1/22/06
2/23/06
Sample Date
PMW NE
PMW NW
PMW SE
PMW SW

Palm Beach County Water Utilities Department
WUD Project No. 04 – 032
9 North Tubing Replacement

GEOPHYSICAL LOG

DATE	RUN #	DEPTH	LOGGED INTERVAL (FROM - TO)	LOG TYPE
8/22/05	1	1142	1142 - 0	Video Log
9/22/05	2	1394	1163 – 1394	Video Log
10/12/05	3	1720	0 – 1720	Video Log
11/14/05	4	2640	0 – 2640	Video Log
12/7/05	5	2807	85 – 2807	XY Caliper, Gamma Ray, Video Log
2/2/06	6	2575	0 – 2575	Pre Cementing Cement Bond Log
2/13/06	7	2575	0 – 2575	Temperature, Gamma Ray - Cement Top Log
2/14/06	8	2575	0 – 2575	Post Cementing Cement Bond Log
3/11/06	9	3025	0 – 3025	Radioactive Tracer Survey, Gamma Ray, Temperature, Video Log

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

X-Y CALIPER GAMMA RAY LOG

Company	PALM BEACH COUNTY WATER UTIL.
Well	SRPF 9 NORTH
Field	SRPF
County	PALM BEACH
State	FLORIDA
Location	
Other Services	VIDEO
Permanent Datum	PAD
Log Measured From	PAD
Drilling Measured From	PAD
Elevation K.B. / D.F. / G.L.	
Date	7-DEC-2005
Run Number	ONE
Depth Driller	3060'
Depth Logger	2807'
Bottom Logged Interval	2654'
Top Log Interval	80'
Open Hole Size	24"
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	NA
Estimated Cement Top	NA
Time Well Ready	ON ARRIVAL
Time Logger on Bottom	1100
Equipment Number	103
Location	FT. MYERS
Recorded By	CATHEY
Witnessed By	T. URAM

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	24"	500" W.T.	SURFACE	2641'
Prot. String	20"	500" W.T.	2575'	2628'
Production String				
Liner				

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

ABHV CALCULATED IN BARRELS FOR 16" CASING

MAIN PASS

Database File: bocaline.db
Dataset Pathname: pass2.1
Presentation Format: gr_xyc
Dataset Creation: Wed Dec 07 12:51:24 2005 by Calc 6.2_B4
Charted by: Depth in Feet scaled 1:1200

REPEAT PASS

Database File: bocaline.db
Dataset Pathname: pass1
Presentation Format: gr_xyc
Dataset Creation: Wed Dec 07 11:28:06 2005 by Log 6.2_B4
Charted by: Depth in Feet scaled 1:240

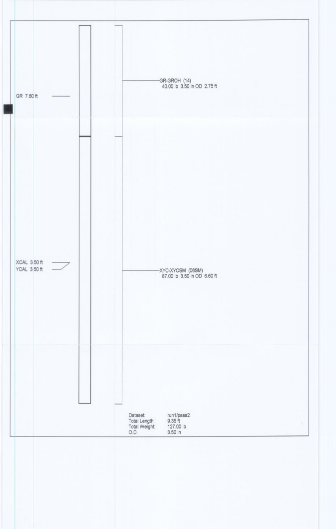
XY Caliper Calibration Report

Serial Number/Model: 06SM-XYCSM
Performed: Wed Dec 07 11:02:27 2005

	Ring		X Caliper		Y Caliper	
1:	5.81	in	323.624	cps	281.481	cps
2:	13.4	in	426.126	cps	377.778	cps
3:	23	in	570	cps	517	cps
4:	39	in	825.025	cps	778.078	cps
5:		in		cps		cps
6:		in		cps		cps

Gamma Ray Calibration Report

Serial Number:	14	
Tool Model:	GROH	
Performed:	Tue Nov 15 13:26:42 2005	
Calibrator Value:	120	GAPI
Background Reading:	45.1785	cps
Calibrator Reading:	242.721	cps
Sensitivity:	0.607466	GAPI/cps



Dataset: run1/pass2
Total Length: 9.35 ft
Total Weight: 127.00 lb
O.D.: 3.50 in

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

16" FRP CEMENT BOND VARIABLE DENSITY LOG

Company	PALM BEACH UTILITIES
Well	SRPF 9 NORTH (IW #1)
Field	SRPF
County	PALM BEACH
State	FLORIDA

Company PALM BEACH UTILITIES
Well SRPF 9 NORTH (IW #1)
Field SRPF
County PALM BEACH State FLORIDA
Location
Other Services

		Elevation	Elevation
Permanent Datum	PAD		K.B.
Log Measured From	PAD		D.F.
Drilling Measured From	PAD		G.L.

Date	14-FEB-2006
Run Number	CBL
Depth Driller	NA
Depth Logger	2575'
Bottom Logged Interval	2575'
Top Log Interval	SURFACE
Open Hole Size	NA
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	NA
Estimated Cement Top	SURFACE
Time Well Ready	ON ARRIVAL
Time Logger on Bottom	0000
Equipment Number	102
Location	FT.MYERS
Recorded By	LEE
Witnessed By	T.URAM

Borehole Record				Tubing Record		
Run Number	Bit	From	To	Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	16" FRP		SURFACE	2575'
Prot. String				
Production String				
Liner				

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Comments

BEFORE CEMENTING 02-FEB
AFTER CEMENTING 14-FEB

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

AFTER CEMENTING

Database File: sys9.db
Dataset Pathname: CBLA
Presentation Format: cbl101
Dataset Creation: Tue Feb 14 09:12:36 2006 by Log 6.2_B4
Charted by: Depth in Feet scaled 1:240

950 Travel Time 5 Ft (usec) 550 | 0 Amplified Amplitude x 10 (mV) 10 | 0 Amplitude 5 Ft (mV) 100 | 400 Variable Density 1400

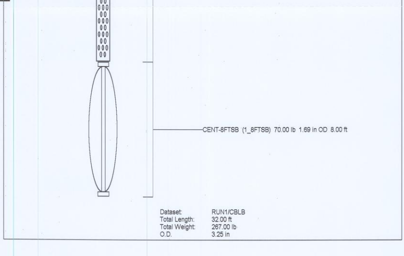
950 Travel Time 5 Ft (usec) 550 | 0 Amplified Amplitude x 10 (mV) 10 | 0 Amplitude 5 Ft (mV) 100 | 400 Variable Density 1400

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

BEFORE CEMENTING

Database File:	sys9.db
Dataset Pathname:	CBLB
Presentation Format:	cbl101
Dataset Creation:	Thu Feb 02 08:51:03 2006 by Log 6.2_B4
Charted by:	Depth in Feet scaled 1:240

Cement Bond Log Calibration Report			
Serial Number:	004		
Tool Model:	GEARHART		
Performed:	Thu Feb 02 08:45:37 2006		
Depth:	2308.1	ft	
Casing Diameter:	16	in	
	3' Spacing	5' Spacing	
Signal Zero:	1	1	mV
Calibrated Amplitude:	37.7164	37.7164	mV
Reading at Signal Zero:	0.46084	0.0244629	V
Reading in Free Pipe:	0.46001	0.87749	V
Gain:	-44232.1	43.0425	
Offset:	20384.9	-0.0529431	



Dataset:	RUN1/CBLB
Total Length:	32.00 ft
Total Weight:	267.00 lb
O.D.	3.25 in

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

CEMENT TOP TEMPERATURE LOG

Company PALM BEACH UTILITIES
Well SRPF 9 NORTH (IW #1)
Field SRPF
County PALM BEACH
State FLORIDA

Company	PALM BEACH UTILITIES
Well	SRPF 9 NORTH (IW #1)
Field	SRPF
County	PALM BEACH
State	FLORIDA
Location	
Other Services	
Permanent Datum	PAD
Log Measured From	PAD
Drilling Measured From	PAD
Elevation	
Elevation	K.B. D.F. G.L.

Date	13-FEB-2006
Run Number	CTL
Depth Driller	NA
Depth Logger	2575'
Bottom Logged Interval	2575'
Top Log Interval	SURFACE
Open Hole Size	NA
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	NA
Estimated Cement Top	SURFACE
Time Well Ready	ON ARRIVAL
Time Logger on Bottom	0000
Equipment Number	102
Location	FT.MYERS
Recorded By	LEE
Witnessed By	T.URAM

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	16" FRP		SURFACE	2575'
Prot. String				
Production String				
Liner				

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Comments

CTL MERGE

YOUNGQUIST BROTHERS, Inc
GEOPHYSICAL LOGGING DIVISION

CTL MERGE

Database File: sys9.db
Dataset Pathname: RUN2/CTL1
Presentation Format: ctl_mg
Dataset Creation: Thu Feb 09 07:08:08 2006 by Log 6.2_B4
Charted by: Depth in Feet scaled 1:600

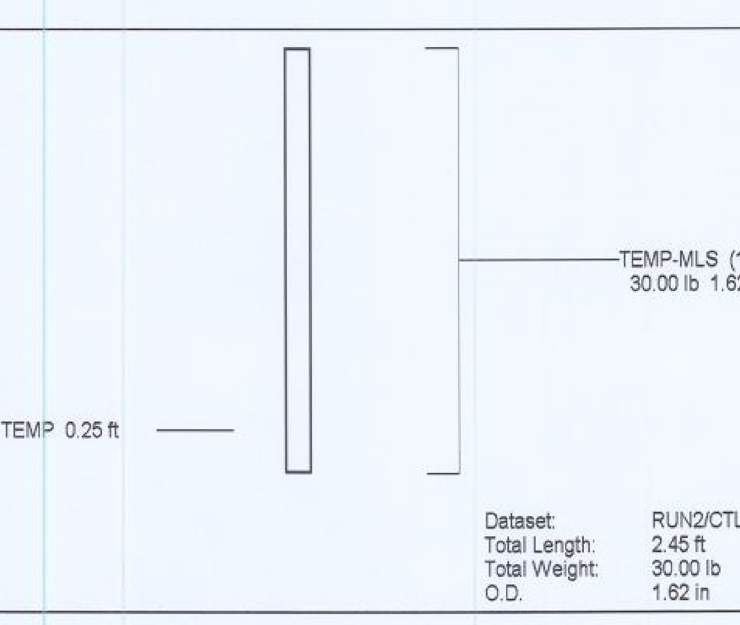
50	Temp - Stage #1 (degF)	150
50	Temp - Stage #2 (degF)	150
50	TEMP3 (degF)	150
50	Temp - Stage #4 (degF)	150
50	Temp - Stage #5 (degF)	150
50	Temp - Stage #6 (degF)	150

50	Temp - Stage #1 (degF)	150
50	Temp - Stage #2 (degF)	150
50	TEMP3 (degF)	150
50	Temp - Stage #4 (degF)	150
50	Temp - Stage #5 (degF)	150
50	Temp - Stage #6 (degF)	150

Temperature Calibration Report

Serial Number: 17
Tool Model: MLS
Performed: Sat Nov 19 18:11:03 2005

Point #	Reading		Reference	
1	320	cps	32	degF
2	700	cps	70	degF
3	2000	cps	200	degF



Dataset: RUN2/CTL6
Total Length: 2.45 ft
Total Weight: 30.00 lb
O.D. 1.62 in

APPENDIX

INJECTION WELL PRESSURE TEST
24" FINAL Casing

Palm Beach County
Water Utilities

Location: Palm Beach County
Well: 9 North IW-1
Date: 8-Dec-05
Contractor: Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure	Time	Casing Pressure	Packer Pressure
15:53	155.5				
15:58	155.0				
16:03	154.8				
16:08	154.8				
16:13	154.5				
16:18	154.5				
16:23	154.2				
16:28	154.0				
16:33	154.0				
16:38	154.0				
16:43	154.0				
16:48	154.0				
16:53	154.0				

Witnessed By: ______________________
FDEP

Pressure Decrease: 0.96%

Certified By: ______________________
Thomas G. Uram, P.G., Hydrologist

APPENDIX

INJECTION WELL PRESSURE TEST

16" FRP - Pre Cementing

Location: Palm Beach County
Well: 9 North IW-1
Date: 3-Feb-06
Contractor: Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure	Time	Casing Pressure	Packer Pressure
8:30	156.0				
8:35	156.0				
8:40	156.0				
8:45	156.0				
8:50	156.0				
8:55	156.0				
9:00	156.0				
9:05	156.0				
9:10	156.0				
9:15	156.0				
9:20	156.0				
9:25	156.0				
9:30	156.0				

Witnessed By: ______________________________
FDEP

Pressure Decrease: 0.00%

Certified By: ______________________________
Thomas G. Uram, P.G., Hydrologist

APPENDIX

INJECTION WELL PRESSURE TEST

16" FRP - Post Cementing

Location: Palm Beach County
Well: 9 North IW-1
Date: 15-Feb-06
Contractor: Youngquist Brothers, Inc.

Time	Casing Pressure	Packer Pressure	Time	Casing Pressure	Packer Pressure
10:20	164.5				
10:25	163.9				
10:30	163.2				
10:35	162.8				
10:40	162.2				
10:45	162.0				
10:50	161.0				
10:55	160.5				
11:00	160.0				
11:05	159.4				
11:10	158.9				
11:15	158.4				
11:20	157.7				

Witnessed By: ______________________
FDEP

Pressure Decrease: 4.13%

Certified By: ______________________
Thomas G. Uram, P.G., Hydrologist

BLUE RIBBON
INDUSTRIAL COMPONENTS CORP.
1940 Howell Branch Rd., Winter Park, FL 32792

Phone: (407) 677-8899
Fax: (407) 657-6622
Email: blueribboncorp.com

CALIBRATION CERTIFICATE
10/06/05

Youngquist Brothers, Inc.
15465 Pineridge Road
FT. Myers, FL 33908

P.O. 6230-EG12

S/N: 03305

This certificate will certify that your gauge authorized for calibration on your Purchase Order VERBAL, tested this date, is in calibration. The gauge tested is identified as a 6", McDaniel gauge 0-200 psi.

This gauge was tested on a Mansfield & Green Deadweight Tester model T-100 Serial Number 11353, certified by DELTA ELECTRONICS LABORATORY, INC., ORLANDO, FL, on November 20, 2004 to be accurate to within +/-.25%, traceable to NIST standards.

The subject gauge performed to within +/-1.5% accuracy.

Sincerely,

Julio Matos

BLUE RIBBON
INDUSTRIAL COMPONENTS CORP.
1940 Howell Branch Rd., Winter Park, FL 32792

Phone: (407) 677-8899
Fax: (407) 657-6622
Email: blueribboncorp.com

CALIBRATION CERTIFICATE
07/13/05

Youngquist Brothers
15465 Pineridge Road
Ft. Myers, FL 33908

P.O. # 16893

S/N: 071305-03

This certificate will certify that your gauge authorized for calibration on your Purchase Order VERBAL, tested this date, is in calibration. The gauge tested is identified as a 12", gauge 0-300 psi.

This gauge was tested on a Mansfield & Green Deadweight Tester model T-100 Serial Number 11353, certified by DELTA ELECTRONICS LABORATORY, INC., ORLANDO, FL, on November 20, 2004 to be accurate to within +/-.25%, traceable to NIST standards.

The subject gauge performed to within +/-1.5% accuracy.

Sincerely,

Julio Matos

Julio Matos

CEMENTING RECORD

PROJECT: 9 NORTH TUBING REPLACEMENT

WUD Project No.: 04 - 032

CONTRACTOR: Youngquist Brothers, Inc.

BID ITEM:

CASING SIZE: 16-inch Injection Tubing

Palm Beach County Water Utilities

ATTACH ALL CALCULATION SHEETS

A	B	C	D	E	F	G	H	I	J	K	L	M
DATE	STAGE NO.	CEMENT (ADDITIVES, BLENDS, MIXTURES)	YIELD (FT^3/SK)	QUANTITY PUMPED (FT^3)	THEORETICAL FILL INTERVAL	THEORETICAL FILL FOOTAGE	TAG DEPTH PAD LEVEL	ACTUAL FILL INTERVAL	ACTUAL FILL FOOTAGE	PERCENT FILLED J/G x 100	CUMULATIVE TOTAL (FT^3)	INSPECTOR'S INITIALS
2/6/2006	1	Neat	1.18	11.2	2575-2567	8	2571	2575-2571	4	50	11.2	TGU
2/6/2006	2	Neat	1.18	16.8	2571-2558	13	2571	2571-2571	0.5	4	28	TGU
2/7/2006	3	Neat	1.18	16.8	2571-2558	13	2569	2571-2569	2	15	44.8	TGU
2/8/2006	4	Neat	1.18	16.8	2569-2556	13	2560	2669-2560	9	69	61.6	TGU
2/8/2006	5	Neat	1.18	281	2560-2346	214	2379	2560-2379	181	85	342.6	TGU
2/9/2006	6	12% Gel	2.2	595	2379-1954	455	1993	2379-1993	386	85	937.6	TGU
2/10/2006	7	12% Gel	2.2	595	1993-1538	455	1623	1993-1623	370	81	1532.6	TGU
2/10/2006	8	12% Gel	2.2	646	1623-1129	494	1247	1623-1247	376	76	2178.6	TGU
2/11/2006	9	12% Gel	2.2	702	1247-711	536	802	1247-802	445	83	2880.6	TGU
2/13/2006	10	12% Gel	2.2	674	802-287	515	374	802-374	428	83	3554.6	TGU
2/13/2006	11	12% Gel	2.2	601	374-0	459	0	374-0	374	81	4155.6	TGU

MedTech Diagnostic Services
1840 Boy Scout Dr.
Ft.Myers, Fl 33907
(239) 277-0990

I-131 THERAPY SOLUTION Disp.Date 4/7/2006

Act. 16.00 mCi @ 08:00 on 4/11/2006

Youngquist Brothers Inc.

Address: 15465 Pine Ridge Rd Fort Myers FL 33908

Doctor:

Patient: MEDICINAL GRADE

Procedure: Iodine Therapy Solution

Special Instructions: MEDICINAL GRADE

Vol. 10.00 ml Assay: 1.6 mCi/ml

Lot #: RX#: 718203

Exp Time: 12:00 Exp Date: 5/10/2006

Lic.#: 2771-1

CAUTION: To be used under the direct supervision of physician WARNING: The U.S. Nuclear Regulatory Commission has approved this radiopharmaceutical for distribution pursuant to 35.14 and 35 100 Group of 10 CFR Part 35, or under equivalent licenses of Agreement States.

Filled By: BL

Lot #:

Patient: MEDICINAL GRADE

16.00 mCi @ 08:00 on 4/11/200 RX#: 718203
4/11/2006 I-131 THERAPY SOLUTION
Iodine Therapy Solution

WATER METER
ACCURACY TEST REPORT

4/5/2006

#	MAKE	SERIAL#	LOW FLOW	INT.FLOW	HIGH FLOW
1	2"	NONE	101.4	100.5	101.3
2	USG	4459904	99.7	100.1	99.9
3	MJ	2363373	99.8	99.8	99.5
4	METERS				
5			2 GPM	11 GPM	74 GPM
6					
7		USAGE			
8		13058			
9		9134			
10		19566			
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
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22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					

MASTER METER

101 Regency Parkway
Mansfield, Texas
817-842-8000
(800) 765-6518
FAX# 817-842-8100

RMA# 15021

CUSTOMER: YOUNGQUIST BROTHERS
TEST DATE: 4/5/2006
TESTER: STEVE WHITE

NOTE:
Accuracy limits according to AWWA C708-96

* 97% - 103% for Low Flows

* 98.5% - 101.5% for Intermediate and High Flows

* Accuracy limits for meters removed from service according to M-6 Manual Table 5-1

*80% - 104.0% for Low Flows

*96% - 102.0% for Intermediate and High Flows

VIDEO SURVEY

DATE(S): 7-Dec-05

Palm Beach County Water Utilities

PROJECT: 9 NORTH TUBING REPLACEMENT

WUD Project No.: 04-032

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

VIDEO CONTRACTOR: Florida Geophysical

TOTAL DEPTH: 2,807

DESCRIPTION OF OPERATIONS: Final Video Log - 24-inch Final Casing

DEPTH IN FEET		OBSERVATIONS					
From	To						
0		Ground Level					
36	2641	Casing joints	36	557	1080	1603	2126
			76	598	1120	1643	2166
			116	638	1160	1683	2206
			156	678	1200	1723	2243
			196	718	1240	1764	2280
			236	758	1281	1804	2321
			276	798	1321	1844	2361
			316	838	1361	1885	2401
			356	878	1401	1925	2441
			396	919	1442	1965	2481
			436	959	1482	2005	2522
			477	999	1523	2046	
			517	1040	1563	2086	
2524	2575	Remnant cement on casing wall from the cementing of the 20-inch tubing tailpipe					
2575		Top of remaing 20-inch tubing tailpipe					
2575	2627	Tubing tailpipe corroded with hole and visible cement					
2590		Tubing weld					
2627		Bottom of tubing tailpipe					
2641		Bottom of 24-inch final casing					

VIDEO SURVEY

DATE(S): 11-Apr-06

PROJECT: 9 NORTH TUBING REPLACEMENT

WUD Project No.: 04-032

CONTRACTOR: Youngquist Brothers, Inc.

PROJECT MANAGER: Tom Uram

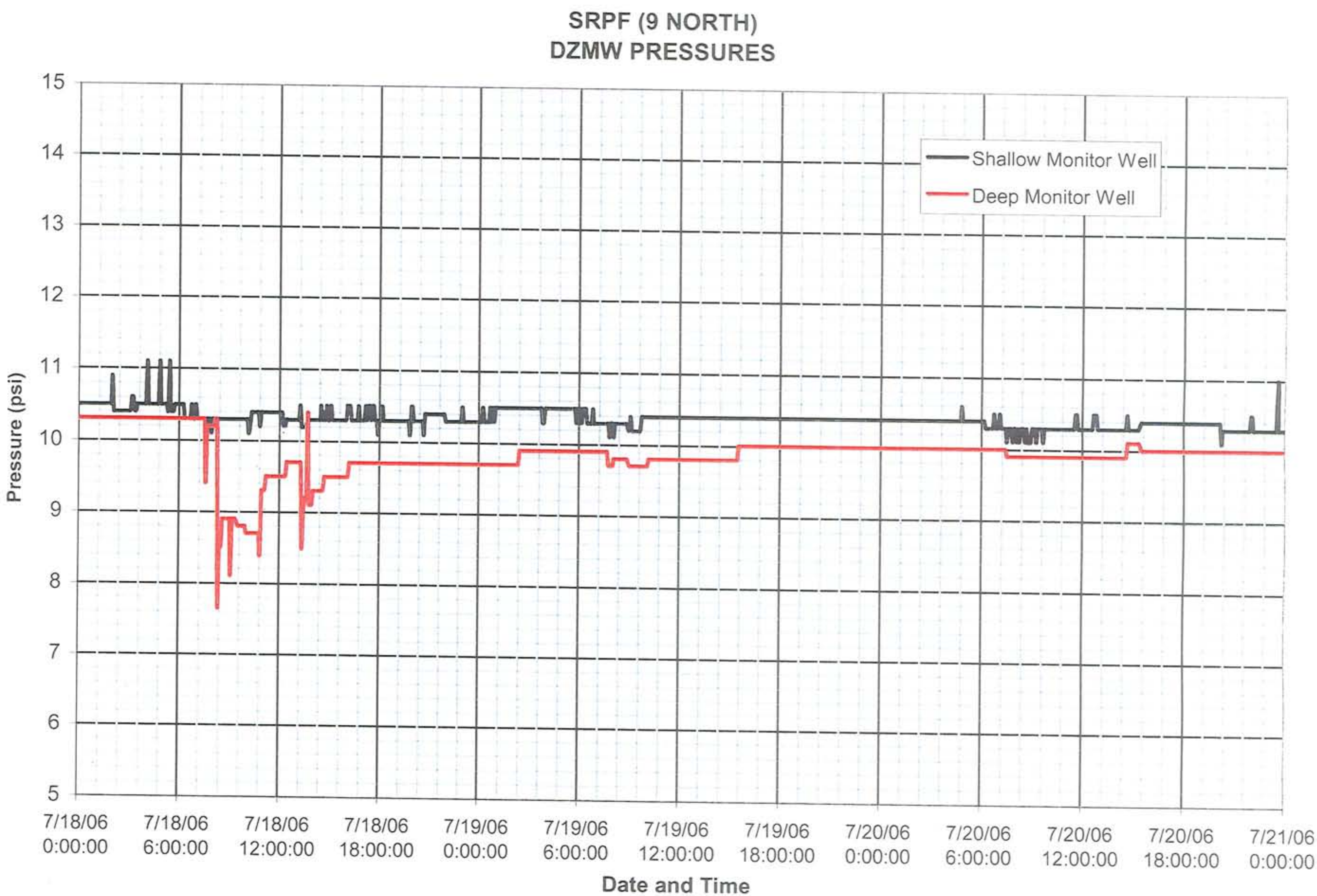
VIDEO CONTRACTOR: Florida Geophysical

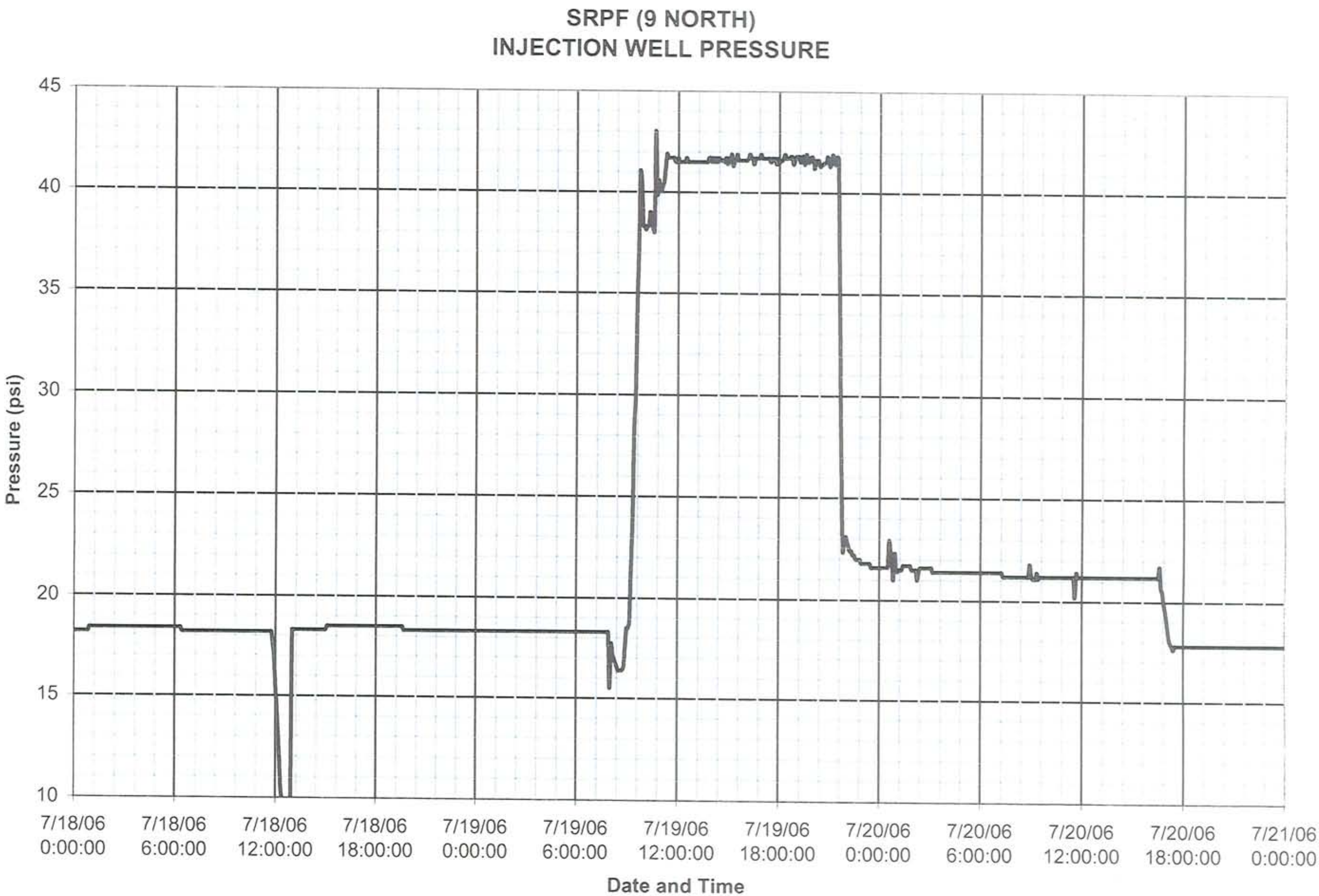
TOTAL DEPTH: 3,025

DESCRIPTION OF OPERATIONS: Final Video Log - 16-inch FRP Injection Tubing

DEPTH IN FEET		OBSERVATIONS					
From	To						
0		Ground Level					
9		Stainless Steel Weld					
16		Stainless Steel Weld					
32	34	Stainless Steel to FRP Adaptor					
34		Top of FRP					
34	2568	Tubing joints	34	545	1072	1601	2129
			62	574	1102	1630	2158
			77	603	1131	1660	2187
			106	633	1160	1689	2217
			135	662	1190	1718	2246
			164	692	1219	1747	2275
			194	721	1249	1777	2305
			223	750	1278	1806	2334
			252	750	1307	1830	2363
			282	809	1337	1865	2392
			311	838	1366	1894	2422
			340	867	1396	1924	2451
			370	896	1425	1953	2481
			399	926	1454	1982	2510
			428	955	1484	2011	2539
			457	984	1513	2040	2568
			487	1014	1542	2069	
			516	1043	1571	2099	
2568		Bottom of FRP					

DEPTH IN FEET		OBSERVATIONS
From	To	
2568	**2570**	FRP to Cement Retainer Adaptor
2570	**2573**	Cement Retainer
2572.8		Fluid Holes
2575	**2626**	Corroded 20-inch tubing tailpipe - holes with visible cement
2587		Tubing weld
2641		Bottom of 24-inch final casing
2641	**3025**	Open hole - injection interval
3025		Total Depth


SRPF (9 NORTH)
DZMW PRESSURES
Shallow Monitor Well
Deep Monitor Well
Pressure (psi)
15
14
13
12
11
10
9
8
7
6
5
7/18/06 0:00:00
7/18/06 6:00:00
7/18/06 12:00:00
7/18/06 18:00:00
7/19/06 0:00:00
7/19/06 6:00:00
7/19/06 12:00:00
7/19/06 18:00:00
7/20/06 0:00:00
7/20/06 6:00:00
7/20/06 12:00:00
7/20/06 18:00:00
7/21/06 0:00:00
Date and Time


SRPF (9 NORTH)
INJECTION WELL PRESSURE
Pressure (psi)
45
40
35
30
25
20
15
10
7/18/06 0:00:00
7/18/06 6:00:00
7/18/06 12:00:00
7/18/06 18:00:00
7/19/06 0:00:00
7/19/06 6:00:00
7/19/06 12:00:00
7/19/06 18:00:00
7/20/06 0:00:00
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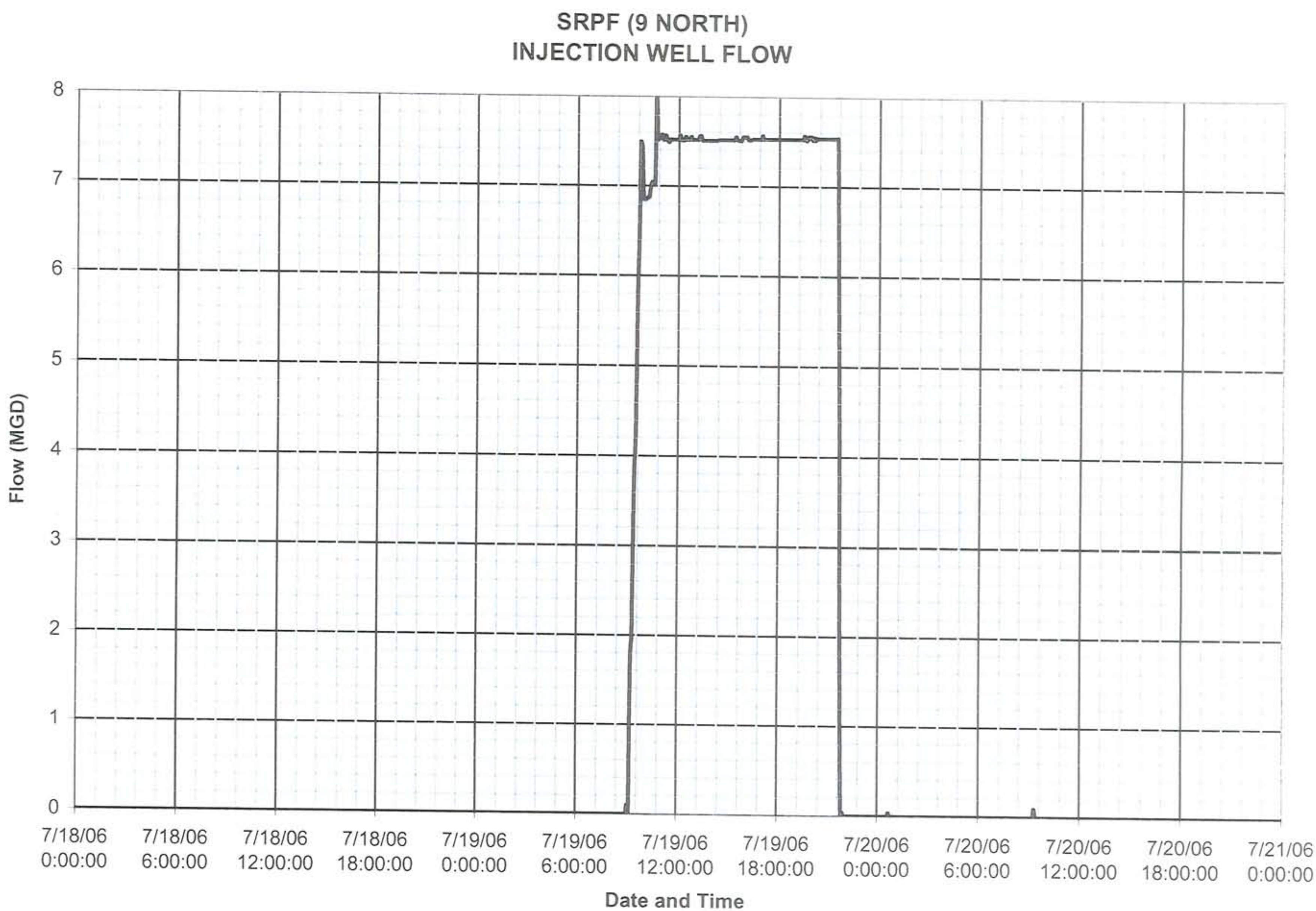
7/20/06 18:00:00
7/21/06 0:00:00
Date and Time


SRPF (9 NORTH)
INJECTION WELL FLOW
Flow (MGD)
0
1
2
3
4
5
6
7
8
7/18/06 0:00:00
7/18/06 6:00:00
7/18/06 12:00:00
7/18/06 18:00:00
7/19/06 0:00:00
7/19/06 6:00:00
7/19/06 12:00:00
7/19/06 18:00:00
7/20/06 0:00:00
7/20/06 6:00:00
7/20/06 12:00:00
7/20/06 18:00:00
7/21/06 0:00:00
Date and Time