MHC **McNabb Hydrogeologic Consulting, Inc.**
**601 Heritage Drive, Suite 110**
**Jupiter, Florida 33458**
**Phone: 561-891-0763**
**Fax: 561-623-5468**

May 8, 2012

Mr. Len Fishkin, P.G.
Florida Department of Environmental Protection
400 N. Congress Ave, Suite 200
West Palm Beach, FL 33401

**RE: Martin County Utilities North WTP/WWTP Facility IW-2 Modification**

Dear Mr. Fishkin:

Hereby submitted on behalf of Martin County Utilities are two (2) originals of the Technical Memorandum summarizing the modification of deep injection well IW-2 at the Martin County Utilities North Martin County Water and Wastewater Treatment Plant.

Should you have any questions regarding the Technical Memorandum or the well modification, please contact me at (561) 891-0763.

Sincerely,

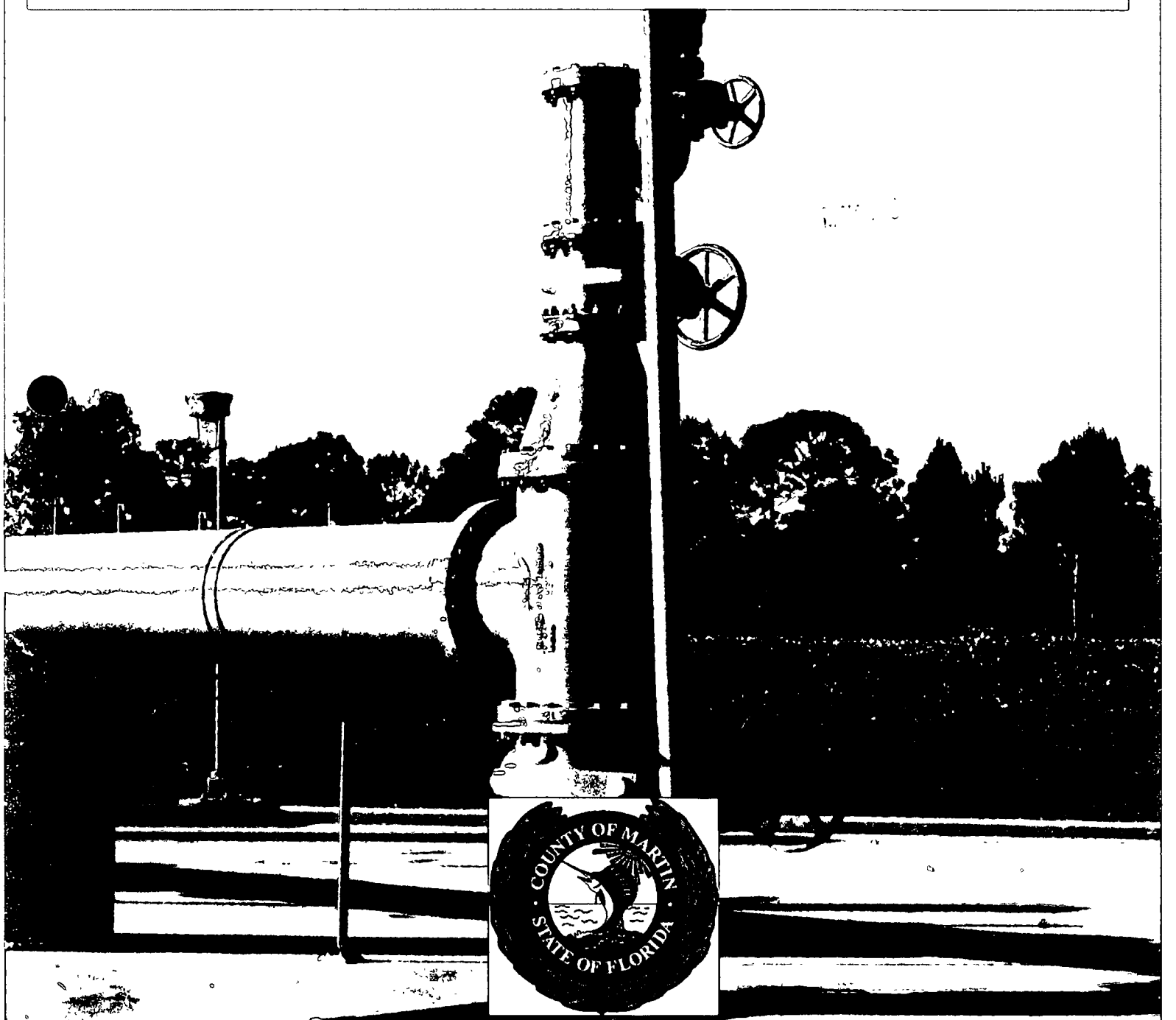
McNabb Hydrogeologic Consulting, Inc.

David McNabb, P.G.



cc: James Alexander/FDEP
Darrell Schuler/MCU
David Holtz/HCE
Anne Murray/MCU
Ted Robbins/MCU

# Technical Memorandum on the Martin County Utilities North Water and Wastewater Treatment Plant Deep Injection Well IW-2 Modification



McNabb Hydrogeologic Consulting, Inc.

May 2012

MHC McNabb Hydrogeologic Consulting, Inc.
601 Heritage Drive, Suite 110
Jupiter, Florida 33458
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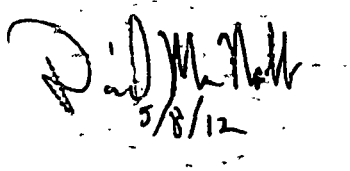
# TECHNICAL MEMORANDUM

**To:** Len Fishkin/FDEP **Date:** May 8, 2012

**Copy:** Darrell Schuler/MCU
Ted Robbins/MCU
Anne Murray/MCU
James Alexander/FDEP
David Holtz/HCE



**From:** David McNabb
McNabb Hydrogeologic Consulting, Inc.

**RE:** **Martin County Utilities North Water and Wastewater Treatment Plant Deep Injection Well IW-2 Modification**

## Introduction

Martin County Utilities (MCU) owns and operates a Class I deep injection well system for disposal of treated wastewater and reverse-osmosis concentrate located at its North Martin County Water and Wastewater Treatment Plant. The deep injection well system consists of one deep injection well (IW-2) and one dual-zone monitor well (DZMW-1). The deep injection well was constructed in 2001 to a total depth of 3,350 feet below pad level (bpl) with a 20-inch diameter steel injection tubing installed to a depth of 2,811 feet bpl and a 14.46-inch diameter fiberglass reinforced pipe (FRP) injection liner installed to a depth of 2,785.5 feet bpl. The base of the FRP injection liner was seated in a Texas Iron Works, Inc. (TIW) retrievable packer to allow isolation of the fluid-filled annulus between the 20-inch diameter injection tubing and 14.46-inch diameter injection liner. Figure 1 provides a diagram of the IW-2 configuration as it was completed in 2001.

Rule 62-528, Florida Administrative Code (FAC), requires that Class I deep injection well undergo testing every five years to demonstrate mechanical integrity. Part of the mechanical integrity testing requires that the well undergo pressure testing for a 60 minute period with no

greater than a five percent change in test pressure. In June of 2011, IW-2 was undergoing an annular pressure test to demonstrate that no leaks existed in the injection tubing, injection liner, and at the retrievable packer at the base of the injection liner. Repeated attempts at successfully performing the annular pressure test resulted in greater than a five percent pressure decrease in annular pressure. Subsequent testing demonstrated that the pressure loss was occurring at the retrievable packer.

MCU requested the services of McNabb Hydrogeologic Consulting, Inc. (MHC) to provide professional services for the modification of IW-2 to restore the mechanical integrity of the well. MCU also requested the services of Holtz Consulting Engineers, Inc. (HCE) to provide professional services for wellhead equipment and piping changes for IW-2. MHC subsequently prepared an IW-2 modification plan and well modification technical specifications for MCU review and concurrence. The IW-2 modification plan was then submitted to and approved by the Florida Department of Environmental Protection (FDEP). Youngquist Brothers, Inc. was the selected well contractor for the well modification upon being the low bidder for this publically bid project. Modification of IW-2 began on January 3, 2012, and was completed on January 21, 2012. Subsequent successful annular pressure testing was performed on February 23, 2012. A copy of the FDEP approved IW-2 modification plan is provided in Attachment A. MHC prepared weekly summaries during the well modification for submittal to the FDEP. Copies of the weekly modification summaries are provided in Attachment B.

**IW-2 Modification**

Modification of IW-2 took place in two phases. The first phase was to unseat the injection liner from the TIW retrievable packer, and the second phase was to seal the base of the annular space between the injection liner and injection tubing with cement, and demonstrate a successful 60-minute annular pressure test with less than a five percent change in pressure. The phased approach to the IW-2 modification was necessary in order to establish that the injection liner could successfully be unseated from the TIW retrievable packer. If the injection liner was unable to be unseated from the packer, an alternate method of separating the injection liner from the packer, such as cutting the injection liner a few feet above the retrievable packer, would have been required.

The first phase of the well modification began with removing the well from service and killing the well with 12,000 pounds of salt. The wellhead was then disassembled to allow the contractor access to the injection liner. The well contractor then unseated the injection liner from the TIW retrievable packer by lifting the injection liner upward approximately seven feet. After raising the injection liner an additional seven feet, the stainless steel transition piece located at the top of the injection liner was cut and the wellhead was reassembled with a new stainless steel flange to seal the annulus at surface. The wellhead was then reassembled and the well was placed back into service. A flow rate of approximately nine gallons per minute (gpm) of potable water was established down the annulus between the injection liner and the injection tubing prior to placing the well back into service. The purpose of establishing flow down the annulus was to prevent potentially corrosive fluids from moving into the annulus.

The second phase of the well modification began on January 16, 2012 by again removing the well from service and killing the well with salt. A total of 12,000 pounds of salt was used to kill the injection liner and 4,000 pounds of salt was used to kill the annulus between the injection liner and the injection tubing. A caliper log was then performed on the well to confirm the location of the base of the 20-inch diameter injection tubing and the TIW packer receptacle. The depth of the base of the 20-inch diameter injection tubing was confirmed at a depth of 2,811 feet bpl. The packer receptacle was identified over the interval from 2,776 feet to 2,791 feet bpl. A copy of the caliper log is provided in Attachment C.

The well contractor then established a drillable bridge plug over the interval from 2,785 feet to 2,778 feet bpl using a total of three barrels of neat cement pumped in two separate one-and-a-half-barrel cement stages. The top of the cement was tagged at a depth of 2,778 feet bpl before removing the cement tremie line from the well. The stainless steel transition piece that had previously been cut from the injection liner during the first phase of the well modification was then welded back onto the injection liner, and the injection liner was lowered so the base of the injection liner was at a depth of 2,773 feet bpl. The fluid in the annular space between the injection liner and the injection tubing was then displaced with a volume of 12,000 gallons of one-percent corrosion inhibiting Baracor 100 solution.

The well contractor then performed a pre-cementing cement bond log (CBL) on the lowermost 500 feet of the injection liner to establish baseline cement bond data. A copy of the pre-cementing CBL is provided in Attachment C. A cement tremie line was then installed inside the injection liner to a depth of 2,775 feet bpl before pressure grouting a volume of nine barrels of Class H neat cement. A pumping rate of one barrel per minute was used during pressure grouting. The well was then shut in over night to allow the cement to set. A temperature log was performed on the well the following day to assist in determining the top of cement on the outside of the injection liner. The top of cement was estimated to be at a depth of 2,710 feet bpl based on the temperature log results. A copy of the temperature log is provided in Attachment C.

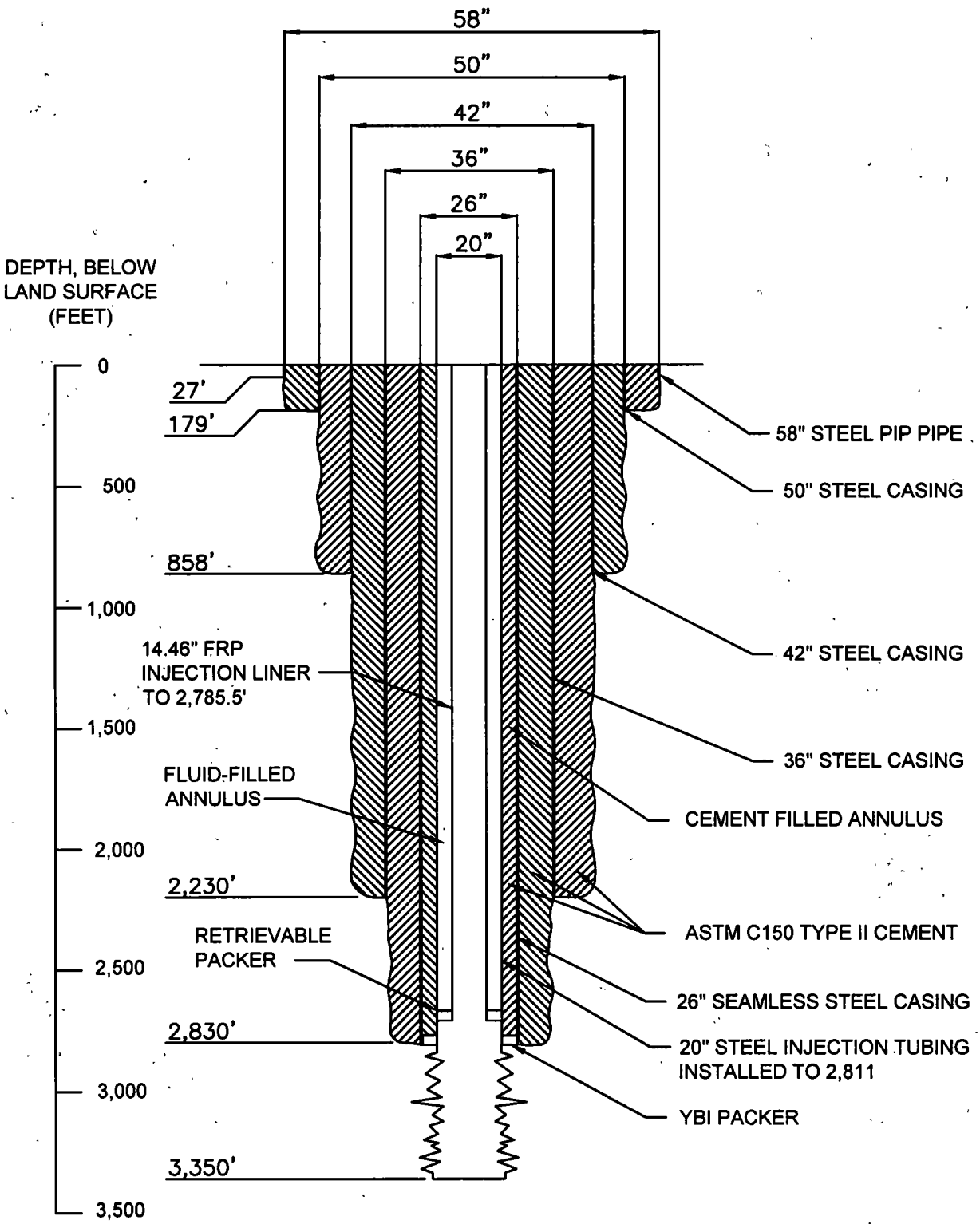
The well contractor then used a mud motor to drill out the cement plug at the base of the injection liner and drill through the drillable bridge plug. The top of the cement plug was encountered at a depth of 2,772.5 feet bpl. After drilling through the drillable bridge plug, a post-cementing CBL was performed to determine the depth of the top of cement on the outside of the injection liner. The post-cementing CBL results indicated that the top of cement behind the injection liner was at a depth of 2,698 feet bpl, indicating the lowermost 77 feet of the injection liner is cemented. This is greater than the "approximately 50 feet" of cemented injection tubing that was presented in the IW-2 modification plan. It is also about 12 feet higher than was estimated from the temperature log. The post-cementing CBL provided a more definitive and more precise depth estimate for the top of cement than did the temperature log results, which had suggested the top of cement was located at a depth of approximately 2,710 feet bpl.

The wellhead was then reassembled and IW-2 was placed back into service. While reassembling the wellhead, the original 20-inch diameter gate valve, and the 4-inch diameter gate valve, air/vacuum relief valve and associated piping were replaced. The following day, the well underwent preliminary annular pressure testing. Repeated attempts to perform annular pressure testing on January 23-25, 2012 resulted in an approximately eight to ten percent pressure loss over an hour period. The pressure decrease was not within the five percent pressure change allowable by Rule 62-528, FAC. A request to allow the cement at

the base of the annular space to cure for a period of approximately 30 days was approved by the FDEP.

On February 23, 2012, a successful annular pressure test was performed on IW-2 with a starting pressure of 125.0 psi and ending pressure of 121.5 psi after a 60 minute monitoring period. The annular pressure test was witnessed by Gardner Strasser/FDEP, David McNabb/MHC, and Shamus English/AECOM. A copy of the pressure gauge calibration certificate and pressure test summary sheet summarizing the annular pressure test results is provided in Attachment D. Figure 2 provides a diagram of the modified IW-2.

The wellhead was then reinstalled and the well was placed back into service. The subsurface 20-inch diameter ductile iron piping associated with IW-2 was then replaced with 20-inch diameter polyvinyl chloride (PVC) pipe. Record Drawings showing the IW-2 and associated piping modifications are provided in Attachment E.

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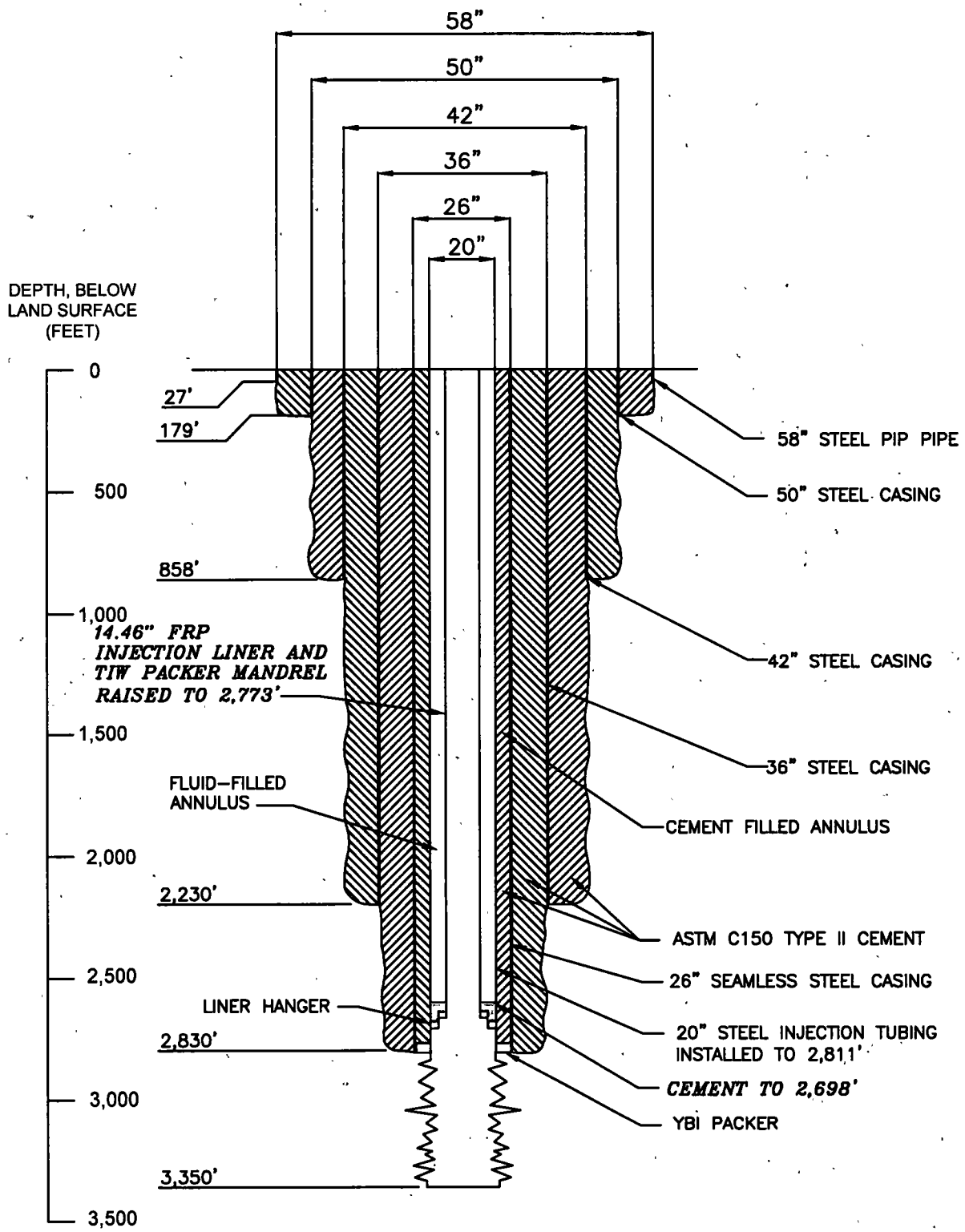
| HOLTZ CONSULTING ENGINEERS, INC.<br>50 SOUTH US HIGHWAY ONE, SUITE 206<br>JUPITER, FLORIDA 33477<br>PH (561) 575-2005 | MARTIN COUNTY UTILITIES<br>NORTH WTP/WWTP IW-2 | INJECTION WELL IW-2<br>ORIGINAL CONFIGURATION | FIGURE 1 |

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| HOLTZ CONSULTING ENGINEERS, INC.<br>50 SOUTH US HIGHWAY ONE, SUITE 208<br>JUPITER, FLORIDA 33477<br>PH (561) 575-2005 | MARTIN COUNTY UTILITIES<br>NORTH WTP/WWTP IW-2 | INJECTION WELL IW-2<br>CONFIGURATION<br>AFTER MODIFICATION | FIGURE 2 |

MHC McNabb Hydrogeologic Consulting, Inc.
601 Heritage Drive, Suite 110
Jupiter, Florida 33458
Phone: 561-891-0763
Fax: 561-623-5468

August 31, 2011

Mr. Joe May, P.G.
Florida Department of Environmental Protection
400 N. Congress Ave, Suite 200
West Palm Beach, FL 33401

**RE: Martin County Utilities North WTP/WWTP Facility IW-2 Modification Plan**

Dear Mr. May:

Preliminary annular pressure testing performed on Martin County Utilities (MCU) North WTP/WWTP Facility deep injection well IW-2 on June 20, 2011 was unsuccessful at demonstrating mechanical integrity of the well. Subsequent pressure testing of the 16-inch diameter Fiberglass Reinforced Pipe (FRP) injection tubing and the 20-inch diameter steel liner demonstrated that both the FRP injection tubing and the steel liner do have mechanical integrity. Pressure changes in the annular space between the FRP injection tubing and the steel liner during pressure testing of steel liner indicate the presence of a leak in the TIW packer attached to the base of the FRP injection liner. The purpose of this letter is to provide a plan for the modification of the well to restore mechanical integrity. Figures 1 and 2 provide a diagram of IW-2 in its current configuration and the configuration of the well following completion of the proposed modifications, respectively. The proposed well modification will not begin until Department approval has been received.

The following steps are proposed for the well modification:

1. Remove IW-2 from service to allow the well modification to take place. Treated wastewater and reverse-osmosis concentrate will be routed to the on-site lined ponds during the well modification.
2. Kill IW-2 with a salt brine solution to suppress the artesian head of the well to a minimum of 30 feet below land surface.
3. Remove the wellhead to allow access to the FRP injection liner.
4. Install a drillable bridge plug inside the liner hanger of the TIW packer. The base of the 7.92-foot long liner hanger is at a depth of 2,785 feet below pad level. The top of the bridge plug shall not extend above a depth of 2,778 feet bpl.
5. Mechanically unseat the TIW retrievable packer mandrel from the liner hanger and lift the FRP injection liner and TIW packer mandrel up approximately 10 feet above its current depth. If the TIW retrievable packer is unable to be mechanically

unseated, trip into the well with a casing cutter and cut the FRP injection liner approximately one foot above the top of the packer.

6. Perform a cement bond log (CBL) on the lower 500 feet of the FRP injection tubing.
7. Pump a volume of 1,875 gallons of 1% Baracor 100 solution mixed with potable water into the annular space between the FRP injection tubing and the 20-inch diameter steel liner from the surface. This volume is equivalent to 110% of the annular volume.
8. Install a cement tremie line on the inside of the FRP injection tubing to a depth of 2,772 feet bpl. Pressure grout a volume of 10.0 barrels of Class H neat cement and chase the cement from the cement tremie line with potable water. This volume of cement should theoretically fill the lower approximately 50 feet of the annular space between the FRP injection tubing and the 20-inch diameter steel liner.
9. Seal in the well for a period of 24-hours before bleeding off any pressure that may remain inside the FRP injection tubing.
10. Drill out the cement plug and bridge plug at the base of the FRP injection tubing and 20-inch diameter steel liner, respectively.
11. Perform a cement bond log (CBL) on the lower 500 feet of the FRP injection tubing.
12. Provide the Department with a minimum of a 72-hour notice that an annular pressure test will be performed on IW-2.
13. Perform an annular pressure test on the annular space between the FRP injection tubing and the 20-inch diameter steel liner at a test pressure between 150 and 160 psi for a period of 60 minutes. A pressure gauge, calibrated within the previous 90 days shall be used to monitor the annular space pressure and pressure readings will be recorded at 5-minute intervals throughout the pressure test. The pressure test will be considered successful if no greater than a 5% change in annular pressure has occurred at the end of the 60-minute monitoring period.
14. Prepare a Technical Memorandum providing an interpretation of the annular pressure test results and the well modification procedure. The Technical Memorandum will be signed and sealed by a Florida registered Professional Engineer.
15. Submit the signed and sealed Technical Memorandum to the Department for review and comment and address any comments or questions regarding the Technical Memorandum.

In addition to the well modification discussed above, MCU plans to replace portions of the IW-2 wellhead and a portion of the buried ductile iron pipe connecting the injection well to the pump station. Specifically, MCU plans to replace the existing 10-inch and 20-inch diameter gate valves and the air-release valve on the injection wellhead. Also, a conductor pipe will be installed to direct water discharged from the air-release valve to the well pad to protect the wellhead from corrosion. In addition, some of the existing buried ductile iron pipe between the injection well and the pump station will also be replaced. A set of drawings showing the proposed wellhead and buried piping changes is attached.

Please review the above proposed well modification plan and provide any comments you may have at your earliest convenience in order to allow MCU to get a well service contractor under contract so that we may complete the well modification in a timely manner.

Should you have any questions regarding the above proposed well modification plan, please contact me at (561) 891-0763.

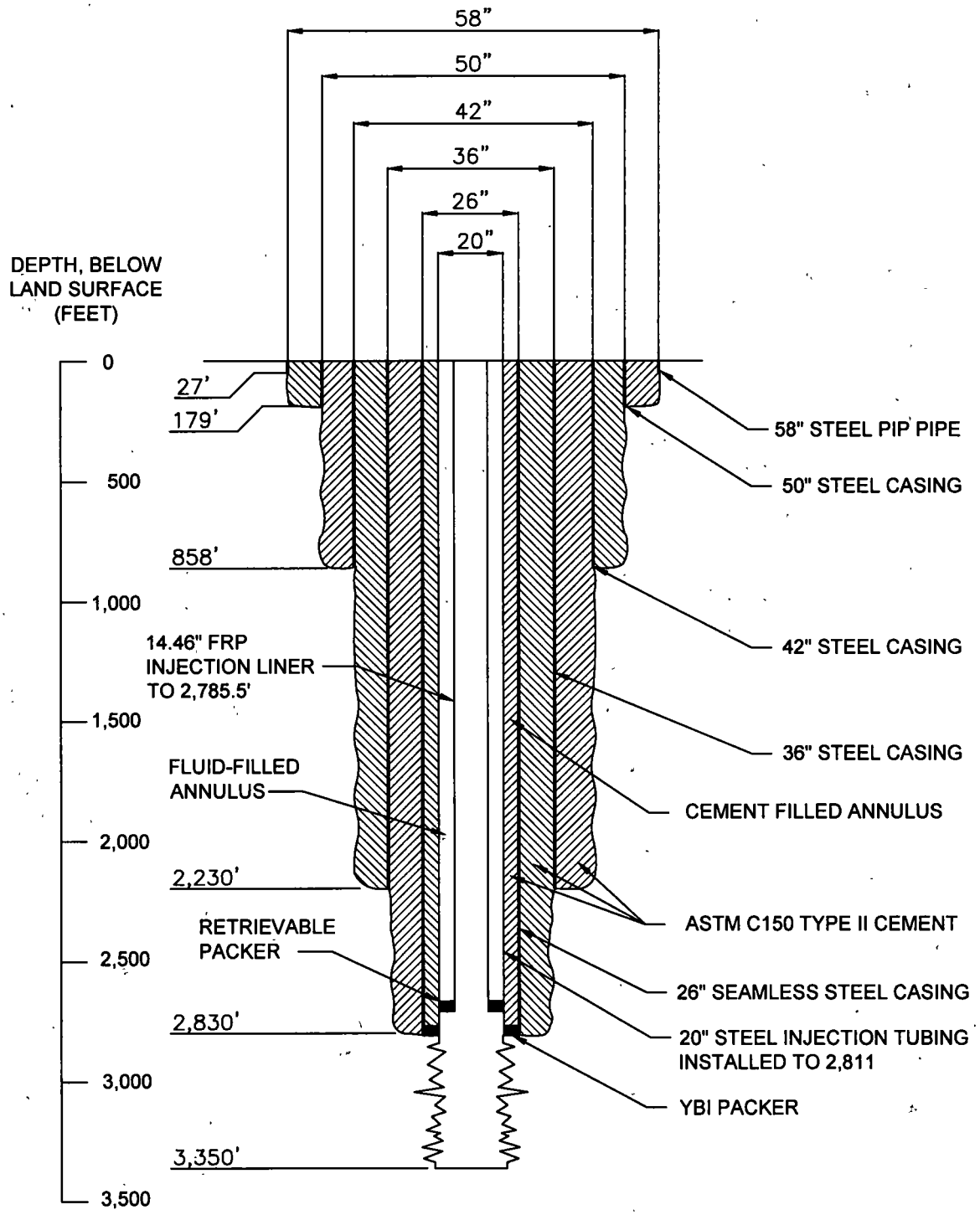
Sincerely,

McNabb Hydrogeologic Consulting, Inc.

8/31/11

David McNabb, P.G.

cc: Len Fishkin/FDEP
Cathleen McCarty/FDEP
Anne Murray/MCU
David Holtz/HCE
John Polley/MCU
Ted Robbins/MCU
David Xavier/HCE

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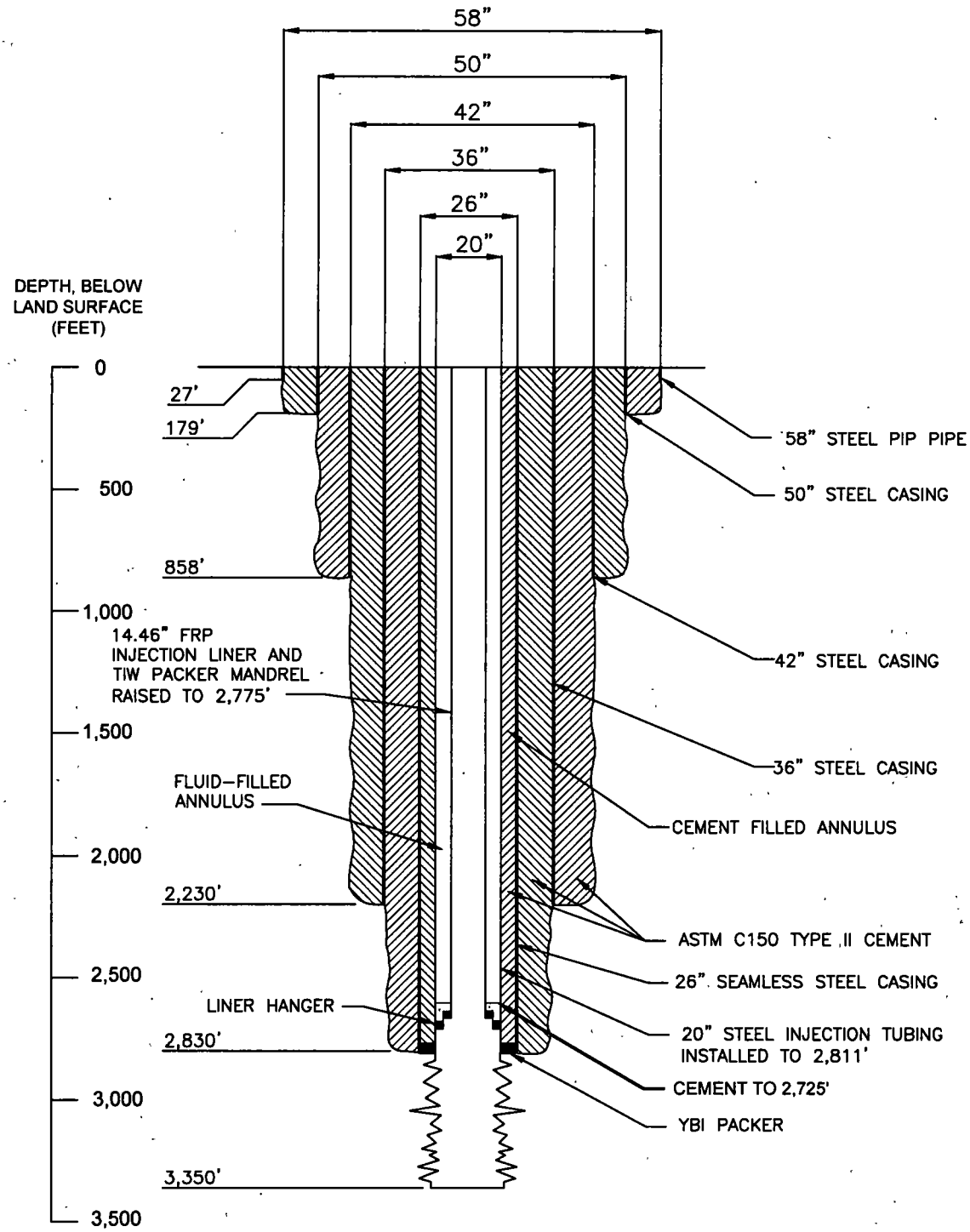
| HOLTZ CONSULTING ENGINEERS, INC.<br>50 SOUTH US HIGHWAY ONE, SUITE 208<br>JUPITER, FLORIDA 33477<br>PH (561) 575-2005 | MARTIN COUNTY UTILITIES<br>NORTH WTP/WWTP IW-2 | INJECTION WELL IW-2<br>CURRENT CONFIGURATION | FIGURE 1 |

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| HOLTZ CONSULTING ENGINEERS, INC.<br>50 SOUTH US HIGHWAY ONE, SUITE 206<br>JUPITER, FLORIDA 33477<br>PH (561) 575-2005 | MARTIN COUNTY UTILITIES<br>NORTH WTP/WWTP IW-2 | INJECTION WELL IW-2<br>CONFIGURATION<br>AFTER PACKER REPAIR | FIGURE 2 |

# WEEKLY CONSTRUCTION SUMMARY

MHC **McNabb Hydrogeologic Consulting, Inc.**
**601 Heritage Drive, Suite 110**
**Jupiter, Florida 33458**
**Phone: 561-891-0763**
**Fax: 561-623-5469**

January 10, 2012

Mr. Len Fishkin, P.G.
Florida Department of Environmental Protection
400 N. Congress Ave, Suite 200
West Palm Beach, FL 33401

**RE: Martin County Utilities North WTP/WWTP IW-2 Modification**
**Weekly Construction Summary #1**

Dear Mr. Fishkin:

This is the first weekly construction summary for the above referenced project. The reporting period for this weekly construction summary began at 7:00 AM, Tuesday, January 3, 2012 and ended at 7:00 AM, Tuesday, January 10, 2012. Consultant daily reports were prepared for this reporting period and are attached for your records.

During this reporting period, the well contractor removed IW-2 from service, killed the well with salt, dismantled the wellhead, unseated the packer assembly from the packer hanger, reassembled the wellhead and placed the well back into service. A flowrate of approximately 10 gallons per minutes (gpm) down the annulus of the well was established prior to placing the well back into service. The well will remain in service until January 16, 2012 when the well will be removed from service to complete the IW-2 modification.

During the next reporting period, which will begin on January 16, 2012, it is anticipated that the well contractor will install a drillable bridge plug below the base of the injection tubing, perform a pre-cementing cement bond log (CBL) on the injection tubing, cement the lowermost approximately 50 feet of the annular space between the injection tubing and the 20-inch diameter liner, perform a post-cementing CBL on the injection tubing, drill out the cement plug at the base of the injection tubing, reassemble the wellhead and perform an annular pressure test on the modified well.

Should you have any questions regarding the above weekly construction summary, please contact David McNabb at (561) 891-0763.

Sincerely,

McNabb Hydrogeologic Consulting, Inc.

1/10/12

David McNabb, P.G.

Attachments: Consultant Daily Reports

Cc: Cathleen McCarty/FDEP-Tallahassee
Gardner Strasser/FDEP-WPB
Ted Robbins/MCU
Jimmy Mercurio/MCU
Joseph May/FDEP-WPB
Darrell Schuler/MCU
Anne Murray/MCU
David Xavier/HCE

MHC McNabb Hydrogeologic Consulting, Inc.
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# Daily Construction Log

**Date:** January 3, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Unseating TIW Packer

## CONSTRUCTION ACTIVITIES

0805 D McNabb on site. The Contractor is setting up to begin killing the well in preparation for removing the well, installing a 20-inch flange on the wellhead and unseating the TIW packer at the base of the injection tubing.

0915 The contractor is preparing to begin killing the well with salt.

1110 The well has been killed with salt. It took a total of six 2,000 pound sacks of salt to kill the well. The contractor is moving the kill equipment out of the way in preparation for dismantling the wellhead.

1205 The wellhead has been disassembled and the welder is getting set up on the well.

1400 The 20-inch flange has been cut off the wellhead.

1510 The contractor is welding a new 20-inch flange to the 20-inch well casing. The contractor will spend the rest of the day welding temporary pipe to the injection tubing. They will then shut the well in. D. McNabb off site.

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Fax: 561-623-5469

# Daily Construction Log

**Date:** January 4, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Unseating TIW Packer

## CONSTRUCTION ACTIVITIES

0745 D McNabb on site. A salt delivery has just arrived on site. The Contractor is beginning to unload the salt and place it on the injection well pad.

0800 The contractor is preparing to extend the rig derrick in preparation for unseating the TIW packer at the base of the injection tubing.

0920 Gardner Strasser (FDEP) arrived on site. The contractor is still setting up the rig (extending derrick, attached guide wires).

1015 The contractor is still attaching guide wires to the rig and anchoring the guide wires.

1245 The guide wires have been installed and the contractor is prepared to kill the annulus with salt after unseating the packer.

1300 The contractor has unseated the injection tubing from the packer. It unseated after the injection tubing had been raised about 7 feet. They are in the process of killing the annulus.

1455 The contractor is welding the 20-inch flange to the stainless steel transition piece that is connected to the injection tubing.

1520 The contractor has cut off 14 feet of the stainless steel transition piece. They will then reassemble the wellhead in preparation for placing the well back into service tomorrow morning. D. McNabb off site.

MHC McNabb Hydrogeologic Consulting, Inc.
601 Heritage Drive, suite 110
Jupiter, Florida 33458 t
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Fax: 561-623-5469

# Daily Construction Log

**Date:** January 5, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Putting Well Back Online

## CONSTRUCTION ACTIVITIES

0750 D McNabb on site. The contractor has reassembled the wellhead. They have also installed a temporary line from the fire hydrant to the annulus and established a flow of potable water down the annulus.

0830 The contractor is washing down the pad and making sure all valves are the proper position to bring the well back on-line.

0910 There is not enough water in the pond to establish flow down the well.

1000 Flow is coming from the water treatment plant at a rate of about 350 gpm. Treated wastewater flow is going to a pond in preparation for pumping the treated wastewater down the well to demonstrate the absence of leaks in the surface piping of IW-2.

1030 Flow is going down the well and no leaks are visible on the surface piping. The flow going down the annulus is 9 gpm. The well is back in service. D. McNabb off site.

# WEEKLY CONSTRUCTION SUMMARY

MHC McNabb Hydrogeologic Consulting, Inc.
601 Heritage Drive, Suite 110
Jupiter, Florida 33458
Phone: 561-891-0763
Fax: 561-623-5469

February 2, 2012

Mr. Len Fishkin, P.G.
Florida Department of Environmental Protection
400 N. Congress Ave, Suite 200
West Palm Beach, FL 33401

**RE: Martin County Utilities North WTP/WWTP IW-2 Modification**
**Weekly Construction Summary #2**

Dear Mr. Fishkin:

This is the second weekly construction summary for the above referenced project. The reporting period for this weekly construction summary began at 7:00 AM, Monday, January 16, 2012 and ended at 10:00 AM, Wednesday, January 25, 2012. Consultant daily reports were prepared for this reporting period and are attached for your records.

During this reporting period, the well contractor removed IW-2 from service, killed the well with salt, dismantled the wellhead, established a drillable bridge plug over the interval from 2,785 to 2,778 feet below pad level (bpl), performed a pre-cementing cement bond log (CBL), cemented the lower 77 feet of the injection tubing annulus, performed post-cement CBL and temperature logs, drilled out the cement plug and drillable bridge plug and attempted to perform an annular pressure test on IW-2. During annular pressure testing attempts, the annulus was losing approximately twice the allowable pressure change. After several annular pressure test attempts, it was decided to allow the newly installed cement to cure for approximately 30 days before performing the annular pressure test. Copies of the geophysical logs are attached for your records.

During the next reporting period, which is tentatively scheduled to begin on February 28, 2012, it is anticipated that the well contractor will perform a successful annular pressure test on IW-2. The Department will receive a minimum of a 72-hour notice prior to the performance of the annular pressure test.

Should you have any questions regarding the above weekly construction summary, please contact David McNabb at (561) 891-0763.

Sincerely,

McNabb Hydrogeologic Consulting, Inc.

2/2/12

David McNabb, P.G.

Attachments: Consultant Daily Reports

Cc: James Alexander/FDEP-Tallahassee
Gardner Strasser/FDEP-WPB
Ted Robbins/MCU
Jimmy Mercurio/MCU
Joseph May/FDEP-WPB
Darrell Schuler/MCU
Anne Murray/MCU
David Xavier/HCE

MHC McNabb Hydrogeologic Consulting, Inc.
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# Daily Construction Log

**Date:** January 16, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Setting Drillable Bridge Plug

## CONSTRUCTION ACTIVITIES

| | |
|---|---|
| 0830 | D McNabb on site. The contractor has set up and is starting to kill the well with salt. |
| 0915 | The injection tubing has been killed with six 2,000 pound sacks of salt. They are now starting to pump salt down the annulus. |
| 0950 | The annulus has been killed with two 2,000 pound sacks of salt. The contractor begins to disassemble the wellhead. |
| 1115 | The wellhead has been disassembled and the geophysical logging truck has arrived on site. They will perform a caliper log to identify the base of casing and the location of the TIW packer receptacle. |
| 1150 | The geophysical logger begins lowering the caliper tool down the well. |
| 1350 | Caliper logging is completed. The contractor will set up and run the drillable bridge plug to a depth of 2,785 feet below pad level (bpl). This will place the drillable bridge plug near the base of the TIW packer receptacle. D. McNabb off site. |
| 1745 | D. McNabb on site. The contractor continues lowering the drillable bridge plug to a depth of 2,785 feet bpl. |
| 1805 | The drillable bridge plug has been installed to a depth of 2,785 feet bpl. A Larkin head is being installed on the well in preparation for pumping 1.5 barrels of neat cementing into the bridge plug. |
| 1810 | Begin pumping potable water pre-flush. |
| 1830 | Contractor held a safety meeting to discuss the cementing procedure and potential hazards. |
| 1835 | Finished pumping a 500 gallon pre-flush. Begin mixing cement. The plan is to mix approximately 1.5 barrels of neat cement. |
| 1915 | Thirteen sacks of cement have been mixed. Begin pumping the neat cement down the cement tubing. |
| 1917 | Completed pumping 1.5 barrels of neat cement. Begin pumping potable water chase. |
| 1930 | Completed pumping 477 gallon potable water chase. Begin cleaning up. |
| 2015 | Clean up is complete. D. McNabb and the contractor off site for the night. The plan is to tag the top of cement in the morning. |

0830 The contractor is washing down the pad and making sure all valves are the proper position to bring the well back on-line.

0910 There is not enough water in the pond to establish flow down the well.

1000 Flow is coming from the water treatment plant at a rate of about 350 gpm. Treated wastewater flow is going to a pond in preparation for pumping the treated wastewater down the well to demonstrate the absence of leaks in the surface piping of IW-2.

1030 Flow is going down the well and no leaks are visible on the surface piping. The flow going down the annulus is 9 gpm. The well is back in service. D. McNabb off site.

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# Daily Construction Log

**Date:** January 17, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Establishing Bridge Plug

## CONSTRUCTION ACTIVITIES

0735 D McNabb on site. The contractor set the drillable bridge plug at a depth of 2,785 feet below pad level (bpl) and pumped 1.5 barrels of neat cement to begin establishing the drillable bridge plug.

0745 The contractor began pumping down the cement tubing that is connected to the drillable bridge plug. Water was produced from the backside of the cement tremie, indicating that the drillable bridge plug is not fully established.

0750 After discussion with the contractor it is decided to disconnect from the drillable bridge plug, tag the top of plug with the cement tremie and then pump additional cement to fully establish the drillable bridge plug.

0810 The contractor has disconnected from the drillable bridge plug with the cement tubing and has tagged the top of cement on the bridge plug at a depth of 2,783.5 feet bpl.

0915 Begin pumping water flush down the cement tubing. The plan is to pump 500 gallons of water for the flush, then mix and pump 1.5 barrels of neat cement followed by a 455 gallon water flush to chase the cement out of the cement tubing. This should result in about 4 feet of additional fill.

1000 Fifteen sacks of neat cement have been mixed and the contractor begins pumping cement down the cement tubing.

1005 One and a half barrels of neat cement have been pumped. Stop pumping cement and begin water chase.

1015 Completed 455 gallon water chase.

1020 The contractor pulled the cement tubing up 60 feet. The plan is to tag the top of cement in about 4 hours. The contractor begins cleaning up the site.

1200 D. McNabb off site.

1255 D. McNabb on site. The contractor is waiting on cement to harden before tagging the top of cement.

1515 The top of cement has been tagged at 2,778 feet bpl. The contractor will now trip out of hole this afternoon.

1520 D. McNabb off site.

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# Daily Construction Log

**Date:** January 18, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Landing Injection Tubing and CBL

## CONSTRUCTION ACTIVITIES

0810 D McNabb on site. The contractor is preparing to re-connect (weld) the portion of the stainless steel transition piece that had been removed when the injection tubing was unseated from the TIW packer. After the welding is completed, the injection tubing will be lowered to place the base of the injection tubing at a depth of 2,773 feet below pad level (bpl). The base of the injection tubing is currently at a depth of 2,768 feet bpl. The contractor pressurized the injection tubing to 35 psi this morning to confirm that the drillable bridge plug was completely established.

1000 The stainless steel transition piece has been welded and the contractor is now cutting off the temporary flange that is in place.

1050 The temporary flange has been removed and the contractor is beginning to weld the stainless steel flange to the transition piece.

1120 The stainless steel flange has been welded to the transition piece and the injection tubing has been lowered so the base of the tubing is at a depth of 2,773 feet bpl. D. McNabb off site.

1215 D. McNabb on site. The contractor has cut the transition piece to about 1.5 inches above the stainless steel flange. They are in the process of mixing 60 gallons of Baracor 100 with 6,000 gallons of water in preparation for pumping it down the annular space behind the injection tubing.

1250 Begin pumping 1% Baracor 100 solution down the annulus.

1330 The first tank (first of two) tanker of 1% Baracor 100 solution has been pumped down the well. The contractor begins filling the second tanker with water and adds 60 gallons of Baracor 100 to the tanker.

1425 The second tanker has been filled with 6,000 gallons of 1% Baracor 100 solution. They will let it mix in the tanker for an additional 10 minutes (using pump to mix the solution).

1435 Begin pumping second tanker of 1% Baracor 100 solution down the annulus.

1515 The second tanker of 1% Baracor 100 solution has been pumped down the well. A total volume of 12,120 gallons of solution were pumped into the annulus. The contractor is setting up to conduct a cement bond log (CBL) on the lower 500 feet of the injection tubing.

1640 The geophysical logger has arrived on site to perform a CBL on the lowermost 500 feet of the injection tubing.

1810 The CBL has been performed on the lower 500 feet of the injection tubing and the tool has been removed from the well.

1815 D. McNabb off site. The contractor will cleanup and leave the site until tomorrow morning. They will trip into the well with cement tubing in preparation for cementing the lowermost 50-70 feet of annulus between the injection tubing and the 20-inch diameter steel liner tomorrow morning.

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# Daily Construction Log

**Date:** January 19, 2012
**Contractor:** Youngquist Brothers, Inc.
**Activity:** Cementing

**Project:** MCU North WWTP IW-2
**Recorder By:** David McNabb

## CONSTRUCTION ACTIVITIES

0810 D McNabb on site. The contractor is preparing to begin tripping into the well with cement tubing in preparation for cementing the lowermost 50-70 feet of annulus between the injection tubing and the 20-inch diameter steel liner.
0835 The contractor begins tripping cement tubing into the well.
1135 The cement tubing has been installed to a depth of 2,775 feet below pad level (bpl). The plan will be to pump 9 barrels of Class H cement. This should theoretically bring the cement up about 70 feet behind the injection tubing. There will be a pre-flush of 20 barrels of 1% Baracor solution and an 11 barrel water chase after pumping cement. The contractor is rigging up for cementing.
1300 The contractor is rigged up for cementing.
1313 Start pumping pre-flush of 1% Baracor solution.
1327 Completed 20 barrel pre-flush, start mixing cement.
1337 Start pumping Class H neat cement. Density is 16.4 lb/gallon.
1338 Pumping rate is 1 barrel per minute.
1348 Completed pumping 9 barrels of neat. Switch to chase.
1353 Completed 11 barrel chase.
1355 The contractor has pulled the cement tubing up 60 feet and shut in the well.
1405 D. McNabb off site. The contractor will leave the well undisturbed until tomorrow morning.

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# Daily Construction Log

**Date:** January 20, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Temperature Logging

## CONSTRUCTION ACTIVITIES

| | |
|---|---|
| 1030 | D McNabb on site. The contractor is tripping the cement tubing from yesterday's cement pump out of hole. They have about 900 feet more to go until it is all out of the well. The geophysical logger is scheduled for 1300 today. |
| 1130 | The cement tubing has been removed from the well. Waiting on the geophysical logger to arrive to perform a temperature log on the well. |
| 1215 | The geophysical logger has arrived on site. He will perform a temperature log to determine the top of cement on the backside of the injection tubing. |
| 1220 | Rigging up the geophysical logger. |
| 1235 | Begin lowering the temperature tool into the well. |
| 1325 | Completed temperature logging and the tool has been removed from the well. The top of cement is estimated at 2,710 feet below pad level (bpl) based on interpretation of the temperature log. |
| 1330 | D. McNabb off site. The contractor will set up to begin running the mud motor into the well to drill out the cement plug and bridge plug. |

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# Daily Construction Log

**Date:** January 21, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Drilling Out Cement

## CONSTRUCTION ACTIVITIES

1150 D McNabb on site. The contractor is tripping into the well with the mud motor. There are four more joints to install before they can start drilling out the cement plug.

1310 The mud motor has been run into the well and tagged the top of the cement plug at a depth of 2,772.5 feet below pad level (bpl). The contractor is setting up surface equipment to begin drilling with the mud motor.

1340 Begin drilling through the cement plug using the mud motor.

1430 Currently drilling at a depth of 2,774 feet bpl.

1520 Currently drilling at a depth of 2,775 feet bpl. The contractor will continue drilling until dark or until they reach a depth of 2,783 feet bpl. They will then shut down for the night before drilling through the bridge plug.

1530 D. McNabb off site.

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# Daily Construction Log

**Date:** January 22, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Cement Bond Logging

## CONSTRUCTION ACTIVITIES

| | |
|---|---|
| 0750 | Call from the contractor. They drilled through the drillable bridge plug and are beginning to trip out of hole with the mud motor. Cement bond logging is scheduled for 1600 today. |
| 1530 | D. McNabb on site. The contractor is waiting on the geophysical logger to arrive on site. |
| 1600 | The geophysical logger has arrived and the contractor is setting up to begin cement bond logging. |
| 1610 | Begin lowering the cement bond log (CBL) tool down the well. |
| 1740 | Begin cement bond logging. |
| 1815 | Cement bond logging is completed. The top of cement was detected at a depth of 2,698 feet bpl. |
| 1820 | D. McNabb off site. The contractor will shut in the well and leave the site for the evening. |

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# Daily Construction Log

**Date:** January 23, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Annular Pressure Testing

## CONSTRUCTION ACTIVITIES

1045 D. McNabb on site. The contractor is beginning to conduct a preliminary annular pressure test on IW-2. They are also rigging down the drill rig and equipment.

1220 Pressure is dropping at a rate of about 8 psi in 30 minutes. The contractor will release annular pressure and loosen bolts on the wellhead to allow any trapped air at the top of the annulus to bleed past the gasket. It is suspected that air trapped at the top of the annulus is interfering with the pressure test.

1305 The bolts around the wellhead flange have been tightened and the annulus is being pressurized.

1330 Annular pressure continues to decrease at a rate of approximately 16 psi an hour. It appears it will take several hours to allow the well to sit with the annulus pressurized before another attempt at performing the pressure test will be made.

1345 D. McNabb off site. The contractor will clean up the site and periodically add pressure to the annulus. The pressure test will be attempted again tomorrow morning.

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# Daily Construction Log

**Date:** January 24, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Annular Pressure Testing

## CONSTRUCTION ACTIVITIES

0730 D. McNabb on site. The contractor is beginning to pressurize the annulus. The annulus was pressurized to 160 psi last night before the contractor left the site. It was 61 psi at 0700 this morning.

0737 Begin preliminary annular pressure test.

0930 Pressure is decreasing in the annulus at about 12 psi an hour. Decide to flush the water currently in the injection tubing out by pumping some reverse osmosis concentrate down the well. The pressure decrease may be related to decreasing temperature of the water in the injection tubing (related to being heated up from cementing).

1000 Annular pressure appears to be stabilizing.

1025 It appears the annulus is holding pressure within the 5% allowable change. Changed pressure gauges to one with a recent calibration and increased pressure to 161 psi.

1300 The annular pressure is dropping at a rate of about 12 psi an hour. The contractor will keep the annulus pressurized throughout the day. The well will be operated throughout the day and night to reduce temperature affects that may be impacting the pressure test.

1330 D. McNabb off site.

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# Daily Construction Log

**Date:** January 25, 2012
**Project:** MCU North WWTP IW-2
**Contractor:** Youngquist Brothers, Inc.
**Recorder By:** David McNabb
**Activity:** Annular Pressure Test

## CONSTRUCTION ACTIVITIES

0710 D. McNabb on site. The annulus was pressurized to 160 psi last night before the contractor left the site. It was 79 psi at 0700 this morning.

0750 Pressure is dropping at a rate of about 12 psi an hour. The contractor has used a hose to eliminate any air at the top of the annular space.

0820 Pressure continues to drop. Flow down the well will be stopped to see if that affects annular pressure.

0930 The annulus pressure continues to drop at about 12-14 psi an hour. The decision is made to let the cement cure for about 30 days before attempting the annular pressure test.

1000 The well annular system has been hooked up and the well is in service. D. McNabb off site.

The logs that came with this document are to be filed in OCULUS as follows:

Catalog **Underground Injection Control**
Profile **Permitting_Authorization**
County **MARTIN**
District **SED**
Facility-Site ID **68865 - MARTIN COUNTY UTILITY NORTH/DIW**
Document Date **05-08-2012**
Received Date **05-10-2012**
Document Type **ENGINEERING REPORTS**
Contractor ID
PSD Number
Permit Type **CONSTRUCTION**
Facility Type **CLASS I**
Application Number
Permit Number

Document Subject ***Log Type*** **IW-2** ***Log Date*** **Eng Rpt IW-2 Mod**

**Martin County Utilities**

**North Water and Wastewater Treatment Plant**

**Deep Injection Well IW-2**

**Annular Pressure Test**

**Client:** Martin County Utilities

**Well Name:** IW-2

**Date:** 23-Feb-12

**Observer:** Gardner Strasser (FDEP)
David McNabb (MHC)
Shamus English (AECOM)

**Base of Annulus:** 2,698 feet bpl

| Time | Lapse Time (minutes) | Casing Pressure (psi) | Change in Pressure (psi) | Change in Pressure (percent) | Comments |
|---|---|---|---|---|---|
| 0945 | 0 | 125.00 | 0.00 | 0.00% | Start Test |
| 0950 | 5 | 124.50 | 0.50 | 0.40% | |
| 0955 | 10 | 124.00 | 1.00 | 0.81% | |
| 1000 | 15 | 123.75 | 1.25 | 1.01% | |
| 1005 | 20 | 123.50 | 1.50 | 1.21% | |
| 1010 | 25 | 123.00 | 2.00 | 1.63% | |
| 1015 | 30 | 123.00 | 2.00 | 1.63% | |
| 1020 | 35 | 122.50 | 2.50 | 2.04% | |
| 1025 | 40 | 122.25 | 2.75 | 2.25% | |
| 1030 | 45 | 122.00 | 3.00 | 2.46% | |
| 1035 | 50 | 121.75 | 3.25 | 2.67% | |
| 1040 | 55 | 121.50 | 3.50 | 2.88% | |
| 1045 | 60 | 121.50 | 3.50 | 2.88% | End Test |
| | | | | | |
| | | | | | |

Note: 17 gallons of water were released during pressure bleed-off.
feet bpl = feet below pad level

# Certificate of Calibration

ØZONE INDUSTRIES CORPORATION
15465 PINE RIDGE ROAD
FORT MYERS, FL 33908

Ozone Industries, Inc.
*Precision Measurement Equipment Division*

*Purchase Order #*

**Calibration Performed By:**
OZONE INDUSTRIES, INC.
15551 PINE RIDGE RD.
FORT MYERS, FL 33908

**For:**
YOUNGQUIST BROTHERS, INC.
15465 PINE RIDGE RD.
FORT MYERS, FL 33908

**EQUIPMENT INFORMATION:**

Description: PRESSURE GAUGE
Manufacter: MCDANIELS
Model Number: 200PSI
Part Number: N/A
Range: 0-200 PSI

Serial Number: 100506-1
Customer I.D.:
Cust. Barcode: N/A
Cust. Location: N/A
Specifications: +/- 0.25% FS

Cal Date: 2/10/2012
Cal. Due Date: 3/10/2012
Cal. Interval 1 MONTHS
Received: IN TOLERANCE
Calibration Result: PASS
Environmental Conditions: 73 DEG F / 40% H
Performed By: R.B.

Procedure: STANDARD

This is to certify that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure at the points tested (unless otherwise noted). It has been Calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self calibration techniques This calibration is in accordance with Ozone Industries, Inc Quality Assurance Manual. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired.

**Calibration Remarks:**
THIS UNIT WAS FOUND TO BE IN TOLERANCE AT THE TIME OF CALIBRATION.
PERFORMED ROUTINE CALIBRATION / CERTIFICATION.

**Standards Used to Calibrate Equipment:**

| Company | I.D. | Description | Last Cal. | Cal. Due Date |
|---|---|---|---|---|
| OZONE | A1731 | EATON UPC5000 PNEUMATIC CALIBRATOR | ########## | 1/18/2013 |

**Signatures:**

**Certified by:**
Print: Ryan Blank
Date: 02/10/12

**Approved by:**
Print: Ryan Blank
Date: 02/10/12

ØZONE
INDUSTRIES
CORPORATION
15465 PINE RIDGE ROAD
FORT MYERS, FL 33908

PH: 239-433-3400
FAX: 239-489-3877

CONTROL NO: 111108-2

CUSTOMER: YBI15465

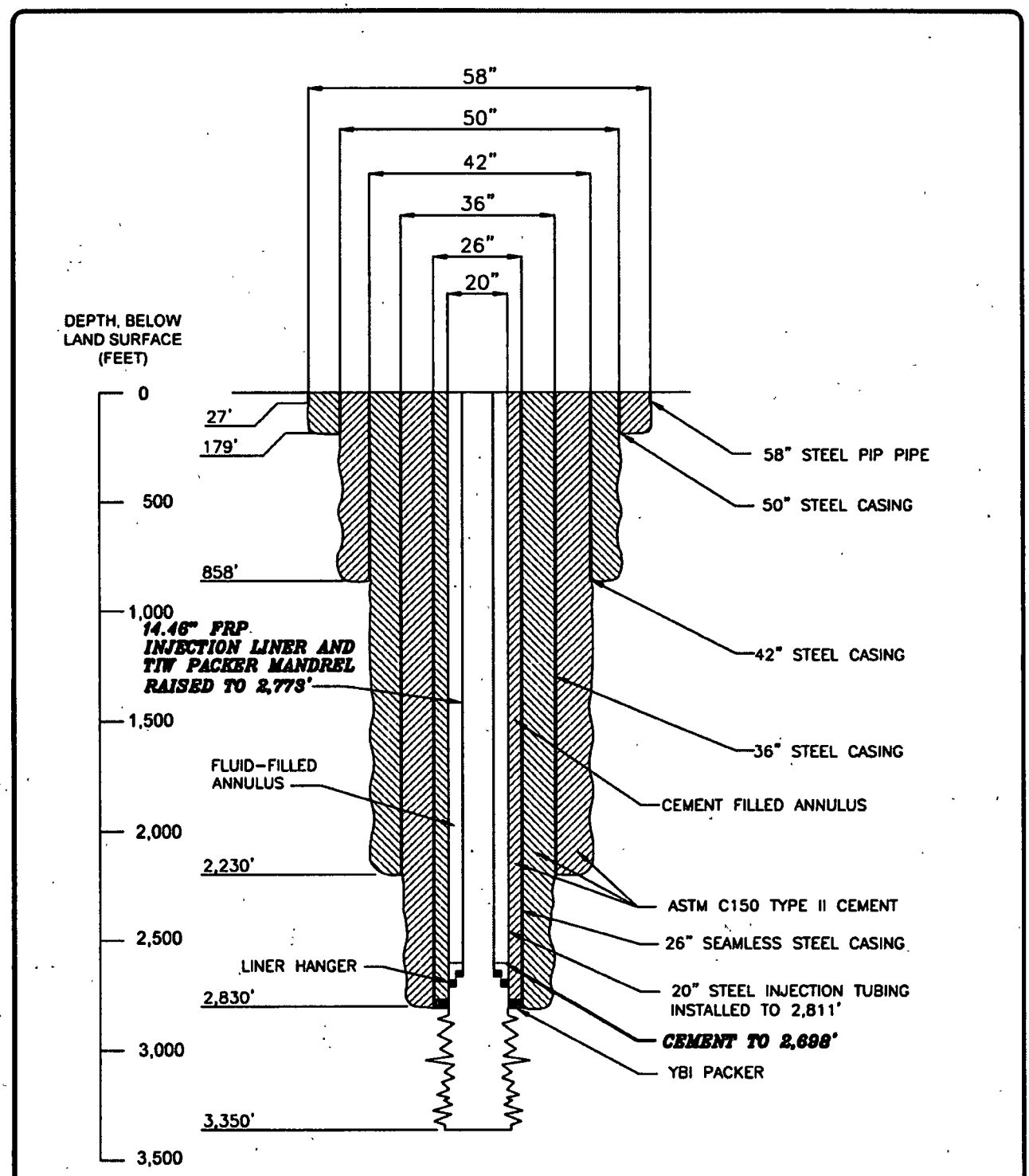
# CALIBRATION DATA FORM

| | | | |
|---|---|---|---|
| **MFR:** | MCDANIELS | **DESCRIPTION** | PRESSURE GAUGE |
| **MODEL NO:** | 200 PSI .25% | **TECHNICIAN:** | 0030 |
| **SERIAL NO:** | 100506-1 | **CAL. DATE:** | 02/10/12 |
| **CUST. ID:** | | **DUE DATE:** | 03/10/12 |

* IF NO "AS LEFT" READING IS SHOWN ON THIS CHART, IT MEANS THE UNIT WAS IN TOLERANCE AND THERE WERE NO ADJUSTMENTS MADE TO IT.

**RANGE:** 0-200 PS1

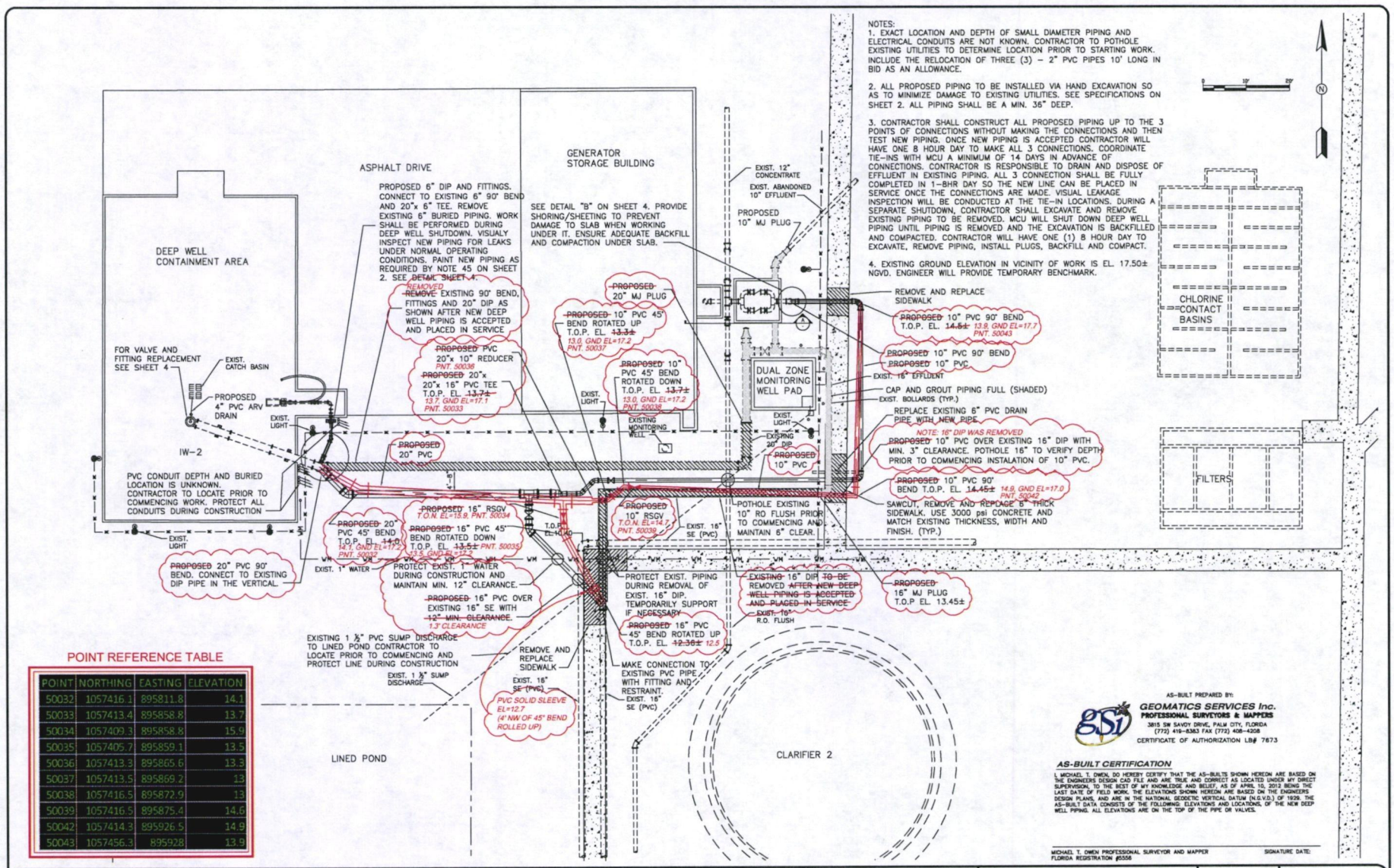
| NOMINAL | AS FOUND | AS LEFT * | LOW LIMIT | HIGH LIMIT |
|---|---|---|---|---|
| | | | | |
| 40 | 39.6 | | 39.5 | 40.5 |
| | | | | |
| 80 | 79.6 | | 79.5 | 80.5 |
| | | | | |
| 120 | 119.8 | | 119.5 | 120.5 |
| | | | | |
| 160 | 159.7 | | 159.5 | 160.5 |
| | | | | |
| 200 | 199.8 | | 199.5 | 200.5 |
| | | | | |




David Holtz PE #42595
4-20-12

RECORD DRAWING

| | | | |
|---|---|---|---|
| HOLTZ CONSULTING ENGINEERS, INC.<br>50 SOUTH US HIGHWAY ONE, SUITE 206<br>JUPITER, FLORIDA 33477<br>PH (561) 575-2005 | MARTIN COUNTY UTILITIES<br>NORTH WTP/WWTP IW-2 | INJECTION WELL IW-2<br>CONFIGURATION<br>AFTER MODIFICATION | FIGURE 2 |


NOTES:
1. EXACT LOCATION AND DEPTH OF SMALL DIAMETER PIPING AND ELECTRICAL CONDUITS ARE NOT KNOWN. CONTRACTOR TO POTHOLE EXISTING UTILITIES TO DETERMINE LOCATION PRIOR TO STARTING WORK. INCLUDE THE RELOCATION OF THREE (3) – 2" PVC PIPES 10' LONG IN BID AS AN ALLOWANCE.
2. ALL PROPOSED PIPING TO BE INSTALLED VIA HAND EXCAVATION SO AS TO MINIMIZE DAMAGE TO EXISTING UTILITIES. SEE SPECIFICATIONS ON SHEET 2. ALL PIPING SHALL BE A MIN. 36" DEEP.
3. CONTRACTOR SHALL CONSTRUCT ALL PROPOSED PIPING UP TO THE 3 POINTS OF CONNECTIONS WITHOUT MAKING THE CONNECTIONS AND THEN TEST NEW PIPING. ONCE NEW PIPING IS ACCEPTED CONTRACTOR WILL HAVE ONE 8 HOUR DAY TO MAKE ALL 3 CONNECTIONS. COORDINATE TIE–INS WITH MCU A MINIMUM OF 14 DAYS IN ADVANCE OF CONNECTIONS. CONTRACTOR IS RESPONSIBLE TO DRAIN AND DISPOSE OF EFFLUENT IN EXISTING PIPING. ALL 3 CONNECTION SHALL BE FULLY COMPLETED IN 1–8HR DAY SO THE NEW LINE CAN BE PLACED IN SERVICE ONCE THE CONNECTIONS ARE MADE. VISUAL LEAKAGE INSPECTION WILL BE CONDUCTED AT THE TIE–IN LOCATIONS. DURING A SEPARATE SHUTDOWN, CONTRACTOR SHALL EXCAVATE AND REMOVE EXISTING PIPING TO BE REMOVED. MCU WILL SHUT DOWN DEEP WELL PIPING UNTIL PIPING IS REMOVED AND THE EXCAVATION IS BACKFILLED AND COMPACTED. CONTRACTOR WILL HAVE ONE (1) 8 HOUR DAY TO EXCAVATE, REMOVE PIPING, INSTALL PLUGS, BACKFILL AND COMPACT.
4. EXISTING GROUND ELEVATION IN VICINITY OF WORK IS EL. 17.50± NGVD. ENGINEER WILL PROVIDE TEMPORARY BENCHMARK.
ASPHALT DRIVE
GENERATOR STORAGE BUILDING
DEEP WELL CONTAINMENT AREA
PROPOSED 6" DIP AND FITTINGS. CONNECT TO EXISTING 6" 90° BEND AND 20"x 6" TEE. REMOVE EXISTING 6" BURIED PIPING. WORK SHALL BE PERFORMED DURING DEEP WELL SHUTDOWN. VISUALLY INSPECT NEW PIPING FOR LEAKS UNDER NORMAL OPERATING CONDITIONS. PAINT NEW PIPING AS REQUIRED BY NOTE 45 ON SHEET 2. SEE DETAIL SHEET 4.
SEE DETAIL "B" ON SHEET 4. PROVIDE SHORING/SHEETING TO PREVENT DAMAGE TO SLAB WHEN WORKING UNDER IT. ENSURE ADEQUATE BACKFILL AND COMPACTION UNDER SLAB.
REMOVED
REMOVE EXISTING 90° BEND, FITTINGS AND 20" DIP AS SHOWN AFTER NEW DEEP WELL PIPING IS ACCEPTED AND PLACED IN SERVICE
PROPOSED PVC 20"x 10" REDUCER PNT. 50036
PROPOSED 20"x 20"x 16" PVC TEE T.O.P. EL. 13.7± 13.7, GND EL=17.1 PNT. 50033
PROPOSED 20" MJ PLUG
PROPOSED 10" PVC 45° BEND ROTATED UP T.O.P. EL. 13.3± 13.0, GND EL=17.2 PNT. 50037
PROPOSED 10" PVC 45° BEND ROTATED DOWN T.O.P. EL. 13.7± 13.0, GND EL=17.2 PNT. 50038
EXIST. 12" CONCENTRATE
EXIST. ABANDONED 10" EFFLUENT
PROPOSED 10" MJ PLUG
REMOVE AND REPLACE SIDEWALK
PROPOSED 10" PVC 90° BEND T.O.P. EL. 14.5± 13.9, GND EL=17.7 PNT. 50043
PROPOSED 10" PVC 90° BEND
PROPOSED 10" PVC
EXIST. 16" EFFLUENT
CAP AND GROUT PIPING FULL (SHADED)
EXIST. BOLLARDS (TYP.)
REPLACE EXISTING 6" PVC DRAIN PIPE WITH NEW PIPE
NOTE: 16" DIP WAS REMOVED
PROPOSED 10" PVC OVER EXISTING 16" DIP WITH MIN. 3" CLEARANCE. POTHOLE 16" TO VERIFY DEPTH PRIOR TO COMMENCING INSTALATION OF 10" PVC.
PROPOSED 10" PVC 90° BEND T.O.P. EL. 14.45± 14.9, GND EL=17.0 PNT. 50042
SAWCUT, REMOVE AND REPLACE 6" THICK SIDEWALK. USE 3000 psi CONCRETE AND MATCH EXISTING THICKNESS, WIDTH AND FINISH. (TYP.)
CHLORINE CONTACT BASINS
FILTERS
DUAL ZONE MONITORING WELL PAD
EXISTING MONITORING WELL
EXISTING 20" DIP
PROPOSED 10" PVC
EXIST. LIGHT
FOR VALVE AND FITTING REPLACEMENT SEE SHEET 4
EXIST. CATCH BASIN
PROPOSED 4" PVC ARV DRAIN
IW–2
PVC CONDUIT DEPTH AND BURIED LOCATION IS UNKNOWN. CONTRACTOR TO LOCATE PRIOR TO COMMENCING WORK. PROTECT ALL CONDUITS DURING CONSTRUCTION
PROPOSED 20" PVC
PROPOSED 20" PVC 45° BEND T.O.P. EL. 14.0 14.1, GND EL=17.2 PNT. 50032
PROPOSED 20" PVC 90° BEND. CONNECT TO EXISTING DIP PIPE IN THE VERTICAL.
PROPOSED 16" RSGV T.O.N. EL=15.9, PNT. 50034
PROPOSED 16" PVC 45° BEND ROTATED DOWN T.O.P. EL. 13.5± PNT. 50035 13.5, GND EL=17.2
PROTECT EXIST. 1" WATER DURING CONSTRUCTION AND MAINTAIN MIN. 12" CLEARANCE.
EXIST. 1" WATER
PROPOSED 16" PVC OVER EXISTING 16" SE WITH 12" MIN. CLEARANCE. 1.3' CLEARANCE
EXISTING 1 ½" PVC SUMP DISCHARGE TO LINED POND CONTRACTOR TO LOCATE PRIOR TO COMMENCING AND PROTECT LINE DURING CONSTRUCTION
EXIST. 1 ½" SUMP DISCHARGE
REMOVE AND REPLACE SIDEWALK
EXIST. 16" SE (PVC)
PVC SOLID SLEEVE EL=12.7 (4' NW OF 45° BEND ROLLED UP)
LINED POND
T.O.P. EL=14.40
PROPOSED 10" RSGV T.O.N. EL=14.7, PNT. 50039
EXIST. 16" SE (PVC)
POTHOLE EXISTING 10" RO FLUSH PRIOR TO COMMENCING AND MAINTAIN 6" CLEAR.
PROTECT EXIST. PIPING DURING REMOVAL OF EXIST. 16" DIP. TEMPORARILY SUPPORT IF NECESSARY
PROPOSED 16" PVC 45° BEND ROTATED UP T.O.P. EL. 12.36± 12.5
MAKE CONNECTION TO EXISTING PVC PIPE WITH FITTING AND RESTRAINT.
EXIST. 16" SE (PVC)
EXISTING 16" DIP TO BE REMOVED AFTER NEW DEEP WELL PIPING IS ACCEPTED AND PLACED IN SERVICE
EXIST. 16" R.O. FLUSH
PROPOSED 16" MJ PLUG T.O.P EL. 13.45±
CLARIFIER 2
POINT REFERENCE TABLE
POINT | NORTHING | EASTING | ELEVATION
50032 | 1057416.1 | 895811.8 | 14.1
50033 | 1057413.4 | 895858.8 | 13.7
50034 | 1057409.3 | 895858.8 | 15.9
50035 | 1057405.7 | 895859.1 | 13.5
50036 | 1057413.3 | 895865.6 | 13.3
50037 | 1057413.5 | 895869.2 | 13
50038 | 1057416.5 | 895872.9 | 13
50039 | 1057416.5 | 895875.4 | 14.6
50042 | 1057414.3 | 895926.5 | 14.9
50043 | 1057456.3 | 895928 | 13.9
AS–BUILT PREPARED BY:
GEOMATICS SERVICES Inc.
PROFESSIONAL SURVEYORS & MAPPERS
3815 SW SAVOY DRIVE, PALM CITY, FLORIDA
(772) 419–8383 FAX (772) 408–4208
CERTIFICATE OF AUTHORIZATION LB# 7873
AS–BUILT CERTIFICATION
I, MICHAEL T. OWEN, DO HEREBY CERTIFY THAT THE AS–BUILTS SHOWN HEREON ARE BASED ON THE ENGINEERS DESIGN CAD FILE AND ARE TRUE AND CORRECT AS LOCATED UNDER MY DIRECT SUPERVISION, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AS OF APRIL 10, 2012 BEING THE LAST DATE OF FIELD WORK. THE ELEVATIONS SHOWN HEREON ARE BASED ON THE ENGINEERS DESIGN PLANS, AND ARE IN THE NATIONAL GEODETIC VERTICAL DATUM (N.G.V.D.) OF 1929. THE AS–BUILT DATA CONSISTS OF THE FOLLOWING: ELEVATIONS AND LOCATIONS, OF THE NEW DEEP WELL PIPING. ALL ELEVATIONS ARE ON THE TOP OF THE PIPE OR VALVES.
MICHAEL T. OWEN PROFESSIONAL SURVEYOR AND MAPPER
FLORIDA REGISTRATION #5558
SIGNATURE DATE:
DATE | BY | REVISIONS
Date: 6/17/2011
Scale: N/A
Design By: DV
Drawn By: FBC
Check By: XX
MCU NORTH W/WWTP
RO CONCENTRATE AND WW EFFLUENT
PIPING MODIFICATIONS
PROPOSED YARD PIPING MODIFICATIONS
HOLTZ CONSULTING ENGINEERS, INC.
50 SOUTH US HIGHWAY ONE, SUITE 206
JUPITER, FLORIDA 33477
PH. (561) 575-2005
Cert. No. 26960
DAVID XAVIER, P.E.
License No: 55308
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