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# MECHANICAL INTEGRITY TEST

# DEEP

# INJECTION

# WELL

PREPARED FOR

NORTH FORT MYERS UTILITY, INC.
NORTH FORT MYERS, FLORIDA

RUST Rust Environment & Infrastructure Inc.

# MECHANICAL INTEGRITY TEST ENGINEERING REPORT FOR THE DEEP INJECTION WELL AT THE NORTH FORT MYERS UTILITY TREATMENT PLANT

Prepared for:

**NORTH FORT MYERS UTILITY, INC**
NORTH FORT MYERS, FLORIDA

For Submittal To:

**TECHNICAL ADVISORY COMMITTEE**
**UNDERGROUND INJECTION CONTROL**
**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**

December 1997

Prepared By:
**RUST ENVIRONMENT & INFRASTRUCTURE, INC.**
2600 Douglas Road, suite 305
Coral Gables, Florida 33134

**200898-10090**

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Phone 305.447.4494
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December 31, 1997

Mr. Jack Myers, P.G.
Chairman, TAC-UIC
Florida Department of Environmental Protection
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901

**Reference:** **North Fort Myers Utility, Inc. -- Mechanical Integrity Testing (MIT) Report on the Deep Injection Well at the Wastewater Treatment Plant Site.**
REI Job ID 200898

Dear Mr. Myers:

Enclosed please find the Engineering Report on the re-testing of the Deep Injection Well at the North Fort Myers Utility, Inc. (NFMU) wastewater treatment plant site in North Fort Myers. Rust Environment & Infrastructure, Inc. (REI) has prepared this report on behalf of NFMU.

All the tests were conducted in strict adherence to the Test Plan submitted to your office and modified to include your staff's recommendations. The testing results for the well were very good. Both external and internal mechanical integrity were demonstrated. The well casing and the well head components are in good condition. The valving has been serviced and the well head has been rust-proofed and repainted. Based on the results of the well testing we concluded that the well has retained full mechanical integrity and recommend that the well be allowed to continue in its normal operation as backup to the irrigation re-use system.

If you have any questions or require additional explanation of any item in the report, please do not hesitate to contact me at (305) 447-4494.

Sincerely,
Rust Environment & Infrastructure, Inc.

William A. J. Pitt, P.E., P.H.
Senior Consultant

c: Joseph Haberfeld, FDEP - Tallahassee
Steve Anderson, SFWMD - West Palm Beach
Dan Duerr, USGS - Tampa
Nancy Marsh, USEPA - Atlanta
Jack Schenkman, NFMU - Miami
Tony Reeves, NFMU - Ft Myers
Gary Long, NFMU - Ft. Myers
Bill Sundstrom, RS&B - Tallahassee

**CERTIFICATE OF MECHANICAL INTEGRITY**
**DEEP INJECTION WELL SYSTEM**

The **North Fort Myers Utility** deep injection well system operated by **North Fort Myers Utility, Inc.** has been tested under Rust Environment & Infrastructure, Inc.'s direct supervision for mechanical integrity. The tests followed standard engineering practices generally accepted for the purposes of these tests. The external and internal mechanical integrity tests followed a Florida Department of Environmental Protection (FDEP) pre-approved Test Plan and all the critical test elements were witnessed by representatives of the FDEP.

Having examined the results of the above-mentioned tests and having prepared the engineering report which is part of this certification, Rust Environment & Infrastructure, Inc. (REI), as engineer of record for this project, certifies that the deep injection well system operated by **North Fort Myers Utility, Inc.,** at the **North Fort Myers Treatment Plant Site in Lee County, Florida,** has successfully passed all the testing requirements for mechanical integrity under rules of Chapter 62-528 of the Florida Administrative Code and is therefore considered to have mechanical integrity.

RUST ENVIRONMENT & INFRASTRUCTURE, INC.

William A.J. Pitt, Jr., P.E.,P.H.
Senior Consultant
FL Professional Engineer #12517
December 29, 1997

# ABSTRACT

A Mechanical Integrity Test (MIT) was conducted for the North Fort Myers Utility, Inc. deep injection well. The test was designed to determine if the well still retains internal and external mechanical integrity.

The internal mechanical integrity was proven by conducting a pressure test on the casing at more than 1.5 times the maximum expected injection pressure that the well will have when operating at full capacity. This test was backed-up by a T.V. survey of the casing which showed the casing and all the joints to be in excellent condition.

The external mechanical integrity was proven by conducting a Radioactive Tracer Survey (RTS). A radioactive substance (Iodine 131) was injected in the well and its movement traced. The tracer test showed that there is no water movement in the cement filled annular space outside the casing nor upward movement in the formations through the confining zone. This test was backed up by a temperature test, which also showed complete external mechanical integrity.

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# Section 1

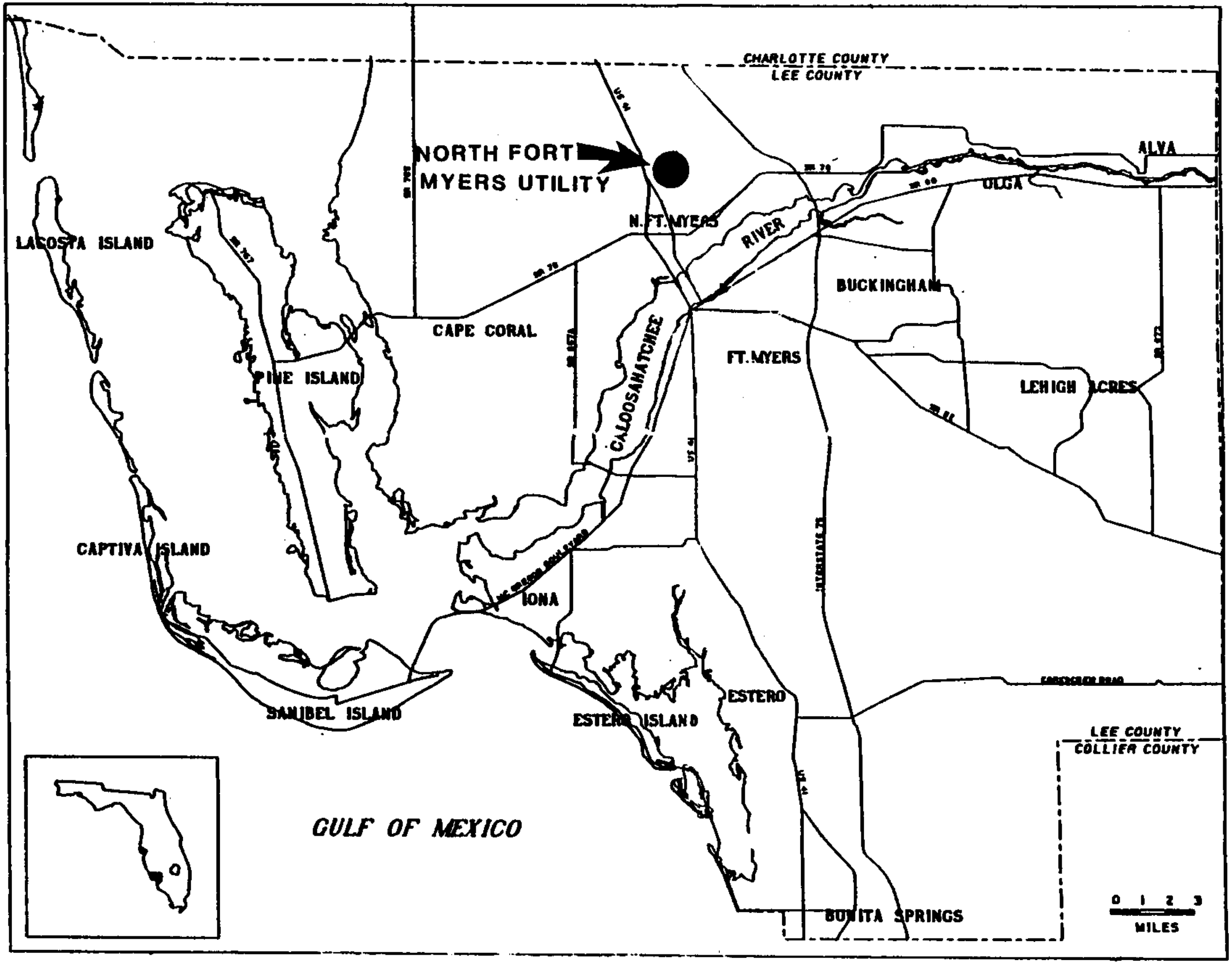
# INTRODUCTION

## 1.1 BACKGROUND

The deep injection well that serves the North Fort Myers Wastewater Treatment Plant of North Fort Myers Utility, Inc. (NFMU) (see Figures 1-1, 1-2 and 1-3) was constructed in 1987, and on December 4 of that year the first mechanical integrity test (MIT) on the well was completed when the radioactive tracer test was performed.

The deep injection well regulations in Chapter 62-528 of the Florida Administrative Code (FAC) require that the permittee conduct a new MIT within five years of the time of the previous test. The second MIT was completed on October 14, 1992 when Layne-Atlantic Company, Inc. conducted the pressure test on the injection casing. The special conditions of the current Operating Permit (UO 36-301451) dated October 8, 1997 required that the third MIT be conducted before October 14, 1997.

In early April 1997, Rust Environment & Infrastructure, Inc. (REI) was retained by NFMU to develop a scope of work to perform the third MIT test by October 14, 1997. A contract was negotiated with NFMU shortly thereafter. On May 7, 1997 the contract was signed by the two parties and within a month, work started on the preparation of a Test Plan (see appendix A) and the contract documents (plans and specifications) for the testing subcontractor. The draft of the Test Plan was submitted for review on July 9th. Comments were received from NFMU on July 10th.. During the rest of July, telephoned discussions were held and correspondence (July 11, July 15, and July 24) was exchanged between REI and the Staff of the Florida Department of Environmental Regulation (FDEP) to clarify the proposed test procedures and match them to the rule requirements. On August 4, 1997, the MIT Test Plan was finalized with the incorporation of the FDEP recommendations, and on August 6, 1997 a letter was sent to FDEP confirming that the changes requested had been incorporated into the Test Plan.





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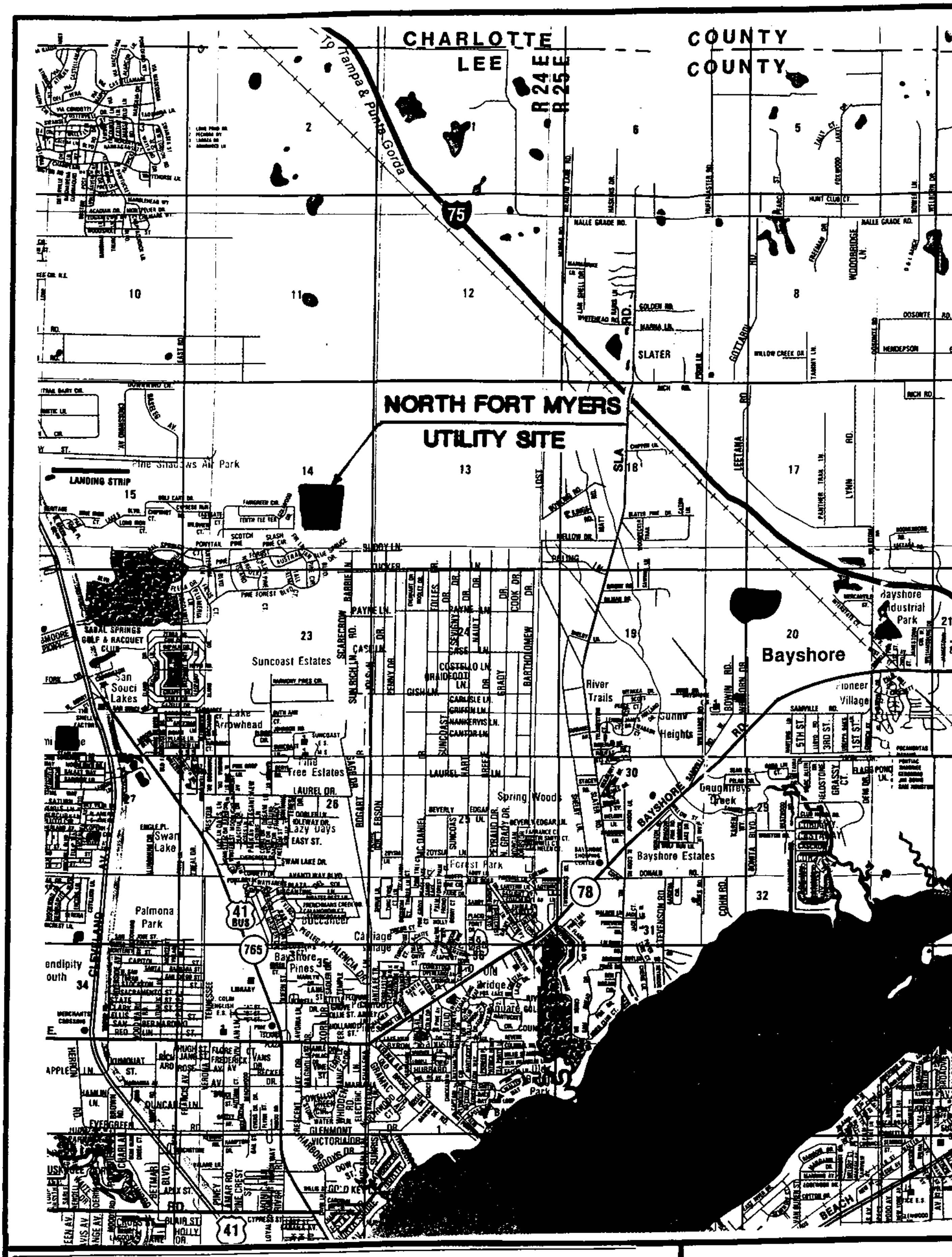
General Location Map

Figure 1-1

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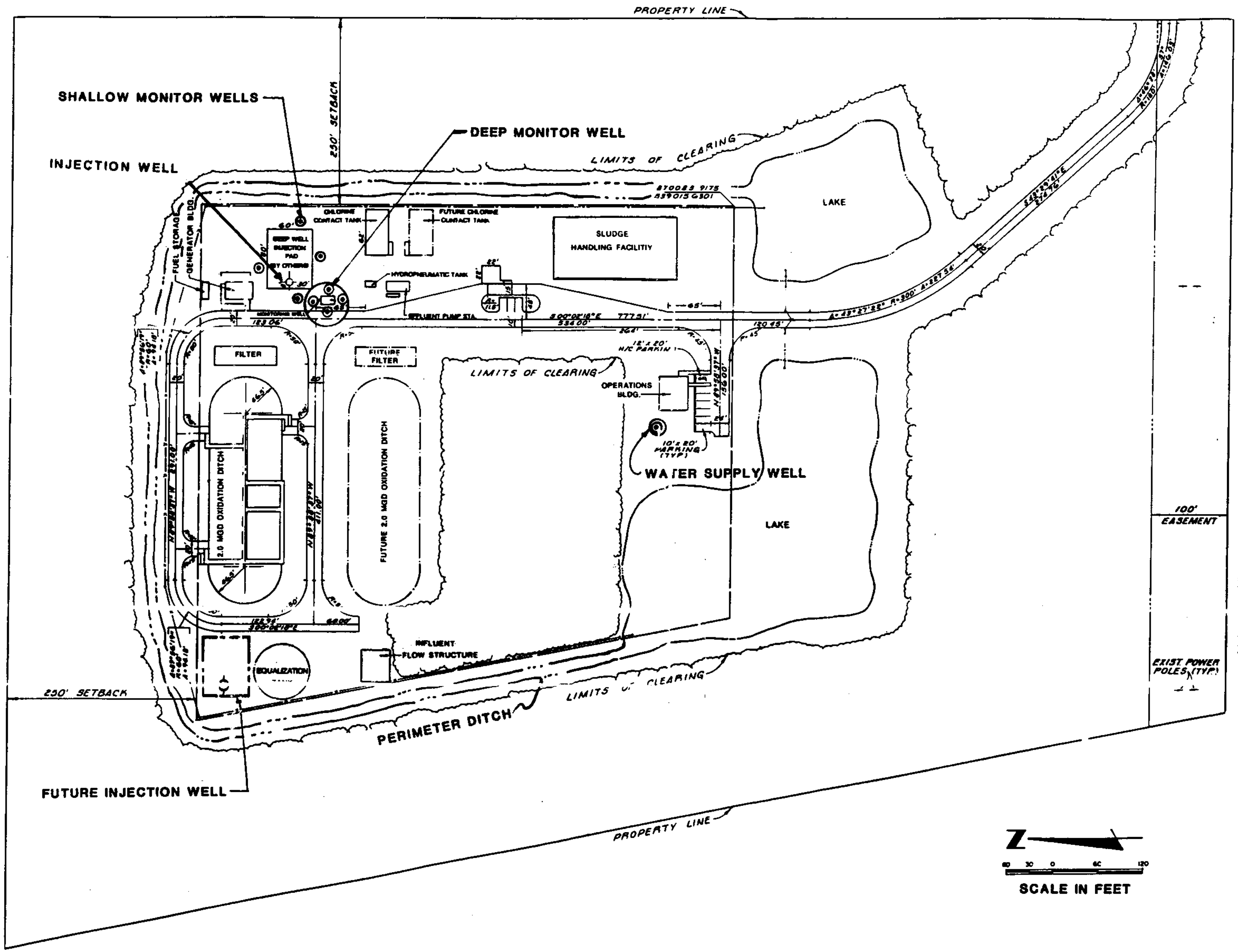
**Specific Location Map**

**Figure 1-2**

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Site Layout

Figure 1-3

On September 9, 1997, FDEP formally notified its intent to issue a permit for the injection system with the condition that the MIT test be conducted by October 14, 1997. The contract documents for conducting the MIT were completed on September 12 and faxed to NFMU for review that same day. On September 23, 1997 the liability insurance certificates were received, and after receipt of the payment and performance bonds on September 29, the contract with the testing contractor (Youngquist Brothers, Inc. of Ft. Myers, Florida) was signed by NFMU officials (back-dated to September 15, 1997). A pre-construction telephone conference was conducted on September 29 with representatives of Florida Geophysical Logging, Inc. and Youngquist Brothers, Inc.. REI issued the notice to proceed to Youngquist Brothers on September 30, 1997 (see Appendix B). The contract had a 30-day limit but because it had been back-dated, the completion date was October 14. The contract time had already run 15 days when the mobilization of equipment to the NFMU site started on September 30, 1997.

A schedule of work for the MIT was prepared September 25, 1997 (see Appendix C) and forwarded to the regulatory agencies and to other individuals concerned. The schedule called for flushing out the well on September 30 and conducting the T.V. Survey on October 1. It also included dates for the pressure testing (October 3), and for the radioactive tracer tests (October 6); however, the radioactive tracer test had to be postponed to October 7 because of scheduling problems with the logging truck.

## 1.2 PURPOSE

The purpose of this report is to present all the data (and its interpretation) collected as part of this MIT. The starting points for data collection are the dates of the preconstruction conference and mobilization to the site occurring on September 29, and 30, 1997 respectively (see Appendix D); and continuing through the radioactive tracer test conducted on October 7, 1997. For the purposes of permitting, the work was determined to be completed on the date of the tracer test, one week prior to the October 14, 1997 date required in the operating permit; however, for the purpose of the contract with the driller, the certificate of substantial completion was not issued until October 23 when all the equipment had been removed from the site and the site returned to its original condition.

## Section 2

## MECHANICAL INTEGRITY TESTING (MIT)

The MIT program is designed to test two elements of the injection system: Internal and external integrity. The first test element, the internal mechanical integrity in the well itself, tests the condition of the injection casing. This is achieved through a series of field tests including T.V. surveys, self complementary geophysical logs, and a pressure test of the casing. The second test element, the external mechanical integrity test, tests for leaks in both the well bore and in the geologic formations penetrated by the well. This is achieved partially through various complementary geophysical logs, but primarily by using a radioactive tracer survey (RTS).

### 2.1 PRE-CONSTRUCTION CONFERENCE AND MOBILIZATION

The Pre-Construction Conference was held by telephone on September 29, 1997. All the construction details had already been discussed in detail with the drilliers and the loggers when the contract was being prepared and so, a formal sit-down conference was not necessary. Mobilization to the site began on September 30, 1997 and set the starting date of the contract. The drilling contractor (Youngquist) achieved mobilization on September 30 by mobilizing a flat-bed truck with the drill rods, and a pitman truck for moving heavy equipment. The pre-construction telephone conference held September 29 included the following representatives:

Mr. William Musselwhite - representing Youngquist Brothers, Inc.
Mr. Edward Callahan - representing Florida Geophysical Logging, Inc.
Mr. William Pitt - representing REI and North Fort Myers Utility, Inc.

REI facilitated the telephone conference. It was divided into two topics. One topic was referred to as the legal and the other as the technical. The legal was a quick discussion to determine if all the contract requirements of insurance, deposits, bonds, securities, etc had been met. There was also a quick explanation of billings procedures. The completion schedule was discussed and the chain of command was set up. The technical topic covered the specifications for testing and included warnings on testing the packer at land surface, maintaining a clean site, providing legible and sealed field copies of logs and surveys, providing gauge calibration certification. It ended with a discussion of scheduling the work so as to coordinate well shut-down during periods when no irrigation discharges could be made to the golf courses. There was concern that rainfall would require that the testing be interrupted because the golf courses do not accept water for irrigation when it rains. As it turned out this became a moot point since it did not rain at all during the period from the start of mobilizatin until after all tests had been completed. Another item discussed during the pre-construction conference was the requirement in the contract that clean city water be used to flush out the well prior to T.V. surveying. No city water is available on site therefore it was agreed that filtered effluent would be used as long as the video picture was clear.

On October 1, 1997 Florida Geophysical mobilized to the site, and on October 2, 1997, Youngquist's mobilization was completed with the arrival of the drilling rig and its support equipment (see Figure 2-1).

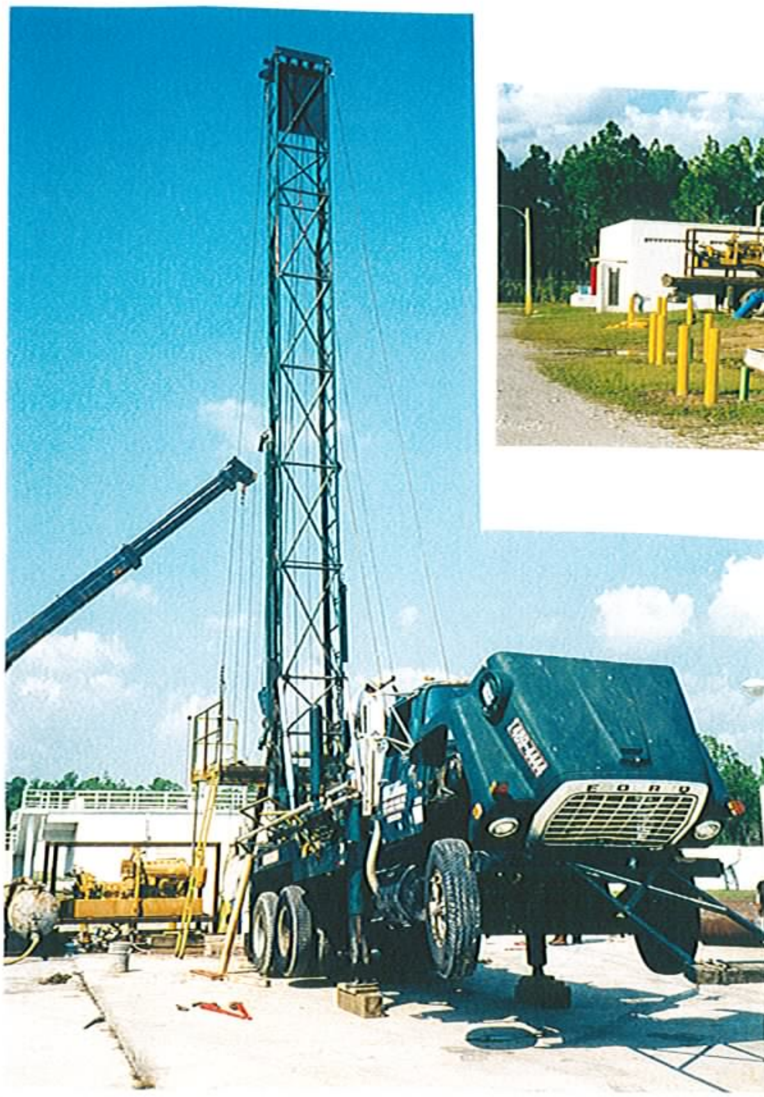
## 2.2 INTERNAL MECHANICAL INTEGRITY

### 2.2.1 T.V. Survey

On September 30 the injection well was flushed with filtered effluent in preparation for the T.V. Survey the next day. The effluent quality was perfectly transparent. Field-office laboratory tests showed no color in the water and a turbidity reading of 1.1 NTUs (Nephelometric Turbidity Units) for the filtered effluent used to flush out the well. After flushing, the well was taken off-line and all effluent was piped to the irrigation fields in the golf courses.

The T.V. survey was scheduled for 8:00 A.M. October 1, 1997, and although FDEP had previously said that it did not need to witness the survey, REI telephoned FDEP on September 30 as a reminder of the starting time and date. At 8:00 A.M. the T.V.surveying crew was on-site but ran into a slight delay with the installation of the standpipe on the wellhead. This delay added an extra hour and a half to the sheduled start. Assuming at 9:30 A.M. that FDEP was not going to attend, the T.V. survey was started as the camera was lowered down the well (see Figure 2-2).

The T.V. picture was of excellent quality and presented a very clear look of the casing and of all the welded joints; as well as of the open hole all the way to 2,539 feet (unfortunately the logger was unable to video tape the open hole portion below 2,539 feet because a bridge across the hole at that depth presented a risk to the T.V. camera). Table 2.1 shows the depth of each welded joint as determined from the T.V. picture by the Engineer.



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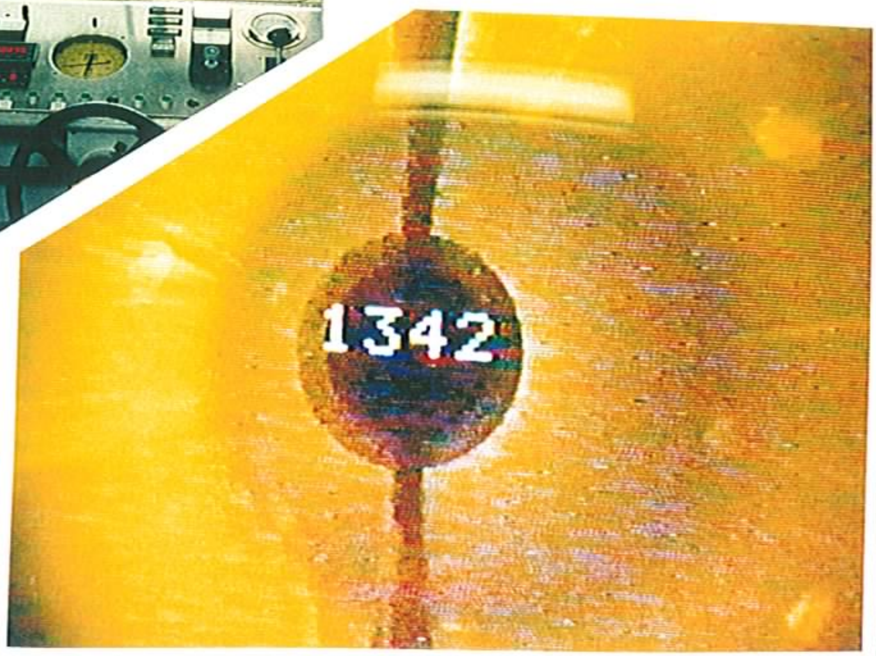
Mobilization to Site

Figure 2-1

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Television Survey

Figure 2-2

**Table 2-1**
**CASING JOINTS FROM T.V. SURVEY**

| | | | | | |
|---|---|---|---|---|---|
| 1st joint at | 25 ft. | 14th joint at | 436 ft. | 27th joint at | 851 ft. |
| 2nd joint at | 56 ft. | 15th joint at | 467 ft. | 28th joint at | 882 ft. |
| 3rd joint at | 89 ft. | 16th joint at | 501 ft. | 29th joint at | 918 ft. |
| 4th joint at | 122 ft. | 17th joint at | 534 ft. | 30th joint at | 942 ft. |
| 5th joint at | 154 ft. | 18th joint at | 568 ft. | 31st joint at | 972 ft. |
| 6th joint at | 187 ft. | 19th joint at | 601 ft. | 32nd joint at | 1,003 ft. |
| 7th joint at | 216 ft. | 20th joint at | 630 ft. | 33rd joint at | 1,037 ft. |
| 8th joint at | 249 ft. | 21st joint at | 663 ft. | 34th joint at | 1,064 ft. |
| 9th joint at | 282 ft. | 22nd joint at | 701 ft. | 35th joint at | 1,094 ft. |
| 10th joint at | 311 ft. | 23rd joint at | 729 ft. | 36th joint at | 1,129 ft. |
| 11th joint at | 344 ft. | 24th joint at | 759 ft. | 37th joint at | 1,162 ft |
| 12th joint at | 376 ft. | 25th joint at | 789 ft. | 38th joint at | 1,191 ft |
| 13th joint at | 407 ft. | 26th joint at | 821 ft. | 39th joint at | 1,223 ft |
| 40th joint at | 1,258 ft. | 46th joint at | 1,450 ft. | 52nd joint at | 1,642 ft. |
| 41st joint at | 1,290 ft. | 47th joint at | 1,482 ft. | 53rd joint at | 1,669 ft. |
| 42nd joint at | 1,324 ft. | 48th joint at | 1,514 ft. | 54th joint at | 1,702 ft. |
| 43rd joint at | 1,356 ft. | 49th joint at | 1,546 ft. | 55th joint at | 1,735 ft. |
| 44th joint at | 1,386 ft. | 50th joint at | 1,578 ft. | 56th joint at | 1,767 ft. |
| 45th joint at | 1,418 ft. | 51st joint at | 1,610 ft. | 57th joint at | 1,799 ft. |
| 58th joint at | 1,831 ft. | 64th joint at | 2,023 ft. | 70th joint at | 2,215 ft. |
| 59th joint at | 1,860 ft. | 65th joint at | 2,056 ft. | 71st joint at | 2,248 ft. |
| 60th joint at | 1,893 ft. | 66th joint at | 2,086 ft. | 72nd joint at | 2,281 ft. |
| 61st joint at | 1,926 ft. | 67th joint at | 2,117 ft. | 73rd joint at | 2,313ft. |
| 62nd joint at | 1,947 ft. | 68th joint at | 2,149 ft. | Casing ends at | 2,345ft. |
| 63rd joint at | 1,991 ft. | 69th joint at | 2,183 ft. | | |

Each and every one of these joints appears to be tight and there are no indications of any perforations or breaks of any kind. Similarly, there are no holes or breaks in the casing, and there are no nicks, gouges or grooves visible anywhere in the casing.

The October 1, 1997 T.V. survey (by Florida Geophysical Logging, Inc.) was compared with the T.V. surveys of December 2, 1987 (Deep Venture Video Logging, Inc.) and July 23, 1992 (Layne Atlantic Corp.) to see if any changes in the integrity of the casing could be detected; but other than rust stains, incrustations, and the presence of tuberculation throuhgout the casing, the current 1997 T.V. survey shows no change from the July 23, 1992 T.V. survey. In fact, the amount of tuberculation seen on the casing in 1997 appears to be the same as in 1992. Therefore, assuming that the casing was scrubbed cleaned in 1992, it is likely that the amount of tuberculation seen in both the 1992 and 1997 surveys represents that which can be expect every five years.

The 1997 T.V. survey does show however, that the amount of tuberculation in the last piece of casing is considerably more than anywhere else in the casing. It is worth pointing out at this time that when the well was last scrubbed in 1992, the brush was suspended from a cable and was not lowered enough to reach the bottom of the casing (see hand written notes for October 7, 1992 in Appendix C of the 1992 MIT test report). This shortened scrubbing was done to avoid getting the brush bristles hung-up at the end of the casing; but resulted in never having scrubbed the lowermost part of the casing. Therefore, the 1997 T.V. survey shows five years of tuberculation everywhere on the casing except for the lowermost part where it is apparently showing 10 years of tuberculation.

In the open hole itself there has been no noticeable change since the well was put in operation, and in fact the same description made December 2, 1987 (see Appendix E) is still applicable today.

There are, however, discrepancies in each of the three T.V. video surveys. The measured length of casing pipe installed in the well places the bottom of the casing at 2,340 feet below land surface, but each of the three surveys show discrepancies brought about due to cable strectching, cable hanging on the curvatures of the casing, and differences in the starting base line or measuring point. These differences however do not affect the evaluation of the casing, but do show different depths for each of the joints and for the bottom of the casing. The 1987 T.V. survey, based on a starting point 1 foot above land surface, recorded the end of the casing at between 2,338 feet below the measuring point or 2,337 feet below land surface (a real difference of -3 feet). In 1992 the T.V. survey tape was started from a measuring point located approximately 4 feet above land surface (3 feet higher than the 1987 survey tape). Therefore every one of the joints and the end of the casing are recorded 3 feet higher in the 1992 survey video tape than in the 1987 tape. The 1992 survey records the end of the casing at 2,335 feet below the measuring point or 2, 331 feet below land surface (a real difference of -9 feet). The 1997 survey was started from land surface and records the end of the casing at 2,344 feet (a real difference of +4 feet). From the 1997 T.V. survey it is concluded that the casing is in excellent shape after ten years in operation. The open hole remains clean and without any visible clogging throughout its effective depth and shows no change from 1992 to 1997, except for a minor obstruction at the 2,528 foot depth first discovered in 1992 and still visible in 1997 (2,538 feet). It appears from the T.V. survey that ten years of injection has not affected either the casing or the capability of the well to continue to operate as an injection system.

The 1997 T.V. survey from land surface down through the end of the casing can be seen in the video tape in Appendix F. Copies of the video have been provided to the TAC agencies with this report. A copy is also available for viewing at REI's Coral Gables office and at NFMU's office in North Fort Myers.

2.2.2 Pressure Test

Prior to the 1992 pressure test conducted on October 14, the inside of the casing was scrubbed with a brush to remove the tuberculation and other growth that had accumulated in the 5 years since the well had been put in operation. However, the last section of casing below the last joint was not scrubbed for fear of getting the brush stuck at the rim of the pipe. In 1992 a packer was inflated inside the casing, at a depth of 2,313 feet, one joint above the bottom of the casing, in the section of the casing that had been scrubbed. The 1997 pressure test however, was not performed in a smoothly scrubbed well casing. This time the casing was not scrubbed as part of the testing contract. Consequently, in 1997 the inside surfaces of the casing where rough and did not present an easy seal for the inflated packer. What is more, in 1997, the packer was inflated in the last section of casing, below the last joint, at a depth of 2,334 feet. This is the most highly tuberculated part of the casing, representing ten years of use without scrubbing.

Although FDEP had approved setting the packers a whole 30 feet higher, it was decided to test the well casing as near to the botom as possible in order to allay any concerns that the last joint of the casing had never been tested since the well was constructed.

The 1997 pressure test (see Figure 2-3), was performed in essentially the same manner as the two previous tests in 1987 and 1992, but extra care was given this time to sealing all the above ground connections very tightly because the less than perfect fit of the packer in the tuberculated area of the casing would require very tight connections above ground to compensate for pressure lost around the packer. Even then, minor leaks were detected in the well head connections above ground; and in the end, the butterfly valve on the line between the well and the plant had to be replaced with a blind flange before enough of the above ground leaks could be eliminated and the test could be successfully completed.

The FDEP rules require that the well be pressurized to 150% of the maximum operating pressure expected when the well is operated at full capacity. In addition, the rules require that the pressure be maintained for no less than one hour ( a maximum pressure change of 5% is allowed).

The well head was removed on October 2 and the packer installed at the bottom of the casing at 2,334 feet. Prior to lowering the packer to the bottom it was tested at land surface and was found to inflate properly. A preliminary test had been schedule for October 2, but there were delays in getting the packer down the hole and setting it. These delays made it impossible to pre-test the casing before the FDEP representatives arrived on October 3. All the tightening and re-tightening, packing and re-packing of valves and connections, and testing and re-testing that is usually done ahead of time so that the testing runs smoothly the first time it is conducted before the FDEP, had to be done the day of the test.

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Well-Head Layout for Packer Testing

Figure 2-3

Five times, leaks in the well head required tightening and it was not until the sixth try, when the butterfly valve at the wellhead was replaced with a blind flange, that the leaks were controlled enough to hold pressure for the required one hour with less than a 5% change in pressure.

The packer was pressurized to 240 psi and the casing to 130 psi. At the end of one hour the pressure in the casing was 124 psi., representing a 4.6% change in pressure. The pressure changes were measured with a McDaniel Test Grade Pressure Gauge calibrated on September 30, 1997. The test-gauge calibration certificate (see Appendix A) was made available to FDEP for review and approval prior to the start of the test. The test was witnessed by an FDEP representative (Mr.Richard Orth, P.G.) who approved the test procedure and passed the test results described above and in the daily logs in Appendix D. William Pitt, P.E., P.H., of REI certified the test results and the successful completion of the test.

The sucessful completion of the T.V. survey and the pressure test on the casing show that there is internal mechanical integrity on the NFMU injection well at North Fort Myers.

## 2.3 EXTERNAL MECHANICAL INTEGRITY

### 2.3.1 Temperature Log

Florida Geophysical Logging, Inc. (see Figure 2-4) conducted the temperature log on October 7, 1997 starting at 8:16 A.M. and ending at 9:09 A.M.. The temperature log was run from the surface downward, and it was started more than 12 hours after the well had last been disturbed during the pressure test, and a whole week after the well last received any discharges ( it was flushed for the T.V. survey a week before).

The temperature log (see Appendix G) shows inconsistent temperature changes in the uppermost 100 feet of the well probably caused by interference in preparing the well for testing, and then a gradual but very steady increase from 100 feet to 1,970 feet. At 1,970 feet the temperature drops slightly and at 2,085 feet continues the gradual steady increase down to 2,180 feet. At 2,180 feet begins a gradual but continued temperature decrease until at 2,352 feet there is a very sharp temperature increase of approximately 7 degrees Farenheit. The temperature remains steady to a depth of 2,498 feet where it cools by a couple of degrees before again beginning a steady gradual increase. This description, down to 2,352 feet is very similar to that of the temperature logs conducted on December 3, 1987 and July 24, 1992. The main difference is a much sharper temperature increase in the interval from 2,352 to 2,498 feet in the 1997 log than in the other two logs, although the 1992 log also show the same shape of the temperature footprint in that interval. Below 2,498 feet the three logs are similar. The main difference between the 1997 log and the other two logs can be ascribed to a much more native water quality condition in 1987 and to a




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Temperature Logging

Figure 2-4

shorter period of time since the last flushing of the well before the 1992 temperature log was run. The similarity of the 1992 and 1997 logs in the interval from 2,352 and 2,498 feet confirm that this is the zone that is receiving the injection water. In other words, this is the injection zone. The similarity also indicates that there has been no movement up or down for the location of the injection interval in the last ten years and consequently there has not been any upward movement of the injected water. The similarity of the graphs below 2,498 feet confirm that there has not been any upward displacement of the warmer bottom water either. The 1987 temperature log can be found in Appendix #12 of Volume 2A of the 1988 Engineering Report. The 1992 temperature log is in Appendix B of the 1992 MIT report. A copy of the new 1997 temperature log is in Appendix G to this report.

### 2.3.2 Radioactive Tracer Survey (RTS)

The tracer test of the deep injection well was conducted on October 7, 1997 by Florida Geophysical Logging (see Figure 2-5). The test was witnessed by two officials of the FDEP, Messrs. Jack Myers, P.G., Chairperson of the UIC TAC, and Joseph Haberfeld, P.G., TAC representative from FDEP's Tallahassee headquarters. Florida Geophysical Logging assembled the RTS tool with one gamma ray detector above the ejector and two gamma ray detectors below it (see Appendix I). The tool assembly was then lowered down the well to full depth and a background gamma ray (base log) was run up the hole into the casing and on up to land surface(see Appendix J). The background gamma ray log was run first, using a 27.5-foot RTS tool with three gamma ray detectors . Gamma background showed an API count of approximately 20 units or less at every depth in the well except at 2,525 feet to 2,545 feet, when this count increased up to 70 units. (One API unit represents 165 micrograms of radium equivalent per ton of material.)

After the base log was completed, Florida Geophysical filled the ejector with 10 microcuries of radioactive Iodine 131 and the static tracer test was begun. The ejector was brought up to just outside the casing (one foot outside the casing at 2,344 ft.), thus positioning the upper detector inside the casing at 2,334 feet and other detectors 2.5 feet below the ejector and 9.0 feet outside the casing at 2,346.5 feet and 2,356.5 feet respectively. A 1-minute background reading was done with all three detectors each showing 20 API units or less.

The ejector was then opened for 3.1 seconds allowing 1.0 microcuries of Iodine 131 to enter the system just below the casing. The upper gamma ray detector (located 10 feet above the ejector) did not show any upward movement of the radioactive tracer and remained well within the background of 20 API units for the whole 60 minutes of the test. However, the middle one of the two lower gamma ray detectors, which is 2.5 feet below the ejector, began to show a downward drift below the casing as early as 12 minutes after ejection. The second lower gamma ray tool, located 10 feet below the ejector, detected the downward tracer movement 14 minutes into the test.

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Radioactive Tracer Testing

Figure 2-5

After the static test was completed, the tool assembly was raised to 200 feet (actually 224 feet) and then the two lower detectors (middle and bottom) picked up the Iodine 131 just as they crossed through the 2,344-foot depth (the Iodine 131 release depth). Above 2,330 feet, all three tracers paralleled background gamma ray activity. Because tracer was picked up at essentially the same level in all three counters, the indication is that there was only a slow upward drift inside the casing and a slow downward drift below the casing. The Iodine 131 did not move up outside the casing, but it did dissipate upward inside the casing about 14 feet by convection and not by real fluid movement.

The dynamic tracer test was performed next while pumping water down the well, but first a hose was connected to the well and reclaimed water was flushed down the well for 20 minutes at a rate of approximately 1,500 gallons per minute to flush out the previously released tracer. The RTS assembly was then lowered to 2,360 feet and a tracer log upward to 2,150 feet was made. The iodine slug had moved out of the casing and the three gamma ray counters had returned to background levels.

It was then that the dynamic tracer test was run.

First the injection rate of water was reduced to 13 gallons per minute at 2:50 p.m. and the RTS assembly was then moved inside the well and stationed with the ejector at 2,338 feet (5 feet inside the casings). Then at 3:18 p.m. 2.0 millicuries of radioactive tracer were ejected while water continued to be injected at a 13 gallons per minute rate. A little over a minute later the middle detector (2.5 feet below the ejector) picked up the tracer signal and two minutes later began to decrease. Three minutes after ejection the lower detector (12.5 feet below the ejector) began to pick up the signal and two minutes after that began to decline. The upper detector did not show any change. At 3:51 p.m. the middle detector is again reading background levels of gamma radiation, but the bottom detector is still above background. The test was ended at 3:56 p.m. with detectors at background except for the bottom one (see Appendix J).

Next, and while still pumping at 13 gpm, the tool assembly was raised up 200 feet and both the middle and lower detector reacted sharply as they crossed the 2,338-foot tracer release depth.

The dynamic test was repeated another time, again using 2 millicuries and again showing essentially the same results. After that the tool assembly was lowered to 2,580 feet and the remaining radioactive tracer released while pumping at 1,500 gpm. The well was then logged from bottom to top while continuing to pump at 1,500 gpm. This final log showed that all the tracer had entered the formations within the zone previously identified as the injection zone and it also showed that no tracer had moved into the zone identified as the confining zone. This proves not only that there is complete mechanical integrity, but that the confining zone is indeed confining.

The mechanical integrity test was then concluded, but to insure that the remaining Iodine was well dispersed, injection of water at 1,500 gpm down the well continued for the next hour.

## 2.4 WELL HEAD RE-INSTALLATION

The completion of the work associated with the MIT was achieved when the well head was replaced (see Figure 2-6). The pressure and vacuum release valves were cleaned out prior to replacement of the well head. The well head was then repainted after rustproofing, and has been in continuous service ever since. The well has been placed back on line and flow from the plant is now going through the pump station (see Figure 2-6) and discharges either to the injection well (blue system) or to the golf course for irrigation (purple system).

RUST **Rust Environment & Infrastructure Inc.**

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

**Final Well Head Completion (Well Back On-Line)**

**Figure 2-6**

## Section 3

## CONCLUSIONS AND RECOMMENDATIONS

### 3.1 CONCLUSIONS

The evaluation of the NFMU deep injection well for mechanical integrity both external and internal was conducted in adherence to the Test Plan proposed to FDEP on July 9, 1997. The Test Plan was reviewed and changes were recommeded by FDEP on July 24, 1997. Finally on August 6, 1997 the recommended changes were incorporated in the Test Plan.

The various tests conducted during the month of October 1997 have shown that after nearly ten years of continuous operation the NFMU injection well continues to exhibit complete internal and external mechanical integrity.

Internal mechanical integrity was proven by a pressure test successfully conducted on the injection casing. The test was conducted for the required one-hour time. The pressure test, officially witnessed by Mr. Rick Orth, P.G. of the FDEP office of Fort Myers, consisted of initially pressurizing the injection casing to a pressure of at least three times the maximum expected pressure during well operation at full capacity; and measuring the change of pressure at the end of the test. The casin was initially pressurized to 130 psi, which is well above expected operational pressure. At the end of the test, the pressure was 124 psi; representing a change of 6 psi in one hour. This change is slightly less than the maximum allowable 5% (6.5 psi in this case) under Chapter 62-528.300(6)(e).

Internal mechanical integrity was also confirmed with a T.V. Survey of the well. This type of test, although not as definite and objective as the pressure test, nevertheless provided a visual look inside the well casing and showed that the casing and each of the casing joints are in perfect mechanical condition.

External mechanical integrity was proven by the successful completion of a radioactive tracer survey (RTS). The RTS was officially observed by Messrs. Jack Myers, P.G. and Mr. Joseph Haberfeld, P.G. of the FDEP offices in Fort Myers and Tallahassee respectively. Both the static and the dynamic portions of the test clearly indicated that there was no leakage outside the casing either in the annular space filled with cement, or in the formations above the injection zone. The dynamic test showed the same results. Both tests were performed twice to provide a higher degree of confidence in the resutls.

A temperature survey conducted to reinforce the results of the RTS also showed no movement of injected water anywhere but in the injection zone.

Finally, and although not part of the MIT, a second temperature survey and a final radioactive tracer test of the injection zone led to the conclusion that most of the injected fluids are entering the formations of the injection zone between the end of the casing at x,xxx feet and the end of the higher permeability layers at x,xxx feet. The T.V. survey also confirmed this interval as the injection zone. Density differences in the fresh water in the injection zone and the dense saline water below create optical changes that are easily detected by the T.V. camera.

## 3.2 RECOMMENDATIONS

The results of the MIT have shown that there is complete external and internal mechanical integrity at the NFMU injection well site. It is therefore recommended that the NFMU deep injection well be officially determined to have mechanical integrity and be allowed to continue to serve as the standby and emergency disposal alternative to the NFMU treatment plant. The NFMU primary disposal option is to reuse the treated water for the irrigation of nearby golf courses in northern Lee County.

## Appendix A
## Test Plan Submittal Letter to FDEP
## Test Plan Review and Recommendations Letter from FDEP
## Test Plan Compliance Letter to FDEP Recommendations

**Rust Environment & Infrastructure Inc.**

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

Phone 305.447.4494
Fax 305.443.9119

July 9, 1997

Mr. Jack Myers, P.G.
Chairman, TAC - UIC
Florida Department of Environmental Protection
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901

**Re: North Fort Myers Utility, Inc. - Test Plan for Mechanical Integrity Testing (MIT) of the Wastewater Disposal Deep Injection Well in North Fort Myers**
REI Job ID 200898

Dear Mr. Myers:

The Operating Permit (U036-191266) for the injection well located at the site of the North Fort Myers Utility, Inc. (NFMU) wastewater treatment plant in Lee County, requires that the permittee conduct a mechanical integrity test (MIT) of the well every five years. The MITs were last completed in October 1992, when the pressure test of the well was conducted. The next MIT must therefore be completed by that anniversary date this year.

NFMU has contracted Rust Environment and Infrastructure Inc. (REI) as its engineer of record, and requested REI's assistance in preparing the MIT plan and testing specifications; and in conducting the MITs before the October deadline.

Enclosed please find the test plan we propose to implement. It has been specifically prepared for testing the mechanical integrity of the North Fort Myers deep injection well. The plan is being submitted for your review as required (ahead of the 90-day time limit), before the expiration of the five-year interval since the last MIT test. REI expects that review comments and recommendations will be forthcoming from the TAC, and will modify the plan after TAC review by incorporating the FDEP's suggestions and comments.

If you have any questions or require a more detailed explanation of any item in the plan, please don't hesitate to contact me at (305) 447-4494.

Sincerely,

William A. J. Pitt, Jr., P.E., P.H.
Senior Consultant

cc: Joseph Haberfeld, FDEP - Tallahassee
Steve Anderson, SFWMD - West Palm Beach
Dan Duerr, USGS - Tampa
Nancy Marsh, USEPA - Atlanta
Jack Schenkman, NFMU - Miami
Tony Reeves, NFMU - Ft. Myers
Gary Long, NFMU - Ft. Myers
Bill Sundstrom, RS&B - Tallahassee

# Department of Environmental Protection

COPY

South District
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901-3881

Lawton Chiles
Governor

Virginia B. Weth
Secretary

July 24, 1997

Garrison Long, Vice President Utilities
North Fort Myers Utility
128 John Smith Loop
North Fort Myers, Florida 33917

Re: <u>Lee County - UIC</u>
North Fort Myers Utility WWTP
Class I Injection Well
MIT Plan

Dear Mr. Long:

The Department staff have reviewed the July 9, 1997 Mechanical Integrity Test Plan for the subject well and have the following comments:

1. The due date for the test is October 14, 1997 but it states on p. 6 the testing will take place in late October and will be after the rainy season. Testing must be completed on or before October 14 or the permittee may be subject to enforcement. October is still quite rainy in South Florida, and considering the due date the permittee should plan to start wellsite work considerably earlier than planned. If the injection well is needed for operation during the testing period, that could extend the testing period even longer.

2. Consideration should be given to a mechanical cleaning of the inside of the injection well casing to keep the buildup of solids from getting too thick as well as to provide a smooth surface for seating of the inflatable packer.

3. What is meant by an electrical log? Is this going to be a casing collar log (CCL)? A CCL is necessary to locate the bottom of the 12 inch steel casing and is usually run with the background gamma ray log.

RECEIVED BY
JUL 28 1997
RUST E & I

Continued . . .

**RADIOACTIVE TRACER TEST**

4. The background gamma ray log must be run from the bottom of the injection zone to land surface.

5. In step E, p. 11, log upward to at least 200 feet above the bottom of the casing. Also, log upward to the same depth after all dynamic tracer ejects.

6. Any flushing to remove tracer from the inside of the casing may use the injection pumps capable of 1500 gpm.

7. The 5 feet/minute velocity for an 11.75 inch ID casing is 28 gpm. Lower rates may be used if they are adequate to move the tracer downhole.

8. Unless tracer is seen with the upper gamma detector, wait a minimum of 30 minutes before logging up out of position after each dynamic eject.

9. When releasing the remainder of the tracer into the injection well after all ejects are complete, it should be done within the injection zone, This is normally accomplished prior to running the final gamma ray log.

**If you have any questions, please call me at 941-332-6975.**

Sincerely,

Jack Myers

Jack Myers, P.G.
Water Facilities

JBM/klm

Copies to:

William Pitt, Jr., P.E. - RUST
Joe Haberfeld - FDEP

**RUST** **Rust Environment & Infrastructure Inc.**

A Rust International Company
2601 Douglas Road, Suite 305
Coral Gables, FL 33134
Phone 305.447.4494
Fax 305.443.9119

August 6, 1997

Florida Department of Environmental Protection
South District Office
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901-3881

Attention: Mr. Jack Myers, P.G.
UIC - TAC Chairman

Reference: North Ft. Myers Utility, Inc. (NFMU)
Mechanical Integrity Test (MIT)
North Ft. Myers, Florida

Rust Project No. 200898

Dear Mr. Myers:

I have received a copy of your letter of July 24 to Mr. Garrison Long. The letter includes nine FDEP comments on the proposed Test Plan we submitted earlier. I have conferred with Mr. Long and discussed those comments, and I am now able to respond on behalf of NFMU.

**1. The due date for the test is October 14...........could extend the testing period even longer.**

All the tests will be completed before the October 14 deadline. Testing is being schedule for the last week in September (Monday September 29) in order to have enough time to complete all the tests even if the work is occasionally interrupted by heavy rains and the well has to be reconnected temporarily. All the storage facilities at the plant and at the irrigation sites (the three golf courses) will be lowered as much as possible before hand, so that when testing starts there will be maximum storage capacity available.

**2. Consideration should be given to mechanical cleaning.......seating inflatable packer.**

The T.V. survey is schedule to be performed right after the first temperature log is completed, and before the well is prepared for the pressure test using the inflatable packer. This will allow observation of the internal condition of the casing before installing the packer. If the T.V. survey indicates excessive growth of bacteria (slimes, molds, etc.) or, if in the opinion of the Engineer, the casing needs cleaning for any other reason, provisos in the drilling contract will require the driller to scrub the well before proceeding any further.

**3. What is meant by an electric log? Is this..........CCL .....with background gamma ray log.**

This was incorrectly presented in the Test Plan. Because the casing is a steel casing, an electric log will not be run inside the casing. Instead it is intended that a caliper log will be run to locate the end of the casing, and any breaks that may be large enough to be seen in this log. Page 9 of the Test Plan shows that it was the caliper log that was intended and not an electric log. A casing collar log (CCL) is not usually associated with MIT testing. There is no intention to run a CCL log on this well

**4.-9. RADIOACTIVE TRACER TEST**

Each of these six comments will be applied to the radioactive tracer test. 4. The background gamma ray log will be run from bottom of the hole to land surface. 5. After all static and dynamic tracer releases, the log will be run at least 200 feet above the bottom of the casing. 6. If re-connection of the well head makes it feasible to use the injection pumps, flushing will be done with the injection pumps, if not line pressure using city water will be used. 7. A 30 gpm rate of flow will be implemented instead of 10 gpm which may be too slow to adequately move the tracer downhole. 8. If tracer is not seen with the upper detector, during the dynamic ejects, a full 30 minutes will be allowed to lapse before logging up out of position. 9. The discharge of any leftover tracer will be into the injection zone, and after flushing a final gamma ray log will be run.

We are now getting ready to negotiate a contract with Youngquist Brothers to conduct the test. As soon as I have a firm starting date I will call you so we can arrange the inspections by FDEP personnel. All I can tell you at this time is that we are looking to start on September 29.

On behalf of NFMU, and on my own behalf as well, I thank you and the TAC members for the thorough review of our Test Plan. I believe the comments and suggestions, all of which we have now incorporated into the Test Plan, will help us conduct a better and more exacting MIT test.

I am looking forward to seeing you at 10:30 A.M. August 28 at your offices for the public meeting,

Sincerely,

William A. J. Pitt

William A. J. Pitt, P.E., P.H.
Senior Consultant

cc: Joseph Haberfeld, FDEP, Tallahassee
Jack Schenkman, NFMU-Miami
Tony Reeves, NFMU-Ft Myers
Gary Long, NFMU-Ft Myers
Bill Sundstrom, RS&B-Tallahassee

# Appendix B - Notice to Proceed

# NOTICE TO PROCEED

**DATE :** September 30. 1997

**TO:** Messrs. William Musselwhite and Edward Callahan

**ADDRESS:** Youngquist Brothers. Inc.
15465 Pine Ridge Road
Ft. Myers, Fl. 33908

**PROJECT No.** 200898

**CONTRACT FOR:** Mechanical Integrity Test - Deep Injection Well at Wastewater Treatment Plant of North Fort Myers Utility, Inc.

Dear Messrs. Musselwhite and Callahan:

This document constitutes notification that you are to proceed with the performance of the above contract within the time limits specified as described in the contract documents titled:

Contract for Mechanical Integrity Testing of the North Fort Myers Utility, Inc. Deep Injection Well and dated: September 15, 1997.

A pre-construction conference will be conducted by telephone at: 11:00 a.m., on September 29, 1997. You or your field superintendent will be required to be available.

**RUST ENVIRONMENT & INFRASTRUCTURE, INC.**

By: William A J. Pitt
William A J. Pitt, P.E., P.H.
Senior Consultant

c: Jack Schenkman
Tony Reeves
Gary Long

# Appendix C - MIT Work Schedule

**RUST Interoffice Correspondence**

Date: September 25, 1997

To: Jack Myers, P.G. (FDEP)

Copy: See list

From: Bill Pitt, P.E., P.H. (Rust E & I)

Subject: MIT Schedule for North Ft. Myers Utility

North Ft. Myers Utility Schedule of Work for 1997 MIT

Sept. 30 (Tuesday) Youngquist Bros. will flush out the well in preparation for T.V. Survey. They will be using effluent (treated to spray quality) if no other source of water (fire hydrant) is available. Youngquist Bros. will do this by themselves. Rust personnel will not be available to observe this. The well will not be taken out of service to do this.

Oct. 1 (Wednesday) The T.V. survey will be conducted. Rust personnel will be on-site first thing in the morning and will remain on site until the survey is completed. The well will be put back in operation at the end of the day in case of a rain emergency.

Oct. 2 (Thursday) The well will be killed and the well head will be removed in preparation for the pressure test. The inflatable packer will be test inflated outside the well first. Then it will be inserted in the well and a preliminary pressure test will be conducted to make sure everything is in order. If all is in order then, the actual pressure test will be conducted the next day. If not ready, then FDEP will also be notified and a new date selected. Rust personnel will be on site.

Oct. 3 (Friday) After the FDEP representative arrives, the pressure test will commence and after one hour, if the test is successful, the pressure will be released and the well put back into service over the weekend. Rust personnel will be on site to observe the test with the FDEP representative. After the test, the well head will be reassembled and the well put back in operation for the weekend.

Oct. 6 (Monday) If weather conditions allow it, the well will again be taken out of production and the radioactive tracer test will be conducted today. The test will start after the FDEP representative arrives. Rust personnel will be onsite for the whole procedure. If over the weekend rain causes the well to be on line on Monday then the Rust representative will call FDEP and re-schedule the radioactive tracer test for another date.

| Telephone Numbers | OFFICE | HOME |
|---|---|---|
| Gary Long (North Ft. Myers Utility) | (941) 543-1808 | |
| Bill Pitt (Rust E & I) | (305) 447-4494 | (305) 274-2245 |
| Mike Sordan (Youngquist Bros.) | (941) 489-4444 | |
| Jack Myers (FDEP-FT.Myers) | (941) 332-6975 | |
| Joe Haberfeld (FDEP-Tallahassee) | (904) 921-9415 | (850) 668-2810 |

# Appendix D - Daily Construction Reports
# (September 29, 1997 - October 7, 1997)

**RUST** Rust Environment & Infrastructure Inc.

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE SEPT. 29, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER N/A
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE SORDAN (YBI) - BILL PITT (REI)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

TODAY, THE PERFORMANCE AND PAYMENT BONDS WERE RECEIVED AT THE NFMU OFFICES. THE MIT CONTRACT WAS IMMEDIATELY SIGNED BY NFMU OFFICIALS ONCE THE DOCUMENTS WERE REVIEWED.

THE SIGNED CONTRACT IS BACKDATED TO SEPT. 15 BECAUSE THE CONTRACTOR HAD BEEN INVITED TO OCCUPY THE SITE BACK THEN EVEN WITHOUT A CONTRACT SIGNED, AND ALSO BECAUSE IT HAD BEEN PREVIOUSLY AGREED THAT THE DUE DATE WOULD BE OCT. 14 AND THAT THE CONTRACT LENGTH WOULD BE 30 DAYS. THEREFORE THE SIGNING OF THE CONTRACT ON SEPT. 29th BUT BACK DATED TO SEPT. 15th, ESTABLISHED THE OCT. 14th END DATE.

AFTER NFMU EXECUTED THE CONTRACT IT WAS HAND CARRIED TO YOUNGQUIST BROS. OFFICES, AND THERE IT WAS FULLY EXECUTED WITH THE YOUNGQUIST SIGNING.

AFTER BEING NOTIFIED THAT THE CONTRACT WAS IN VIGOR, REI (BILL PITT) TELEPHONED BILL MUSSELWHITE AND REMINDED HIM THAT IT WAS IMPORTANT TO START WORK IMMEDIATELY BECAUSE IF IT RAINED DURING TESTING WE WOULD HAVE TO PUT THE WELL BACK ON LINE AND THIS WOULD CUT ON THE TIME AVAILABLE TO COMPLETE THE TESTS.

A PRE-CONSTRUCTION CONFERENCE WAS THEN ARRANGED BY TELEPHONE TO DISCUSS THE TESTING PROGRAM

**RUST** **Rust Environment & Infrastructure Inc.**

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134
Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE SEPT. 29, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER N/A
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE JORDAN (YBI) - BILL PITT (REI)

**DESCRIPTION OF WORK OBSERVED AND REMARKS:**

PRE-CONSTRUCTION CONFERENCE

TO SAVE TIME ON A SHORT LIVED CONTRACT IT WAS AGREED TO CONDUCT THE CONTRACT REQUIRED PRE-CONSTRUCTION CONFERENCE BY TELEPHONE.

THE CONFERENCE INCLUDED:

BILL MUSSELWHITE – YOUNGQUIST BROTHERS, INC.
ED CALLAHAN – FLORIDA GEOPHYSICAL LOGGING, INC.
BILL PITT – RUST E&I - REPRESENTING NFMU

DURING THE CONFERENCE ALL DETAILS OF THE TESTING WERE DISCUSSED AND NOTIFICATION REQUIREMENTS TO THE REGULATORY AGENCIES WERE ASSIGNED.

A VERBAL NOTICE TO PROCEED WAS ALSO ISSUED (LATER IT WILL BE BACKED UP WITH A PAPER DOCUMENT). HOWEVER THE NOTICE TO PROCEED DOES NOT CHANGE THE SEPT. 15 STARTING DATE. IT WILL BE ISSUED AS A FORMALITY TO MEET THE CONTRACT REQUIREMENTS FOR A NOTICE TO BE ISSUED.



sk0836

**RUST** Rust Environment & Infrastructure Inc.

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE SEPT. 30, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY - HOT
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE SORDAN (YBI) BILL PITT (REI)

DESCRIPTION OF WORK OBSERVED AND REMARKS:

08:00A PAPER COPY OF THE NOTICE TO PROCEED WAS ISSUED TODAY SEPT. 30, 1997.

09:45 MOBILIZATION TO THE NFMU SITE HAS ALSO STARTED TODAY. THE CONTRACTOR HAS MOVED A PITMAN TRUCK ON SITE, A TRAILER TRUCK WITH THE DRILL RODS AND THE INFLATABLE PACKERS, AND A SECOND TRAILER WITH SIX 1,000 lbs. SALT BAGS.

11:40 THE WELL IS BEING FLUSHED OUT WITH FILTERED RECLAIMED WATER. THERE IS NO PUBLIC WATER SUPPLY AVAILABLE ON SITE. THE FILTERED RECLAIMED WATER IS VERY CLEAN. AT THE FILTER AND SETTLING TANK OVERFLOW THE RECLAIMED WATER IS CLEAR ENOUGH TO ALLOW THE BOTTOM OF THE TANKS TO BE SEEN. THIS REPRESENTS A 6' FOOT DISTANCE THROUGH THE WATER. THE TURBIDITY IS LESS THAN 1.1 NTU'S. A GOOD T.V. PICTURE SHOULD BE EASY TO GET.

13:15 FLUSHING WILL CONTINUE FOR ANOTHER HOUR OR SO AS THIS WILL ALSO LOWER THE WATER LEVELS AT THE PLANT AND PROVIDE SOME ADDED STORAGE IN CASE OF A VERY SMALL RAIN. OTHERWISE AFTER FLUSHING OF THE WELL IS COMPLETED, ALL THE EFFLUENT WILL BE DIRECTED TO THE GOLF COURSES FOR SPRAYING.

Sheet 1 of 1

sk0836

RUST Rust Environment & Infrastructure Inc.

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE SEPT. 30, 1997

PROJECT NAME NEMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE SORDAN (YBI) BILL PITT (REI)

DESCRIPTION OF WORK OBSERVED AND REMARKS:

THE OPERATIONS OF THE MIT ARE TO BE SUSPENDED IN CASE OF RAIN. THE GOLF COURSES, BY CONTRACT AGREEMENT CAN NOT BE FORCED TO TAKE SPRAY RECLAIMED WATER DURING RAINS.

WE HAVE ASKED THE THREE GOLF COURSES SERVED BY NEMU RECLAIMED WATER TO REDUCE AS MUCH OF THEIR STORAGE CAPACITY SO THAT IF RAINS COME WE CAN HAVE SOME EXTRA TIME BEFORE WE HAVE TO COME BACK ON LINE WITH THE INJECTION WELL.

THE SPRAY FIELDS AND THEIR CAPACITIES AND STORAGE ARE:

| LOCATION | DAILY CAPACITY | STORAGE CAPACITY |
|---|---|---|
| SIX LAKES GOLF AND COUNTRY CLUB | 0.100 MGD | 1.0 MG STORAGE POND |
| RIVERBEND COUNTRY CLUB & GOLF COURSE | 0.400 MGD | 2.0 MG STORAGE POND |
| SABAL SPRINGS GOLF COURSE | 1.200 MGD | 0.75 MG STORAGE TANK |
| TOTALS | 1.7 MGD | 3.75 MG |

WHEN THERE ARE HEAVY RAINFALLS THE PLANT PRODUCED NEARLY 2.0 MGD; THEREFORE AT BEST, SINCE THERE IS ONLY 3.75 MG OF STORAGE AVAILABLE, WE CAN SUSPEND WELL OPERATION DURING A RAIN FOR ONLY 1 DAY AND ABOUT 20 HOURS.

Sheet 1 of 1

sk0836

**RUST** Rust Environment & Infrastructure Inc.

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134
Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE OCT. 1, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY-WARM
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE SORDAN (YBI) - BILL PITT (REI)

DESCRIPTION OF WORK OBSERVED AND REMARKS:

08:15 FLORIDA GEOPHYSICAL HAS ARRIVED ON SITE TO CONDUCT THE T.V. SURVEY. FDEP WAS NOTIFIED BY PHONE YESTERDAY BUT SAID THEY WILL NOT BE INSPECTING THE T.V. SURVEY WHILE IT IS BEING RUN.

09:00 A 12-FOOT LONG STANDPIPE HAS BEEN INSTALLED ON THE WELL HEAD TO CONTROL FLOW OUT OF THE WELL WHILE INSERTING AND REMOVING THE T.V. CAMERA. A PACKING GLAND ON TOP OF THE STANDPIPE ALLOWS THE CAMERA CABLE TO MOVE UP AND DOWN THE WELL WITHOUT SPILLS OF WATER ON THE PAD. THIS ALLOWS US TO KEEP THE WELL ON LINE WITHOUT FEAR OF NOT HAVING ENOUGH TIME TO RECONNECT IT IN CASE IT STARTS TO RAIN.

09:32 STARTED T.V. SURVEY. THE ZERO COUNTER IS AT LAND SURFACE (THE SURFACE OF THE DRILLING PAD). STARTING AT LAND SURFACE THE CASING SHOWS SOME KIND OF TUBERCULES GROWING INSIDE. THE TUBERCULES ARE AMORPHOUS AND LESS THAN 1/2 INCH IN SIZE (DIAMETER?) THEY ARE BEIGE TO LIGHT BROWN AND ARE SPREAD IN CLUMPS, OCCUPYING ABOUT 15% OF THE PIPE SURFACE. DOWN TO 880 FT. NO RUST OR PITTING IS SEEN, BUT AT 880' SOME SMALL PITTING IS VISIBLE. AT 930' THERE IS A COLOR CHANGE IN THE DEPOSITS INSIDE THE CASING. DARK SPOTS ARE REALLY SHADOWS PRODUCED WHEN THE LIGHT GOES BY THE TUBERCULES. A BELL SHAPED SHADOW APPEARS AS THE LIGHT APPROACHES THE PROTRUDING TUBERCULE. HOWEVER THE TUBERCULES ARE VERY SMALL, SELDOM MORE THAN 1/4 INCH.

Sheet 1 of 3

**RUST** Rust Environment & Infrastructure Inc.

A Rust International Company
2600 Douglas Road, Suite 305
Coral Gables, FL 33134

Phone 305.447.4494
Fax 305.443.9119

# CONSTRUCTION REPORT

DATE OCT. 1, 1992

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY-HOT
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE JORDAN - STEVE MILLER - BILL PITT

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

AT 2,070 PITTING IS A BIT DEEPER BUT STILL INSIGNIFICANT AND CAN NOT BE MEASURED OR ESTIMATED (SHEET THICKNESS). AT 2313 THERE IS A CASING JOINT BELOW WHICH THE CONCENTRATION OF TUBERCULES INCREASES AND REMAINS THAT WAY ALL THE WAY TO THE BOTTOM OF THE CASING AT 2,344.4 FEET.

THE PICTURE IS CLEAR THROUGHOUT, BUT SOME OF THE CASING JOINTS ARE HARD TO SEE AND APPEAR TO HAVE A COATING THAT MAKES THEM DIFFICULT TO SPOT. DURING THE WHOLE T.V. SURVEY, THERE IS DEBRIS FALLING AT ABOUT THE SAME SPEED AS THE T.V. CAMERA IS GOING DOWN THE HOLE. THIS HOWEVER STOPS AT 2,430 FEET WHICH APPEARS TO BE THE DEPTH TO WHICH NONE OF THE EFFLUENT PENETRATES BELOW. AT 2,430 FEET THE T.V. PICTURE SHOWS A SHIMMERING OF THE MORE DENSE SALTWATER IMMEDIATELY BELOW THE FRESH WATER. ALSO SINCE NO DEBRIS IS SEEN FALLING DOWN THE HOLE BELOW 2,430 FEET, IT IS LOGICAL TO EXPECT THAT ALL THE INJECTED WATER IS FINDING ITSELF INTO THE AQUIFER IN THE INTERVAL FROM 2,344.4 FT. AND 2,430 FT. A HUGE CAVITY IS SEEN ABOVE THIS FRESH WATER-SALT WATER INTERFACE.

A RECOMMENDATION IS BEING MADE TO TRY AND SET THE PACKER AS CLOSE TO THE BOTTOM OF THE CASING AS POSSIBLE, AND THE INTERVAL FROM 2,328 TO 2,338 FEET HAS BEEN CHOSEN. IF THE TUBERCULES PREVENT A GOOD SEAL THERE PERMISSION HAS BEEN GIVEN BY FDER TO MOVE UP 30 FEET INTO THE NEXT JOINT OF CASING



sk0836

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A Rust International Company
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# CONSTRUCTION REPORT

DATE OCT. 1, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY - HOT
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE GARY LONG (NFMU), STEVE MILLER (FGL), BILL PITT (REI)

**DESCRIPTION OF WORK OBSERVED AND REMARKS:**

THE T.V. SURVEY WAS CONTINUED TO 2,539 FT. WHERE THE HOLE APPEARS TO BE BRIDGED AND THE T.V. LOGGER DID NOT WANT TO RISK GOING BELOW AND GETTING STUCK. SINCE ALL INJECTED FLOW ENTERS THE FORMATION ABOVE THIS LEVEL, THERE IS NO NEED TO DRILL OUT THIS BRIDGE.

THE T.V. SURVEY WAS WITNESSED IN ITS ENTIRETY BY G. LONG AND/OR T. REPLEY (FOR NFMU), BILL PITT (REI), AND OF COURSE STEVE MILLER THE LOGGER. THE CONDITION OF THE CASING IS GOOD THROUGHOUT. IT LOOKS BETTER THAN IS USUALLY FOUND IN INJECTION WELLS AFTER 5-YEARS IN OPERATION. THIS IS PROBABLY BECAUSE THIS PLANT PROVIDES ADDITIONAL FILTRATION AND CHLORINATION THAT OTHER SECONDARY TREATMENT PLANTS DO NOT PROVIDE. THE LAST 30 FEET OF CASING IS MUCH MORE HEAVILY ENCRUSTED WITH GROWTHS THAN THE REST OF THE CASING. WE HAVE LEARNED THAT IN 1992 THE CASING WAS SCRUBBED BUT THAT FOR FEAR OF GETTING THE DRUM STUCK WITH THE OPEN END OF THE CASING THE SCRUBBING OPERATORS DID NOT GO BELOW THE NEXT TO LAST JOINT OF CASING. IT APPEARS THAT THE LAST JOINT OF CASING HAS 10-YEARS OF GROWTH ATTACHED TO IT WHILE THE REST OF THE CASING ONLY HAS 5-YEARS OF GROWTH AFTER THE SCRUBBING IN 1992.

14:50 T.V. SURVEY IS COMPLETED. WEATHER FORECASTS INDICATE NO RAIN IS EXPECTED THE NEXT TWO DAYS. THIS WILL ALLOW US TO TAKE THE WELL OFF-LINE AND DIRECT THE FLOW FOR RE-USE IN THE GOLF COURSES. WE WILL RUN A PRACTICE PRESSURE TEST TOMORROW AFTERNOON AND THE REAL ONE DAY AFTER TOMORROW. FDEP HAS BEEN NOTIFIED

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# CONSTRUCTION REPORT

DATE OCT. 2, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY-WARM
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE MIKE SORDAN (YBI) BILL PITT (REI)

**DESCRIPTION OF WORK OBSERVED AND REMARKS:**

08:10 MOBILIZATION BY YOUNGQUIST BRO. HAS BEEN COMPLETED YESTERDAY AFTERNOON AFTER THE T.V. SURVEY WAS COMPLETED, A GARDNER-DENVER RIG WAS BROUGHT ON SITE AND POSITIONED OVER THE WELL HEAD. THE PACKER AND THE TETERING CABLE AND HOSES WERE ALSO BROUGHT ON SITE.

08:50 THE WELL IS BEING KILLED WITH SALT TO ALLOW THE INSERTION OF THE PACKER THROUGH THE WELLHEAD. TWO 1,000 lbs BAGS OF SALT ARE BEING MIXED IN WATER AND PUMPED DOWN THE WELL.

11:30 THE WELL IS NOW "KILLED", AND ONLY PERIODIC ADDITION OF SALT IS BEING SHOVELED IN TO STABILIZE. FDEP IS ADVISED THAT WE WILL BE READY TO CONDUCT THE PRESSURE TEST TOMORROW (FRIDAY OCT 3) AT 08:00 A.M.

14:30 STILL TRYING TO GET THE PACKER INFLATED IN THE HOLE. THE DRILLERS RAN VERY SLOWLY WITH THE DRILL RODS AND ARE NOT GOING TO BE READY TO CONDUCT THE INITIAL PRESSURE TEST UNTIL LATE THIS AFTERNOON.

17:10 THERE HAVE BEEN SO MANY DELAYS THAT WE ARE NOT READY TO CONDUCT A PRELIMINARY PRESSURE TEST. A NIGHT SHIFT HAS NOT BEEN SCHEDULED, SO PREPARATIONS FOR THE INITIAL TEST WILL NOT BE COMPLETED TONIGHT

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# CONSTRUCTION REPORT

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DATE OCT. 3, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER SUNNY - COOL
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE (RICK ORTH - FDEP) (BILL PITT - RUST)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

07:15 DRILLERS ARE STILL TRYING TO GET THE PACKER INSTALLED. WE MAY NOT HAVE TIME TO RUN A PRELIMINARY TEST BEFORE THE FDEP REPRESENTATIVE GETS HERE.

08:-- RICHARD (RICK) ORTH, P.G. ARRIVED ON SITE. WE TOLD HIM THAT WE HAVE NOT BEEN ABLE TO RUN A PRELIMINARY TEST BECAUSE OF DELAYS IN INSTALLING THE PACKERS. HOWEVER WE WILL DO THE PRELIMINARY AND FINAL TEST AS 1 ONE.

09:00 THE PACKER TEST WILL BEGIN AT 09:00.

09:03 THE WELL IS WATER PRESSURIZED TO 130 PSI AT 09:05 AND THE TEST STARTS.

| TIME | PRESSURE |
|---|---|
| 09:05 | 130 psi |
| 09:10 | 129 psi |
| 09:15 | 128.5 psi |
| 09:20 | 127 psi |
| 09:25 | 126 psi |
| 09:30 | 124.5 psi |
| 09:35 | 123.5 psi |

THIS IS A LOSS OF 6.5 psi IN ONE HALF HOUR
(IT DOES NOT MEET THE 5% THEORETICAL ALLOWED FOR ONE HOUR
THE DECISION IS MADE TO REPEAT THE TEST, BUT FIRST WE WILL FIX SOME SURFACE LEAKS.
WE HOPE TO DO BETTER.

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# CONSTRUCTION REPORT

DATE OCT. 3, 1997

PROJECT NAME NFMU - MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE RICK ORTH (FDEP) BILL PITT (REI)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

SMALL LEAKS ARE FOUND AROUND THE BASE OF THE PIPE CONNECTION TO THE WELL HEAD AND ATTEMPTS ARE MADE TO TIGHTEN THE LEAK BUT INITIALLY IT GETS WORST BEFORE IT APPEARS TO GET BETTER.

A SECOND TEST IS SCHEDULED FOR 10:00 A.M.

| TIME | PRESSURE |
|---|---|
| 10:03 | 130 psi |
| 10:33 | 123 psi |

NOW THERE ARE LEAKS IN THE SAMPLING VALVE AT THE BOTTOM OF THE WELL HEAD AND ANOTHER LEAK AT THE TOP OF THE PACKER LINE CONNECTION.

LEAKS APPEAR TO BE RESOLVED. NEXT TEST IS AT NOON

| 3rd Test | | 4th Test | |
|---|---|---|---|
| TIME | PRESSURE | START | PRESSURE |
| 12:09 | 130.0 psi | 0 | 130 psi |
| 12:16 | 129.5 psi | 15 | 128 psi |
| 12:21 | 128.5 psi | 30 | 126 psi |
| 12:26 | 127.5 psi | 45 | 123.5 psi |
| 12:31 | 127.0 psi | 60 | 122.5 psi |
| 12:36 | 126.5 psi | 5th Test | |
| 12:39 | 125.5 psi | 0 | 130 psi |
| | | 50 | 123.5 psi |

THERE IS CONCERN THAT THE ROUGH CONDITION OF THE LAST JOINT OF CASING MAY BE CAUSING THE PACKER SEAL TO BE LEAKING, BUT BEFORE REMOVING THE PACKERS TO MOVE THEM UP TO THE OTHER FDEP APPROVED DEPTH



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# CONSTRUCTION REPORT

DATE OCT. 3, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE

DESCRIPTION OF WORK OBSERVED AND REMARKS:

WE WILL TRY TO REMOVE THE BUTTERFLY VALVE TO THE WELL. WE KNOW THIS VALVE HAS BEEN LEAKING BECAUSE IT DOESN'T SEAT WELL BUT WE WERE HOPING THAT THE LEAK WOULD BE SMALL ENOUGH SO THAT WE COULD STILL PASS THE PRESSURE TEST.

16:15 WE HAVE REMOVED THE LEAKING BUTTERFLY VALVE AND REPLACED IT WITH A BLIND FLANGE. THE VALVE DID APPEAR TO BE AT FAULT BECAUSE INCRUSTATION ON THE PLATES AND THE SITTING WOULD HAVE PREVENTED A GOOD SEAL. ALL POSSIBLE SURFACE LEAKS ARE NOW TAKEN CARE OF. ANY FURTHER PROBLEMS MUST BE WITH THE PACKER SEAL.

TEST No. 6

| TIME | PRESSURE |
|---|---|
| 0:00 | 130.0 psi |
| 5:00 | 129.5 |
| 10:00 | 129.0 |
| 15:00 | 128.5 |
| 20:00 | 128.0 |
| 32:00 | 126.0 |
| 45:00 | 124.5 |
| 52:00 | 124.0 |
| 55:00 | 123.5 |
| 60:00 | 124.0 |

THE MIT PRESSURE TEST HAS PASSED. AT THE END OF ONE HOUR THE PRESSURE DROP IS 6.0 PSI AND THE ALLOWABLE LOSS IS 6.5 PSI.
RICK ORTH OF FDEP SAYS HE ACCEPTS THE TEST AND I (BILL PITT) SAY THAT I WILL CERTIFY IT AS MEETING THE RULES.



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DATE OCT 3, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER N/A
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE BILL PITT (REI)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

SINCE THE PRESSURE TEST HAS RUN INTO SO MANY PROBLEMS AND THE SCHEDULE IS RUNNING BEHIND, IT HAS BEEN DECIDED TO PUT OFF THE RADIOACTIVE TRACER TEST UNTIL TUESDAY OCTOBER 7TH INSTEAD OF MONDAY OCTOBER 6TH. THIS STILL LEAVES US ENOUGH TIME TO FINISH AHEAD OF THE OCTOBER 14TH DEADLINE. THIS WILL HELP WITH A SCHEDULING PROBLEM WITH THE LOGGING TRUCK. FDEP (JACK MYERS AND JOE HABERFELD) IS NOTIFIED (BY BILL PITT) THAT THE RTS WILL BE PERFORMED TUESDAY.

FLORIDA GEOPHYSICAL LOGGING WILL BE ON SITE AT 08:00 A.M. TUESDAY TO RUN THE TEMPERATURE SURVEY FIRST.

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# CONSTRUCTION REPORT

DATE OCT. 7, 1997

PROJECT NAME NFMU-MIT PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC. WEATHER SUNNY - WARM
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE STEVE MILLER (FGL), J. MYERS & J. HADERMAN (FDEP) BILL PITT (RUST)

DESCRIPTION OF WORK OBSERVED AND REMARKS:

08:30 ARRIVED ON SITE AND FLORIDA GEOPHYSICAL WAS ALREADY ON SITE AND IN THE HOLE RUNNING THE TEMPERATURE SURVEY.

09:10 BY 9:10 THEY HAD REACHED FULL DEPTH AND STARTED COMING OUT OF THE HOLE WITH THE TEMP. LOG. THE TOOL, IN ADDITION TO HAVING THE TEMPERATURE PROBE, ALSO HAS A GAMMA RAY LOG AND A COLLAR LOCATOR CCL TOOL. THE CASING COLLAR LOCATOR TOOL WAS RUN INSTEAD OF THE ELECTRIC LOG WHICH INSIDE THE CASING WOULD HAVE BEEN WORTHLESS. SIMILARLY, THE NOISE LOG WAS ELIMINATED IN FAVOR OF THE RTS TEST.

TOOL CALIBRATION WAS PERFORMED AS FOLLOWS:
TEMPERATURE TOOL - CALIBRATED IN THE SHOP YESTERDAY
GAMMA RAY TOOL - CALIBRATED ON SITE USING A CESIUM SOURCE OF KNOWN STRENGTH AT A KNOWN DISTANCE.

09:26 STARTED LOGGING UP THE BACKGROUND GAMMA RAY LOG

THE GAMMA RAY LOG WILL BE THE COMPARISON LOG TO THE BEFORE AND AFTER RADIOACTIVE TRACER INJECTION.

10:28 COMPLETED THE BACKGROUND GAMMA RAY. HAD TROUBLE IDENTIFYING THE CASING BOTTOM WITH THE CCL LOG AND MATCHING IT TO THE T.V. SURVEY DEPTH. HAD TO TAKE OUT THE CCL FROM SCHLUMBERGER IN 1992 TO BE ABLE TO MATCH THE TWO. IT APPEARS THAT A COMBINATION OF DIFFERENT STARTING POINTS, DIFFERENT RATES OF TOOL CABLE STRETCH, AND COUNTER VARIATIONS

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# CONSTRUCTION REPORT

DATE OCT. 7, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER HOT SUNNY
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE STEVE MILLER (EGL), JACK MYERS & JOE HADERFELD (FDEP), BILL PITT (REI)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

RESULTED IN DIFFERENT DEPTHS FOR ALL CASING JOINTS AND DEPTH OF CASING. HOWEVER WHAT IS IMPORTANT, THE DISTANCES BETWEEN JOINTS OR ELEVATIONS ABOVE OR BELOW BOTTOM OF CASING ARE STILL ACCURATE.

AT 11:19 JOE HADERFELD ARRIVED ON SITE. WHILE WAITING TO GET THE RTS TOOL READY, JOE PROCEEDED TO INSPECT THE PLANT WITH NFMU REPS. METERS, GAGES, ETC. WERE INSPECTED THROUGHOUT THE PLANT. WHILE EGL PREPARED THE IODINE 131 INSERTION IN THE TUBE OPENING, THE PRINTS OF THE TEMP. LOG ARE BEING PRINTED BY PETER "MILES" McHugh.

A TOTAL OF 10 MICROCURIES OF IODINE 131 HAVE BEEN INSERTED IN THE EJECTOR OF THE LOGGING TOOL. A 31 SECOND EJECTOR OPENING WILL RELEASE 9 TO 10 MICROCURIES. THE DISCHARGE EJECTION RELATIONSHIP WAS CALCULATED ABOVE GROUND USING WATER PRIOR TO LOADING UP THE TOOL WITH IODINE 131.

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# CONSTRUCTION REPORT

DATE OCT. 7, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER HOT-SUNNY
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE S. MILLER (EGC), B. PITT (REI), J. MYERS, & J. HABERFELD (FDEP)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

RADIOACTIVE TRACER TEST

LOADED 10 MICROCURIES OF IODINE 131 ($^{131}I$) IN THE EJECTOR (LOCATED ABOVE THE MIDDLE GAMMA RAY DETECTOR BUT BELOW THE UPPER GAMMA RAY DETECTOR) - (SEE SKETCH ON NEXT PAGE). AT NOON TIME THE LOGGER STARTED GOING DOWNHOLE WITH THE TOOL ASSEMBLY. JOE HABERFELD OF FDEP (TALLAHASSEE) IS ON HAND AND OBSERVING THE OPERATION.

JACK MYERS OF FDEP (FT MYERS) HAS ARRIVED (12:10 P.M.) AND THE LOGGING TOOL IS STILL GOING DOWN THE HOLE. I SHOW BOTH HABERFELD AND MYERS THE LOGGING TOOL CONFIGURATION AND PROVIDE THEM WITH A COPY, HOWEVER THE SKETCH IN THE NEXT PAGE IS MORE ACCURATE THAN THE ONE I PROVIDED TO HABERFELD IN THE FIELD. ALSO INFORM FDEP OF INTENTION TO RELEASE 2 MICROCURIES OF IODINE 131 FOR THE STATIC TEST.

A DECISION HAS BEEN MADE TO REDUCE THE FIRST RELEASE TO 1 MICROCURIES (A 3.1 SECONDS EJECTION TIME) BECAUSE THIS IS A SMALL CASING AND WE DONT NEED MORE IODINE 131 TO PRODUCE A GOOD SHOWING. USING 2 MICROCURIES WOULD BE OVERKILL AND COULD CLOG UP THE GAMMA RAY DETECTORS.

STATIC TEST

BOTTOM OF CASING IS AT 2,343 FT. EJECTOR IS ~~PLACED~~ LOCATED 13.5 FEET ABOVE BOTTOM OF TOOL AND IT IS PLACED ONE FOOT BELOW THE BOTTOM OF THE CASING AT 2,344 FT. THE UPPER DETECTOR IS INSIDE THE CASING THE MIDDLE DETECTOR IS 2.5 FEET BELOW THE EJECTOR AND 3.5 FEET BELOW THE BOTTOM OF THE CASING. THE LOWER DETECTOR IS 13.5 FT. BELOW



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DATE OCT. 7, 1997

PROJECT NAME NFMU - MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER HOT - SUNNY
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE J. MILLER (FCT), D. PITT (REI), J. AYERS & J. HAVERFELD (FDEP)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

THE BOTTOM OF THE CASING.
WE RELEASE IODINE 131 FOR 3.1 SECONDS (THE EJECTOR PORT IS HELD OPEN 3.1 SECONDS) AND 1 MICROCURIE OF TRACER IS RELEASED. WE WILL HOLD THIS LOCATION FOR 1 HOUR.

AFTER 14 MINUTES A SPIKE IS RECORDED IN THE LOWER DETECTOR BUT ON THE MIDDLE DETECTOR A CORRESPONDING SPIKE TWO MINUTES EARLIER SHOWS LITTLE ACTIVITY (PERHAPS BECAUSE THIS DETECTOR IS SET TO LOWER SENSITIVITY. SIMILAR ACTIVITY TAKES PLACE 30 MINUTES INTO THE TEST AND 43 MINUTES INTO THE TEST. AT 58 MINUTES, THE BOTTOM DETECTOR RECORDS A SPIKE MOVING THROUGH BUT THE MIDDLE DETECTOR DOES NOT RECORD IT. THE UPPER DETECTOR DOES NOT RECORD ANY CHANGE DURING THE STATIC TEST.
THE LOGGING UP THE HOLE TO FIND THE TRACER SHOWS IT AT 2,343 FT AS EXPECTED, AND BOTH THE MIDDLE AND LOWER DETECTORS FIND IT THERE. THE UPPER DETECTOR SHOWS NO ACTIVITY.

THE INJECTION PUMPS ARE TURNED ON TO FLUSH OUT THE IODINE 131 FROM THE STATIC TEST. WE FLOW AT 1,500 GPM FOR ABOUT 20 MINUTES TO COMPLETE THE FLUSHING OUT OF THE TRACER. A PASS THROUGH THE PREVIOUS RELEASE POINT WITH ALL THREE DETECTORS SHOWS THE IODINE 131 HAS BEEN FLUSHED OUT.
DYNAMIC TEST:
AT 3:17 PM THE FIRST DYNAMIC TEST IS PERFORMED (STARTED). THE EJECTOR IS SET 5 FEET ABOVE THE BOTTOM OF THE CASING SO THAT ONLY THE BOTTOM DETECTOR IS IN THE OPEN HOLE. WE START PUMPING IN WATER AT A RATE OF 130 GPM, AND AT 3:18 P.M. WE OPEN THE EJECTOR FOR 6.2 SECONDS AND RELEASE 2 MICROCURIES OF $I^{131}$. WE THEN START LOGGING IN PLACE FOR 1 HOUR AS WE FLUSH AT 130 GPM.

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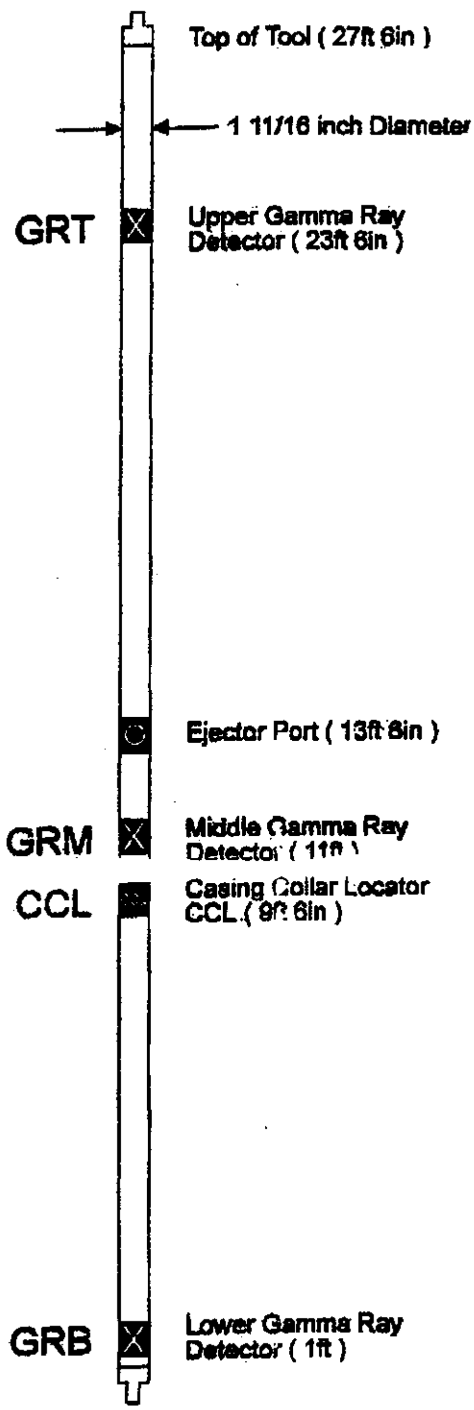
# CONSTRUCTION REPORT

DATE OCT. 7, 1997

PROJECT NAME NFMU - MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROS. INC.
WEATHER HOT - SUNNY
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE STEVE MILLER (FLORIDA GEOPHYSICAL) BILL PITT (RUST E&I)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:




THIS SKETCH REPRESENTS THE CONFIGURATION OF THE RTS LOGGING TOOL USED BY FLORIDA GEOPHYSICAL ON THIS JOB.

GRT = TOP DETECTOR (UPPER)
GRM = MIDDLE DETECTOR
GRB = BOTTOM DETECTOR (LOWER)

THE EJECTION PORT IS ABOVE THE MIDDLE DETECTOR.

ALL MEASUREMENTS ARE GIVEN FROM THE BOTTOM OF THE TOOL. FOR EXAMPLE, THE MIDDLE GAMMA RAY DETECTOR IS 11 FEET ABOVE THE BOTTOM OF THE TOOL AND THE LOWER GAMMA RAY DETECTOR IS 1 FT. ABOVE THE BOTTOM OF THE TOOL. THE TEMPERATURE PROBE IS AT THE BOTTOM OF THE TOOL (SEE FIGURE 2-4) IN TH

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# CONSTRUCTION REPORT

DATE OCT. 7, 1997

PROJECT NAME NFMU-MIT
PROJECT NO. 200898
CONTRACTOR YOUNGQUIST BROTHERS, INC.
WEATHER HOT AND SUNNY
CONTRACTOR'S REPRESENTATIVE BILL MUSSELWHITE
FIELD REPRESENTATIVE FDEP (HABERFELD & MYERS), PBI (PITT), FGS (MILLER)

## DESCRIPTION OF WORK OBSERVED AND REMARKS:

WITHIN TWO MINUTES OF TRACER RELEASE THE MIDDLE DETECTOR SHOWS SHOWS A SHARP INCREASE IN GAMMA RAY ACTIVITY AND DOES NOT RETURN TO BACKGROUND LEVELS UNTIL ABOUT 28 MINUTES LATER.

THE LOWER DETECTOR PICKS UP THE RADIATION ABOUT A MINUTE AFTER THE MIDDLE DETECTOR DID, AND AFTER 30 MINUTES IT IS STILL SLIGHTLY ABOVE ORIGINAL LEVELS.

THE UPPER DETECTOR DID NOT PICK UP ANY RADIATION.

THE LOGGING BACK UP THE WELL DID NOT SHOW ANY UPWARD MOVEMENT OF THE TRACER. A SMALL BLIP ON THE BOTTOM DETECTOR GRAPH AT 2125 IS NOT SIGNIFICANT AND IS PROBABLY A SMALL LEAK FROM THE EJECTOR IF AT ALL BECAUSE EVEN IN THE BACKGROUND LOG BEFORE ANY IODINE 131 WAS INTRODUCED, THERE WAS A SMALL INCREASE IN GAMMA RAY ACTIVITY AT THAT DEPTH.

THE FLUSH OUT AND RE-RUN TO COMPARE WITH PRE-TRACER INJECTION SHOWS THE TWO GRAPHS CLOSELY PARALLELING EACH OTHER; INDICATING THAT THE RADIOACTIVE IODINE 131 DID NOT MOVE UP FROM THE INJECTION ZONE. THIS CONFIRMS MECHANICAL INTEGRITY OF THE INJECTION SYSTEM AT NFMU.

SECOND DYNAMIC TEST

THE SECOND DYNAMIC TEST SHOWED THE SAME RESULTS AS THE FIRST DYNAMIC TEST.



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# Appendix E - T.V. Survey Notes (Dec. 3, 1987)

TELEVISION SURVEY NOTES ON THE OPEN HOLE
AFTER WELL CONSTRUCTION WAS COMPLETED

DECEMBER 3, 1987

| Depth (feet) | Comments |
|---|---|
| 0 - 2,340 | Casing. |
| 2,340 | Out of casing. |
| 2,341 - 2,349 | Tight round hole with smooth walls and little, if any, porosity. |
| 2,351 - 2,353 | Rougher walls - some porosity. |
| 2,353 - 2,357 | Small openings (smaller than cavities). |
| 2,363 - 2,364 | Openings are bigger but still cannot be called cavities. High permeability. |
| 2,368 - 2,375 | Tight round hole (no visible porosity). |
| 2,375 - 2,376 | Broken section good porosity. Probably high permeability. Fractures. |
| 2,379 - 2,381 | Large cavern. Very good injection potential |
| 2,381 - 2,384 | Rough porous walls. |
| 2,384 - 2,385 | Broken sections. Good porosity and permeability. |
| 2,387 | Very rough walls. Small openings. |
| 2,393 | Rough walls. |
| 2,395 - 2,397 | Small cavities. |
| 2,397 | Small cavern. |
| 2,398 - 2,405 | Smooth walls. |
| 2,408 - 2,410 | Vertical fracture (not interconnected). |
| 2,410 - 2,414 | Smooth walls. |
| 2,414 - 2,418 | Broken section - numerous holes. Good permeability. |
| 2,420 - 2,423 | Fair porosity. |
| 2,423 - 2,427 | Very large cavern. Light does not reach the walls. The whole 4.0 mgd can easily be injected into this cavity alone. |
| 2,427 - 2,429 | Same cavern as above, but here the walls are seen to be very fractured. |
| 2,430 | Still extremely fractured zone, but here a horizontal fracture is seen to bridge the well bore and continues into the formation. |
| 2,431 - 2,434 | Very broken section. Large permeable zone. |

(Continued)

| Depth (feet) | Comments |
|---|---|
| 2,434 - 2,437 | Tight hole - low porosity. |
| 2,437 - 2,438 | Rough walls - some porosity. |
| 2,444 - 2,446 | Rough walls - porous zone. |
| 2,450 - 2,463 | Rough walls - some porosity. |
| | THIS IS THE SECTION OF CORE 8. |
| 2,458 | Small hole (cavity). |
| 2,464 - 2,465 | Some cavities, but not much interconnection. |
| 2,465 - 2,478 | Fairly smooth hole. Almost as tight as some confining sections above the injection zone. |
| 2,478 - 2,480 | Fractured zone. Horizontal and vertical openings criss-cross the open hole. |
| 2,491 | Large hole. |
| | THIS IS THE LAKE CITY - OLDSMAR CONTACT ACCORDING TO SAMPLES. |
| 2,493 - 2,506 | Very tight round hole. No porosity. Walls are dense and non-porous. |
| 2,506 - 2,507 | Porosity starts increasing. |
| 2,507 | Hole |
| 2,509 | Hole |
| 2,511 - 2,514 | Some cavities are present. Hole loses roundness and the formation is obviously broken [illegible] Small cavern. |
| 2,514 - 2,518 | Numerous small cavities. Lots of fractures. Could be considered a cavern that is not well developed. |
| 2,518 - 2,520 | Small cavities. |
| 2,520 - 2,527 | Dense and tight formations. Very low porosity. |
| 2,527 - 2,529 | This is the carbonaceous layer reported as lignite in the cuttings description. This material burns when fired. |
| 2,529 - 2,533 | Traces of thin lignite beds still visible. |
| 2,533 - 2,536 | More lignite layers. This is so dark that it almost looks like a cavern. |
| 2,537 | Another lignite layer. |
| 2,539 - 2,555 | Light-colored limestone. Very tight and dense - low porosity and probably impermeable. |
| 2,555 - 2,578 | Picture is cloudy, but same as above. |
| 2,580 - 2,603 (TD) | Same as above but cloudier. |

# Appendix F- T.V. Video (October 1, 1997)

# Appendix G -Temperature Log (October 7, 1997)

**FLORIDA GEOPHYSICAL LOGGING, INC.**

HIGH RESOLUTION TEMPERATURE SURVEY

FILE NO. ______

| | |
|---|---|
| COMPANY | NORTH FT. MYERS UTILITIES |
| WELL | IW-1 |
| FIELD | NORTH FT. MYERS |
| COUNTY | LEE |
| STATE | FLORIDA |
| LOCATION | NORTH FORT MYERS WATER RECLAIMATION FACILITY |
| OTHER SERVICES: | RTS |
| SEC. ___ TWP ___ RGE ___ | |
| PERMANENT DATUM | PAD |
| ELEV. | |
| LOG MEASURED FROM | PAD FT. ABOVE PERMANENT DATUM |
| DRILLING MEASURED FROM | PAD |
| ELEV.: K.B. ___ D.F. ___ G.L. ___ | |
| DATE | 7-OCT-97 |
| RUN NO. | MIT |
| TYPE LOG | RTS/HRT |
| DEPTH-DRILLER | 2600' |
| DEPTH-LOGGER | 2578' |
| LOGGED INTERVAL | SURFACE TO 2578' |
| OPERATING RIG TIME | 2 HRS |
| TYPE FLUID IN HOLE | WATER |
| SALINITY, PPM CL | FRESH/TREATED |
| DENSITY-VISCOSITY | 8.5/NA |
| LEVEL | FULL |
| MAX. REC. TEMP. DEG F. | 92 DEGF |
| EQUIPMENT-LOCATION | 101 - FTM |
| RECORDED BY | S.MILLER |
| WITNESSED BY | B.PITT (RUST) / J.HABERFELD/J.MYER |

| BOREHOLE RECORD | | | | CASING RECORD | | | |
|---|---|---|---|---|---|---|---|
| RUN NO. | BIT | FROM | TO | SIZE | WGT. | FROM | TO |
| ONE | 35" | SURFACE | 220' | 30" | | SURF | 220' |
| TWO | 28" | 220' | 1100' | 24" | | SURF | 1100' |
| THREE | 24" | 1100' | 1582' | 20" | | SURF | 1582' |
| FOUR | 12" | 1582' | 2600' | 13 3/8" | | SURF | 2343' |



**REMARKS**

TEMPERATURE DATA GATHERED LOGGING DOWN.
WELL STATUS: STATIC

VERSION: 2.26

**TEMPERATURE**

NFTMTEMP1

FINISH DEPTH: -0.1 FEET DIRECTION: UP DATE: 10/07/97 TIME: 08:16:15 MODE: TRACE PLAYBACK

MC: TEMPERATURE — 50 DEGREES 150
GRT — 0 GAPI 100

DELTA TEMPERATURE — -1.0 1.0
TEMPERATURE — 70 DEGREES 90


GRT — 0 GAPI 100
MC: TEMPERATURE — 50 DEGREES 150

TEMPERATURE — 70 DEGREES 90
DELTA TEMPERATURE — -1.0 1.0

START DEPTH: 2600.0 FEET DIRECTION: UP DATE: 10/07/97 TIME: 09:09:26 MODE: TRACE PLAYBACK

NFTMTEMP1

**TEMPERATURE**

VERSION: 2.26

**MASTER CALIBRATION SUMMARY**

FILE: DATE: 10/08/97 TIME: 09:07 VERSION: 2.26

TEMPERATURE #951

DATE: 10/06/97 TIME: 14:00

| | MEASURED | UNITS | STANDARD | MINIMUM | MAXIMUM | DEVIATION | UNITS |
|---|---|---|---|---|---|---|---|
| ICE/WATER BATH | 109.5 | CPS | 32.5 | 32.4 | 32.6 | 0.06 | DEGF |
| AMBIENT | 1080.1 | CPS | 93.0 | 92.8 | 93.3 | 0.15 | DEGF |
| CONVECTION | 1954.7 | CPS | 150.0 | 147.5 | 152.4 | 1.63 | DEGF |

UPPER GR #U51

DATE: 10/07/97 TIME: 07:51

| | MEASURED | UNITS | STANDARD | MINIMUM | MAXIMUM | DEVIATION | UNITS |
|---|---|---|---|---|---|---|---|
| SHOP: BACKGROUND | 35.4 | CPS | 0.0 | 18.0 | 38.6 | 4.79 | API |
| SHOP: CALIBRATOR | 186.9 | CPS | 120.0 | 121.7 | 175.3 | 10.98 | API |

| | |
|---|---|
| COMPANY | NORTH FT. MYERS UTILITIES |
| | NORTH FT. MYERS WATER RECLAIMATION |
| WELL | IW-1 |
| FIELD | NORTH FT. MYERS |
| STATE | FLORIDA |

# Appendix H - Pressure Gauge Calibration Certificate

KELI

Kimball Electronic Laboratory, Inc.

*Precision Measurement Equipment Specialists*

# Certificate of Calibration

Customer: YOUNGQUIST BROTHERS, INC.
Certificate # 0000044462
Manufacturer: MCDANIEL
Model Number: 200 PSI
Nomenclature: PRESSURE TEST GAUGE
Serial/I.D. # 7868120
Specifications: +/-.25%
Cal. Procedure: MP03/C1-NAV
KELI Control # YOU-44462

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Inc. or derived by the ratio type of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL Z540-1.

In Tolerance When Received? N Cal. Tech:012 Relative Humidity: 50% Temperature: 73 Deg. F

In-House Y Cal. Cycle: 12 Mos. Calibration Date: 09/30/1997 Calibration Due: 09/30/1998

Remarks: RECEIVED READING 1% HIGH @ 160 PSI
ADJUSTED TO MEET MANUFACTURERS SPECIFICATIONS

| I.D. # | Standards Used | Cal. Date | Cal. Due |
|---|---|---|---|
| 331 | AMETEK T-150 DEAD WEIGHT TESTER | 07/22/1997 | 07/22/1999 |

Quality Assurance





8081 West 21st Lane, Hialeah, Fl. 33016 • Ph (305) 822-5792 • Fax (305) 362-3125

KELI

# Kimball Electronic Laboratory, Inc.

*Precision Measurement Equipment Specialists*

YOUNGQUIST BROTHERS, INC.

Certificate Of Test # 152248

KELI Control # YOU-44462

Manufacturer: MCDANIEL
Model: 200 PSI
Serial / I.D: 7868120
Description: PRESSURE TEST GAUGE

| RANGE | APPLIED | READING PRE-CAL | READING POST-CAL | LOW LIMIT | HIGH LIMIT | SPECIFICATIONS |
|---|---|---|---|---|---|---|
| 200 PSI | 40 | 39.5 | 39.5 | 39.5 | 40.5 | +/-.25% of FS |
| | 80 | 79.8 | 79.5 | 79.5 | 80.5 | |
| | 120 | 120.2 | 119.5 | 119.5 | 120.5 | |
| | 160 | **161.8 | 160.0 | 159.5 | 160.5 | |
| | 200 | 199.8 | 200.5 | 199.5 | 200.5 | |

In tolerance when received? *NO* Temperature: *73* Deg. F R.H. *50* %

Remarks: *ADJUSTED TO MEET MANUFACTURER'S SPECIFICATIONS*
***RECEIVED READING OUT OF SPECIFICATIONS*

| I.D.# | STANDARDS USED | CAL. DATE | CAL. DUE |
|---|---|---|---|
| 331 | AMETEK T-150 DEAD WEIGHT TESTER | 07/22/97 | 07/22/99 |

Procedure Used: *MP03/C1-NAV* Accuracy: *MANUFACTURERS*

**The accuracy & calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Inc. and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL Z540-1.**

Calibration Date: *09/30/97* Cal. Tech: *012*

Calibration Due: *09/30/98*

Approved By

8081 West 21st Lane, Hialeah, Fl. 33016 • Ph (305) 822-5792 • Fax (305) 362-3125

# Appendix I - RTS Tool Configuration

# Appendix J - Radioactive Tracer Survey (RTS)

# FLORIDA GEOPHYSICAL LOGGING, INC.

RADIOACTIVE TRACER SURVEY LOG

FILE NO.

| | |
|---|---|
| COMPANY | NORTH FT. MYERS UTILITIES |
| WELL | IW-1 |
| FIELD | NORTH FT. MYERS |
| COUNTY | LEE |
| STATE | FLORIDA |
| LOCATION | NORTH FORT MYERS WATER RECLAMATION FACILITY |
| OTHER SERVICES: | HRT |
| SEC. | TWP. RGE. |
| PERMANENT DATUM | PAD ELEV. |
| LOG MEASURED FROM | PAD FT. ABOVE PERMANENT DATUM |
| DRILLING MEASURED FROM | PAD |
| ELEV.: K.B. / D.F. / G.L. | |
| DATE | 7-OCT-97 |
| RUN NO. | MIT |
| TYPE LOG | RTS/HRT |
| DEPTH-DRILLER | 2600' |
| DEPTH-LOGGER | 2578' |
| LOGGED INTERVAL | 2578 TO SURFACE |
| OPERATING RIG TIME | 7 HRS |
| TYPE FLUID IN HOLE | WATER |
| SALINITY, PPM CL | FRESH/TREATED |
| DENSITY-VISCOSITY | 8.5/NA |
| LEVEL | FULL |
| MAX. REC. TEMP. DEG F. | 92 DEGF |
| EQUIPMENT-LOCATION | 101 - FTM |
| RECORDED BY | S.MILLER |
| WITNESSED BY | B.PITT (RUST) J.HABERFELD/J.MYER |

| BOREHOLE RECORD | | | | CASING RECORD | | | |
|---|---|---|---|---|---|---|---|
| RUN NO. | BIT | FROM | TO | SIZE | WGT. | FROM | TO |
| ONE | 35" | SURFACE | 220' | 30" | | SURF | 220' |
| TWO | 28" | 220' | 1100' | 24" | | SURF | 1100' |
| THREE | 24" | 1100' | 1582' | 20" | | SURF | 1582' |
| FOUR | 12" | 1582' | 2600' | 13 3/8" | | SURF | 2343' |



REMARKS: ** PRESENTATION NOTES**

INITIAL BACKGROUND GAMMA RAY (AND MERGED) CURVES ARE PRESENTED AS DASHED LINES.

"REAL TIME" GAMMA RAY CURVES ARE PRESENTED AS SOLID LINES.

**REMARKS**

RADIOACTIVE TRACER SURVEY TOOL STRING CONFIGURATION

OVERALL LENGTH: 25.1'

TOOL DIAMETER: 1 11/16"

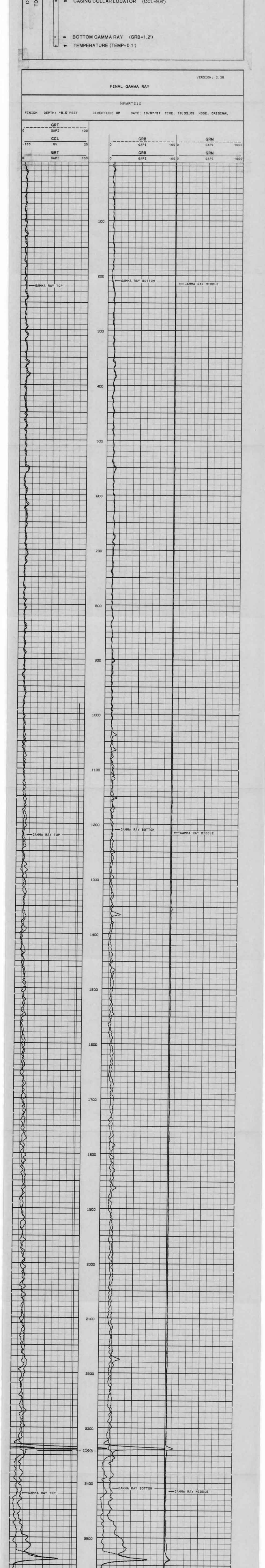
- UPPER GAMMA RAY (GRT=23.3')
- EJECTOR PORT (EJ=13.5')
- MIDDLE GAMMA RAY (GRM=11.4')
- CASING COLLAR LOCATOR (CCL=9.6')
- BOTTOM GAMMA RAY (GRB=1.2')
- TEMPERATURE (TEMP=0.1')

VERSION: 2.26

FINAL GAMMA RAY

NFMRTS10

FINISH DEPTH: -9.5 FEET DIRECTION: UP DATE: 10/07/97 TIME: 18:32:05 MODE: ORIGINAL




START DEPTH: 2585.1 FEET DIRECTION: UP DATE: 10/07/97 TIME: 17:26:25 MODE: ORIGINAL

NFMRTS10

FINAL GAMMA RAY

VERSION: 2.26

**REMARKS**

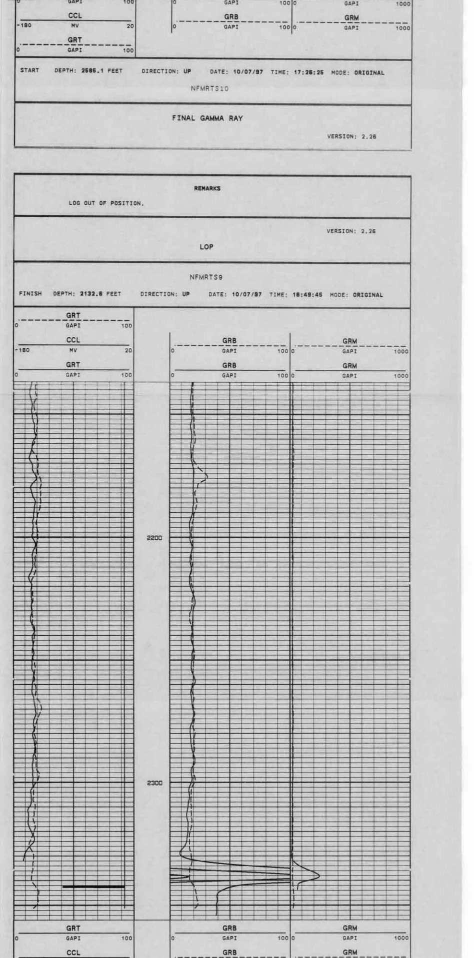
LOG OUT OF POSITION.

VERSION: 2.26

LOP

NFMRTS9

FINISH DEPTH: 2132.6 FEET DIRECTION: UP DATE: 10/07/97 TIME: 16:49:45 MODE: ORIGINAL




START DEPTH: 2351.5 FEET DIRECTION: UP DATE: 10/07/97 TIME: 16:43:15 MODE: ORIGINAL

NFMRTS9

LOP

VERSION: 2.26

**REMARKS**

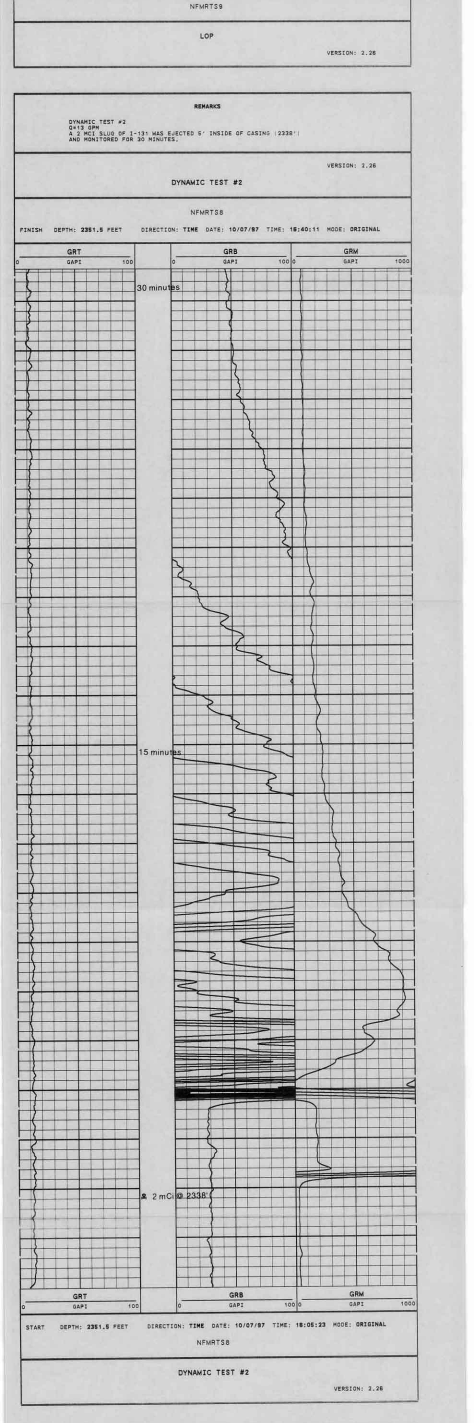
DYNAMIC TEST #2
Q=13 GPM
A 2 MCI SLUG OF I-131 WAS EJECTED 5' INSIDE OF CASING (2338')
AND MONITORED FOR 30 MINUTES.

VERSION: 2.26

DYNAMIC TEST #2

NFMRTS8

FINISH DEPTH: 2351.5 FEET DIRECTION: TIME DATE: 10/07/97 TIME: 16:40:11 MODE: ORIGINAL




START DEPTH: 2351.5 FEET DIRECTION: TIME DATE: 10/07/97 TIME: 16:05:23 MODE: ORIGINAL

NFMRTS8

DYNAMIC TEST #2

VERSION: 2.26

**REMARKS**

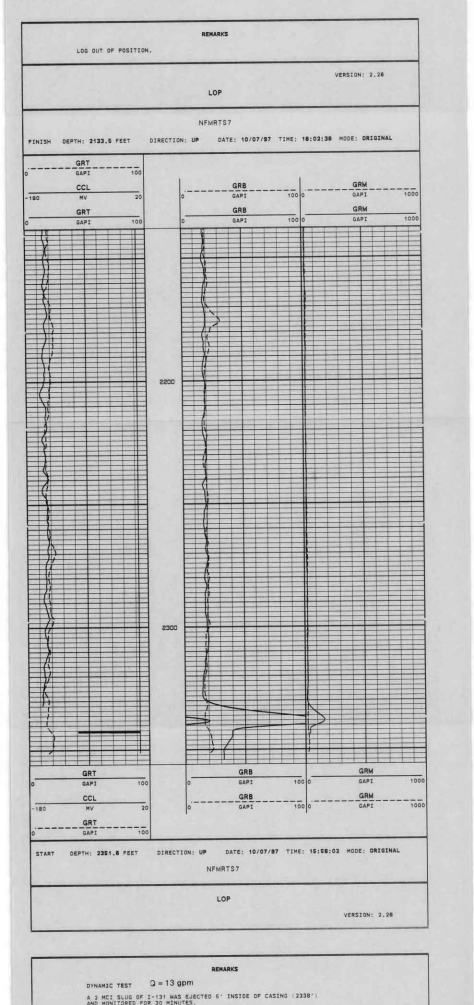
LOG OUT OF POSITION.

VERSION: 2.26

LOP

NFMRTS7

FINISH DEPTH: 2133.5 FEET DIRECTION: UP DATE: 10/07/97 TIME: 16:02:36 MODE: ORIGINAL




START DEPTH: 2351.6 FEET DIRECTION: UP DATE: 10/07/97 TIME: 15:58:02 MODE: ORIGINAL

NFMRTS7

LOP

VERSION: 2.26

**REMARKS**

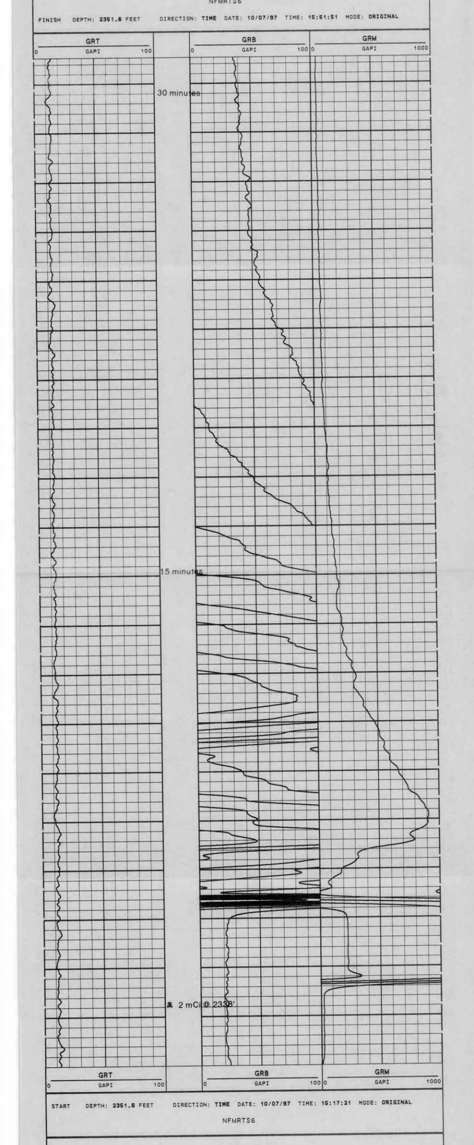
DYNAMIC TEST Q = 13 gpm
A 2 MCI SLUG OF I-131 WAS EJECTED 5' INSIDE OF CASING (2338')
AND MONITORED FOR 30 MINUTES.

VERSION: 2.26

DYNAMIC TEST #1

NFMRTS6

FINISH DEPTH: 2351.6 FEET DIRECTION: TIME DATE: 10/07/97 TIME: 15:51:51 MODE: ORIGINAL




START DEPTH: 2351.6 FEET DIRECTION: TIME DATE: 10/07/97 TIME: 15:17:21 MODE: ORIGINAL

NFMRTS6

DYNAMIC TEST #1

VERSION: 2.26

**REMARKS**

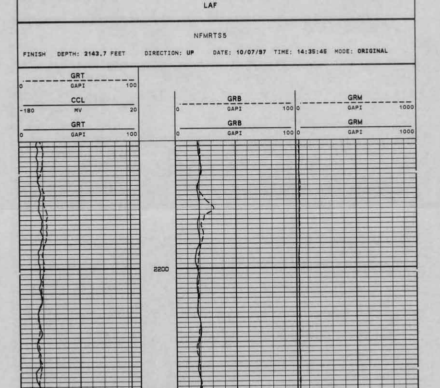
LOG AFTER FLUSH PASS.
FLUSHED APPROX. 25,000 GALS.

VERSION: 2.26

**LAF**

NFMRTS5

FINISH DEPTH: **2143.7** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **14:35:45** MODE: **ORIGINAL**




START DEPTH: **2357.4** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **14:29:03** MODE: **ORIGINAL**

NFMRTS5

**LAF**

VERSION: 2.26

**REMARKS**

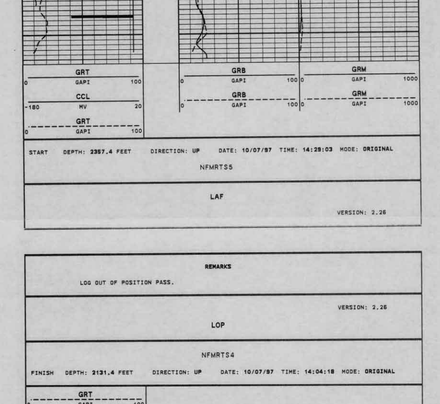
LOG OUT OF POSITION PASS.

VERSION: 2.26

**LOP**

NFMRTS4

FINISH DEPTH: **2131.4** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **14:04:18** MODE: **ORIGINAL**




START DEPTH: **2357.5** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **13:57:43** MODE: **ORIGINAL**

NFMRTS4

**LOP**

VERSION: 2.26

**REMARKS**

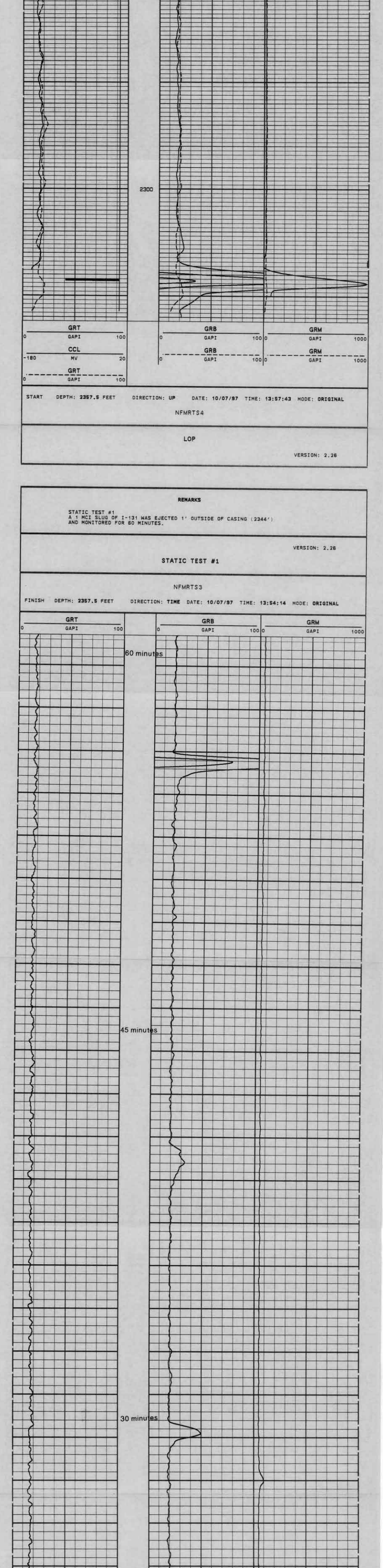
STATIC TEST #1
A 1 MCI SLUG OF I-131 WAS EJECTED 1' OUTSIDE OF CASING (2344')
AND MONITORED FOR 60 MINUTES.

VERSION: 2.26

**STATIC TEST #1**

NFMRTS3

FINISH DEPTH: **2357.5** FEET DIRECTION: **TIME** DATE: **10/07/97** TIME: **13:54:14** MODE: **ORIGINAL**




START DEPTH: **2357.5** FEET DIRECTION: **TIME** DATE: **10/07/97** TIME: **12:50:57** MODE: **ORIGINAL**

NFMRTS3

**STATIC TEST #1**

VERSION: 2.26

VERSION: 2.26

**STATIC TEST 1**

NFMRTS3

FINISH DEPTH: **2357.5** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **12:50:09** MODE: **ORIGINAL**

| GRT | | GRB | GRM |
|---|---|---|---|
| 0 GAPI 100 | | 0 GAPI 100 | 0 GAPI 1000 |
| GRT | | GRB | GRM |
| 0 GAPI 100 | | 0 GAPI 100 | 0 GAPI 1000 |

START DEPTH: **2357.5** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **12:49:46** MODE: **ORIGINAL**

NFMRTS3

**STATIC TEST 1**

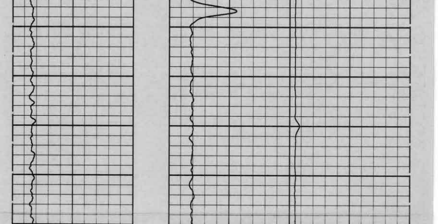
VERSION: 2.26

VERSION: 2.26

**TIE-IN PASS**

NFMRTS2

FINISH DEPTH: **2314.7** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **12:41:00** MODE: **TRACE PLAYBACK**




START DEPTH: **2380.9** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **12:38:53** MODE: **TRACE PLAYBACK**

NFMRTS2

**TIE-IN PASS**

VERSION: 2.26

**REMARKS**

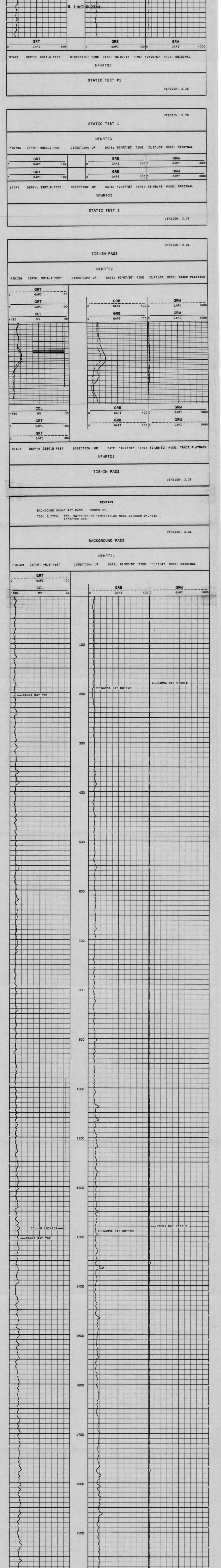
BACKGOUND GAMMA RAY PASS - LOGGED UP.
TOOL GLITCH: TOOL SWITCHED TO TEMPERATURE MODE BETWEEN 910-930';
AFFECTED GRB.

VERSION: 2.26

**BACKGROUND PASS**

NFMRTS1

FINISH DEPTH: **-8.5** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **11:15:47** MODE: **ORIGINAL**




START DEPTH: **2584.1** FEET DIRECTION: **UP** DATE: **10/07/97** TIME: **10:18:41** MODE: **ORIGINAL**

NFMRTS1

**BACKGROUND PASS**

VERSION: 2.26

**MASTER CALIBRATION SUMMARY**

FILE: DATE: 10/07/97 TIME: 09:18 VERSION: 2.26

LOWER GAMMA RAY #L51

DATE: 10/07/97 TIME: 07:51

| | MEASURED | UNITS | STANDARD | MINIMUM | MAXIMUM | DEVIATION | UNITS |
|---|---|---|---|---|---|---|---|
| BACKGROUND | 54.5 | CPS | 0.0 | 29.8 | 38.4 | 1.89 | API |
| CALIBRATOR | 249.1 | CPS | 120.0 | 139.1 | 162.8 | 4.00 | API |

MIDDLE GAMMA M51

DATE: 10/07/97 TIME: 07:51

| | MEASURED | UNITS | STANDARD | MINIMUM | MAXIMUM | DEVIATION | UNITS |
|---|---|---|---|---|---|---|---|
| BACKGROUND | 38.7 | CPS | 0.0 | 23.0 | 31.9 | 1.98 | API |
| CALIBRATOR | 205.3 | CPS | 120.0 | 136.5 | 158.1 | 4.18 | API |

UPPER GR #U51

DATE: 10/07/97 TIME: 07:51

| | MEASURED | UNITS | STANDARD | MINIMUM | MAXIMUM | DEVIATION | UNITS |
|---|---|---|---|---|---|---|---|
| SHOP: BACKGROUND | 35.4 | CPS | 0.0 | 18.0 | 38.6 | 4.79 | API |
| SHOP: CALIBRATOR | 186.9 | CPS | 120.0 | 121.7 | 175.3 | 10.98 | API |

COMPANY NORTH FT. MYERS UTILITIES
NORTH FT. MYERS WATER RECLAIMATION
WELL IW-1
FIELD NORTH FT. MYERS STATE FLORIDA

# Appendix K - FDEP Permit

# Department of Environmental Protection

Lawton Chiles
Governor

South District
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901-3881

Virginia B. Wetherell
Secretary


## NOTICE OF PERMIT

PERMITTEE:

North Fort Myers Utilities
128 John Smith Loop
North Fort Myers, FL 33917

I.D. No: 5236P00249
Permit/Certification
Number: UO36-301451
Date of Issue: October 8, 1997
Expiration Date: October 8, 2002
County: Lee
Latitude: 26° 43' 58" N
Longitude: 81° 52' 54" W
Section/Town/Range: 14/43S/24E
Project: North Fort Myers Utility
Class I Injection Well
IW-1

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Rules 62-4, 62-520, 62-528, 62-600, 62-601, and 62-620. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the Department and made a part hereof and specifically described as follows:

Operate a nominal 12 inch diameter Class I injection well (IW-1) with 12 inch steel casing cemented to 2,340 feet below land surface (bls) and a total depth of 2,600 feet bls utilized as a back up for disposal of non-hazardous, secondarily treated domestic wastewater following filtration and disinfection from the existing wastewater treatment plant. The maximum injection rate and pressure shall not exceed 2810 gallons per minute (4.0 million gallons per day) and 86 pounds per square inch, respectively. The existing dual zone monitor well will monitor from a shallow zone (1318-1422 feet bls) and a deeper zone (1930-2004 feet bls).

The Application to Construct/Operate/Abandon Class I, III, or V Injection Well System, DEP Form 62-528.900(1), was received February 13, 1997 with supporting documents and additional information last received April 3, 1997. Project is located at 1700 Tucker Lane, North Fort Myers, Lee County, Florida.

Subject to General Conditions 1-16 and Specific Conditions 1-7.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

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 by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5) F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any 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 the permit.

4. This permit conveys no title to land or 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 or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by any 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, as 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
credential 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 the conditions of the permit;
b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

GENERAL CONDITIONS:

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may 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 non-compliance; and
b. The period of non-compliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. 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 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 prescribed by Section 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. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-3.051, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.

11. This permit is transferable only upon Department approval in accordance with F.A.C. Rules 62-4.120 and 62-30.300, F.A.C. as applicable. 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. This permit also constitutes:

(a) Determination of Best Available Control Technology (BACT)
(b) Determination of Prevention of Significant Deterioration PSD)
(c) Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
(d) Compliance with New Source Performance Standards

GENERAL CONDITIONS:

14. 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 will be extended automatically, unless otherwise stipulated by the Department.

(b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all 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:

1. the date, exact place, and time of sampling or measurements;
2. the person responsible for performing the sampling or measurements;
3. the dates analyses were performed;
4. the person responsible for performing the analyses;
5. the analytical techniques or methods used;
6. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the 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.

16. In the case of an underground injection control permit, the following permit conditions also shall apply:

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

(b) 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 schedule date.

GENERAL CONDITIONS:

(c) Notification of any noncompliance which may endanger health or the environment shall be reported verbally to the Department within 24 hours and again within 72 hours, and a final written report provided within two weeks.

1. The verbal reports shall contain any monitoring or other information which indicate that any contaminant may endanger an underground source of drinking water and 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.

2. The written submission shall contain a description of an a discussion of the cause of the noncompliance and, if it has not been corrected, the anticipated time the noncompliance is expected to continue, the steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance and all information required by Rule 62-28.415(4)(b), F.A.C.

(d) The Department shall be notified at least 180 days before conversion or abandonment of an injection well, unless abandonment within a lesser period of time is necessary to protect waters of the State.

SPECIFIC CONDITIONS:

1. OPERATING REQUIREMENTS

a. Injection of fluids other than those permitted into the disposal wells(s) will constitute a violation of this permit and shall constitute cause for permit revocation and possible enforcement action for water quality violations.

b. In the event the permittee is temporarily unable to comply with any of the conditions of a permit due to breakdown of equipment, power outages, destruction by hazard of fire, wind, or by other cause, the permittee of the facility shall notify the Department.

1) Notification shall be made in person, by telephone, or by telegraph within 24 hours of breakdown or malfunction to the South District office.

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

SPECIFIC CONDITIONS:

c. The permittee shall calibrate all pressure gauges, flow meters, chart recorders, and other related equipment associated with the injection well system on a semiannual basis. The permittee shall maintain all monitoring equipment and shall ensure that the monitoring equipment is calibrated and in proper operating condition at all times. Laboratory equipment, methods, and quality control will follow EPA guidelines as expressed in Standard Methods for the Examination of Water and Wastewater.

   The pressure gauges, flow meters, and chart recorders shall be calibrated using standard engineering methods. Calibration records shall be submitted to the Department with the monthly monitoring data.

d. In the event a well must be plugged or abandoned, the permittee shall obtain a permit from the Department as required by Chapter 62-528, Florida Administrative Code. When no longer used for their intended purpose, these wells shall be properly plugged and abandoned. Within 180 days of well abandonment, the permittee shall submit to the Department and the TAC the proposed plugging method, pursuant to Rule 62-528.460, F.A.C.

e. The permittee shall notify the Department and obtain approval prior to any well work or modification, including removal of the well head.

f. No underground injection is allowed which causes or allows movement of fluid into underground sources of drinking water.

2. TESTING AND REPORTING REQUIREMENTS

a. A specific injectivity test shall be performed quarterly on the injection well as required by Rule 62-528.430(2)(b)1.b., F.A.C.

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

b. The permittee shall demonstrate the mechanical integrity pursuant to Rule 62-528.300(6)(b) and (c), Florida Administrative Code (F.A.C.), at least once every five (5) years during the life of the well. As part of the mechanical integrity survey a video television survey shall be conducted from the surface to the bottom of the injection zone or more frequently if deemed necessary by the Department, pursuant to Rule 62-528.425(1)(c), F.A.C. The last

SPECIFIC CONDITIONS:

mechanical integrity test for injection well IW-1 was conducted on October 14, 1992. Therefore, the next mechanical integrity test on the injection well shall be completed on or before October 14, 1997.

c. The Department must be notified seventy-two (72) hours prior to all testing for mechanical integrity on the injection wells. The testing procedure must be approved by the Department before testing begins. All testing must be initiated during daylight hours, Monday through Friday. An evaluation of all test results must be submitted with all test data.

d. Injection Well

The specifications for the injection well is as follows:

| Well Number | Casing Diameter/Depth (Inches/Feet bls) | Total Depth (Ft bls) |
|---|---|---|
| IW-1 | 12 Steel/2340 | 2600 |

The injection well shall be monitored in accordance with F.A.C. Rule 62-528.430(2) and the frequency and the parameters listed below.

| Parameters` | Frequency |
|---|---|
| Monthly Average Injection Pressure (psig) | Monthly |
| Monthly Maximum Injection Pressure (psig) | Monthly |
| Monthly Minimum Injection Pressure (psig) | Monthly |
| Monthly Average Flow Rate (gpm) | Monthly |
| Monthly Maximum Flow Rate (gpm) | Monthly |
| Monthly Minimum Flow Rate (gpm) | Monthly |
| Daily Average Injection Pressure (psig) | Continuously |
| Daily Maximum Injection Pressure (psig) | Continuously |
| Daily Minimum Injection Pressure (psig) | Continuously |
| Daily Average Flow Rate (gpm) | Continuously |
| Daily Maximum Flow Rate (gpm) | Continuously |
| Daily Minimum Flow Rate (gpm) | Continuously |
| Total Volume Discharged (Gals) | Monthly |
| Total Volume Discharged (Gals) | Daily |

SPECIFIC CONDITIONS:

| | |
|---|---|
| Nitrate and Nitrite (as N) (mg/L) | Monthly |
| Ammonia (as N) (mg/L) | Monthly |
| Total Kjeldahl Nitrogen (mg/L) | Monthly |

e. (1) MONITOR WELL

The monitor well consists of one dual zone monitor well as listed below:

ON-SITE MONITOR WELL

| Well Number | Casing Diameter/Depth (Inches/Feet bls) | Open Hole Interval (Feet bls) |
|---|---|---|
| MW-1 (Upper) | 10.00/1318 | 1318-1422 |
| MW-2 (Lower) | 4.000/1930 | 1930-2004 |

(2) MONITORING WELL PARAMETERS

The monitoring parameters listed below shall be developed and reported for the monitor well listed above. The monitor well casings shall be evacuated of three (3) to five (5) well volumes prior to collection of the water sample for analysis. The volume of water evacuated shall be based on the calculated volume of water in the well casing and sampling interval. The water sample collected shall be of sufficient volume to complete the analysis required. All samples must be analyzed by a laboratory certified in the State of Florida. The laboratory reports shall be submitted and shall include information required by General Condition 14C of this permit.

| | |
|---|---|
| Monthly Average Pressure or Water Level (psig or ft) | Monthly |
| Monthly Maximum Pressure or Water Level (psig or ft) | Monthly |
| Monthly Minimum Pressure or Water Level (psig or ft) | Monthly |
| Daily Average Pressure or Water Level (psig or ft) | Daily |

Pressure recorders shall keep a continuous record.

| | |
|---|---|
| pH (Standards Units) | Monthly |
| Specific Conductance (umhos/cm) | Monthly |
| Chloride (mg/l) | Monthly |
| Total Dissolved Solids (T.D.S.) (mg/l) | Monthly |

SPECIFIC CONDITIONS:

| | |
|---|---|
| Sulfate (mg/l) | Monthly |
| Field Temperature (°C) | Monthly |
| Ammonia (as N) (mg/l) | Monthly |
| Total Kjeldahl Nitrogen (TKN) (mg/l) | Monthly |
| Total Phosphorous (mg/l) | Monthly |
| Nitrate (as N) | Monthly |

f. The permittee shall submit to the Department the results of all injection well and monitor well data collected no later than the fifteenth (15) day of the month immediately following the end of the sampling period. The results shall be sent to the Department of Environmental Protection, South District Office, 2295 Victoria Avenue, Suite 364, Fort Myers, Florida 33901-3881. Copies shall also be sent to the Department of Environmental Protection, Underground Injection Control Section, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

g. In accordance with Chapter 62-4.090, F.A.C., Renewals, the permittee shall submit an application for renewal of the existing operating permit (a minimum of 5 copies) with the applicable fee sixty (60) days prior to the expiration of the operating permit. The application for renewal shall include a report addressing the items listed in Rule 62-528.455(3)(b), F.A.C.

3. EMERGENCY DISPOSAL

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

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

c. The permittee shall notify the local office of the Department in the event the emergency discharge has been used. The notification should include the reason for using the emergency discharge, the duration of the discharge, and the volume discharged.

4. FINANCIAL RESPONSIBILITY

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

b. The permittee shall review annually the plugging and abandonment cost estimates. An increase of 10% or more over the cost estimate upon which the financial responsibility demonstration is based shall require the permittee to submit documentation to obtain an updated Certificate of Demonstration of Financial Responsibility.

SPECIFIC CONDITIONS:

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

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

6. Signatories

All reports submitted to satisfy the requirements of this permit shall be signed by a person authorized under Rule 62-528.340(1), F.A.C., or a duly authorized representative of that person under Rule
62-528.340(2), F.A.C. All reports required by this permit which are submitted to the Department shall contain the following certification as required by Rule 62-528.340(4), F.A.C.:

"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."

7. Mechanical Integrity

a. The permittee shall maintain mechanical integrity of the well at all times.

b. If the Department determines that the injection well lacks mechanical integrity, written notice shall be given to the permittee.

c. Unless the Department requires immediate cessation of injection, within 48 hours of receiving written notice from the department that the well lacks mechanical integrity, the permittee shall cease injection into the well unless the department allows continued injection pursuant to (d) below.

PERMITTEE:

North Fort Myers Utilities

I.D. No.: 5236P00249
Permit/Cert. No.: UO36-301451
Date of Issue: October 8, 1997
Expiration Date: October 8, 2002

SPECIFIC CONDITIONS:

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

Note: In the event of an emergency the permittee shall contact the Department by calling (850) 488-1320. During normal business hours, the permittee shall call (941)332-6975.

Issued this 8th day of October , 1997.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

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

ABA/JBM/klm