CONSTRUCTION AND TESTING
OF INJECTION WELL SYSTEM #1
CITY OF PAHOKEE WASTEWATER TREATMENT PLANT
PALM BEACH COUNTY, FLORIDA

MARCH 1991

GERAGHTY
& MILLER, INC.
Environmental Services

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March 1991

Prepared for:
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Geraghty & Miller, Inc., appreciates the opportunity to work for Russell & Axon, Inc., at the City of Pahokee Wastewater Treatment Plant, Palm Beach County, Florida site. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,
GERAGHTY & MILLER, INC.

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CERTIFICATION OF COMPLETION

CONSTRUCTION AND TESTING
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PALM BEACH COUNTY, FLORIDA

I hereby certify that I have reviewed this report and found that the engineering practices used are consistent with standards for constructing injection well systems in Florida and satisfy the requirements of Chapter 17-28 of the Florida Statutes.

G. Douglas Leonard, P.E.
Registered Professional Engineer
State of Florida, No. 42635

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CONSTRUCTION AND TESTING OF INJECTION WELL SYSTEM #1 CITY OF PAHOKEE WASTEWATER TREATMENT PLANT PALM BEACH COUNTY, FLORIDA

INTRODUCTION

In November 1988, the Florida Department of Environmental Regulation (FDER) issued a construction permit Certification UC50-145482 (modified in April, 1989) for one Class I Injection Well and an associated dual-zone Deep Monitor Well to be installed at the Pahokee Wastewater Treatment Plant. On December 24, 1988, contract documents and specifications prepared by Russell & Axon, Inc., project engineers, and Geraghty & Miller, Inc., subconsultants, were made available to qualified contractors for bidding on the well construction. The general site location is shown on Figure 1. Bids were received by the Mayor of the City of Pahokee on January 24, 1989. The contract was awarded to Youngquist Brothers, Incorporated, a drilling company from Fort Myers, Florida on April 6, 1989.

The specifications contained provisions for constructing, testing, and completion of one dual-zone deep monitor well; drilling and testing one 12-inch-diameter injection well to a total depth of 3500 feet; conducting pumping tests in discrete zones in the borehole; collecting cores to determine adequate confinement; conducting an injection test to demonstrate that the injection zone could accept the effluent; and conducting pressure tests and a radioactive tracer survey to demonstrate mechanical integrity. Copies of the various geophysical logs, geologic logs, water-quality analyses, mill certificates, mechanical integrity testing data, and core test data are included in the Appendices.

Youngquist first mobilized manpower and equipment to the City of Pahokee Wastewater Treatment Plant site in April 1989. The deep monitor well was completed at a total depth of 2008 feet below pad level on August 4, 1989. The injection well was completed at a total depth of 3510 feet below pad level on October 9, 1989. Final testing of the injection well, including geophysical logging, injection testing, and radioactive tracer survey testing, was completed by October 17, 1989.

As a condition of the permit, the FDER requested that upon drilling and testing, a final report summarizing the information obtained during the program be submitted along with an application to operate the well.

This report documents the results of the well construction program and contains the various test data used to evaluate the injection zone and confining sequence. Conclusions are presented regarding the capability of the injection zone to accept treated effluent and the integrity of the confining sequence. The monitoring program required by Chapter 17-28.25, Florida Administration Code (FAC), is presented in addition to operation and maintenance procedures for the wells. A plugging and abandonment program also is detailed.

FINDINGS

1. The data from the injection well demonstrates the presence of an extremely transmissive injection zone saturated with water containing a concentration greater than 10,000 milligrams per liter (mg/L) of Total Dissolved Solids (TDS).

2. The injection zone has a transmissivity which is estimated to be greater than 2 million gallons per day per foot (mgd/ft).

3. The injection well has been tested at a rate in excess of 4.0 million gallons per day (mgd) and is capable of accepting a flow rate of 3.9 mgd in accordance with state regulations.

4. The injection zone occurs approximately between 2697 and 2950 feet below land surface in Injection Well 1 (IW-1).

5. The contact between the potable and non-potable water (greater than 10,000 mg/L of TDS) occurs at a depth of approximately 1820 to 1890 feet below pad level.

6. The horizontal permeability of the confining sequence, as determined from core tests from IW-1, ranged from 0.000554 to 0.00000794 centimeters per second (cm/sec.)

7. The vertical permeability of the confining sequence as determined from core tests from IW-1 ranges from 0.000103 to 0.000000756 cm/sec.

8. The presence of a highly transmissive injection zone in the Oldsmar Limestone, suitable overlying confining sequences, and the deep monitor well system will permit the operation of this injection well in compliance with State and Federal Underground Injection Control Regulations.

DATA COLLECTION

The collection of data to accomplish the drilling and testing program objectives required the use of a variety of techniques and equipment. The data collection methods are described below.

A log of drilling and related activities (Daily Log) was maintained by the project staff on a 24-hour basis throughout the course of the project. Items related to each well's construction and testing, various work tasks (geophysical logging, coring, inclination surveys, and related incidents), and daily activities at the site were described. Materials used during construction, time spent on contract items, and footage drilled were recorded in a separate construction log; they also were noted in the Daily Log. Copies of the Daily Logs were furnished on a weekly basis to the members of the Technical Advisory Committee (TAC), along with copies of the driller's log, geologic

log, summary lithologic log, and weekly water-quality analyses and water levels for the four surficial aquifer wells.

Formation cuttings were collected from the pilot holes in the injection well and the deep monitor well. Lag time for the cuttings (time required for the cuttings to circulate from the bottom of the hole to the surface) was calculated regularly to ensure that reasonably accurate sample depths were recorded. The samples were washed, dried, and examined microscopically prior to preparing the geologic log. A copy of each geologic log is presented in Appendix A. Additionally, a continuous summary log which correlated lithology, weight on bit, penetration rate, and a concise geologic description was prepared. The summary log is drawn on a vertical scale of 20 feet per inch to facilitate correlation with the associated geophysical logs. A set of samples from each well was sent to the Florida Bureau of Geology in Tallahassee, Florida.

Cores were collected, using a core barrel and four-inch-diameter core bit, during drilling of the 12-1/4-inch-diameter borehole. Core intervals averaged approximately 11 feet in length and sections were sent to a laboratory where they were tested to determine their horizontal and vertical permeability, porosity, unconfined compressive strength, and specific gravity. The cores also were photographed. Copies of the laboratory reports and photographs of the cores are contained in Appendix B.

Multi-Shot Gyroscopic Surveys were performed on the injection well pilot and ream holes prior to setting the 22-inch-diameter intermediate casing and the 12-inch-diameter injection casing. The gyroscopic surveys provided evidence that the reamed holes for the intermediate and injection casing strings had tracked the pilot holes. Gyroscopic survey results are presented in Appendix C. Various geophysical logs were conducted in the pilot holes to collect data regarding the injection zone, the confining sequence, and the selection of monitor zones. Dual-induction (a shallow, medium, and deep investigation borehole tool), temperature, caliper, natural gamma ray, and borehole-compensated sonic/VDL were conducted. Copies of the various logs for IW-

1 are contained in Appendix D in a separate volume. Copies of the geophysical logs for the DMW are contained in Appendix E.

The dual-induction log was used to differentiate between the limestone and dolomite beds and, along with the gamma ray log, was used to aid in the correlation of lithologic units in the hole. The "porosity" log (borehole-compensated sonic) was useful in identifying the injection zone, monitor zones, and the confining sequence, as well as locating zones that could cause problems during cementing.

Inflatable straddle-packers were used to conduct pumping tests at various intervals in IW-1. The packers were leased by Youngquist Brothers from TAM International. Four pumping tests were performed in order to obtain hydraulic conductivity and water-quality data. The tests were performed at a constant pumping rate using a submersible pump set in the drill pipe. Drawdown and recovery measurements were recorded and representative formation water samples were obtained. The transmissivity and hydraulic conductivity values calculated from the packer tests are presented in Table 1.

After installation and cementing of the 12-inch-diameter injection casing in IW-1, a hydrostatic pressure test was conducted on the casing prior to the injection tests. The casing was filled with water and placed under a well-head pressure of 140 pounds per square inch (psi). Over the 1-hour test period, the pressure did not vary beyond the 5% limit as required by the FDER. The test pressure is more than 1-1/2 times the expected maximum well-head pressure of 80 psi. Additional hydrostatic pressure tests were conducted successfully on the deep monitor well's 16-inch-diameter and 6-inch-diameter casing strings. Detailed pressure test data are presented in Appendix F.

Water samples were obtained from the injection zone and both shallow and deep monitor zones. The samples were analyzed for various constituents to establish the "natural" or background quality of the water in the injection zone and in the shallow and

deep zones of the deep monitor well prior to disposal of treated effluent. Copies of the laboratory reports of the analyses are contained in Appendix G.

Following sampling of the injection well, 24 hours of background temperature and pressure data were collected on the injection zone prior to beginning an injection test. The injection test was run for a 24-hour period, during which approximately 2.8 million gallons of water were pumped into the well. Subsequent to the pumping portion of the test, recovery data were recorded. A detailed discussion of the injection test is presented later in this report.

Following the injection test, a television (TV) survey was performed on the injection well. Clear fresh water was pumped into the well before surveying with the video camera. The favorable picture clarity obtained during the survey provided visual data on the condition of the injection casing and the nature of the injection zone. A copy of the survey has been supplied to each member of the TAC.

A Radioactive Tracer Survey (RTS) was conducted subsequent to the TV survey. Eight logging events were conducted which consisted of measuring radiation levels with three gamma ray detectors through an interval where a known amount of the radioactive isotope Iodine-131 was released. A thorough discussion of the RTS test is included in the report section entitled "Test Interpretation." A copy of the RTS Log is included in Appendix D.

WELL DRILLING AND CONSTRUCTION

The construction of the injection well system commenced in April 1989 when Youngquist Brothers constructed the drilling pad for IW-1 and the deep monitor well. In May 1989, construction started on IW-1 and in June 1989, drilling commenced on the deep monitor well.

Injection Well 1

Construction of the injection well began in May 1989 with the drilling of a nominal 47-inch-diameter ream hole to a depth of 193 feet below pad level. A caliper and gamma ray log was conducted and 40-inch-diameter conductor casing was installed at 193 feet. The casing was cemented in place using ASTM Type II cement with 12 percent bentonite. Copies of the Well Casing Mill Certificates and Cement Records are presented in Appendices H and I, respectively. The bottom of the casing was cemented with ASTM Type II neat cement and temperature logs were run after each cementing stage. Following cementing of the conductor casing, a nominal 39-inch-diameter hole was drilled to 996 feet below pad level. A caliper and gamma ray log was conducted and 32-inch-diameter surface casing was set at 996 feet. The casing was cemented in place with ASTM Type II neat cement at the bottom of the casing followed by ASTM Type II cement with 12 percent bentonite. Temperature logs were conducted after each stage of cementing.

After cementing of the 32-inch-diameter surface casing, the drilling method was changed from mud-rotary to reverse-air drilling. A 12-1/4-inch-diameter pilot hole was drilled to 2204 feet, followed by a gyroscopic survey and geophysical logging (dual-induction, temperature, natural gamma ray, borehole-compensated sonic/VDL, X-Y caliper). Straddle packer testing was conducted over the intervals from 1776 to 1821 feet and from 1890 to 1935 feet. After completing the testing program in the pilot hole, the hole was reamed out to a nominal 32-inch-diameter hole. Following reaming of the 32-inch-diameter hole, a gyroscopic survey and an X-Y caliper log were performed. Next, 22-inch-diameter intermediate casing was set at 2000 feet. Cementing of the 22-inch-diameter casing required 105 stages. Gravel was used after stage 95 to fill the interval from 1310 to 1295 feet. A detailed discussion of the 22-inch-diameter casing cementing program is presented in the enclosed section of this report entitled "Construction Problems." A list of all cement samples, including lost circulation materials and additives, and their compressive strengths is shown in Appendix I.

Temperature logs conducted during cementing of the 22-inch-diameter casing are contained in Appendix D.

After cementing the 22-inch-diameter casing, a 12-1/4-inch-diameter pilot hole was drilled to 3510 feet below pad level. During drilling of the 12-1/4-inch-diameter pilot hole, five conventional cores were taken from the following intervals: 2359 to 2368 feet, 2403 to 2418 feet, 2587 to 2606 feet, 2633 to 2653 feet, and 2747 to 2757 feet. A geologic description of each core and the results of the laboratory analysis of several core samples are presented in Appendix B. Table 2 summarizes the core data obtained and the intervals tested. Following completion of the pilot hole to 3510 feet below pad level, a gyroscopic survey and geophysical logs (dual-induction, temperature, X-Y caliper, borehole compensated sonic/VDL, natural gamma ray) were conducted. Straddle packer tests were run over the intervals from 2511 to 2531 feet and from 2350 to 2370 feet. Next, a cement plug was set at approximately 2800 feet. The pilot hole was reamed out to a nominal 22-inch-diameter hole to a depth of 2650 feet. Subsequently, a gyroscopic survey and X-Y caliper log were conducted. The 12-inch-diameter final injection casing was set and cemented in place at 2650 feet. ASTM Type II neat cement was placed near the bottom of the casing followed by ASTM Type II cement with six percent bentonite. The last five stages of cement consisted of ASTM Type II cement with 12 percent bentonite. Temperature logs were conducted after each stage. Before pumping the final stage (Stage 10), a cement bond log was conducted on the 12-inch-diameter casing. A copy of the cement bond log appears in Appendix D. After completing the cement bond log, a pressure test was successfully performed on the injection casing. Results of the pressure test are presented in Appendix F. Following the pressure test, the cement plug was drilled out and the original hole was cleared to a total depth of 3510 feet. Water samples of the injection zone were taken (see section entitled "Water Quality") and a caliper log was conducted from 2600 feet to 3495 feet.

The injection test program for IW-1 began with 24-hour background monitoring followed by a 24-hour injection test. After the injection test, 12 hours of post-injection monitoring were conducted. Results of the injection test are presented in Appendix J.

Following the injection test, a background TV survey was conducted. After conducting a temperature log and a radioactive tracer survey, testing of the injection well was completed. A review of the cementing records, pressure test data, injection test data, and radioactive tracer survey indicates that the injection casing is properly cemented and that isolation between the injection horizon and overlying sources of drinking water has been achieved.

The conductor, surface, and intermediate casings were constructed of 0.375-inch-wall Grade B carbon-steel pipe. The final injection casing was 12-3/4-inch-diameter Grade B seamless pipe with a 0.500-inch wall thickness. Copies of the mill certificates are presented in Appendix H. Construction of IW-1 was finished on October 17, 1989 when the RTS was successfully completed. Final completion construction details are shown on Figure 2.

Deep Monitor Well

Construction of the deep monitor well began with the drilling of a nominal 32-inch-diameter ream hole to 192 feet. A gamma ray/X-Y caliper log was conducted prior to setting and cementing 24-inch-diameter casing to 192 feet. The bottom portion of the casing was cemented with ASTM Type II neat cement and the upper portion was cemented with ASTM Type II cement with 12 percent bentonite. Following cementing, a temperature log was conducted, and a nominal 24-inch-diameter hole was drilled to 1009 feet. A gamma ray/X-Y caliper log was conducted followed by setting and cementing 16-inch-diameter casing at 996 feet using ASTM Type II cement with four percent bentonite. The bottom portion of the 16-inch-diameter casing was cemented with ASTM Type II neat cement. Following cementing, both temperature and cement bond logs were conducted on the 16-inch-diameter casing. Additionally, a hydrostatic pressure test was successfully performed on the casing. After the pressure test, a nominal 16-inch-diameter hole was drilled to 1925 feet followed by a gamma ray/X-Y caliper log conducted in the open hole. A string of 6-5/8-inch-diameter casing with the top 1201 feet coated with an epoxy-phenolic coating was set and cemented at 1915

feet. Cementing of the 6-5/8-inch-diameter casing required 16 stages (see Appendix I). Temperature logs were conducted after each stage of cementing. The depth to the top of the final cement stage was tagged at 1147 feet. A cement bond log and hydrostatic pressure test were conducted on the 6-5/8-inch-diameter casing, followed by drilling a nominal 6-inch-diameter hole to 2008 feet. A temperature log was conducted in the open hole section and the lower part of the 6-5/8-inch-diameter casing. Both the shallow (996 feet to 1147 feet) and lower (1915 feet to 2008 feet) monitor zones were disinfected, developed, and sampled. Water samples were analyzed for primary and secondary drinking water standards in addition to EPA Test Methods 608, 624, and 625 (see Appendix G for laboratory results). Final completion construction details of the deep monitor well are shown on Figure 3. Geophysical logs performed during the construction of the deep monitor well are presented in Appendix E.

Construction Problems

Although various problems occurred during the construction of the injection well, drilling of the deep monitor well was accomplished without any significant delays.

On June 23, 1989, during the reaming of the nominal 32-inch-diameter hole in IW-1, a drill cone broke off of the reamer assembly. On June 29, 1989, after several attempts to retrieve the cone with a junk basket, a coring barrel tool was fabricated and used to remove the lost bit cone.

Cementing of the injection well's 22-inch-diameter casing began on July 11, 1989, and finished on August 20, 1989. A total of 105 stages of cement was required with many of the stages containing lost circulation materials such as celloflake, cottonseed husks, and calcium chloride, a curing accelerator. Flowing conditions below 1300 feet and cavernous zones were the main reasons for the excessive amount of cement used. After pumping stage 95, the cement level had risen to 1310 feet. Subsequently, a meeting was held on August 9, 1989, with the injection well's engineer of record, TAC members, and Geraghty & Miller representatives. After presenting the construction

data to the TAC, permission was granted by the FDER to gravel the interval from 1312 to 1295 feet. After placing the gravel, ten additional cement stages were required to complete the cementing of the 22-inch-diameter intermediate casing.

On August 28, 1989, the bottom hole drilling assembly twisted off while a 12-1/4-inch-diameter pilot hole was being drilled at 2561 feet. An overshot tool was fabricated and used to retrieve the bottom hole assembly on August 30, 1989.

On September 16, 1989, during straddle-packer testing of the interval from 2350 feet to 2370 feet, the bottom packer failed to deflate and was left in the hole. The packer was retrieved on the first attempt with an overshot fishing tool.

SUBSURFACE CONDITIONS

Background

The final design of the injection well was based on information collected during drilling and testing of the pilot holes. The drilling and testing program was designed to provide flexibility and to allow for modifications in the well completion procedure as dictated by local geologic conditions. The drilling program and specifications were based on regional geologic conditions and data from existing injection wells in the area. The following section presents the site-specific geologic conditions encountered during this project.

Geologic Setting

An extensive sequence of carbonate sediments is present at the City of Pahokee Injection Well site and throughout the region. As shown in the Cross Section on Figure 4, both the confining sequence and injection zone are present at similar depths in two

wells in Palm Beach County. The two reference wells are the ENCON Injection Well and the Pratt & Whitney Injection Well.

The structure of the geological units encountered during the construction of the City of Pahokee Injection Well was sufficiently within the requirements of Chapter 17-28 FAC. The injection zone proved capable of receiving the design rate of effluent (3.41 million gallons per day [mgd]), and proper disposal of the effluent into this zone should not contaminate any underground source of drinking water. A brief description of the various geological units encountered is presented in the following text.

From land surface to approximately 178 feet, the sediments are comprised of limestone, sandstone, clay, unconsolidated shell and sand, and peat. An organic-rich peat layer extends from land surface to approximately 10 feet. The limestone generally is very pale orange to light gray, fine- to coarse-crystalline, and contains varying amounts of sand. The sandstone is predominantly very light gray to light olive gray, fine- to coarse-grained and is comprised of quartz and some phosphatic minerals. Various amounts of shell are contained within the sequence. Shells are particularly abundant within the first 100 feet. These sediments correspond to the Shallow Aquifer in Palm Beach County and are Pleistocene to Miocene in age.

Below 178 feet and extending to a depth of 760 feet, the sediment is composed predominantly of a pale olive, plastic, calcareous clay which contains varying amounts of sand-sized phosphate. Limestone is found within this sequence in amounts lower than 20 percent and is generally micritic and poorly to moderately well-cemented. These sediments correspond to descriptions of the Miocene-age Hawthorne Formation.

Over the interval from 760 to 1560 feet, limestone is the dominant lithology. From 760 to 910 feet, the limestone is generally medium to coarse-grained, light gray to yellowish gray, and contains varying amounts of sand. Calcareous clay also was found in gradually smaller amounts over the interval. From 910 to 1560 feet, the limestone generally is very pale orange, fossiliferous, and contains numerous calcareous pellets.

The sediments between 760 to 910 feet are Miocene to later Eocene in age and correspond with descriptions of Post-Hawthorn, Pre-Hawthorn, Suwannee, Tampa and probably the Ocala Limestone. Sediments below 910 feet are similar to the later to middle Eocene Avon Park Limestone. Drilling rates over the interval from 1000 to 1560 feet generally averaged less than two minutes per foot.

Dolomite was first encountered at approximately 1560 feet. The interval between 1560 to 1870 feet is represented by interbedded layers of dolomite and limestone. The dolomite is predominantly moderate yellowish brown to dusky yellowish brown, very fine to fine-crystalline, and contains dissolution features. The interbedded limestone in this interval is mostly very pale orange, micritic, foraminiferal, and pelitomorphic.

From 1870 to 2090 feet, a very dolomitic limestone is encountered. It generally is fine- to medium-crystalline, saccharoidal, and very pale orange to moderate yellowish brown. From 1930 to 1960 feet, the limestone appears iron-rich and is grayish orange to pale red in color. The interval from 1560 to 2090 feet is of middle to later Eocene age and is similar to the Avon Park Formation and Lake City Limestone. Without detailed microfossil identification, it is difficult to delineate the boundary between the base of the Avon Park Formation and the top of the conformable sequence below the Lake City Limestone.

Interbedded limestones and dolomites are found within the interval covering 2090 to 2820 feet. The dolomite varies in color from very pale orange to dark yellowish brown and is medium to coarse-crystalline with a sucrosic texture. The limestones exhibit varying degrees of dolomitization and are white to very pale orange, fine- to coarse-crystalline, and pelitomorphic. Large-scale dissolution features are evident on the caliper log below 2700 feet and vugs are present in rock samples taken from this depth. The sediments below 2700 feet are early Eocene age and correspond with the Oldsmar Limestone.

From 2820 feet to the total depth at 3510 feet, the rocks are composed almost entirely of dolomite, although more calcitic over the interval from 3180 to 3450 feet. The top of the Paleocene-age Cedar Keys Formation was penetrated at approximately 3450 feet. Sixty feet of the formation were drilled and a yellowish gray to grayish orange, sucrosic, gypsiferous dolomite was revealed.

The injection zone extends from approximately 2697 feet to 2950 feet in the Oldsmar Formation. Results from the TV survey indicate that the dolomite sequences within this zone exhibit extensive dissolution cavities. Open-spaced crystal growth is commonly found in vugs within dolomite retrieved in the well cuttings. The majority of the injected fluid will be disposed into the cavities between 2720 feet and 2920 feet.

Hydrogeologic Setting

The upper 180 feet of sediments beneath the site are Pleistocene-, Pliocene-, and later Miocene-age sands, in addition to silts, limestone, and shell. These sediments contain the surficial aquifer which is used as a source of drinking water throughout the County. Due to the presence of highly mineralized water in the surficial aquifer in western Palm Beach County, the City of Pahokee uses water from Lake Okeechobee for drinking purposes.

Underlying the surficial aquifer are approximately 600 feet of Miocene clay and marl which form a confining bed between the surficial aquifer and the Oligocene to Eocene-age limestones and dolomites of the Floridan aquifer. This confining bed is called the Hawthorn Formation. Water quality in the Floridan aquifer is poor in comparison to the surficial aquifer. Water from the Floridan aquifer in this area contains concentrations of dissolved solids which exceed drinking water standards. The aquifer generally is not used as a source of drinking water in the County because of the additional treatment required to meet potable standards. The Floridan aquifer exists under artesian conditions with a potentiometric level above land surface. The dense

Miocene clays of the overlying Hawthorn Formation provide good confinement for this aquifer.

A confining sequence is present between 2350 feet and 2650 feet below pad level in the City of Pahokee injection well. It consists of a thick sequence of dense limestone with some interbedded layers of dolomite. This confining sequence overlies a section of highly permeable dolomite of the lower Oldsmar Formation referred to as the "Bolder Zone". This zone contains highly mineralized water and is used throughout south Florida for the disposal of treated domestic waste effluent.

Confining Sequence

Information on the nature of the confining sequence was obtained during various phases of the drilling and testing program. During pilot hole drilling, drill cuttings were collected and examined by the on-site geologist and five cores were taken over the interval between 2359 feet and 2757 feet. Several portions of each core were selected to be analyzed for a number of parameters, including porosity and vertical hydraulic conductivity. Table 2 summarizes the core data obtained and lists the intervals tested. The lowest vertical permeability was exhibited by a core from 2597 feet which revealed a permeability of 0.000000756 centimeters per second (cm/sec). The limestones and dolomites comprising the confining sequence are apparent on the dual induction and sonic logs. The log sections covering the interval from 2350 to 2480 feet are particularly characteristic of uniform microcrystalline sediment.

After the completion of pilot hole drilling to a depth of 3510 feet, straddle-packer tests were conducted in the borehole. A typical straddle-packer assembly is shown on Figure 5. Two tests were successfully conducted in the interval between 2350 feet and 2550 feet. Values of hydraulic conductivity determined from these tests are presented in Table 1. The data from the cores, laboratory test data, and copies of the geophysical logs are presented in the appendices.

Injection Zone

During the drilling of the well, the presence of an injection zone was indicated by erratic penetration rates which are characteristic of a fractured cavernous dolomite formation. Confirmation of the presence of the injection zone was made from the cuttings, geophysical logs, TV survey and injection test. The results of the injection test are presented in a subsequent section of this report. Evidence gathered during drilling and testing confirmed that the injection zone consists predominantly of fractured and cavernous dolomite.

The correlation between the injection zone and the occurrence of dolomite is shown clearly on the Dual Induction and Borehole-compensated Sonic logs presented in Appendix D. The resistivity profile shown on the Dual Induction log varies drastically within the injection zone. This variation is due to the presence of a massive, dense dolomite (higher resistivity), along with fractures and cavities containing highly mineralized water (lower resistivity). On the Borehole-compensated Sonic log, the abrupt and large changes in transit velocities and cycle skipping between 2697 feet and 2950 feet confirm the presence of fractured dolomite containing large cavities. Drill cuttings were composed mainly of hard, fine- crystalline dolomite with dissolution features. Also, the presence of large cavities and fractures can be seen on the TV survey.

Water Quality

Prior to the preliminary injection test, representative water samples were collected from isolated sections of the borehole during the straddle-packer tests in IW-1 and from the injection zone. Water samples also were collected from both monitor zones in the deep monitor well. The water samples were analyzed for selected ions to establish the 10,000 mg/L TDS the interface, background water quality of the injection zone, and the background water quality of the monitor zones. Results of these laboratory analyses are presented in Appendix G.

Two straddle-packer tests were conducted in IW-1 in the interval between 1776 and 1935 feet. The formation intervals tested were both 45 feet in thickness. During the straddle-packer tests, each section of the hole was isolated using inflatable packers provided and installed by TAM International. Each zone was pumped for a minimum of four hours using a submersible pump. Temperature, conductivity, and chloride readings of the water from the isolated zones were taken periodically throughout the tests. Just prior to the end of the tests, samples were collected from each zone for laboratory analysis. Based on geophysical logs and water quality data from the packer tests, the 10,000 mg/L TDS level in the City of Pahokee injection well is estimated to be between 1821 and 1890 feet. Below 1821 feet, the TDS increases rapidly and reaches a value of 16,153 within the interval between 1890 feet and 1935 feet (see Table 3). The analysis of the deep monitor zone sample (1915 to 2008 feet) confirms this abrupt increase in TDS. The static heads measured at the end of the recovery period in the straddle-packer tests support the water-quality data. The interval from 1776 feet to 1821 feet contains lower density water than the interval between 1890 feet to 1935 feet. For regulatory purposes, the 10,000 mg/L TDS interface is estimated to be at approximately 1850 feet.

The water-quality data obtained from the injection zone sample reveal a TDS level far greater than 10,000 mg/L; therefore, the zone can be used for the disposal of treated wastewater in compliance with Chapter 17-28 FAC. Water quality analyses of the samples obtained from the straddle-packer tests, shallow and deep monitor well zones, injection zone, and plant effluent are contained in Appendix G.

RADIOACTIVE TRACER SURVEY

On October 16 and 17, 1989, a Radioactive Tracer Survey (RTS) was conducted in the injection well located at the City of Pahokee Wastewater Treatment Plant. The survey began at 8:00 a.m. and was concluded at 5:30 a.m. the following morning. During

this time, a total of eight "slugs" of the radioactive isotope Iodine 131 was released. The slug of tracer material varied in strengths between one and five millicuries (MCI). Each release of tracer material was accompanied by two or more logging events. Each logging event consisted of moving a logging tool through the interval where the slug was released. The logging tool was equipped with the following: casing collar location (CCL) to pinpoint the depth of the casing seat, two tracer material ejectors (VEI and LEI), and three gamma ray detectors (the lower detector [GRSG], the middle detector [GRTE], and the upper detector [GR]). A diagram of the logging tool used for the tests is shown on Figure 6 and a copy of the RTS log is included in Appendix D.

A "fresh water bubble" was established by pumping fresh water into the well over a period of several days prior to the survey. Over 2.5 million gallons of fresh water were pumped into the injection zone during this time. The "fresh water bubble" is required to provide a potential for upward migration of fluid. The potential was measured by a pressure gauge mounted on the well head and a static pressure of 29 psi was recorded at the beginning of the RTS. Because the gauge well head pressure was zero before any fresh water was introduced into the well, the surface pressure recorded at the beginning of the test was due entirely to the density difference between the native formation water and the injected fresh water.

The testing began with the recording of a temperature log from surface to approximately 2700 feet. The next phase of the test consisted of conducting a gamma ray log from 2708 feet to 1136 feet. This first gamma ray log provides the "background" information to which subsequent logs are compared.

For each test, time-drive monitoring commenced just prior to the release of the slug. In time-drive monitoring, 1.5 inches on the log's vertical scale equals one minute (see Figure 7). In the center unscaled column, where one is accustomed to reading the measured depth of the well, there are small tick marks along the left side which indicate one-minute increments. Ten minute increments are numbered for ease of interpretation. On the right side of the center column, a large, dark tick marks the time

when the tracer material was released. The attached figure represents a typical log format during time-drive monitoring.

The first slug of tracer material was ejected at 12:03 p.m. on October 16, 1989, and is labeled "First STATIC" on the log. For this test, the upper ejector (VEI) was positioned one foot below the casing seat (bottom of the casing). It should be noted here that the casing seat was located at 2652 feet by the TV Survey on October 13, 1989. However, as determined from previous geophysical logs, the actual depth of the casing seat is at 2650 feet. For simplicity's sake and for the purposes of this report, the depths used during the RTS test will be assumed correct. Time-drive monitoring ceased after a total of 61 minutes.

As can be seen on the RTS log, the middle gamma ray detector (labeled "GRM" on the log and "GRTE" on the scale) is the first detector to indicate the presence of the tracer material (after 10 minutes). It should be noted at this point that because of the proximity of GRM to ejectors VEI and LEI, the scale for GRM is 0-2000 American Petroleum Institute gamma ray units (GAPI). Additionally, after this first release, GRM became stained with radioactive material and ceased to be useful in detecting small amounts of radioactivity. After approximately 20 minutes the bottom gamma ray detector (GRB on the logs and GRSG on the scale) began showing the presence of radioactive material. After approximately 48 minutes, the radioactivity level peaked at approximately 680 API units.

Because no radioactivity was detected at GRT, this test shows that there is no movement of water from below the casing seat into the casing or through the cement sheath behind the casing.

A gamma ray log up to approximately 2000 feet then was conducted to ensure that no tracer material had moved up into or behind the casing through the cement or formation without being detected. Fresh water then was pumped to remove any residual tracer material that lingered at the bottom of the hole. An additional gamma ray log

then was run from 2756 to 2553 feet to locate any radioactive stain present in the hole. As can be seen from the log labeled "Logged Thru Slug After A Flush", the tracer left a considerable stain immediately below the casing seat at 2653 feet (which is where the tracer material was released) and at approximately 2710 feet (which is where the formation becomes fractured and very permeable). These stains are experienced routinely with this type of test and are repeated with each subsequent test.

It should be noted that there are two curves shown in the GRT column on this same log. The dashed line, labeled GRT BG, represents the naturally occurring gamma ray radiation or background obtained from the first gamma ray log. The solid line (GRT) curve was the gamma ray radiation log conducted at the time. The separation between the two curves indicates an increase in radiation since the first log was recorded. Naturally, this increase is due to the presence of the new source (Iodine 131) introduced during the test. It also indicates the difference in permeability between the formation above 2710 feet and the formation below 2710 feet.

The second static test began by placing ejector VEI 5 feet inside the casing at 2647 feet. This test is labeled "Second Static Test" on the log. The procedure for this test was the same as the first static test. After approximately 5 minutes of time-drive monitoring, the tracer material was detected at the upper detector. Approximately 9 minutes after releasing the slug, the lower detector began showing signs of tracer material. Both detectors GRT and GRB were showing several hundred API units before time-drive monitoring was discontinued after approximately 15.5 minutes. The short-time interval between release of the tracer material slug and detection by GRT was a source of some concern. As a result, a thorough check to ensure that there was no leak in any of the above ground piping was conducted and then a gamma ray log was conducted. The results of the gamma ray log, labeled "Logging Thru Slug," indicate that there is no appreciable difference between the amount of background gamma ray radiation and the current radiation above 2644 feet below pad level.

The tool was reset with the ejector (LEI) set at 2647 and the second static test was rerun under identical conditions. The slug was detected after approximately 8.5 minutes by GRT and after approximately 10.5 minutes by GRBA. As in the previous test, a gamma ray log was run as in the previous test to confirm that no additional tracer material had migrated up-hole. However, the rate of dispersion of tracer material upward, compared to the rate of dispersion downward, was still a source of concern. Time-drive monitoring was initiated at this point and fresh water was pumped to clear the tracer material from inside the casing. After approximately 26 minutes of pumping fresh water, the tracer material was essentially cleared. However, a stain on the casing was now beginning to form at 2647 feet.

The next section of log labeled "Logging Thru Slug After A Flush" illustrates the extent of the stain inside the casing. More fresh water was pumped to clear the stain, and the hole was logged again. The next log section, unlabeled on the log, shows that the stain, although still present, is virtually eliminated above 2638 feet.

In order to ensure there was no water leak in the above-ground piping to account for the faster upward migration of tracer material (faster than the rate of downward migration), the tool was reset with ejector LEI located at 2473 feet. A one (1) MCI slug was released after time-drive monitoring commenced. Tracer material was detected after approximately 7.5 minutes by the lower detector GRB and after 13 minutes by top detector GRT. Time-drive monitoring ended after 21 minutes. A gamma ray log was run through the slug and as can be seen on the section of log labeled "Logging Thru Slugs," the tracer material was found to be evenly dispersed between approximately 2440 and 2510 feet. This indicates that the tracer moved up from the point of release approximately 37 feet and that there was no leak in the above-ground piping or in the casing above approximately 2440 feet.

Next, fresh water was used to flush the tracer material from the casing. The tool then was reset at 2620 feet. Again, a 1 MCI slug of tracer material was released after initiating time-drive monitoring. The slug was first detected by GRB and GRT after

approximately 15 minutes. A substantial change of GRT, however, did not occur until after almost 30 minutes. Time-drive monitoring was terminated after almost 65 minutes. The gamma ray logging tool then was lowered to 2706 feet and a log was conducted through the slug to 1950 feet. The previous test results were repeated in that the tracer material was evenly dispersed over the interval from approximately 2596 feet to 2646 feet. This test showed an upward dispersal of the slug of approximately 24 feet and a downward dispersal of 26 feet.

Fresh water then was pumped to clear the tracer material from the casing. Another gamma ray log was run to see if there were any hot spots on the casing which might indicate a hole in the interval previously tested. The log showed no hot spots or stains in the casing below 2486 feet. (Previous static tests indicated no leaks above or below 2473 feet.) The separation between GRT and GRTBG on the log (File 24) between 2630 feet and 2650 feet is attributed to normal buildup of stain at the bottom of the casing string.

The results of the static RTS testing indicate that there is no leak inside the casing or in the cement sheath behind the casing. The reason for faster upward migration of tracer material when the ejector is positioned near the casing seat is due to turbulence created by water movement below the casing seat. The radioactive tracer survey revealed significant permeability in the formation immediately below the casing seat. This conclusion also is supported by geophysical logs run in the open hole over this interval.

Additionally, evidence of this water movement is shown in the TV Survey. Below approximately 2630 feet, suspended sediments can be seen in the casing. The section of the TV survey that proceeds into open hole was conducted without pumping any water at the surface. During this portion of the tape, suspended sediments can be seen in motion due to water movement.

The next part of the RTS is presented in the section of the log labeled "Low Flow Dynamics" (File 25). For this portion of the test, a low flow rate of approximately 40 gallons per minute (gpm) was established prior to commencement of time-drive monitoring. The ejector was positioned at 2621 feet and a 2 MCI slug was released. After its release, the slug was detected near the two minute mark by GRB located inside the casing at 2636 feet (GRM responded almost immediately but, as already explained, useful data cannot be discerned due to stain.) Gamma ray levels returned to normal after approximately 13 minutes. After 32 minutes, gamma ray radiation was again detected by GRB at 2636 feet. This indicates that tracer material had moved up behind the casing, either in the formation or through channels in the cement sheath.

The velocity of the tracer movement was calculated based on flow rate, the length of casing that the tracer had to move through before leaving the casing, and the depth difference between the casing seat and GRB. It was determined that, at the current pumping rate (40 gpm), tracer material would be detected at GRT after 72 minutes of time-drive monitoring if the cement sheath did not seal the casing to the borehole. Consequently, time-drive monitoring was continued for a total of 75 minutes. No increase in gamma ray radiation was detected by GRT and time-drive monitoring was discontinued after 75 minutes.

A gamma ray log then was run (File 26) from 2706 feet to 1945 feet. A stain on the casing was detected at 2621 feet, which was the location of the ejector that released the slug of radioactive material. The separation between the curves representing the log response for GRT and GRT BG indicates some increase in gamma ray radiation below 2621 feet. This increase over the background readings is attributed to stain on the casing.

A second dynamic pumping test was conducted at a flow rate of 3000 gpm. The tool again was set with the ejector positioned at 2621 feet. As can be seen on the log (File 28), a 2 MCI slug was ejected shortly after initiating time-drive monitoring. The tracer material was detected immediately by GRB (Note: GRM shows a decrease of

radioactivity during this period.) Time-drive monitoring was continued for approximately 31 minutes without any detectors showing indications of increased radioactivity. After time-drive monitoring was discontinued, a gamma ray log was run from 2706 feet to 1948 feet. As can be seen from the next log section (File 29), the stain at the casing seat is still visible. But the casing, although still stained, shows gamma ray readings very close to background.

Next, a third and final dynamic pumping test was conducted (File 30). Again, the ejector was located at 2621 feet, however, the pumping rate was reduced to 1400 gpm. A 5 MCI slug of tracer material was released shortly after time-drive monitoring was initiated. Again, GRB detected the slug almost immediately after release. Time-drive monitoring continued for 31 minutes without any radioactive tracer material being detected. The 5 MCI slug was used to ensure that there would be enough radioactive material present for the tool to detect, if any should migrate upward outside the casing.

After discontinuing time-drive monitoring and pumping, a final gamma ray log was run (File 31) to ensure that no tracer material had migrated upward. As can be seen on the log, a stain is present at 2621 feet (the location of the ejector). The stain provided a slightly larger response than after the second dynamic test. This probably is due to the slower pumping rate, and, thus the less efficient cleansing of the casing; the cumulative effect of repeated ejections at the same location; and the unusually large size (radioactive strength) of the slug. The log correlates very closely with the original GRT BG above the location of the stain. This indicates the absence of tracer material behind the casing due to upward migration through the formation or cement sheath.

OPERATION AND MAINTENANCE

When the injection wells are operating during long-term injection testing and over their operational life, a variety of data will be collected to satisfy statutory/permit requirements and to assist in managing the system. This section discusses the basic

requirements for data collection to aid in permit compliance during the initial testing period and during the operation of the system.

Injection-Well Data Collection

The well-head pressure and the injection rate will be monitored continuously to ensure that the maximum pressure at the well head does not exceed 92 pounds per square inch gauge (psig) and the velocity down the well does not exceed 8 feet per second. Values of the daily maximum flow in millions of gallons per day (in mgd) and total daily flow (in mgd) will be recorded on a daily basis and submitted monthly to the Florida Department of Environmental Regulation (FDER). Daily measurements of the maximum injection pressure (in psig), and the average injection pressure (in psig) also will be reported monthly to the FDER. Monthly averages for the daily maximum flow (mgd), daily maximum injection pressure (psig), and daily average injection pressure (psig) will be calculated for monthly reporting to the FDER. Measurements of the injection pressure and rate should be made at the same time and recorded so that correlations between these two values can be made. It is essential that performance data be collected from the start to establish baseline information for satisfying regulatory requirements and to serve as a benchmark for future data comparison and analysis of performance. The records will be maintained permanently. The lead plant operator or a higher official must sign and date each submittal. A sample form for recording the above-mentioned measurements and calculations is included in Appendix K.

Monitor-Well Data Collection

The purpose of monitor-well data collection is to detect changes in water quality in the monitor zones that could be attributed to the injection of treated effluent. The parameters established for analysis are chlorides, specific conductance, fecal coliform, 5-day biological oxygen demand (BOD5), total dissolved solids (TDS), pH, temperature, and ammonia. Analysis for these constituents will be conducted weekly and reported to the FDER monthly. The lead plant operator or a higher official must sign and date

each submittal. A sample form for recording the results of analysis for the above-mentioned constituents is included in Appendix K.

In order to collect the monitor-zone data, the deep monitor wells have been equipped with sampling pumps. At least three well volumes will be pumped from the monitor zones before samples are taken. The water from the monitor zones will be discharged into the treated effluent wet well and disposed into the injection well.

The integrity of the monitor-zone sampling systems is to be maintained at all times. Sampling lines and equipment shall be kept free of contamination through the use of independent discharges and no interconnections with any other lines. Because both monitor zones will flow due to artesian pressure, the height of the water column in each monitor zone will be the same as the total depth of that monitor zone; i.e., the water column in the shallow monitor zone will be 1,147 feet and the water column in the deep monitor zone will be 2,008 feet. The volume of water in the shallow-monitor-zone water column is approximately 12,126 gallons and the volume in the deep monitor zone is approximately 2,550 gallons. Multiplying these volumes by 3 will determine the minimum volume of water required to be pumped from the respective monitor zones prior to sampling. Therefore, a minimum of 36,378 gallons of water must be pumped from the shallow monitor zone and a minimum of 7,650 gallons of water must be pumped from the deep monitor zone. Assuming the sampling pumps have a pumping rate of 75 gallons per minute (gpm), the deep monitor zone should be pumped for a minimum of 1.75 hours (7,650 gallons divided by 75 gpm divided by 60) and the shallow monitor zone should be pumped for a minimum of 8 hours (36,378 gallons divided by 75 gpm divided by 60). Should a higher or lower pumping rate be determined, the pumping time can be adjusted accordingly. Monitor-zone pressure data should be recorded prior to the purging and submitted to the FDER with the monthly reports. Forms have been provided for recording this data (see Appendix K). Also, daily measurements of the maximum, minimum, and average monitor-zone pressures must be maintained. It is recommended that a 7-day wind-up, 2-pen pressure recorder be employed for this task. This gauge can record both monitor zone pressures

simultaneously and will not require any electrical service to the well head. Forms have been provided in Appendix K for recording this information.

Injectivity Testing

A well's injectivity is a function of (1) friction loss in the casing; (2) the bottom-hole driving pressure; and (3) the density differential between treated effluent and the formation water in the injection zone. The latter is a constant as long as the temperature and density of the injection fluid remains constant. Bottom-hole injection pressure and friction loss in the casing can vary as a result of changes in the flow rate, plugging of the injection zone, and/or the physical condition of the pipe. In general, pressure builds slowly with time (for a given pumping rate) as the casing "ages." Similarly, plugging of the injection zone can cause a gradual pressure build-up with respect to time; this is not expected at the Pahokee well because of the cavernous nature of the injection zone.

Periodic determination of a well's injectivity can be used as a measure of a well's efficiency and is recommended as a monitoring tool for the injection well system. Performing the test is relatively simple. It involves injecting into the well at two injection rates and recording the injection pressure for each rate. The high injection rate should approach the maximum design flow or an injection rate as high as can be sustained for the injectivity testing period. The injection flow rate (mgd) and the injection pressure (psig) should be recorded and reported for each injection rate. Additionally, the shut-in well-head pressure (psig) with no flow must be recorded and reported. All readings during the injectivity testing should be taken after the selected injection rate has stabilized for a minimum of five minutes.

Monitor zone pressures must be recorded prior to, during, and after each injectivity test and submitted to the FDER with the test results. A form has been provided for recording these results (see Appendix J).

The injectivity is calculated by dividing the injection rate by the surface injection pressure (well-head pressure minus the static pressure). The result is expressed as gallons per minute per psi. As noted, testing should be conducted at two rates so that future comparisons can be made.

A procedure for injectivity testing should be established as soon as the wells are placed in operation in order to collect baseline operating data. The procedure should be easily repeatable so that injectivities can be computed for the same injection rates. Testing should be conducted monthly for the life of the well. The lead plant operator or a higher official must sign and date each submittal.

Mechanical Integrity Testing

An injection well has mechanical integrity if there is no leak in the casing and no fluid movement into any underground source of drinking water through channels adjacent to the injection well casing. In accordance with the Chapter 17-28.13(6) and 17-28.25(1) FAC, the mechanical integrity of all injection wells must be demonstrated every five years. A TV survey is required for the injection well and injection zone. The injection casing must be pressure tested or tested by an approved method to demonstrate the absence of leaks. A temperature and/or noise log and monitoring of overlying aquifers will be conducted to demonstrate absence of fluid movement through channels adjacent to the injection well bore. A radioactive tracer survey (RTS) also is required every five years.

Plugging and Abandonment Plan

Section 28.27(2) of Chapter 17-28 FAC states that "an applicant for an Underground Injection Control permit shall be required to submit a plan for plugging and abandonment which may include post-closure monitoring of the injection operation." The FDER can order the plugging of an injection well when it has been abandoned or has been "determined to be a threat to the waters of the State." Additionally, a P&A

(plugging and abandonment) plan should be included in the Operation and Maintenance manual for the treatment facility so that it can be implemented promptly in the unlikely event it is ever needed. The objective of the P&A plan is to effectively plug or seal the borehole through the confining bed thereby preventing the upward migration of injected treated effluent and the circulation of ground water of different qualities. The program described in this section accomplishes that objective.

In the event the City of Pahokee injection well has to be abandoned, the following program would be followed. The plugging program will require the services of a qualified contractor and equipment capable of installing drill pipe to a depth of approximately 2700 feet; pumping ASTM Type II neat cement, mixing and pumping drilling fluid to suppress flow, and providing some form of blow-out prevention equipment.

The initial step in the program will be to mix a solution of "weight" material and pump it into the well to suppress flow. Sufficient weight material should be added to the well to depress the fluid level to approximately 20 feet below pad level. A supply of previously-mixed drilling fluid should be kept on-site as weight material and may have to be added periodically to maintain the desired fluid level in the well. Following the addition of the weight material, the well-head assembly will be removed to permit easy access into the well. A blow-out preventor will be installed at this time.

The bridge plug will consist of 2-inch-diameter threaded tubing and two cement baskets assembled on location and lowered into the well on a string of drill pipe. A careful tally of pipe lengths should be kept to permit setting of the plug with the cement baskets about 5 feet above the bottom of the injection casing. The 2-inch-diameter casing will have a bottom plug and two sets of left-hand threaded couplings at levels about 80 and 140 feet above the bottom of the injection casing. A series of cement ports will be cut into the 2-inch-diameter tubing above the cement baskets.

The cement baskets will be expanded and set by adding crushed limestone to the well and allowing it to settle. A mixture of ASTM Type II neat cement will be pumped into the well through the drill pipe and the cement ports above the limestone fill. The quantity of cement pumped should be equivalent to the volume of slurry required to fill the casing from the top of the limestone to one foot below the lowermost left-hand threaded coupling.

The cement will be allowed to set for at least 24 hours, then "tagged" with a wire line to determine if fill-up has been achieved. If not, additional crushed limestone will be added and another stage of cement will be pumped. (A single stage of cement usually is sufficient to build the first portion of the bridge plug.) A strain of no more than 1000 pounds above drill string weight will be exerted. If no movement occurs (other than pipe stretching), the plug is deemed set and the Contractor will proceed with disconnecting the assembly by rotating and "backing off" the drill pipe (right-hand rotation will unscrew the pipe from the left-hand threaded couplings). Two successive small stages consisting of no more than 100 feet of cement fill-up will be pumped. The remainder of the casing will be filled with neat cement after the two smaller cement stages are set.

The deep monitor well also will be plugged in the event the injection well is abandoned. However, the FDER may require sampling of the monitor zones for some period of time after abandonment and plugging of the injection wells for post-closure monitoring of the system. The 6-5/8-inch-diameter tubing for the deep monitor zone can be plugged from the surface by pumping sufficient ASTM Type II neat cement to displace the fluid in the tubing. The upper monitor zone will require installation of a tremie line to fill the hole from 1147 feet to the surface. Cementing of this zone should require only one cement stage.

ACKNOWLEDGEMENTS

The success of this program was due largely to the cooperative efforts of a number of individuals on the staffs of the City of Pahokee, Russell and Axon, South Florida Water Management District, U.S. Geological Survey, Palm Beach County Health Department, and Florida Department of Environmental Regulation. All parties worked together to complete this project that will enable the City of Pahokee to dispose of treated effluent safely, and protect the local environment. Special thanks are due to each of the following organizations for their assistance, guidance, and cooperation.

City of Pahokee

Florida Department of Environmental Regulation

South Florida Water Management District

U.S. Geological Survey

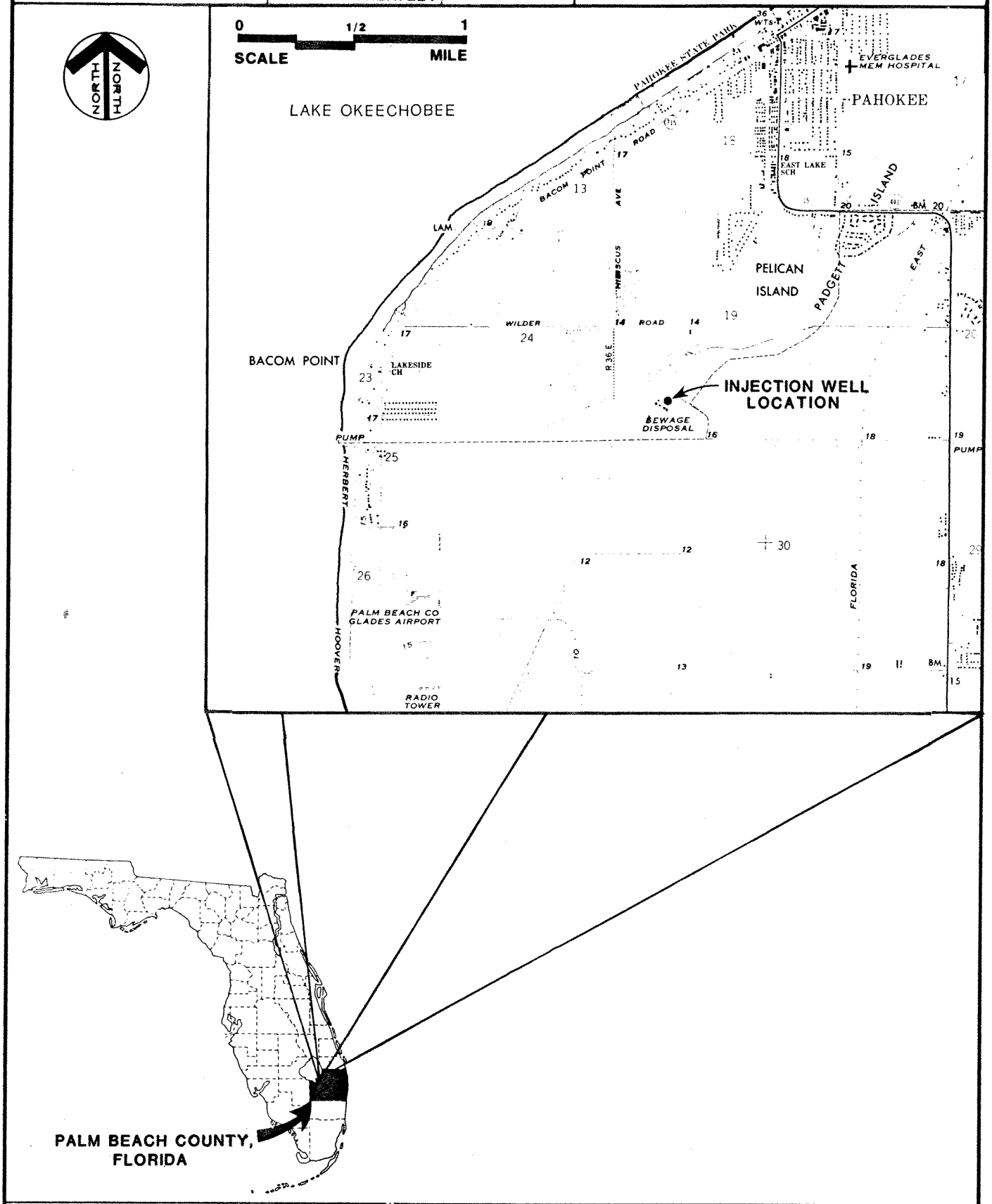
Palm Beach County Health Department

Youngquist Brothers, Incorporated

FIGURES

GERAGHTY & MILLER, INC.
Environmental Services

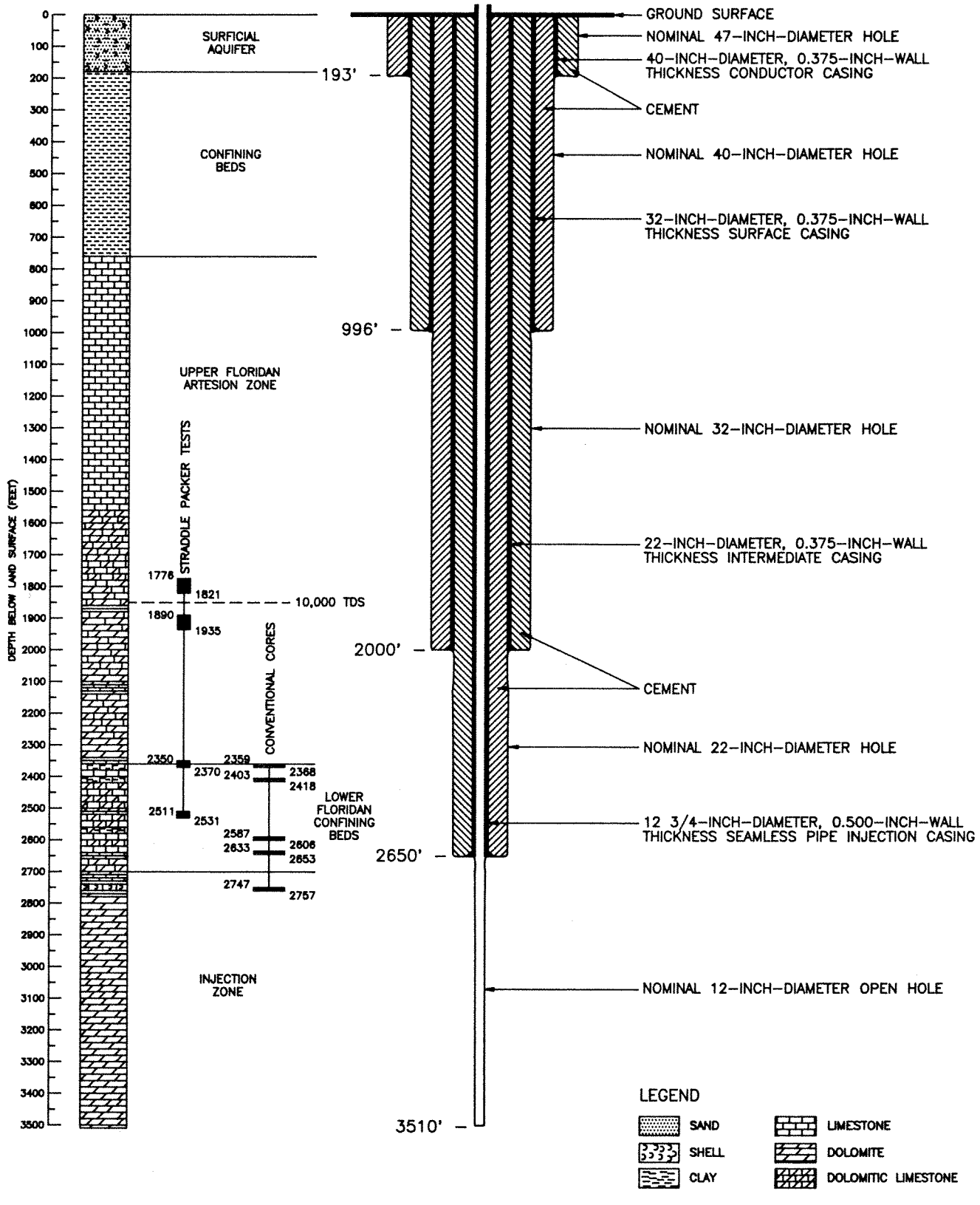
COMPILED BY: K. VERON	DATE: JUL 90	SCALE: SHOWN	PREPARED FOR: RUSSELL & AXON, INC.
PREPARED BY: S. SCZYMANSKI	FILE NO: PF06403		
PROJECT MGR.: J. WHEATLEY			



SUBJECT: SITE MAP - PAHOKEE INJECTION WELL

FIGURE 1

GERAGHTY & MILLER, INC. Environmental Services	COMPILED BY: K. VERON	DATE: JUL 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON, INC.
	PREPARED BY: B. OLIVA	FILE NO: PF06403		
	PROJECT MGR.: J. WHEATLEY			

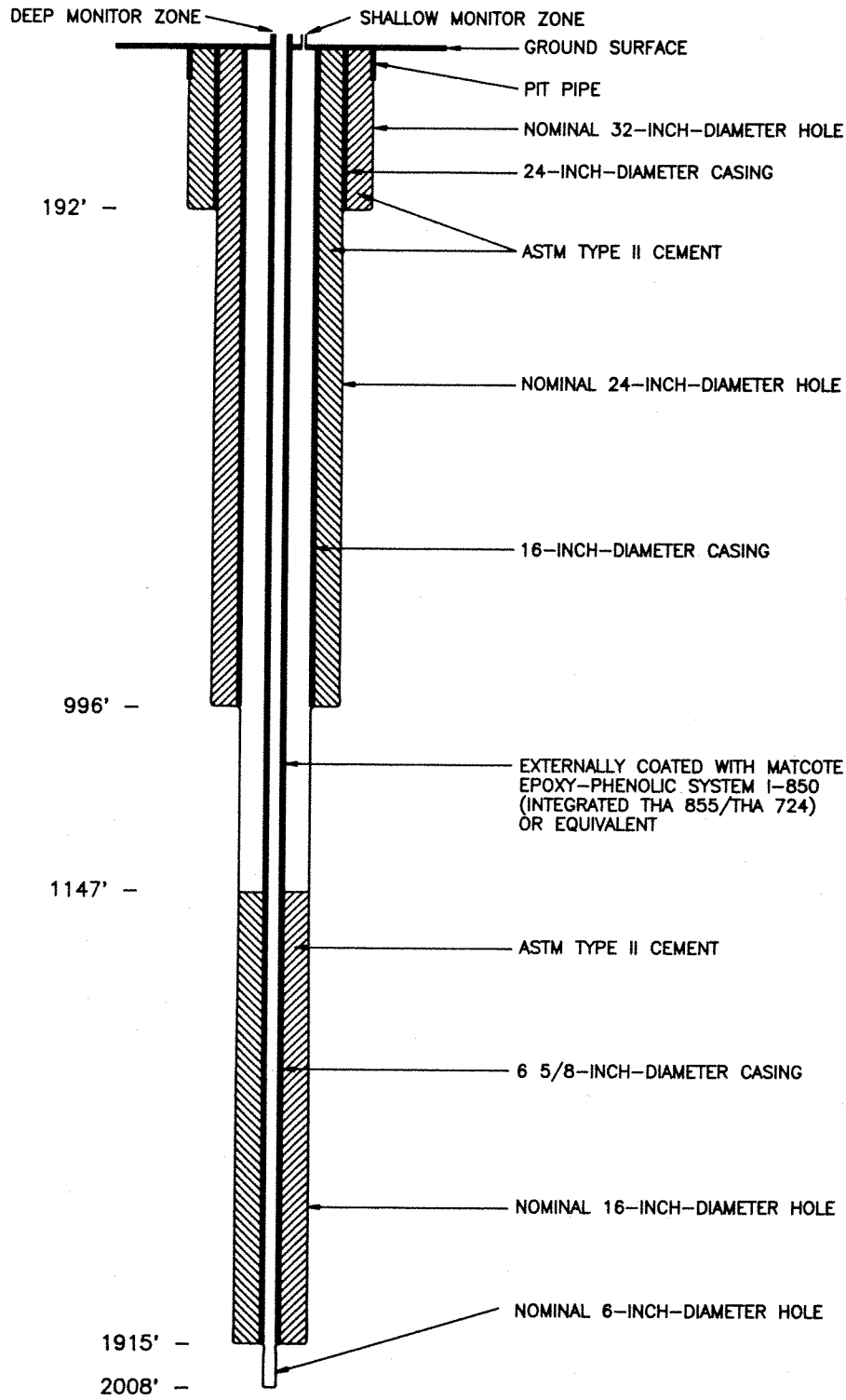


SUBJECT:

FINAL COMPLETION CONSTRUCTION AND TESTING DETAILS FOR CITY OF PAHOKEE INJECTION WELL

FIGURE 2

GERAGHTY & MILLER, INC. Environmental Services	COMPILED BY: K. VERON	DATE: JUL 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON, INC.
	PREPARED BY: B. OLIVA	FILE NO: PF06403		
	PROJECT MGR.: J. WHEATLEY			

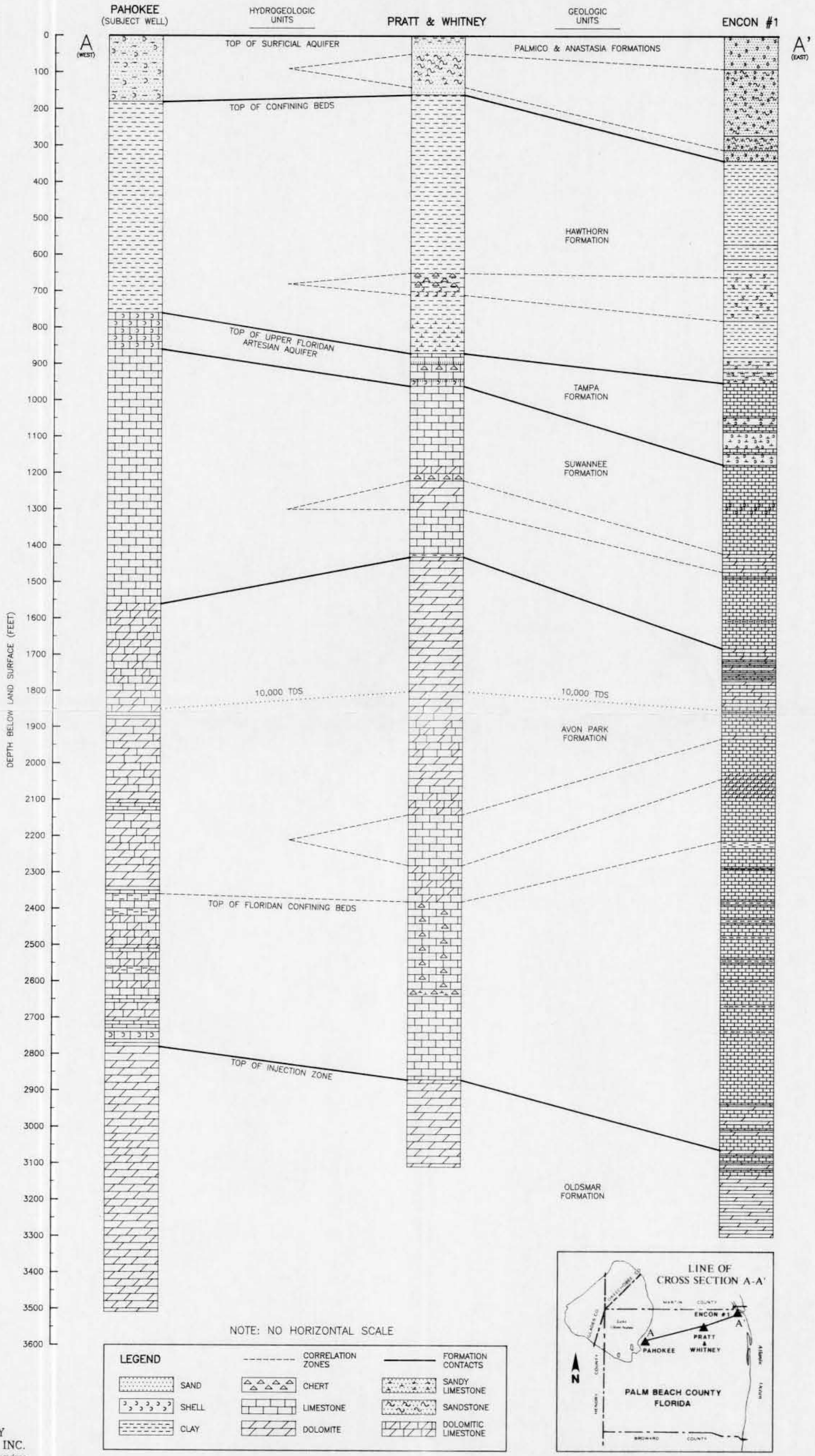


SUBJECT:

FINAL COMPLETION CONSTRUCTION DETAILS FOR CITY OF PAHOKEE DEEP MONITOR WELL

FIGURE **3**

EAST–WEST STRATIGRAPHIC CROSS SECTION



NOTE: NO HORIZONTAL SCALE

LEGEND

SAND	CHERT	SANDY LIMESTONE
SHELL	LIMESTONE	SANDSTONE
CLAY	DOLOMITE	DOLOMITIC LIMESTONE

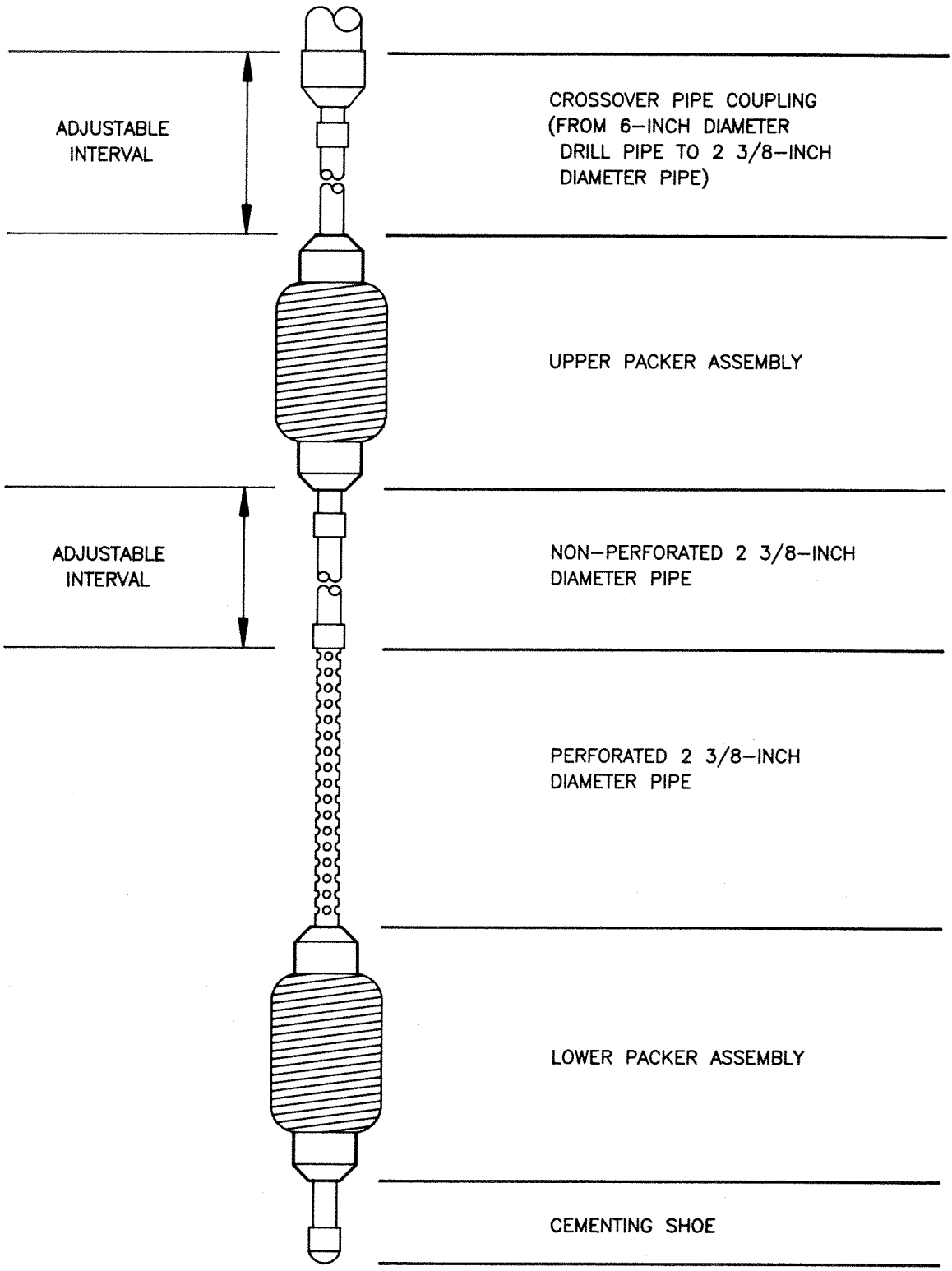
CORRELATION ZONES

FORMATION CONTACTS

GERAGHTY & MILLER, INC.
Environmental Services

FIGURE 4

GERAGHTY & MILLER, INC. Environmental Services	COMPILED BY: R. VERRASTRO	DATE: JUL 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON, INC.
	PREPARED BY: B. OLIVA	FILE NO: PF06403		
	PROJECT MGR.: J. WHEATLEY			

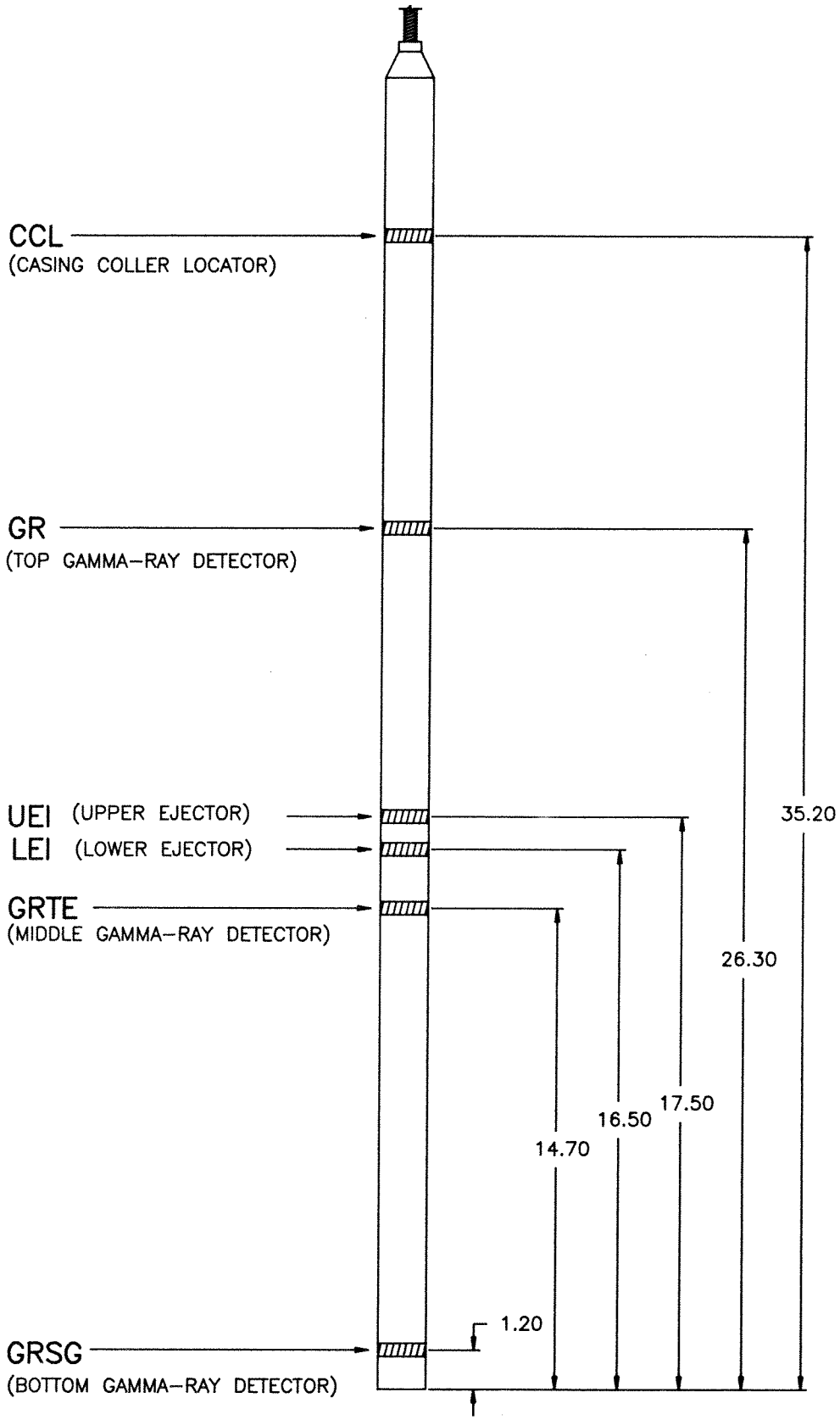


SUBJECT:

TYPICAL STRADDLE-PACKER ASSEMBLY

FIGURE 5

GERAGHTY & MILLER, INC. Environmental Services	COMPILED BY: R. VERRASTRO	DATE: JUL 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON, INC.
	PREPARED BY: B. OLIVA	FILE NO: PF06403		
	PROJECT MGR.: J. WHEATLEY			

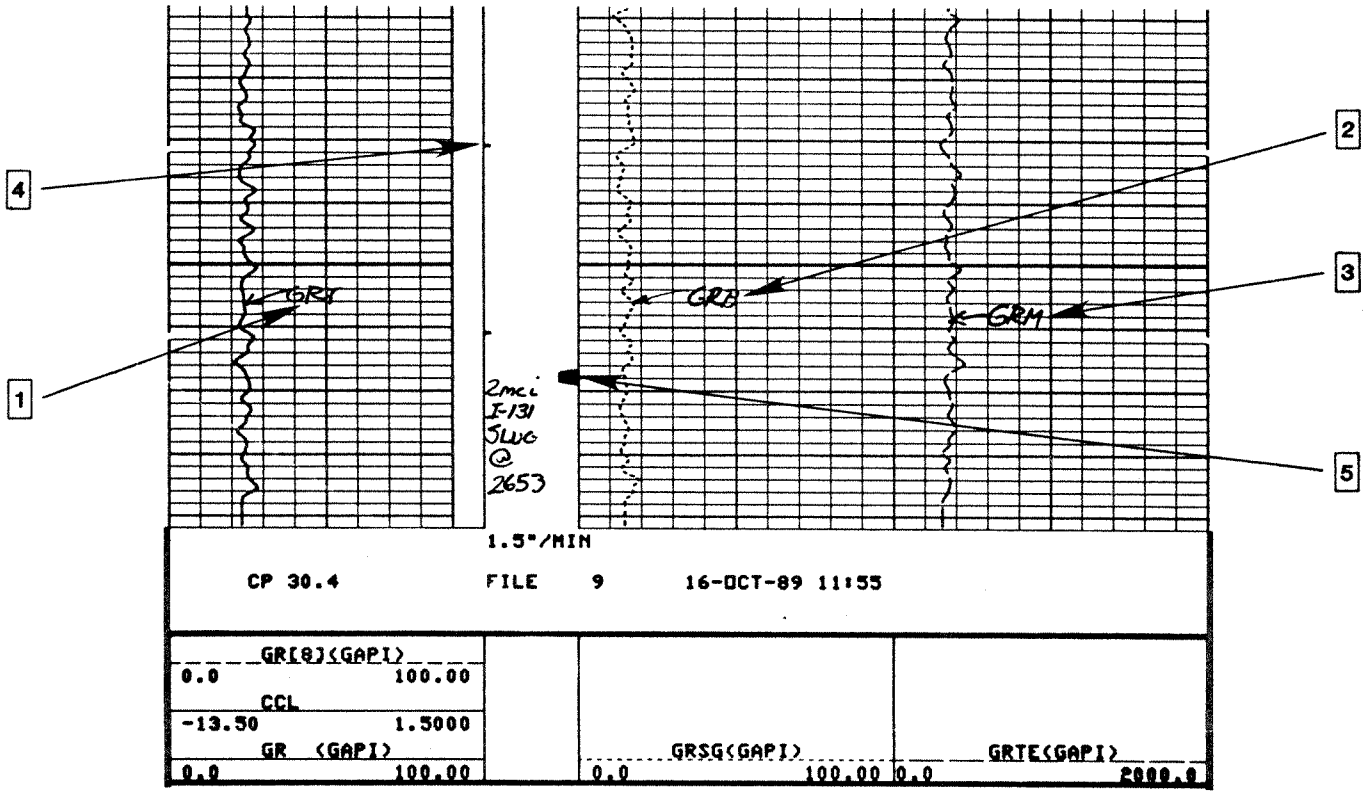


SUBJECT:

DIAGRAM OF RADIOACTIVE TRACER SURVEY LOGGING TOOL

FIGURE 6

GERAGHTY & MILLER, INC. Environmental Services	COMPILED BY: J. WHEATLEY	DATE: JUL 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON, INC.
	PREPARED BY: B. OLIVA	FILE NO: PF06403		
	PROJECT MGR.: J. WHEATLEY			



LEGEND

1. GRT = GR = TOP OF GAMMA-RAY DETECTOR
2. GRB = GRSG = BOTTOM GAMMA-RAY DETECTOR
3. GRM = GRTE = MIDDLE GAMMA-RAY DETECTOR
4. REPRESENTS ONE MINUTE ELAPSED TIME
5. REPRESENTS RELEASE OF RADIOACTIVE MATERIAL

SUBJECT:

TYPICAL LOG PRESENTATION OF A RADIOACTIVE TRACER SURVEY

FIGURE 7

TABLES

Table 1. Hydrologic Properties of Straddle Packer Test Intervals, Injection Well 1

Test	Depth	Int. Thickness (ft)	Calculated Transmissivity (GPD/ft)	Hydraulic Conductivity (GPD/ft2)	Hydraulic Conductivity (cm/sec.)
1	1776 - 1821	45	78,185	1,737	0.082
2	1890 - 1935	45	N/A	N/A	N/A
3	2350 - 2370	20	1,377	69	0.0032
4	2511 - 2531	20	N/A	N/A	N/A

N/A = Not available. Poor data recovery due to borehole conditions.

Table 2. Results of the Analysis of Selected Core Samples, Injection Well 1

Sample	Core Depth	Horizontal Hydraulic Conductivity (cm/sec)	Vertical Hydraulic Conductivity (cm/sec)
1	2366	0.0000242	0.0000318
2	2367	0.0000331	0.0000376
3	2411	0.0000512	0.000103
4	2412	0.0000216	0.0000128
5	2414	0.00000794	0.0000318
6	2592	0.0000119	0.0000459
7	2597	0.0000675	0.000000756
8	2603	0.000175	0.00000151
9	2637	0.0000475	0.0000157
10	2644	0.0000151	0.00000217
11	2648	0.0000620	0.00000616
12	2747	0.000554	0.0000242

Notes: (1) Four-inch-diameter cores

(2) Analysis performed by Professional Service Industries, Inc., Clearwater, Florida.

Table 3. Water-Quality Analyses, Injection Well 1 and Deep Monitor Well, City of Pahokee Wastewater Treatment Plant

Well	Interval (feet)	TDS (mg/L)	Chloride (mg/L)	Specific Conductance (micromhos/cm)	Sulfate (mg/L)
Monitor	946-1147	4,981	2,400	7,030	563
Injection	1776-1821	8,485	4,610	10,350	114
Injection	1890-1935	16,153	7,693	18,880	863
Monitor	1915-2008	19,620	13,400	25,300	1130
Injection	2650-3512	40,863	70,700	54,300	3410

APPENDIX A

Geologic Logs

INJECTION WELL 1

GEOLOGIC LOG
OF
INJECTION WELL 1
CITY OF PAHOKEE, FLORIDA

Depth Interval (feet)	Thickness (feet)	Sample Description
0 - 9.5	9.5	PEAT - Peat, 75%, black; Clay, 15%, medium gray; Shell, 10%, white to light gray, poorly sorted.
9.5 - 11.0	1.5	LIMESTONE - Limestone, 55%, micritic, very pale orange, poorly cemented; Siltstone, 40%, calcareous, dark yellowish brown, poorly- to moderately well-cemented; Shell, 5%, white to light gray, unweathered, entire shells or fragments.
11.0 - 18.5	7.5	SHELL - Shell, 100%, white to light gray, slightly weathered, bivalves and gastropods, entire shells or fragments; Clay, trace, light olive gray; Limestone, trace, micritic, very pale orange, hard.
18.5 - 30.0	11.5	SHELL - Shell, 80%, white to light gray, bivalves and gastropods, mostly fragmented; Sandstone, 20%, quartz, calcareous, fine-grained, very light gray, moderately well-cemented.
30.0 - 40.0	10.0	SANDSTONE - Sandstone, 60%, quartz, calcareous, fine- to medium-grained, very pale orange to medium light gray, subangular to rounded, well-cemented; Shell, 40%, white to light gray, bivalves and gastropods, entire shells or fragments; Limestone, trace, micritic, very pale orange, well-cemented.

Depth Interval (feet)	Thickness (feet)	Sample Description
40.0 - 49.0	9.0	LIMESTONE - Limestone, 70%, sandy, medium- to coarse-grained, very pale orange to light gray, moderately- to well-cemented; Shell, 30%, white to very pale orange, unweathered, mostly fragmented; Sandstone, trace, quartz, calcareous, medium-grained, light gray, subrounded to rounded, well-cemented; Phosphate, trace, very fine-grained, black.
49.0 - 57.0	8.0	SHELL - Shell, 50%, very pale orange, unweathered, mostly fragments; Sandstone, 45%, quartz, fine- to medium-grained, light to medium gray, angular to rounded, well-cemented; Limestone, 5%, micritic, light to medium gray, moderately well cemented; Phosphate, trace, black.
57.0 - 76.0	19.0	SHELL - Shell, 95%, white to very pale orange, entire shell or large fragments; Sand, 5%, quartz, fine- to medium-grained, angular to sub-rounded; Phosphate, trace, black.
76.0 - 80.0	4.0	SHELL - Shell, 70%, white to pale yellowish orange, entire shells or fragments; Limestone, 20%, sparry, very pale orange to pale yellowish brown, moderately hard; Limestone, 10%, sandy, micritic, very pale orange, moderately hard.
80.0 - 90.0	10.0	LIMESTONE - Limestone, 70%, saccharoidal to coarse-crystalline, very light gray to light gray, moderately hard to soft, vuggy, trace fossils; Shell, 30%, pale orange to light gray, mostly fragmented; Phosphate, trace, black.

Depth Interval (feet)	Thickness (feet)	Sample Description
90.0 - 120.0	30.0	SANDSTONE - Sandstone, 50%, quartz, calcareous, medium- to very coarse-grained, white to very light gray, subrounded to rounded, well-cemented; Limestone, 45%, arenaceous, sparry, white to very pale orange, moderately well- to well cemented, vuggy, trace fossils; Shell, 5%, white to very pale orange, mostly fragmented; Phosphate, trace, nodules, black.
120.0 - 130.0	10.0	LIMESTONE - Limestone, 55%, arenaceous, sparry, white to very pale orange, moderately hard to soft; Sandstone, 35%, quartz, calcareous, medium- to coarse-grained, white to very light gray, moderately well-cemented; Shell, 10%, white to very pale orange, fragmented; Phosphate, trace, nodules, black.
130.0 - 140.0	10.0	SANDSTONE - Sandstone, 45%, quartz, calcareous, medium- to coarse-grained, light olive gray, subrounded to rounded, well-cemented, very hard, slightly vuggy; Limestone, 40%, saccharoidal to coarse-crystalline, white to very pale orange, moderately well-cemented; Shell, 15%, white to very pale orange, mostly fragmented; Phosphate, trace, black.
140.0 - 178.0	38.0	SANDSTONE - Sandstone, 100%, quartz, calcareous, medium-grained, light olive gray, subangular to rounded, moderately well- to well-cemented; Shell, trace, white to very pale orange, fragments; Phosphate, trace, black.

Depth Interval (feet)	Thickness (feet)	Sample Description
178.0 - 191.0	13.0	CLAY - Clay, 75%, silty, grayish olive, sticky; Sandstone, 25%, quartz, fine- to medium-grained, grayish olive, angular to subrounded, poorly- to moderately well-cemented; Phosphate, trace, black.
191.0 - 330.0	139.0	CLAY - Clay, 100%, silty, grayish olive green, sticky; Phosphate, trace, black.
330.0 - 350.0	20.0	CLAY - Clay, 100%, silty, grayish olive green, sticky; Shell, trace, white to very pale orange, fragmented; Phosphate, trace, black.
350.0 - 387.0	37.0	CLAY - Clay, 100%, moderate olive brown, sticky; Phosphate, trace, black.
387.0 - 415.0	28.0	CLAY - Clay, 100%, calcareous, silty, moderate olive brown, sticky.
415.0 - 420.0	5.0	CLAY - Clay, 80%, calcareous, silty, pale olive, sticky; Limestone, 20%, micritic, white to very pale orange, moderately well-cemented to well-cemented; Phosphate, trace, black.
420.0 - 449.0	29.0	CLAY - Clay, 75%, calcareous, silty, pale olive to moderate olive brown, sticky; Limestone, 25%, micritic to coarse-grained, very pale orange to pale olive, poorly- to moderately well-cemented; Phosphate, trace, black.
449.0 - 460.0	11.0	CLAY - Clay, 95%, silty, dusky yellow green, sticky; Phosphate, 5%, very fine-grained, nodular, black.

Depth Interval (feet)	Thickness (feet)	Sample Description
460.0 - 480.0	20.0	CLAY - Clay, 90%, calcareous, silty, light olive gray, plastic; Limestone, 10%, silty, micritic, very pale orange, moderately hard; Phosphate, trace, black.
480.0 - 513.0	33.0	CLAY - Clay, 80%, calcareous, pale olive, sticky, phosphatic; Limestone, 20%, phosphatic, medium- to coarse-grained, very pale orange to yellowish gray, poorly- to moderately well-cemented.
513.0 - 525.0	12.0	CLAY - Clay, 100%, silty, calcareous, pale olive to grayish olive, sticky, phosphatic; Limestone, trace, phosphatic, medium-grained, very pale orange to yellowish gray, poorly- to moderately well-cemented.
525.0 - 540.0	15.0	CLAY - Clay, 80%, calcareous, slightly silty, light greenish gray, phosphatic; Limestone, 20%, micritic, white; Fossils, trace, white to very pale orange, coral, weathered.
540.0 - 550.0	10.0	CLAY - Clay, 90%, calcareous, silty, pale olive; Phosphate, 10%, very fine-grained, dark yellowish orange to dusky yellowish brown, rounded to well-rounded; Limestone, trace, micritic, white.
550.0 - 570.0	20.0	CLAY - Clay, 95%, calcareous, pale greenish yellow, plastic; Phosphate, 5%, fine-grained, dark yellowish orange to dusky brown; Limestone, trace, micritic, white.

Depth Interval (feet)	Thickness (feet)	Sample Description
570.0 - 584.0	14.0	CLAY - Clay, 75%, calcareous, yellowish gray, phosphatic, sticky; Limestone, 25%, phosphatic, micritic, very pale orange to yellowish gray, poorly- to moderately well-cemented.
584.0 - 670.0	86.0	CLAY - Clay, 100%, calcareous, yellowish gray to pale olive, phosphatic, plastic; Limestone, trace, micritic, yellowish gray.
670.0 - 720.0	50.0	CLAY - Clay, 95%, calcareous, silty, yellowish gray to pale olive, phosphatic; Limestone, 5%, micritic, white to yellowish gray, soft to moderately hard, slightly phosphatic.
720.0 - 750.0	30.0	CLAY - Clay, 85%, calcareous, silty, yellowish gray, phosphatic; Limestone, 15%, arenaceous, medium- to coarse-grained, yellowish gray to pale olive, poorly- to moderately well-cemented, phosphatic.
750.0 - 760.0	10.0	CLAY - Clay, 80%, calcareous, silty, yellowish gray to light gray, sticky; Limestone, 20%, arenaceous, medium- to coarse-grained, light gray, poorly- to moderately well-cemented.
760.0 - 780.0	20.0	LIMESTONE - Limestone, 70%, arenaceous, medium- to coarse-grained, light gray, poorly- to well-cemented, phosphate grains; Clay 30%, calcareous, silty, white to yellowish gray, sticky.
780.0 - 790.0	10.0	LIMESTONE - Limestone, 90%, arenaceous, medium-grained, light gray, poorly- to moderately well-cemented, phosphate grains; Clay, 10%, calcareous, white, sticky.

Depth Interval (feet)	Thickness (feet)	Sample Description
790.0 - 820.0	30.0	LIMESTONE - Limestone, 100%, arenaceous, medium- to fine-grained, partially micritic, light gray to yellowish gray, poorly- to moderately well-cemented, phosphate grains, fossiliferous; Clay, trace, calcareous, yellowish gray.
820.0 - 850.0	30.0	LIMESTONE - Limestone, 100%, medium- to coarse-grained, partially micritic, yellowish gray, poorly-cemented and soft, pelitomorphic, fossiliferous; Clay, trace, calcareous, white to yellowish gray; Phosphate, trace, black.
850.0 - 910.0	60.0	LIMESTONE - Limestone, 100%, medium- to very coarse-grained, partially micritic, yellowish gray to grayish orange, poorly-cemented and soft, pelitomorphic, foraminiferal, some sparite.
910.0 - 950.0	40.0	LIMESTONE - Limestone, 100%, micritic, very pale orange, soft, pelitomorphic, foraminiferal, partially saccharoidal and sparry, echinoids.
950.0 - 990.0	40.0	LIMESTONE - Limestone, 100%, micritic, white to very pale orange, soft, pelitomorphic, foraminiferal; Limestone, trace, micritic, light bluish gray.
990.0 -1000.0	10.0	LIMESTONE - Limestone, 100%, micritic, very pale orange, pelitomorphic, very soft, fossiliferous.
1000.0 -1070.0	70.0	LIMESTONE - Limestone, 100%, coarse-grained, partially micritic, very pale orange, poorly- to moderately well-cemented, pelitomorphic, fossiliferous, calcite crystals.

Depth Interval (feet)	Thickness (feet)	Sample Description
1070.0 -1120.0	50.0	LIMESTONE - Limestone, 100%, fine- to coarse-grained, partially micritic, very pale orange to yellowish gray, poorly cemented, pelitomorphic, foraminiferal, trace of shell, calcite crystals, gastropods.
1120.0 -1140.0	20.0	LIMESTONE - Limestone, 90%, coarse-grained, partially micritic, very pale orange to light gray, poorly- to moderately well-cemented, pelitomorphic, foraminiferal, trace of shell; Limestone, 10%, fine-grained, partially micritic, very pale orange to yellowish gray, well-cemented, very hard.
1140.0 -1220.0	80.0	LIMESTONE - Limestone, 90%, coarse-grained, partially micritic, very pale orange to grayish orange, moderately well-cemented, pelitomorphic, foraminiferal, trace of shell; Limestone, 10%, fine- to medium-grained, partially micritic, light gray to medium light gray, well-cemented, hard.
1220.0 -1230.0	10.0	LIMESTONE - Limestone, 60%, medium- to coarse-grained, partially micritic, very pale orange to grayish orange, moderately well-cemented, pelitomorphic, foraminiferal, trace of shell, echinoids; Limestone, 40%, fine- to medium-grained, partially micritic, medium gray, moderately well-cemented.
1230.0 -1240.0	10.0	LIMESTONE - Limestone, 90%, micritic, very pale orange to grayish orange, pelitomorphic, foraminiferal; Limestone, 10%, fine-grained, partially micritic, medium gray, hard.

Depth Interval (feet)	Thickness (feet)	Sample Description
1240.0 -1260.0	20.0	LIMESTONE - Limestone, 80%, micritic, white to very pale orange, chalky, soft; Limestone, 20%, micritic, very pale orange to grayish orange, pelitomorphic, foraminiferal, trace of shell.
1260.0 -1290.0	30.0	LIMESTONE - Limestone, 80%, micritic, very pale orange to grayish orange, pelitomorphic, foraminiferal; Limestone, 20%, fine-grained, medium gray, hard; Organics, trace, grayish black.
1290.0 -1350.0	60.0	LIMESTONE - Limestone, 80%, micritic, very pale orange to grayish orange, pelitomorphic, foraminiferal; Limestone, 10%, micritic, white to very pale orange, chalky, soft; Limestone, 10%, fine-grained, partially micritic, medium gray, hard.
1350.0 -1480.0	130.0	LIMESTONE - Limestone, 90%, medium- to coarse-grained, partially micritic, very pale to grayish orange, poorly- to moderately well-cemented, pelitomorphic, foraminiferal; Limestone, 10%, fine-grained, partially micritic, pale orange to light gray, well-cemented.
1480.0 -1510.0	30.0	LIMESTONE - Limestone, 70%, medium- to coarse-grained, partially micritic, very pale orange to light gray, poorly- to moderately well-cemented, pelitomorphic, foraminiferal, trace of shell; Limestone, 30%, fine-grained, partially micritic, very pale orange, poorly cemented, chalky; Phosphate, trace.

Depth Interval (feet)	Thickness (feet)	Sample Description
1510.0 -1530.0	20.0	LIMESTONE - Limestone, 90%, medium- to coarse-grained, partially micritic, very pale orange to grayish orange, poorly cemented, pelitomorphic, soft, foraminiferal, trace of shell; Limestone, 10%, fine-grained, partially micritic, light gray, chalky, soft.
1530.0 -1560.0	30.0	LIMESTONE - Limestone, 80%, micritic, very pale orange, poorly- to moderately well-cemented, pelitomorphic, foraminiferal; Limestone, 20%, micritic, very pale orange, chalky; Limestone, trace, micritic, very pale orange, hard, foraminiferal, vuggy.
1560.0 -1630.0	70.0	LIMESTONE - Limestone, 50%, fine-grained, very pale orange, poorly- to moderately well-cemented, foraminiferal, slightly vuggy; Dolomite, 50%, saccharoidal, dark yellowish brown, moderately hard, slightly vuggy, brittle.
1630.0 - 1680.0	50.0	DOLOMITE - Dolomite, 80%, fine- to medium-crystalline, moderate yellowish brown to grayish brown, hard, vuggy, brittle; Limestone, 20%, fine-crystalline, very pale orange, soft, trace fossils.
1680.0 -1720.0	40.0	DOLOMITE - Dolomite, 90%, very fine- to fine-crystalline, saccharoidal, moderate yellowish brown to dark yellowish brown, hard, vuggy, slightly cellular, drusy; Limestone, 10%, sparry, very pale orange, soft to moderately hard, pelitomorphic, foraminiferal.

Depth Interval (feet)	Thickness (feet)	Sample Description
1720.0 -1780.0	60.0	LIMESTONE - Limestone, 90%, slightly dolomitic, micritic, very pale orange, pelitomorphic, foraminiferal; Dolomite, 10%, very fine- to fine-crystalline, saccharoidal, moderate yellowish brown to moderate brown, hard, vuggy, drusy.
1780.0 -1810.0	30.0	DOLOMITE - Dolomite, 95%, fine-crystalline, moderate yellowish brown to medium gray, hard, slightly vuggy, brittle, drusy; Limestone, 5%, dolomitic, micritic to very fine-crystalline, very pale orange to pale yellowish brown, hard.
1810.0 -1860.0	50.0	DOLOMITE - Dolomite, 90%, calcitic, fine-crystalline, dark yellowish orange to dusky yellowish brown, hard, slightly vuggy; Limestone, 10%, micritic, very pale orange, soft to moderately hard, foraminiferal, slightly vuggy.
1860.0 -1870.0	10.0	DOLOMITE - Dolomite, 95%, calcitic, very fine- to fine-crystalline, grayish orange to moderate brown, slightly vuggy; Limestone, 5%, micritic, very pale orange, moderately hard, pelitomorphic.
1870.0 -1920.0	50.0	LIMESTONE - Limestone, 95%, very dolomitic, micritic to fine-crystalline, very pale orange to grayish orange, hard, brittle; Limestone, 5%, micritic, very pale orange, soft to moderately hard, pelitomorphic.

Depth Interval (feet)	Thickness (feet)	Sample Description
1920.0 -1930.0	10.0	LIMESTONE - Limestone, 95%, dolomitic, fine- to medium-crystalline, saccharoidal, pale yellowish brown to grayish orange, slightly vuggy; Limestone, 5%, micritic, very pale orange, hard.
1930.0 -1960.0	30.0	LIMESTONE - Limestone, 95%, very dolomitic, fine- to medium-crystalline, saccharoidal, grayish orange to pale red, slightly vuggy, iron-rich; Limestone, 5%, micritic, very pale orange, hard; Phosphate, trace.
1960.0 -1980.0	20.0	LIMESTONE - Limestone, 70%, dolomitic, fine- to medium-crystalline, saccharoidal, pale yellowish brown to grayish orange, vuggy; Limestone, 30%, micritic, very pale orange, moderately soft to moderately hard; Phosphate, trace.
1980.0 -1990.0	10.0	LIMESTONE - Limestone, 95%, dolomitic, fine- to medium-crystalline, saccharoidal, moderate yellowish brown to grayish orange, moderately soft to moderately hard, pelitomorphic, slightly vuggy; Limestone, 5%, micritic, very pale orange to moderately grayish orange, moderately soft.
1990.0 -2040.0	50.0	LIMESTONE - Limestone, 80%, very dolomitic, fine- to medium-crystalline, moderate yellowish brown to dark yellowish brown, hard, brittle; Limestone, 10%, dolomitic, micritic to fine-crystalline, very pale orange, moderately hard; Limestone, 10%, dolomitic, micritic, dark yellowish brown, hard, slightly vuggy, brittle.

Depth Interval (feet)	Thickness (feet)	Sample Description
2040.0 -2050.0	10.0	LIMESTONE - Limestone, 80%, dolomitic, micritic to fine-crystalline, very pale orange, moderately soft, slightly vuggy, brittle; Dolomite 20%, fine- to medium-crystalline, moderate yellowish brown, hard.
2050.0 -2090.0	40.0	LIMESTONE - Limestone, 70%, medium-crystalline, pale yellowish orange, soft, pelitomorphic; Limestone, 30%, dolomitic, very fine-crystalline, very pale orange, moderately soft to moderately hard.
2090.0 -2110.0	20.0	DOLOMITE - Dolomite, 95%, medium- to coarse-crystalline, saccharoidal, moderate yellowish brown, soft to moderately hard, vuggy; Dolomite, 5%, very fine- to fine-crystalline, dark yellowish orange, moderately hard.
2110.0 -2130.0	20.0	LIMESTONE - Limestone, 100%, medium- to coarse-crystalline, very pale orange, moderately soft to moderately hard, pelitomorphic, fossiliferous, sparry.
2130.0 -2150.0	20.0	DOLOMITE - Dolomite, 80%, medium- to coarse-crystalline, moderate yellowish brown, soft to moderately hard, vuggy; Limestone, 20%, medium- to coarse-crystalline, very pale orange, moderately soft to moderately hard, pelitomorphic, fossiliferous.
2150.0 -2240.0	90.0	DOLOMITE - Dolomite, 80%, medium- to coarse-crystalline, saccharoidal, grayish orange to moderate yellowish brown, moderately soft to moderately hard, vuggy; Limestone, 20%, pelitomorphic, very pale orange, soft.

Depth Interval (feet)	Thickness (feet)	Sample Description
2240.0 -2270.0	30.0	DOLOMITE - Dolomite, 95%, medium- to coarse-crystalline, saccharoidal, grayish orange to moderate yellowish brown, moderately soft to moderately hard, vuggy; Limestone, 5%, pelitomorphic, white to very pale orange, soft.
2270.0 -2280.0	10.0	DOLOMITE - Dolomite, 95%, medium-grained, moderate to dark yellowish brown, hard; Limestone, 5%, pelitomorphic, white to very pale orange, soft.
2280.0 -2290.0	10.0	DOLOMITE - Dolomite, 90%, medium- to coarse-crystalline, saccharoidal, light brown to moderate reddish brown, moderately soft to moderately hard, sparry; Limestone, 10%, pelitomorphic, white, soft.
2290.0 -2300.0	10.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, very pale orange to light brown, moderately hard, brittle; Limestone, trace, pelitomorphic, very pale orange, soft.
2300.0 -2340.0	40.0	DOLOMITE - Dolomite, 100%, coarse-crystalline, very pale orange, moderately hard, slightly vuggy; Limestone, trace, white to very pale orange, soft.
2340.0 -2357.0	17.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, very pale orange to light brown, vuggy, sparry; Limestone, trace, white to very pale orange, soft.

Depth Interval (feet)	Thickness (feet)	Sample Description
2357.0 -2359.0	2.0	LIMESTONE - Limestone, 70%, micritic, very pale orange, poorly- to moderately well-cemented, slightly vuggy; Dolomite, 30%, medium- to very-coarse-crystalline, saccharoidal, grayish orange to moderate yellowish brown, moderately soft to moderately hard, vuggy.
2359.0 -2368.0	9.0	LIMESTONE - Limestone, 100%, pelitomorphic, white to very pale orange, very well-cemented, fossiliferous.
2368.0 -2403.0	35.0	LIMESTONE - Limestone, 100%, pelitomorphic, white to very pale orange, moderately soft, vuggy, fossiliferous.
2403.0 -2420.0	17.0	LIMESTONE - Limestone, 100%, pelitomorphic, very pale orange to grayish pink, poorly- to moderately well-cemented, fossiliferous.
2420.0 -2430.0	10.0	LIMESTONE - Limestone, 75%, pelitomorphic, white to very pale orange, poorly cemented, vuggy; Dolomite, 25%, medium-crystalline, saccharoidal, moderate yellowish brown, moderately soft.
2430.0 -2460.0	30.0	LIMESTONE - Limestone, 60%, pelitomorphic, white to very pale orange, poorly cemented, vuggy; Dolomite, 40%, medium-crystalline, saccharoidal, moderate yellowish brown, moderately soft.
2460.0 -2500.0	40.0	LIMESTONE - Limestone, 85%, micritic, very pale orange, moderately soft, pelitomorphic, vuggy; Dolomite, 15%, medium-crystalline, saccharoidal, grayish orange to yellowish brown, moderately soft to moderately hard.

Depth Interval (feet)	Thickness (feet)	Sample Description
2500.0 -2510.0	10.0	DOLOMITE - Dolomite, 100%, medium-crystalline, very pale orange to light brown, moderately hard.
2510.0 -2525.0	15.0	DOLOMITE - Dolomite, 70%, medium-crystalline, very pale orange to light brown, moderately hard; Limestone, 30%, pelitomorphic, white to very pale orange, moderately soft.
2525.0 -2530.0	5.0	LIMESTONE - Limestone, 70%, pelitomorphic, white to very pale orange, moderately soft, chalky; Dolomite, 30%, medium-crystalline, light brown, moderately hard.
2530.0 -2540.0	10.0	DOLOMITE - Dolomite, 60%, calcitic, fine-crystalline, saccharoidal, pale yellowish orange to dark yellowish orange, slightly vuggy; Limestone, 40%, micritic, white to very pale orange, soft, partially pelitomorphic; Shell, trace, very pale orange.
2540.0 -2560.0	20.0	LIMESTONE - Limestone, 75%, micritic, white to very pale orange, soft to moderately hard, partially pelitomorphic, foraminiferal; Dolomite, 25%, calcitic, fine-crystalline, saccharoidal, pale yellowish orange, vuggy.
2560.0 -2570.0	10.0	LIMESTONE - Limestone, 75%, dolomite, pelitomorphic, white to very pale orange, soft to moderately hard, phosphate grains; Clay, 20%, calcitic, white to very pale orange, very soft; Dolomite, 5%, calcitic, saccharoidal, moderate yellowish brown, hard.

Depth Interval (feet)	Thickness (feet)	Sample Description
2570.0 -2580.0	10.0	LIMESTONE - Limestone, 90%, dolomitic, fine- to coarse-crystalline, saccharoidal, white to grayish orange, soft to moderately hard, partially pelitomorphic, slightly vuggy, some phosphate grains; Dolomite, 10%, calcitic, very-fine crystalline, saccharoidal, medium yellowish brown, hard, some phosphate grains.
2580.0 -2610.0	30.0	LIMESTONE - Limestone, 90%, slightly dolomitic, fine-crystalline, saccharoidal, grayish orange, moderately hard, partially pelitomorphic; Limestone, 10%, dolomitic, cryptocrystalline to very fine-crystalline, bluish white to medium bluish gray, hard, small black veins.
2610.0 -2620.0	10.0	LIMESTONE - Limestone, 60%, slightly dolomitic, saccharoidal, very pale orange to moderate yellowish brown, moderately soft, pelitomorphic; Dolomite, 40%, cryptocrystalline to fine-crystalline, dark yellowish brown, hard.
2620.0 -2650.0	30.0	LIMESTONE - Limestone, 100%, microcrystalline to saccharoidal, very pale orange to dark yellowish brown, partially pelitomorphic, moderately soft, brittle.
2650.0 -2680.0	30.0	LIMESTONE - Limestone, 40%, micritic, white to very pale orange, soft to moderately hard; Limestone, 30%, dolomitic, micritic, white to very pale orange, brittle, some fine-size dolomite crystals; Limestone, 30%, dolomitic, very fine-crystalline, pale yellowish brown to very light gray, moderately hard, brittle.

Depth Interval (feet)	Thickness (feet)	Sample Description
2680.0-2700.0	20.0	LIMESTONE - Limestone, 60%, dolomitic, micritic, pale yellowish brown to medium gray, hard; Limestone, 40%, micritic, white to very pale orange, soft to moderately hard, slightly vuggy.
2700.0 -2710.0	10.0	LIMESTONE - Limestone, 100%, dolomitic, very fine- to fine-crystalline, pale yellowish brown to medium dark gray, moderately hard, brittle.
2710.0 - 2730.0	20.0	LIMESTONE - Limestone, 60%, pelitomorphic, partially saccharoidal, very pale orange to grayish orange, soft to moderately hard; Limestone, 40%, micritic, partially saccharoidal, medium gray to black, moderately hard to very hard.
2730.0 -2740.0	10.0	CAVERN - No Sample.
2740.0 -2780.0	40.0	LIMESTONE - Limestone, 80%, pelitomorphic, partially micritic, very pale orange, soft to moderately hard; Dolomite, 20%, fine-crystalline, moderate yellowish brown, hard, brittle.
2780.0 -2810.0	30.0	DOLOMITE - Dolomite, 70%, saccharoidal, moderate yellowish brown, hard, brittle; Limestone, 30%, pelitomorphic, very pale orange, soft to moderately hard.
2810.0 -2820.0	10.0	DOLOMITE - Dolomite, 90%, fine-crystalline, saccharoidal, medium yellowish brown to medium gray, hard, brittle; Limestone, 10%, pelitomorphic, very pale orange, soft to moderately hard.

Depth Interval (feet)	Thickness (feet)	Sample Description
2820.0 -2830.0	10.0	DOLOMITE - Dolomite, 100%, very fine-crystalline, saccharoidal, pale yellowish brown to dark reddish brown, moderately hard, brittle; Limestone, trace, pelitomorphic, very pale orange, soft to moderately hard.
2830.0 -2840.0	10.0	DOLOMITE - Dolomite, 95%, fine- to medium-crystalline, saccharoidal, grayish red to dark reddish brown, moderately hard; Limestone, 5%, pelitomorphic, white to very pale orange, soft to moderately hard.
2840.0 -2850.0	10.0	DOLOMITE - Dolomite, 95%, medium- to coarse-crystalline, saccharoidal, grayish orange to pale yellowish brown, moderately hard, vuggy; Limestone, 5%, pelitomorphic, very pale orange, soft to moderately hard.
2850.0 -2860.0	10.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, yellowish brown to dusky yellowish brown, moderately hard to very hard, vuggy.
2860.0 -2880.0	20.0	DOLOMITE - Dolomite, 95%, fine- to medium-crystalline, saccharoidal, grayish orange to moderate yellowish brown, moderately hard to very hard, vuggy; Limestone, 5%, micritic, white to very pale orange, soft to moderately hard, foraminiferal.
2880.0 -2900.0	20.0	DOLOMITE - Dolomite, 90%, fine- to medium-crystalline, saccharoidal, moderate yellowish brown to dusky yellowish brown, moderately hard to very hard, vuggy; Limestone, 10%, micritic, white to very pale orange, soft to moderately hard, foraminiferal.

Depth Interval (feet)	Thickness (feet)	Sample Description
2900.0 -2920.0	20.0	DOLOMITE - Dolomite, 100%, fine- to medium-crystalline, saccharoidal, moderate yellowish brown to dusky yellowish brown, hard to very hard; Limestone, trace, micritic, white to very pale orange, soft to moderately hard.
2920.0 -2930.0	10.0	DOLOMITE - Dolomite, 100%, fine- to medium-crystalline, saccharoidal, pale yellowish orange to dark yellowish brown, moderately hard, vuggy; Limestone, trace, micritic, white to very pale orange, soft.
2930.0 -2940.0	10.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, pale to dark yellowish brown, moderately hard; Limestone, trace, pelitomorphic, very pale orange, soft.
2940.0 -2960.0	20.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, saccharoidal, moderate yellowish brown to dark yellowish brown, moderately hard, brittle, vuggy; Limestone, trace, pelitomorphic, very pale orange, soft.
2960.0 -2970.0	10.0	DOLOMITE - Dolomite, 100%, medium- to coarse-crystalline, saccharoidal, moderate yellowish brown to dark yellowish brown, partially micritic, moderately hard, brittle, vuggy; Limestone, trace, pelitomorphic, soft.
2970.0 -2980.0	10.0	DOLOMITE - Dolomite, 100%, fine- to medium-crystalline, saccharoidal, moderate yellowish brown to dusky brown, partially micritic, moderately hard, brittle.

Depth Interval (feet)	Thickness (feet)	Sample Description
2980.0 -3010.0	30.0	DOLOMITE - Dolomite, 100%, microcrystalline, yellowish brown to brownish black, moderately hard, brittle.
3010.0 -3050.0	40.0	DOLOMITE - Dolomite, 100%, microcrystalline, calcitic, light olive gray to olive gray, vuggy, hard, brittle; Limestone, trace, white, soft.
3050.0 -3070.0	20.0	DOLOMITE - Dolomite, 100%, microcrystalline, moderate yellowish brown to grayish black, hard, brittle; Limestone, trace, pelitomorphic, white, soft.
3070.0 -3080.0	10.0	DOLOMITE - Dolomite, 100%, microcrystalline, yellowish brown to grayish black, hard, brittle; Limestone, trace, pelitomorphic, very pale orange, soft.
3080.0 -3100.0	20.0	DOLOMITE - Dolomite, 100%, microcrystalline, moderate yellowish brown to grayish black, hard, brittle; Limestone, trace, pelitomorphic, very pale orange, moderately soft.
3100.0 -3110.0	10.0	DOLOMITE - Dolomite, 100%, microcrystalline, dark yellowish brown to grayish black, hard, brittle.
3110.0 -3140.0	30.0	DOLOMITE - Dolomite, 100%, microcrystalline, dark yellowish brown to dusky yellowish brown, hard, brittle.
3140.0 -3160.0	20.0	DOLOMITE - Dolomite, 100%, slightly calcitic, microcrystalline, pale yellowish orange to dusky brown, moderately hard, brittle.

Depth Interval (feet)	Thickness (feet)	Sample Description
3160.0 -3170.0	10.0	DOLOMITE - Dolomite, 100%, slightly calcitic, microcrystalline, pale yellowish orange to dusky brown, moderately hard, brittle.
3170.0 - 3180.0	10.0	DOLOMITE - Dolomite, 100%, slightly calcitic, microcrystalline, moderately yellowish brown to dusky yellowish brown with traces of dark reddish brown, moderately hard, brittle.
3180.0 -3190.0	10.0	DOLOMITE - Dolomite, 60%, calcitic, cryptocrystalline to saccharoidal, medium light gray, brittle to firm; Dolomite, 40%, calcitic, cryptocrystalline to saccharoidal, dark yellowish brown, brittle to firm.
3190.0 -3240.0	50.0	DOLOMITE - Dolomite, 70%, microcrystalline to fine-crystalline, grayish orange to moderate yellowish brown, moderately hard, brittle; Dolomite, 30%, slightly calcitic, microcrystalline to saccharoidal, very pale orange to light gray; Limestone, trace, dolomitic, saccharoidal, white to very pale orange, pelitomorphic.
3240.0 -3260.0	20.0	DOLOMITE - Dolomite, 95%, calcitic, microcrystalline, grayish orange to light brown, pelitomorphic; Limestone, 5%, dolomitic, saccharoidal, white to very pale orange, moderately soft.
3260.0 -3290.0	30.0	DOLOMITE - Dolomite, 100%, calcitic, saccharoidal, moderate yellowish brown to dark yellowish brown, moderately hard, brittle; Limestone, trace, dolomitic, microcrystalline to saccharoidal, very pale orange, moderately soft.

Depth Interval (feet)	Thickness (feet)	Sample Description
3290.0 -3330.0	40.0	DOLOMITE - Dolomite, 85%, microcrystalline to saccharoidal, dark yellowish brown to dusky yellowish brown, hard; Dolomite, 15%, slightly calcitic, very fine-crystalline to saccharoidal, moderate yellowish brown to dark yellowish brown, brittle.
3330.0 -3400.0	70.0	DOLOMITE - Dolomite, 100%, calcitic, very fine-crystalline to saccharoidal, very pale orange to moderate yellowish brown, brittle, partially pelitomorphic, very vuggy; Dolomite, trace, calcitic, saccharoidal, grayish orange to dark reddish brown, hard.
3400.0 -3450.0	50.0	DOLOMITE - Dolomite, 100%, calcitic, very fine-crystalline, partially saccharoidal, grayish orange to moderate yellowish brown, brittle, vuggy.
3450.0 -3510.0	60.0+	DOLOMITE - Dolomite, 95%, gypsiferous, saccharoidal, yellowish gray to grayish orange, moderately soft to moderately hard, brittle, vuggy, slightly calcitic; Gypsum, 5%, microcrystalline to coarse-crystalline, colorless to white, partially vitreous; Organics, trace, black.

TOTAL DEPTH: 3510.0

DEEP MONITOR WELL

GEOLOGIC LOG
OF
DEEP MONITOR WELL
CITY OF PAHOKEE, FLORIDA

Depth Interval (feet)	Thickness (feet)	Sample Description
0 - 13	13	PEAT - Peat, 75%, black; Clay, 15%, plastic, light gray; Shell, 10%, white to light gray, poorly sorted.
13 - 40	27	SHELL - Shell, 80%, light gray to brown, unweathered, entire shells or fragments; Limestone, 20%, micritic, white to light gray.
40 - 70	30	SHELL - Shell, 90%, white to light gray, entire shells or fragments; Limestone, 5%, medium- to coarse-grained, white to light gray; Sandstone, 5%, quartz, white to light gray, medium- to coarse-grained, angular to sub-angular.
70 - 80	10	SHELL - Shell, 85%, white to light gray, entire shells or fragments; Sandstone, 15%, quartz, gray to light gray, quartz, fine- to medium-grained, sub-angular.
80 - 90	10	SANDSTONE - Sandstone, 60%, quartz, fine- to medium-grained, gray to light gray, sub-angular; Shell, 30%, white to light gray, mostly fragments, some entire shells; Limestone, 10%, saccharoidal, fine- to medium-grained, light gray to white.
90 - 100	10	SANDSTONE - Sandstone, 80%, quartz, fine- to medium-grained, gray to light gray, sub-angular; Shell, 20%, white to gray, entire shells or fragments.

Depth Interval (feet)	Thickness (feet)	Sample Description
100 - 130	30	SANDSTONE - Sandstone, 60%, quartz, fine- to medium-grained, gray to light gray, sub-angular; Shell, 30%, white to gray, entire shells or fragments; Limestone, 10%, fine-grained, white to light gray.
130 - 150	20	SANDSTONE - Sandstone, 80%, quartz, fine- to medium-grained, light gray, sub-angular to sub-rounded, well cemented; Shell, 15%, gray to light brown, mostly small- or medium-sized fragments; Limestone, 5%, saccharoidal, fine- to medium-grained, light gray.
150 - 160	10	SANDSTONE - Sandstone, 80%, quartz, fine- to medium-grained, light gray, sub-angular to sub-rounded, well-cemented; Shell, 20%, white to light brown, some entire shells, mostly fragments.
160 - 180	20	SANDSTONE - Sandstone, 95%, quartz, fine- to medium-grained, light gray, sub-angular to sub-rounded, well cemented; Shell, 5%, white to light gray, entire shells or fragments.
180 - 190	10	SANDSTONE - Sandstone, 90%, quartz, fine- to coarse-grained, light gray to gray, sub-angular to sub-rounded; Shell, 5%, white to light gray, entire shells or fragments; Clay, 5%, silty, grayish olive green, plastic; Phosphate, trace, black.
190 - 334	144	CLAY - Clay, 100%, silty, grayish olive green to dusky green, plastic; Phosphate, trace, black.

Depth Interval (feet)	Thickness (feet)	Sample Description
334 - 350	16	CLAY - Clay, 100%, silty, grayish olive green to dusky green; Shell, trace, white, small fragments; Phosphate, trace, black.
350 - 415	65	CLAY - Clay, 100%, silty, grayish olive green; Phosphate, trace, black.
415 - 430	15	CLAY - Clay, 80%, calcareous, silty, pale olive, sticky; Limestone, 20%, white to light gray, moderately well-cemented to well cemented; Phosphate, trace, black.
430 - 450	20	CLAY - Clay, 60%, calcareous, silty, light gray, sticky; Limestone, 40%, micritic, white to light gray, moderately well-cemented to well cemented; Phosphate, trace, black.
450 - 480	30	CLAY - Clay, 100%, calcareous, silty, dusky yellow green, sticky; Phosphate, trace, light olive gray.
480 - 510	30	CLAY - Clay, 95%, calcareous, silty, light olive gray, phosphatic, sticky; Limestone, 5%, micritic, very pale orange, moderately hard.
510 - 550	40	CLAY - Clay, 100%, calcareous, silty, grayish yellow green, sticky; Phosphate, trace, black; Limestone, trace, white to very pale orange.
550 - 610	60	CLAY -Clay, 95%, calcareous, yellowish gray to grayish yellow green, sticky; Limestone, 5%, micritic, very pale orange to white, moderately hard; Phosphate, trace, black.
610 - 650	40	CLAY - Clay, 95%, calcareous, silty, pale olive, sticky; Phosphate, 5%, fine-grained, black; Limestone, trace, micritic, white, hard.

Depth Interval (feet)	Thickness (feet)	Sample Description
650 - 680	30	CLAY - Clay, 95%, calcareous, silty, pale olive, sticky; Phosphate, 5%, fine-grained, black; Limestone, trace, micritic, white, hard.
680 - 720	40	CLAY - Clay, 95%, calcareous, slightly phosphatic, pale olive, plastic; Limestone, 5%, micritic, very pale orange to white, moderately hard, fossiliferous.
720 - 730	10	CLAY - Clay, 90%, calcareous, slightly phosphatic, pale olive; Limestone, 10%, micritic, silty, phosphatic, white to very pale orange.
730 - 760	30	CLAY - Clay, 80%, calcareous, silty, yellowish gray to light gray; Limestone, 20%, arenaceous, micritic light gray, poorly- to moderately well-cemented, phosphatic.
760- 790	30	LIMESTONE - Limestone, 90%, arenaceous, micritic, partially saccharoidal, light gray, poorly- to well-cemented; Clay, 10%, calcareous, light gray.
790 - 820	30	LIMESTONE - Limestone, 100%, arenaceous, micritic, partially saccharoidal, light gray to yellowish gray, poorly- to well-cemented.
820 - 900	80	LIMESTONE - Limestone, 100%, saccharoidal, very pale orange, soft to moderately hard, pelitomorphic; Limestone, trace, micritic, medium light to dark gray, hard fossiliferous, foraminiferal, trace of shell; Phosphate, trace, moderate brown.

Depth Interval (feet)	Thickness (feet)	Sample Description
900 - 950	50	LIMESTONE - Limestone, 100%, micritic, very pale orange to grayish orange, pelitomorphic, soft to moderately hard, foraminiferal, trace of shell.
950 - 1060	110	LIMESTONE - Limestone, 100%, micritic, very pale orange to grayish orange, partially pelitomorphic, soft to moderately hard, foraminiferal, trace of shell.
1060 - 1100	40	LIMESTONE - Limestone, 60%, medium-grained, partially micritic, light gray, moderately well-cemented, clayey; Limestone, 30%, coarse-grained, partially micritic, yellowish gray, well-cemented; Limestone, 10%, micritic, light gray, soft.
1100 - 1130	30	LIMESTONE - Limestone, 100%, fine- to coarse-grained, partially micritic, yellowish gray, poorly- to well-cemented, soft to moderately hard, pelitomorphic, foraminiferal, trace of shells.
1130 - 1150	20	LIMESTONE - Limestone 80%, medium-grained, partially micritic, very pale orange, moderately well-cemented, foraminiferal, trace of shells, clayey; Limestone, 20%, coarse-grained, partially micritic, light gray, well-cemented.
1150 - 1190	40	LIMESTONE - Limestone, 80%, medium-grained, partially micritic, very pale orange, moderately well-cemented, foraminiferal, trace of shell, clayey; Limestone, 15%, fine-grained, partially micritic, pale orange, soft; Limestone, 5%, coarse-grained, light gray, well-cemented.

Depth Interval (feet)	Thickness (feet)	Sample Description
1190 - 1260	70	LIMESTONE - Limestone, 90%, fine- to medium-grained, mainly micritic, very pale orange to light gray, soft, poorly cemented, pelitomorphic, foraminiferal, trace of shell; Limestone, 10%, coarse-grained, micritic, light gray, well cemented, moderately hard.
1260 - 1280	20	LIMESTONE - Limestone, 80%, medium-grained, partially micritic, very pale orange, moderately well-cemented, trace of shell, clayey; Limestone, 20%, coarse-grained, light gray, well-cemented.
1280 - 1310	30	LIMESTONE - Limestone, 100%, fine- to medium-grained, partially micritic, grayish orange, poorly- to moderately well-cemented, pelitomorphic, foraminiferal, clayey.
1310 - 1370	60	LIMESTONE - Limestone, 100%, fine- to medium-grained, partially micritic, very pale orange, moderately well-cemented, moderately hard to soft, pelitomorphic, foraminiferal.
1370 - 1400	30	LIMESTONE - Limestone, 100%, fine- to medium-grained, partially micritic, light gray, moderately well-cemented, clayey.
1400 - 1470	70	LIMESTONE - Limestone, 60%, fine- to medium-grained, partially micritic, very pale orange, poorly- to well-cemented, pelitomorphic, foraminiferal; Limestone, 40%, coarse-grained, partially micritic, light gray, well cemented.

Depth Interval (feet)	Thickness (feet)	Sample Description
1470 - 1510	40	LIMESTONE - Limestone, 90%, medium- to coarse-grained, partially micritic, light gray to very pale orange, poorly- to moderately well-cemented, pelitomorphic, foraminiferal, trace of shell; Limestone, 10%, fine-grained, partially micritic, very pale orange, poorly cemented.
1510 - 1550	40	LIMESTONE - Limestone, 80%, medium-grained, partially micritic, light gray to very pale orange, poorly- to moderately well-cemented, pelitomorphic, foraminiferal, trace of shell, clayey; Limestone, 10%, coarse-grained, partially micritic, light gray, well cemented; Limestone, 10%, fine-grained, partially micritic, light gray, soft.
1550 - 1560	10	LIMESTONE - Limestone, 70%, medium- to coarse-grained, partially micritic, light gray to very pale orange, moderately- to well-cemented, pelitomorphic, foraminiferal, hard; Dolomite, 30%, fine- to medium-crystalline, saccharoidal, yellowish brown, hard, vuggy, brittle.
1560 - 1590	30	DOLOMITE - Dolomite, 95%, fine- to medium-crystalline, yellowish brown, hard, vuggy, brittle; Limestone, 5%, medium- to coarse-grained, partially micritic, light gray to very pale orange, moderately- to well-cemented, hard.
1590 - 1610	20	DOLOMITE - Dolomite, 70%, fine-crystalline, saccharoidal, yellowish brown to dark yellowish brown, hard, vuggy, brittle; Limestone, 30%, micritic, very pale orange, poorly- to moderately well-cemented, pelitomorphic.

Depth Interval (feet)	Thickness (feet)	Sample Description
1610 - 1670	60	LIMESTONE - Limestone, 90%, micritic, very pale orange, moderately well-cemented, pelitomorphic, foraminiferal, brittle; Dolomite, 10%, fine-crystalline, saccharodial, yellowish brown to dark yellowish brown, hard, vuggy.
1670 - 1760	90	LIMESTONE - Limestone, 100%, micritic, very pale orange, moderately well-cemented, pelitomorphic, foraminiferal, brittle.
1760 - 1800	40	LIMESTONE - Limestone, 80%, micritic, very pale orange, poorly- to moderately well-cemented, pelitomorphic; Dolomite, 20%, fine- to medium-crystalline, saccharodial, yellowish brown to moderate brown, hard.
1800 - 1830	30	DOLOMITE - Dolomite, 60%, partially calcitic, fine- to medium-crystalline, saccharodial, yellowish brown to moderate brown, hard, vuggy; Limestone, 40%, micritic, very pale orange, soft to moderately hard, pelitomorphic.
1830 - 1840	10	DOLOMITE - Dolomite, 80%, calcitic, very fine-crystalline, saccharodial, yellowish brown to moderate brown, brittle to very hard; Limestone, 20%, micritic, very pale orange, soft to hard, pelitomorphic, trace fossils.
1840 - 1870	30	DOLOMITE - Dolomite, 70%, calcitic, very fine-crystalline, saccharoidal, grayish orange to moderate yellowish brown, moderately hard, brittle; Limestone, 30%, micritic, very pale orange, soft to moderately hard, pelitomorphic, fossiliferous.

Depth Interval (feet)	Thickness (feet)	Sample Description
1870 - 1920	50	LIMESTONE - Limestone, 80%, dolomitic to very dolomitic, fine-crystalline, saccharodial, grayish orange to dusky yellowish brown, hard, brittle; Limestone, 20%, micritic, very pale orange, soft to moderately hard, pelitomorphic, foraminiferous.
1920 - 1960	40	LIMESTONE - Limestone, 80%, dolomitic to very dolomitic, fine-crystalline, saccharodial, grayish orange to moderate yellowish brown, brittle; Limestone, 20%, micritic, very pale orange, soft to moderately hard.
1960 - 2008	48+	LIMESTONE - Limestone, 70%, dolomitic, saccharodial, grayish orange, to moderate yellowish brown to grayish orange, moderately hard; Limestone, 20%, very dolomitic, saccharodial, moderate yellowish brown to moderate brown, hard; Limestone, 10%, micritic, very pale orange, soft to moderately hard.

TOTAL DEPTH: 2008

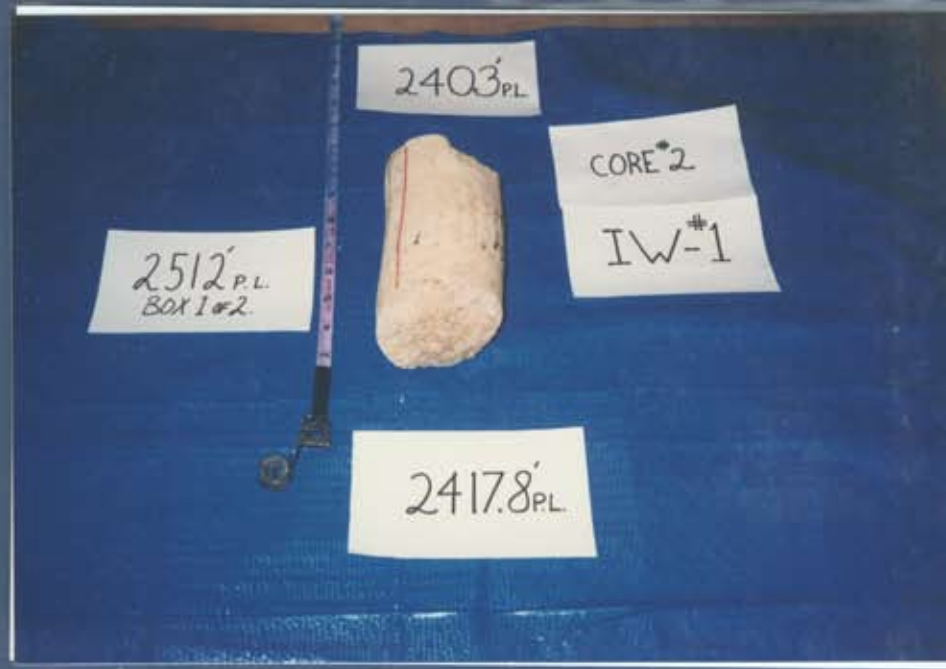
APPENDIX B

Results of Core Tests and Photographs of the Core

CITY OF PAHOKEE
INJECTION WELL 1
CORE TEST DATA

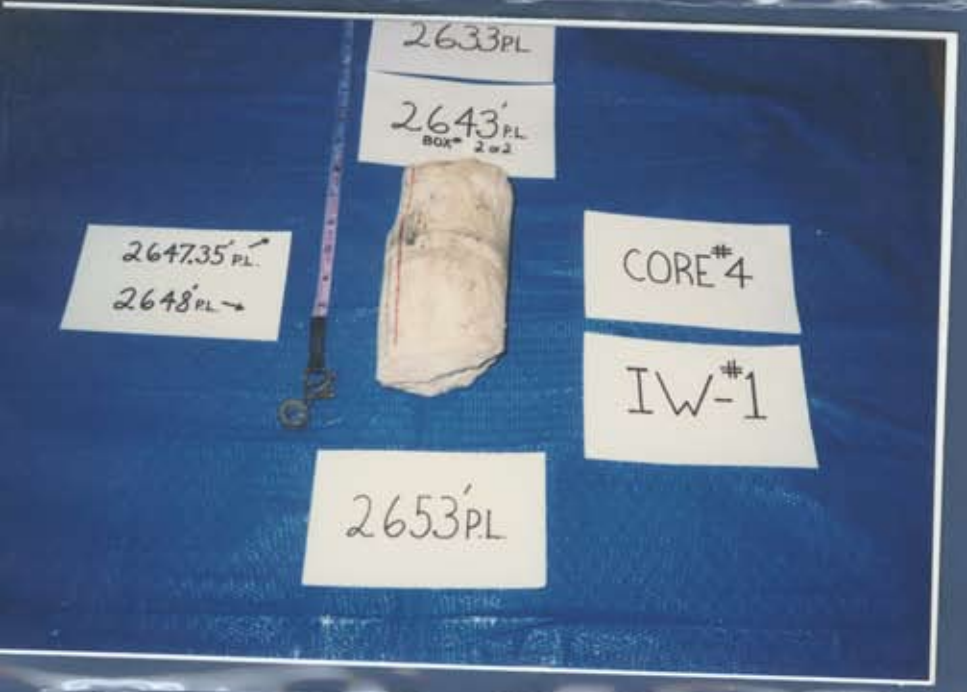
CORE NO.	HORIZONTAL PERMEABILITY (cm/sec)	VERTICAL PERMEABILITY (cm/sec)	ULTIMATE COMPRESSIVE STRENGTH (PSI)	MODULUS OF ELASTICITY (PSI)	SPECIFIC GRAVITY	POROSITY
2747	5.54×10^{-4}	2.42×10^{-5}	4210	556,899	2.62	17.4
2637	4.75×10^{-5}	1.57×10^{-5}	1971	399,185	2.63	35.6
2648	6.20×10^{-5}	6.16×10^{-6}	1920	323,238	2.64	31.1
2644	1.51×10^{-5}	2.17×10^{-6}	2374	356,397	2.64	33.3
2603	1.75×10^{-4}	1.51×10^{-6}	1156	218,849	2.66	15.4
2597	6.75×10^{-5}	7.56×10^{-7}	1685	220,002	2.64	28.9
2366	2.42×10^{-5}	1.45×10^{-5}	1710	369,253	2.67	29.3
2414	7.94×10^{-6}	3.18×10^{-5}	2055	76,035	2.73	33.1
2592	1.19×10^{-5}	4.59×10^{-5}	4009	538,970	2.64	25.0
2412	2.16×10^{-5}	1.28×10^{-5}	945	134,417	2.67	26.2
2367	3.31×10^{-5}	3.76×10^{-5}	1015	157,277	2.63	30.2
2411	5.12×10^{-5}	1.03×10^{-4}	1744	282,281	2.73	30.3

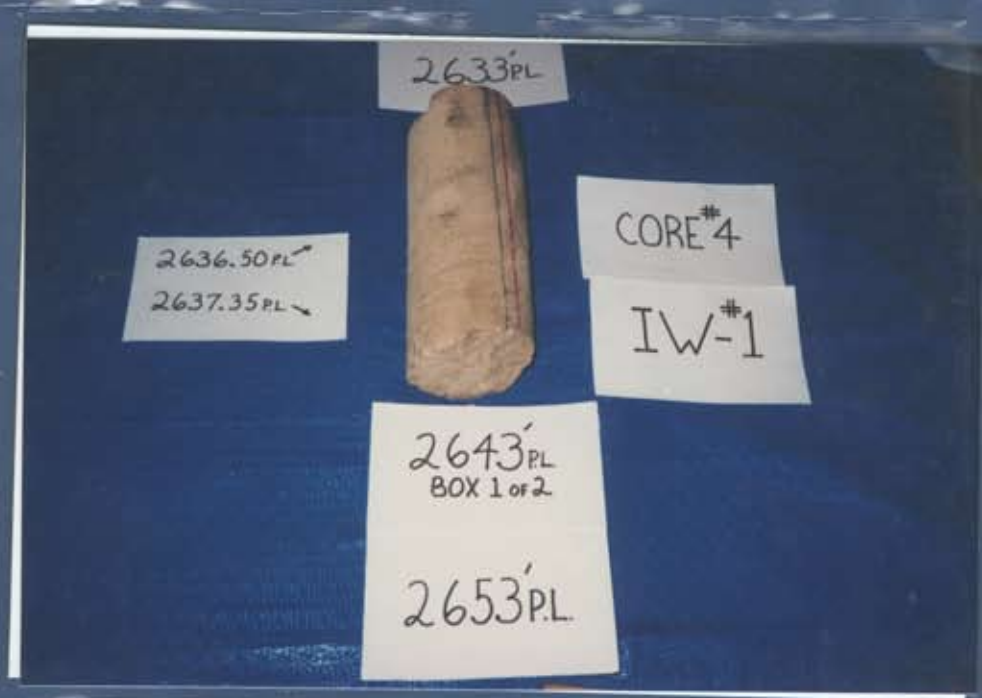

2403' P.L.
IW-#1
CORE #2
BOX 1 OF 2
2417.8' P.L.


2403' P.L.
CORE #2
IW-#1
2512' P.L.
BOX 1 OF 2
2417.8' P.L.

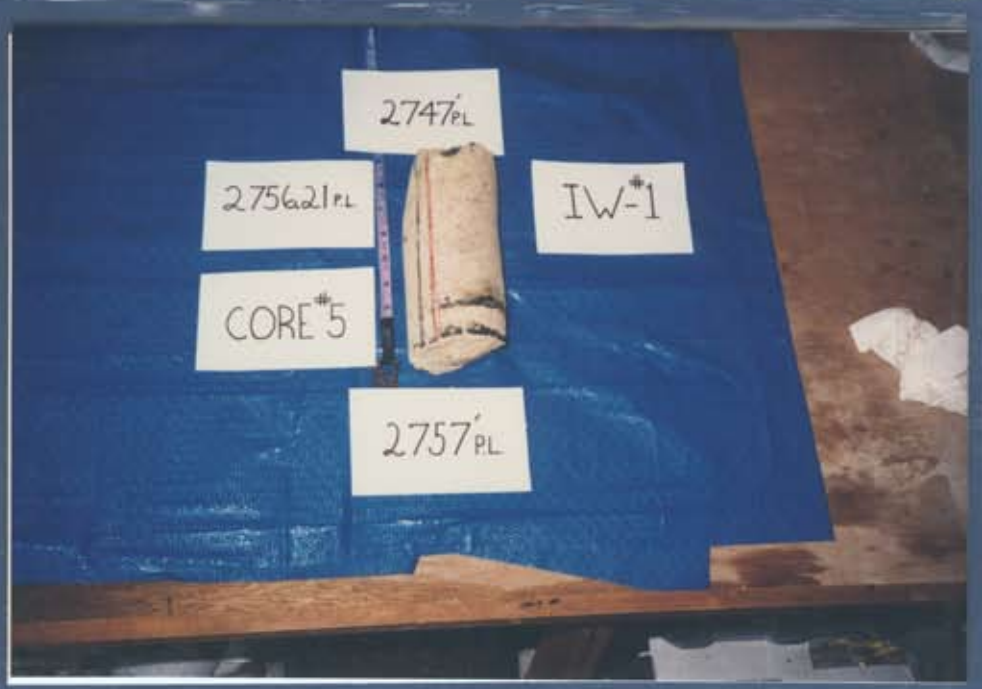

2606' P.L.
IW-#1
CORE #3


2597' P.L.
BOX 1 OF 2
2606' P.L.
IW-#1
CORE #3


2633 P.L
2643' P.L
BOX # 2 of 2
2647.35' P.L
2648' P.L
CORE #4
IW-#1
2653' P.L


2633' P.L
2636.50 P.L
2637.35 P.L
CORE #4
IW-#1
2643' P.L
BOX 1 of 2
2653' P.L


2757' P.L
2747' P.L
CORE #5
IW-#1
2756.21 P.L

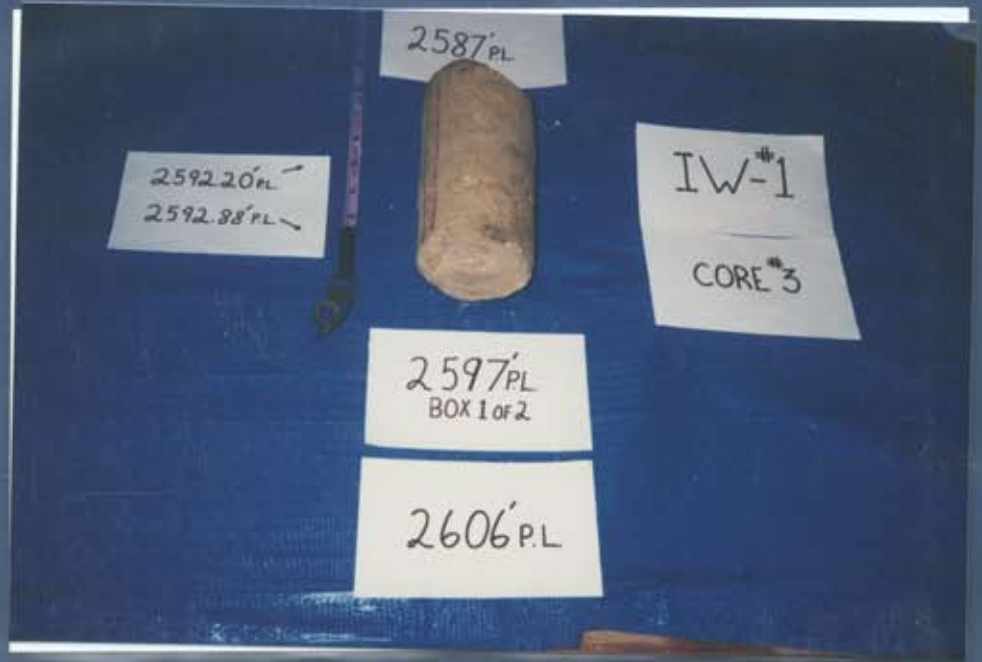

2747' P.L
2756.21 P.L
IW-#1
CORE #5
2757' P.L

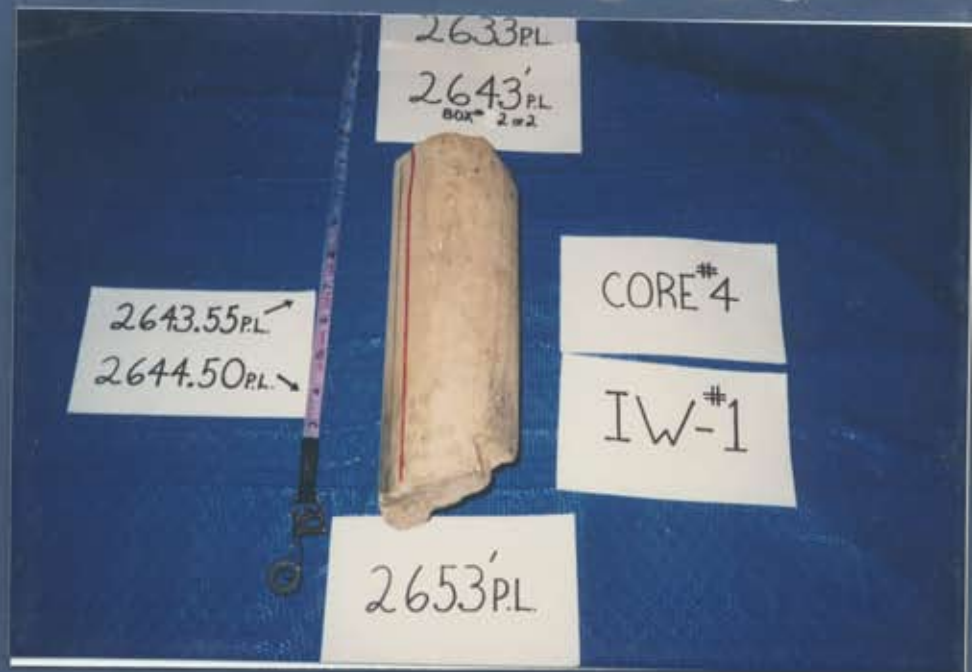

IW-1
CORE 2
Box 2 of 2
24178' PL


24178' PL


IW-1
CORE 1
2359' PL
2368' PL
2367' PL


IW-1
CORE 1
2368' PL


2587' P.L.
2592.20' P.L.
2592.88' P.L.
IW-#1
CORE #3
2597' P.L.
BOX 1 OF 2
2606' P.L.


2633 P.L.
2643' P.L.
BOX # 2 of 2
2643.55 P.L.
2644.50 P.L.
CORE #4
IW-#1
2653' P.L.


2653' P.L.
CORE #4
IW-#1


2643' P.L.
BOX 1 of 2
IW-#1
CORE #4

APPENDIX C

Gyroscopic Survey Results

MULTI-SHOT, INC.
P.O. Box 31450
Lafayette, LA. 70593
(318) 837-2866

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RIG: YOUNGQUIST #1
JOB NUMBER: G-007H-89 07/09/89 V. WAYMAN
JOB NUMBER: G-023H-89 09/15/89 V. WAYMAN
DECLINATION: 2 DEGREES 30 MINUTES WEST (TRUE)

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RADIUS OF CURVATURE CALCULATIONS

Friday, September 15, 1989 Page 1

MEASURED DEPTH Feet	BORE-HOLE INCLINATION Deg Min	BORE-HOLE DIRECTION Deg Min	COURSE LENGTH Feet	VERTICAL DEPTH Feet	RECTANGULAR COORDINATES Feet	RECTANGULAR COORDINATES Feet	CLOSURES DISTANCE Feet	CLOSURES DIRECTION Deg Min	DOGLEG SEVERITY Deg/100ft.
0.00	0 0	0 0		0.00	0.00 N	0.00 E	0.00	0 0	
0.00	0 0	0 0		0.00	0.00 N	0.00 E	0.00	0 0	
30.00	0 7	N 16 0 W	30.00	30.00	0.03 N	0.01 W	0.03	N 16 0 W	0.42
60.00	0 0	0 0	30.00	60.00	0.06 N	0.02 W	0.07	N 16 0 W	0.42
90.00	0 0	0 0	30.00	90.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
120.00	0 0	0 0	30.00	120.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
150.00	0 0	0 0	30.00	150.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
180.00	0 0	0 0	30.00	180.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
210.00	0 0	0 0	30.00	210.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
240.00	0 0	0 0	30.00	240.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
270.00	0 0	0 0	30.00	270.00	0.06 N	0.02 W	0.07	N 16 0 W	0.00
300.00	0 7	S 69 0 W	30.00	300.00	0.05 N	0.05 W	0.07	N 43 31 W	0.42
330.00	0 7	S 29 0 W	30.00	330.00	0.01 N	0.10 W	0.10	N 84 38 W	0.29
360.00	0 7	N 21 0 W	30.00	360.00	0.01 N	0.15 W	0.15	N 85 7 W	0.76
390.00	0 7	N 33 0 E	30.00	390.00	0.08 N	0.14 W	0.16	N 62 6 W	0.38
420.00	0 7	N 33 0 E	30.00	420.00	0.13 N	0.11 W	0.17	N 39 21 W	0.00
450.00	0 7	N 30 0 E	30.00	450.00	0.19 N	0.07 W	0.20	N 21 20 W	0.02
480.00	0 7	N 31 0 E	30.00	480.00	0.24 N	0.04 W	0.25	N 9 15 W	0.01
510.00	0 7	N 3 0 W	30.00	510.00	0.31 N	0.02 W	0.31	N 4 29 W	0.24
540.00	0 7	N 13 0 W	30.00	540.00	0.37 N	0.03 W	0.37	N 5 6 W	0.07
570.00	0 7	N 38 0 W	30.00	570.00	0.43 N	0.06 W	0.43	N 8 6 W	0.18
600.00	0 7	N 39 0 W	30.00	600.00	0.48 N	0.10 W	0.49	N 11 58 W	0.01
630.00	0 7	N 38 0 W	30.00	630.00	0.53 N	0.14 W	0.55	N 15 1 W	0.01
660.00	0 0	0 0	30.00	660.00	0.56 N	0.16 W	0.58	N 16 17 W	0.42
690.00	0 7	N 43 0 W	30.00	690.00	0.58 N	0.18 W	0.61	N 17 40 W	0.42

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RADIUS OF CURVATURE CALCULATIONS
Friday, September 15, 1989 Page 2

MEASURED DEPTH Feet	BORE-HOLE INCLINATION Deg Min	BORE-HOLE DIRECTION Deg Min	COURSE LENGTH Feet	VERTICAL DEPTH Feet	RECTANGULAR COORDINATES Feet	RECTANGULAR COORDINATES Feet	CLOSURES DISTANCE Feet	CLOSURES DIRECTION Deg Min	DOGLEG SEVERITY Deg/100ft.
720.00	0 7	N 35 0 W	30.00	720.00	0.63 N	0.23 W	0.67	N 19 42 W	0.06
750.00	0 7	N 43 0 W	30.00	750.00	0.68 N	0.27 W	0.73	N 21 23 W	0.06
780.00	0 7	N 83 0 W	30.00	780.00	0.71 N	0.32 W	0.78	N 24 31 W	0.29
810.00	0 7	N 53 0 W	30.00	810.00	0.74 N	0.38 W	0.83	N 27 35 W	0.22
840.00	0 0	0 0	30.00	840.00	0.76 N	0.41 W	0.86	N 28 31 W	0.42
870.00	0 7	N 18 0 E	30.00	870.00	0.79 N	0.40 W	0.88	N 26 59 W	0.42
900.00	0 7	N 28 0 E	30.00	900.00	0.85 N	0.37 W	0.93	N 23 53 W	0.07
930.00	0 7	N 53 0 W	30.00	930.00	0.91 N	0.39 W	0.98	N 23 11 W	0.54
960.00	0 7	N 56 0 W	30.00	960.00	0.94 N	0.44 W	1.04	N 25 4 W	0.02
990.00	0 7	N 48 0 W	30.00	990.00	0.98 N	0.49 W	1.10	N 26 36 W	0.06
1020.00	0 7	N 37 0 W	30.00	1020.00	1.03 N	0.54 W	1.16	N 27 29 W	0.08
1050.00	0 7	N 85 0 W	30.00	1050.00	1.06 N	0.59 W	1.22	N 29 8 W	0.34
1080.00	0 7	S 57 0 W	30.00	1080.00	1.05 N	0.65 W	1.23	N 32 1 W	0.27
1110.00	0 7	S 62 0 W	30.00	1110.00	1.01 N	0.71 W	1.24	N 35 3 W	0.04
1140.00	0 7	N 45 0 E	30.00	1140.00	1.05 N	0.74 W	1.28	N 35 6 W	0.82
1170.00	0 7	N 18 0 W	30.00	1170.00	1.11 N	0.72 W	1.33	N 33 5 W	0.44
1200.00	0 7	N 12 0 W	30.00	1200.00	1.17 N	0.74 W	1.39	N 32 15 W	0.04
1230.00	0 15	N 23 0 W	30.00	1230.00	1.27 N	0.77 W	1.48	N 31 17 W	0.43
1260.00	0 15	N 58 0 W	30.00	1260.00	1.37 N	0.85 W	1.61	N 32 1 W	0.50
1290.00	0 15	N 83 0 W	30.00	1290.00	1.41 N	0.98 W	1.71	N 34 43 W	0.36
1320.00	0 15	N 28 0 W	30.00	1320.00	1.48 N	1.08 W	1.83	N 36 7 W	0.77
1350.00	0 15	N 33 0 W	30.00	1350.00	1.59 N	1.15 W	1.96	N 35 44 W	0.07
1380.00	0 15	N 33 0 W	30.00	1380.00	1.70 N	1.22 W	2.09	N 35 34 W	0.00
1410.00	0 15	N 38 0 W	30.00	1410.00	1.81 N	1.29 W	2.22	N 35 34 W	0.07
1440.00	0 15	N 53 0 W	30.00	1440.00	1.90 N	1.39 W	2.35	N 36 7 W	0.22

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RADIUS OF CURVATURE CALCULATIONS
Friday, September 15, 1989 Page 3

MEASURED DEPTH Feet	BORE-HOLE INCLINATION Deg Min	BORE-HOLE DIRECTION Deg Min	COURSE LENGTH Feet	VERTICAL DEPTH Feet	RECTANGULAR COORDINATES Feet	RECTANGULAR COORDINATES Feet	CLOSURES DISTANCE Feet	CLOSURES DIRECTION Deg Min	DOGLEG SEVERITY Deg/100ft.
1470.00	0 15	N 88 0 W	30.00	1470.00	1.94 N	1.51 W	2.46	N 37 49 W	0.50
1500.00	0 15	N 32 0 W	30.00	1500.00	2.01 N	1.62 W	2.58	N 38 52 W	0.78
1530.00	0 15	N 32 0 W	30.00	1529.99	2.12 N	1.69 W	2.71	N 38 32 W	0.00
1560.00	0 15	N 42 0 W	30.00	1559.99	2.22 N	1.77 W	2.84	N 38 28 W	0.15
1590.00	0 15	N 42 0 W	30.00	1589.99	2.32 N	1.85 W	2.97	N 38 37 W	0.00
1620.00	0 15	N 33 0 W	30.00	1619.99	2.42 N	1.93 W	3.10	N 38 34 W	0.13
1650.00	0 20	N 34 0 W	30.00	1649.99	2.55 N	2.02 W	3.25	N 38 20 W	0.27
1680.00	0 15	N 37 0 W	30.00	1679.99	2.67 N	2.10 W	3.40	N 38 13 W	0.27
1710.00	0 15	N 53 0 W	30.00	1709.99	2.77 N	2.20 W	3.53	N 38 28 W	0.23
1740.00	0 15	N 57 0 W	30.00	1739.99	2.84 N	2.30 W	3.66	N 39 3 W	0.06
1770.00	0 15	N 37 0 W	30.00	1769.99	2.93 N	2.40 W	3.79	N 39 19 W	0.29
1800.00	0 15	N 52 0 W	30.00	1799.99	3.02 N	2.49 W	3.92	N 39 29 W	0.22
1830.00	0 20	N 38 0 W	30.00	1829.99	3.13 N	2.60 W	4.07	N 39 42 W	0.35
1860.00	0 20	N 43 0 W	30.00	1859.99	3.26 N	2.71 W	4.24	N 39 44 W	0.10
1890.00	0 20	N 48 0 W	30.00	1889.99	3.38 N	2.83 W	4.41	N 39 57 W	0.10
1920.00	0 20	N 43 0 W	30.00	1919.99	3.50 N	2.96 W	4.58	N 40 10 W	0.10
1950.00	0 20	N 53 0 W	30.00	1949.99	3.62 N	3.08 W	4.75	N 40 27 W	0.19
1980.00	0 20	N 38 0 W	30.00	1979.99	3.74 N	3.21 W	4.93	N 40 37 W	0.29
TIE-IN TO PREVIOUS M.S.I. SURVEY AT 1980' M.D.									
2010.00	0 20	N 41 0 W	30.00	2009.99	3.87 N	3.32 W	5.10	N 40 35 W	0.06
2040.00	0 20	N 41 0 W	30.00	2039.99	4.00 N	3.43 W	5.27	N 40 36 W	0.00
2070.00	0 15	N 40 0 W	30.00	2069.99	4.12 N	3.53 W	5.42	N 40 36 W	0.27
2100.00	0 15	N 42 0 W	30.00	2099.99	4.22 N	3.62 W	5.55	N 40 36 W	0.03
2130.00	0 15	N 39 0 W	30.00	2129.99	4.32 N	3.70 W	5.69	N 40 36 W	0.04
2160.00	0 15	N 38 0 W	30.00	2159.99	4.42 N	3.78 W	5.82	N 40 33 W	0.01

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RADIUS OF CURVATURE CALCULATIONS
Friday, September 15, 1989 Page 4

MEASURED DEPTH Feet	BORE-HOLE INCLINATION Deg Min	BORE-HOLE DIRECTION Deg Min	COURSE LENGTH Feet	VERTICAL DEPTH Feet	RECTANGULAR COORDINATES Feet	RECTANGULAR COORDINATES Feet	CLOSURES DISTANCE Feet	CLOSURES DIRECTION Deg Min	DOGLEG SEVERITY Deg/100ft.
2190.00	0 15	N 35 0 W	30.00	2189.99	4.52 N	3.86 W	5.95	N 40 28 W	0.04
2220.00	0 15	N 54 0 W	30.00	2219.99	4.62 N	3.95 W	6.08	N 40 33 W	0.28
2250.00	0 30	N 54 0 W	30.00	2249.99	4.73 N	4.11 W	6.27	N 40 58 W	0.83
2280.00	0 30	N 71 0 W	30.00	2279.98	4.85 N	4.34 W	6.51	N 41 49 W	0.49
2310.00	0 15	N 65 0 W	30.00	2309.98	4.93 N	4.52 W	6.69	N 42 33 W	0.84
2340.00	0 30	N 70 0 W	30.00	2339.98	5.00 N	4.70 W	6.87	N 43 15 W	0.84
2370.00	0 15	N 73 0 W	30.00	2369.98	5.06 N	4.89 W	7.04	N 44 0 W	0.84
2400.00	0 15	N 65 0 W	30.00	2399.98	5.11 N	5.01 W	7.16	N 44 27 W	0.12
2430.00	0 30	N 75 0 W	30.00	2429.98	5.18 N	5.20 W	7.34	N 45 6 W	0.86
2460.00	0 15	N 72 0 W	30.00	2459.98	5.23 N	5.39 W	7.51	N 45 49 W	0.84
2490.00	0 30	N 74 0 W	30.00	2489.98	5.29 N	5.57 W	7.68	N 46 29 W	0.83
2520.00	0 15	N 66 0 W	30.00	2519.98	5.36 N	5.76 W	7.87	N 47 3 W	0.85
2550.00	0 15	N 71 0 W	30.00	2549.98	5.41 N	5.88 W	7.99	N 47 24 W	0.07
2580.00	0 15	N 65 0 W	30.00	2579.98	5.46 N	6.00 W	8.11	N 47 43 W	0.09
2610.00	0 15	N 66 0 W	30.00	2609.98	5.51 N	6.12 W	8.23	N 48 8 W	0.01
2640.00	0 15	N 62 0 W	30.00	2639.98	5.57 N	6.24 W	8.36	N 48 15 W	0.06
2670.00	0 15	N 73 0 W	30.00	2669.98	5.62 N	6.36 W	8.48	N 48 32 W	0.16
2700.00	0 20	N 78 0 W	30.00	2699.98	5.66 N	6.50 W	8.62	N 49 0 W	0.28
2730.00	0 30	N 79 0 W	30.00	2729.98	5.70 N	6.72 W	8.81	N 49 42 W	0.57
2760.00	0 30	N 82 0 W	30.00	2759.98	5.74 N	6.98 W	9.03	N 50 33 W	0.09
2790.00	0 30	N 82 0 W	30.00	2789.97	5.78 N	7.24 W	9.26	N 51 23 W	0.00
2820.00	0 30	N 81 0 W	30.00	2819.97	5.82 N	7.49 W	9.49	N 52 11 W	0.03
2850.00	0 20	N 79 0 W	30.00	2849.97	5.85 N	7.71 W	9.68	N 52 47 W	0.57
2880.00	0 30	N 83 0 W	30.00	2879.97	5.89 N	7.92 W	9.87	N 53 23 W	0.57
2910.00	0 30	N 85 0 W	30.00	2909.97	5.92 N	8.18 W	10.10	N 54 8 W	0.06

YOUNGQUIST BROTHERS
PAHOKEE, WELL IW #1
PAHOKEE WELL#3

RADIUS OF CURVATURE CALCULATIONS

Friday, September 15, 1989 Page 5

MEASURED DEPTH Feet	BORE-HOLE INCLINATION Deg Min	BORE-HOLE DIRECTION Deg Min	COURSE LENGTH Feet	VERTICAL DEPTH Feet	RECTANGULAR COORDINATES Feet	Feet	CLOSURES DISTANCE Feet	CLOSURES DIRECTION Deg Min	DOGLEG SEVERITY Deg/100ft.
2940.00	0 30	N 86 0 W	30.00	2939.97	5.94 N	8.44 W	10.32	N 54 53 W	0.03
2970.00	0 30	N 88 0 W	30.00	2969.97	5.95 N	8.71 W	10.54	N 55 39 W	0.06
3000.00	0 30	N 85 0 W	30.00	2999.97	5.97 N	8.97 W	10.77	N 56 22 W	0.09
3030.00	0 30	N 86 0 W	30.00	3029.97	5.99 N	9.23 W	11.00	N 57 2 W	0.03
3060.00	0 40	N 82 0 W	30.00	3059.96	6.02 N	9.53 W	11.27	N 57 44 W	0.55
3090.00	0 30	N 84 0 W	30.00	3089.96	6.06 N	9.83 W	11.55	N 58 22 W	0.54
3120.00	0 30	N 90 0 W	30.00	3119.96	6.07 N	10.09 W	11.78	N 58 59 W	0.17
3150.00	0 30	S 89 0 W	30.00	3149.96	6.07 N	10.35 W	12.00	N 59 38 W	0.03
3180.00	0 40	N 88 0 W	30.00	3179.96	6.07 N	10.66 W	12.26	N 60 20 W	0.54
3210.00	0 40	N 87 0 W	30.00	3209.96	6.08 N	11.00 W	12.57	N 61 3 W	0.04
3240.00	0 40	S 89 0 W	30.00	3239.96	6.09 N	11.35 W	12.88	N 61 47 W	0.15
3270.00	0 40	N 89 0 W	30.00	3269.95	6.09 N	11.69 W	13.18	N 62 29 W	0.08
3300.00	0 40	S 85 0 W	30.00	3299.95	6.08 N	12.04 W	13.49	N 63 13 W	0.23
3330.00	0 40	N 89 0 W	30.00	3329.95	6.07 N	12.38 W	13.79	N 63 54 W	0.23
3360.00	0 40	S 86 0 W	30.00	3359.95	6.06 N	12.73 W	14.10	N 64 33 W	0.19
3390.00	0 40	S 86 0 W	30.00	3389.95	6.03 N	13.07 W	14.40	N 65 14 W	0.00
3420.00	0 40	S 84 0 W	30.00	3419.94	6.00 N	13.42 W	14.70	N 65 54 W	0.08
3450.00	0 40	S 85 0 W	30.00	3449.94	5.97 N	13.76 W	15.00	N 66 33 W	0.04

Final Station Closure - Distance: 15.00 Feet
- Direction: N 66 33 W

Houston 530 7767

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LAFAYETTE, LA 70503
(318) 233-5943

MULTI-SHOT

P. O. BOX 4357
CORPUS CHRISTI, TX 78469
(512) 883-7267

SURVEY CALCULATION FIELD SHEET

SHEET NO. 1 OF
COMPANY YOUNGQUIST BROTHERS
LEASE/AREA PAHOKEE WELL NO. JN #1
FIELD WEST PALM BEACH
RIG/PLAT YOUNGQUIST 1
JOB NO. 6007H-89 DATE 7/9/89
SURVEYOR VAN WAYHAN

TYPE OF SURVEY GYROSCOPIC MULTI-SHOT
TARGET DIRECTION N/A KBE DECLN. 2½ E (W)
CALCULATION METHOD RADIUS OF CURVATURE
COMPLETION ☐ YES ☐ NO
REMARKS:

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
30	1/8	N16W												
60	0	N00E												
90	0	N00E												
120	0	N00E												
150	0	N00E	150 00		N 06	W 01	N 06	W 01						
180	0	N00E												
210	0	N00W												
240	0	N00E												
270	0	N00E												
300	1/8	S69W	300 00		N 05	W 04								
330	1/8	S29W												
360	1/8	N21W												
390	1/8	N33E												
420	1/8	N33E												
450	1/8	N30E	450 00		N 18	W 07								
480	1/8	N31E												
510	1/8	N3W												
540	1/8	N13W												
570	1/8	N38W												
600	1/8	N39W	600		N 46	W 09								

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MULTI-SHOT

P.
CORPUS Ch...
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SURVEY CALCULATION FIELD SHEET

SHEET NO. 2 OF ____
COMPANY YOUNGQUIST BROTHERS
LEASE/AREA PAHOKEE WELL NO. Unit 1
FIELD WEST PALM
RIG/PLAT YOUNGQUIST
JOB NO. 6007H-89 DATE ____
SURVEYOR VAN WAHKAN

TYPE OF SURVEY ____
TARGET DIRECTION ____ KBE ____ DECLN. ____ E/W
CALCULATION METHOD ____
COMPLETION ☐ YES ☐ NO
REMARKS: ____

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
630	1/8	N38W												
660	0	N00E												
690	1/8	N43W												
720	1/8	N35W												
750	1/8	N43W	750 00		N 20	W 06								
780	1/8	N83W												
810	1/8	N53W												
840	0	N00E												
870	1/8	N18E												
900	1/8	N28E	900 00		N 36	W 15								
930	1/8	N53W												
960	1/8	N56W												
990	1/8	N48W												
1020	1/8	N37W												
1050	1/8	N85W	1050 00		N 57	W 36								
1080	1/8	S57W												
1110	1/8	S62W												
1140	1/8	N45E												
1170	1/8	N18W												
1200	1/8	N6W	1200 00		N 68	W 50								

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MULTI-SHOT

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SURVEY CALCULATION FIELD SHEET

SHEET NO. 3 OF _____
COMPANY YOUNGQUIST BROTHERS
LEASE/AREA PAHOKEE WELL NO. AW#1
FIELD WEST PALM
RIG/PLAT YOUNGQUIST 1
JOB NO. 60074-89 DATE 7/9/89
SURVEYOR DAN WAYMAN

TYPE OF SURVEY _____
TARGET DIRECTION _____ KBE _____ DECLN. _____ E/W
CALCULATION METHOD _____
COMPLETION ☐ YES ☐ NO
REMARKS: _____

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
1230	1/4	N23W	[illegible]											
1260	1/4	N58W												
1290	1/4	N83W												
1320	1/4	N28W												
1350	1/4	N38W	1350		N 1 01	W 1 09								
1380	1/4	N33W												
1410	1/4	N38W												
1440	1/4	N53W												
1470	1/4	N88W												
1500	1/4	N32W	1500 00		N 1 51	W 1 39								
1530	1/4	N37W												
1560	1/4	N42W												
1590	1/4	N42W												
1620	1/4	N33W												
1650	1/3	N34W	1650 00		N 2 03	W 1 79								
1680	1/4	N37W												
1710	1/4	N53W												
1740	1/4	N57W												
1770	1/4	N37W												
1800	1/4	N52W	1800 00		N 2 52	W 2 28								

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SURVEY CALCULATION FIELD SHEET

SHEET NO. 4 OF _____
COMPANY Youngquist Brothers
LEASE/AREA Palmer WELL NO. SW#1
FIELD West Palm
RIG/PLAT Youngquist 1
JOB NO. 6007H-89 DATE _____
SURVEYOR Dan Wayman

TYPE OF SURVEY _____
TARGET DIRECTION _____ KBE _____ DECLN. _____ E/W
CALCULATION METHOD _____
COMPLETION ☐ YES ☐ NO
REMARKS: _____

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
1830	1/3	N38W	1829.99		261	239								
1860	1/3	N43W												
1890	1/3	N48W												
1920	1/3	N43W												
1950	1/3	N53W												
1980	1/3	N38W	1979.99		305	303								
		Bottom Hole Closure												
				9.27 AT	@ N~~38~~~~53~~W									
					4484W									

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SURVEY CALCULATION FIELD SHEET

SHEET NO. 1 OF 3
COMPANY YOUNGQUIST BROTHERS
LEASE/AREA PAHOKEE JUNCTION WELL NO. 3
FIELD PAHOKEE FLORIDA
RIG/PLAT YOUNGQUIST #1
JOB NO. _____ DATE 9/14/89
SURVEYOR VAN WAGNER

TYPE OF SURVEY GYROSCOPIC MULTI-SHOT
TARGET DIRECTION N/A KBE _____ DECLN. _____ E/W
CALCULATION METHOD RADIUS OF CURVATURE
COMPLETION ☐ YES ☐ NO
REMARKS: _____

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
1980	0-20	N38W	1979.99		+3.74	-3.21								
TIE INTO MULTI-SHOT GYRO SURVEY														
2010	0-20	N41W	2009.99		+3.86	-3.31								
2040	0-20	N4NW	2039.99		+3.98	-3.41								
2070	0-15	N40W	2069.99		+4.09	-3.51								
2100	0-15	N42W	2099.99		+4.19	-3.59								
2130	0-15	N39W	2129.99		+4.29	-3.68								
2160	0-15	N38W	2159.99		+4.39	-3.76								
2190	0-15	N35W	2189.99		+4.50	-3.84								
2220	0-15	N54W	2219.99		+4.59	-3.93								
2250	0-30	N51W	2249.99		+4.67	-4.04								
2280	0-30	N71W	2279.99		+4.75	-4.18								
2310	0-15	N65W	2309.99		+4.80	-4.32								
2340	0-30	N70W	2339.99		+4.85	-4.45								
2370	0-15	N73W	2369.99		+4.90	-4.59								
2400	0-15	N65W	2399.99		+4.95	-4.71								
2430	0-30	N75W	2429.98		+5.00	-4.84								
2460	0-15	N72W	2459.98		+5.04	-4.98								
2490	0-30	N74W	2489.98		+5.08	-5.12								

P. O. BOX 31450
LAFAYETTE, LA 70503
(318) 233-5943

MULTI-SHOT

P. O. BOX 4357
CORPUS CHRISTI, TX 78469
(512) 883-7267

SURVEY CALCULATION FIELD SHEET

SHEET NO. 2 OF 2
COMPANY YOUNGQUIST
LEASE/AREA PAHOKEE JW WELL NO. 3
FIELD PAHOKEE FLORIDA
RIG/PLAT YOUNGQUIST #1
JOB NO. DATE 9/14/82
SURVEYOR VAN WAYHAN

TYPE OF SURVEY GYROSCOPIC MULTI-SHOT
TARGET DIRECTION N/A KBE DECLN. E/W
CALCULATION METHOD RADIUS OF CURVATURE
COMPLETION ☐ YES ☐ NO
REMARKS:

MEASURED DEPTH	INCL. ANGLE	HOLE DIRECTION	TRUE VERTICAL DEPTH	TOTAL VERTICAL SECTION	TOTAL CO-ORDINATES N(+)/S(−)	TOTAL CO-ORDINATES E(+)/W(−)	CO-ORDINATES N(+)/S(−)	CO-ORDINATES E(+)/W(−)	CRSE. LNGTH.	AVG. INCLN. ANGLE	AVERAGE HOLE DIRECTION	VERT. DEPTH	CRSE. DEVN.	DOG LEG SVRTY
2520	0-15	N66W	2519.98		+513	-525								
2550	0-15	N71W	2549.98		+518	-538								
2580	0-15	N65W	2579.98		+522	-550								
2610	0-15	N66W	2609.98		+528	-562	Final Closure @ 2610 7.717 @ N 46.79W							
2640	0-15	N62W	2639.98		+534	-573								
2670	0-15	N73W	2669.98		+539	-586								
2700	0-20	N78W	2699.98		+542	-599								
2730	0-30	N79W	2729.98		+546	-620								
2760	0-30	N82W	2759.98		+551	-646								
2790	0-30	N82W	2789.98		+554	-672								
2820	0-30	N81W	2819.98		+558	-698								
2850	0-20	N79W	2849.98		+562	-718								
2880	0-30	N83W	2879.99		+565	-739								
2910	0-30	N85W	2909.98		+568	-765								
2940	0-30	N86W	2939.97		+570	-791								
2970	0-30	N88W	2969.97		+571	-817								
3000	0-30	N85W	2999.97		+573	-843								
3030	0-30	N86W	3029.97		+575	-869								
3060	0-40	N82W	3059.97		+578	-900								
3090	0-30	N84W	3089.97		+582	-930								

APPENDIX D

Geophysical Logs of Injection Well 1

See Separate Binder - Volume II

FLORIDA GEOPHYSICAL LOGGING, INC.

FT. MYERS (813) 489-2155

GAMMA RAY X-Y CALIPER

FILING NO. # 146

COMPANY YOUNGQUIST BROTHERS DRILLING, INC.
WELL PAHOKEE MW-1
FIELD
COUNTY PALM BEACH STATE FLORIDA

LOCATION:

OTHER SERV:

SEC 19 TWP 42S RGE 37E

PERMANENT DATUM: PAD LEVEL ELEV: 13.82'
LOG MEASURED FROM 0 FT ABOVE PERM DATUM
DRILLING MEASURED FROM PAD LEVEL

ELEVATION:
KB:
DF:
GL:

DATE	6-27-89	6-27-89
RUN NO.	ONE	ONE
TYPE LOG	GAMMA RAY	CALIPER
DEPTH - DRILLER	194'	
DEPTH - LOGGER	190'	
BOTTOM LOGGED INT		
TOP LOGGED INT	0	
TYPE FLUID IN HOLE	MUD	
SALINITY PPM CL		
DENSITY		
LEVEL	FULL	
MAX TEMP DEG F		
OPERATING RIG TIME		
RECORDED BY	D. WILSON	
WITNESSED BY	MR. McGRATH	

RUN NO.	BORE HOLE RECORD FROM	BORE HOLE RECORD TO	CASING RECORD SIZE	CASING RECORD WGT.	CASING RECORD FROM	CASING RECORD TO
BIT		TD	36		SURF	19
	19					

Equipment Data

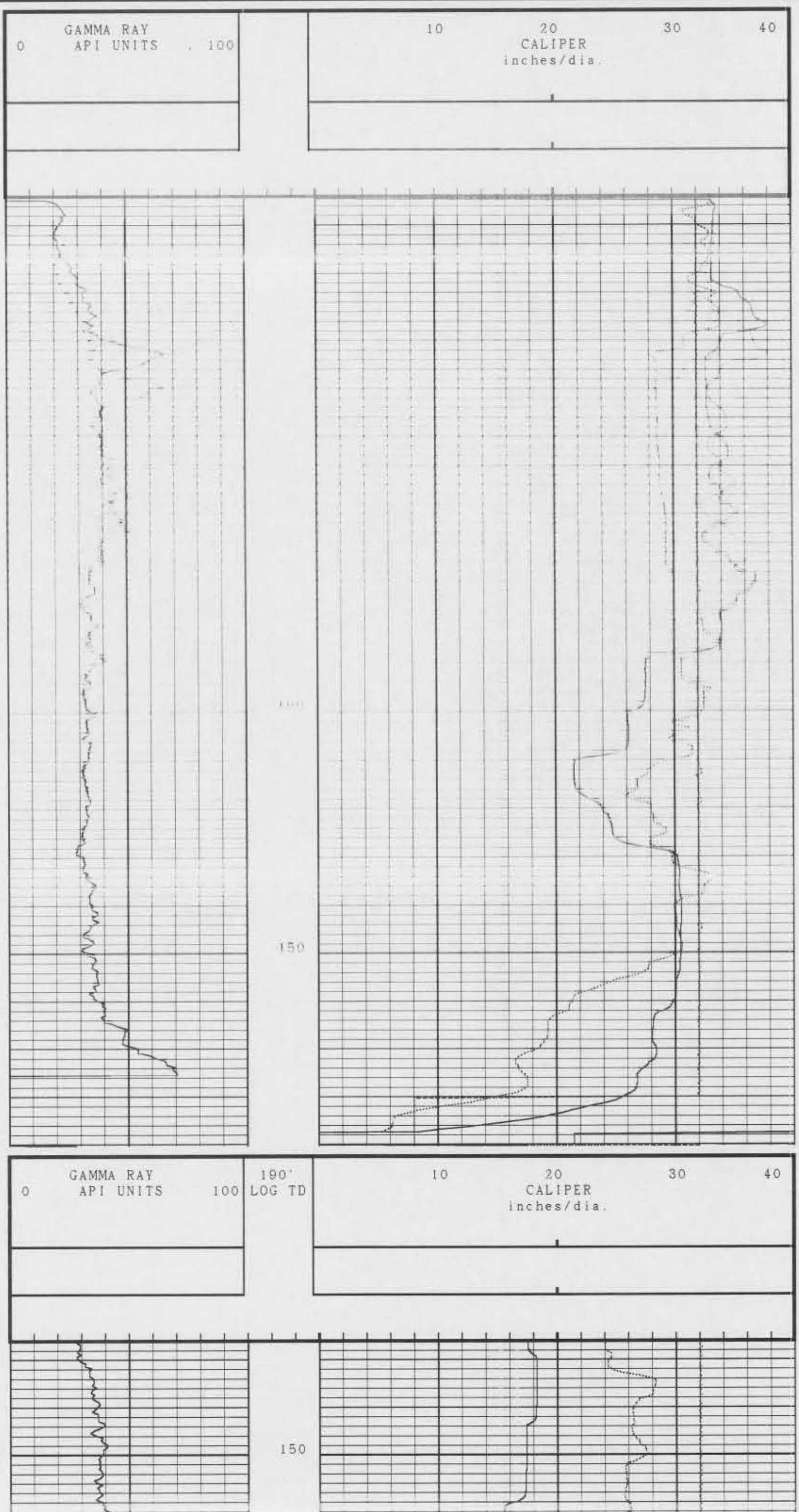
Run	PANEL	ZERO	100CAL X10	PANEL	ZERO	100CAL X10
1	NIM2LRM-	T-1 D-0	53.7	NIM1LRM-	T-2 D-4.3	60
				NIM1RRM-	T-1 D-10	62

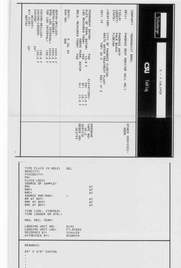
Calibration Data

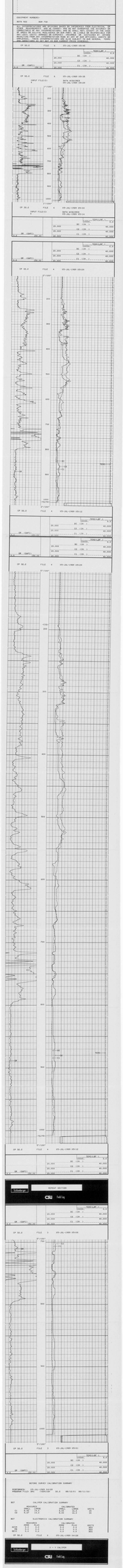
Run No.	GAMMA RAY ZERO	BKGD	TOOL # 3.5 120 API	X-Y CALIPER	36"	55"	TOOL # 4
1	0	55	268	-	730	1105	
				+	833	1214	

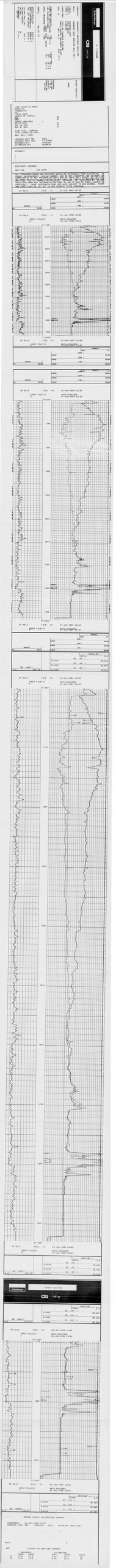
Logging Data

Run No.	Depths From	Depths To	Speed Ft/Min
1			30









APPENDIX E

Geophysical Logs of Deep Monitor Well

FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.

COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.

WELL PAHOKEE MW-1

FIELD

COUNTY PALM BEACH STATE FLORIDA

LOCATION

SEC 19 TWP 42S RGE 37E

OTHER SERV.

PERMANENT DATUM: PAD LEVEL ELEV: 13.82'

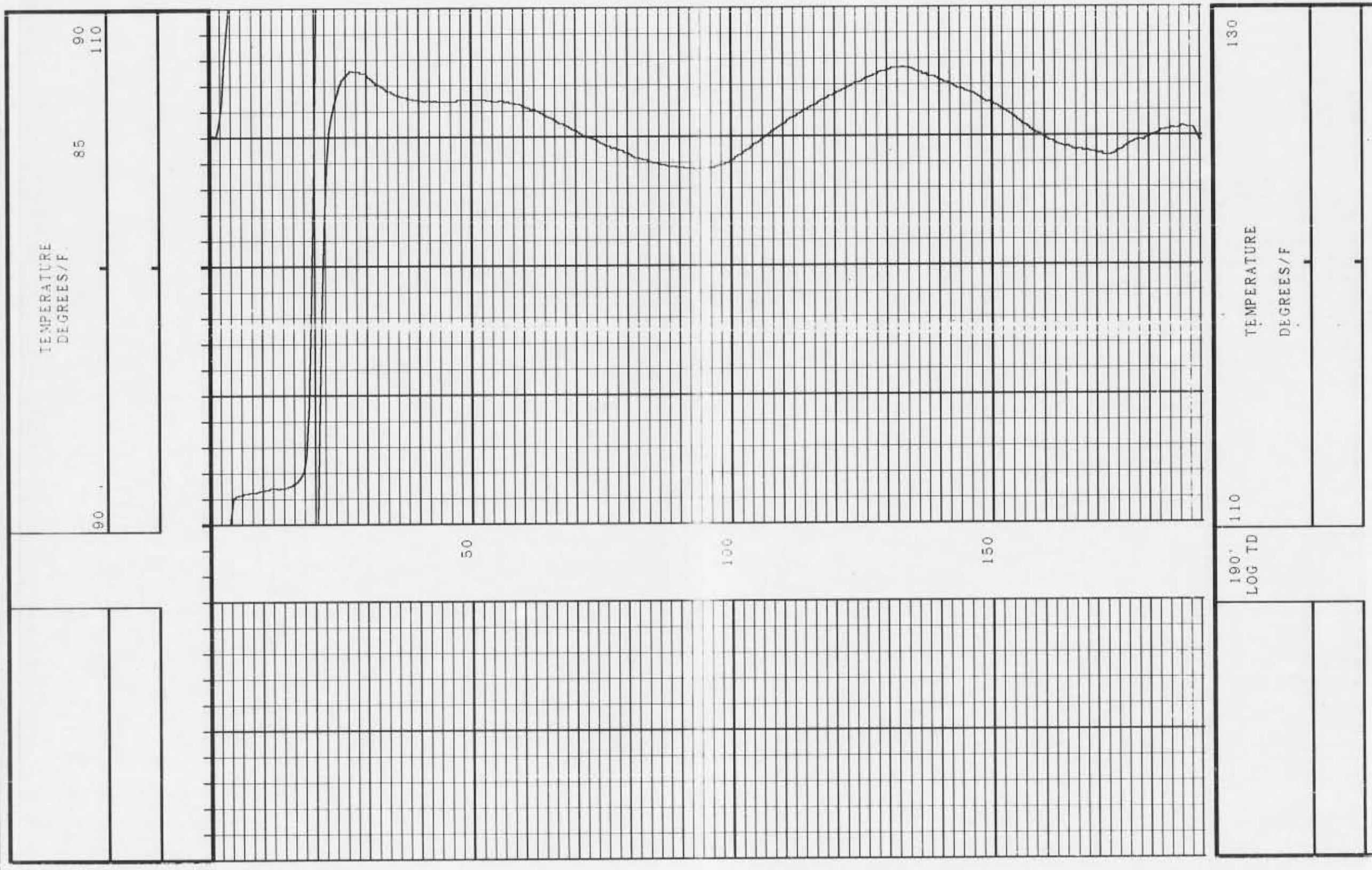
LOG MEASURED FROM 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM PAD LEVEL

ELEVATION:
KB.
DF.
GL.

DATE	6-28-89		
RUN NO.	ONE		
DEPTH - DRILLER	194		
DEPTH - LOGGER	190		
BOTTOM LOGGED INT	190		
TOP LOGGED INT	0		
TYPE FLUID IN HOLE	WATER		
SALINITY PPM CL.			
DENSITY			
LEVEL	FULL		
MAX TEMP DEG F	128		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	WILSON		
WITNESSED BY	MR. BRANTLEY	MR. KWAPINSKI	

RUN NO.	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				24"			192.9'



FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.

COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.

WELL PAHOKEE MW-1

FIELD

COUNTY PALM BEACH STATE FLORIDA

LOCATION

SEC 19 TWP 42S RGE 37E

OTHER SERV.

PERMANENT DATUM: PAD LEVEL ELEV: 13.82'

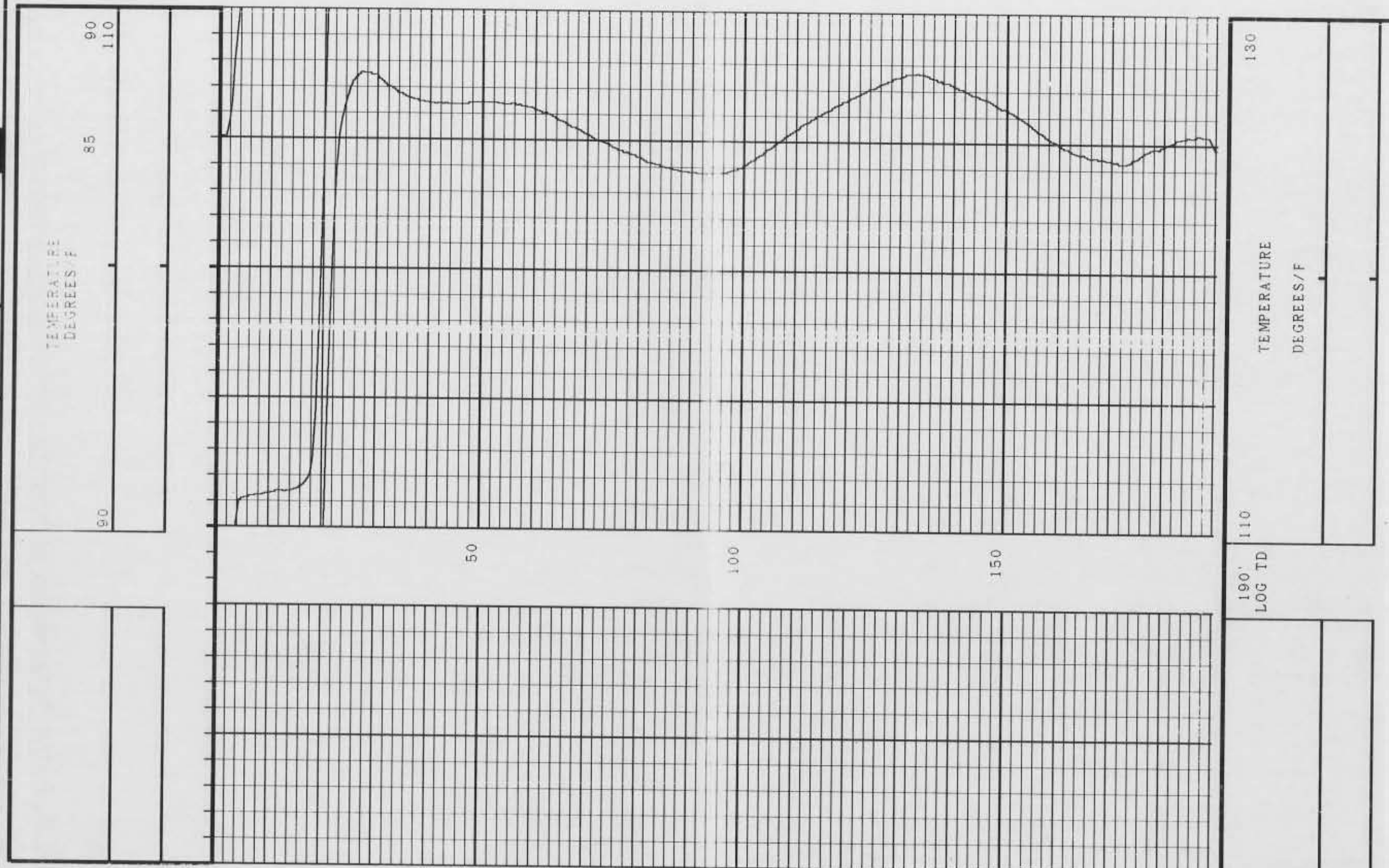
LOG MEASURED FROM 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM PAD LEVEL

ELEVATION: KB. DF. GL.

DATE	6-28-89		
RUN NO.	ONE		
DEPTH - DRILLER	194		
DEPTH - LOGGER	190		
BOTTOM LOGGED INT	190		
TOP LOGGED INT	0		
TYPE FLUID IN HOLE	WATER		
SALINITY PPM CL.			
DENSITY			
LEVEL	FULL		
MAX TEMP DEG F	128		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	WILSON		
WITNESSED BY	MR. BRANTLEY	MR. KWAPINSKI	

RUN NO	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				24"			192.9'



FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.

COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.

WELL PAHOKEE MW-1

FIELD

COUNTY PALM BEACH STATE FLORIDA

LOCATION

SEC 19 TWP 42S RGE 37E

OTHER SERV.

PERMANENT DATUM: PAD LEVEL ELEV: 13.82'

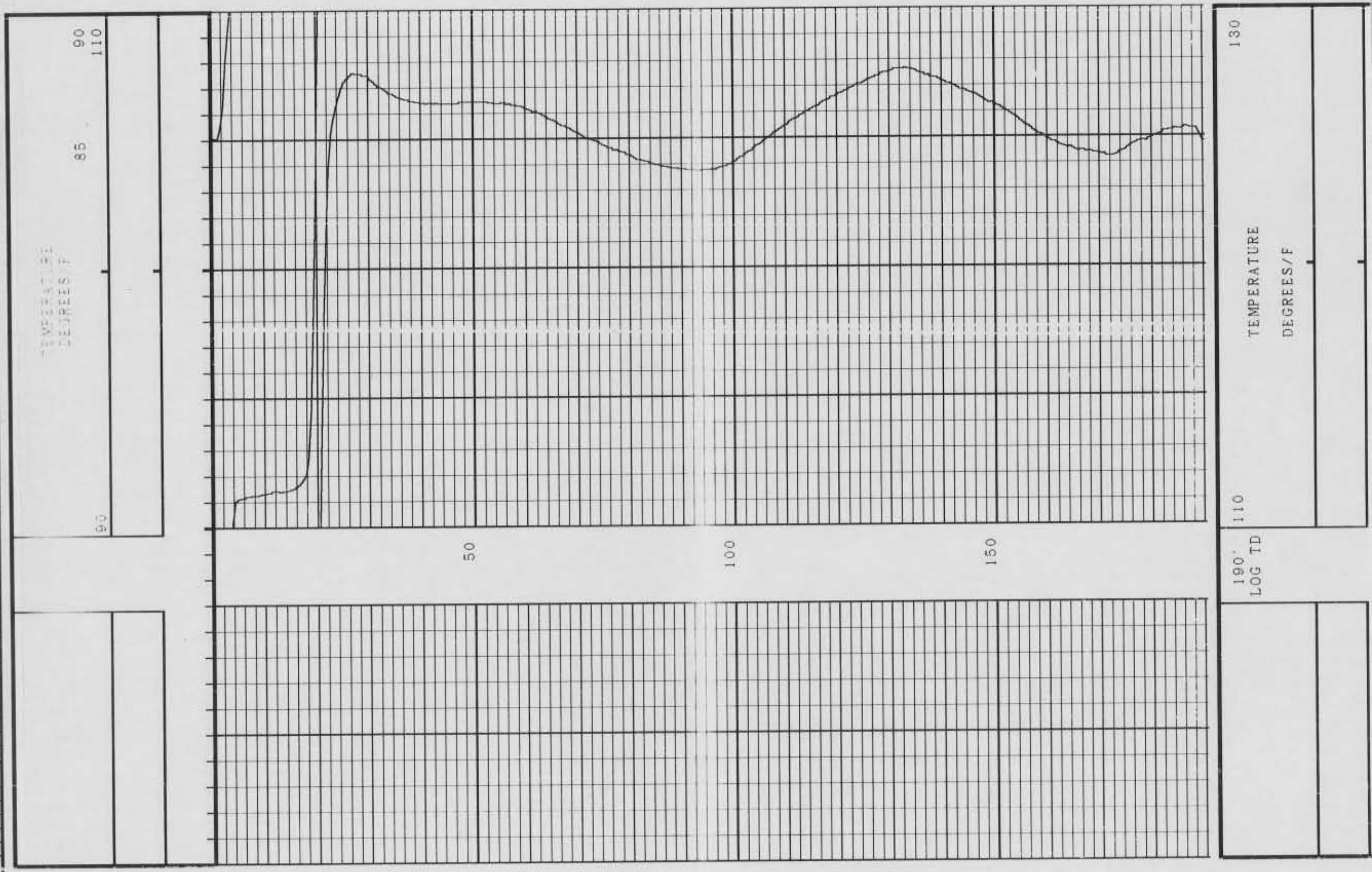
LOG MEASURED FROM 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM PAD LEVEL

ELEVATION:
KB.
DF.
GL.

DATE	6-28-89		
RUN NO.	ONE		
DEPTH - DRILLER	194		
DEPTH - LOGGER	190		
BOTTOM LOGGED INT	190		
TOP LOGGED INT	0		
TYPE FLUID IN HOLE	WATER		
SALINITY PPM CL.			
DENSITY			
LEVEL	FULL		
MAX TEMP DEG F	128		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	WILSON		
WITNESSED BY	MR. BRANTLEY	MR. KWAPINSKI	

RUN NO.	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				24"			192.9'



Schlumberger

CSU Field Log

TEMPERATURE LOG

OTHER SERVICES-
CBL

COMPANY: YOUNGQUIST BROTHERS DRILLING

WELL: PAHOKEE DEEP MONITOR WELL NO.1

FIELD: PAHOKEE WWTP
COUNTY: PALM BEACH
STATE: FLORIDA

LOCATION: CITY OF PAHOKEE FLORIDA
WASTE WATER TREATMNET PLANT
TWP: 42 S RGE: 37 E

SEC: 19

PERMANENT DATUM: PAD
ELEV. OF PERM. DATUM: 13.8 F
LOG MEASURED FROM: PAD
ABOVE PERM. DATUM
DRLG. MEASURED FROM: PAD

ELEVATIONS-
KB: 19.8 F
DF: 18.7 F
GL: 13.8 F

PROGRAM
TAPE NO:
30.4
SERVICE
ORDER NO:
363793

DATE: 6 JUL 89
RUN NO: ONE

DEPTH-DRILLER: 1009.0 F
DEPTH-LOGGER: 984.0 F
BTM. LOG INTERVAL: 984.0 F
TOP LOG INTERVAL: 37.0 F

CASING-DRILLER: 1009.0 F
CASING-LOGGER:
CASING: 16"
WEIGHT:
BIT SIZE: 22"
DEPTH:

TYPE FLUID IN HOLE: GEL
DENSITY:
VISCOSITY:
PH:
FLUID LOSS:
SOURCE OF SAMPLE:
RM: AT
RMF: AT
RMC: AT
SOURCE RMF/RMC: /
RM AT BHT: AT 131. DEGF
RMF AT BHT: AT 131. DEGF
RMC AT BHT: AT 131. DEGF

TIME CIRC. STOPPED:
TIME LOGGER ON BTM.:

MAX. REC. TEMP: 131.0 DEGF

LOGGING UNIT NO: 8193
LOGGING UNIT LOC: FT.MYERS
RECORDED BY: SCHULER
WITNESSED BY: MANER/BRANTLEY

REMARKS:

LOG RUN FOR CEMENT TOP INFORMATION
CEMENT INFORMATION:
195 BBL 4% BENTONITE MIX FOLLOWED BY
46 BBL NEAT. PLUG DOWN AT 20:02 5-JUL-89
.
.
.
.

EQUIPMENT NUMBERS-

MTSC 3804W ATM 303

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
WMUD	9.20000	LB/G	SGSN	201 17NOV84	
CDAT	17-11-87		FCHD	CSID	
PTHR	10.0000	F/MN	NTHR	-10.0000	F/MN
TIRA	.500000		VPCF	.830000	
FDSH	0.0	G/C3	QIOP	FLOW	
TCSH	0.0	IN	BS	22.0000	IN
BHS	CASE				

SENSOR MEASURE POINT TO TOOL ZERO

DTEM	2.5	FEET	MP	1.1	FEET
TEMP	2.5	FEET	CCL	19.2	FEET
CVEL	0.0	FEET	TENS	19.2	FEET
EXT	0.0	FEET	EXP3	0.0	FEET
EXP2	0.0	FEET	EXP1	0.0	FEET
GR	10.3	FEET			

0.0	GR (GAPI)	150.00	80.000	TEMP(DEGF) 100.00
-13.50	CCL	1.5000	-1.000	DTEM(DF/F) 1.0000
70.000	TEMP(DEGF)	170.00	100.00	TEMP(DEGF) 120.00
			120.00	TEMP(DEGF) 140.00
			140.00	TEMP(DEGF) 160.00
			60.000	TEMP(DEGF) 80.000

CP 30.4 FILE 1 06-JUL-89 13:55

5"/100'

5"/100'

CP 30.4 FILE 1 06-JUL-89 14:21

0.0	GR (GAPI)	150.00	80.000	TEMP(DEGF) 100.00
-13.50	CCL	1.5000	-1.000	DTEM(DF/F) 1.0000
70.000	TEMP(DEGF)	170.00	100.00	TEMP(DEGF) 120.00
			120.00	TEMP(DEGF) 140.00
			140.00	TEMP(DEGF) 160.00
			60.000	TEMP(DEGF) 80.000

BEFORE SURVEY CALIBRATION SUMMARY

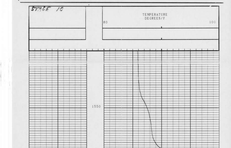
PERFORMED: 06-JUL-89 13:42
PROGRAM FILE: PL (VERSION 30.4 00/00/00 87/11/19)

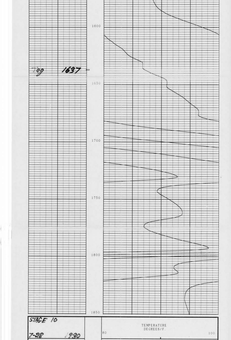
MTSC ELECTRONICS CALIBRATION SUMMARY

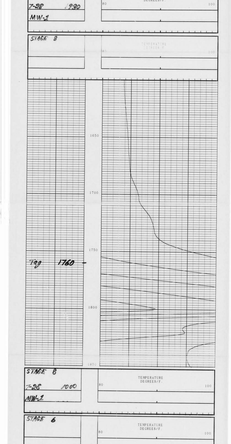
	MEASURED ZERO	MEASURED PLUS	CALIBRATED ZERO	CALIBRATED PLUS	UNITS
MP	0.0	0.0	0.0	0.0	PSIG

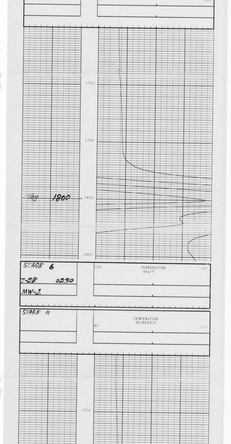
MTSC ELECTRONICS CALIBRATION SUMMARY

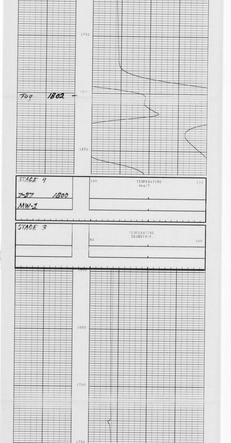
	MEASURED ZERO	MEASURED PLUS	CALIBRATED ZERO	CALIBRATED PLUS	UNITS
TEMP	52.3	160.9	0.0	200.0	DEGF

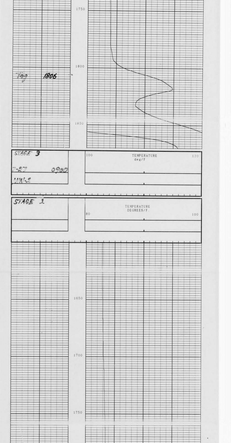












FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.	COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.
	WELL PAHOKEE DEEP MONITOR WELL # 1
	FIELD
	COUNTY PALM BEACH STATE FLORIDA
	LOCATION: OTHER SERV:
	SEC 19 TWP 42S RGE 37E

PERMANENT DATUM: PAD LEVEL ELEV 13.80' ELEVATION:
LOG MEASURED FROM 0 FT ABOVE PERM DATUM KB:
DRILLING MEASURED FROM PAD LEVEL DF:
GL:

DATE	7-29-89	7-30-89
RUN NO	11-12	13-14-15
DEPTH - DRILLER		
DEPTH - LOGGER	1860	
BOTTOM LOGGED INT		
TOP LOGGED INT	0	
TYPE FLUID IN HOLE	WATER	
DENSITY		
LEVEL	FULL	
MAX REC TEMP DEG F		
OPERATING RIG TIME		
RECORDED BY	WILSON	
WITNESSED BY	MR. BRANTLEY MR. RUCINSKI	MR. WAPINSKI

BORE HOLE RECORD			CASING RECORD			
RUN NO	BIT	FROM	TO	SIZE WGT	FROM	TO
				6"		1915

Equipment Data

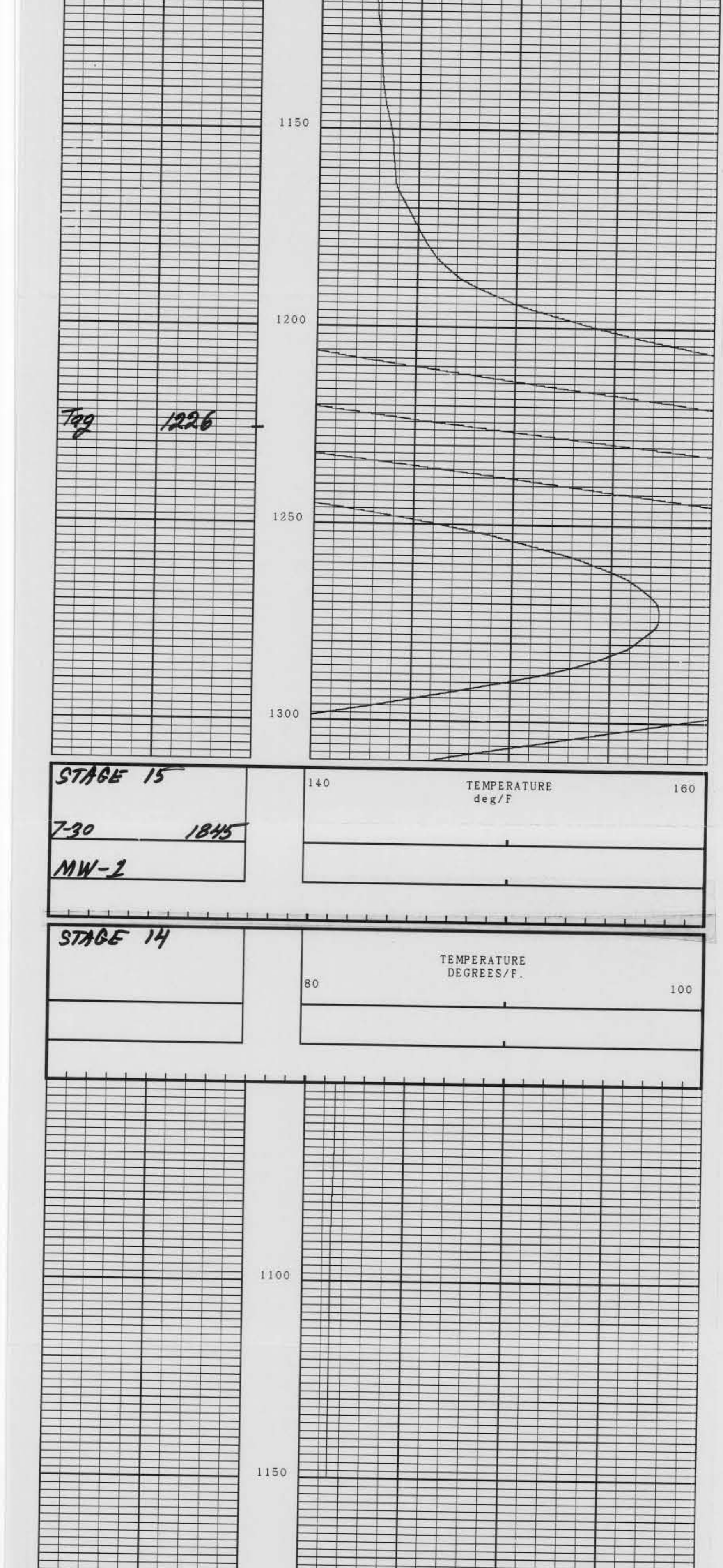
Run	PANEL	ZERO	100CALX1		
1	NIM2LRM-	T-2 D-9	32.2		

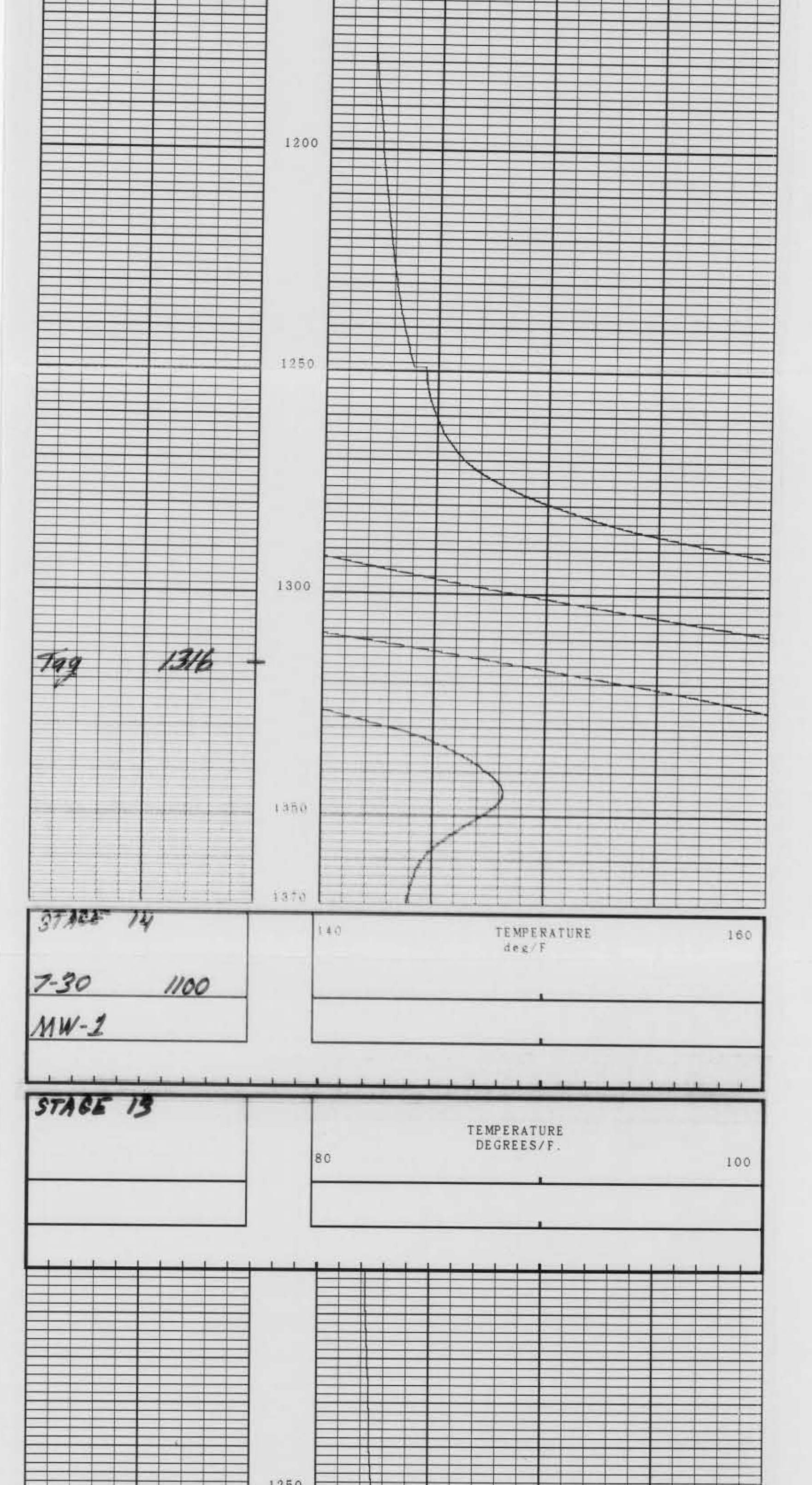
Calibration Data

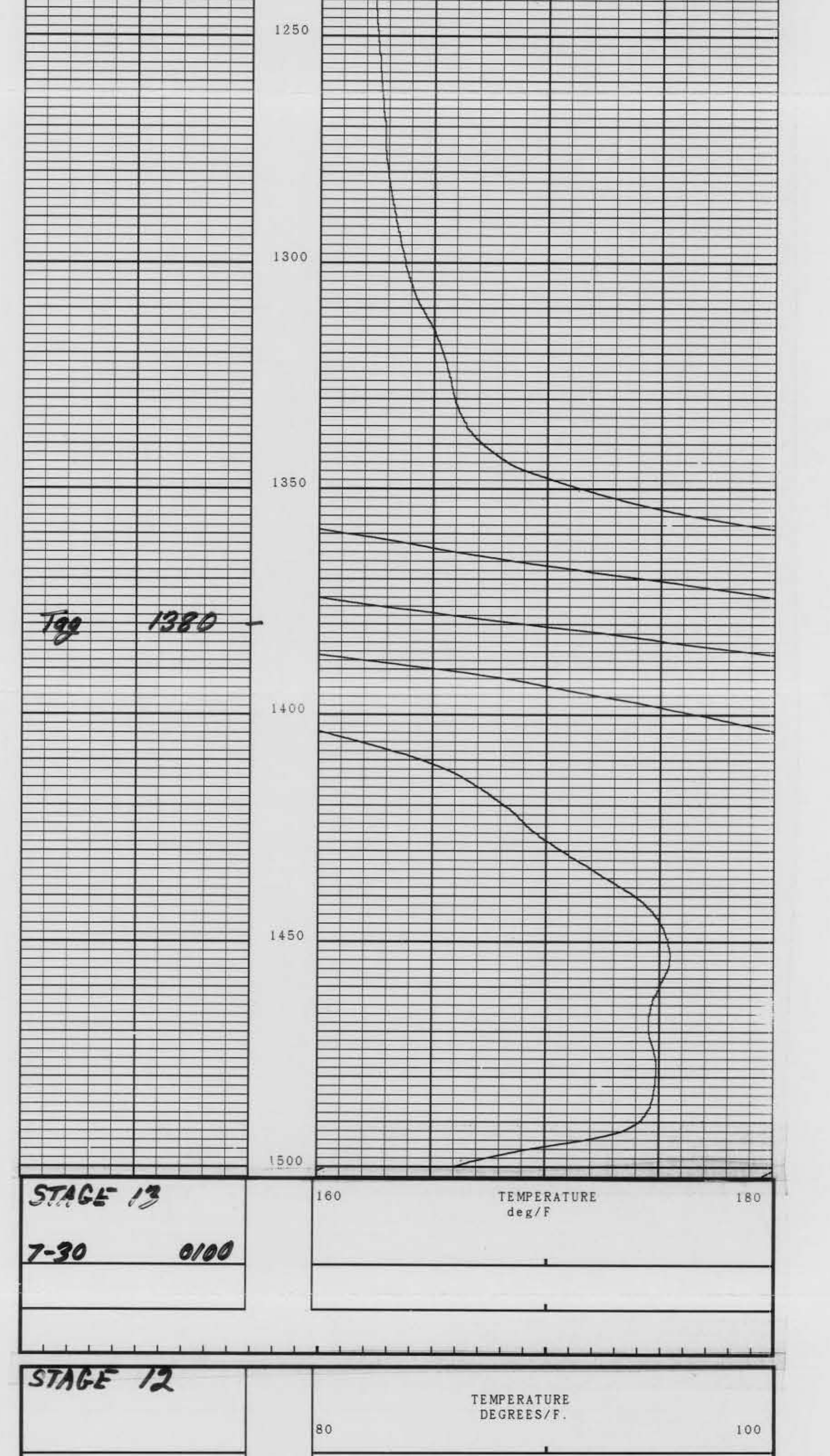
Run No.	80	140	TOOL # T10	TOOL #
1	503	629		

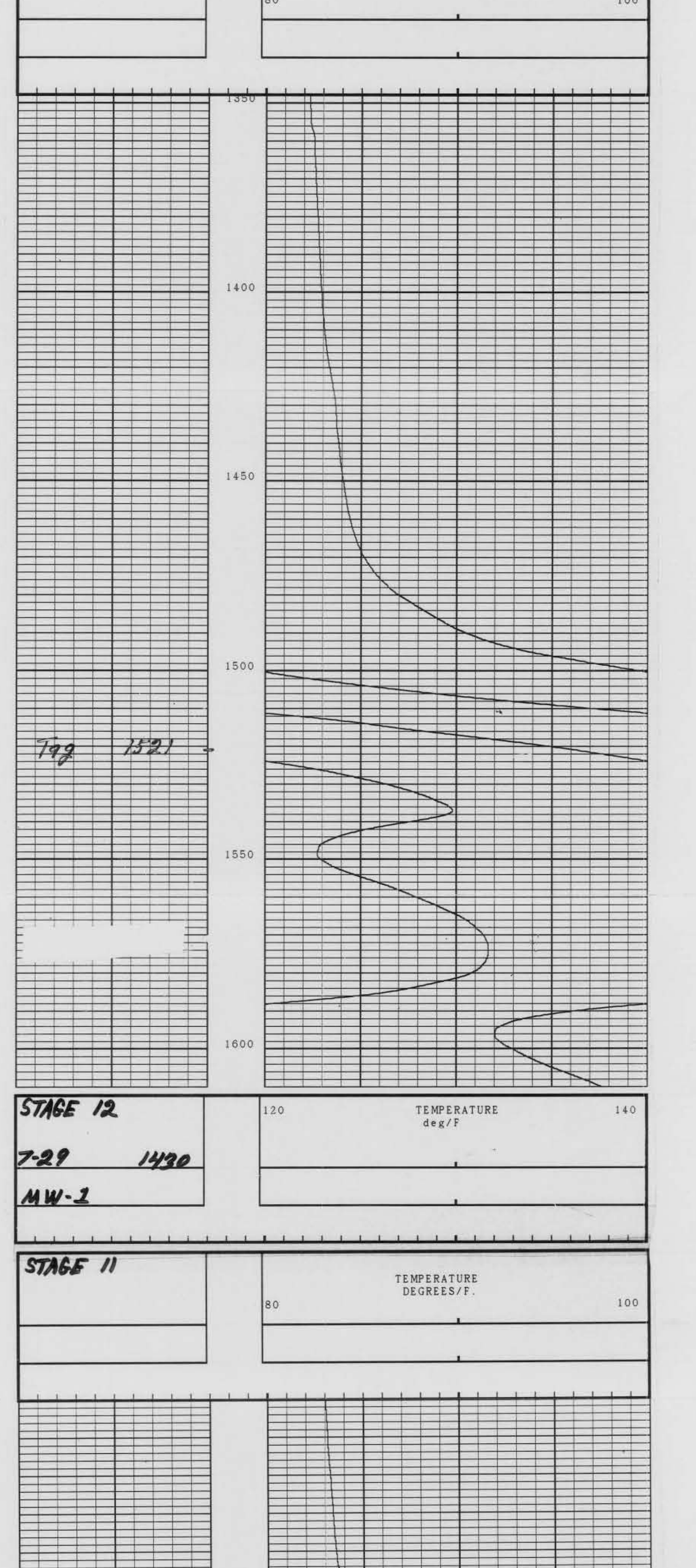
Logging Data

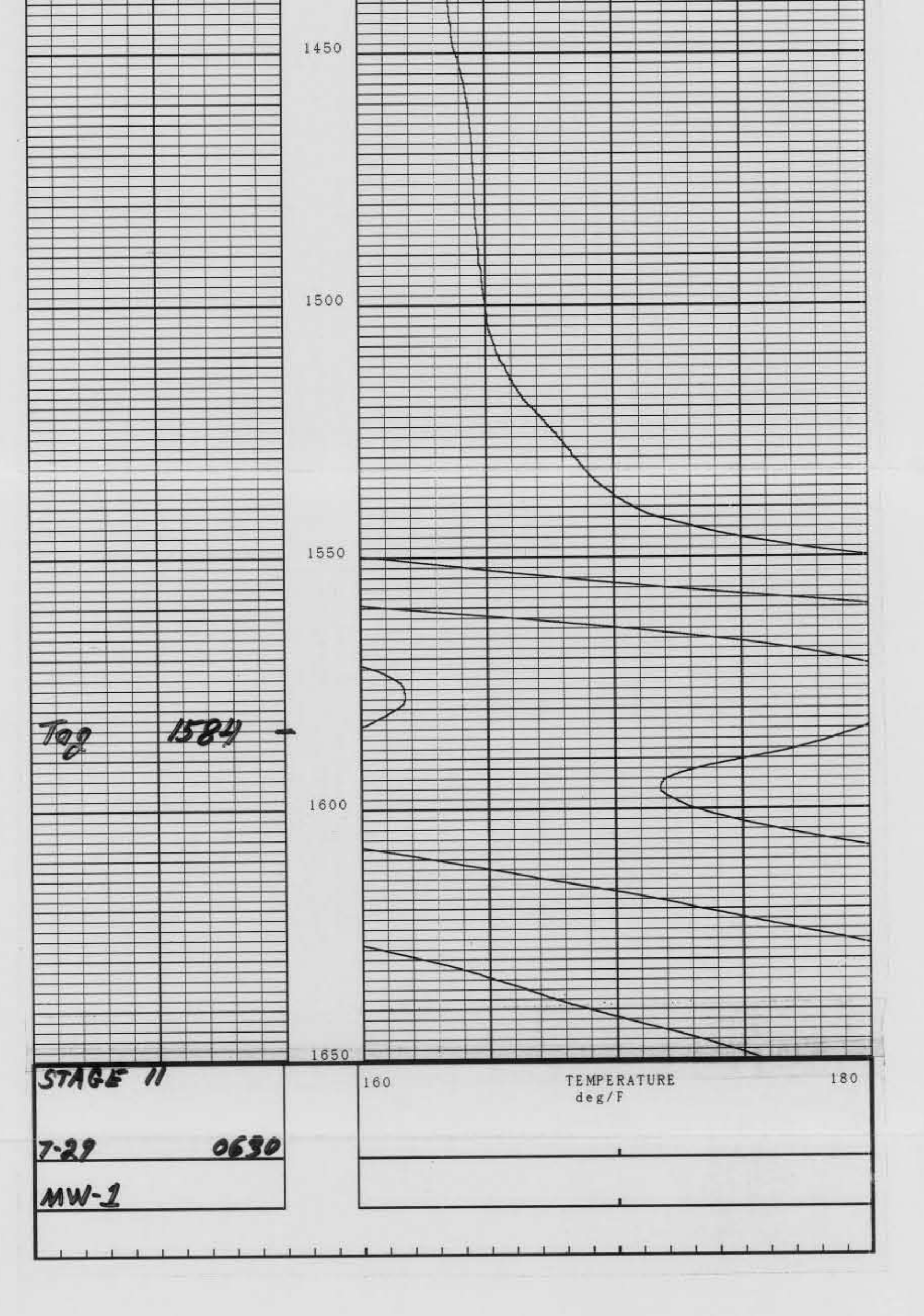
Run No.	Depths From	To	Speed Ft/Min
1	0	1980	30











FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS

(813) 480 2155

TEMPERATURE

COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.

WELL PAHOKEE DEEP MONITOR WELL # 1

FIELD

COUNTY PALM BEACH STATE FLORIDA

LOCATION SEC 19 TWP 42S RGE 37E

PERMANENT DATUM PAD LEVEL ELEV 13.80'

LOG MEASURED FROM KB 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM PAD LEVEL

ELEVATION KB DF GL

OTHER SERV

RUN NO.	ONE
BIT	12 1/4"
FROM	SURFACE
TO	1918'
BORE HOLE RECORD	
SIZE	12 1/4"
WGT	
FROM	SURFACE
TO	1918'
CASING RECORD	
DATE	7-31-80
RUN NO.	ONE
DEPTH DRILLER	1980
DEPTH LOGGER	1980
BOTTOM LOGGED INT	0
TOP LOGGED INTERVAL	SURFACE
TYPE FLUID IN HOLE	WATER
DENSITY PPG	
LEVEL	FULL
MAX REC. TEMP. DEG. F	
EQUIPMENT NO. LOCATION	
RECORDED BY	WILSON
WITNESSED BY	MR. BRADLEY MR. RUCINSKI MR. WALTINSKI

Equipment Data

Run	PANEL	ZERO	100CAL#1			
1	N1M2LRM-	T-2 D-9	32.2			

Calibration Data

Run No.	80	140	TOOL # T10				TOOL #	
1	503	629						

Logging Data

Run No.	Depths From	Depths To	Speed Ft/Min
1	0	1980	30

STAGE 17

TEMPERATURE DEGREES/F.

80 100

1000 1050 1100 1150 1200

Tgg 1147

STAGE 17

7-31 2030

MW-2

100 TEMPERATURE deg/F 120

STAGE 16

TEMPERATURE DEGREES/F.

80 100

1050 1100 1150 1200 1250

Tgg 1177

STAGE 16

7-31 0700

MW-2

140 TEMPERATURE deg/F 160

FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.	
COMPANY	YOUNGQUIST BROTHERS DRILLING CO. INC.
WELL	PAHOKEE MW-1
FIELD	
COUNTY	PALM BEACH STATE FLORIDA
LOCATION:	OTHER SERV:
SEC 19 TWP 42S RGE 37E	

PERMANENT DATUM: PAD LEVEL ELEV: 13.00' ELEVATION:
LOG MEASURED FROM 0 FT ABOVE PERM DATUM KB:
DRILLING MEASURED FROM PAD LEVEL DF:
GL:

DATE	8-3-89	8-4-89	8-5-89
RUN NO.	78-80	82-84-85	86-87-88
DEPTH - DRILLER			
DEPTH - LOGGER			
BOTTOM LOGGED INT			
TOP LOGGED INT	0		
TYPE FLUID IN HOLE	WATER		
SALINITY PPM CL.			
DENSITY			
LEVEL	FULL		
MAX TEMP DEG F			
OPERATING RIG TIME			
RECORDED BY	WILSON		
WITNESSED BY	MR. MANER	MR. DRETZKA	

BORE HOLE RECORD			CASING RECORD			
RUN NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
				22"		0	2000'

Equipment Data

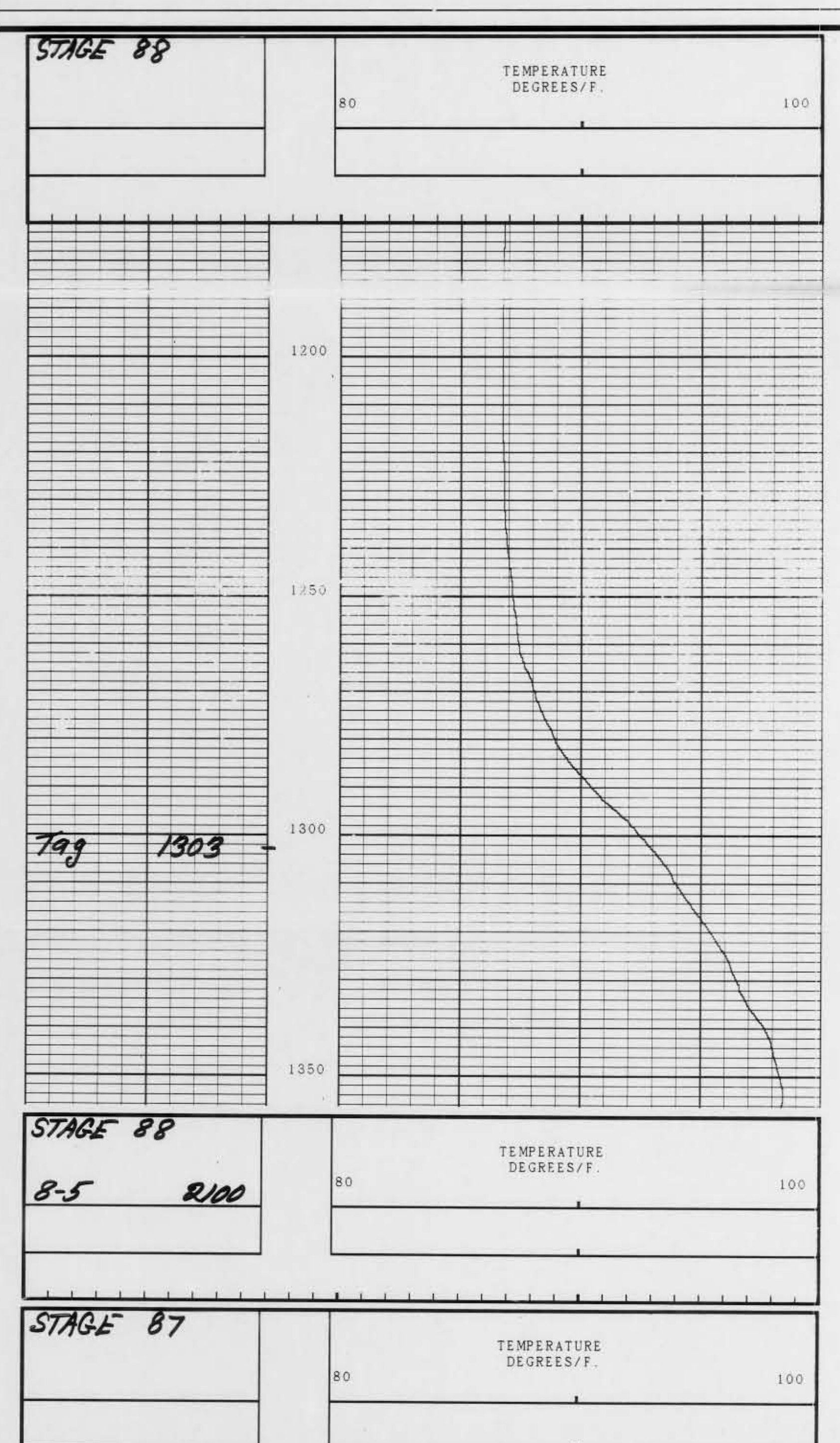
Run	PANEL	ZERO	TOOCALY1			
1	NIM2LRM-	T-2 D-9	31.2			

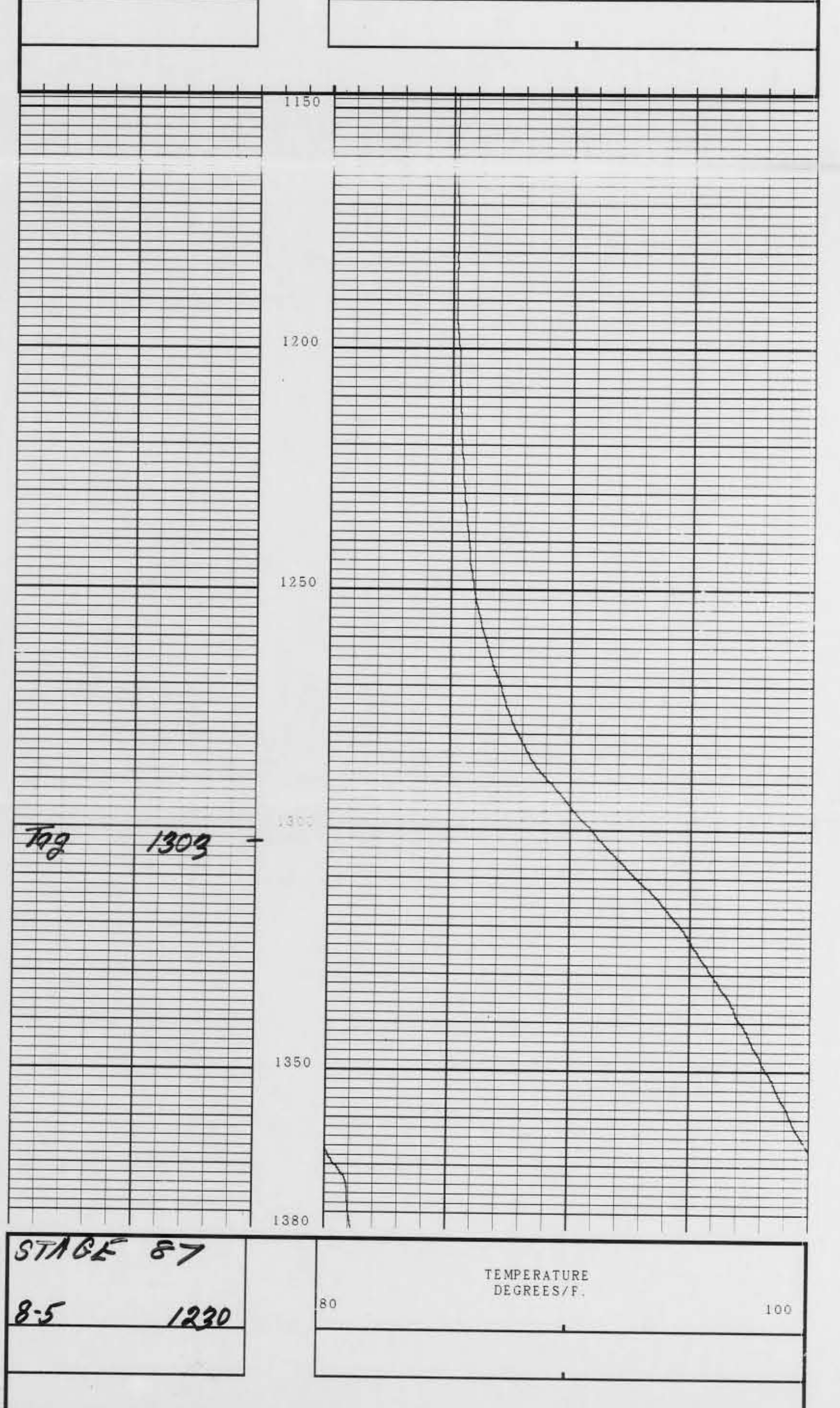
Calibration Data

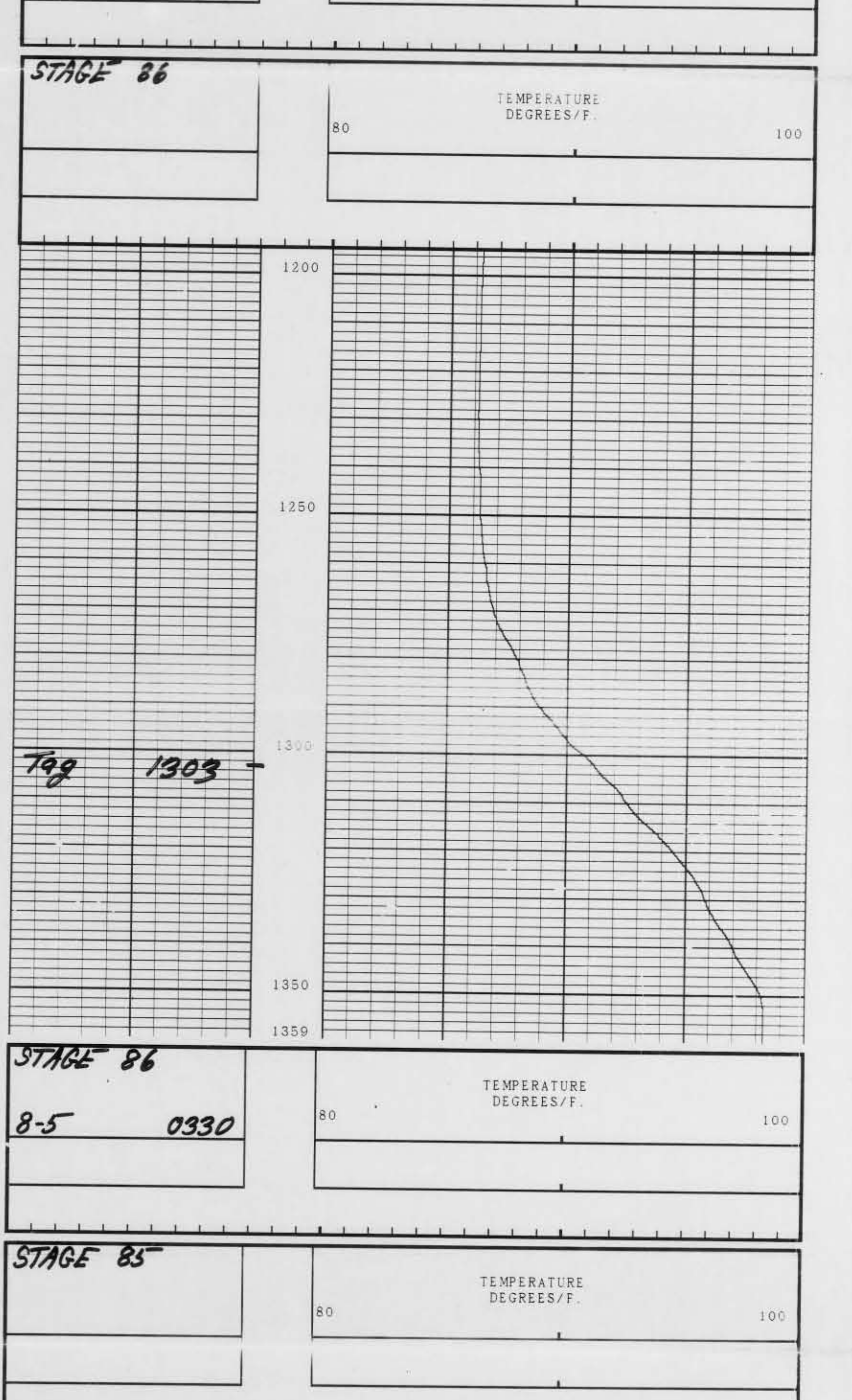
Run No.	80	140	TOOL # T10	TOOL #
1	503	629		

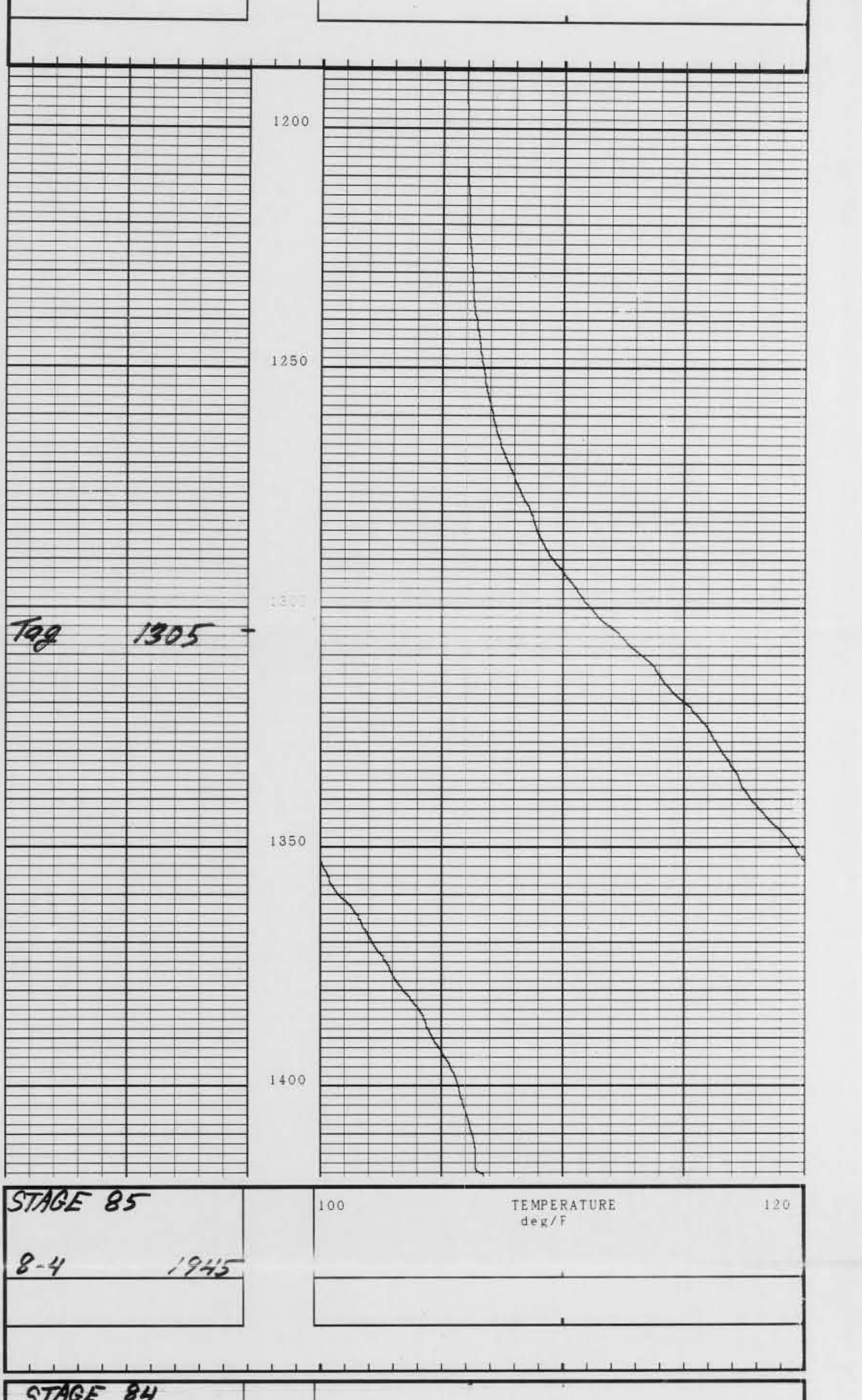
Logging Data

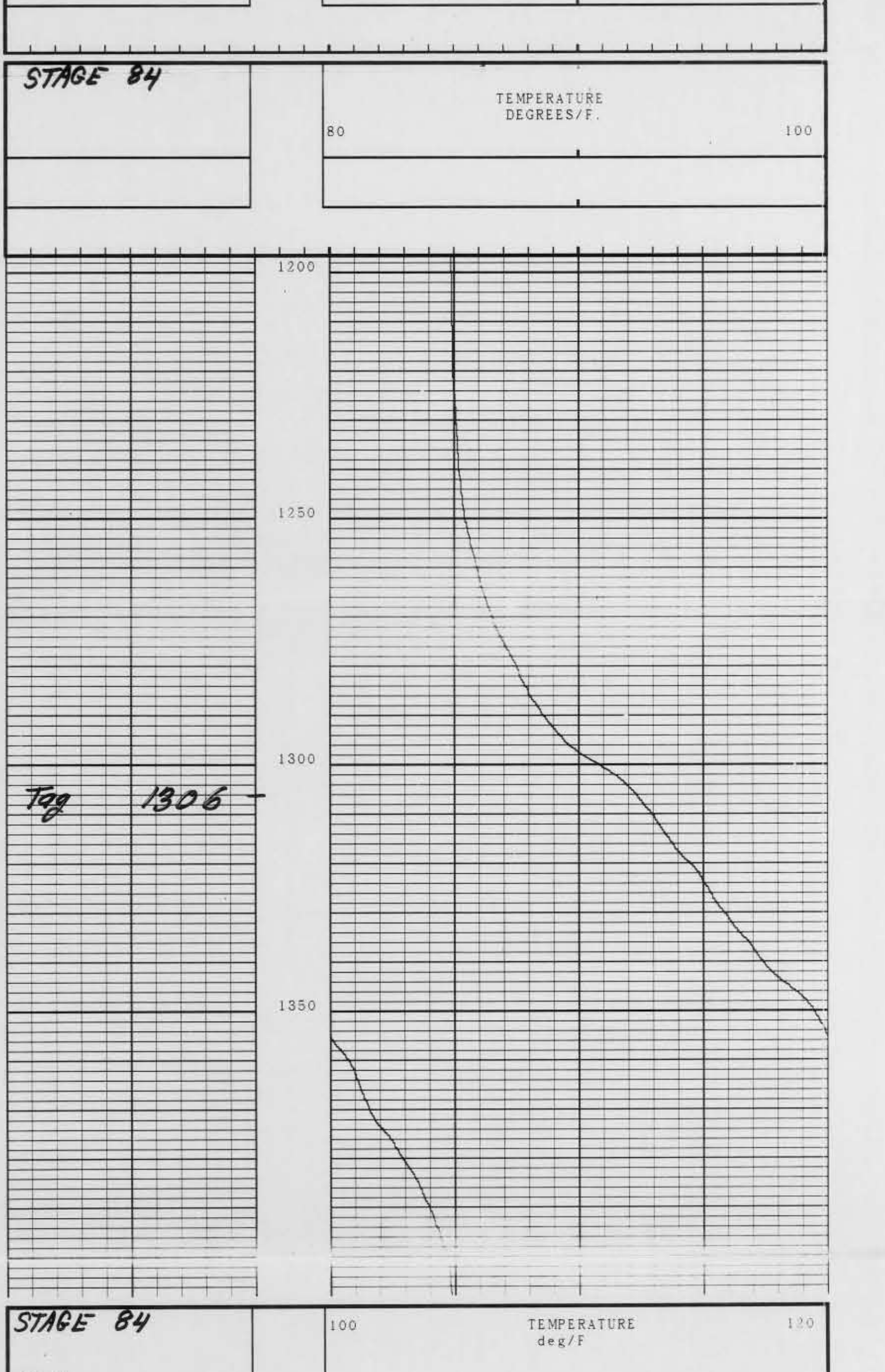
Run No.	Depths From	To	Speed Ft/Min
1	0	1980	30

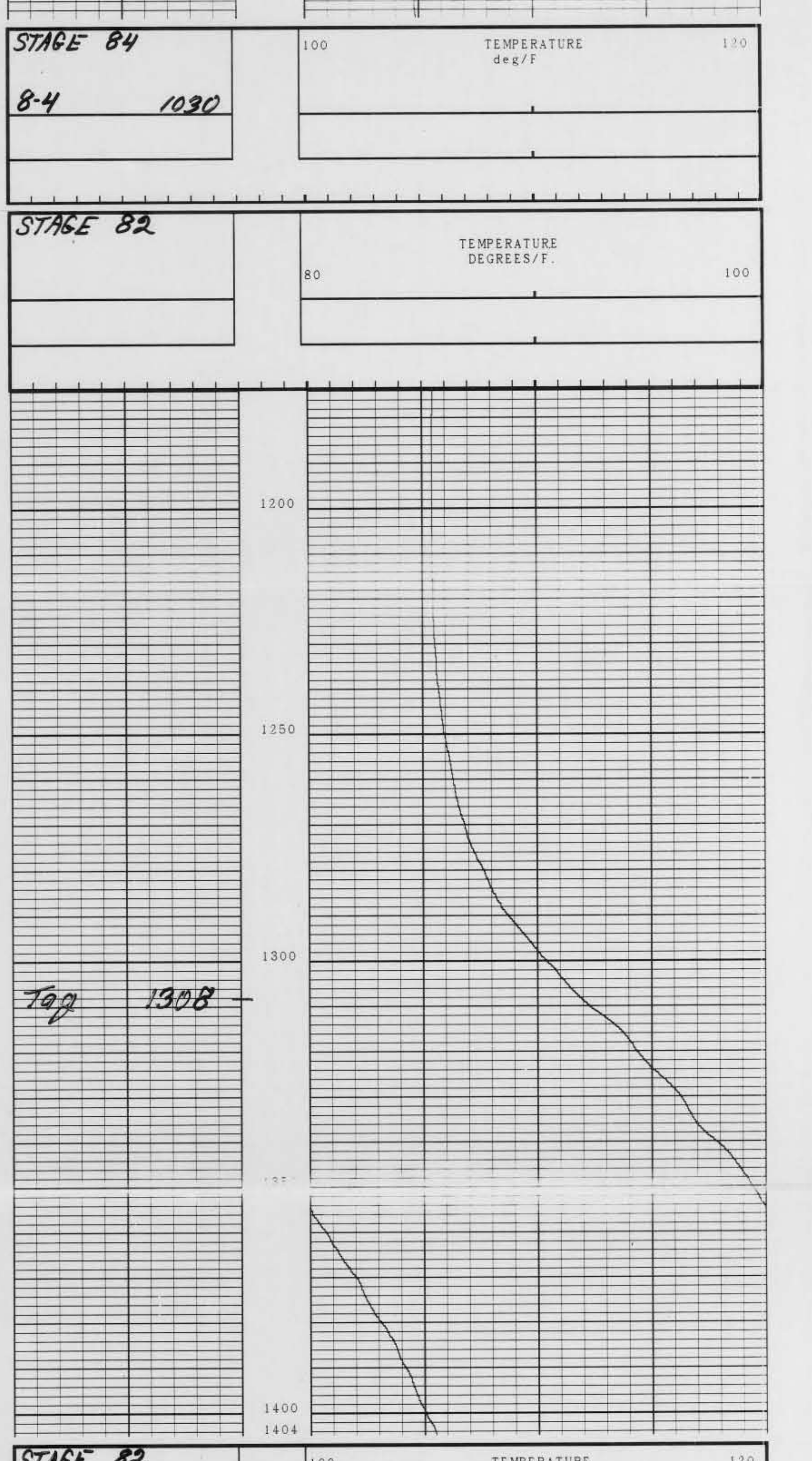


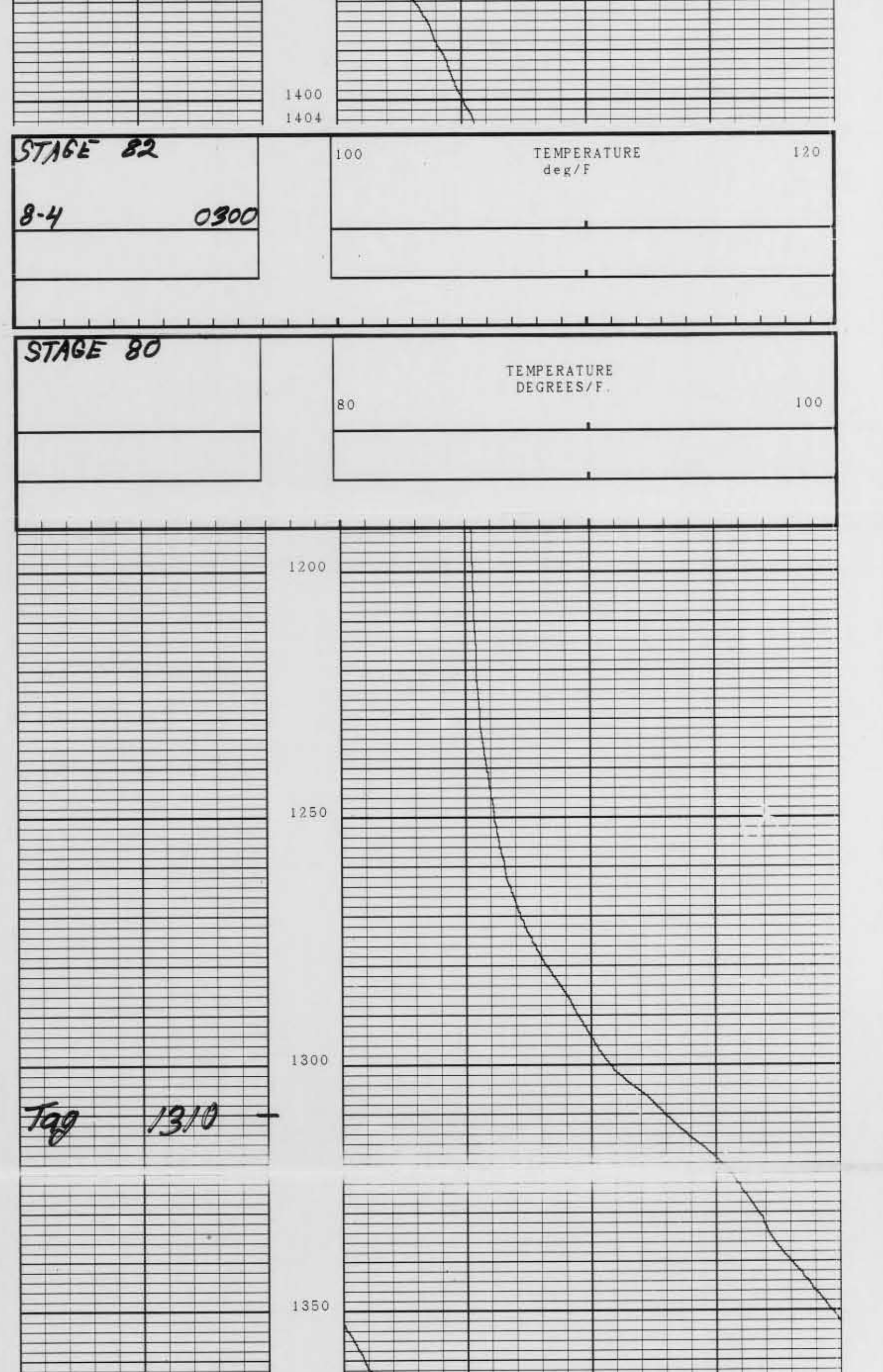


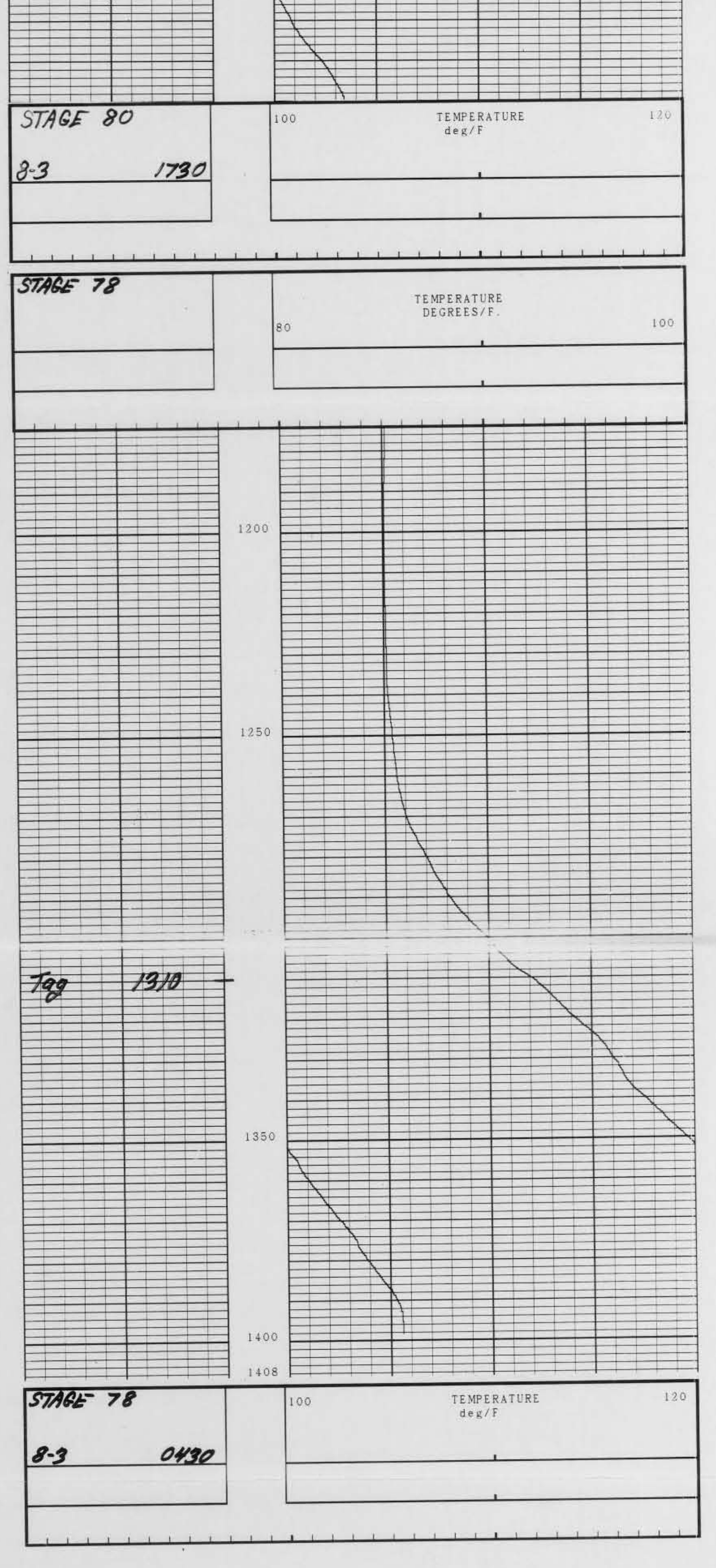












FLORIDA GEOPHYSICAL LOGGING, INC.

FORT MYERS (813) 489 2155

TEMPERATURE

FILING NO.

COMPANY YOUNGQUIST BROTHERS DRILLING CO. INC.

WELL PAHOKEE DEEP MONITOR WELL # 1

FIELD

COUNTY PALM BEACH STATE FLORIDA

LOCATION:

SEC 19 TWP 42S RGE 37E

OTHER SERV:

PERMANENT DATUM: PAD LEVEL ELEV: 13.80'

LOG MEASURED FROM 0 FT ABOVE PERM DATUM

DRILLING MEASURED FROM PAD LEVEL

ELEVATION:
KB.
DF.
GL.

DATE	8-5-89-		
RUN NO.	ONE		
DEPTH - DRILLER	2008		
DEPTH - LOGGER	2008		
BOTTOM LOGGED INT			
TOP LOGGED INT	0		
TYPE FLUID IN HOLE	WATER		
SALINITY PPM CL.			
DENSITY			
LEVEL	FULL		
MAX TEMP DEG F			
OPERATING RIG TIME			
RECORDED BY	WILSON		
WITNESSED BY	MR. GREUEL	MR. DRETZKA	

RUN NO.	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				6"		0	1915'

Equipment Data

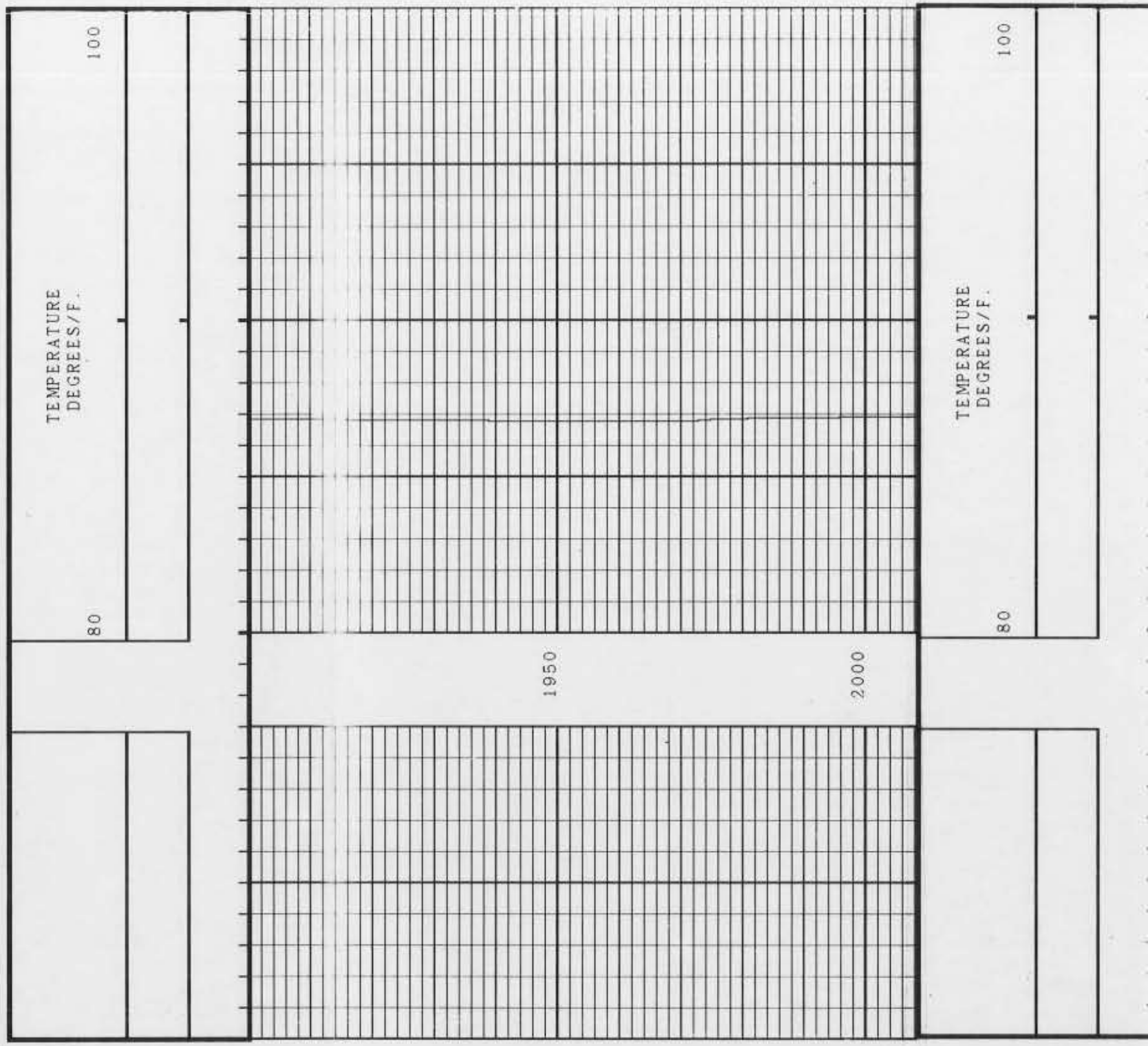
Run	PANEL	ZERO	100CAL*1
1	NIMØLRM-	T-2 D-9	32.2

Calibration Data

Run No	TOOL = T10	TOOL #
	140	
1	629	

Logging Data

Run No.	Depths From	To	Speed Ft/Min
1	0	1980	30



APPENDIX F

Hydrostatic Pressure Test Data

INJECTION WELL 1
PRESSURE TEST
OF
12-INCH-DIAMETER INJECTION CASING
(OCTOBER 6, 1989)

Time	Delta Time (in minutes)	Casing Head Pressure (in pounds per square inch)
11:08	0	139.8
11:13	5	139.0
11:18	10	139.0
11:23	15	139.0
11:28	20	139.0
11:33	25	139.0
11:38	30	139.0
11:43	35	139.0
11:48	40	139.0
11:53	45	139.0
12:01	53	138.0
12:08	60	138.0

Decrease of 1.8 psi over a one-hour period (1.29 percent change). I, Michael J. Waldron, certify that the above data is true and accurate.

Signed: 

DEEP MONITOR WELL
PRESSURE TEST
OF
16-INCH-DIAMETER STEEL CASING
(July 11, 1989)

Time	Delta Time (in minutes)	Casing Head Pressure (in pounds per square inch)
18:30	0	110
18:35	5	110
18:40	10	110
18:45	15	110
18:50	20	110
18:55	25	109
19:00	30	109
19:05	35	108
19:10	40	108
19:15	45	108
19:20	50	107
19:25	55	107
19:30	60	106

Decrease of 4.0 psi over a one-hour period (3.63 percent change). We, Andrew E. Rucinski and Lech B. Kwapinski, certify that the above data are true and accurate.

Signed: Andrew E. Rucinski

L. Kwapinski

DEEP MONITOR WELL
PRESSURE TEST
OF
6-INCH-DIAMETER CASING
(August 3, 1989)

Time	Delta Time (in minutes)	Casing Head Pressure (in pounds per square inch)
18:20	0	102
18:25	5	102
18:30	10	102
18:35	15	102
18:40	20	102
18:45	25	102
18:50	30	102
18:55	35	102
19:00	40	102
19:05	45	102
19:10	50	102
19:15	55	102
19:20	60	102

Decrease of 0.0 psi over a one-hour period (0.00 percent change). I, Pitt T. Maner, III, certify that the above data is true and accurate.

Signed: Pitt T. Maner III

APPENDIX G

Water Quality Analyses

STRADDLE-PACKER TESTS

Straddle - packer tests

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

GERAGHTY & MILLER, INC
2700 PGA BLVD. SUITE 104
PALM BEACH GARDENS, FL 33410
CLIENT NAME AND ADDRESS

RECEIVED
NOV 16 19xx
Geraghty & ...

40894
SAMPLE NUMBER

06-08-89 CLIENT 06-13-89 1315
DATE TIME COLL RECD

PF0546PA02 - PAHOKEE
PROJECT NO/LOCATION

IW-1/SP#1 STRADDLE PACKER TEST #1 (1776 - 1821' PAD LEVEL)

PARAMETER	STORET #	DATE BY NBR	RESULTS,mg/L
CONDUCTIVITY umho/cm	00095	06-13 JP 166-55	10,350
CHLORIDE	00940	06-15 BM #1603	4,610
TDS	070304	06-14 CH 43A-48	8,485
SULFATE	000945	06-15 BM #1602	114

DATE 06-15-89 LAB ID 86122,86109, E86048

BY _____
DIRECTOR

GEC TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

GERAGHTY & MILLER, INC — CLIENT NAME AND ADDRESS
2700 PGA BLVD. SUITE 104
PALM BEACH GARDENS, FL 33410
40895 — SAMPLE NUMBER
06-12-89 CLIENT 06-13-89 1315 — DATE TIME COLL RECD
PF0546PA02 - PAHOKEE — PROJECT NO/LOCATION
IW-1/SP#2 STRADDLE PACKER TEST #2 (1890 - 1935' PAD LEVEL)

PARAMETER	STORET #	DATE BY NBR	RESULTS,mg/L
CONDUCTIVITY umho/cm	00095	06-13 JP 166-55	18,880
CHLORIDE	00940	06-15 BM #1603	7,693
TDS	070304	06-14 CH 43A-48	16,153
SULFATE	000945	06-15 BM #1602	863

DATE 06-15-89 LAB ID 86122,86109, E86048

BY _____
DIRECTOR

SHALLOW MONITOR ZONE

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS
6100 W. 45TH STREET
WEST PALM BEACH, FLORIDA 33407
42172 — SAMPLE NUMBER
09-27-89 1830 BM 09-27-89 2210 — DATE TIME RECEIVED BY
INJECTION WELL - PAHOKEE — LOCATION
SHALLOW 946 - 1147'

PARAMETER	STORET #	DATE BY NBR	RESULTS,mg/L
ARSENIC	01002	10-11 MD 78-161	<0.005
BARIUM	01007	10-17 MD 78-167	0.13
CADMIUM	01027	10-19 MD 78-169	<0.001
CHROMIUM	01034	10-09 MD 78-158	<0.005
LEAD	01051	10-11 MD 78-162	0.015
MERCURY	71900	10-18 MD 78-168	<0.0002
SELENIUM	01147	10-16 MD 78-165	<0.001
SILVER	01077	10-19 MD 78-170	<0.005
SODIUM	00929	10-05 MD 78-152	1200
MAGNESIUM	00927	10-24 MD 78-182	114

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____
DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ORGANICS ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY

INJECTION WELL - PAHOKEE — LOCATION

SHALLOW 946 - 1147'

PARAMETER	STORET #	MCL, mg/L	RESULTS,mg/L
LINDANE	39782	0.004	<0.000005
ENDRIN	39390	0.0002	<0.000005
METHOXYCHLOR	39480	0.1	<0.00005
TOXAPHENE	39400	0.005	<0.0005
2,4-D		0.1	<0.001
2,4,5-TP	39760	0.01	<0.001

DATE 11-30-89 BY _____ LAB ID 86109,86122

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

TRIHALOMETHANES THM1.FRM

YOUNGQUIST BROTHERS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
CLIENT NAME AND ADDRESS

42172
SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210
DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE
LOCATION

SHALLOW 946 - 1147

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
CHLOROFORM	32106	*	<2
DIBROMOCHLOROMETHANE	32105	*	<2
TOTAL TRIHALOMETHANES			<2

DATE 11-30-89 BY _____ LAB ID 86109

GEO TEC INC. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

SEC.FRM SECONDARY REPORT FORM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
42172 — SAMPLE NUMBER
09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY RECD
INJECTION WELL - PAHOKEE — LOCATION
SHALLOW 946 - 1147'

PARAMETER	STORET NO.	DATE BY NBR	RESULT, mg/L
ALKALINITY	00410	10-01 TM 64-233	120
CALCIUM	00916	10-24 MD 78-180	135
CHLORIDE	00940	10-10 BM 62-353	2400
COLOR	00081	10-10 CH 81-74	5
COPPER	01042	10-23 MD 78-175	0.010
CORROSIVITY		CALCULATED	0.57
FOAMING AGENTS	38260	09-28 TM 64-234	0.118
IRON	01045	10-02 MD 78-148	0.090
MANGANESE	01055	10-03 MD 78-150	0.016
ODOR	00085	09-28 CH 81-71	1
TDS	70304	09-28 CH 81-71	4981
NON-FILTERABLE RESIDUE	00530	10-02 CH 81-72	4
ZINC	01092	10-05 MD 78-154	<0.10
BICARBONATE ALKALINITY		CALCULATED	119

DATE 11-30-89 BY _____ LAB ID 86122, 86109

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION

SHALLOW 946 - 1147'

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
TURBIDITY NTU	00076	09-28 BM TB-71	0.6
BOD (5)	00310	09-28 CH 80-63	4
POTASSIUM	00937	10-05 MD 78-153	31.4
ANTIMONY	01097	11-03 MD 78-196	0.060
BROMIDE	71870	10-10 BM 62-353	3.52
STRONTIUM	01080	11-07 MD 78-209	10.1
BORON	01022	10-10 BM 62-353	0.500
HYDROGEN SULFIDE	71875	09-28 TM 64-233	<0.20
COD	00340	10-17 TM 64-235	323

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION/SHALLOW 946-1147

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
SPEC COND,mS	00095	09-27 BM COC	7.03
SPEC GRAVITY	72013		1.002
pH	00400	09-27 BM COC	7.95
DO	00299	09-27 COC	0.1 mg/L
WATER TEMPERATURE (C)		09-27 BM COC	26.6
			RESULTS,ORG/100ML
FECAL COLIFORM,MPN		09-27 BM 77-45	<2
			RESULTS,mg/L
FLUORIDE	00951	09-28 BM #2795	3.85
NITRATE-N	00630	09-28 BM #2795	<0.08
TKN	00625	10-07 BM 62-354	1.38
ORTHO-PHOSPHORUS	00671	09-10 BM 62-352	<0.02
t-PHOSPHORUS	00665	10-15 BM 62-352	<0.02
AMMONIA NITROGEN	00610	10-10 BM 62-353	0.744
SULFATE	00945	10-10 BM 62-352	563
ORGANIC NITROGEN		CALCULATED	0.64

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC INC. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE HALOCARBONS M601 METHOD 601

YOUNGQUIST BROTHERS — CLIENTS NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 8305 BM 09-27-89 2210 — DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE — LOCATION

SHALLOW 946 - 1147'

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
BROMOMETHANE	34413		<5
CARBON TETRACHLORIDE	32102	3	<0.3
CHLOROBENZENE	34301		<2
CHLOROETHANE	34311		<5
2-CHLOROETHYLVINYL ETHER	34576		<5
CHLOROFORM	32106	*	<2
CHLOROMETHANE	34418		<5
DIBROMOCHLOROMETHANE	32105	*	<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571	75	<2
DICHLORODIFLUOROMETHANE	34668		<5
1,1-DICHLOROETHANE	34496		<2
1,2-DICHLOROETHANE	34531	3	<0.3
1,1-DICHLOROETHENE	34501	7	<2
1,2-DICHLOROETHENE	34546		<2
1,2-DICHLOROPROPANE	34541		<2
cis-1,3-DICHLOROPROPENE	34704		<2
trans-1,3-DICHLOROPROPENE	34699		<2
METHYLENE CHLORIDE	34423		<2
1,1,2,2-TETRACHLOROETHANE	34516		<2
TETRACHLOROETHENE	34475	3	<0.3
1,1,1-TRICHLOROETHANE	34506	200	<2
1,1,2-TRICHLOROETHANE	34511		<2
TRICHLOROETHENE	39180	3	<0.3
TRICHLOROFLUOROMETHANE	34488		<2
VINYL CHLORIDE	39175	1	<0.1

DATE 11-30-89 BY _____ LAB ID 86109, E86048

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE AROMATICS — M602 METHOD

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY REC.

INJECTION WELL - PAHOKEE — DESCRIPTION

SHALLOW 946 - 1147' — LOCATION

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BENZENE	34030	1	<0.1
CHLOROBENZENE	34301		<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571		<2
ETHYLBENZENE	34371		<0.1
TOLUENE	34010		<0.1
XYLENES	81551		<2

DATE 11-30-89 LAB ID 86122,86109,E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
42172 — SAMPLE NUMBER
09-27-89 1830 BM 09-27-89 2210 — DATE/TIME COLLECTED BY/RECD
INJECTION WELL - PAHOKEE — LOCATION/SHALLOW 946-1147'

PARAMETER	STORET NO.	RESULT ug/L
ALDRIN	39330	<0.005
a-BHC	39337	<0.005
b-BHC	39338	<0.005
d-BHC	34259	<0.005
g-BHC (LINDANE)	39340	<0.005
CHLORDANE	39350	<0.05
4,4'-DDD	39310	<0.05
4,4'-DDE	39320	<0.05
4,4'-DDT	39300	<0.05
DIELDRIN	39380	<0.005
ENDOSULFAN I	34361	<0.005
ENDOSULFAN II	34356	<0.005
ENDOSULFAN SO4	34351	<0.05
ENDRIN	39390	<0.005
ENDRIN ALDEHYDE	34366	<0.05
HEPTACHLOR	39410	<0.005
HEPTACHLOR EPOXIDE	39420	<0.005
TOXAPHENE	39400	<0.5

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE/TIME COLLECTED BY/RECD

INJECTION WELL - PAHOKEE — LOCATION/SHALLOW 946-1147'

PARAMETER	STORET NO.	RESULT, ug/L
PCB A1016	34671	<0.1
PCB A1221	39488	<0.1
PCB A1232	39392	<0.1
PCB A1242	39496	<0.1
PCB A1248	39500	<0.1
PCB A1254	39504	<0.1
PCB A1260	39508	<0.1

FED.REGISTER VOL 44 NO233 DECEMBER 3, 1979

DATE 11-30-89 BY _____ LAB ID 86109,86122

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FLORIDA

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION

SHALLOW 946 - 1147'

PARAMETER	RESULTS,ug/L
HEXACHLOROBENZENE	<2
HEXACHLOROETHANE	<2
TRICHLOROETHYLENE	<0.3
TETRACHLOROETHYLENE	<0.3
ETHYLENE DIBROMIDE	<0.003
trans-1,2-DICHLOROETHENE	<2
BROMOMETHANE	<5

DATE 11-30-89 LAB ID 86122,86109, E86048

BY

DIRECTOR

SPECTRUM
Laboratories, Inc.

CLIENT: GEOTECH/EVERGLADES LABS
SAMPLE ID: #42172 / 027-092889
SAMPLED BY: CLIENT
DATE RECEIVED: 09-28-89
DATE ANALYZED: 10-02-89

-CERTIFICATIONS-
EPA NUMBER: # FL09
FLORIDA DRINKING WATER: # 8614
FLORIDA ENVRIONMENTAL: #E8600

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

CAS NUMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
83-32-9	ACENAPHTHENE	BMDL	1.9
208-96-8	ACENAPHTHYLENE	BMDL	3.5
120-12-7	ANTHRACENE	BMDL	1.9
309-00-2	ALDRIN	BMDL	1.9
56-55-3	BENZO(a)ANTHRACENE	BMDL	7.8
205-99-2	BENZO(b)FLUORANTHENE	BMDL	4.8
207-08-9	BENZO(k)FLOURANTHENE	BMDL	2.5
50-32-8	BENZO(a)PYRENE	BMDL	2.5
191-24-2	BENZO(ghi)PERYLENE	BMDL	4.1
85-68-7	BUTYL BENZYL PHTHALATE	BMDL	2.5
319-85-7	b-BHC	BMDL	4.2
319-86-8	d-BHC	BMDL	3.1
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	5.7
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	5.3
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	BMDL	2.5
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	5.7
101-55-3	4-BROMOPHENYL PHENYL ETHER	BMDL	1.9
57-74-9	CHLORDANE	BMDL	30
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.9
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	BMDL	4.2
218-01-9	CHRYSENE	BMDL	2.5
72-54-8	4,4'-DDD	BMDL	2.8
75-55-9	4,4'-DDE	BMDL	5.6
50-29-3	4,4'-DDT	BMDL	4.7
53-70-3	DIBENZO(a,h)ANTHRACENE	BMDL	2.5
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	2.5
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.9
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.9
106-46-7	1,4-DICHLOROBENZENE	BMDL	4.4
91-94-1	3,3'-DICHLOROBENZIDINE	BMDL	16.5
60-57-1	DIELDRIN	BMDL	2.5
84-66-2	DIETHYL PHTHALATE	BMDL	22
131-11-3	DIMETHYL PHTHALATE	BMDL	1.6
121-14-2	2,4-DINITROTOLUENE	BMDL	5.7
606-20-2	2,6-DINITROTOLUENE	BMDL	1.9
117-84-0	DI-N-OCTYLPHTHALATE	BMDL	2.5
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.6
421-93-4	ENDRIN ALDEHYDE	BMDL	10

B M D L = BELOW METHOD DETECTION LIMIT L O D = LIMIT OF DETECTION

CONTINUED ON NEXT PAGE

GEOTECH/EVERGLADES LABS
#42172 / 027-092889

EPA METHOD 625
CONTINUTED

CAS NUMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
206-44-0	FLOURANTHENE	BMDL	2.2
86-73-7	FLOURENE	BMDL	1.9
76-44-8	HEPTACHLOR	BMDL	1.9
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	2.2
118-74-1	HEXACHLOROBENZENE	BMDL	1.9
87-68-3	HEXACHLOROBUTADIENE	BMDL	0.9
67-72-1	HEXACHLOROETHANE	BMDL	1.6
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.9
78-59-1	ISOPHORONE	BMDL	3.7
91-20-3	NAPHTHALENE	BMDL	2.2
98-95-3	NITROBENZENE	BMDL	1.9
621-64-7	N-NITROSODI-N-PROPYLAMINE	BMDL	1.9
12674-11-2	PCB-1016	BMDL	10
11104-28-2	PCB-1221	BMDL	10
11141-16-5	PCB-1232	BMDL	10
53469-21-9	PCB-1242	BMDL	10
12672-29-6	PCB-1248	BMDL	10
11097-69-1	PCB-1254	BMDL	10
1[illegible]6-82-5	PCB-1260	BMDL	10
[illegible]01-8	PHENANTHRENE	BMDL	5.4
129-00-0	PYRENE	BMDL	1.9
8001-35-2	TOXAPHENE	BMDL	30
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	1.9

ACID EXTRACTABLES

59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	3.0
95-57-8	2-CHLOROPHENOL	BMDL	3.3
120-83-2	2,4-DICHLOROPHENOL	BMDL	2.7
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.7
51-28-5	2,4-DINITROPHENOL	BMDL	42
534-52-1	2-METHYL-4,6-DINITROPHENOL	BMDL	24
38-75-5	2-NITROPHENOL	BMDL	3.6
100-02-7	4-NITROPHENOL	BMDL	2.4
37-86-5	PENTACHLOROPHENOL	BMDL	3.6
108-95-2	PHENOL	BMDL	1.5
38-06-2	2,4,6-TRICHLOROPHENOL	BMDL	2.7

M D L = BELOW DETECTION LIMIT

L O D = LIMIT OF DETECTION

CONTINUED ON NEXT PAGE

GT TECH/EVERGLADES LABS
.172 / 027-092889

EPA METHOD 625
CONTINUTED

CAS NUMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
92-87-5	BENZIDINE	BMDL	4
319-84-6	a-BHC	BMDL	1.0
58-89-8	y-BHC	BMDL	5.0
959-98-8	ENDOSULFAN I	BMDL	10
33213-65-9	ENDOSULFAN II	BMDL	10
72-20-8	ENDRIN	BMDL	1.0
77-47-7	HEXACHLOROCYCLOPENTADIENE	BMDL	10
62-75-9	N-NITROSODIMETHYLAMINE	BMDL	10
86-30-6	N-NITROSODIPHENYLAMINE	BMDL	1.9
1746-01-6	2,3,7,8-TCDD (DIOXIN)		1.9

Albert Castellanos
Chemist

M D L = BELOW DETECTION LIMIT

L O D = LIMIT OF DETECTION

DEEP MONITOR ZONE

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FLORIDA 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME RECEIVED BY

INJECTION WELL - PAHOKEE — LOCATION

DEEP 1915-2008'

PARAMETER	STORET #	DATE BY NBR	RESULTS,mg/L
ARSENIC	01002	10-11 MD 78-161	<0.005
BARIUM	01007	10-17 MD 78-167	0.13
CADMIUM	01027	10-19 MD 78-169	<0.001
CHROMIUM	01034	10-09 MD 78-158	<0.005
LEAD	01051	10-11 MD 78-162	0.015
MERCURY	71900	10-18 MD 78-168	<0.0002
SELENIUM	01147	10-16 MD 78-165	<0.001
SILVER	01077	10-19 MD 78-170	<0.005
SODIUM	00929	10-05 MD 78-152	1200
MAGNESIUM	00927	10-24 MD 78-182	114

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ORGANICS ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY

INJECTION WELL - PAHOKEE — LOCATION

DEEP 1915 - 2008'

PARAMETER	STORET #	MCL, mg/L	RESULTS,mg/L
LINDANE	39782	0.004	<0.000005
ENDRIN	39390	0.0002	<0.000005
METHOXYCHLOR	39480	0.1	<0.00005
TOXAPHENE	39400	0.005	<0.0005
2,4-D		0.1	<0.001
2,4,5-TP	39760	0.01	<0.001

DATE 11-30-89 BY _____ LAB ID 86109,86122

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

TRIHALOMETHANES THM1.FRM

YOUNGQUIST BROTHERS CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE LOCATION

DEEP 1915 - 2008'

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
CHLOROFORM	32106	*	<2
DIBROMOCHLOROMETHANE	32105	*	<2
TOTAL TRIHALOMETHANES			<2

DATE 11-30-89 BY _____ LAB ID 86109

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

SEC.FRM SECONDARY REPORT FORM

YOUNGQUIST BROTHERS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
CLIENT NAME AND ADDRESS

42172
SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210
DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE
LOCATION

DEEP 1915 - 2008'

PARAMETER	STORET NO.	DATE BY NBR	RESULT, mg/L
ALKALINITY	00410	10-01 TM 64-233	120
CALCIUM	00916	10-24 MD 78-180	135
CHLORIDE	00940	10-10 BM 62-353	2400
COLOR	00081	09-28 CH 81-71	5
COPPER	01042	10-23 MD 78-175	0.010
CORROSIVITY		CALCULATED	0.57
FOAMING AGENTS	38260	09-28 TM 64-234	0.118
IRON	01045	10-02 MD 78-148	0.090
MANGANESE	01055	10-03 MD 78-150	0.016
ODOR	00085	09-28 CH 81-71	1
TDS	70304	09-28 CH 81-71	4981
NON-FILTERABLE RESIDUE	00530	10-02 CH 81-72	4
ZINC	01092	10-05 MD 78-154	<0.10
BICARBONATE ALKALINITY		CALCULATED	119

DATE 11-30-89 BY _____ LAB ID 86122, 86109

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION

DEEP 1915 - 2008'

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
TURBIDITY,NTU	00076	09-28 BM TB-71	0.6
BOD (5)	00310	09-28 CH 80-63	4
POTASSIUM	00937	10-05 MD 78-153	31.4
ANTIMONY	01097	11-03 MD 78-196	0.060
BROMIDE	71870	10-10 BM 62-353	3.52
STRONTIUM	01080	11-07 MD 78-209	10.1
BORON	01022	10-10 BM 62-353	0.500
HYDROGEN SULFIDE	00745	09-28 TM 64-233	<0.20
COD	00340	10-17 TM 64-235	323

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION/DEEP 1915-2008'

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
SPEC COND,mS	00095	09-27 BM COC	7.03
SPEC GRAVITY	72013		1.002
pH	00400	09-27 BM COC	7.95
DO	00299	09-27 BM COC	0.1 mg/L
WATER TEMPERATURE (C)		09-27 BM COC	26.6
			RESULTS,ORG/100ML
FECAL COLIFORM,MPN		09-27 BM 77-45	<2
			RESULTS,mg/L
FLUORIDE	00951	09-28 BM #2795	3.85
NITRATE-N	00630	09-28 BM #2795	<0.08
TKN	00625	10-07 BM 62-354	1.38
ORTHO-PHOSPHORUS	00671	09-10 BM 62-352	<0.02
t-PHOSPHORUS	00665	10-15 BM 62-352	<0.02
AMMONIA NITROGEN	00610	10-10 BM 62-353	0.744
SULFATE	00945	10-10 BM 62-352	563
ORGANIC NITROGEN		CALCULATED	0.64

DATE 11-30-89 LAB ID 86122,86109, E86048

BY

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE HALOCARBONS M601 METHOD 601

YOUNGQUIST BROTHERS — CLIENTS NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE — LOCATION

DEEP 1915 - 2008'

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
BROMOMETHANE	34413		<5
CARBON TETRACHLORIDE	32102	3	<0.3
CHLOROBENZENE	34301		<2
CHLOROETHANE	34311		<5
2-CHLOROETHYLVINYL ETHER	34576		<5
CHLOROFORM	32106	*	<2
CHLOROMETHANE	34418		<5
DIBROMOCHLOROMETHANE	32105	*	<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571	75	<2
DICHLORODIFLUOROMETHANE	34668		<5
1,1-DICHLOROETHANE	34496		<2
1,2-DICHLOROETHANE	34531	3	<0.3
1,1-DICHLOROETHENE	34501	7	<2
1,2-DICHLOROETHENE	34546		<2
1,2-DICHLOROPROPANE	34541		<2
cis-1,3-DICHLOROPROPENE	34704		<2
trans-1,3-DICHLOROPROPENE	34699		<2
METHYLENE CHLORIDE	34423		<2
1,1,2,2-TETRACHLOROETHANE	34516		<2
TETRACHLOROETHENE	34475	3	<0.3
1,1,1-TRICHLOROETHANE	34506	200	<2
1,1,2-TRICHLOROETHANE	34511		<2
TRICHLOROETHENE	39180	3	<0.3
TRICHLOROFLUOROMETHANE	34488		<2
VINYL CHLORIDE	39175	1	<0.1

DATE 11-30-89 BY _____ LAB ID 86109, E86048

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE AROMATICS — M602 — METHOD

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE TIME COLLECTED BY REC.

INJECTION WELL - PAHOKEE — DESCRIPTION

DEEP 1915 - 2008' — LOCATION

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BENZENE	34030	1	<0.1
CHLOROBENZENE	34301		<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571		<2
ETHYLBENZENE	34371		<0.1
TOLUENE	34010		<0.1
XYLENES	81551		<2

DATE 11-30-89 LAB ID 86122,86109,E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE/TIME COLLECTED BY/RECD

INJECTION WELL - PAHOKEE — LOCATION DEEP 1915 - 2008'

PARAMETER	STORET NO.	RESULT ug/L
ALDRIN	39330	<0.005
a-BHC	39337	<0.005
b-BHC	39338	<0.005
d-BHC	34259	<0.005
g-BHC (LINDANE)	39340	<0.005
CHLORDANE	39350	<0.05
4,4'-DDD	39310	<0.05
4,4'-DDE	39320	<0.05
4,4'-DDT	39300	<0.05
DIELDRIN	39380	<0.005
ENDOSULFAN I	34361	<0.005
ENDOSULFAN II	34356	<0.005
ENDOSULFAN SO4	34351	<0.05
ENDRIN	39390	<0.005
ENDRIN ALDEHYDE	34366	<0.05
HEPTACHLOR	39410	<0.005
HEPTACHLOR EPOXIDE	39420	<0.005
TOXAPHENE	39400	<0.5

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42172 — SAMPLE NUMBER

09-27-89 1830 BM 09-27-89 2210 — DATE/TIME COLLECTED BY/RECD

INJECTION WELL - PAHOKEE — LOCATION

PARAMETER	STORET NO.	RESULT, ug/L
PCB A1016	34671	<0.1
PCB A1221	39488	<0.1
PCB A1232	39392	<0.1
PCB A1242	39496	<0.1
PCB A1248	39500	<0.1
PCB A1254	39504	<0.1
PCB A1260	39508	<0.1

FED.REGISTER VOL 44 NO233 DECEMBER 3, 1979

DATE 11-30-89 BY _____ LAB ID 86109,86122

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS	CLIENT NAME AND ADDRESS
6100 W. 45TH STREET	
WEST PALM BEACH, FLORIDA	
42172	SAMPLE NUMBER
09-27-89 1830 BM 09-27-89 2210	DATE TIME COLL RECD
INJECTION WELL - PAHOKEE	LOCATION
DEEP 1915 - 2008'	

PARAMETER	RESULTS,ug/L
HEXACHLOROBENZENE	<2
HEXACHLOROETHANE	<2
TRICHLOROETHYLENE	<0.3
TETRACHLOROETHYLENE	<0.3
TETRACHLOROMETHANE	<0.3
ETHYLENE DIBROMIDE	<0.003
trans-1,2-DICHLOROETHENE	<2
BROMOMETHANE	<5

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____
DIRECTOR

INJECTION ZONE

Injection Zone

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FLORIDA 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME RECEIVED BY

INJECTION WELL - PAHOKEE — LOCATION

TEST AT 3512'

PARAMETER	STORET #	DATE BY NBR	RESULTS,mg/L
ARSENIC	01002	10-11 MD 78-161	<0.005
BARIUM	01007	10-17 MD 78-167	<0.10
CADMIUM	01027	10-19 MD 78-169	0.002
CHROMIUM	01034	10-10 MD 78-160	<0.005
LEAD	01051	10-11 MD 78-162	0.028
MERCURY	71900	10-18 MD 78-168	<0.0002
SELENIUM	01147	10-16 MD 78-165	0.002
SILVER	01077	10-19 MD 78-170	<0.005
SODIUM	00929	11-06 MD 78-197	11600
MAGNESIUM	00927	10-24 MD 78-182	1130

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ORGANICS ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME COLLECTED BY

INJECTION WELL - PAHOKEE — LOCATION

TEST AT 3512'

PARAMETER	STORET #	MCL, mg/L	RESULTS,mg/L
LINDANE	39782	0.004	<0.000005
ENDRIN	39390	0.0002	<0.000005
METHOXYCHLOR	39480	0.1	<0.00005
TOXAPHENE	39400	0.005	<0.0005
2,4-D		0.1	<0.001
2,4,5-TP	39760	0.01	<0.001

DATE 11-30-89 BY _____ LAB ID 86109,86122

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

TRIHALOMETHANES THM1.FRM

YOUNGQUIST BROTHERS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
CLIENT NAME AND ADDRESS

42277
SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330
DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE
LOCATION

TEST AT 3512'

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
CHLOROFORM	32106	*	<2
DIBROMOCHLOROMETHANE	32105	*	<2
TOTAL TRIHALOMETHANES			<2

DATE 11-30-89 BY _____ LAB ID 86109

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

SEC.FRM SECONDARY REPORT FORM

YOUNGQUIST BROTHERS
6100 W. 45TH STREET
WEST PALM BEACH, FL 33407
CLIENT NAME AND ADDRESS

42277
SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330
DATE TIME COLLECTED BY RECD

WASTEWATER TREATMENT PLANT PAHOKEE FL
LOCATION

TEST AT 3512'

PARAMETER	STORET NO.	DATE BY NBR	RESULT, mg/L
ALKALINITY	00410	10-01 TM 64-233	114
CALCIUM	00916	10-24 MD 78-180	739
CHLORIDE	00940	10-10 BM 62-353	70700
COLOR	00081	10-10 CH 81-74	100
COPPER	01042	10-23 MD 78-175	<0.005
CORROSIVITY		CALCULATED	0.67
FOAMING AGENTS	38260	10-10 TM 64-234	0.715
IRON	01045	10-20 MD 78-173	4.69
MANGANESE	01055	11-02 MD 78-194	0.117
ODOR	00085	10-10 CH 81-74	1
TDS	70304	10-11 CH 81-75	40863
NON-FILTERABLE RESIDUE	00530	10-13 CH 81-75	56
ZINC	01092	10-20 MD 78-174	0.10
BICARBONATE ALKALINITY		CALCULATED	119

DATE 11-30-89 BY _____ LAB ID 86122, 86109

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION

TEST AT 3512'

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
TURBIDITY	00076	10-09 BM TB-71	18.2
BOD (5)	00310	10-10 CH 80-66	2
POTASSIUM	00937	11-06 MD 78-198	391
ANTIMONY	01097	11-03 MD 78-196	0.077
BROMIDE	71870	10-10 BM 62-353	67.8
STRONTIUM	01080	11-07 MD 78-209	10.2
BORON	01022	10-10 BM 62-353	67.8
HYDROGEN SULFIDE	71875	10-09 TM 64-239	0.526
COD	00340	10-23 TM 64-236	2381

DATE 11-30-89 LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

MFORMA ANALYSIS REPORT

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME COLL RECD

INJECTION WELL - PAHOKEE — LOCATION

TEST AT 3512'

PARAMETER	STORET #	DATE BY NUMBER	RESULTS
SPEC COND,mS	00095	10-09 BM COC	54.3
SPEC GRAVITY	72013		1.025
pH	00400	10-09 BM COC	7.45
			RESULTS,ORG/100ML
FECAL COLIFORM,MPN		10-09 BM 77-48	<2
			RESULTS,mg/L
FLUORIDE	00951	10-10 BM 62-354	<0.05
NITRATE-N	00630	10-10 BM	<0.05
TKN	00625	10-17 BM 62-354	1.17
ORTHO-PHOSPHORUS	00671	10-10 BM 62-354	<0.05
t-PHOSPHORUS	00665	10-10 BM 62-354	<0.05
AMMONIA NITROGEN	00610	10-10 BM 62-354	<0.05
SULFATE	00945	11-05 BM 62-354	3410
TOTAL NITROGEN		CALCULATED	1.17

DATE _____ LAB ID 86122,86109, E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE HALOCARBONS M601 METHOD 601

YOUNGQUIST BROTHERS — CLIENTS NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME COLLECTED BY RECD

INJECTION WELL - PAHOKEE — LOCATION

TEST AT 3512'

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BROMODICHLOROMETHANE	32101	*	<2
BROMOFORM	32104	*	<2
BROMOMETHANE	34413		<5
CARBON TETRACHLORIDE	32102	3	<0.3
CHLOROBENZENE	34301		<2
CHLOROETHANE	34311		<5
2-CHLOROETHYLVINYL ETHER	34576		<5
CHLOROFORM	32106	*	<2
CHLOROMETHANE	34418		<5
DIBROMOCHLOROMETHANE	32105	*	<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571	75	<2
DICHLORODIFLUOROMETHANE	34668		<5
1,1-DICHLOROETHANE	34496		<2
1,2-DICHLOROETHANE	34531	3	<0.3
1,1-DICHLOROETHENE	34501	7	<2
1,2-DICHLOROETHENE	34546		<2
1,2-DICHLOROPROPANE	34541		<2
cis-1,3-DICHLOROPROPENE	34704		<2
trans-1,3-DICHLOROPROPENE	34699		<2
METHYLENE CHLORIDE	34423		<2
1,1,2,2-TETRACHLOROETHANE	34516		<2
TETRACHLOROETHENE	34475	3	<0.3
1,1,1-TRICHLOROETHANE	34506	200	<2
1,1,2-TRICHLOROETHANE	34511		<2
TRICHLOROETHENE	39180	3	<0.3
TRICHLOROFLUOROMETHANE	34488		<2
VINYL CHLORIDE	39175	1	<0.1

DATE 11-30-89 BY [signature] LAB ID 86109, E86048

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

PURGEABLE AROMATICS — M602 METHOD

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE TIME COLLECTED BY REC.

INJECTION WELL - PAHOKEE — DESCRIPTION

TEST AT 3512' — LOCATION

PARAMETER	STORET NO.	MCL ug/L	RESULT ug/L
BENZENE	34030	1	<0.1
CHLOROBENZENE	34301		<2
1,2-DICHLOROBENZENE	34536		<2
1,3-DICHLOROBENZENE	34566		<2
1,4-DICHLOROBENZENE	34571		<2
ETHYLBENZENE	34371		<0.1
TOLUENE	34010		<0.1
XYLENES	81551		<2

DATE 11-30-89 LAB ID 86122,86109,E86048

BY _____

DIRECTOR

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS — CLIENT NAME AND ADDRESS

6100 W. 45TH STREET

WEST PALM BEACH, FL 33407

42277 — SAMPLE NUMBER

10-09-89 1215 BM 10-09-89 1330 — DATE/TIME COLLECTED BY/RECD

INJECTION WELL - PAHOKEE — LOCATION TEST AT 3512'

PARAMETER	STORET NO.	RESULT ug/L
ALDRIN	39330	<0.005
a-BHC	39337	<0.005
b-BHC	39338	<0.005
d-BHC	34259	<0.005
g-BHC (LINDANE)	39340	<0.005
CHLORDANE	39350	<0.05
4,4'-DDD	39310	<0.05
4,4'-DDE	39320	<0.05
4,4'-DDT	39300	<0.05
DIELDRIN	39380	<0.005
ENDOSULFAN I	34361	<0.005
ENDOSULFAN II	34356	<0.005
ENDOSULFAN SO4	34351	<0.05
ENDRIN	39390	<0.005
ENDRIN ALDEHYDE	34366	<0.05
HEPTACHLOR	39410	<0.005
HEPTACHLOR EPOXIDE	39420	<0.005
TOXAPHENE	39400	<0.5

GEO TEC inc. 1602 CLARE AVENUE • WEST PALM BEACH, FL 33401 • 407/833-7280

ANALYSIS REPORT M608.FRM

YOUNGQUIST BROTHERS	CLIENT NAME AND ADDRESS
6100 W. 45TH STREET	
WEST PALM BEACH, FL 33407	
42277	SAMPLE NUMBER
10-09-89 1215 BM 10-09-89 1330	DATE/TIME COLLECTED BY/RECD
INJECTION WELL - PAHOKEE	LOCATION TEST AT 3512'

PARAMETER	STORET NO.	RESULT, ug/L
PCB A1016	34671	<0.1
PCB A1221	39488	<0.1
PCB A1232	39392	<0.1
PCB A1242	39496	<0.1
PCB A1248	39500	<0.1
PCB A1254	39504	<0.1
PCB A1260	39508	<0.1

FED.REGISTER VOL 44 NO233 DECEMBER 3, 1979

DATE 11-30-89 BY _____ LAB ID 86109,86122

SPECTRUM
Laboratories, Inc.

CLIENT: GEOTECH/EVERGLADES LABS
SAMPLE ID: #42277 / 018-101089
SAMPLED BY: CLIENT
ATE RECEIVED: 10-10-89
ATE ANALYZED: 10-16-89

-CERTIFICATIONS-
EPA NUMBER: # FL095
FLORIDA DRINKING WATER: # 86144
FLORIDA ENVRIONMENTAL: #E86006

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

AS UMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
3-32-9	ACENAPHTHENE	BMDL	1.9
08-96-8	ACENAPHTHYLENE	BMDL	3.5
20-12-7	ANTHRACENE	BMDL	1.9
09-00-2	ALDRIN	BMDL	1.9
6-55-3	BENZO(a)ANTHRACENE	BMDL	7.8
05-99-2	BENZO(b)FLUORANTHENE	BMDL	4.8
07-08-9	BENZO(k)FLOURANTHENE	BMDL	2.5
0-32-8	BENZO(a)PYRENE	BMDL	2.5
91-24-2	BENZO(ghi)PERYLENE	BMDL	4.1
5-68-7	BUTYL BENZYL PHTHALATE	BMDL	2.5
19-85-7	b-BHC	BMDL	4.2
1 36-8	d-BHC	BMDL	3.1
-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	5.7
11-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	5.3
17-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	BMDL	2.5
08-60-1	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	5.7
01-55-3	4-BROMOPHENYL PHENYL ETHER	BMDL	1.9
7-74-9	CHLORDANE	BMDL	30
-58-7	2-CHLORONAPHTHALENE	BMDL	1.9
005-72-3	4-CHLOROPHENYL PHENYL ETHER	BMDL	4.2
8-01-9	CHRYSENE	BMDL	2.5
2-54-8	4,4'-DDD	BMDL	2.8
5-55-9	4,4'-DDE	BMDL	5.6
0-29-3	4,4'-DDT	BMDL	4.7
-70-3	DIBENZO(a,h)ANTHRACENE	BMDL	2.5
-74-2	DI-n-BUTYLPHTHALATE	BMDL	2.5
1-73-1	1,3-DICHLOROBENZENE	BMDL	1.9
-50-1	1,2-DICHLOROBENZENE	BMDL	1.9
6-46-7	1,4-DICHLOROBENZENE	BMDL	4.4
-94-1	3,3'-DICHLOROBENZIDINE	BMDL	16.5
-57-1	DIELDRIN	BMDL	2.5
-66-2	DIETHYL PHTHALATE	BMDL	22
1-11-3	DIMETHYL PHTHALATE	BMDL	1.6
1-14-2	2,4-DINITROTOLUENE	BMDL	5.7
6-20-2	2,6-DINITROTOLUENE	BMDL	1.9
7-84-0	DI-N-OCTYLPHTHALATE	BMDL	2.5
07-8	ENDOSULFAN SULFATE	BMDL	5.6
1-93-4	ENDRIN ALDEHYDE	BMDL	10

M D L = BELOW METHOD DETECTION LIMIT L O D = LIMIT OF DETECTION

CONTINUED ON NEXT PAGE

EPA METHOD 625
CONTINUTED

CAS NUMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
206-44-0	FLOURANTHENE	BMDL	2.2
86-73-7	FLOURENE	BMDL	1.9
76-44-8	HEPTACHLOR	BMDL	1.9
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	2.2
118-74-1	HEXACHLOROBENZENE	BMDL	1.9
87-68-3	HEXACHLOROBUTADIENE	BMDL	0.9
67-72-1	HEXACHLOROETHANE	BMDL	1.6
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.9
78-59-1	ISOPHORONE	BMDL	3.7
91-20-3	NAPHTHALENE	BMDL	2.2
98-95-3	NITROBENZENE	BMDL	1.9
621-64-7	N-NITROSODI-N-PROPYLAMINE	BMDL	1.9
12674-11-2	PCB-1016	BMDL	10
11104-28-2	PCB-1221	BMDL	10
11141-16-5	PCB-1232	BMDL	10
53469-21-9	PCB-1242	BMDL	10
[illegible]2-29-6	PCB-1248	BMDL	10
[illegible]097-69-1	PCB-1254	BMDL	10
11096-82-5	PCB-1260	BMDL	10
85-01-8	PHENANTHRENE	BMDL	5.4
129-00-0	PYRENE	BMDL	1.9
8001-35-2	TOXAPHENE	BMDL	30
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	1.9

ACID EXTRACTABLES

59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	3.0
95-57-8	2-CHLOROPHENOL	BMDL	3.3
120-83-2	2,4-DICHLOROPHENOL	BMDL	2.7
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.7
51-28-5	2,4-DINITROPHENOL	BMDL	42
534-52-1	2-METHYL-4,6-DINITROPHENOL	BMDL	24
88-75-5	2-NITROPHENOL	BMDL	3.6
100-02-7	4-NITROPHENOL	BMDL	2.4
87-86-5	PENTACHLOROPHENOL	BMDL	3.6
108-95-2	PHENOL	BMDL	1.5
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	2.7

B M D L = BELOW DETECTION LIMIT L O D = LIMIT OF DETECTION

CONTINUED ON NEXT PAGE

EOTECH/EVERGLADES LABS
42277 / 018-101089

EPA METHOD 625
CONTINUED

AS UMBER	PARAMETER	CONCENTRATION (ug/l)	LOD (ug/l)
2-87-5	BENZIDINE	BMDL	4
19-84-6	a-BHC	BMDL	1.0
8-89-8	y-BHC	BMDL	5.0
59-98-8	ENDOSULFAN I	BMDL	10
3213-65-9	ENDOSULFAN II	BMDL	10
2-20-8	ENDRIN	BMDL	1.0
7-47-7	HEXACHLOROCYCLOPENTADIENE	BMDL	10
2-75-9	N-NITROSODIMETHYLAMINE	BMDL	10
6-30-6	N-NITROSODIPHENYLAMINE	BMDL	1.9
746-01-6	2,3,7,8-TCDD (DIOXIN)		1.9

Albert Castellanos
Chemist

B M D L = BELOW DETECTION LIMIT

L O D = LIMIT OF DETECTION

PLANT EFFLUENT

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01A
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT
FAC 17-550 PRIMARY INORGANICS

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Total Silver, Ag	EPA 272.1	<0.01	mg/L	0.01	01/30/90	NRW
Total Arsenic, As	EPA 206.2	<0.002	mg/L	0.002	02/06/90	NRW
Total Barium, Ba	EPA 208.2	0.2	mg/L	0.1	02/05/90	NRW
Total Cadmium, Cd	EPA 213.2	<0.005	mg/L	0.005	02/02/90	JAM
Total Chromium, Cr	EPA 218.1	<0.01	mg/L	0.01	02/02/90	JAM
Fluoride, F-	EPA 340.2	0.52	mg/L	0.05	02/01/90	RAC
Total Mercury, Hg	EPA 245.1	<0.001	mg/L	0.001	02/08/90	JAM
Nitrate, N	EPA 352.1	0.3	mg/L	0.1	01/30/90	DJG
Total Lead, Pb	EPA 239.2	<0.002	mg/L	0.002	01/30/90	JAM
Total Selenium, Se	EPA 270.2	<0.005	mg/L	0.005	02/06/90	NRW

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

Analyst

Project Manager
DHRS Laboratory ID Nos.86140/E86070

PAUL R. McGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01B
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT
FAC 17-550 PRIMARY ORGANICS

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
2,4,5-TP (Silvex)	EPA 515	< 1.0	ug/L	1.0	02/13/90	HLW
2,4-D	EPA 515	< 2.0	ug/L	2.0	02/13/90	HLW
CHLOR.HERBICIDES - EXTRACTION	EPA 515				02/01/90	ROM
CHLOR.HYDR.PEST.- EXTRACT.	SW 3510				01/30/90	DLO
Endrin	SM 509A	<0.05	ug/L	0.05	02/12/90	HLW/AS
Lindane	SM 509A	<0.002	ug/L	0.002	02/12/90	HLW/AS
Methoxychlor	SM 509A	<0.1	ug/L	0.1	02/12/90	HLW/AS
Toxaphene	SM 509A	<0.1	ug/L	0.1	02/12/90	HLW/AS

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

Analyst

Thomas Colgan
Project Manager
DHRS Laboratory ID Nos.86140/E86070

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01C
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT
Comments: Gross Alpha was performed by Pembroke Labs, DHRS #84172.

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Gross Alpha	EPA 900	<1+-4.	pCi/L	1.0	02/06/90	P.L.
Hydrogen Sulfide, H2S	EPA 376.1	0.13	mg/L	0.05	01/29/90	GJP
Ammonia Nitrogen, N	EPA 350.2	15.5	mg/L	1.0	01/30/90	DJG
Ortho Phosphate, P	EPA 365.3	2.2	mg/L	0.1	01/30/90	DJG
Organic Nitrogen, N	EPA 350.2	2.8	mg/L	0.2	01/30/90	DJG
Ammonia Nitrogen, N		15.5	mg/L	1.0	01/30/90	DJG
Total Antimony, Sb	EPA 204.2	<0.01	mg/L	0.01	02/12/90	NRW
Turbidity	EPA 180.1	23	N.T.U.	2	01/29/90	GJP

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

Analyst

Thomas Colgan
Project Manager
DHRS Laboratory ID Nos.86140/E86070

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01D
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BASE/ACID/PEST-Extraction	SW 3510				01/31/90	ROM
BASE NEUTRAL EXTRACTABLES	SW 8270		ug/L		02/06/90	KGG
Acenaphthene		< 2		2		
Acenaphthylene		< 4		4		
Anthracene		< 2		2		
Benzo(a)anthracene		< 9		9		
Benzo(b)fluoranthene		< 5		5		
Benzo(k)fluoranthene		< 3		3		
Benzo(a)pyrene		< 3		3		
Benzo(g,h,i)perylene		< 5		5		
Benzidine		< 45		45		
Bis(2-chloroethyl)ether		< 6		6		
Bis(2-chloroethoxy)methane		< 6		6		
Bis(2-ethylhexyl)phthalate		30		3		
Bis(2chloroisopropyl)ether		< 6		6		
4-Bromophenyl phenyl ether		< 2		2		
Butyl benzyl phthalate		< 10		10		
2-Chloronaphthalene		< 2		2		
4-Chlorophenyl phenylether		< 5		5		
Chrysene		< 3		3		
Dibenzo(a,h)anthracene		< 3		3		
Di-n-butylphthalate		30		3		
1,3-Dichlorobenzene		< 2		2		
1,4-Dichlorobenzene		< 5		5		
1,2-Dichlorobenzene		< 2		2		
3,3'-Dichlorobenzidine		< 20		20		
Diethylphthalate		< 22		22		
Dimethylphthalate		< 2		2		
2,4-Dinitrotoluene		< 6		6		
2,6-Dinitrotoluene		< 2		2		
Dioctylphthalate		25		3		
1,2-Diphenylhydrazine		< 10		10		

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
(Continued)						
Fluoranthene		< 3	ug/L	3	02/06/90	KGG
Fluorene		< 2		2		
Hexachlorobenzene		< 2		2		
Hexachlorobutadiene		< 1		1		
Hexachloroethane		< 2		2		
Hexachlorocyclopentadiene		< 10		10		
Indeno(1,2,3-cd)pyrene		< 4		4		
Isophorone		< 3		3		
Naphthalene		< 2		2		
Nitrobenzene		< 2		2		
N-Nitrosodimethylamine		< 10		10		
N-Nitrosodi-n-propylamine		< 10		10		
N-Nitrosodiphenylamine		< 2		2		
Phenanthrene		< 6		6		
Pyrene		< 2		2		
2,3,7,8-Tetrachlorodibenzo p-dioxin (scan)		ND		---		
1,2,4-Trichlorobenzene		< 2		2		
ACID EXTRACTABLES						
4-choro-3-methylphenol		< 3		3		
2-chlorophenol		< 4		4		
2,4-Dichlorophenol		< 3		3		
2,4-Dimethylphenol		< 3		3		
2,4-Dinitrophenol		< 45		45		
2-Methyl-4,6-dinitrophenol		< 25		25		
2-Nitrophenol		< 4		4		
4-Nitrophenol		< 3		3		
Pentachlorophenol		< 4		4		
Phenol		< 2		2		
Phenanthrene		< 6		6		
2,4,6-Trichlorophenol		< 3		3		
PESTICIDE EXTRACTABLES						
Aldrin		< 2		2		
a-BHC		< 10		10		
b-BHC		< 5		5		
d-BHC		< 5		5		
g-BHC		< 10		10		
Chlordane		< 10		10		
4,4'-DDD		< 2		2		
4,4'-DDE		< 6		6		

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
(Continued)						
4,4'-DDT		< 5	ug/L	5	02/06/90	KGG
Dieldrin		< 3		3		
Endosulfan I		< 10		10		
Endosulfan II		< 10		10		
Endosulfan Sulfate		< 6		6		
Endrin		< 10		10		
Endrin Aldehyde		< 10		10		
Heptachlor		< 2		2		
Heptachlor Epoxide		< 3		3		
Toxaphene		< 10		10		
PCB-1016		< 30		30		
PCB-1221		< 30		30		
PCB-1232		< 30		30		
PCB-1242		< 30		30		
PCB-1248		< 30		30		
PCB-1254		< 40		40		
PCB-1260		< 30		30		
VOLATILE ORGANICS	SW 5030/8021		ug/L		01/30/90	HLW/AS
Benzene		<0.2		0.2		
Bromobenzene		<0.2		0.2		
Bromochloromethane		<0.1		0.1		
Bromodichloromethane		<0.1		0.1		
Bromoform		<2.0		2.0		
Bromomethane		<2.0		2.0		
n-Butylbenzene		<0.2		0.2		
sec-Butylbenzene		<0.2		0.2		
tert-Butylbenzene		<0.5		0.5		
Carbon tetrachloride		<0.5		0.5		
Chlorobenzene		<0.5		0.5		
Chloroethane		<0.5		0.5		
Chloroform		<0.5		0.5		
Chloromethane		<0.5		0.5		
2-Chlorotoluene		<0.5		0.5		
4-Chlorotoluene		<0.5		0.5		
Dibromochloromethane		<0.5		0.5		
1,2-Dibromo-3chloropropane		<3.0		3.0		
1,2-Dibromoethane		<1.5		1.5		
Dibromomethane		<5.0		5.0		
1,2-Dichlorobenzene		<0.5		0.5		
1,3-Dichlorobenzene		<0.5		0.5		
1,4-Dichlorobenzene		<0.5		0.5		

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES 9001348-01D

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
(Continued)						
Dichlorodifluoromethane		<0.5	ug/L	0.5	01/30/90	HLW/AS
1,1-Dichloroethane		<0.5		0.5		
1,2-Dichloroethane		<0.5		0.5		
1,1-Dichloroethene		<0.5		0.5		
cis-1,2-Dichloroethene		<0.5		0.5		
trans-1,2-Dichloroethene		<0.5		0.5		
1,2-Dichloropropane		<0.5		0.5		
1,3-Dichloropropane		<0.5		0.5		
2,2-Dichloropropane		<0.5		0.5		
1,1-Dichloropropene		<0.5		0.5		
Ethylbenzene		<0.2		0.2		
Hexachlorobutadiene		<0.5		0.5		
Isopropylbenzene		<0.5		0.5		
p-Isopropyltoluene		<0.5		0.5		
Methylene chloride		<2.5		2.5		
*Naphthalene		<0.5		0.5		
n-Propylbenzene		<0.5		0.5		
Styrene		<2.5		2.5		
1,1,1,2-Tetrachloroethane		<0.2		0.2		
1,1,2,2-Tetrachloroethane		<0.2		0.2		
Tetrachloroethene		<0.5		0.5		
Toluene		<0.2		0.2		
1,2,3-Trichlorobenzene		<0.2		0.2		
1,2,4-Trichlorobenzene		<0.2		0.2		
1,1,1-Trichloroethane		<0.2		0.2		
1,1,2-Trichloroethane		<0.5		0.5		
Trichloroethene		<0.5		0.5		
Trichlorofluoromethane		<0.5		0.5		
1,2,3-Trichloropropane		<1.0		1.0		
1,2,4-Trimethylbenzene		<0.5		0.5		
1,3,5-Trimethylbenzene		<0.5		0.5		
Vinyl chloride		<0.5		0.5		
o-Xylene		<0.2		0.2		
p & m Xylene		<0.2		0.2		
Methyltertiarybutylether		<1.0		1.0		

*NOTE:Purgeable Naphthalene is only a fraction of the total naphthalene present. Results represent only that which is easily volatilized.

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ethylene Dibromide	EPA 504	< 0.01	ug/L	0.01	01/29/90	HLW/AS
TRIHALOMETHANES	EPA 501.2		mg/L		01/30/90	HLW/AS
Chloroform		<0.002		0.002		
Bromodichloromethane		<0.001		0.001		
Dibromochloromethane		<0.001		0.001		
Bromoform		<0.003		0.003		
Total Trihalomethanes		<0.007		0.007		

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

Analyst

Thomas Colgan

Project Manager

DHRS Laboratory ID Nos.86140/E86070

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01E
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT
FAC 17-550 SECONDARY INORGANICS

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Total Alkalinity, CaCO3	EPA 310.1	403	mg/L	4	01/29/90	ROM
Calcium, Ca	EPA 215.1	114	mg/L	1	02/13/90	JAM
Chloride, Cl-	EPA 325.3	570	mg/L	40	01/30/90	ROM
Color, APHA	EPA 110.2	102	units	2	01/29/90	JYA
Corrosivity, L.I.	CALC.	0.44	L.I.	---	02/16/90	TPC
Total Copper, Cu	EPA 220.1	0.02	mg/L	0.01	02/09/90	NRW
Total Iron, Fe	EPA 236.1	0.40	mg/L	0.01	01/30/90	NRW
Fluoride, F-	EPA 340.2	0.52	mg/L	0.05	02/01/90	RAC
Foaming Agents, MBAS	EPA 425.1	0.18	mg/L	0.02	01/30/90	ROM
Total Manganese, Mn	EPA 243.1	0.026	mg/L	0.005	02/12/90	NRW
Total Odor Number	EPA 140.1	34	T.O.N.	1	01/30/90	JYA
pHs	CALC	6.80	units	---	02/16/90	TPC
pH	SW 9040	7.24	units	---	01/29/90	GDP
Sulfate, SO4	EPA 375.4	200	mg/L	20	01/31/90	RAC
Total Dissolved Solids	EPA 160.1	1,740	mg/L	1	01/31/90	JYA
Temperature	EPA 170.1	26.0	deg. C	---	01/29/90	GDP
Total Zinc, Zn	EPA 289.1	0.039	mg/L	0.005	02/12/90	NRW

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

N. R. Wyd
Analyst

Thomas Colgan
Project Manager

DHRS Laboratory ID Nos.86140/E86070

PAUL R. MCGINNES AND ASSOCIATES
CONSULTING LABORATORIES, INC.

4168 WESTROADS DRIVE - WEST PALM BEACH, FLORIDA 33407-1241 - (407) 842-2849

CITY OF PAHOKEE UTILITIES
180 NORTH LAKE AVENUE
PAHOKEE, FLORIDA 33476

9001348-01F
Report Date: 02/19/90

Attn: MR. BRUCE MILLER

Project ID: EFFLUENT MONITORING
Sample ID: EFFLUENT
NOTE: Total Coliform ≥ 2,630,000
This sample test is UNACEPTABLE by Health Dept.
Standards for safe public drinking water.

Date Received: 01/29/90
Date Collected: 01/29/90 14:40:00

Water sample collected by G. Perrone of McGinnes Laboratories.

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Total Coliform, count	SM 909A	NOTE	/100 mL	10,000	01/29/90	JP,LJJ

Methods: All analyses by McGinnes Laboratories were performed using EPA and DER approved methods per McGinnes Laboratories Quality Assurance Plan #87232G. All quality assurance samples met regulatory and in-house quality control limits unless otherwise specified.

Julie Pondville
Analyst

Thomas Colgan
Project Manager
DHRS Laboratory ID Nos.86140/E86070

APPENDIX H

Well Casing Mill Certificates

L. B. FOSTER COMPANY
Route 1, Box 15
Washington, WV 26181

STANDARD CERTIFIED TEST REPORT
TUBULAR PRODUCTS

CUSTOMER

Name: YOUNGQUIST BROTHERS INC.

Address: RR 34 BOX 502

15000 PINE RIDGE ROAD

City & State: FT. MYERS, FL 33908

Date: MAY 26, 1989

Customer's Order No.:

LBF Invoice No.: 23H-049488

Material: FOSTERWELD

Grade: ASTM A-139 GRADE B

Coil or Lot. No.	Size O.D.	Wt/Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)				
				Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong. In ___ %	C	Mn	P	S	SI
66444	40"	.375		46,200	66,700	28.6	.20	.38	.009	.010	.008
T66430	40"	.375		48,700	66,100	32.2	.19	.39	.010	.011	.006

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
Donald E. Adams
Rt. 4, Box 321
Parkersburg, W. Va. 26101
My commission expires August 6, 1996

The undersigned, in behalf of The L. B. Foster Company, hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspection or testing are prescribed by said specifications, the standard mill inspection and testing practices of The L. B. Foster Company have been applied. Unless it appears otherwise in the results of such inspection and tests shown above, the undersigned agent of The L. B. Foster Company believes that said materials conform to said specifications.

Subscribed and sworn to before me this 26 day of MAY 1989

Donald E. Adams
Notary Public

BILL PETERSON - PLANT MANAGER
Agents' Name & Title

L.B. FOSTER CO. - WASHINGTON, WV
COMPANY

Form No. - SW 4 69

L. B. FOSTER COMPANY
P. O. BOX 7796
GARDEN CITY, GA 31418-7796

STANDARD CERTIFIED TEST REPORT
TUBULAR PRODUCTS

CUSTOMER

Name: YOUNGQUIST BROS INC
Address: RT 34 BOX 502
FT MYERS FL
City & State

Date MAY 26 1989
PHONE- JIMMY
Customer's Order No.: 23H010-049497
LBF Invoice No.

Material 32" OD X 375 PIPE Grade ASTM A-139 GR B

Heat No.	Size O.D.	Wt/Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)				
				Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong. In 2" %	C	Mn	P	S	Si
5B12053	32"	375	495	59900	71600	32.9	.080	1.01	.020	.014	

The undersigned, in behalf of The L. B. Foster Company, hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspecting or testing are prescribed by said specifications, the standard mill inspection and testing practices of The L. B. Foster Company have been applied. Unless it appears otherwise in the results of such inspection and tests shown above, the undersigned agent of The L. B. Foster Company believes that said materials conform to said specifications.

Subscribed and sworn to before me this 26 day of May 19 89

Earline F. Shearouse
Notary Public

EARLINE F. SHEAROUSE
Notary Public, Chatham County, Ga.

Otis R Kessler
OTIS R KESSLER PLNT MGR
Agents' Name & Title

L. B. FOSTER CO
COMPANY

Form No. - SW 2-49

L. B. FOSTER COMPANY
P. O. BOX 7796
GARDEN CITY, GA 31418-7796

STANDARD CERTIFIED TEST REPORT
TUBULAR PRODUCTS

CUSTOMER

Name: YOUNGQUIST BROS INC

Address: RT 3 BOX 502

FT MYERS FL

City & State

Date: MAY 26 1989

Customer's Order No.: PHONE-JIMMY

LBF Invoice No.: 23H010-049497

Material: 22" OD X 375 PIPE

Grade: ASTM A-139 GR B

Heat No.	Size O.D.	Wt/Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)				
				Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong. In ___ %	C	Mn	P	S	SI
96D019	22"	375	715	40200	70700	36	.23	.81	.015	.026	
5B12059	22"	375	715	57000	69000	38	.060	1.03	.018	.014	

The undersigned, in behalf of The L. B. Foster Company, hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspecting or testing are prescribed by sold specifications, the standard mill inspection and testing practices of The L. B. Foster Company have been applied. Unless it appears otherwise in the results of such inspection and tests shown above, the undersigned agent of The L. B. Foster Company believes that said materials conform to said specifications.

Subscribed and sworn to before me this 26 day of May 19 89

Earline F. Shearouse
Notary Public

EARLINE F. SHEAROUSE
Notary [illegible] Ga.
My Commission Expires [illegible]

Otis R Kessler
OTIS R KESSLER PLNT MGR
Agents' Name & Title

L. B. FOSTER CO
COMPANY

Form No. – SW 4-69

L. B. FOSTER COMPANY
P. O. BOX 7796
GARDEN CITY, GA 31418-7796

STANDARD CERTIFIED TEST REPORT
TUBULAR PRODUCTS

CUSTOMER

Name: YOUNGQUIST BROS INC

Address: RT 3 BOX 502

City & State: FT MYERS FL

Date: MAY 26 1989

PHONE-JIMMY
Customer's Order No.

23H010-049497
LBF Invoice No.

Material: 22" OD X 375 PIPE

Grade: ASTM A-139 GR B

Heat No.	Size O.D.	Wt/Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)				
				Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong. In ___ %	C	Mn	P	S	SI
96D019	22"	375	715	40200	70700	36	.23	.81	.015	.026	
5B12059	22"	375	715	57000	69000	38	.060	1.03	.018	.014	

The undersigned, in behalf of The L. B. Foster Company, hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspecting or testing are prescribed by sold specifications, the standard mill inspection and testing practices of The L. B. Foster Company have been applied. Unless it appears otherwise in the results of such inspection and tests shown above, the undersigned agent of The L. B. Foster Company believes that said materials conform to said specifications.

Subscribed and sworn to before me
this 26 day of May 19 89

Earline F. Shearouse
Notary Public

EARLINE F. SHEAROUSE
Notary Pub... County, Ga.
My Commission Expires Mar... 22

Otis R Kessler
OTIS R KESSLER PLNT MGR
Agents' Name & Title

L. B. FOSTER CO
COMPANY

Form No. - SW 4-69

USS
A division of USX Corporation

TUBULAR PRODUCTS

METALLURGICAL TEST REPORT

7498 (P92)

SOLD TO

LORAIN WORKS

SHIP TO

PREPARED BY THE OFFICE OF:
J.R. MASSIMINO MGR.

DATE 05/31/94

SPEC. & INSP.

ITEM NO.	MATERIAL DESCRIPTION SIZE	WALL	SPECIFICATION & GRADE	MATL.	HEAT/ LOT NO.	MIN. HYDRO PSI	YIELD STR. PSI	TENSILE STR. PSI	ELONG. % IN 2"	GAGE WIDTH IN.	FLAT
3	12 3/4 OD 86ED87A	.500 OD.AST	ASTMA53B73GRB ASMESA53GRB MA10o87AGR8 ASMESA10oGR886	SMLS ED87A	L81502 OD.API5L	2060 GR8 37	42700 THED 5/S3	72400	41.0	1 1/2	OK
5	12 3/4 OD R0ED87A	.500 LD.AST	ASTMA53B73GRB ASMESA53GRB MA10o87AGR8 ASMESA10oGR886	SMLS ED87A	N86560 OD.API5L	2060 GR8 37	43600 THED 5/83	74100	41.0	1 1/2	OK

TEM NO.	HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO
3	L81502	HEAT	25	63	009	003	220	02	02	04	01								
5	L81502	PROD	23	64															
3	N86560																		
5	N86560																		

* END OF DATA THIS SHEET

** LESS THAN .01

USS
A division of USX Corporation

TUBULAR PRODUCTS

METALLURGICAL TEST REPORT

7490

SOLD TO

MILL TO

ALL REQUIREMENTS IN SPECIFICATION(S) LISTED HEREIN WERE MET IN ALL RESPECTS.

PREPARED BY THE OFFICE OF
J.R. MASSIMINO MGR.

DATE 05/31/89

SPEC. & NSP.

ITEM NO.	MATERIAL DESCRIPTION			MATL	HEAT/ LOT NO.	MIN. HYDRO PSI	YIELD STR. PSI	TENSILE STR. PSI	ELONG. % IN 2"	GAGE WIDTH IN.	FLAT
	SIZE	WALL	SPECIFICATION & GRADE								
2	12 3/4 OD 86ED87A	.500 OD.AST	ASTMA5387BGRB ASMESA53GRB MA10687AGRB ASMESA106GRB86	SMLS	L81961 ED87A	2060 DD.API5L	46300 GRB 37	77400 THED 5/88	40.0	1 1/2	OK
2	12 3/4 OD 86ED87A	.500 OD.AST	ASTMA5387BGRB ASMESA53GRB MA10687AGRB ASMESA106GRB86	SMLS	N86428 ED87A	2060 DD.API5L	45400 GRB 37	74000 THED 5/88	41.5	1 1/2	OK
2	12 3/4 OD 86ED87A	.500 OD.AST	ASTMA5387BGRB ASMESA53GRB MA10687AGRB ASMESA106GRB86	SMLS	N86431 ED87A	2060 DD.API5L	40700 GRB 37	75100 THED 5/88	39.0	1 1/2	OK

ITEM NO.	HEAT NO.	TYPE	C																	
2																				
	L81961																			
	N86428																			
2	N86431	PROD	25																	
2	N86431	HEAT	25	62				22												
2	N86431	PROD	27	66	014	016	220													

END OF DATA THIS SHEET ***

USS
A division of USX Corporation

TUBULAR PRODUCTS

SOLD TO

MAIL TO

FILLS REQUIREMENTS IN SUB
RESPECTS.

PREPARED BY THE OFFICE OF:
J.R. MASSIMINO MGR. Q.

DATE 05/31/89

SPEC. & INSP.

ITEM NO.	MATERIAL DESCRIPTION			MATL	HEAT/ LOT NO.	MIN. HYDRO PSI	YIELD STR. PSI	TENSILE STR. PSI	ELONG. % IN 2"	GAGE WIDTH IN.	FLAT
	SIZE	WALL	SPECIFICATION & GRADE								
2	12 3/4 OD	.500	ASTMA53B73GRB ASMESA53GRB	SMLS	L81961	2360	46300	77400	40.0	1 1/2	SK
	86ED87A	OD.AST	MA106B87AGRB ASMESA106GRB86	ED87A	DD.API5L	GRB 37	THED 5/8				
2	12 3/4 OD	.500	ASTMA53B73GRB ASMESA53GRB	SMLS	N86429	2060	43800	71800	39.0	1 1/2	SK
	86ED87A	OD.AST	MA106B87AGRB ASMESA106GRB86	ED87A	DD.API5L	GRB 37	THED 5/8				
2	12 3/4 OD	.500	ASTMA53B73GRB ASMESA53GRB	SMLS	N86430	2060	43800	70300	42.0	1 1/2	SK
	86ED87A	OD.AST	MA106B87AGRB ASMESA106GRB86	ED87A	DD.API5L	GRB 37	THED 5/8				

L81961
L81961
N86429
N86429

2	N86430	HEAT	24	65	013	010	230	02	02	06	02	**			
2	N86430	PROD	24	68	012	014	230								

END OF DATA THIS SHEET ***

**LESS THAN .01

JOB, CONTRACT NO. | P.O. DATE | PURCH ORDER NO. 2917-1155

THIS IS TO CE IFY THAT PRODUCT DESCRIBED HERE

TO

PREPARED BY THE OFFICE
J.R. MASSIMINO MGR.

DATE 05/30/89

C.

P.

ITEM NO.	MATERIAL DESCRIPTION: SIZE	WALL	SPECIFICATION & GRADE	MATL.	HEAT/ LOT NO.	MIN. HYDRO PSI	YIELD STR. PSI	TENSILE STR. PSI	ELONG. % IN 2"	GAGE WIDTH IN.	FLAT
3	2 3/8 OD 86ED87A	.218	ASTMA53873GRB ASMESA53GRB OD.ASTMA10687AGRB ASMESA106GRB	SMLS	L91519	2500	46000	73800	31.0	3/4	
			86ED87AOD.APISL GRB 37THED 5/88								
3	2 3/8 OD 86ED87A	.218	ASTMA53873GRB ASMESA53GRB OD.ASTMA10687AGRB ASMESA106GRB	SMLS	N86183	2500	48000	75300	31.0	3/4	
			86ED87AOD.APISL GRB 37THED 5/88								
4	12 3/4 OD 86ED87A	.500	ASTMA53873GRB ASMESA106GRB OD.ASTMA10687AGRB ASMESA106GRB								
4	12 3/4 OD 86ED87A	.500	ASTMA53873GRB ASMESA106GRB OD.ASTMA10687AGRB ASMESA106GRB								
			86ED87AOD.APISL GRB 37THED 5/88								

ITEM NO.	HEAT NO.	TYPE	C.	MN	P	S	SI	CU	NI	CR	MO	AL	B	V	CB	TI
1	L91519	HEAT	.25													
	L91519															
	N86183															
	N86183															
	L81501															
	L81501															
4	N86177 ✓	HEAT	.25	.64	.11		.2									
4	N86177	HEAT	.24	.62	.09		.3									

END OF DATA THIS SHEET ***

DECIMAL POSITIONS FOR ELEMENTS AND MINERALS ARE ...

SEAMLESS TUBES ROMAN MILL

Contract Department P.O.300/164

Roman 30.04.1986

MILL TEST CERTIFICATE

MILL TEST REPORT

Customer S.U.A.

Material description SEAMLESS CARBON STEEL LINE PIPE, plain ends bevelled to an angle of 30 degrees(+ 5/-0 degrees) to.specs.A-53/API 5 L (latest edition) Grade B. (dual stenciled) hard clear lacquer coated 35-40 ft. random lengths (min.average length per size ordered 35 ft.) with an min. of 30-40 ft.random lengths per size.

Manufacture standard acc.to API Std 5 L and ASTM.

This is to certify that the following products 104 are in accordance with the below specification:

Tube size	Quality of steel	Number of pieces	Meteres	Kgs	Pressure Kgf/cm²
6,625 ODx0,432 WT (168,3 x 10,97 mm)	Gr.B	104	1169,76	50.300	189 (2740 psi)
		3837 FT - 8'			

Marking acc.to API Std.5 L and ASTM.

TOTAL 104 1169,76 50.300

CHEMICAL AND MECANICAL TEST

Quality Gr.B

The whole quantity was checked according to API Std. 5 L and ASTM.

Heat	CHEMICAL ANALYSIS C	Mn	Si	S	P	Cr	MECANICAL TESTS Yield strength Kgf/mm²	Tensile strength Kgf/mm²	Elongation %
376234	0,18 0,21	0,60 0,62	-	0,022 0,024	0,02 0,02	-	29,9	47	41,73
376252	0,22 0,23	0,62 0,58		0,021 0,024	0,020 0,02		30,4		34,05
016224	0,24 0,24	1,13 1,10		0,022 0,025	0,02 0,02		32,9	49,4	33,05

MANAGER
ENG. Stefan Mangu

TECHNICAL SUPERVISOR
ENG Dan Ungureanu

Dispatch note: 013907

L. B. FOSTER COMPANY
P. O. BOX 7796
GARDEN CITY, GA 31418-7796

STANDARD CERTIFIED TEST REPORT
TUBULAR PRODUCTS

RECEIVED JUN 13 1989

CUSTOMER
Name: YOUNGQUIST BROS INC
Address: RURAL ROUTE 34 BOX 502
FT MYERS FL
City & State

Date JUNE 7 1989
PHONE-
Customer's Order No. 23H010-049525
LBF Invoice No.

Material 24" & 16" O D X 375
Grade ASTM A-139 GR B

Heat No.	Size O.D.	Wt/Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)				
				Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong. In 2" %	C	Mn	P	S	SI
512898	24"	375	660	58900	77700	30	.22	.76	.008	.020	
96D004	16"	375	990	40400	74200	34	.24	.86	.008	.027	
96D019	16"	375	990	40200	70700	36	.23	.81	.015	.026	

The undersigned, in behalf of The L. B. Foster Company, hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspecting or testing are prescribed by sold specifications, the standard mill inspection and testing practices of The L. B. Foster Company have been applied. Unless it appears otherwise in the results of such inspection and tests shown above, the undersigned agent of The L. B. Foster Company believes that said materials conform to said specifications.

Subscribed and sworn to before me this 8th day of June 19 ___

Robert G. Stevenson
Notary Public

ROBERT G. STEVENSON
Notary Public, Effingham County, Ga.
MY Commission Expires May 18, 1993

Otis R Kessler
OTIS R KESSLER PLANT MGR
Agents' Name & Title

L B FOSTER CO
COMPANY

Form No. - SW 4-69

APPENDIX I

Cement Records of Injection Well 1 and Deep Monitor Well

Schlumberger

CEMENT BOND LOG VARIABLE DENSITY

CSU Field Log

COMPANY: YOUNGQUIST BROTHERS DRILLING
WELL: PAHOKEE DEEP MONITOR WELL NO.1
FIELD: PAHOKEE WWTP
COUNTY: PALM BEACH
STATE: FLORIDA
LOCATION: CITY OF PAHOKEE FLORIDA
WASTE WATER TREATMNET PLANT
SEC: 19 TWP: 42 S RGE: 37 E

OTHER SERVICES-
CBL
TEMP

PERMANENT DATUM: PAD
ELEV. OF PERM. DATUM: 13.8 F
LOG MEASURED FROM: PAD 6.0 F ABOVE PERM. DATUM
DRLG. MEASURED FROM: PAD

ELEVATIONS-
KB: 19.8 F
DF: 18.7 F
GL: 13.8 F

DATE: 6 JUL 89
RUN NO: ONE

DEPTH-DRILLER: 1009.0 F
DEPTH-LOGGER: 984.0 F
BTM. LOG INTERVAL: 976.0 F
TOP LOG INTERVAL: 10.0 F
CASING-DRILLER: 1009.0 F
CASING-LOGGER:
CASING: 16"
WEIGHT:
BIT SIZE: 22"
DEPTH:

PROGRAM
TAPE NO: 30.4
SERVICE
ORDER NO: 363793

TYPE FLUID IN HOLE: GEL
DENSITY:
VISCOSITY:
PH:
FLUID LOSS:
SOURCE OF SAMPLE:
RM: AT
RMF: AT
RMC: AT
SOURCE RMF/RMC: /
RM AT BHT: AT 131. DEGF
RMF AT BHT: AT 131. DEGF
RMC AT BHT: AT 131. DEGF

TIME CIRC. STOPPED:
TIME LOGGER ON BTM.:

MAX. REC. TEMP: 131.0 DEGF

LOGGING UNIT NO: 8193
LOGGING UNIT LOC: FT.MYERS
RECORDED BY: SCHULER
WITNESSED BY: MANER/MCGRATH/BRANTLEY

REMARKS:

.....
CEMENT INFORMATION:
195 BBL 4% BENTONITE MIX FOLLOWED BY
46 BBL NEAT. PLUG DOWN AT 20:02 5-JUL-89
.
TOOL STRING:
CME-Z *SLS* CME-Z *SLC* CME-Z *GR* CME-Z
GATES:N-417,F-531,C-40

EQUIPMENT NUMBERS-

SLS R 3804 SLC R 3804 SLM DA 350 NLM BC 95

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

CP 30.4 FILE 11 06-JUL-89 18:40

TT2 (US) 600.00 400.00	CBL (MV) 0.0 50.000	
GR (GAPI) 0.0 100.00	CBL (MV) 0.0 10.000	VDL (US) 200.00 1200.0

CP 30.4 FILE 10 06-JUL-89 18:29

5"/100'

5"/100'

CP 30.4 FILE 10 06-JUL-89 17:47

TT2 (US) 600.00 400.00	CBL (MV) 0.0 50.000	
GR (GAPI) 0.0 100.00	CBL (MV) 0.0 10.000	VDL (US) 200.00 1200.0

Schlumberger

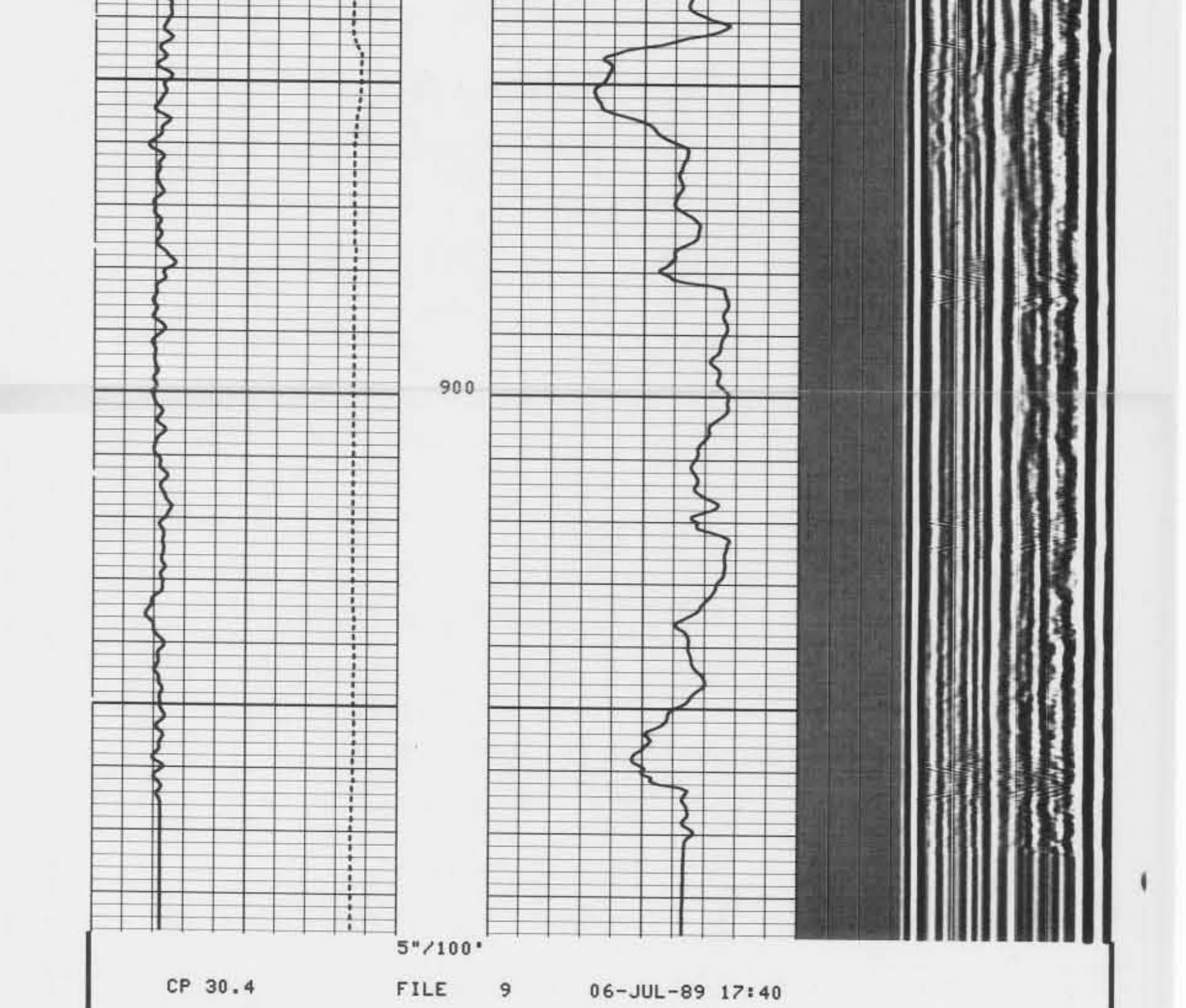
REPEAT SECTION

CSU Field Log

TT2 (US) 600.00 400.00	CBL (MV) 0.0 50.000	
GR (GAPI) 0.0 100.00	CBL (MV) 0.0 10.000	VDL (US) 200.00 1200.0

CP 30.4 FILE 9 06-JUL-89 17:46

5"/100'



5"/100'

CP 30.4 FILE 9 06-JUL-89 17:40

TT2 (US) 600.00 400.00	CBL (MV) 0.0 50.000	
GR (GAPI) 0.0 100.00	CBL (MV) 0.0 10.000	VDL (US) 200.00 1200.0

Schlumberger

CEMENT BOND LOG VARIABLE DENSITY

COUNTY	PALM BEACH
FIELD	PAHOKEE WWTP
LOCATION	CITY OF PAHOKEE FLORIDA
WELL	PAHOKEE DEEP MONITOR WELL N
COMPANY	YOUNGQUIST BROTHERS DRILLING

COMPANY YOUNGQUIST BROTHERS DRILLING

WELL PAHOKEE DEEP MONITOR WELL NO.1

FIELD PAHOKEE WWTP

COUNTY PALM BEACH STATE FLORIDA

LOCATION CITY OF PAHOKEE FLORID WASTE WATER TREATM

API SERIAL NO. | SECT. 19 | TWP. 42 S | RANGE 37 E

Other Services:

Permanent Datum PAD Elev.

Log Measured From PAD above Perm. Datum

Drilling Measured From PAD

Elev.: K.B. 18.8 F, D.F. 18.7 F, G.L. 13.8 F

Date	1-AUG-89		
Run No.	FOUR		
Depth Driller	1860.0 F		
Depth Logger (Schl.)	1862.0 F		
Btm. Log Interval	1853.0 F		
Top Log Interval	1000.0 F		
Casing-Driller	6 5/8 @1925.0 F	@	@
Casing-Logger			
Bit Size	14 3/4		
Type Fluid in Hole	WATER		
Dens. / Visc.			
pH / Fld. Loss			
Source of Sample			
Rm @ Meas. Temp.	@		@
Rmf @ Meas. Temp.	@		@
Rmc @ Meas. Temp.	@		@
Source: Rmf / Rmc			
Rm @ BHT	@		@
Circulation Ended			
Logger on Bottom			
Max. Rec. Temp.			
Equip. / Location	8193 / FT.MYERS		
Recorded By	SCHULER		
Witnessed By	MCGRATH		

The well name, location and borehole reference data were furnished by the customer.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

Run No.	FOUR	
Service Order No.	356710	
Drilling Fluid Level		
Salinity		
Rmf @ BHT	@	@
Rmc @ BHT	@	@
Logging Speed		
EQUIPMENT DATA		
Tool Number 1	SLS B	
Tool Number 2	SLC B3804	
Tool Number 3	SLM 531	
Tool Number 4		
Tool Number 5		
Tool Number 6		
Tool Number 7		
Tool Number 8		
Tool Number 9		
Tool Number 10		
Tool Number 11		
Tool Number 12		

REMARKS:

GATES :N,255

C,38

TOOL:CME-SLS-CME-SLC-CME-GR-CME

TT2 (US) 430.00 230.00 | GR (GAPI) 0.0 100.00 | CBL (MV) 0.0 10.000 | CBL (MV) 0.0 100.00 | VDL (US) 200.00 1200.0

CP 32.2 FILE 4 00- -1924 01:50

5"/100'

5"/100'

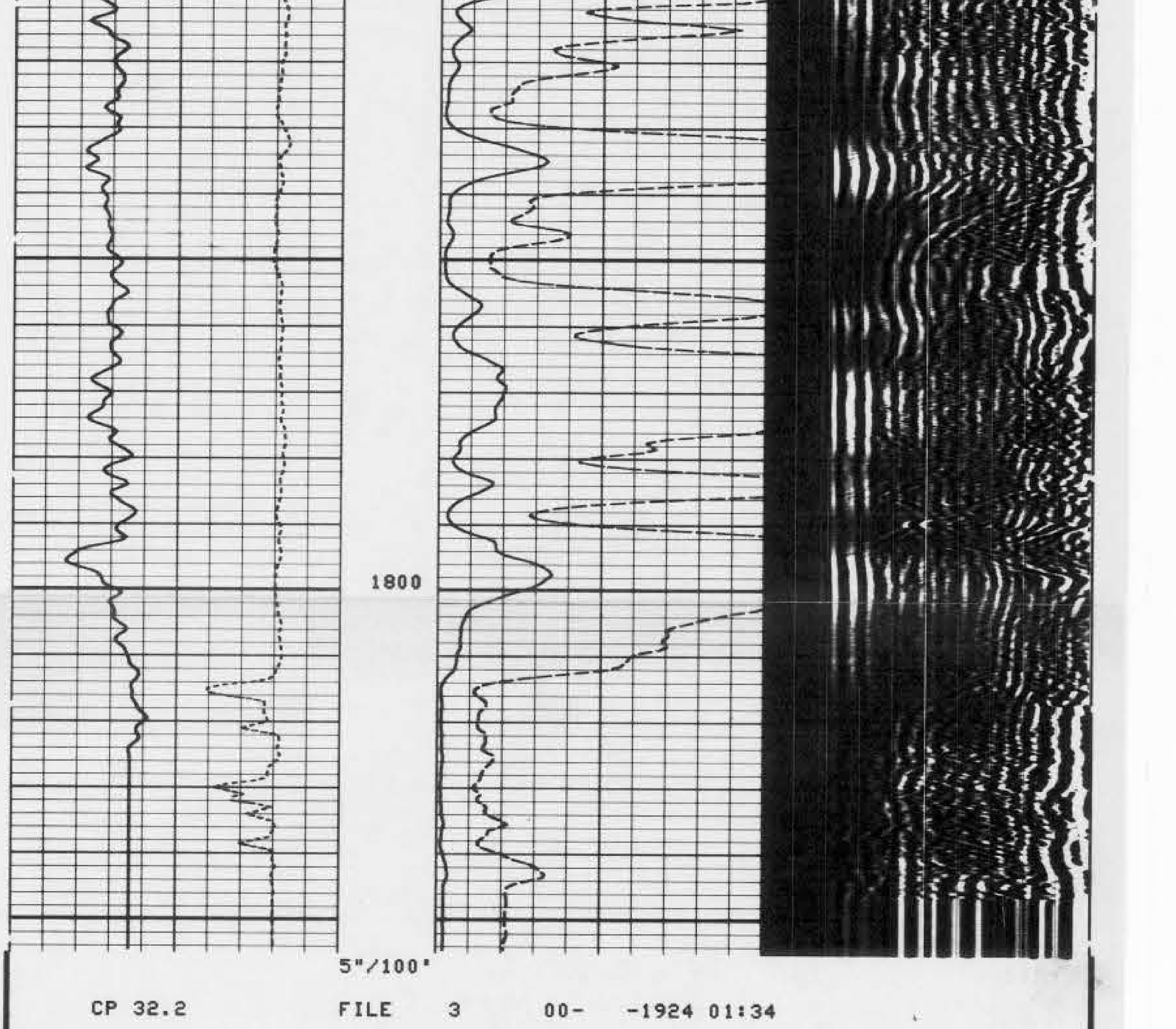
CP 32.2 FILE 4 00- -1924 01:42

TT2 (US) 430.00 230.00 | GR (GAPI) 0.0 100.00 | CBL (MV) 0.0 10.000 | CBL (MV) 0.0 100.00 | VDL (US) 200.00 1200.0

TT2 (US) 430.00 230.00 | GR (GAPI) 0.0 100.00 | CBL (MV) 0.0 10.000 | CBL (MV) 0.0 100.00 | VDL (US) 200.00 1200.0

CP 32.2 FILE 3 00- -1924 01:40

5"/100'



5"/100'

CP 32.2 FILE 3 00- -1924 01:34

TT2 (US) 430.00 230.00 | GR (GAPI) 0.0 100.00 | CBL (MV) 0.0 10.000 | CBL (MV) 0.0 100.00 | VDL (US) 200.00 1200.0

INJECTION WELL 1

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
40	5/18/89	1	12% Bentonite	786.04	1180	
40	5/18/89	1	Neat	168.44		197 - 17
40	5/20/89	2	Neat	67.38	3340	17 - surface
32	5/27/89	1	12% Bentonite	1212.75	1930	997 - 332
32	5/27/89	1	Neat	561.46	4950	997 - 332
32	5/28/90	2	12% Bentonite	853.42	840	332 - surface
22	7/11/89	1	12% bentonite	943.25	N/A	
22	7/11/89	1	Pozzolanmix	263.88	2470	
22	7/11/89	1	Neat	505.31	> 5000	2000 - 1807
22	7/12/89	2	Pozzolanmix	1431.72	2450	1807 - 1807
22	7/13/89	3	Pozzolan 2000	516.72	2990	1807 - 1785
22	7/13/89	4	Pozzolan 2000	707.44	2660	1785 - 1696
22	7/13/89	5	Pozzolan 2000	713.05	2660	1696 - 1696
22	7/14/89	6	Pozzolan 2000	561.46	3560	1696 - 1687
22	7/14/89	7	Pozzolan 2000	561.46	3120	1687 - 1681
22	7/14/89	8	Pozzolan 2000	280.73	> 5000	1681 - 1681
22	7/15/89	9	Pozzolan 2000	286.34	2780	1681 - 1681
22	7/15/89	10	Pozzolan 1500, Kolite, 6% Bentonite	145.98	1450	1681 - 1680
22	7/16/89	11	Pozzolan 3000	84.22	3440	1680 - 1680
22	7/16/89	12	Pozzolan 1500	140.36	1480	1680 - 1680

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	7/17/89	13	Type II Neat, 3% $CaCl_2$, and Celloflakes	140.37	4350	1680 - 1680
22	7/17/89	14	Type II, Neat, 3% $CaCl_2$, and Celloflakes	140.37	2870	1680 - 1680
22	7/17/89	15	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	140.37	4200	1680 - 1673
22	7/17/89	16	Type II, Neat, 3% $CaCl_2$, and Celloflakes	140.37	1640	1673 - 1663
22	7/18/89	17	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	140.37	3240	1633 - 1655
22	7/18/89	18	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	247.04	4140	1655 - 1651
22	7/18/89	19	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	140.37	> 5000	1651 - 1651
22	7/18/89	20	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	61.76	3670	1651 - 1648
22	7/19/89	21	Type II, Neat, 3%, $CaCl_2$, and Celloflakes	140.37	> 5000	1648 - 1633
22	7/19/89	22	Type II, Neat, 4%, $CaCl_2$	140.37	3820	1633 - 1605

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	7/19/89	23	Type II Neat, 4% $CaCl_2$, and Celloflakes	252.66	3340	1605 - 1605
22	7/19/89	24	Type II, Neat, 4% $CaCl_2$, and Celloflakes	140.37	3280	1605 - 1605
22	7/19/89	25	Type II, Neat, 4% $CaCl_2$, and Celloflakes, Kolite	168.44	4760	1605 - 1605
22	7/20/89	26	Type II, Neat, Celloflakes, Kolite	140.37	4110	1605 - 1600
22	7/20/89	27	Type II, Neat, Celloflakes, Kolite	140.37	3250	1600 - 1593
22	7/20/89	28	Pozzolan 1500, 6% Bentonite, Celloflakes, Kolite	140.37	2420	1593 - 1581
22	7/20/89	29	Type II, Neat, 4% $CaCl_2$, Celloflakes and Micatex	140.37	4950	
22	7/20/89	30	Pozzolan, 6% Bentonite, Micatex, Seed Hulls	280.74	2760	1556 - 1546
22	7/21/89	31	Neat, 12% Bentonite, Micatex	561.46	1340	1546 - 1514
22	7/21/89	32	Neat, 12% Bentonite, Micatex	617.61	1360	1514 - 1490
22	7/21/89	33	Neat, 12% Bentonite, Micatex, Cotton Seed Hulls	842.19	1970	1490 - 1462

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	7/21/89	34	Neat, 12% Bentonite, Celloflakes, Cotton Seed Hulls	561.46	1430	1462 - 1453
22	7/22/89	35	Neat, 4% $CaCl_2$ and Micatex	140.37	> 5000	1453 - 1446
22	7/22/89	36	Neat, 4% $CaCl_2$ and Micatex	140.37	4720	1446 - 1437
22	7/22/89	37	Neat, 12% Bentonite	561.46	2660	1437 - 1416
22	7/23/89	38	Neat, 4% $CaCl_2$ and Celloflakes	129.14	5000	1416 - 1407
22	7/23/89	39	Neat, 4% $CaCl_2$ and Celloflakes	196.51	> 5000	1407 - 1400
22	7/23/89	40	Neat, 12% Bentonite, Micatex	280.73	2760	1400 - 1395
22	7/24/89	41	Neat, 4% $CaCl_2$ and Celloflakes	140.37	4420	
22	7/24/89	42	Neat, 3% $CaCl_2$ Celloflakes and Kolite	140.37	4420	
22	7/25/89	43	Neat, 3%, $CaCl_2$ and Kolite	140.37	4420	
22	7/25/89	44	Neat, 3% $CaCl_2$ and Kolite	140.37	4420	1373 - 1354
22	7/25/89	45	12% Bentonite, Celloflakes	140.37	4420	1354 - 1354
22	7/25/89	46	Neat, Kolite	140.37	4420	1354 - 1354

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	7/26/89	47	Neat, 4% $CaCl_2$ and Celloflakes	140.37	4420	1354 - 1354
22	7/26/89	48	Neat, 4% $CaCl_2$ and Celloflakes	140.37	> 5000	1354 - 1354
22	7/26/89	49	Neat, 4% $CaCl_2$ and Celloflakes	56.14	1840	1354 - 1354
22	7/26/89	50	Neat, 4% $CaCl_2$ and Celloflakes	140.37	1450	1354 - 1350
22	7/27/89	51	Neat, 5% $CaCl_2$ and Celloflakes	235.81	4880	1350 - 1335
22	7/27/89	52	Neat, 4% $CaCl_2$ and Celloflakes	145.96	3470	1330 - 1330
22	7/27/89	53	Neat, 4%, $CaCl_2$ and Celloflakes	140.37	3470	1330 - 1330
22	7/27/89	54	Neat, 4%, $CaCl_2$ and Celloflakes	140.37	3470	1330 - 1330
22	7/28/89	55	Neat, 4% $CaCl_2$, Celloflakes and Cotton Seed Hulls	140.37	3470	1330 - 1330
22	7/28/89	56	Neat, 4% $CaCl_2$ and Celloflakes	140.37	3470	1330 - 1329
22	7/28/89	57	Neat, 4% $CaCl_2$ and Celloflakes	145.96	3470	1329 - 1329
22	7/28/89	58	Neat, 4% $CaCl_2$ and Celloflakes	140.37	3470	1329 - 1329

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	7/28/89	59	Neat, 12% Bentonite, Celloflakes	561.48	3470	1329 - 1328
22	7/29/89	60	12% Bentonite	140.37	2750	1328 - 1328
22	7/29/89	61	12% Bentonite, D29	145.96	2760	1328 - 1320
22	7/29/89	62	Neat, 4% $CaCl_2$	140.37	> 5000	1320 - 1317
22	7/30/89	63	Neat, 12% Bentonite	84.22	4980	
22	7/30/89	64	12% Bentonite D29	291.92	2470	
22	7/30/89	65	12% Bentonite 4% $CaCl_2$	252.66	4200	1314 - 1314
22	7/31/89	66	Neat, 4% $CaCl_2$	140.37	4920	1314 - 1312
22	7/31/89	67	Neat, 4% $CaCl_2$	140.37	> 5000	1312 - 1312
22	7/31/89	68	Neat, 4% $CaCl_2$	145.98	4980	1312 - 1312
22	7/21/89	69	Neat, 4% $CaCl_2$	196.51	4920	1312 - 1312
22	7/31/89	70	Neat, 4% $CaCl_2$,	140.37	3470	1312 - 1311
22	8/1/89	71	Neat, 4% $CaCl_2$, 25 lbs Celloflakes	140.37	> 5000	1311 - 1311
22	8/1/89	72	Neat, 12% Bentonite, 25 lbs Celloflakes	280.73	3840	1311 - 1311
22	8/1/89	73	Neat, 4% $CaCl_2$	145.98	> 5000	1311 - 1310
22	8/1/89	74	Neat, 4% $CaCl_2$	140.37	3210	1310 - 1310

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	8/2/89	75	Neat, 4% $CaCl_2$, 50 lbs Cottonseed Hulls	140.37	> 5000	1310 - 1310
22	8/2/89	76	Neat, 4% $CaCl_2$, Cottonseed Hulls	168.44	> 5000	1310 - 1310
22	8/2/89	77	Neat	140.37	3140	1310 - 1310
22	8/2/89	78	Neat, 4% $CaCl_2$	140.37	4850	1310 - 1310
22	8/2/89	79	Neat, 4% $CaCl_2$	140.37	3200	1310 - 1310
22	8/3/89	80	Neat, 12% Bentonite, Cottonseed Hulls, 25 lbs Celloflakes	522.16	3200	
22	8/3/89	81	Neat, 4% $CaCl_2$ and 25 lbs Cottonseed Hulls	140.37	4990	1310 - 1309
22	8/3/89	82	Neat, 4% $CaCl_2$	140.37	3660	1309 - 1308
22	8/3/89	83	Neat, 4% $CaCl_2$	140.37	3560	1308 - 1308
22	8/4/89	84	Neat	140.37	4250	1308 - 1306
22	8/4/89	85	Neat, 12% Bentonite, Cottonseed Hulls	364.95	2100	1306 - 1304
22	8/4/89	86	Lite ASTM Type II, 12% Bentonite, 126 ppg	280.73	3050	1303 - 1303
22	8/4/89	87	Lite ASTM Type II, 12% Bentonite	280.73	3840	1303 - 1303

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	8/5/89	88	Neat, 10 Lbs Cottonseed Hulls	258.27	4970	1303 - 1303
22	8/5/89	89	Neat, 12% Bentonite, 10 lbs Cottonseed Hulls	364.95	2100	1306 - 1304
22	8/6/89	90	Neat, 12% Bentonite	280.73	3860	1301 - 1301
22	8/6/89	91	Neat, 12% Bentonite	280.73	2870	1301 - 1301
22	8/6/89	92	Pozzolan (DSG-2500), 13.0 ppg	280.73	> 5000	1301 - 1301
22	8/7/89	93	Neat, 4% $CaCl_2$	140.37	3060	1311 - 1310
22	8/7/89	94	Neat, 4% $CaCl_2$	145.98	4880	1311 - 1310
22	8/7/89	95	Neat, 4% $CaCl_2$	168.44	> 5000	1310 - 1310
22	8/15/89	96	Neat, 4% $CaCl_2$, 25 lbs Celloflakes	140.37	5000	1291 - 1263
22	8/16/89	97	Neat, 4% $CaCl_2$	140.37	3930	1263 - 1233
22	8/16/89	98	DSG 2500 (13 lb/g) 50 lbs Celloflakes	421.10	1880	1233 - 1168
22	8/17/89	99	DSG 2500 (13 lb/g) 50 lbs Celloflakes	280.73	3220	1168 - 1118
22	8/17/89	100	Neat, 12% Bentonite, 50 lbs Celloflakes	280.73	1270	1118 - 1071
22	8/18/89	101	Neat, 12% Bentonite, 50 lbs Celloflakes	280.73	1760	1071 - 1018
22	8/18/89	102	Neat, 12% Bentonite, 50 lbs Celloflakes	421.10	1820	1018 - 915

CEMENT RECORD
CITY OF PAHOKEE
INJECTION WELL 1

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
22	8/19/89	103	Neat, 12% Bentonite	814.12	1800	915 - 618
22	8/19/89	104	Neat, 12% Bentonite	808.50	2130	618 - 320
22	8/20/89	105	Neat, 12% Bentonite	611.99	2440	320 - surface
12	9/29/89	1	Neat, 6% Bentonite	3716	3180	
12	9/29/89	1	Neat	235.81	4720	2650 - 2410
12	9/30/89	2	Neat, 6% Bentonite	432.32	3260	2410 - 2275
12	10/1/89	3	Neat, 6% Bentonite, 50 lbs Celloflakes	421.12	2180	2275 - 2188
12	10/1/89	4	Neat, 6% Bentonite, 75 lbs Celloflakes	558.88	3240	2188 - 2008
12	10/1/89	5	Neat, 6% Bentonite, 50 lbs Celloflakes	280.75	3670	2008 - 1863
12	10/2/89	6	Neat, 12% bentonite	707.49	3050	1863 - 1440
12	10/2/89	7	Neat, 12% Bentonite	707.49	1530	1440 - 1028
12	10/3/89	8	Neat, 12% Bentonite	707.49	1880	1028 - 590
12	10/3/89	9	Neat, 12% Bentonite	707.49	3070	590 - 142
12	10/3/89	10	Neat, 12% Bentonite	218.99	3490	142 - surface

DEEP MONITOR WELL

CEMENT RECORD
CITY OF PAHOKEE
DEEP MONITOR WELL

Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
24	6/28/89	1	12% Bentonite	365.00	1750	194 - 0
24	6/28/89	1	Neat	140.00	2050	194 - 0
16	7/6/89	1	4% Bentonite	1095.00	2620	1009 - surface
16	7/6/89	1	Neat	258.00	4350	1009 - surface
6	7/26/89	1	Neat	224.59	3740	1925 - 1806
6	7/26/89	1	6% Bentonite, Kolite, and Celloflakes	202.13	1430	1925 - 1806
6	7/26/89	2	6% Bentonite, Celloflakes	140.37	2710	1806 - 1806
6	7/27/89	3	6% Bentonite, Celloflakes	39.30	3330	1806 - 1806
6	7/27/89	4	Neat, 4% $CaCl_2$, Celloflakes	56.14	4300	1806 - 1802
6	7/27/89	5	Neat, 4% $CaCl_2$, Celloflakes	56.14	> 5000	1802 - 1800
6	7/27/89	6	Neat, 4% $CaCl_2$, Celloflakes	56.14	2950	1800 - 1800
6	7/28/89	7	Neat, 4% $CaCl_2$, Celloflakes	56.14	3620	1800 - 1800
6	7/28/89	8	Neat, 4% $CaCl_2$, Celloflakes	56.14	3700	1800 - 1760
6	7/28/89	9	Neat, 4% $CaCl_2$, Celloflakes	67.37	3890	1760 - 1760
6	7/28/89	10	6% Bentonite	174.03	3250	1730 - 1637

CEMENT RECORD
CITY OF PAHOKEE
DEEP MONITOR WELL

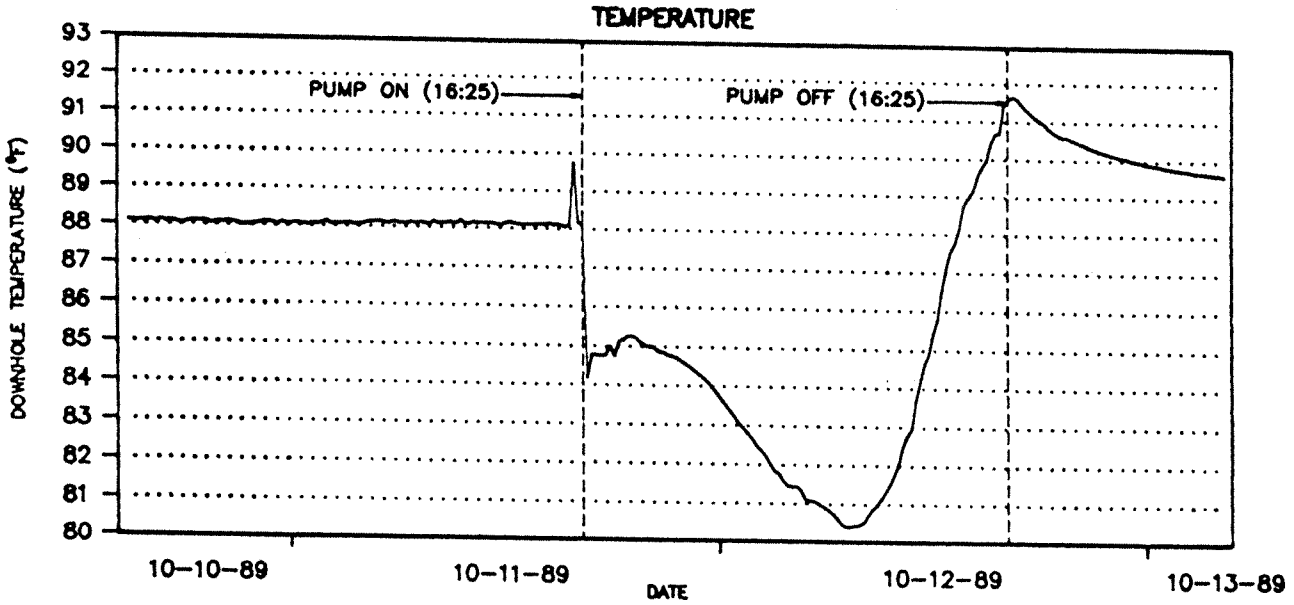
Casing Size (Inches)	Date	Stage Number	Cement Additives	Volume Pumped (Cubic Feet)	Compressive Strengths (in pounds per square inch)	Fill Interval (Feet)
6	7/29/89	12	6% Bentonite, Celloflakes	56.14	2980	1637 - 1584
6	7/29/89	12	6% Bentonite, Celloflakes	56.14	3060	1584 - 1521
6	7/29/89	13	6% Bentonite, Celloflakes	224.56	3460	1521 - 1380
6	7/30/89	14	6% Bentonite	123.52	2950	1380 - 1316
6	7/30/89	15	6% Bentonite	168.44	3750	1316 - 1226
6	7/30/89	16	6% Bentonite	67.38	3280	1226 - 1177
6	7/31/89	16	6% Bentonite	39.30	2720	1177 - 1147

APPENDIX J

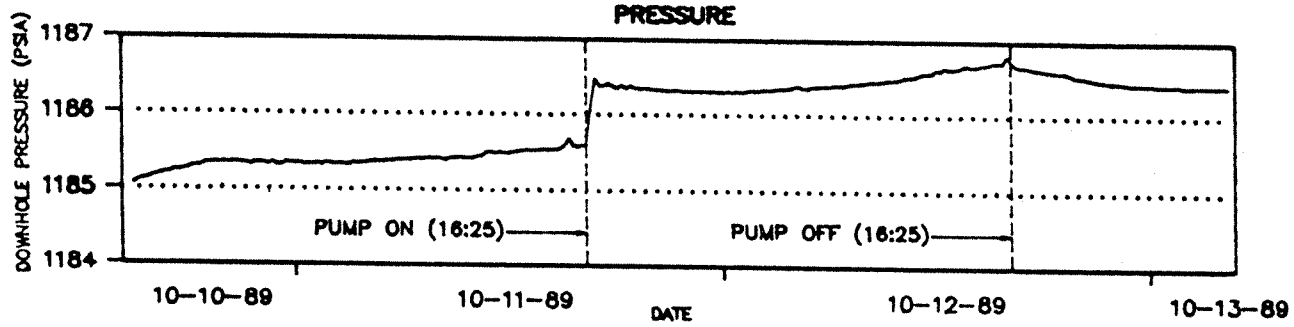
Injection Test Data

GERAGHTY & MILLER, INC.
Environmental Services

COMPILED BY: P. MANER	DATE: JAN 90	SCALE: NONE	PREPARED FOR: RUSSELL & AXON	
PREPARED BY: B. OLIVA	FILE NO: PF06403			
PROJECT MGR.: J. WHEATLEY				



PRE-INJECTION	INJECTION TEST	POST-INJECTION



SUBJECT: INJECTION TEST DATA

APPENDIX K

Operation and Maintenance Forms

CITY OF PAHOKEE
WASTEWATER TREATMENT PLANT
I.D. # 5050M00787

INJECTION WELL DATA

MONTH:_____ YEAR:_____

DATE	TIME	INJECTION* FLOW RATE (MGD)	INJECTION* PRESSURE (PSIG)	MAXIMUM FLOW RATE (MGD)	MAXIMUM PRESSURE (PSIG)	AVERAGE PRESSURE (PSIG)	VOLUME INJECTED (GALLONS)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
TOTAL							
AVERAGE							
MAXIMUM							
MINIMUM							

* Measurements of INJECTION FLOW RATE and INJECTION PRESSURE should be made at the same time each day.

Geraghty & Miller, Inc.

SIGNATURE: _____

CITY OF PAHOKEE
WASTEWATER TREATMENT PLANT
ID # 5050M00787

MONITOR WELL SURFACE PRESSURE DATA

MONTH: _____ YEAR: _____

DATE	SHALLOW MONITOR ZONE			DEEP MONITOR ZONE		
	MAXIMUM PRESSURE (PSIG)	MINIMUM PRESSURE (PSIG)	AVERAGE PRESSURE (PSIG)	MAXIMUM PRESSURE (PSIG)	MINIMUM PRESSURE (PSIG)	AVERAGE PRESSURE (PSIG)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

SIGNATURE: _____

Geraghty & Miller, Inc

CITY OF PAHOKEE
WASTEWATER TREATMENT PLANT
I.D. # 5050M00787

MONITOR WELL WATER QUALITY DATA

MONTH:_____ YEAR:_____

PARAMETER	WEEK BEGINNING				
DATE OF SAMPLING					
SHALLOW MONITOR ZONE (996 FT. TO 1147 FT.)					
PRESSURE PRIOR TO SAMPLING (PSIG)					
TEMPERATURE (°F)					
pH					
SPECIFIC CONDUCTIVITY (μmhos/cm)					
CHLORIDES (mg/L)					
TOTAL DISSOLVED SOLIDS (mg/L)					
AMMONIA (mg/L)					
FECAL COLIFORM (colonies/100ml)					
TKN (mg/L)					
DEEP MONITOR ZONE (1915 FT. TO 2008 FT.)					
PRESSURE PRIOR TO SAMPLING (PSIG)					
TEMPERATURE (°F)					
pH					
SPECIFIC CONDUCTIVITY (μmhos/cm)					
CHLORIDES (mg/L)					
TOTAL DISSOLVED SOLIDS (mg/L)					
AMMONIA (mg/L)					
FECAL COLIFORM (colonies/100ml)					
TKN (mg/L)					

COMMENTS:_____

_____

SIGNATURE:_____

CITY OF PAHOKEE
WASTEWATER TREATMENT PLANT
I.D. # 5050M00787

SPECIFIC INJECTIVITY TEST

DATE: _____

	INJECTION RATE (GPM)	÷ [	WELL–HEAD PRESSURE (PSIG)	–	SHUT–IN PRESSURE (PSIG)	] =	SPECIFIC INJECTIVITY (GPM/PSIG)
TEST 1							
TEST 2							

MONITOR WELL DATA	PRESSURE PRIOR TO TESTS (PSIG)	PRESSURE DURING TESTS (PSIG)	PRESSURE AFTER TESTS (PSIG)
SHALLOW ZONE		TEST 1 _____	
		TEST 2 _____	
DEEP ZONE		TEST 1 _____	
		TEST 2 _____	

COMMENTS: _____

SIGNATURE: _____