Well Completion Report
Saltwater Monitoring Wells

Town of Lantana
Palm Beach County, Florida

October 2007

Prepared for:

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

Prepared by:

CCI
Connect Consulting, Inc.
Water Resource Consultants

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Kevin Rohrer's Copy

1.0 Introduction

1.1 Background

As part of the most recent Water Use Permit (WUP) renewal process, the South Florida Water Management District (SFWMD) required that the Town of Lantana (Town) install two additional saltwater intrusion monitoring wells to document current water quality conditions between the nearest saltwater body, the Intracoastal Waterway (IWW), and the Town's wellfield. The wells, labeled MW-6 and MW-7, are part of a network of monitoring wells used to monitor chloride concentrations within the production zone of the surficial aquifer between the IWW and Town wellfield.

1.2 Purpose

The purpose of this report is to document the hydrogeologic data collected during the drilling and testing of the saltwater monitoring wells into the surficial aquifer at the project sites in Lantana, Palm Beach County, Florida (**Figure 1**). The data includes a summary of:

- well drilling and construction details;
- lithostratigraphy and hydrogeology data;
- water quality results, and
- specific capacity testing.

1.3 Project Description

Monitoring wells MW-6 and MW-7 are located in the Section 3, Township 45 south, Range 43 east in Lantana, Palm Beach County, Florida. Monitoring well MW-6 is located in the grass swale at the intersection of Greynolds Circle and West Atlanta Avenue; MW-7 is located in the grass swale in front of 333 Pinewood Street. **Figure 2** shows aerial photographs of the well locations.

Nutting Environmental of Florida, Inc. (NEF) was the drilling contractor selected by the Town after a review of sealed bids submitted from an Advertisement for Bids issued by the Town. NEF obtained well construction permits from the Florida Department of Health (DOH) prior to mobilization. Copies of the DOH permits are provided in **Appendix A**.

Equipment mobilization and drilling began on August 20, 2007. The two monitoring wells were installed to a total depth of 100 feet below land surface (BLS) with the screened interval from 60 to 100 feet BLS. The well construction and testing was completed on September 21, 2007, at which time all drilling equipment was demobilized from the site. Well Completion Reports (WCR) were completed by NEF and submitted to the SFWMD. Copies of the SFWMD WCR are provided in **Appendix A**.

Connect Consulting, Inc. (CCI), a hydrogeologic consulting company, provided oversight during well drilling, well construction, and well testing operations. NEF was responsible for all drilling, well construction, and testing services (including geophysical logging) associated with this well.

1.0 Introduction

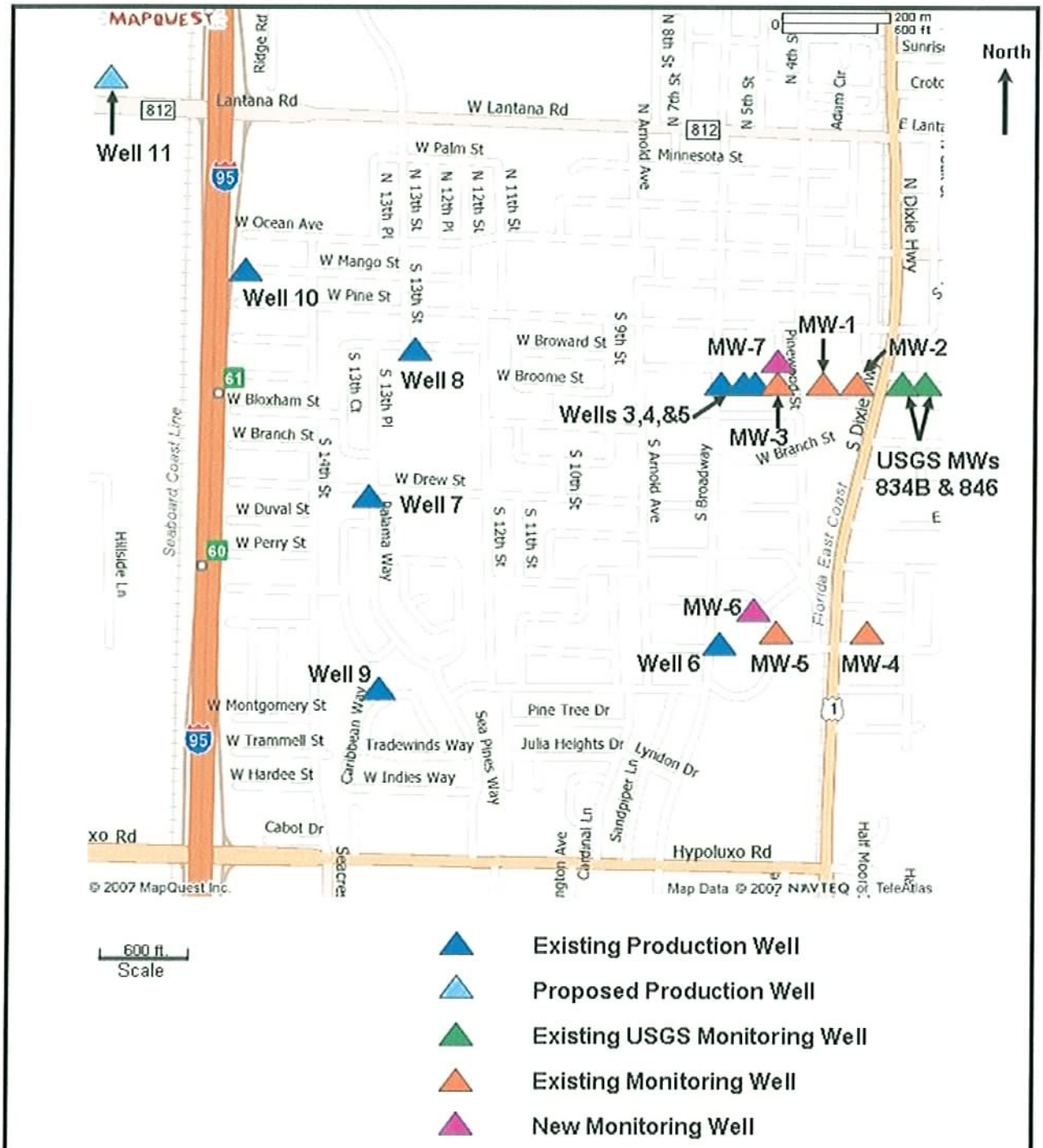


Figure 1 – Well Location Map

1.0 Introduction

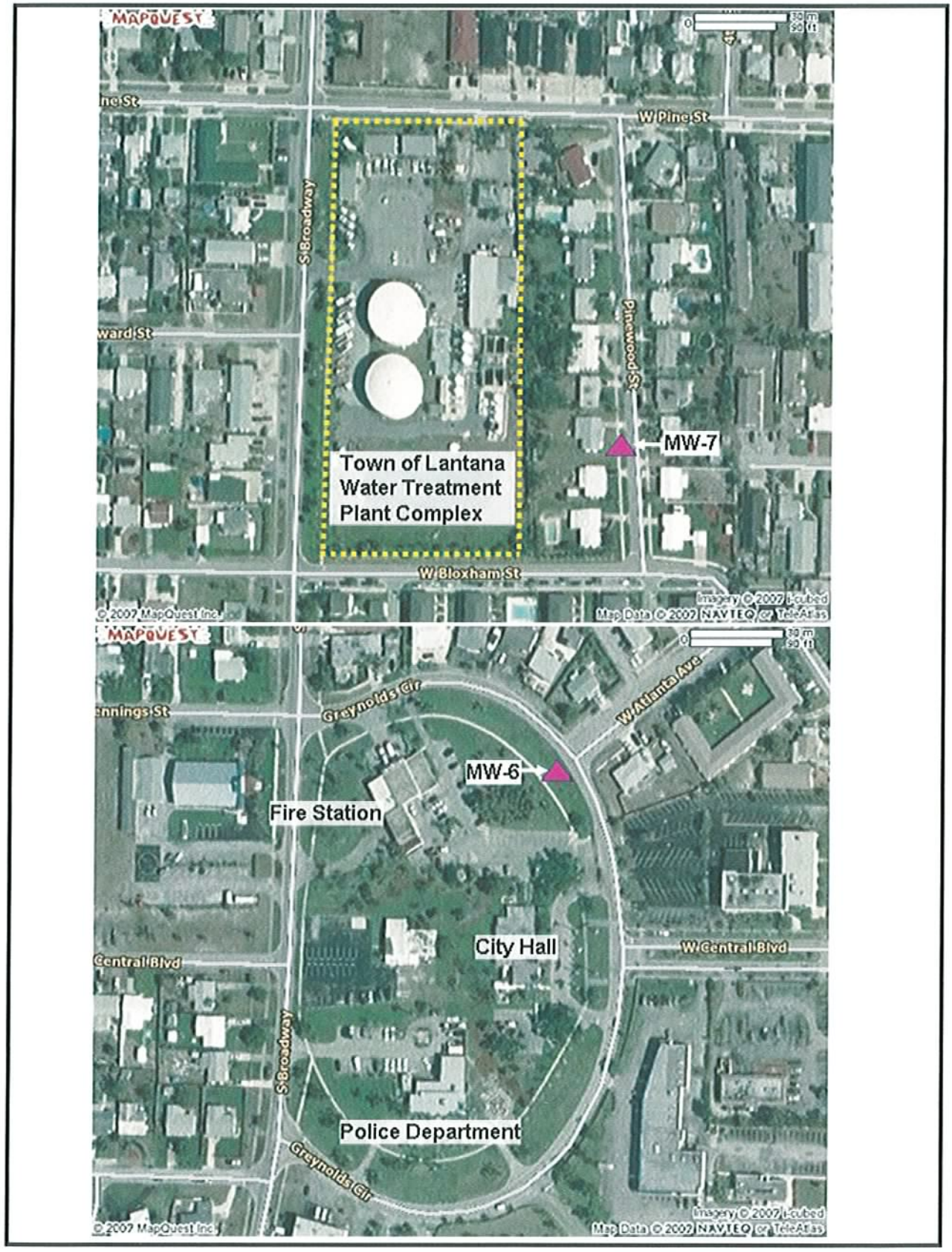


Figure 2 – Aerial Photographs of Well Locations

2.0 Exploratory Drilling and Well Construction

After mobilizing drilling equipment to the site on August 20, 2007, mud rotary drilling was used to install the pilot holes and wells. NEF used closed circulation mud rotary drilling to advance a nominal 8-inch pilot hole from land surface to 128 feet BLS. **Figure 3** is a photograph of the Mobile B-57 drill rig used at the project sites.

CCI based the well construction on the following criteria:

- the screened intervals of the Town's supply wells (~50 to ~105 ft. BLS);
- inspection of formation samples (well cuttings), and
- results of geophysical logging.

Monitoring Well No. 6

On August 20, 2007, NEF began drilling operations at the MW-6 location by advancing a nominal 3-inch diameter borehole to a depth of 40 feet. NEF then advanced a nominal 14-inch borehole to 19 feet BLS, approximately two feet into the top of the bedrock. NEF installed an 8-inch diameter, schedule 80 PVC casing (0.375-inch thickness) to approximately 17 feet BLS and grouted the annulus to land surface using 16 cubic feet (ft^3) of ASTM Type I neat cement containing 3-5% bentonite.

After installing the 8-inch diameter surface casing, NEF advanced a nominal 8-inch borehole from 17 feet to 128 feet BLS. Lithologic samples were collected every 10 feet until circulation of drilling fluids was lost at a depth of ~53 feet BLS. No lithologic samples were collected from 53 to 128 feet BLS due to loss of circulation of drilling fluids.

Aquifer Data Systems, Inc. (ADS) conducted geophysical logging of the 8-inch pilot hole on August 27 2007. The logging suite conducted under static conditions included caliper, gamma ray, electric (single point, spontaneous potential, short and long normal), temperature, and fluid conductivity logs.

Based on the results of the geophysical logging, the 4-inch schedule 40 PVC well screen (0.020-inch) and casing were installed to a total depth of 100 feet BLS. The screened interval was from 60 to 100 feet BLS. Stainless steel centralizers were installed on the screen and casing assembly every 20 feet. A 6/20 silica sand was used for the filter pack. The sand was tremied into the borehole annulus in a slurry from bottom to top. The top of the filter pack was tagged at approximately 50 feet BLS.

The well was then developed using a combination of surging, jetting, and over pumping. Once the well was sufficiently developed, the remainder of the annulus was grouted with a neat cement slurry using a 1.25-inch PVC tremie line from bottom to top. A total of 68 ft^3 of ASTM Type I/II cement containing 3-5% bentonite was used to grout the casing back to land surface in two stages. Additional well development was performed on MW-6 using a combination of surging and over pumping until the turbidity of the discharge water was below 1.0 Nephelometric Turbidity Units (NTU). The well was then secured until specific capacity testing and final geophysical logging were conducted. **Figures 4 through 7** document the various phases of well construction for MW-6.

Monitoring Well No. 7

NEF initiated drilling of the pilot hole for MW-7 on August 31, 2007 by advancing a nominal 8-inch diameter borehole to 29 feet BLS, approximately 7 feet into the top of the bedrock. NEF installed 28 feet of 8-inch diameter steel surface casing. The surface casing was used to stabilize the ground at land surface and was removed during the final grouting of the well casing.

On September 4, 2007, NEF began advancing a nominal 8-inch borehole from 28 to 128 feet BLS. Lithologic samples were collected every 10 feet until circulation of drilling fluids was lost at a depth of 62 feet BLS. No lithologic samples were recovered from 62 to approximately 100 feet BLS due to a loss of circulation of drilling fluids. Circulation of drilling fluids and cuttings back to land surface was reinitiated at approximately 100 feet BLS and continued to total depth of 128 feet BLS.

ADS conducted geophysical logging of the 8-inch pilot hole on September 6, 2007. The logging suite conducted under static conditions included caliper, gamma ray, and electric (single point, spontaneous potential, short and long normal) logs.

Based on the results of the geophysical logging, the 4-inch schedule 40 PVC well screen (0.020-inch) and casing were installed to a total depth of 100 feet BLS. The screened interval was from 60 to 100 feet BLS. Stainless steel centralizers were installed on the screen and casing assembly every 20 feet. A 6/20 silica sand was used for the filter pack. The sand was tremied into the borehole annulus in a slurry from bottom to top. The top of the filter pack was tagged at approximately 50 feet BLS or 10 feet above the well screen.

The well was then developed using a combination of surging, jetting, and over pumping. Once the well was sufficiently developed, the remainder of the annulus was grouted with a neat cement slurry using a 1.25-inch PVC tremie line from bottom to top. A total of 33.6 ft^3 of ASTM Type I/II cement containing 3-5% bentonite was used to grout the casing back to land surface in two stages. Additional well development was performed on MW-7 using a combination of surging and over pumping until the turbidity of the discharge water was below 1.0 NTU. The well was then secured until specific capacity testing and final geophysical logging were conducted. **Figures 8 through 11** document the various phases of well construction for MW-7.

Specific capacity testing of both wells was conducted on September 11, 2007. Geophysical logging of the completed wells was conducted by ADS on September 21, 2007. A series of static and dynamic geophysical logs were conducted on the finished wells. The suite of logs included caliper, gamma-ray, electric, fluid conductivity, fluid temperature, and flow meter. The fluid conductivity, temperature, and flow meter logs were run under static and dynamic conditions. A discussion of the geophysical logs is provided in **Section 4.1**.

Table 2-1 summarizes the actual well construction details and **Figures 12 and 13** are well construction diagrams for the saltwater monitoring wells.

2.0 Exploratory Drilling and Well Construction

Table 2-1- Well Construction Details

Well No.	Start / Completion Date	Latitude/ Longitude	Casing Elevation* (ft)	Casing & Screen Material	Screen Slot Size (in)	Total Depth (ft)	Screen Depth (ft)
MW-6	8-20-07 / 8-30-07	26°34'37.95"N 80°03'19.35"W	14.34	4" Sch. 40 PVC; Flush Thread	0.020	100	60-100
MW-7	8-31-07 / 9-11-07	26°34'53.94"N 80°03'17.49"W	14.67	4" Sch. 40 PVC; Flush Thread	0.020	100	60-100

Notes: * - Elevations based on National Geodetic Vertical Datum of 1929.

Figure 3 – Mobile B-57 Drill Rig Set Up on MW-6 (looking southeast)

Figure 4 – MW-6 Pilot Hole Drilling

Figure 5 – Installing 4-inch PVC Well Screen and Casing

Figure 6 – Adding Filter Pack using Tremie Line

Figure 7 – Completed MW-6 Well Head during Geophysical Logging

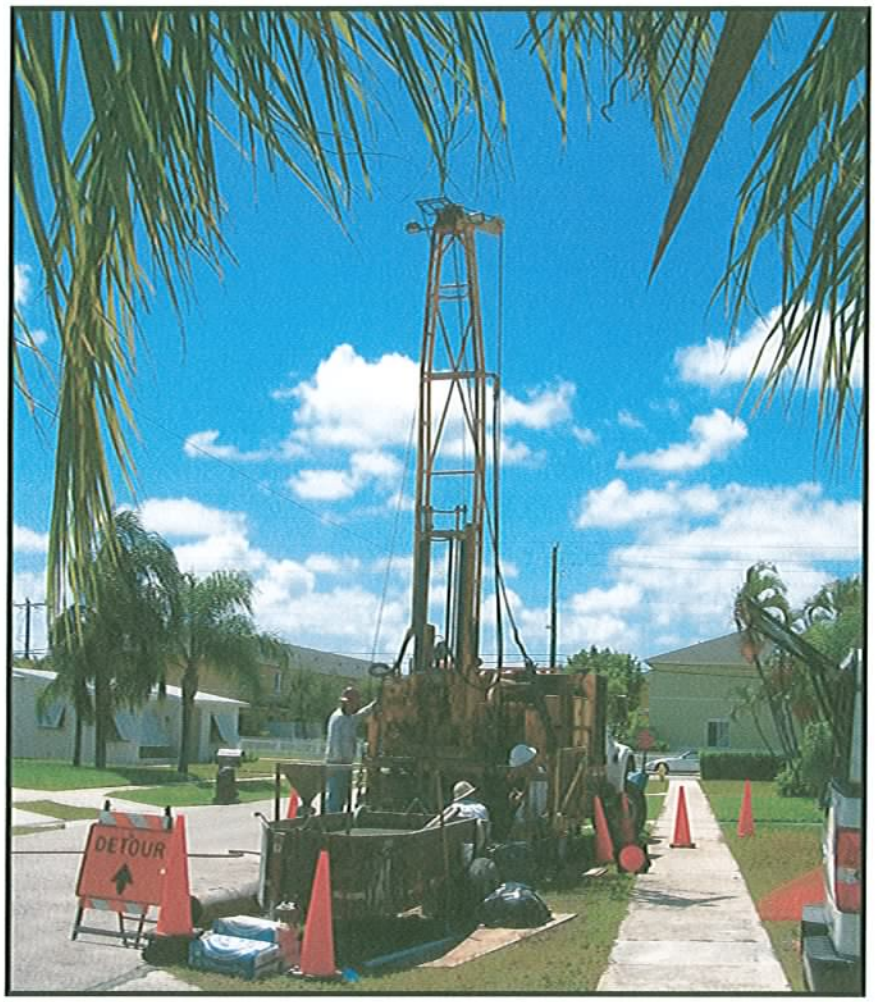


Figure 8 – Drill Rig Set Up at MW-7

Figure 9 – Geophysical Logging of MW-7 Pilot Hole

Figure 10 – Installing 4-inch PVC Well Screen and Casing

Figure 11 – MW-7 Wellhead Manhole and Pad

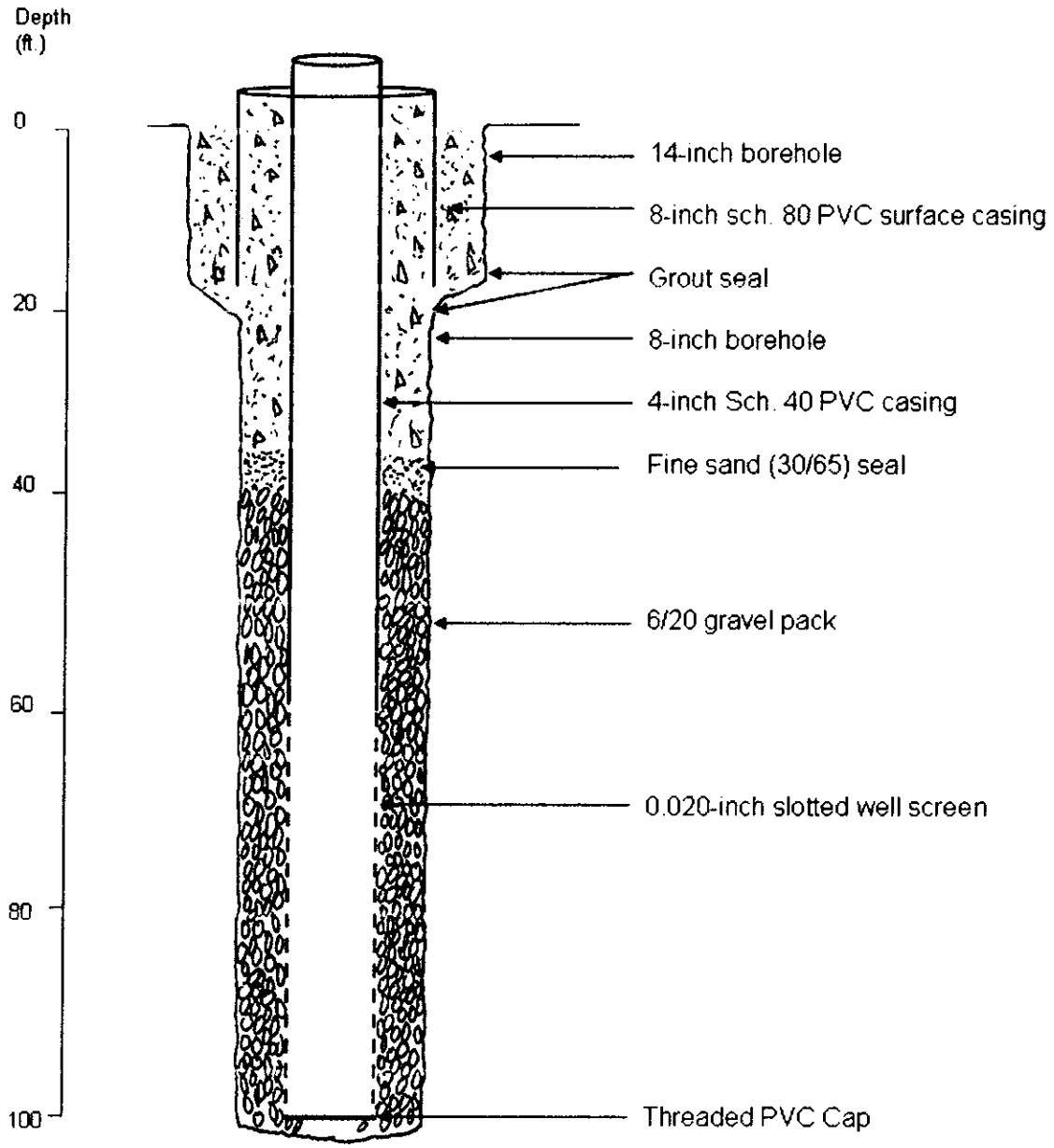


Figure 12 – MW-6 Well Construction Details

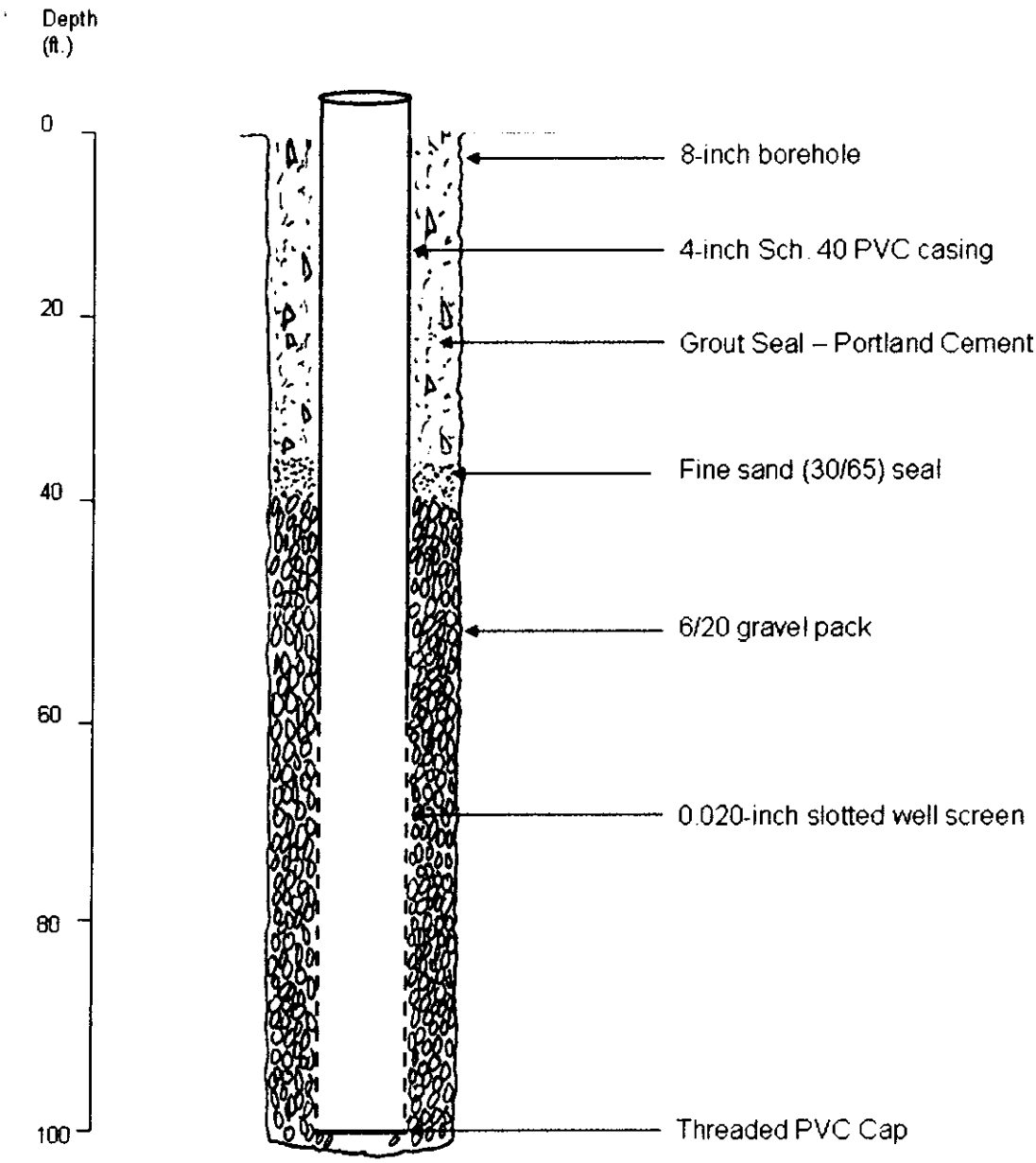


Figure 13 – MW-7 Well Construction Details

3.0 Stratigraphic and Hydrogeologic Framework

3.1 Stratigraphy

Geologic formation samples (drill cuttings) were collected during the drilling of the pilot holes and classified based on their dominant lithologic or textural characteristics and to a lesser degree color. Lithologic samples were collected every 10 feet or at each apparent formation change. Samples from the MW-6 pilot hole were collected from land surface to approximately 53 feet BLS, the depth at which circulation of drilling fluids was lost. Lithologic samples from the MW-7 pilot hole were collected from land surface to approximately 60 feet BLS and from 100 to 128 feet BLS. No sample recovery occurred between 60 and 100 feet BLS due to loss of drilling fluid circulation. The samples were stored on site in lithologic sample bags for further description. **Appendix B** contains the lithologic logs developed from the drill cuttings.

Pleistocene-Recent Series

The undifferentiated sediments that comprise the Pleistocene-Recent age sediments occur from land surface to a depth of approximately 220 feet. In this location, these sediments generally consist of white to red/orange quartz sands associated with the Pamlico Sand formation and the various forms of limestone, coquina, and calcareous sandstone that comprise the Anastasia Formation.

Pamlico Sand

The Pamlico sand is a late Pleistocene terrace deposit of marine origin. The Pamlico sand extends from North Carolina to Southern Florida and includes all marine Pleistocene deposits younger than the Anastasia Formation. The Pamlico sand unconformably overlies and fills the cavities in the Anastasia Formation (Parker and Cooke, 1944).

The Pamlico sand is mainly a quartz sand ranging in color from white to red depending on the amount of iron oxide or carbonaceous material (gray-black) incorporated into the sand. The quartz sand ranges in size from fine to coarse, with a predominance in the medium grain size. The Pamlico sand was documented at the two well sites to occur from land surface to depths ranging from 18 to 22 feet BLS.

Anastasia Formation

The Anastasia Formation was named by Sellard (1912) from its typical development of coquina on Anastasia Island, near St. Augustine, Florida. The Anastasia Formation includes all pre-Pamlico marine sand, limestone, and shell beds of Pleistocene age along the coastal area (Schroeder, Klein, & Hoy, 1958).

The Anastasia Formation represents the main component of the northern extent of Biscayne aquifer in southeastern Palm Beach County. The Anastasia Formation is equivalent to the marine portions of the Fort Thompson Formation to the west. To the south, the upper portion of the Anastasia merges with the Miami Oolite and the lower part merges and interfingers with the Key Largo limestone.

The formation is composed of marine sandy limestone, calcareous sandstone, and shelly sand. The Anastasia Formation represents sediments deposited throughout all or a major portion of the Pleistocene age (Parker and Cooke, 1944).

At the two well sites, the top of the Anastasia Formation was encountered between 18 and 22 feet BLS and continued to total depth of 128 feet BLS.

3.2 Hydrogeology

Two major aquifer systems underlie this site; the surficial (or Biscayne) aquifer system, and the Floridan aquifer system. These aquifer systems consist of discrete aquifers separated by low permeability sediments which act as confining units to varying degrees. The surficial (or Biscayne) aquifer is the focus of this report as it is the only aquifer to be penetrated by the wells.

Surficial Aquifer System

The surficial aquifer system at this location is essentially the northern most extent of the Biscayne aquifer which covers much of Dade and Broward counties to the south. The aquifer is comprised of the sediments of the Anastasia Formation, including a calcareous sandstone, marine sandy limestone and shelly sand. The top of the aquifer is considered to be the top of the Anastasia Formation which is 18 to 22 feet BLS at the two well sites.

Within the surficial aquifer in eastern Palm Beach County is a discontinuous zone of secondary permeability that extends from the Juno Beach area south to Broward County and varies from about 4 to 15 miles. This zone is considered to be the northernmost extent of the Biscayne aquifer (Swayze and Miller, 1984). This zone ranges in depth from about sea level to 220 feet BLS. At the two wells sites, this zone was documented on the caliper logs and the loss of circulation of drilling fluids from both pilot holes. The top of the zone starts between 20 and 25 feet BLS and extends to a depth of approximately 100 feet BLS.

The production wells for the Town are screened from 48 to 105 feet, which is within the zone of secondary permeability.

4.0 Hydrogeologic Testing

CCI collected data during the drilling program to document the lithology and water quality of the surficial aquifer in this area. These data were used to determine the final design criteria of the monitoring wells, including screen interval and total depth.

4.1 Geophysical Logging

Geophysical logging was conducted on both pilot holes and completed wells to provide a continuous record of the physical properties of the subsurface formations and the fluid within those formations. These logs were used to assist in the interpretation of lithology, identification of producing intervals, and determine the fluid conductivity profile of the formation fluids.

ADS provided geophysical logging services. **Table 4-1** is a summary of the geophysical logging program conducted at this site.

Table 4-1 – Summary of Geophysical Logging Operations

Well ID	Date	Logged Interval (Feet BLS)	Caliper	Gamma Ray	Electric (SP, SPR, LSN)	Flow Meter (S&D)	Temp (S&D)	Fluid Cond. (S&D)
MW-6 Pilot Hole	8/27/07	~10-128	X	X	X			
MW-7 Pilot Hole	9/06/07	~10-128	X	X	X			
MW-6	9/21/07	~10-100	X	X	X	X	X	X
MW-7	9/21/07	~10-100	X	X	X	X	X	X

Notes: -
SPR – single point resistivity
SP – spontaneous potential
LSN – long and short normal
S&D – logs run under static and dynamic conditions

The geophysical logging conducted on August 27, 2007 and September 6, 2007 was performed on the pilot holes (open boreholes) prior to installing the wells. The data from the pilot-hole logging was used to provide a continuous geophysical record of the boreholes and to assist in determining the total depth and screen interval of the proposed wells.

The geophysical logging conducted on September 21, 2007 on the completed wells was primarily to document well construction, producing intervals and water quality. The fluid temperature, fluid conductivity, and flow meter logs were run under both static and dynamic conditions. **Appendix C** contains the geophysical logging output from the various log runs performed by ADS.

Key features from the geophysical logging operations include the following:

- Numerous solution features in the Anastasia Formation can be seen from ~25 feet to 80 feet BLS on the caliper logs from the pilot holes. These solution features are part of the zone of secondary permeability that exists in the surficial aquifer in this area.

- The flow meter logs indicate the majority of water during the dynamic run was coming from the top of the screened interval at approximately 60 feet BLS. This may be due to the limited pumping rate (approximately 35 to 40 gallons per minute (GPM)) that was possible on the completed wells given their small (4-inch) diameter.

- The fluid resistivity logging indicated that the water quality was consistent throughout the entire screened interval of both wells. A slight decrease in fluid resistivity was seen at 90 feet during the static run and from 80-100 feet BLS during the dynamic run of MW-6.

4.2 Water Quality Sampling

CCI collected field water quality samples on the completed wells. Samples were collected during well development, specific capacity testing and dynamic geophysical logging operations. The water quality data parameters included temperature, conductivity, total dissolved solids (TDS), total Iron, turbidity, and chlorides. **Table 4-2** summarizes the results of field water quality sampling.

Table 4-2 – Summary of Field Water Quality

Well No.	Date	Time	Task	Parameters					
				Conductivity (uS)	TDS (ppm)	Temp (°F)	Turbidity (NTU)	Chlorides (mg/L)	Total Iron (mg/L)
MW-6	8/30/07	15:45	Dev	487	244	80.1	0.76	38	0.98
MW-6	9/11/07	16:15	ST	485	243	79.7	0.38	38	1.03
MW-6	9/21/07	11:15	GPL	486	243	80.6	0.56	31	1.18
MW-7	9/7/07	16:05	Dev	520	260	79.3	2.28	44	0.88
MW-7	9/11/07	14:25	ST	510	253	79.3	0.35	44	0.83
MW-7	9/21/07	14:45	GPL	522	287	79.3	0.36	44	0.40

Notes: Dev – development
ST – step testing
GPL – geophysical logging
uS – micro Siemens
ppm – parts per million
°F – Degrees Fahrenheit
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter

4.3 Specific Capacity Testing and Water Table Elevation

Step testing was performed on the completed wells to determine the specific capacity of each well. Step testing was conducted on September 11, 2007. The specific capacity data summarized in **Table 4-3** were calculated at the end of each 30 minute step. Step testing was conducted by pumping the wells with a 3-inch, gasoline-powered centrifugal pump with a 25 foot long, 2-inch PVC drop pipe installed into the wells.

Table 4-3 – Summary of Step Testing Data

Well No.	Parameter	Step No. 1	Step No. 2	Step No.3
MW-6	Flow Rate (GPM)	36	70	98
	Static Water Level (ft)	8.80	8.80	8.80
	Pumping Water Level (ft)	10.10	11.65	13.29
	Drawdown (ft)	1.30	2.85	4.49
	Specific Capacity (GPM/ft)	**27.7**	**24.6**	**21.8**
MW-7	Flow Rate (GPM)	35	65	90
	Static Water Level (ft)	9.40	9.40	9.40
	Pumping Water Level (ft)	11.55	14.03	16.15
	Drawdown (ft)	2.15	4.63	6.75
	Specific Capacity (GPM/ft)	**16.3**	**14.0**	**13.3**

Notes: Water levels are from top of casing
GPM – gallons per minute
ft – feet

Table 4-4 provides the water table elevation data from each well on September 11, 2007 prior to step testing and on September 21, 2007 prior to geophysical logging.

Table 4-4 – Water Table Elevation Data

Well No.	Date	Casing Elevation* (ft)	Depth to Water	Water Table Elevation (ft)
MW-6	9/11/07	14.34	8.80	5.54
	9/21/07	14.34	8.78	5.56
MW-7	9/11/07	14.67	9.40	5.27
	9/21/07	14.67	9.10	5.57

Note: * - Elevation is referenced to the National Geodetic Vertical Datum of 1929

5.0 Conclusions and Recommendations

The purpose of this investigation was to document current water quality conditions between the nearest saltwater body, the Intracoastal Waterway (IWW), and the Town's well field. The following conclusions are made based on the drilling and testing of the saltwater monitoring wells:

- Saltwater monitoring wells MW-6 and MW-7 are now part of a network of monitoring wells used to monitor chloride concentrations within the production zone of the surficial aquifer between the IWW and Town wellfield.

- Geophysical logging data and lost circulation of drilling fluids indicates that the wells are screened within the zone of secondary permeability of the surficial aquifer known to exist in this area.

- Data collected during the drilling and testing program indicate that saltwater has not reached the two well locations within the screened interval (60 to 100 feet BLS) of the wells.

- Field water quality data indicates chloride concentrations range from 38 mg/L in MW-6 to 44 mg/L in MW-7.

- Specific capacity of the wells ranged from 13.3 GPM/ft in MW-7 to 21.8 GPM/ft in MW-6.

- The water table elevation data collected from the wells indicates that the water table elevation ranged from 5.27 feet in MW-7 on September 11, 2007 to 5.57 feet in MW-7 on September 21, 2007.

The following recommendations are provided based on the results of the drilling and testing program:

- Water quality samples should be collected from these wells, along with other existing monitoring wells, on a routine basis to monitor for the potential migration of saltwater from the IWW toward the Town wellfield.

- The Town should continue to operate their wellfield in a manner to minimize the potential for saltwater intrusion.

- The Town should pursue an alternate water source to reduce the withdrawals from the surficial aquifer near the IWW and reduce the potential for saltwater intrusion.

6.0 References

Parker, G.G. and Cooke, C.W., 1944. Late Cenozoic Geology of Southern Florida with a Discussion of the Ground Water. Florida Geologic Survey Bulletin No. 27.

Parker, G.G. Ferguson, G.E., and Love, S.K., 1944. Interim Report of Water-Resources Investigation in Southeastern Florida with Special Reference to the Miami Area of Dade County. Florida Geologic Survey Report of Investigations No. 4.

Schroeder, M.C., Klein, H., and Hoy, N.D., 1958. Biscayne Aquifer of Dade and Broward Counties, Florida. Florida Geological Survey Report of Investigations No. 17.

Sellard, E.H., 1912. The Soils and Other Surface Residual Materials of Florida, Their Origin, Character, and the Formations From Which Derived. Florida Geological Survey 12th annual Report.

Swayze, L.J. and Miller W.L., 1984. Hydrogeology of a Zone of Secondary Permeability in the Surficial Aquifer of Eastern Palm Beach County, Florida. USGS Water Resources Investigations Report 83-4249.

APPENDICES

APPENDIX A

DOH WELL CONSTRUCTION PERMIT AND SFWMD WELL COMPLETION REPORT

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☐ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT

THIS FORM *MUST* BE FILLED OUT COMPLETELY.
The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No 923-07
Septic No
Permit Stipulations Required
62-524 well
cup/
wup Application No.

1. TOWN OF LANTANA | 500 Greynolds Cir. | LANTANA | FL | N/A
Owner, Legal Name of Entity if Corporation | Address | City | State | Telephone Number

2. 500 Greynolds Circle Lantana FL 33462
Well Location – Address, Road Name, City and Zip

3. Scott Smith | 11219 | 561-736-4900
Well Drilling Contractor | License No | Telephone No.

1310 Neptune Dr. | 4. ¼ of | ¼ of | Section 03
Address | (smallest) | (biggest)

BOYNTON BEACH | FL | 33426 | 5. Township 45 | Range 43
City | State | Zip | (Indicate Well on Chart)

NW NE SW SE

6. PALM BEACH | — | — | — | —
County | Subdivision Name | Lot | Block | Unit

7. Number of proposed wells 1 Check the use of well: ☐ Domestic (Res. Home) ☒ Monitor ☐ Irrigation (Residential)
☐ Irrigation (Business) ☐ Public Water Supply (Business) List Other

Distance from septic system ft. Distance from foundation ft. Description of facility Town Hall
Estimated start of construction date N/A **Plumbing Connection** ☐ **Sewer** ☐ **Septic**

8. Application for: ☒ New Construction ☐ Repair/Modify
☐ Abandonment (Reason for abandonment)

Approval Stamp

9. Estimated: Well Depth 100 ft Casing Depth TBD ft
Screen Interval from TBD to Casing Material: ☐ Blk-Steel / ☐ Gal / ☒ PVC
Casing Diameter 4" Seal Material

10. If applicable: Proposed Grouting Interval From TBD to Seal Material Neat Grout Schedule 80
From to Seal Material
From to Seal Material

Draw a map of well location and indicate well site with an "X". Identify known Roads and landmarks: provide distances between well and landmarks.

North
West East
South

11. Telescope Casing ☐ or liner ☐ (check one) Diameter
Blk-Steel ☐ / Galvanized ☐ / PVC ☐ Other (specify): N/A

12. Method of Construction: ☒ Rotary ☐ Cable Tool ☐ Combination
☐ Auger ☐ Other (specify):

13. Indicate total No. of wells on site N/A. List No. of unused wells on site N/A

14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ☒ No ☐ Yes
(If yes, complete the following) CUP/WUP No.
District well ID No.
Latitude Longitude
Data obtained from GPS ☐ or map ☐ or survey ☐ (map datum NAD 27 ☐ NAD 83 ☐)

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local Governments, if applicable. I agree to provide a well completion report to the District within 30 days After drilling or the permit expiration, whichever occurs first.

Scott Smith 11219
Signature of Contractor License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

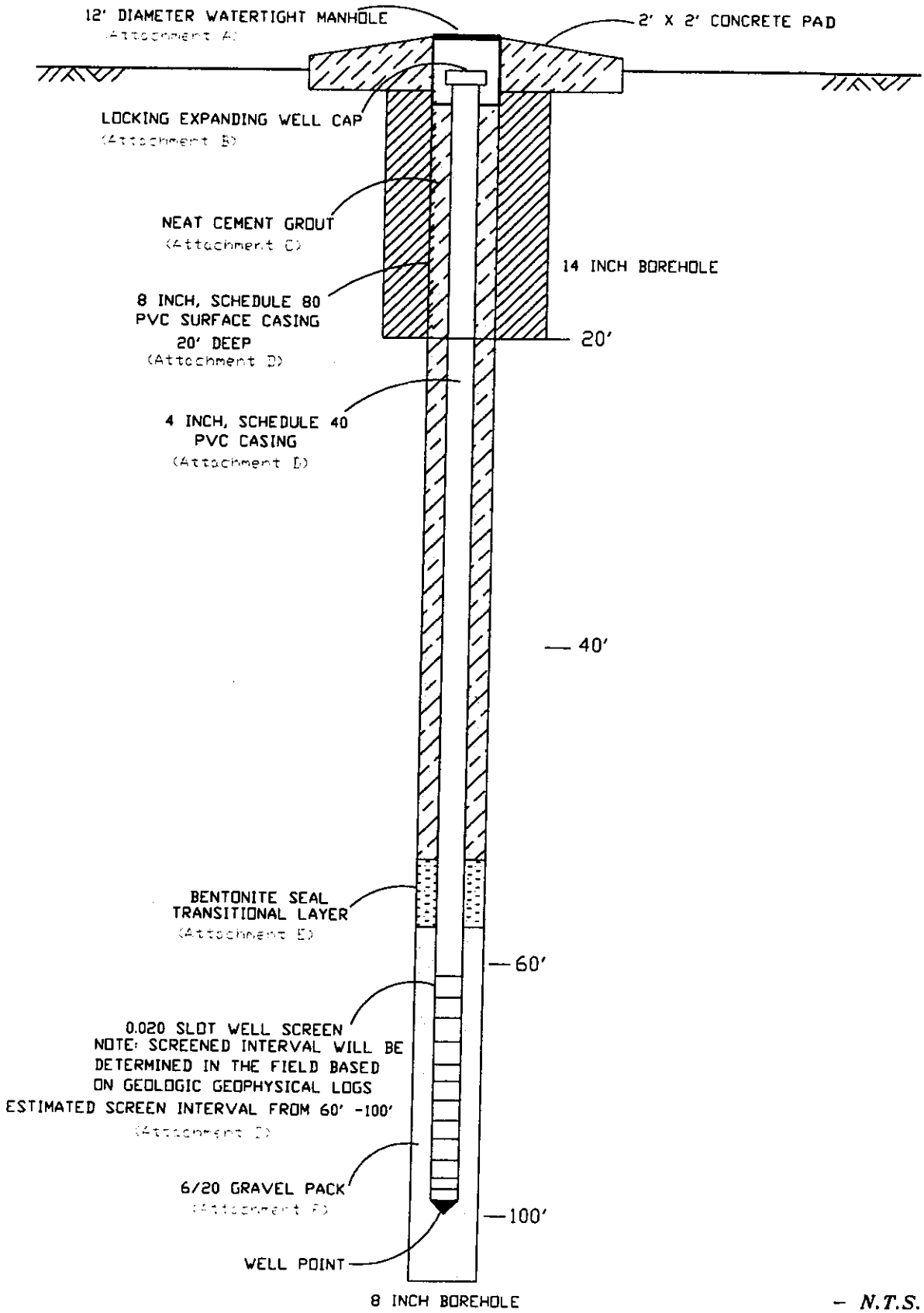
Owner's or Agent's Signature 8/7/07 Date

DO NOT WRITE BELOW THIS LINE – FOR OFFICIAL USE ONLY

Approval Granted By: _____ Issue Date: _____ Hydrologist Approval _____ Initials
Owner Number: _____ Fee Received: $ 100 Receipt No.: 28860 Check No.: _____
Inspected by: _____ Date: _____

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD/CHD IT SHALL BE AVAILABLE AT **THE** WELL SITE DURING ALL DRILLING OPERATIONS. **THIS PERMIT IS VALID FOR 180 DAYS FROM DATE OF ISSUANCE.**

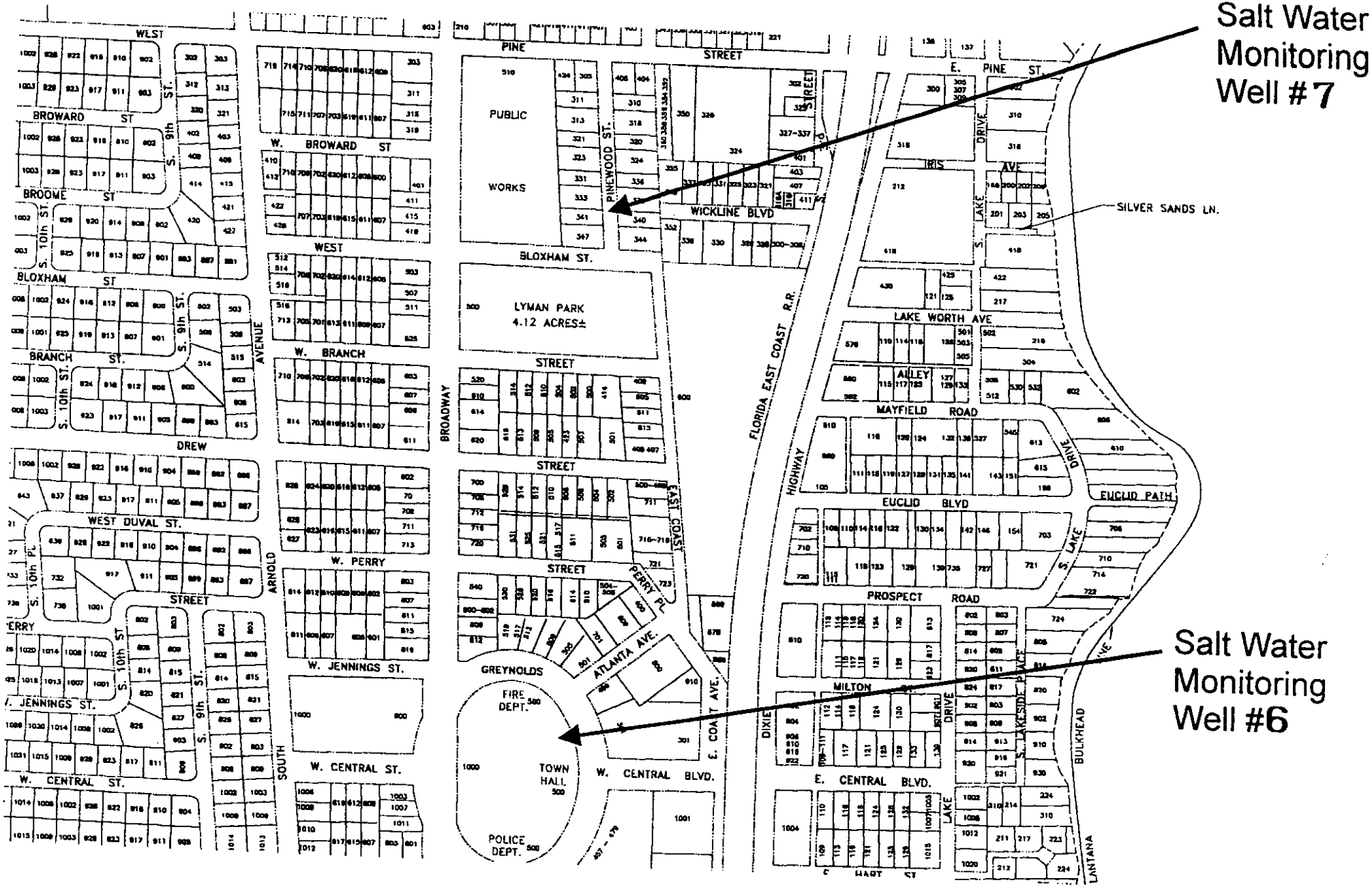
Internet Form 0123



– *N.T.S.* –

TOWN OF LANTANA
LANTANA, FLORIDA

Salt Water Monitoring Well
#6
(Town Hall Site)


Salt Water Monitoring Well #7
Salt Water Monitoring Well #6
SILVER SANDS LN.
PUBLIC WORKS
LYMAN PARK 4.12 ACRES±
FIRE DEPT.
TOWN HALL
POLICE DEPT.
PINE STREET
BLOXHAM ST.
WICKLINE BLVD
W. BROWARD ST
BROWARD ST
BROOME ST
BLOXHAM ST
BRANCH ST.
W. BRANCH
DREW
WEST DUVAL ST.
W. PERRY
W. JENNINGS ST.
W. CENTRAL ST.
E. PINE ST.
LAKE WORTH AVE
MAYFIELD ROAD
EUCLID BLVD
PROSPECT ROAD
MILTON
E. CENTRAL BLVD.
W. CENTRAL BLVD.
GREYNOLDS
ATLANTA AVE.
FLORIDA EAST COAST R.R.
BROADWAY
ARNOLD AVENUE
SOUTH 9th ST.
S. 10th ST.
S. 10th PL
PINEWOOD ST.
EAST COAST
PERRY PL
DIXIE HIGHWAY
LAKE DRIVE
EUCLID PATH
LAKESIDE PLACE
BULKHEAD
LANTANA

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☐ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT

THIS FORM *MUST* BE FILLED OUT COMPLETELY.
The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No 982-07
Septic No
Permit Stipulations Required

62-524 well
cup/
wup Application No.

1. TOWN OF LANTANA | 500 Greynolds Cir. | Lantana | FL. | N/A
Owner, Legal Name of Entity if Corporation | Address | City | State | Telephone Number

2. 333 Pinewood Street Lantana, FL 33462
Well Location – Address, Road Name, City and Zip

3. Scott Smith | 11219 | 561-736-4900
Well Drilling Contractor | License No | Telephone No.

1310 Neptune Dr. | 4. ¼ of | ¼ of | Section 03
Address | (smallest) | (biggest)

Boynton Beach | FL | 33426 | 5. Township 45 | Range 43
City | State | Zip | (Indicate Well on Chart)

NW NE SW SE

6. Palm Beach | — | — | — |
County | Subdivision Name | Lot | Block | Unit

7. Number of proposed wells 1 Check the use of well: ☐ Domestic (Res. Home) ☒ Monitor ☐ Irrigation (Residential)
☐ Irrigation (Business) ☐ Public Water Supply (Business) List Other

Distance from septic system ft. Distance from foundation ft. Description of facility House
Estimated start of construction date **Plumbing Connection** ☐ **Sewer** ☐ **Septic**

8. Application for: ☒ New Construction ☐ Repair/Modify
☐ Abandonment (Reason for abandonment)

9. Estimated: Well Depth 100 ft Casing Depth TBD ft
Screen Interval from to Casing Material: ☐ Blk-Steel / ☐ Gal / ☒ PVC
Casing Diameter 8" Seal Material Schedule 80

10. If applicable: Proposed Grouting Interval From TBD to Seal Material
From to Seal Material
From to Seal Material

Approval Stamp

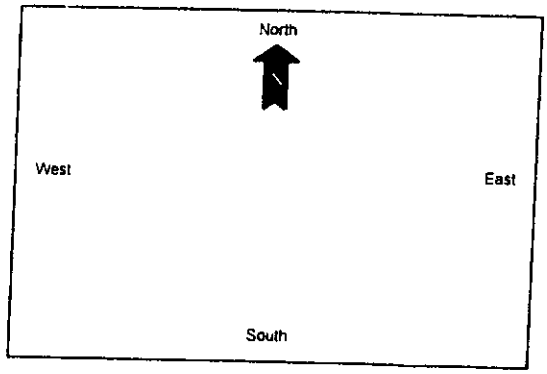
11. Telescope Casing ☐ or liner ☐ (check one) Diameter
Blk-Steel ☐ / Galvanized ☐ / PVC ☐ Other (specify):

12. Method of Construction: ☒ Rotary ☐ Cable Tool ☐ Combination
☐ Auger ☐ Other (specify):

13. Indicate total No. of wells on site . List No. of unused wells on site

14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ☒ No ☐ Yes
(If yes, complete the following) CUP/WUP No.
District well ID No.
Latitude Longitude
Data obtained from GPS ☐ or map ☐ or survey ☐ (map datum NAD 27 ☐ NAD 83 ☐)

Draw a map of well location and indicate well site with an "X". Identify known Roads and landmarks; provide distances between well and landmarks.



15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local Governments, if applicable, I agree to provide a well completion report to the District within 30 days After drilling or the permit expiration, whichever occurs first.

Scott Smith 11219
Signature of Contractor License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

Owner's or Agent's Signature 8/17/07
Date

DO NOT WRITE BELOW THIS LINE - FOR OFFICIAL USE ONLY

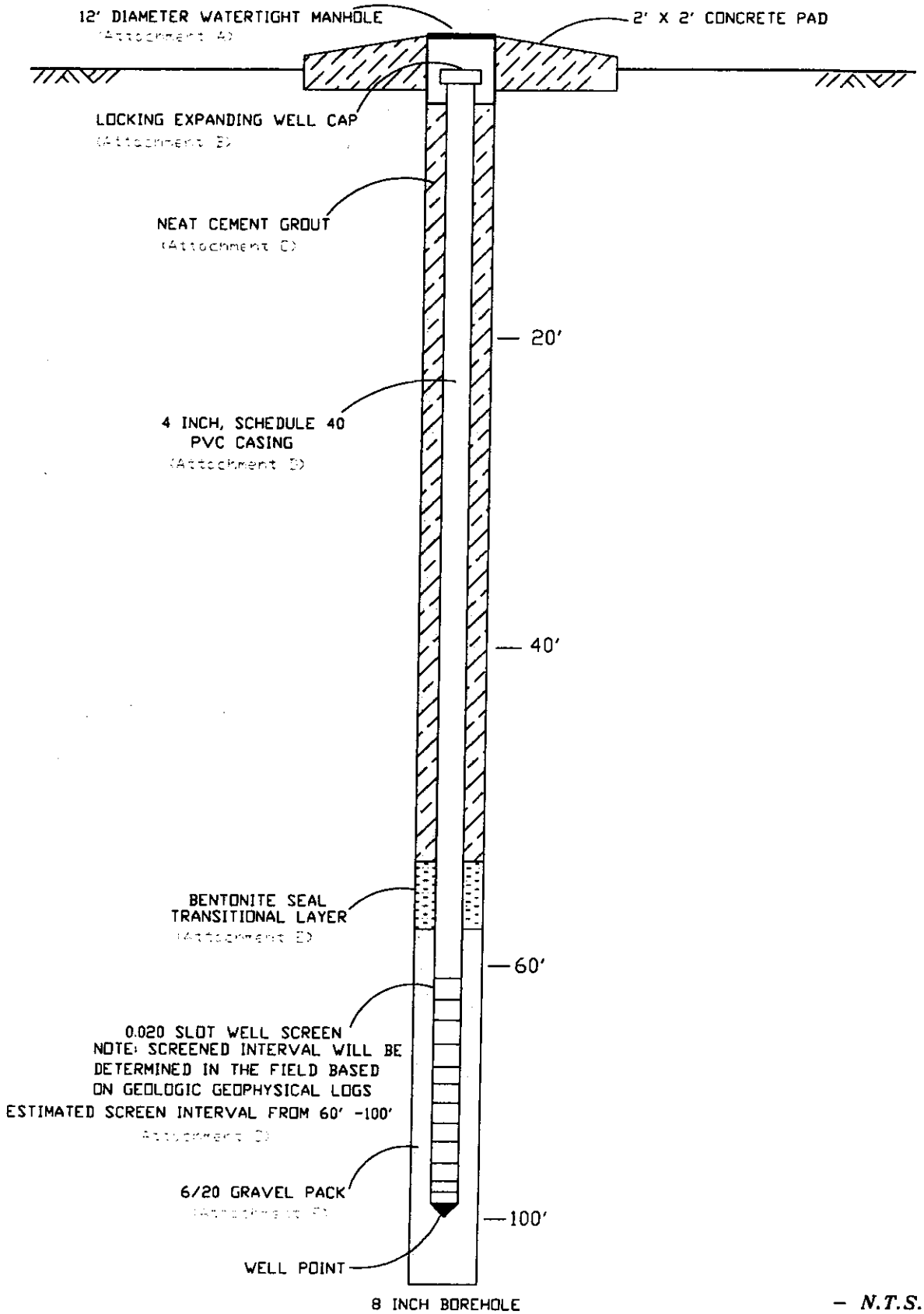
Approval Granted By: _____ Issue Date: _____ Hydrologist Approval _____ Initials

Owner Number: _____ Fee Received: $ 100 Receipt No.: 28910 Check No.: _____

Inspected by: _____ Date: _____

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD/CHD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. **THIS PERMIT IS VALID FOR 180 DAYS FROM DATE OF ISSUANCE.**

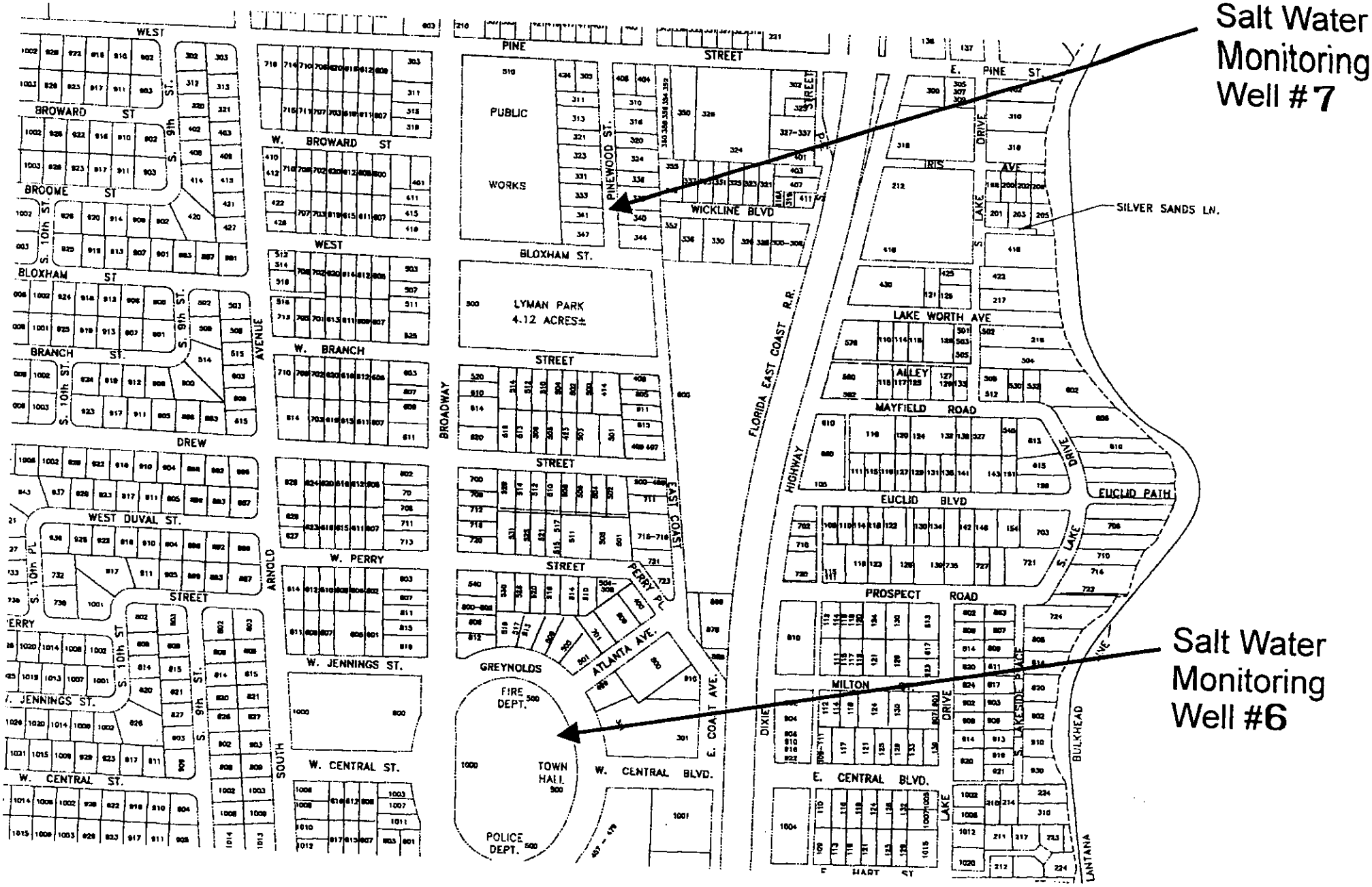
Internet Form 0123



– *N.T.S.* –

TOWN OF LANTANA
LANTANA, FLORIDA

Salt Water Monitoring Well #7
(333 Pinewood Street)


Salt Water Monitoring Well #7
Salt Water Monitoring Well #6
SILVER SANDS LN.
PUBLIC WORKS
LYMAN PARK 4.12 ACRES±
TOWN HALL
FIRE DEPT.
POLICE DEPT.
PINE STREET
E. PINE ST.
BROWARD ST
W. BROWARD ST
BROOME ST
BLOXHAM ST
W. BRANCH
BRANCH ST.
DREW
WEST DUVAL ST.
W. PERRY
W. JENNINGS ST.
W. CENTRAL ST.
E. CENTRAL BLVD.
W. CENTRAL BLVD.
WICKLINE BLVD
LAKE WORTH AVE
MAYFIELD ROAD
EUCLID BLVD
PROSPECT ROAD
MILTON
GREYNOLDS
ATLANTA AVE.
PERRY PL
IRIS AVE
EUCLID PATH
S. LAKESIDE PLACE
BULKHEAD
LANTANA
FLORIDA EAST COAST R.R.
BROADWAY
ARNOLD
PINEWOOD ST.
DIXIE HIGHWAY
LAKE DRIVE
AVENUE
STREET
ALLEY

WELL COMPLETION REPORT
FORM 0124
Rev. 11/90

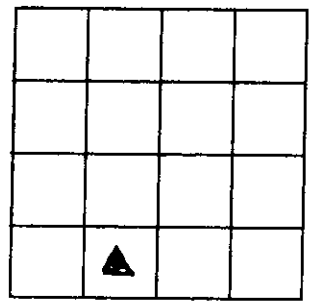
WELL PERMIT NO. 923-07
SFWMD WATER USE PERMIT NO. _____

TOWN OF LANTANA 500 GREYNOLDS CIRCLE, LANTANA FL 33462
Owner Address City State Zip

Contractor's Signature | License No. 1110 | Completion Date 8-27-07 | Casing Depth 60 | Total Depth 100 | Well # MW-6

TYPE OF WORK: Construct (X) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (X) Test ( )
Irrigation ( ) FireWell ( ) Other _____
METHOD: Rotary with MUD (X) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL 9 Ft. below top of casing
PUMPING WATER LEVEL _____ Ft, after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

LOCATION
Located Near TOWN OF LANTANA TOWN HALL
County PALM BEACH
SE SW 3 45 43
1/4 1/4 Section Township Range
Latitude-Longitude



Cuttings sent to District? ( ) Yes (Y) No

LOCATE IN SECTION

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Ø Diameter & Depth		Depth (R) From	Depth (R) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
0	0		0	17	L. TAN QFS
			17	100	TAN QMS + GREY LSF + SHELL
57					
	60	60			
Number of bags		100			
10					

Casing: Black Steel ( ) Galv. ( ) PVC ( ) Fiberglass ( )
Screen: Type PVC Slot size .020
Screened from 60 (ft.) to 100 (ft.)
Type of grout with % additives NEAT
Water: Clear (Y) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

WELL COMPLETION REPORT
FORM 0124
Rev. 11/90

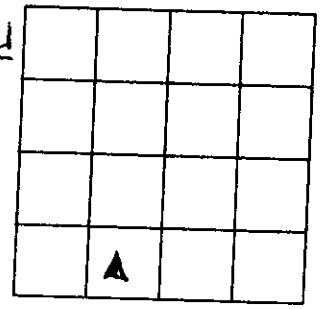
WELL PERMIT NO. 982-07
SFWMD WATER USE PERMIT NO. _____

TOWN OF LANTANA (Owner) 333 Pinewood (Address) STREET, LANTANA (City) FL (State) 33462 (Zip)

Contractor's Signature _____ 1110 (License No.) 9-11-07 (Completion Date) _____ (Casing Depth) _____ (Total Depth) MW-7 (Well #)

TYPE OF WORK: Construct (Y) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (Y) Test ( )
Irrigation ( ) FireWell ( ) Other _____
METHOD: Rotary with MUD (Y) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL 9 Ft. below top of casing
PUMPING WATER LEVEL _____ Ft, after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

LOCATION
Located Near 333 Pinewood
County Palm Beach
SE SW 3 45 43
1/4 1/4 Section Township Range
Latitude-Longitude



Cuttings sent to District? ( ) Yes (Y) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones.
0	0	0	17	LIGHT QES
		17	100	TAN QMS + GRAY LSE + SHELL
57	60			
	60			
Number of bags				
10	100			

Casing: Black Steel ( ) Galv. ( ) PVC (X) Fiberglass ( )
Screen: Type PVC Slot size .020
Screened from 60 (ft.) to 100 (ft.)
Type of grout with % additives NEAT
Water: Clear (Y) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

APPENDIX B

LITHOLOGIC LOGS

LITHOLOGIC LOG

CCI Connect Consulting, Inc.
Water Resource Consultants

Client Name	Mathews Consulting, Inc.	Date	8/20/07 – 8/24/07	Page 1 / 1
Project Name	Town of Lantana–Salt MW	Weather	Sunny, 85-90°F, east wind 5-15 MPH	
Project Location	Lantana, Florida	Report By	David Robertson	
Well / Boring ID	MW-6			
Drilling Contractor	Nutting Environmental of Florida, Inc.			
Drilling Method	Mud Rotary			

Depth (ft)	Description
0 - 8	Sand, white, fine grain, quartz, well sorted, subrounded to rounded.
8 - 18	Sand, pale orange, very fine to coarse, quartz, subangular to subrounded, shell fragments.
18 - 35	Sandstone, pale orange, calcareous, sandy to coquina, hard 18-23 ft., softer 23-25 ft., hard 27-35 ft.
35 - 39	Sand, pale orange, very fine to medium grain, quartz, subangular to subrounded, limestone and shell fragments.
39 - 41	Sandstone, white to pale orange, friable to moderately hard, sandy, shell fragments
41 - 44	Sand/Sandstone, white to pale orange, poorly cemented, fine to very coarse, shell fragments
44 - 52	Limestone, white to pale orange, sandy, shell fragments
52 – 128	No recovery; lost circulation of drilling fluids and cuttings at 52 feet BLS. Description of relative hardness shown below.
61 - 68	Moderately hard
68 – 70	Hard
70 – 71	Moderately soft
71 – 73	Moderately hard
73 – 76	Moderately soft
76 – 77	Moderately hard
86 – 100	Hard
100 – 105	Moderately soft
105 - 106	Moderately hard
106 - 108	Soft
108 - 114	Moderately hard
114 – 128	Moderately soft

LITHOLOGIC LOG

CCI Connect Consulting, Inc.
Water Resource Consultants

Client Name	Mathews Consulting, Inc.	Date	8/31/07 – 9/5/07	Page 1 / 1
Project Name	Town of Lantana–Salt MW	Weather	Sunny, 85-90°F, east wind 5-10 MPH	
Project Location	Lantana, Florida	Report By	David Robertson	
Well / Boring ID	MW-7			
Drilling Contractor	Nutting Environmental of Florida, Inc.			
Drilling Method	Mud Rotary			

Depth (ft)	Description
0 – 8	Sand, white, fine grain, quartz, well sorted, subrounded to rounded.
8 – 22	Sand, pale orange, very fine to coarse, quartz, subangular to subrounded, shell fragments.
22 – 36	Sandstone, pale orange, calcareous, sandy to coquina, hard 18-23 ft., softer 23-25 ft., hard 27-35 ft.
36 – 39	Sand, pale orange, very fine to medium grain, quartz, subangular to subrounded, limestone and shell fragments.
39 – 43	Sandstone, white to pale orange, friable to moderately hard, sandy, shell fragments
43 – 44	Sand/Sandstone, white to pale orange, poorly cemented, fine to very coarse, shell fragments
44 – 60	Limestone, white to pale orange, sandy, shell fragments
60 – 100	No recovery; lost circulation of drilling fluids and cuttings from 60 to 100 feet BLS.
100 - 128	Limestone, white to light brown, sandy, moderately hard to hard, trace shell fragments.

APPENDIX C

GEOPHYSICAL LOGS

Report: Well Completion Report Saltwater Monitoring Wells Town of Lantana Palm Beach County, FL

Packet	Name/Description	Date	Depths	
			Bottom	Top
1	Gamma Ray/Caliper	08/27/2007	0128	0010
	Electric	08/27/2007	0126	0010
	Gamma Ray/Caliper	09/21/2007	0099	0012
	Electric	09/21/2007	0099	0035
	Temperature Fluid Resistivity	09/21/2007	0100	0005
	Flowmeter	09/21/2007	0100	
2	Gamma Ray/Caliper	09/06/2007	0128	0000
	Electric	09/06/2007	0126	0010
	Gamma Ray/Caliper	09/21/2007	0100	0014
	Electric	09/21/2007	0099	0025
	Temperature Fluid Resistivity	09/21/2007	0100	0005
	Flowmeter	09/21/2007	0099	

AQUIFER DATA SYSTEMS

GAMMA RAY/CALIPER

COMPANY NUTTING ENGINEERS
WELL ID MW-6
FIELD TOWN OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

CO
WELL
FLD
CTY
STE
FILING No

LOCATION

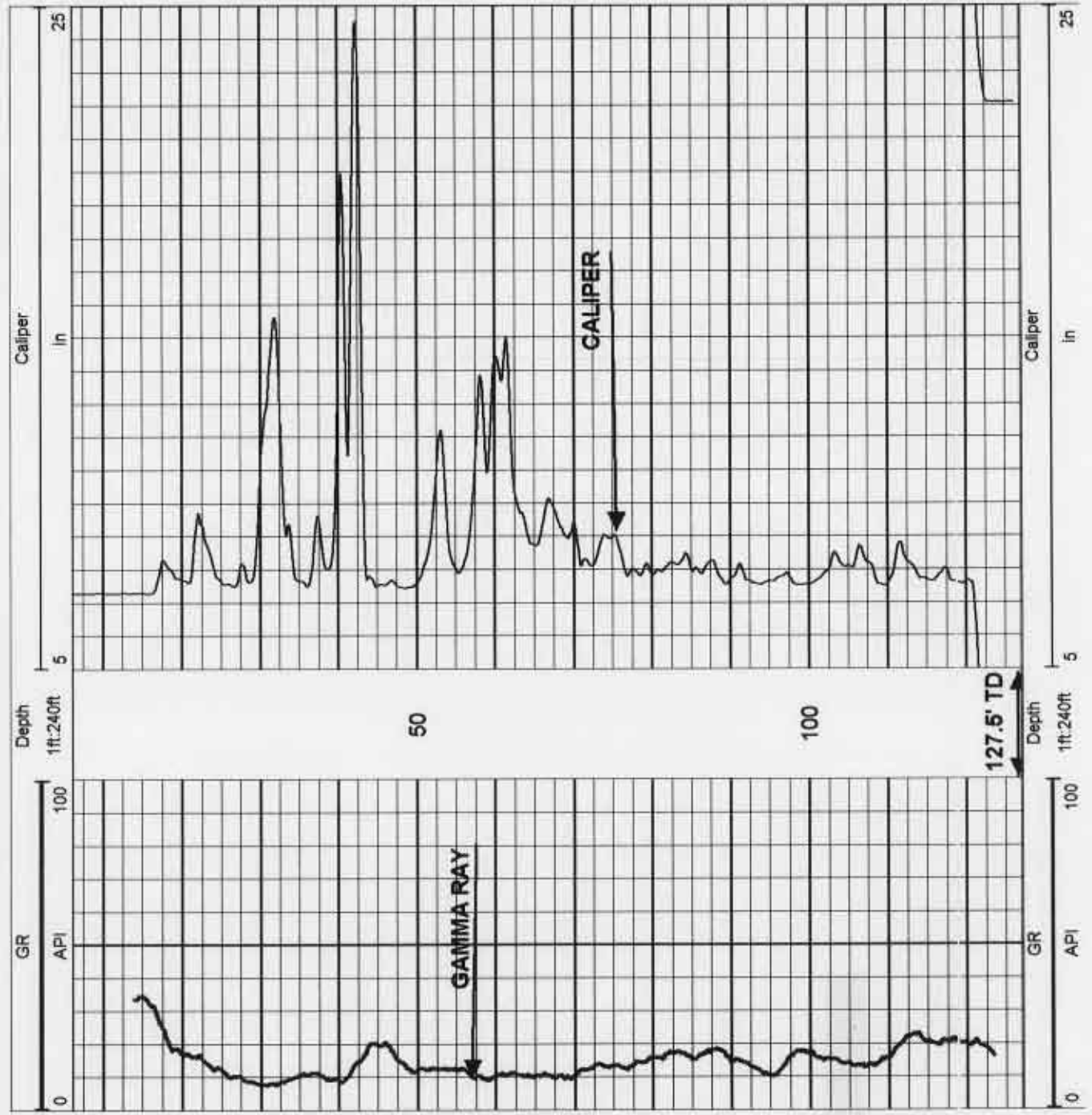
OTHER SERVICES

SEC TWP RGE

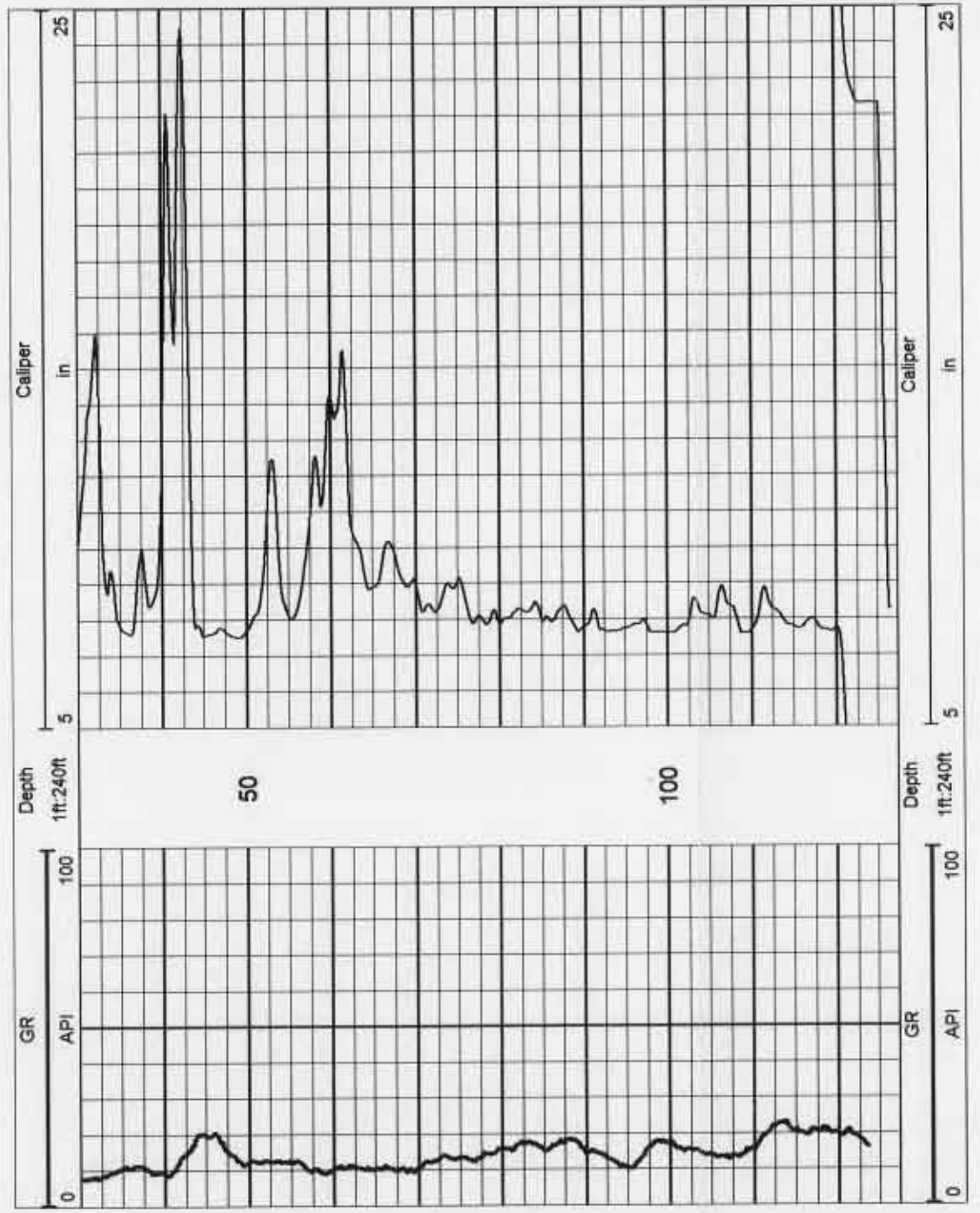
PERMANENT DATUM	GROUND LEVEL	ELEVATION NA	K.B.
LOG MEAS. FROM	G.L.	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	G.L.		G.L.

DATE	8-27-07	TYPE FLUID IN HOLE	MUD
RUN No	TWO	SALINITY	
TYPE LOG	GAMMA RAY/CALIPER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	10'
DEPTH-LOGGER	127.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	127.5'		
TOP LOGGED INTERVAL	10'		
OPERATING RIG TIME	1 1.2 HRS		
RECORDED BY	D. WILSON		
WITNESSED BY	S. SMITH (NE) D. ROBERTSON (JLA)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	14"	SURF	20'	8"	SCH 80 PVC	SURF	18'
2	7.5"	18'	128'				



REPEAT SECTION



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

ELECTRIC LOG

CO
WELL
FLD
CTY
STE
FILING No

COMPANY **NUTTING ENGINEERS**
WELL ID MW-6
FIELD TOWN OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

LOCATION

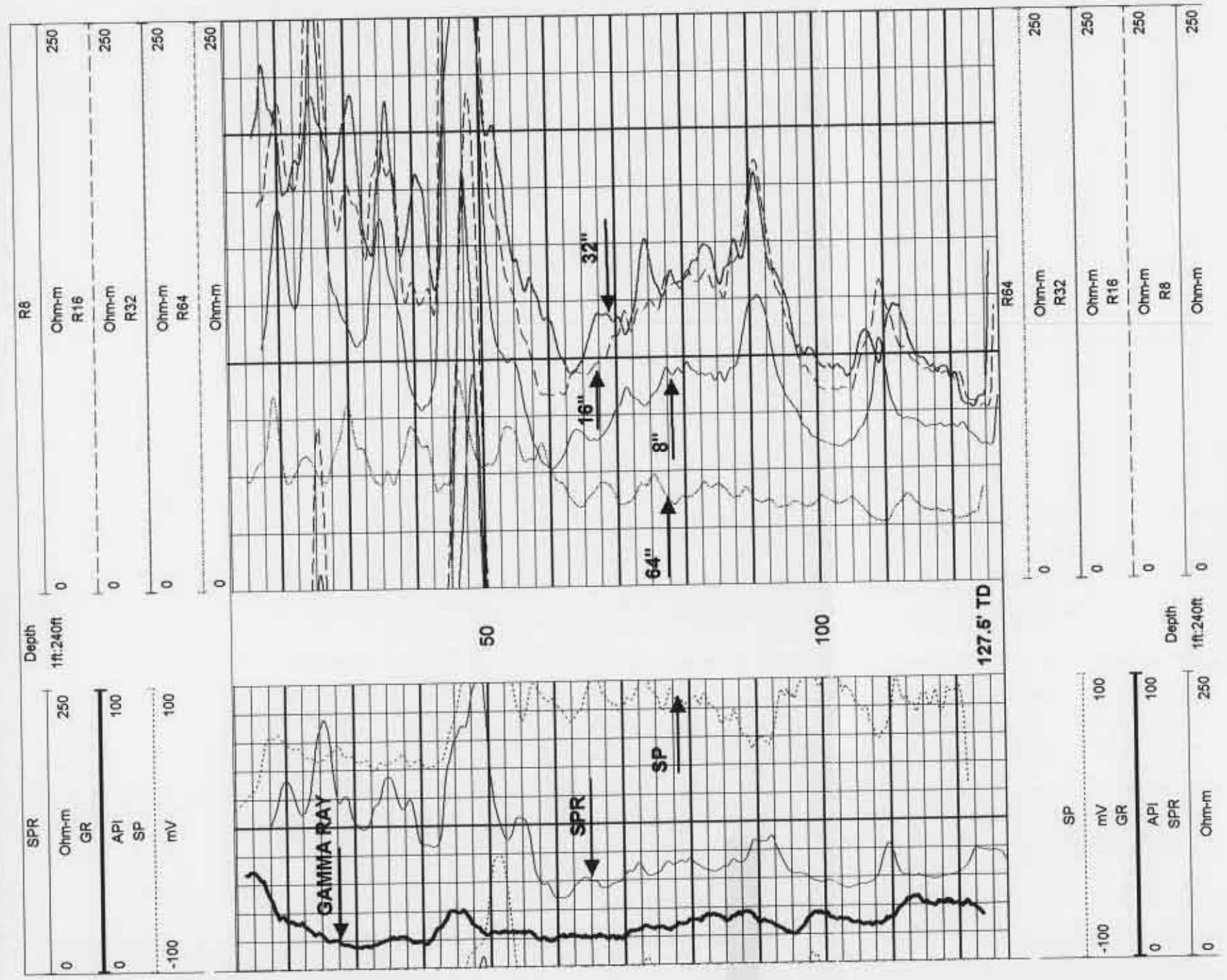
SEC TWP RGE

OTHER SERVICES

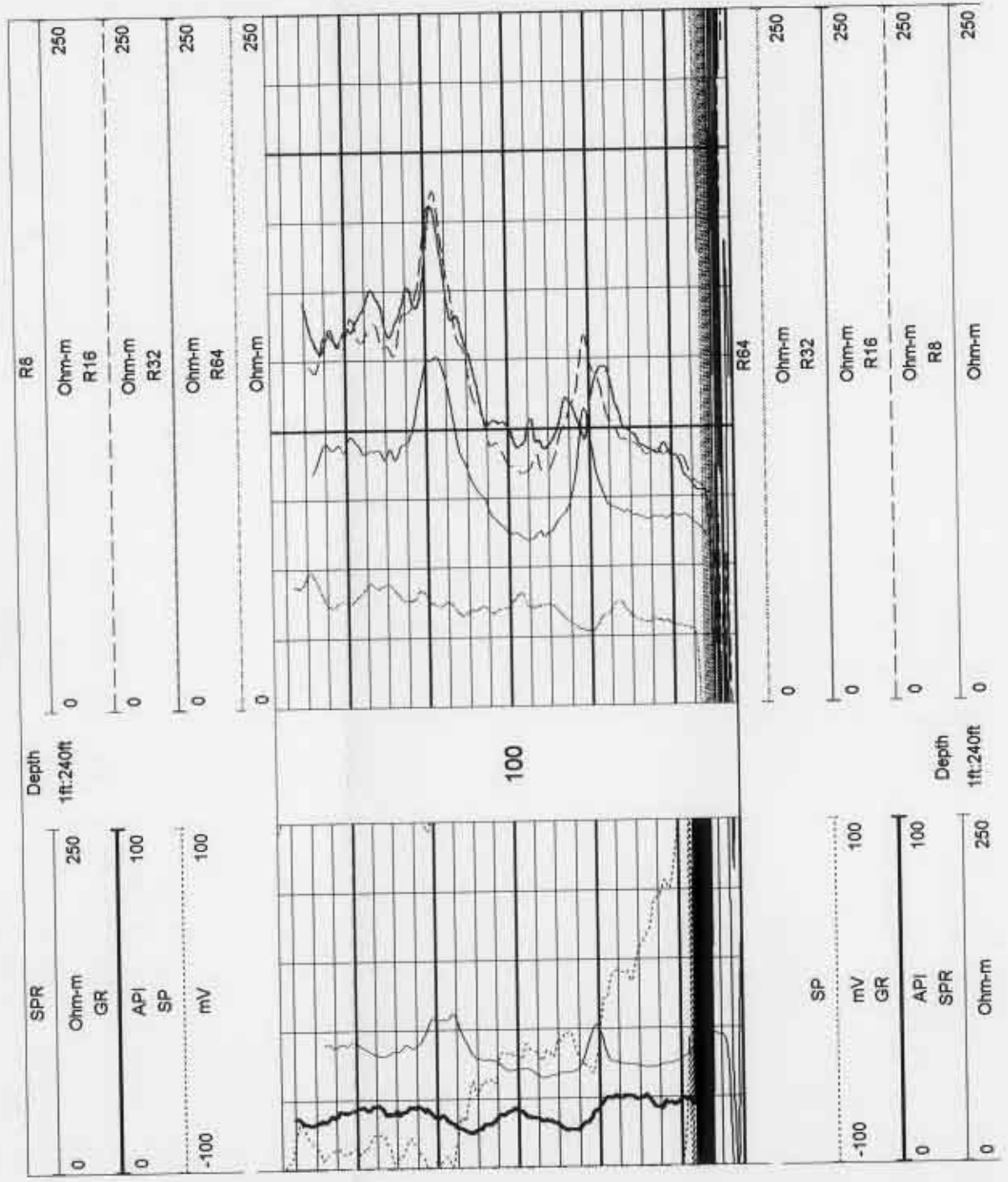
PERMANENT DATUM	GROUND LEVEL	ELEVATION NA	K.B.
LOG MEAS. FROM	G.L.	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	G.L.		G.L.

DATE	8-27-07	TYPE FLUID IN HOLE	
RUN No	THREE	SALINITY	
TYPE LOG	ELECTRIC LOG	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	127.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	126'		
TOP LOGGED INTERVAL	10'		
OPERATING RIG TIME	1 HOURS		
RECORDED BY	D. WILSON		
WITNESSED BY	S. SMITH (N.E.) D. ROBERTSON (J.L.A)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	14"	SURF	20'	8"	SCH 80 PVC	SURF	18'
2	7.5"	18'	128'				



REPEAT SECTION



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

GAMMA RAY/CALIPER

CO
WELL
FLD
CTY
STE
FILING No

COMPANY **NUTTING ENGINEERS**
WELL ID MW-6
FIELD TOWN OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

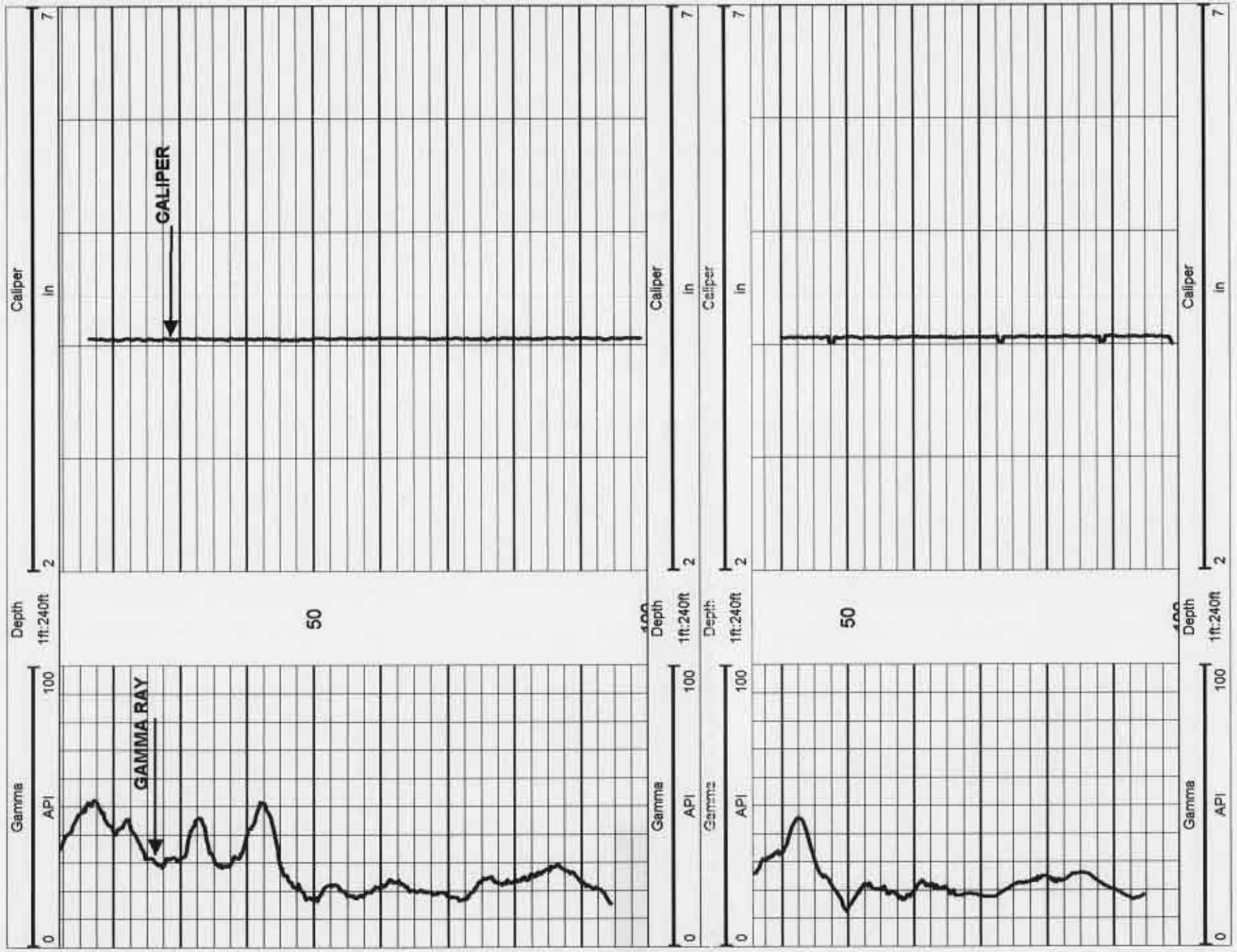
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	09-21-07	TYPE FLUID IN HOLE	WATER
RUN No	THREE	SALINITY	
TYPE LOG	GAMMA RAY/CALIPER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	75o F.
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	99.		
TOP LOGGED INTERVAL	12'		
OPERATING RIG TIME	45 MIN.		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	20'	8"	PVC	SURF.	18'
2	7.5"	18'	128'	4"	PVC	SURF.	60'
				4"	PVC SCREEN	60'	100'



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

ELECTRIC LOG

CO
WELL
FLD
CTY
STE
FILING No

COMPANY **NUTTING ENGINEERS**
WELL ID MW-6
FIELD TOWN OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

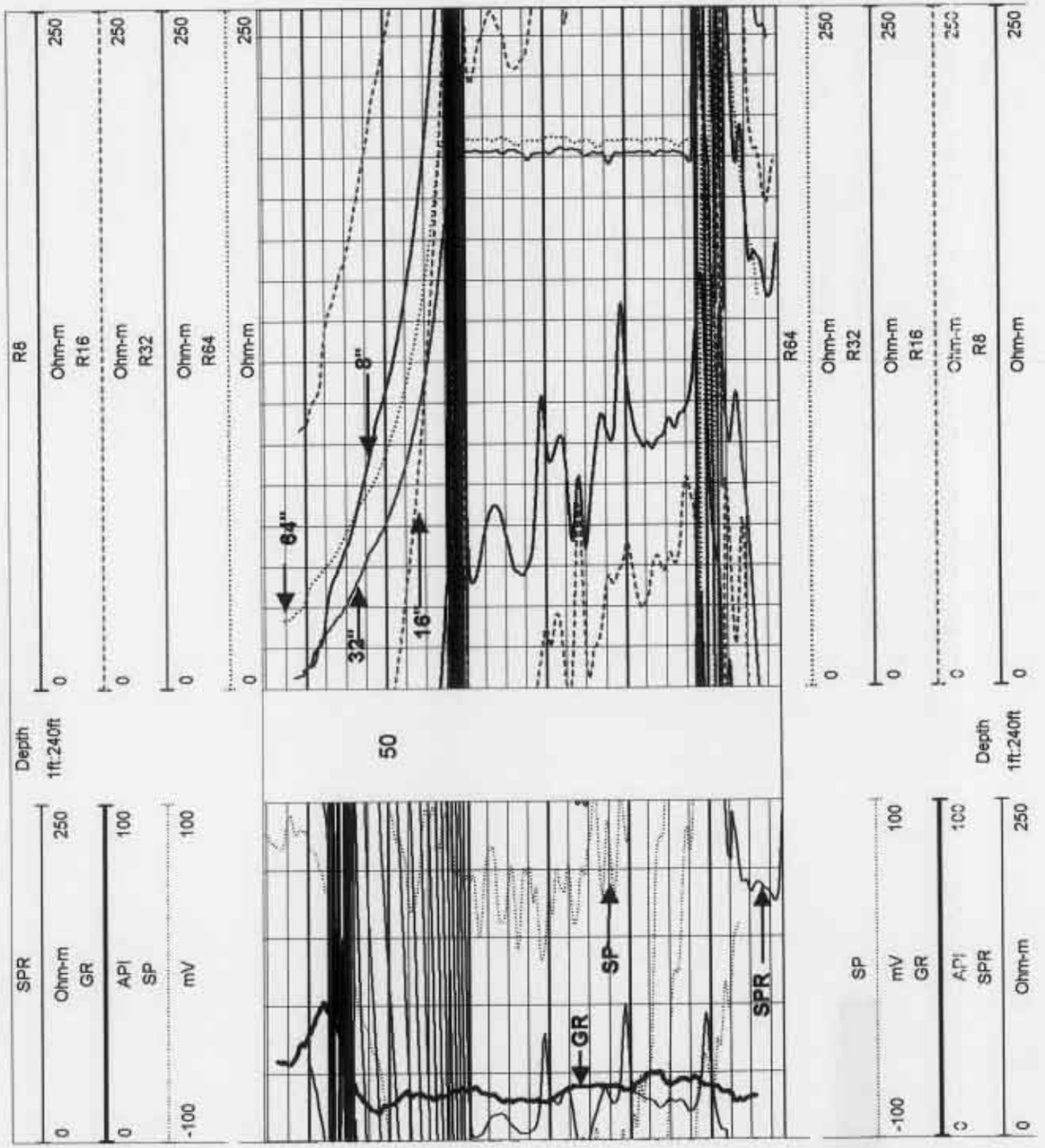
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	09-21-07	TYPE FLUID IN HOLE	WATER
RUN No	FOUR	SALINITY	
TYPE LOG	ELECTRIC LOG	DENSITY	
DEPTH-DRILLER	128'	LEVEL	75o F.
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	99'		
TOP LOGGED INTERVAL	35'		
OPERATING RIG TIME	45 MIN.		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	20'	8"	PVC	SURF.	18'
2	7.5"	18'	128'	4"	PVC	SURF.	60'
				4"	PVC SCREEN	60'	100'



AQUIFER DATA SYSTEMS

TEMPERATURE
FLUID RESISTIVITY

CO
WELL
FLD
CTY
STE
FILING No

COMPANY NUTTING ENGINEERS
WELL ID MW-6
FIELD TOWN OF LANTANA
COUNTRY PALM BEACH STATE FLORIDA

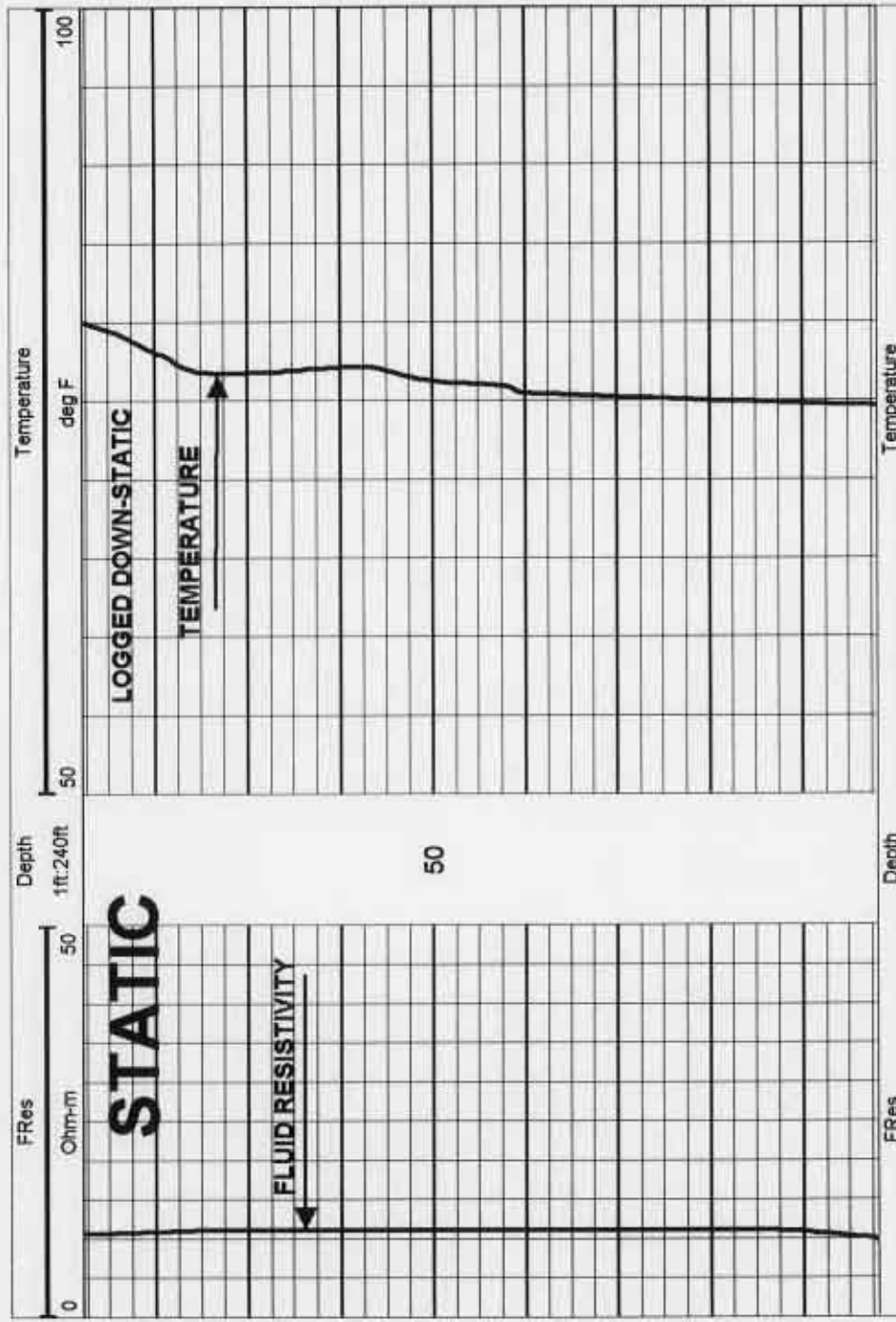
LOCATION
SEC TWP RGE

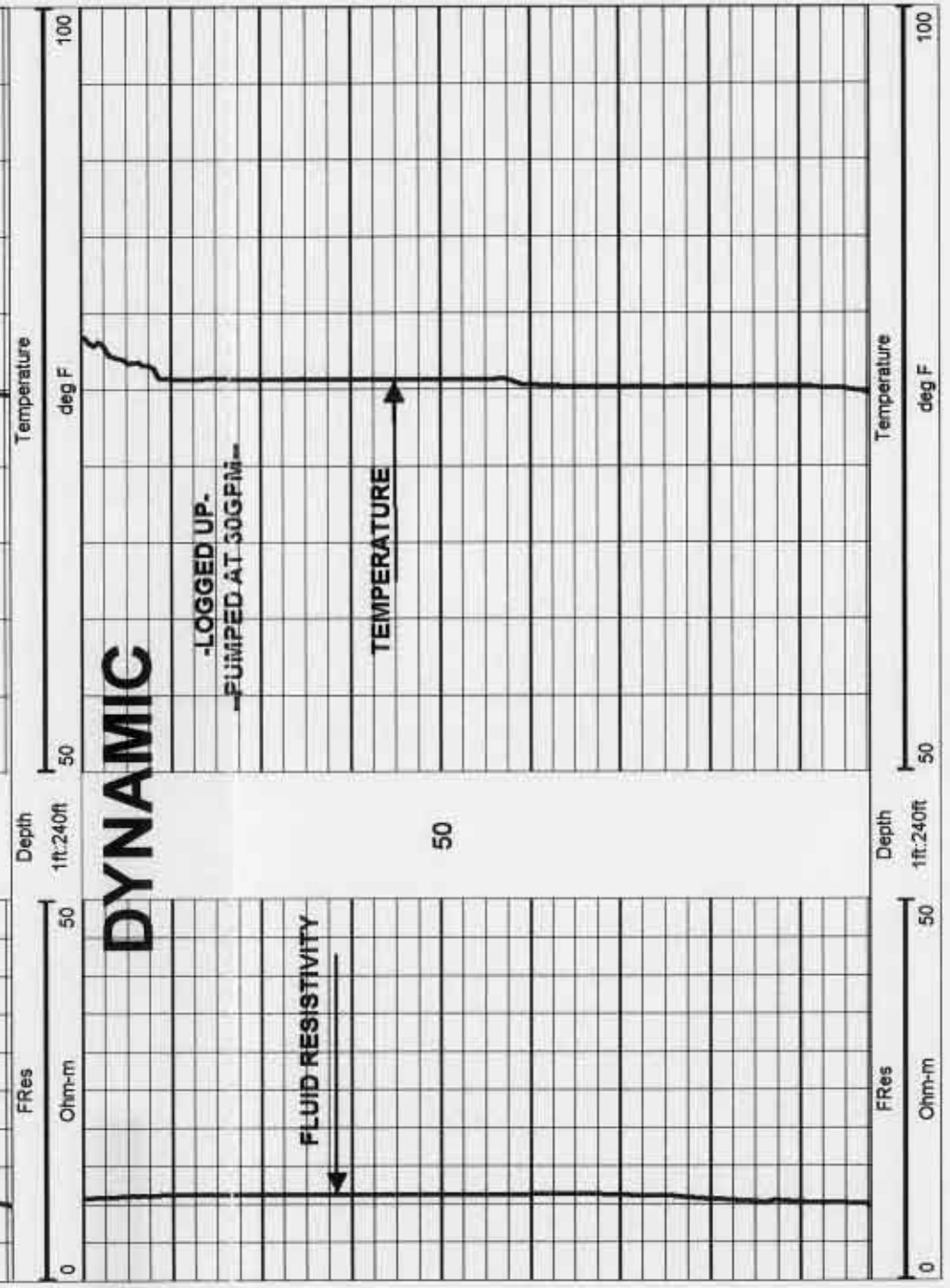
OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	09-21-07	TYPE FLUID IN HOLE	WATER
RUN No	ONE	SALINITY	
TYPE LOG	FL-RES/TEMPERATURE	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	75o F.
BTM LOGGED INTERVAL	99.5'		
TOP LOGGED INTERVAL	5'		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)1		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF	20'	8"	PVC	SURF	18'
2	7.5"	18'	128'	4"	PVC	SURF.	60'
				4"	PVC SCREEN	60'	100'





AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

FLOWMETER

COMPANY **NUTTING ENGINEERS**

WELL ID MW-6

FIELD TOWN OF LANTANA

COUNTY PALM BEACH STATE FLORIDA

CO WELL FLD CTY STE FILING No

LOCATION

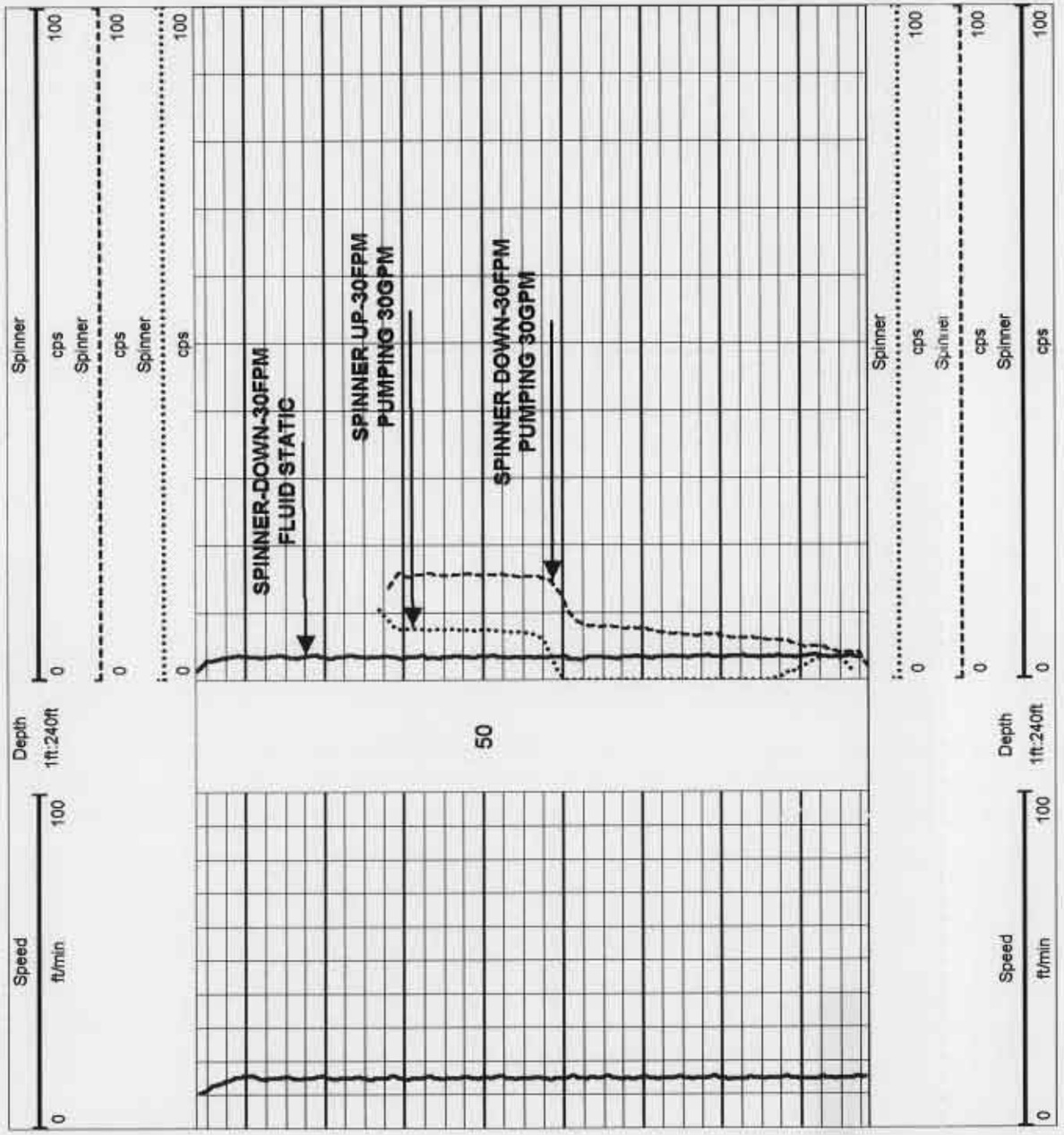
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	9-21-07	TYPE FLUID IN HOLE	WATER
RUN No	TWO	SALINITY	
TYPE LOG	FLOWMETER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	75o F.
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	99.5'		
TOP LOGGED INTERVAL			
OPERATING RIG TIME	1 HOUR		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	14"	SURF	20'	8"	SCH 80 PVC	SURF	18'
2	7.5"	18'	128'	4"	PVC	SURF	60'
				4"	PVC	60'	100'



AQUIFER DATA SYSTEMS

GAMMA RAY/CALIPER

CO
WELL
FLD
CTY
STE
FILING No

COMPANY NUTTING ENGINEERS
WELL ID MW-7
FIELD CITY OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

LOCATION

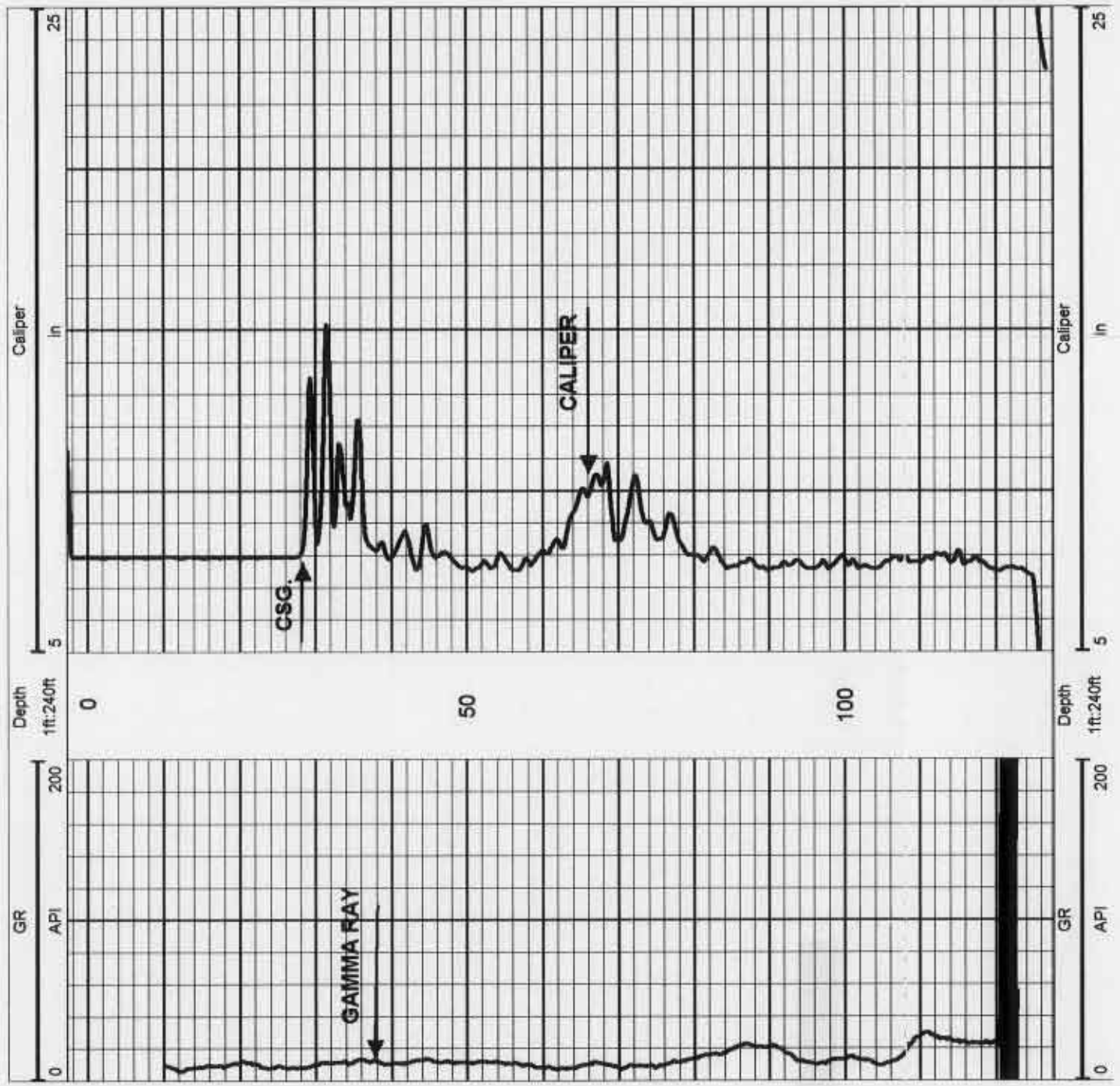
SEC TWP RGE

OTHER SERVICES

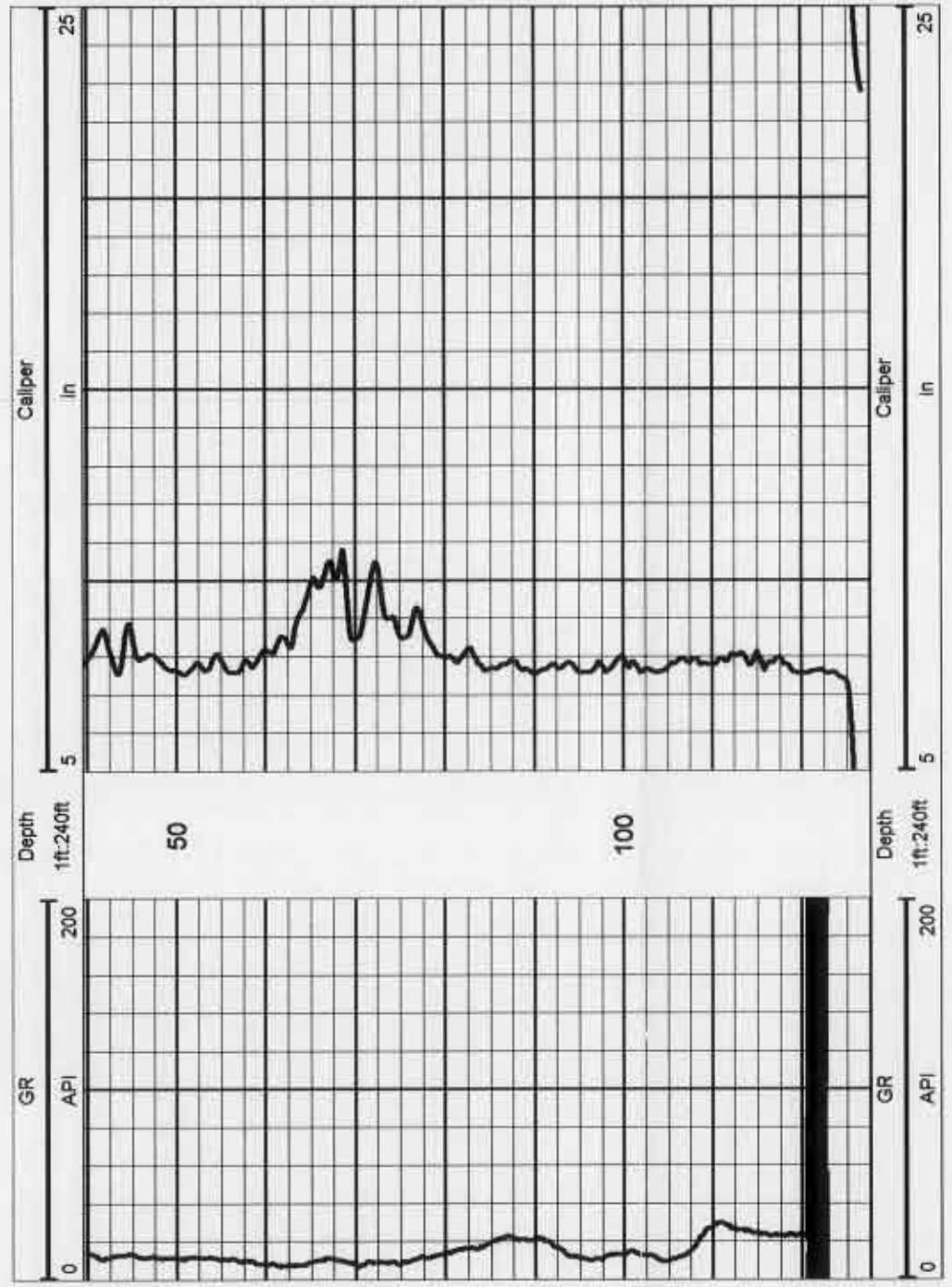
PERMANENT DATUM	GROUMD LEVEL	ELEVATION NA	K.B.
LOG MEAS. FROM	G.L.	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	G.L.		G.L.

DATE	9-06-07	TYPE FLUID IN HOLE	MUD
RUN No	ONE	SALINITY	
TYPE LOG	GAMMA RAY/CALIPER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	FULL
DEPTH-LOGGER	128'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	128'		
TOP LOGGED INTERVAL	0'		
OPERATING RIG TIME	45 MIN.		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	28'	8"	STEEL	SURF.	28'
2	7.5"	28'	128'				



REPEAT SECTION



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

ELECTRIC LOG

CO
WELL
FLD
CTY
STE
FILING No

COMPANY **NUTTING ENGINEERS**
WELL ID MW-7
FIELD CITY OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

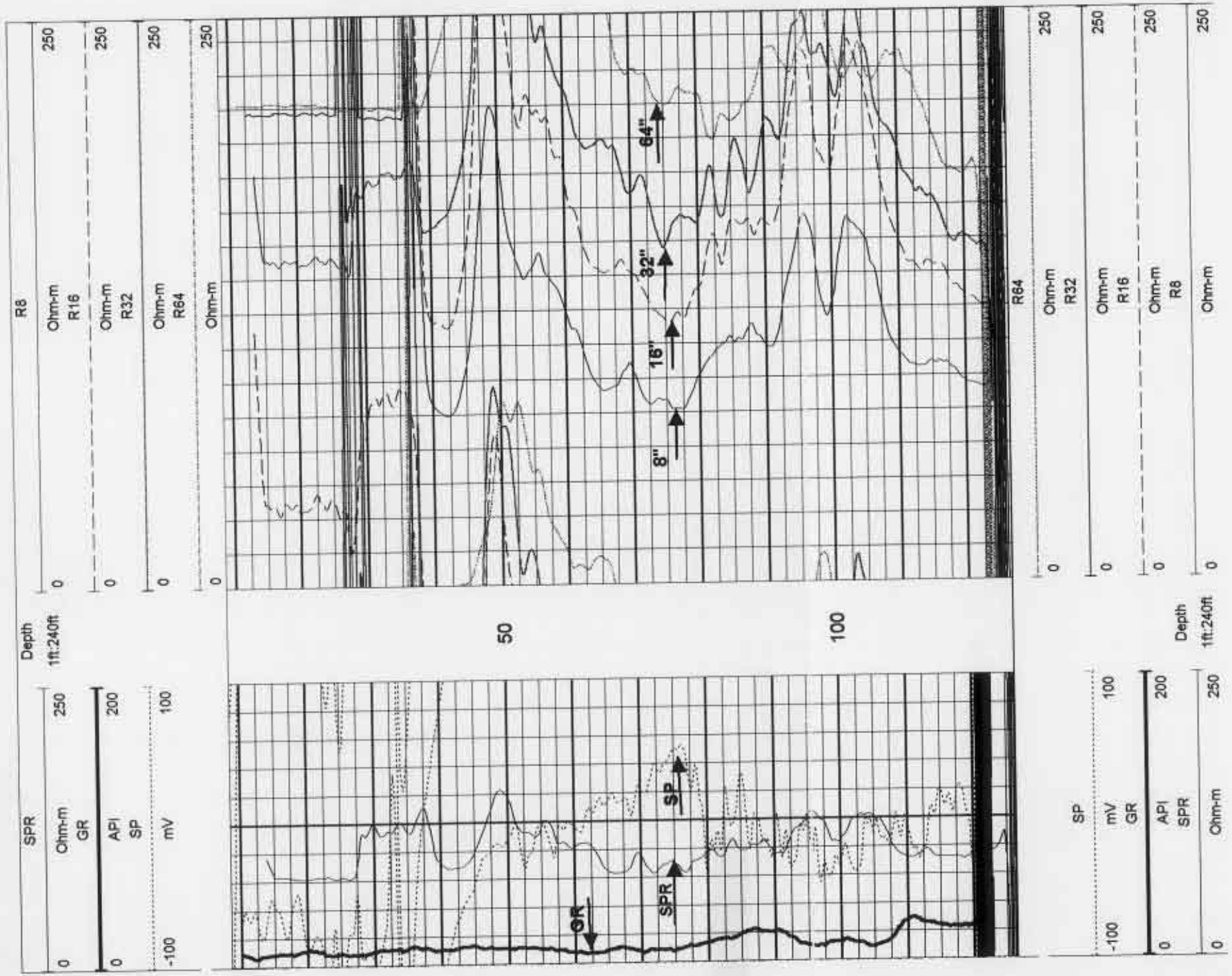
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION N.A.	K.B.
LOG MEAS. FROM	G.L.	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	G.L.		G.L.

DATE	9-06-07	TYPE FLUID IN HOLE	MUD
RUN No	TWO	SALINITY	
TYPE LOG	ELECTRIC LOG	DENSITY	
DEPTH-DRILLER	128'	LEVEL	FULL
DEPTH-LOGGER	127.5'	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	126'		
TOP LOGGED INTERVAL	10'		
OPERATING RIG TIME	45 MIN.		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	28'	8"	STEEL	SURF.	28'
2	7.5"	28'	128'				



AQUIFER DATA SYSTEMS

GAMMA RAY/CALIPER

COMPANY	NUTTING ENGINEERS
WELL ID	MW-7
FIELD	TOWN OF LANTANA
COUNTY	PALM BEACH STATE FLORIDA

CO
WELL
FLD
CTY
STE
FILING No

LOCATION

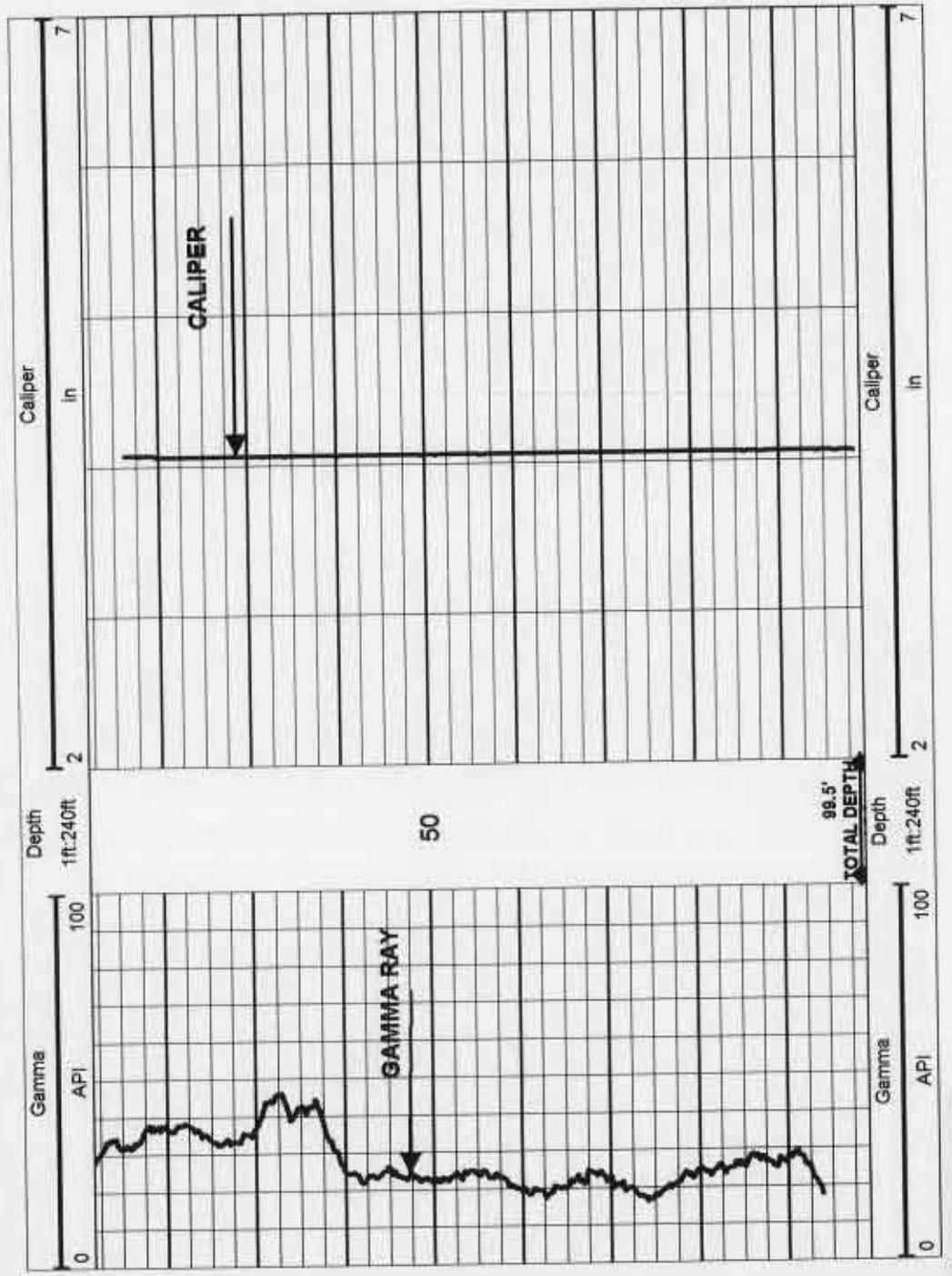
SEC TWP RGE

OTHER SERVICES

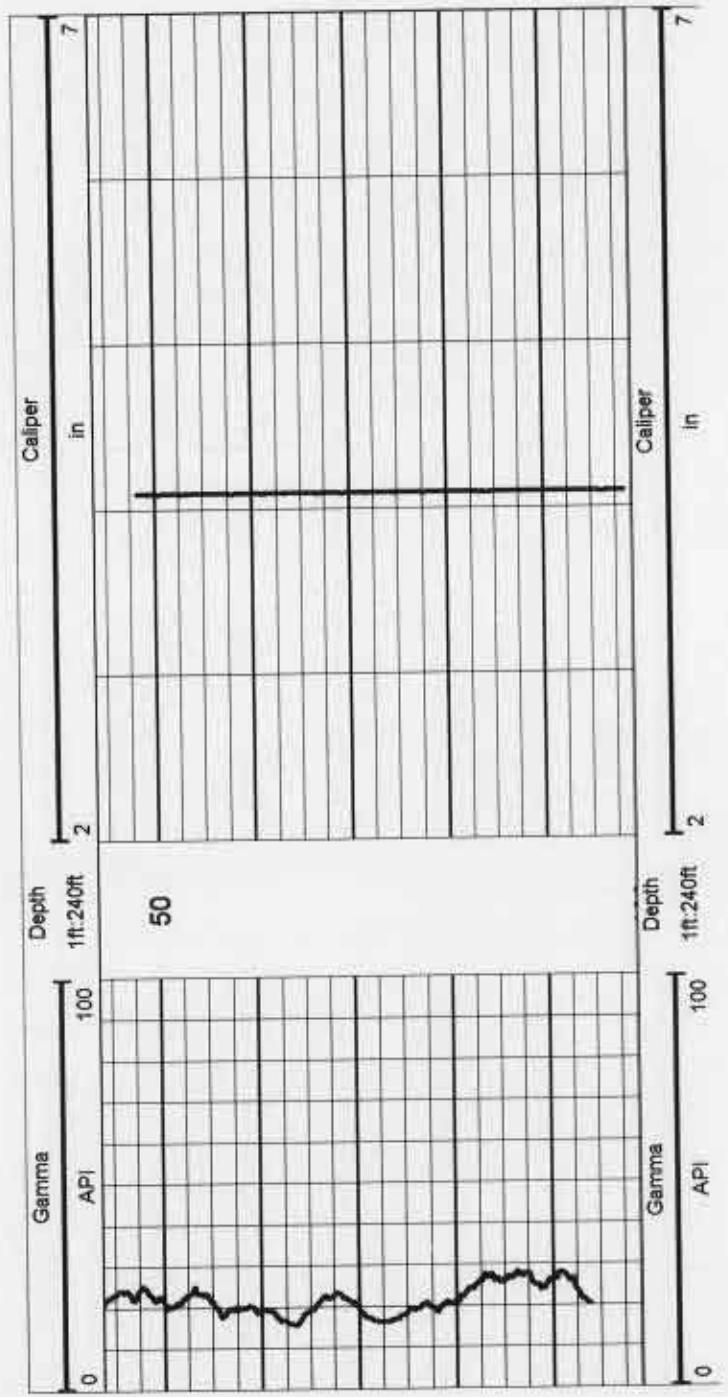
PERMANENT DATUM	GROUND LEVEL ELEVATION	K.B.
LOG MEAS. FROM	GL ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL	G.L.

DATE	9-21-07	TYPE FLUID IN HOLE	WATER
RUN No	ONE	SALINITY	
TYPE LOG	GAMMA RAY/CALIPER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	75o F.
BTM LOGGED INTERVAL	99.5'		
TOP LOGGED INTERVAL	14'		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF	28'	8"	STEEL	SURF.	28'
2	7.5"	28'	128'	4"	PVC	SURF.	60'
				4'	PVC	60'	100'



REPEAT SECTION



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

ELECTRIC LOG

COMPANY	NUTTING ENGINEERS
WELL ID	MW-7
FIELD	TOWN OF LANTANA
COUNTY	PALM BEACH STATE

CO
WELL
FLD
CTY
STE
FILING No

LOCATION

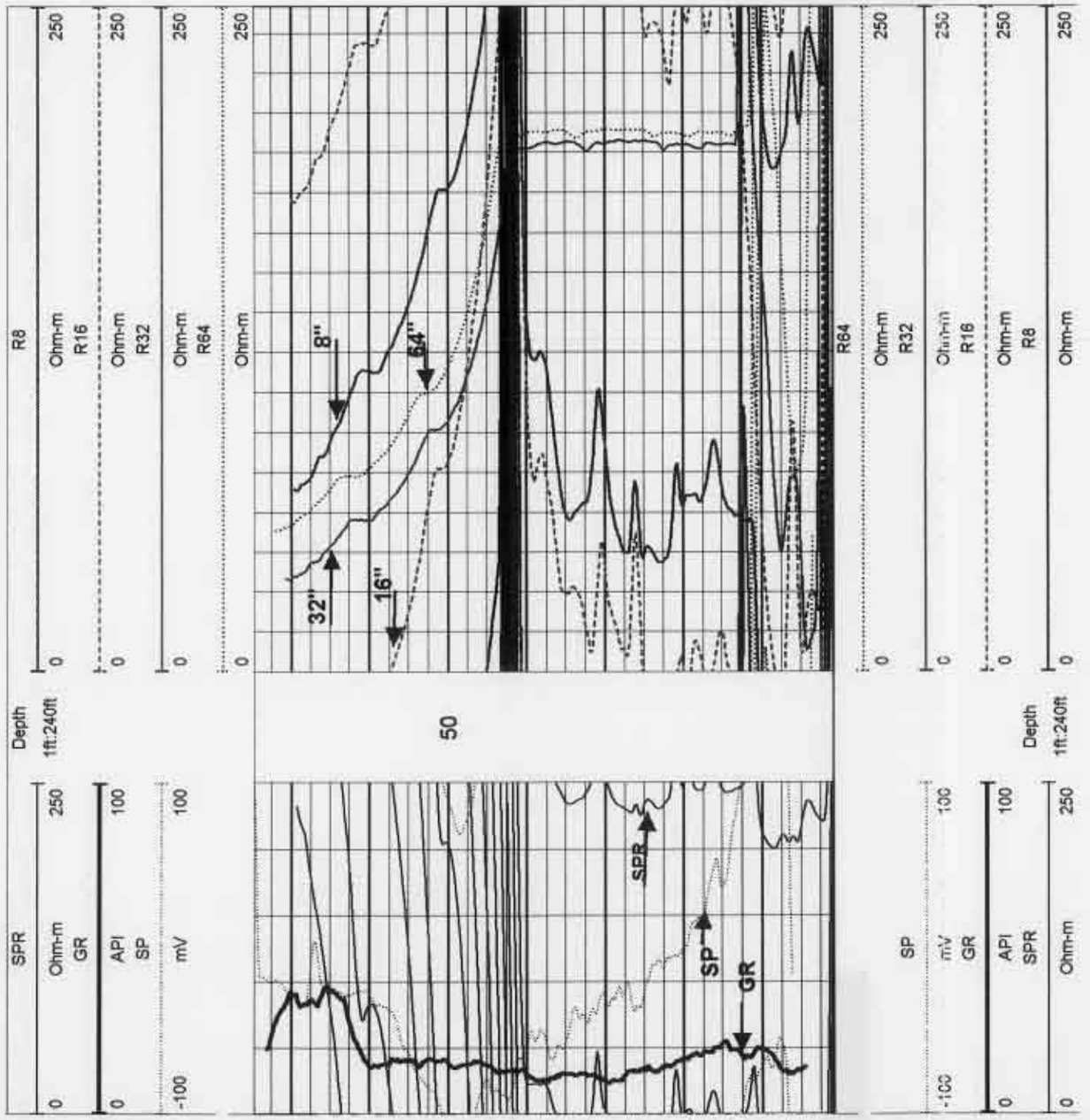
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL.	ELEVATION	K.B.
LOG MEAS. FROM	GL.	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL.		G.L.

DATE	9-21-07	TYPE FLUID IN HOLE	WATER
RUN No	FOUR	SALINITY	
TYPE LOG	ELECTRIC	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	75o F.
BTM LOGGED INTERVAL	99'		
TOP LOGGED INTERVAL	25'		
OPERATING RIG TIME	45 MIN		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	28'	8"	STEEL	SURF.	28'
2	7.5"	28'	128'	4"	PVC	SURF.	60'
				4"	PVC SCREEN	60'	100'



AQUIFER DATA SYSTEMS

TEMPERATURE
FLUID RESISTIVITY

COMPANY NUTTING ENGINEERS
WELL ID MW-7
FIELD TOWN OF LANTANA
COUNTRY STATE FLORIDA

CO
WELL
FLD
CTY
STE
FILING No

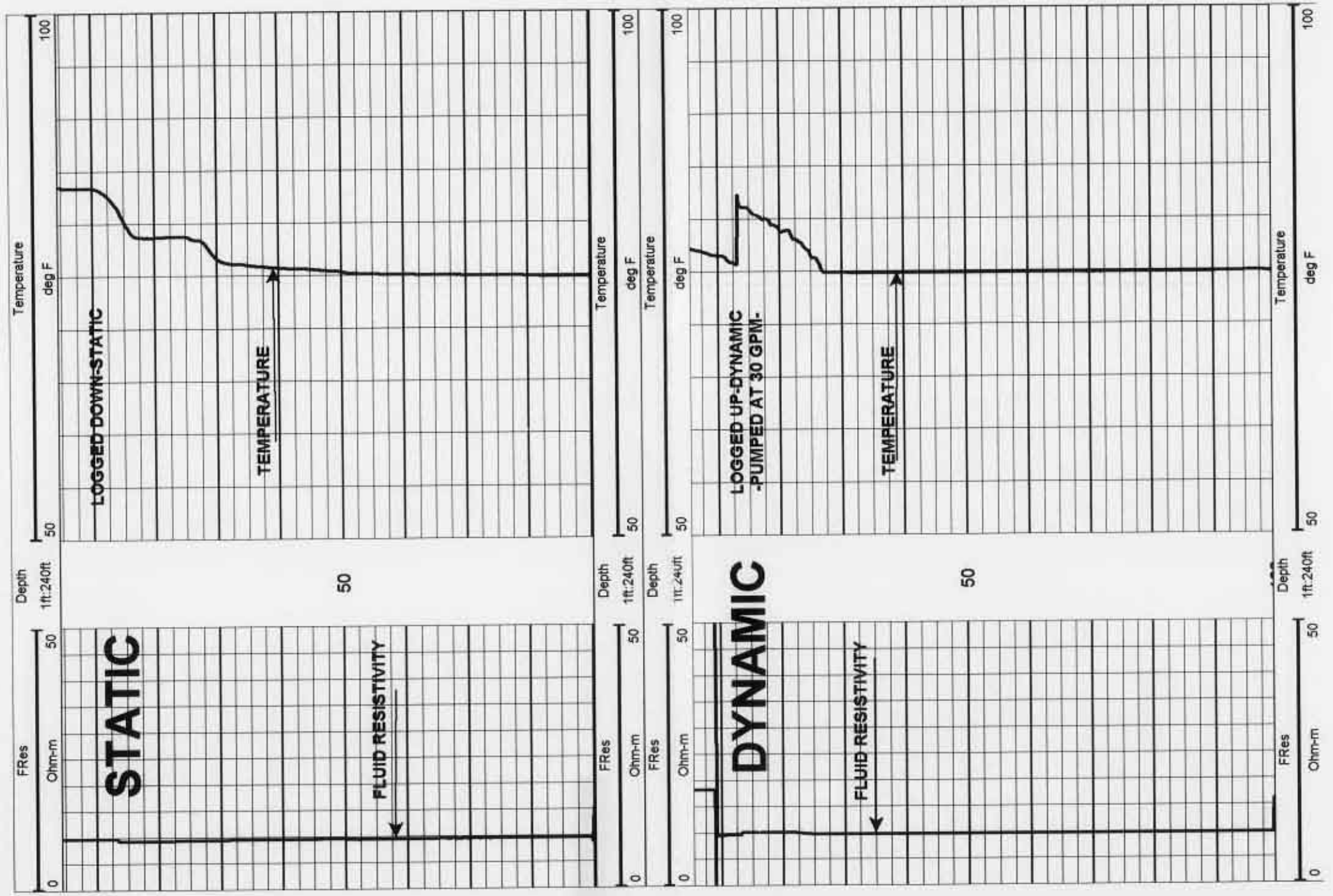
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	09-21-07	TYPE FLUID IN HOLE	WATER
RUN No	ONE	SALINITY	
TYPE LOG	FLRES/TEMPERATURE	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	99.5	MAX. REC. TEMP.	75o F.
BTM LOGGED INTERVAL	99.5		
TOP LOGGED INTERVAL	5'		
OPERATING RIG TIME	1 HOUR		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF	28'	8"	STEEL	SURF	28'
2	7.5"	28'	128'	4"	PVC	SURF	60'
				4"	PVC SCREEN	60'	100'



AQUIFER DATA SYSTEMS

FT. MYERS, FL. 239-872-5617

FLOWMETER

CO / WELL / FLD / CTY / STE / FILING No

COMPANY **NUTTING ENGINEERS**
WELL ID MW-7
FIELD TOWN OF LANTANA
COUNTY PALM BEACH STATE FLORIDA

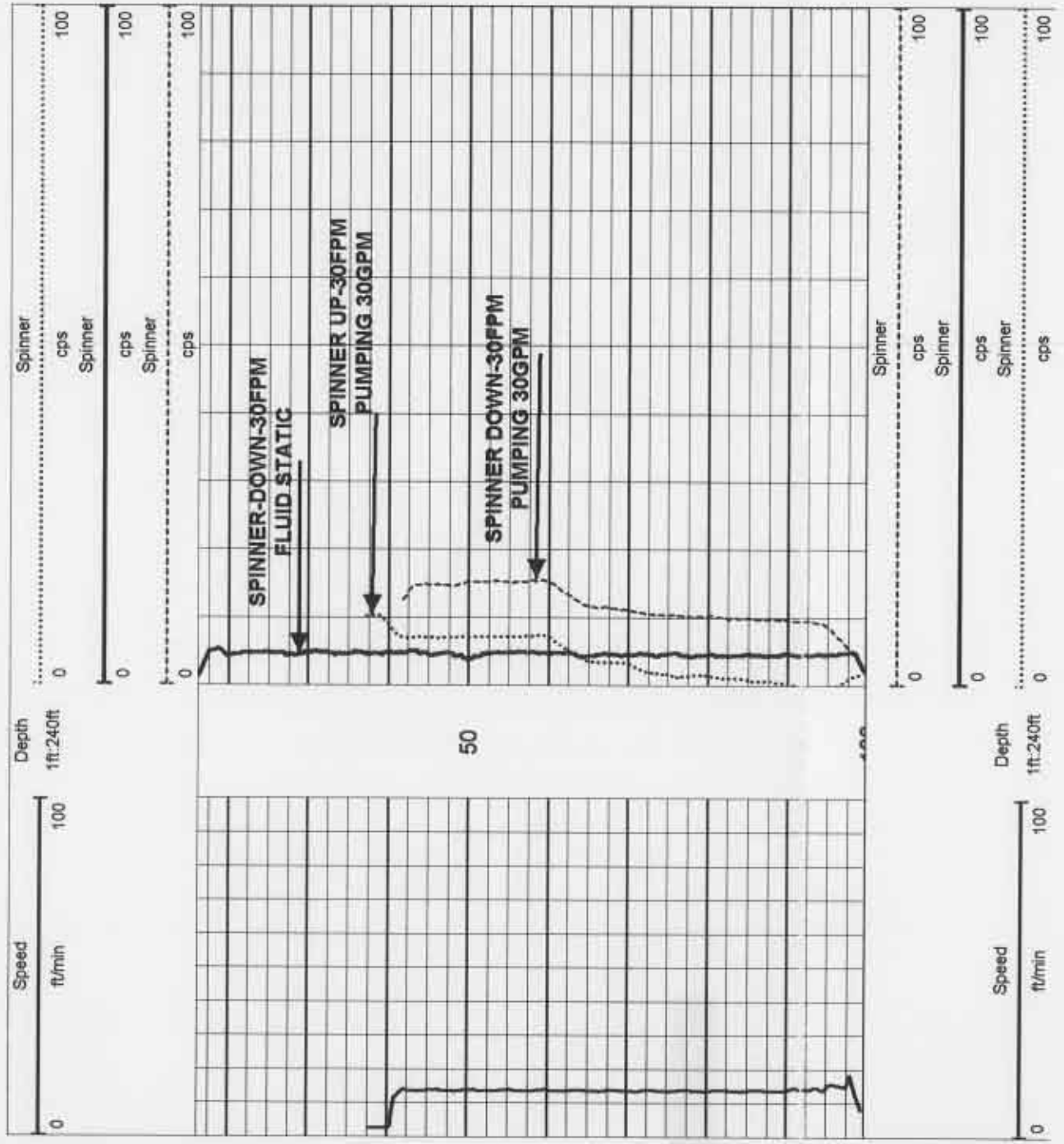
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM	GROUND LEVEL	ELEVATION	K.B.
LOG MEAS. FROM	GL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM	GL		G.L.

DATE	9-21-07	TYPE FLUID IN HOLE	WATER
RUN No	TWO	SALINITY	
TYPE LOG	FLOW5'METER	DENSITY	
DEPTH-DRILLER	128'	LEVEL	
DEPTH-LOGGER	99.5'	MAX. REC. TEMP.	75o F.
BTM LOGGED INTERVAL	99.		
TOP LOGGED INTERVAL			
OPERATING RIG TIME	1 HOUR		
RECORDED BY	D. WILSON		
WITNESSED BY	D. ROBERTSON (CCI)		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	8"	SURF.	28'	8"	STEEL	SURF	28'
2	7.5"	28'	128'	4"	PVC	SURF	60'
				4"	PVC SCREEN	60'	100'

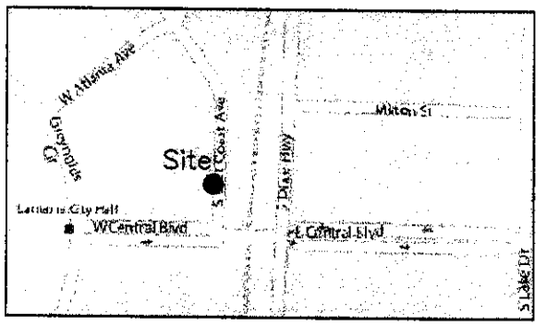


JOHN A. GRANT, JR., INC.

3333 NORTH FEDERAL HIGHWAY
PHONE : (561) 395-3333

CONSULTING ENGINEERS & LAND SURVEYORS
LICENSED BUSINESS # LB-50

BOCA RATON, FLORIDA 33431
FAX : (561) 395-3315

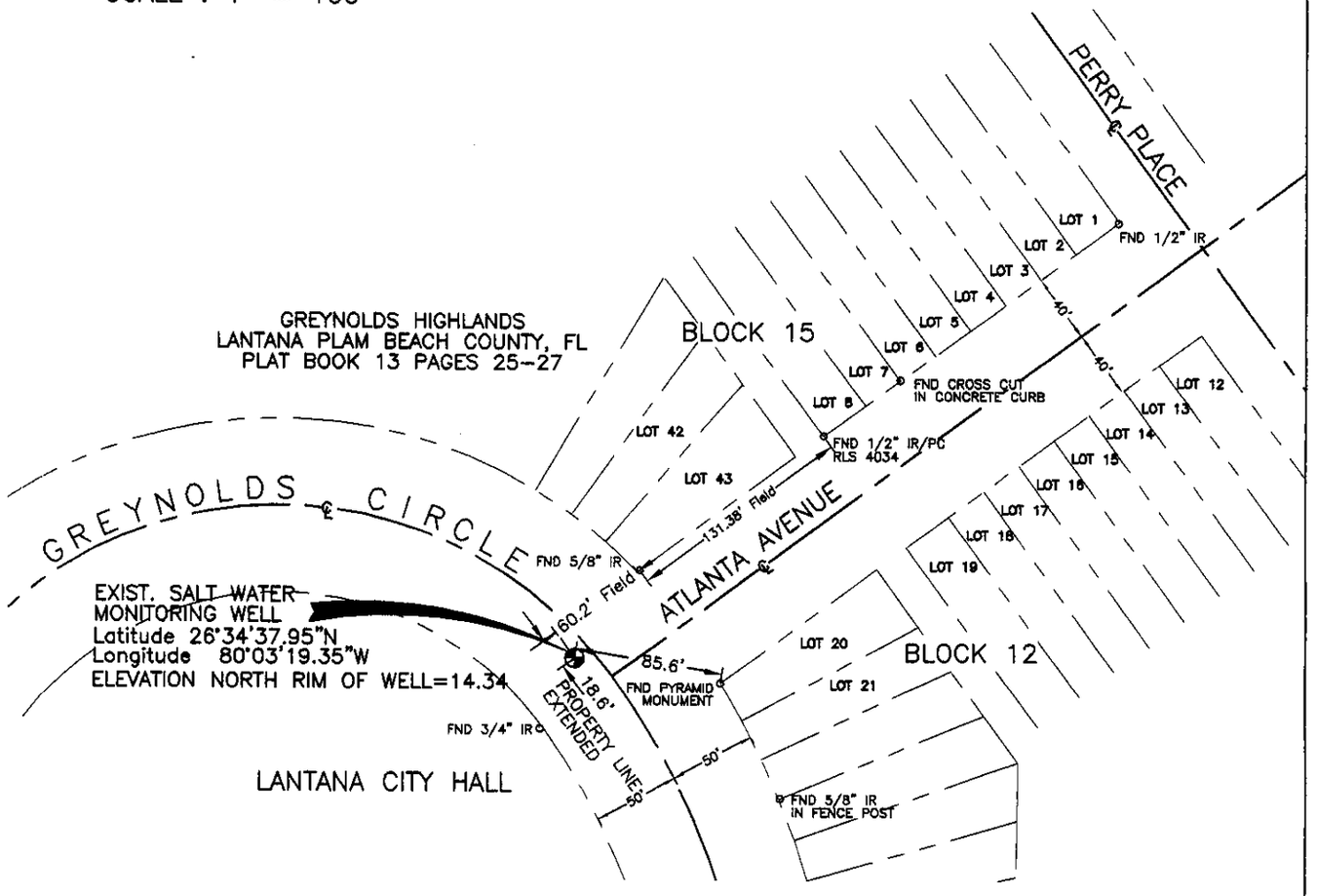


LOCATION MAP
N.T.S.

0 50 100 200

GRAPHIC SCALE IN FEET
SCALE : 1" = 100'

SKETCH OF SURVEY
LOCATION OF SALT WATER MONITORING WELL
CITY OF LANTANA
PALM BEACH COUNTY, FLORIDA



LEGEND

FND	= Found	℄	= Centerline
IR	= Iron Rod	WF	= Wood Fence
IP	= Iron Pipe	CLF	= Chain Link Fence
PC	= Plastic Cap	PL	= Planter
N/C	= Nail and Cap	WP	= Wood Pole
N/D	= Nail and Disc	CP	= Concrete Pole
E	= Easement	ST LT	= Street Light
U	= Utility	-OE-	= Overhead Electric
D	= Drainage	BLDG	= Building
P	= Plat	CBS	= Concrete Block and Stucco
F	= Field	PCP	= Permanent Control Point
BM	= Benchmark	PRM	= Permanent Reference Monument
ELEV	= Elevation	CM	= Concrete Monument
R	= Radius	LME	= Lake Maintenance Easement
L	= Arc Length	ROE	= Roof Overhang Easement
Δ	= Central Angle	LZE	= Littoral Zone Easement
CHB	= Chord Bearing		

Survey for : NUTTING ENGINEERS

SPECIFIC PURPOSE LOCATION SURVEY

Notes :

The specific purpose of this survey is to locate a monitoring well to existing property line, provide a rim elevation, and provide latitude/longitude for same.

Elevations shown hereon are based on the National Geodetic Vertical Datum of 1929.

Benchmark Reference:
Palm Beach County Disc "OLDE TOWN" Elev. = 10.34
Palm Beach County/ USC&G Disc Z 34. Elev = 10.44

I HEREBY CERTIFY : This sketch of survey of the above described property is true and correct to the best of my knowledge and belief as recently surveyed under my direction, and conforms to the minimum technical standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes.

10/4/07

FREDERICK M. LEHMAN
Professional Land Surveyor No. 4304 Date
Not Valid Without the Signature and the Original Raised Seal of a Florida Licensed Surveyor and Mapper.

Scale : 1"=100' Job No. : JG-100-9351

Drawing:K:\JG9351\Field Work\Well 2\4 Oct 07\Well 2.dwg\Well

REVISIONS	FB / PG.	BY	DATE	CHECKED
LOCATION SURVEY	1895/48-50	AJHE	10-8-07	RL 10/9/07

JOHN A. GRANT, JR., INC.

3333 NORTH FEDERAL HIGHWAY
PHONE : (561) 395-3333

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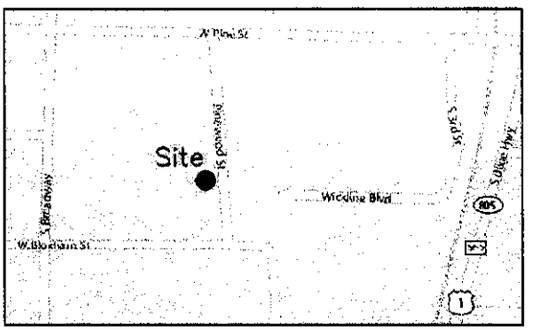
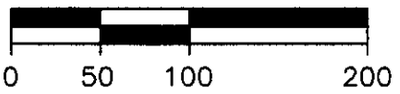
LICENSED BUSINESS # LB-50

BOCA RATON, FLORIDA 33431
FAX : (561) 395-3315

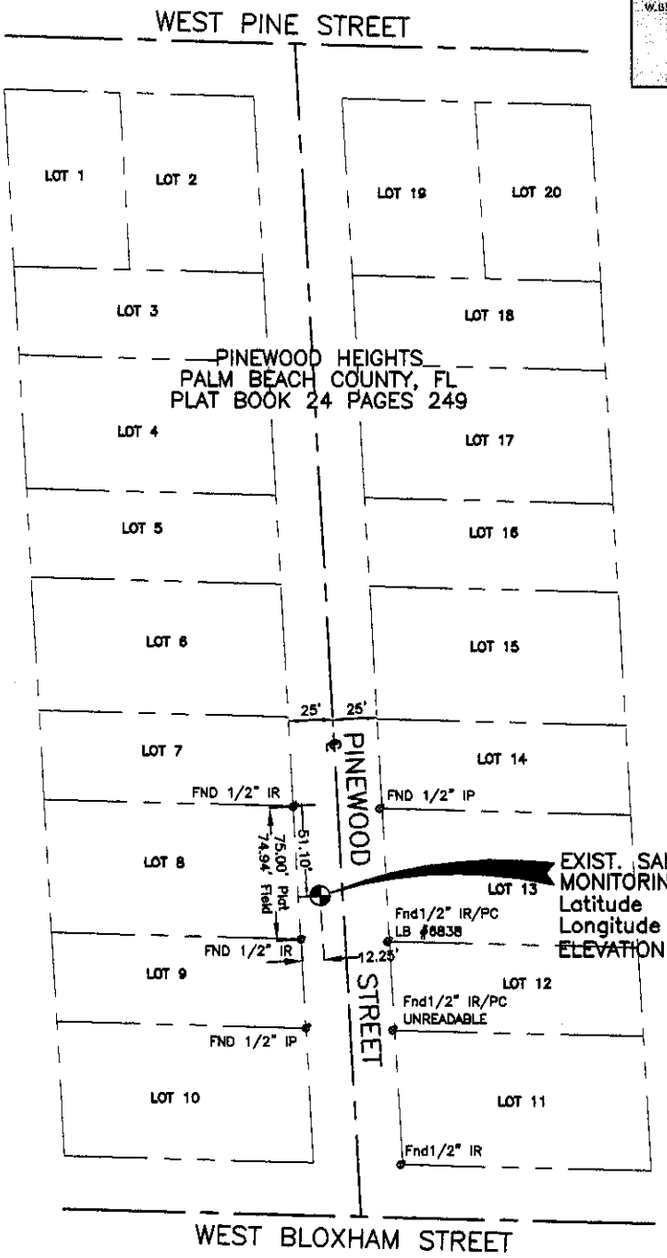
SKETCH OF SURVEY
LOCATION OF SALT WATER MONITORING WELL
CITY OF LANTANA
PALM BEACH COUNTY, FLORIDA



LOCATION MAP
N.T.S.



GRAPHIC SCALE IN FEET
SCALE : 1" = 100'



LEGEND

FND	= Found	℄	= Centerline
IR	= Iron Rod	WF	= Wood Fence
IP	= Iron Pipe	CLF	= Chain Link Fence
PC	= Plastic Cap	PL	= Planter
N/C	= Nail and Cap	WP	= Wood Pole
N/D	= Nail and Disc	CP	= Concrete Pole
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U	= Utility	-OE-	= Overhead Electric
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P	= Plat	CBS	= Concrete Block and Stucco
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Δ	= Central Angle	LZE	= Littoral Zone Easement
CHB	= Chord Bearing		

Drawing:K:\JG9351\Field Work\Well 1\4 Oct 07\well.dwg\Layout1

LOCATION SURVEY	1895/48-50	AJHE	10-8-07	RL 10/9/07
REVISIONS	FB / PG.	BY	DATE	CHECKED

Survey for : NUTTING ENGINEERS

SPECIFIC PURPOSE LOCATION SURVEY

Notes :

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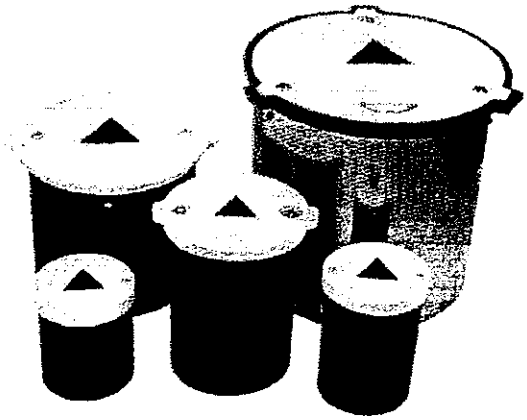
10/9/07

FREDERICK M. LEHMAN
Professional Land Surveyor No. 4304 Date
Not Valid Without the Signature and the Original Raised Seal of a Florida Licensed Surveyor and Mapper.

Scale : 1"=100' Job No. : JG-100-9351

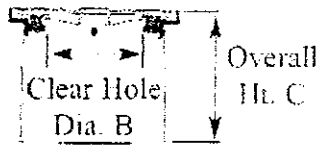
MONITORING WELL MANHOLES CLASS (08)

Monitoring Well Manholes have a painted ductile iron lid and rim with a black triangle. The bolt-down units have water tight lids that are equipped with stainless steel bolts. Alignment tabs are also included on the bolt-down units. Monitoring Well Manholes have an optional steel, polyethylene, or heavy-duty, 100% welded skirt. Each unit is fully painted inside and out, and meets AASHTO H20 wheel loading requirements. An ID tag large enough for all new regulatory requirements is available on the 8" models. The 8" lay-in models have a large notch that eliminates broken screwdrivers.



	Part Number	Style	Skirt Type	A	B	C	Lbs. ea.
6"	MEWA0721-106	Bolt-Down	Steel	6.6"	4.8"	7.5"	7.7
8"	MEWA0721-008L	Lay-in	Poly	9.8"	7.8"	8.0"	12.0
	MEWA0721-188L	Lay-in	Steel	9.8"	7.8"	8.0"	14.7
	MEWA0721-008	Bolt-down	Poly	10.4"	6.0"	12.0"	9.8
	MEWA0721-088	Bolt-down	Poly	10.4"	6.0"	8.0"	9.5
	MEWA0721-108	Bolt-down	Steel	10.4"	6.0"	12.0"	12.0
	MEWA0721-188	Bolt-down	Steel	10.4"	6.0"	12.0"	11.6
	MEWA0721-208	Bolt-down	HD Steel	10.4"	6.0"	12.0"	14.7
12"	MEWA0721-001	Bolt-down	Poly	15.1"	9.4"	12.0"	23.0
	MEWA0721-101	Bolt-down	Steel	15.1"	9.4"	12.0"	27.0
	MEWA0721-119	Bolt-down	Steel	15.1"	9.4"	19.5"	31.6
	MEWA0721-128	Bolt-down	Poly	15.1"	9.4"	8.0"	21.5
	MEWA0722-001 w/ locking cap and collar	Bolt-down	Poly	15.1"	9.4"	12.0"	23.8
18"	MEWA0721-018	Bolt-down	Steel	19.4"	13.8"	12.0"	58.5
	MEWA0721-118	Bolt-down	Steel	19.4"	13.8"	17.0"	69.5

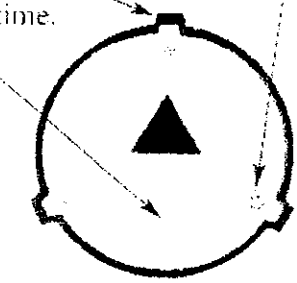
Optional Item: MEWA0720-001 Locking Cap and Collar



Stainless steel bolts - no more rusted bolts.

Alignment tabs - bolt holes line up the first time, every time.

Built-in side handle on 18" models - one hand opening and positioning.

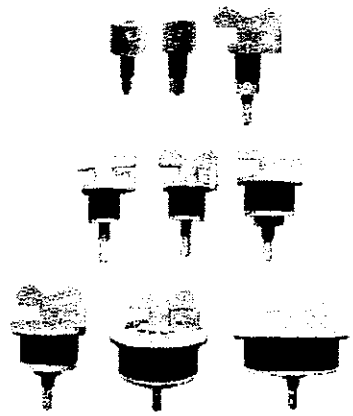


Other manholes available include:
Standard manholes 8" through 42",
Composite manholes 38" and 42",
Square manholes and vaults 18" and 24".

ECONOMY LOCKING PLUGS CLASS (08)

Monoflex heavy duty locking plugs are constructed of high impact ABS plastic. These units fit the inside diameter of PVC or steel wells. An expanding urethane gasket seals the well. Each locking plug will accommodate a padlock for vandal resistant security.

Part Number	Fits Pipe Size	Qty Box	Ounce Ea.
LPLG0050-40/80	1/2" Schedule 40/80	20	1.7
LPLG0075-40/80	3/4" Schedule 40/80	20	1.9
LPLG0100-40/80	1" Schedule 40/80	20	1.7
LPLG0125-40/80	1.25" Schedule 40/80	20	1.9
LPLG0150-40/80	1.50" Schedule 40/80	20	2.1
LPLG0200-40	2" Schedule 40	20	3.4
LPLG0200-80	2" Schedule 80	20	3.3
LPLG0250-40/80	2.50" Schedule 40/80	20	4.6
LPLG0300-40/80	3" Schedule 40/80	20	6.4
LPLG0400-40	4" Schedule 40	20	9.9
LPLG0400-80	4" Schedule 80	20	9.2
LPLG0500-40/80	5" Schedule 40/80	10	14.7



LOCKING PLUGS - MONOFLEX CLASS (08)

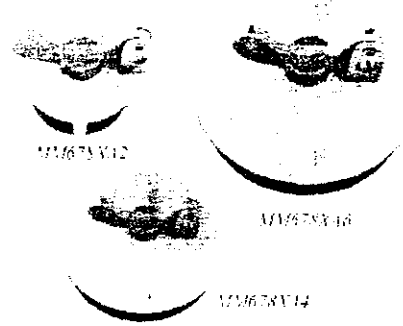
Monoflex economy locking plugs are constructed of high impact ABS plastic. These units fit the inside diameter of Schedule 40 PVC or steel wells. An expanding urethane gasket seals the well. Each locking plug will accommodate a padlock for vandal resistant security.

Part Number	Size	Qty Box	Lbs. Ea.
LPLG8	8"	1	3.00

LOCKING PLUGS - MORRISON BROS. CLASS (08)

Designed to provide a watertight, tamper-proof seal at the top of a monitoring or observation well. Simply slip the plug into the open end of the well pipe. Then, as you turn the lockable brass wing bolt, the Buna-N seal expands against the inside of the pipe, holding the plug securely in place. To complete the installation and lock the well, slip a standard padlock through the matching holes in the stainless steel lock lever and brass wing bolt. All three sizes fit Schedule 40 PVC or steel, and Schedule 5 or Schedule 10 stainless steel pipe. An optional adapter ring is needed to fit 4" stainless steel wells. These units do not fit Schedule 80 pipes. The "Blaze Orange" glass-filled nylon top is easy to spot, sheds water, and features molded-in "TEST WELL-NO FILL" warning. 6" locking plugs are available with or without a bailer ring attached.

Part Number	Size	Qty Box	Bailer Ring	Lbs. Ea.
MM678XA2	2"	20	No	.50
MM678XA4	4"	20	No	.75
MM678XA6	6"	12	No	2.00
MM678XA6R	6"	12	Yes	2.00
MM678XA4SS	4" Buna-N adapter seal for Stainless Casing			
LOCK	Brass Padlock (Keyed Alike)			



Rinker Materials

MATERIAL SAFETY DATA SHEET
for
PORTLAND CEMENT
Type I, II, or III
(wet unhardened cement and dry cement)

Section I - Product and Company Identification

Material Identity (Trade Names): Portland Cement Type I, II, or III (Portland Cement, hydraulic cement)

Manufacturer's Name: Rinker Materials Corp.	**Emergency Telephone Number:** 1-800-226-3768 ext. 2436
Address: 1501 Belvedere Road **West Palm Bch. Fl 33406**	**Telephone Number for Information:** 1-800-226-3768 ext. 2436 **Internet Web Site:** www.rinker.com
	Preparer: Clayton Group Services, Inc.,

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Chemical Identity/Common Names)	CAS No.	OSHA PEL	ACGIH TLV	MSHA PEL	%
Portland Cement	65997-15-1	15 mg/m^3 (Total) 5 mg/m^3(Respirable)	10 mg/m^3	10 mg/m^3 (Total)	100%
Crystalline Silica (Quartz)	14808-60-7	30/(%SiO_2 +2) mg/m^3 (Total) 10/(%SiO_2 +2) mg/m^3 (Respirable)	0.05 mg/m^3 (Respirable quartz)	30/(%SiO_2+3) mg/m^3 (Total) 10/(%SiO_2 +2) mg/m^3 (Respirable)	0-3%

Section III - Physical/Chemical Characteristics

Boiling Point	Not Applicable	**Specific Gravity (H_20 = 1)**	3.15
Vapor Pressure (mm Hg)	Not Applicable	**Melting Point**	Not Applicable
Vapor Density (Air = 1)	Not Applicable	**Evaporation Rate (Butyl Acetate = 1)**	Not Applicable

Solubility in Water: Slightly soluble (0.1 to 1.0 %) in water.

Appearance and Odor: Grayish powder that has no odor.

Section IV - Fire and Explosion Hazard Data

Flash Point: Not Combustible	**Flammable Limits:** Not Flammable	**LEL:** N/A	**UEL:** N/A

Extinguishing Media: This material is noncombustible. Use extinguishing media appropriate to surrounding fire.

Section IV - Fire and Explosion Hazard Data (continued)

Special Fire Fighting Procedures: Avoid exposing skin to wet cement. Be aware of runoff from fire control methods. Do not release material to sewers or waterways, as product reacts with water and hardens within 2 to 6 hours. Hardened material may clog sewers and waterways.

Unusual Fire and Explosion Hazards: None reported.

Section V - Reactivity Data

Stability: Keep dry until use.	**Unstable**		**Conditions to Avoid:** This material is stable at room temperature under normal storage and handling conditions. Product reacts with water and hardens in 2 to 6 hours.
	Stable	X	

Incompatibility (Materials to Avoid): Stable under expected conditions of use. Aluminum powder and other alkali and alkaline earth metals will react in wet mortar or concrete, liberating hydrogen gas. Under unexpected conditions of use, material may react with hydrofluoric acid to produce a corrosive gas (silicon tetrafluoride). Also, contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, maganese trifluoride, and oxygen difluoride may cause fire and/or explosions.

Hazardous Decomposition or Byproducts: None reported.

Hazardous Polymerization: Not known to occur.

Section VI - Health Hazard Data

Route(s) of Entry: **Inhalation?** Yes **Skin?** No **Ingestion?** Unlikely

Health Hazards:

Acute Effects: Exposure to airborne cement dust may cause eye, nose, upper respiratory tract irritation, cough, expectoration, shortness of breath, and wheezing. Eye contact with wet or dry cement may cause burning and possible corneal edema. Direct contact with wet cement may cause extensive skin burns with dermal necrosis. Within 12 to 48 hours (after one to six-hour exposures) possible first, second, or third degree burns may occur. There may be no obvious pain at the time of the exposure. Ingestion of dry cement or unhardened wet cement causes esophagus and stomach burns.

Use of cement for construction purposes is not believed to cause additional acute toxic effects. However, repeated overexposures to very high levels of respirable crystalline silica (quartz, cristobalite, tridymite) for periods as short as six months have caused acute silicosis. Acute silicosis is a rapidly progressive, incurable lung disease that is typically fatal. Symptoms include (but are not limited to): shortness of breath, cough, fever, weight loss, and chest pain.

Chronic Effects:

Chronic bronchitis may result from chronic exposure to dust. There are reports of x-ray changes without symptoms in cement workers exposed to Portland Cement. Chronic dermatitis may result from chronic skin exposure to wet cement. The contact dermatitis may clear up only after a prolonged time after the exposures ends.

Portland cement may contain more than 0.1% crystalline silica, which is a cancer hazard if inhaled. Cancer risk depends on duration and level of exposure. Prolonged exposure to crystalline silica can cause silicosis, a progressive pneumoconiosis (lung disease). Respirable dust containing newly broken silica particles has been shown to be more hazardous to animals in laboratory tests than respirable dust containing older silica particles of similar size. Respirable silica particles which had aged for sixty days or more showed less lung injury in animals than equal exposures of respirable dust containing newly broken particles of silica.

There are reports in the literature suggesting that excessive crystalline silica exposure may be associated with adverse health effects involving the kidney, scleroderma (thickening of the skin caused by swelling and thickening of fibrous tissue) and other autoimmune disorders. However, this evidence has been obtained primarily from case reports involving individuals working in high exposure situations or those who have already developed silicosis; and therefore, this evidence does not conclusively prove a

Section VI - Health Hazard Data (continued)

causal relationship between silica or silicosis and these adverse health effects. Several studies of persons with silicosis also indicate an increased risk in developing lung cancer, a risk that increases with duration of exposure. Many of these studies of silicotics do not account for lung cancer confounders, especially smoking.

Carcinogenicity: Portland cement is not listed on the NTP, IARC, or OSHA lists of carcinogens. However, in October 1996, IARC classified respirable crystalline silica from occupational sources as carcinogenic (Group 1). The NTP indicates that crystalline silica (respirable size) is a known human carcinogen (Group 1). These classifications are based on sufficient evidence of carcinogenicity in certain experimental animals and on selected epidemiological studies of workers exposed to crystalline silica.

Signs and Symptoms of Exposure:

Cement dust is a skin, eye, and mucous membrane irritant. Its principal health hazard (with the addition of water) occurs when it forms alkaline, abrasive, hygroscopic (moisture absorbing) calcium hydroxide (slaked lime) in powdered or slurried form. Dry cement alone does not cause an alkaline burn. Some individuals appear to tolerate brief skin contact with wet cement, but others develop extensive skin burns. Repeated and prolonged skin contact can cause dermatitis, including: skin dryness, fissures, rashes, and nail dystrophy.

Chronic exposure to respirable dust containing crystalline silica in excess of applicable OSHA PELs, MSHA PELS, and ACGIH TLVs has caused silicosis, a progressive lung disease. Chronic tobacco smoking may further increase the risk of developing chronic lung problems. Not all individuals with silicosis will exhibit symptoms (signs) of the disease. However, silicosis is progressive, and symptoms can appear at any time, even years after exposures have ceased. Symptoms of silicosis may include (but are not limited to): shortness of breath, difficulty breathing with or without exertion, coughing, diminished work capacity, diminished chest expansion, reduction of lung volume, right heart enlargement and/or failure. Persons with silicosis have an increased risk of pulmonary tuberculosis infection.

Medical Conditions Generally Aggravated by Exposure:

Individuals with chronic respiratory disorders or skin diseases should minimize inhalation and skin contact with cement. Inhaling respirable cement dust may aggravate existing respiratory diseases or dysfunction. Exposure to dust may aggravate existing skin and/or eye irritations.

Physicians Note: Ingestion of large amounts of material is unlikely. However, to prevent re-exposing the esophagus and stomach, do not induce emesis or perform gastric lavage. Immediate dilution may prevent esophageal burns. For severe burns, consider esophagoscopy within the first 24 hours. Neutralization with acidic agents is not advised because of increased risks of exothermic burns. Water-mineral oil soaks may aid in removing hardened cement from the skin. Dried-on cement is extremely difficult to remove; surgical debridement or even skin grafting may be necessary. Consult an ophthalmologist for ocular burns.

Emergency and First Aid Procedures:

Dust or Wet Cement in Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately if irritation persists.

Wet Cement on Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 minutes. Rinsing the exposed area with dextrose water may slow the hardening process. For reddened or blistered skin, consult a physician. Wash affected areas with soap and water. Treat acute dermal reactions to wet cement as you would for lye burns. Consult a physician immediately if irritation persists.

Inhalation of Dust: Remove exposed person to fresh air and support breathing as needed. Consult a physician immediately if irritation persists.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If the material is ingested, have the conscious person drink 4 to 8 oz. of water or milk. Consult a physician immediately.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled: Cleanup personnel should protect against dust inhalation and direct contact with wet cement using the procedures in Section VIII. Avoid creating airborne dust conditions. Spilled materials, where dust can be generated, may expose cleanup personnel to respirable dust containing crystalline silica. Use methods such as vacuuming (with an appropriate filter) or wet mopping to minimize dust dispersion. Carefully scoop dry material into a suitable container for disposal or reclamation. Wet or unhardened cement should be recycled or allowed to harden and disposed.

Waste Disposal Method: Allow wet unhardened cement to harden and dispose in a landfill as common waste. Follow applicable Federal, State, and local regulations for disposal of dry cement. The material is not listed as a hazardous waste under designations by the EPA or DOT.

Precautions to Be Taken in Handling and Storing: Follow protective controls defined in Section VIII when handling wet or dry cement. Dry cement should be stored such that moisture does not come in contact with the material until it is ready to be used.

Section VIII - Control Measures

Respiratory Protection: When exposed or likely to be exposed to dust above recommended limits, wear a suitable NIOSH-approved respirator with a protection factor appropriate for the level of exposure. Seek guidance from a qualified industrial hygienist, safety professional, or other suitably knowledgeable individual prior to respirator selection and use. For emergency or nonroutine operations (e.g., confined spaces), additional precautions or equipment may be required. Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator repair and cleaning, respirator fit testing, and other requirements.

Ventilation	**Local Exhaust:** Provide general or local ventilation systems, as needed, to maintain airborne dust concentrations below the OSHA PELs, MSHA PELs, and ACGIH TLVs. Local exhaust ventilation is preferred since it prevents release of contaminants into the work area by controlling it at the source.	**Other:** Respirable dust and quartz levels should be monitored regularly. Dust and quartz levels in excess of applicable OSHA PELs , MSHA PELs, and ACGIH TLVs should be reduced by all feasible engineering controls including (but not limited to) wet suppression, ventilation, process enclosure, and enclosed employee work stations.
	Mechanical (General): See above recommendations.	**Special:** None Reported

Skin Protection: Wash skin exposed to dust and wet cement thoroughly after handling. If hands or feet will be immersed in cement, wear impervious gloves and/or boots. Wash work clothes after each use.	**Eye Protection:** Wear safety glasses with side shields as minimum protection from blowing dust. Tightly fitting goggles should be worn when excessively (visible) dusty conditions are present or anticipated, or when there is a splash hazard from wet cement.

Other Protective Clothing or Equipment: Wear suitable protective clothing, as needed, to minimize skin contact.

Work/Hygienic Practices: Avoid dust inhalation and direct contact with skin and eyes. Wear suitable protective clothing and gear when handling cement. If respiratory protection is used, institute a respiratory protection program that includes regular training, inspection, maintenance, and evaluation. To prevent ingestion and skin contact, practice good personal hygiene. Wash contaminated skin before eating, drinking, lavatory use, and before applying cosmetics.

DISCLAIMER:

The information contained in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. The information set forth herein is based on technical data that the Company believes to be accurate. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the Company's control, the Company makes no warranties, expressed or implied, and assumes no liability in connection with any use of this information.

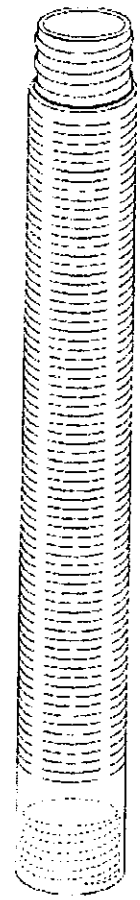
FLUSH THREAD PVC SCREEN AND CASING

- ✓ Monoflex CNC computer lathed flush threads follow ASTM F-480 recommendations for reliable, consistent results on the job site.
- ✓ Our close tolerances provide a strong connection while retaining ease of assembly.
- ✓ Manufactured from quality PVC pipe, Monoflex flush thread screens and casings are available in diameters of 1/2" through 16" with 2, 4, or 8 threads per inch in Sch. 40 & Sch. 80. Other schedules and SDR's are available in PVC and high density polyethylene.
- ✓ Lengths are measured as "laying length", (not including male thread length), in 2" and 4" diameters, Sch. 40 and Sch. 80 and 6" Sch. 80. All other diameters and schedules are measured end to end. Custom lengths are available in all diameters.
- ✓ All standard Monoflex PVC threads are compatible with other materials threaded to ASTM F-480 recommendations, with the same TPI. **Note**: Threads on 14" and 16" Monoflex screens and casings are not ASTM F-480 as the flush thread guideline does not specify pipe diameters larger than 12".
- ✓ All standard screens provide maximum net open area. A wide variety of slot sizes and spacings are available to adapt to various site conditions and applications.
- ✓ 1/2" through 6" Sch. 40 and Sch. 80 screens and casings are provided with Buna-N O-rings. O-rings may be installed or packaged separately depending on size. O-rings for all other sizes and schedules are sold separately. Please specify if O-rings are required when placing order.
- ✓ All flush thread screens and casings are Envirowrapped and hermetically sealed at both ends as a standard practice.

The following pages list flush thread PVC screens and casings along with the appropriate Buna-N O-rings, and flush thread caps, plugs, and points. Custom lengths, threads and adapters are available.

Please specify part number when ordering.

Flush Thread Casing

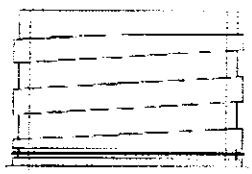


Flush Thread Screen

Female Cap (solid)

Male Plug (solid)

Female Point (solid)



Male Plug (molded)

Hoist Plug (solid)

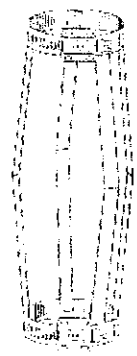
PVC SURGE BLOCKS CLASS (06)

Monoflex PVC surge blocks are used for well development or well rehabilitation. All units are constructed of solid PVC and machined to match the applicable inside diameter of Schedule 40 PVC wells. Internally threaded with female pipe thread for use with steel pipe extensions.

Part Number	Description	Lbs. Ea.
SB2XFPT3/4	2" Solid Surge Block with 3/4" female NPT	.35
SB4XFPT1	4" Solid Surge Block with 1" female NPT	1.65
SB6XFPT1 1/4	6" Solid Surge Block with 1-1/4" female NPT	4.00

STAINLESS STEEL CENTRALIZERS CLASS (08)

Monoflex adjustable centralizers hold screens and casings in place to eliminate off center placement during installation. Constructed from high quality spring stainless steel, Monoflex centralizers resist corrosion and will not contaminate the well. Stainless steel worm gears tighten easily for quick attachment to the screens and casings.



Part Number	Description	Lbs. Ea.
SSC2X12	2" Adjusts up to 12" diameter hole	.40
SSC3X12	3" Adjusts up to 12" diameter hole	.55
SSC4X12	4" Adjusts up to 12" diameter hole	.60
SSC5X12	5" Adjusts up to 12" diameter hole	.60
SSC6X20	6" Adjusts up to 20" diameter hole	.70
SSC8X24	8" Adjusts up to 24" diameter hole	1.00
SSC10X26	10" Adjusts up to 26" diameter hole	1.00
SSC12X28	12" Adjusts up to 28" diameter hole	1.00

POROUS PIEZOMETERS/SPARGE POINTS CLASS (09)

Monoflex manufactures porous polyethylene piezometers for water level measurements, water sampling and air sparging. They do not include any transducers or measuring equipment. The bottom has a PVC plug and the top is fitted with a 1" PVC Sch. 80 male (4 TPI) flush thread. Available in 12" and 24" lengths. The piezometers have a .935 inside diameter and a 50 micron pore size.

Part Number	Description
PIEZPLY1.6X1X12	Porous Polyethylene Piezometer, 1.6" x 12"
PIEZPLY1.6X1X24	Porous Polyethylene Piezometer, 1.6" x 24"

Note: If Schedule 40 flush thread casing is to be used, a Sch. 40 x Sch. 80 adapter must be purchased separately. With sufficient notice, units can be made with your choice of Sch. 40 male (8TPI) flush thread, male NPT thread or plain end PVC pipe.

Other diameters, lengths, pore sizes and top fittings can be custom built to your specifications. Call for prices and availability.

EXTRA HIGH YIELD™ BENTONITE

NSF/ANSI 60

EXTRA HIGH YIELD™ BENTONITE has a Higher Performance formula that makes it very effective. This premium grade beneficiated Wyoming Bentonite is designed for use in mineral exploration, water well and directional drilling operations. EXTRA HIGH YIELD™ BENTONITE is an efficient viscosifier that performs well in a variety of water qualities and successfully reduces application rates, and mixes easily and quickly. EXTRA HIGH YIELD™ BENTONITE is listed with the National Sanitation Foundation for use in potable water well construction.

HIGH YIELDING BENTONITE VISCOSIFIER:

- 220 to 235 barrel yield.
- Mixes rapidly for fast hydration.
- Carries cuttings in mud with lower solids content.
- Enhances fluid loss characteristics; reduces seeping into permeable formations.
- Assists in bore hole stabilization.
- Helps eliminate loss circulation conditions.

DRILLING FLUID PREPARATION

Always adjust make-up water in tank to a pH of 8 to 9 before adding bentonite and/or polymer. Public water supplies often have a pH of only 6.5 to 7. Start by adding 6 oz. of soda ash to 300 gallon and add more as required to maintain a pH of 8 to 9. Add EXTRA HIGH YIELD™ BENTONITE to reach the desired initial funnel viscosity, then add UNI-DRILL® liquid polymer for final desired funnel viscosity. In most cases begin at a 40 to 45 second initial viscosity, then add UNI-DRILL® to bring the viscosity up to 45 to 50 seconds. Below are more specific mixing instructions for various drilling conditions using a 300-gallon mud pit.

CLAY - Soft or Hard *(You want lower viscosity and lower fluid loss.)*	
Soda Ash	Add about ¼ lb to get pH level of 8 - 9
EXTRA HIGH YIELD™	Add 1 +/- bag for funnel viscosity of 30-35 seconds
UNI-DRILL®	Add 3 - 4 quarts to bring final viscosity to 40-45 seconds
SAND - Wet or Dry *(You want higher funnel viscosity and moderate fluid loss.)*	
Soda Ash	Add about ¼ lb to get pH level of 8 - 9
EXTRA HIGH YIELD™	Add 1½ - 2 +/- bags for funnel viscosity of 45-55 seconds
UNI-DRILL®	Add 2 - 3 quarts to bring funnel viscosity to 55-65 seconds
UNKNOWN OR MEDIUM SOILS *(You want moderate viscosity and moderate fluid loss.)*	
Soda Ash	Add about ¼ lb to get pH level of 8 - 9
EXTRA HIGH YIELD™	Add 1 ½ bags for funnel viscosity of 35-40 seconds
UNI-DRILL®	Add 3 - 4 quarts to bring funnel viscosity to 45-55

This product is designed to be flushed out of the well bore prior to using the well for drinking water. Before placing a well in service for drinking water it is to be properly flushed and drained until the turbidity of the water is <NTU above ambient turbidity. (See THINZ-IT® for well completion.)

EXTRA HIGH YIELD™ BENTONITE is packaged in 50 pound, multi-walled paper bags.

WYO-BEN, INC. **P.O. Box 1979** **Billings, Montana 59103**

Internet: www.wyoben.com **email@wyoben.com** **800-548-7055 or (406) 652-6351**