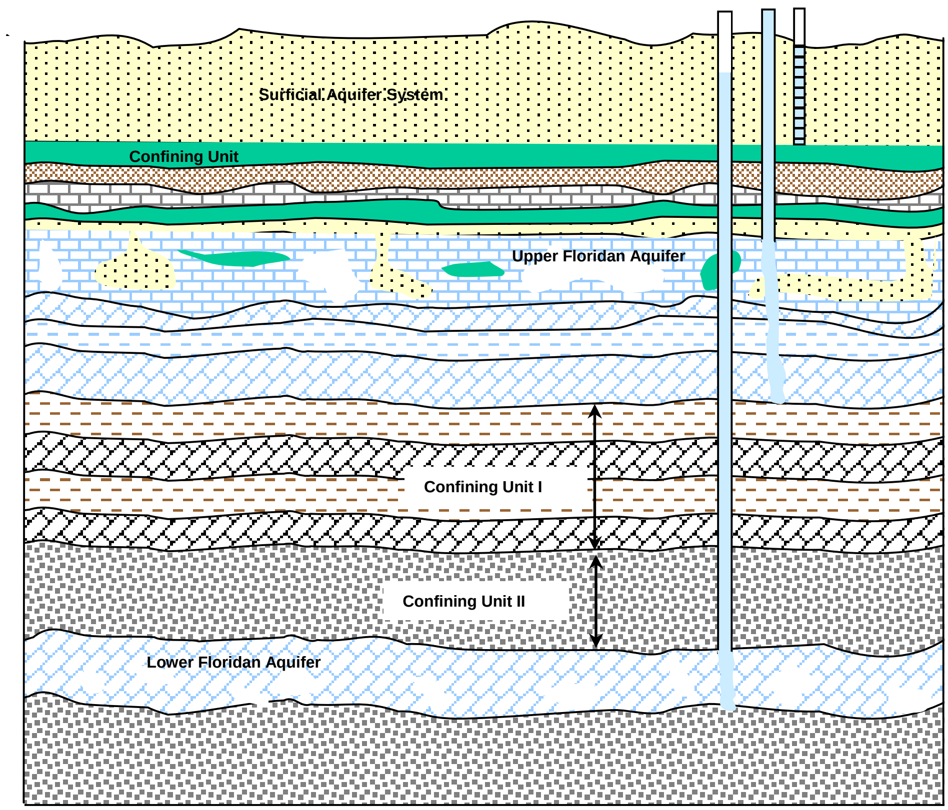
HYDROGEOLOGY OF THE ROMP 74X DAVENPORT MONITOR WELL SITE POLK COUNTY, FLORIDA

FINAL REPORT



Regional Observation and Monitor-well Program
Resource Conservation and Data Department
Southwest Florida Water Management District
7601 Highway 301 North
Tampa, Florida 33637-6759

May 2006

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The geological evaluations and interpretations contained in the *Hydrogeology of the ROMP 74X Davenport Monitor Well Site, Polk County, Florida, Final Report* have been prepared by or approved by a licensed Professional Geologist in the State of Florida, in accordance with Chapter 492, Florida Statutes.

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Final Report

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1.0 INTRODUCTION

The Regional Observation and Monitor-well Program (ROMP) 74X Davenport site was obtained to construct monitor wells for a hydrogeologic investigation in Polk County. The ROMP 74X well site is located on the eastern side of the Lake Wales Ridge, in an area with little available hydrogeologic data. The well site will provide much needed information on the hydrogeologic framework and ground-water quality in the northeastern corner of Polk County within the Southwest Florida Water Management District (District).

Drilling, testing, and monitor well construction at the ROMP 74X well site was planned in three phases: (1) Core drilling and Testing, (2) Monitor Well Construction, and (3) Aquifer Performance Testing (APT). Two previous reports detail the first two phases of the project: *Hydrogeology of the ROMP 74X Davenport Monitor Well Site, Polk County, Florida Phase One Core Drilling and Testing, December 2003* and *Draft Report ROMP 74X Davenport Polk County, Florida Monitor Well Construction, January 2005*. This final report presents a culmination of the data collected during all phases of drilling and testing. The first phase of the project began in October 2002 and the final phase of the project was completed in August 2005.

2.0 SITE LOCATION

The ROMP 74X well site is located in northeast Polk County, on the Lake Wales Ridge (Figure 1). The well site is located east of Highway 17 just outside the city of Davenport (Figure 2). The temporary easement for the well site measures 150 feet x 275 feet. The permanent well site measures 20 feet x 80 feet. The well site is located on a 130-acre parcel of land owned by the District. The 130-acre District parcel is located within the 7,000-acre Lake Marion Creek Management Area owned by the South Florida Water Management District (SFWMD). The Lake Marion Creek Management Area is managed by the Florida Fish and Wildlife Conservation Commission as a Wildlife Management Area.

The well site is located in the northwest ¼ of the northeast ¼ of Section 12, Township 27 South, Range 27 East at latitude: 28° 09' 25.96" longitude: 81° 33' 55.28" at a surface elevation of approximately 91 feet above the National Geodetic Vertical Datum of 1929 (NGVD) (Figure 3). The ROMP 74X monitor well site diagram is presented in Figure 4.

3.0 DATA COLLECTION METHODS

The data collection program at ROMP 74X used several different drilling and testing methods to gather lithologic, water level, water quality, and hydraulic information with depth. Several drilling methods were used to facilitate collection of the data. Hollow-stem auger, wire-line coring, mud-rotary and reverse-air drilling methods were used to collect the lithologic samples. Water quality data was collected by pumping borehole intervals isolated with an off-bottom packer. Hydraulic data was collected using slug tests and aquifer performance tests.

3.1 LITHOLOGIC SAMPLING

The District-owned Central Mine Exploration (CME) 85 drill rig was used to perform the wire-line coring at ROMP 74X. Two-inch diameter core was collected at five-foot intervals from land surface to 1,560 ft below land surface (BLS) from August 2002 to June 2003. Figure 5 presents a diagram of the wire-line coring apparatus.

Drilling began in August 2002 with 10-inch hollow-stem augers and a 6-inch split spoon sampler in the unconsolidated quartz sands. Lithologic samples were collected from land surface to 37 feet BLS using the hollow-stem auger drilling method. A 6-inch diameter poly vinyl-chloride (PVC) screened well was installed to 37 feet BLs in the borehole to supply water for the coring process. Figure 6 presents the surficial water supply well diagram. The location of the auger-hole and the 6-inch surficial water supply well are shown in Figure 4.

A new borehole location (core-hole number one) was begun on the east side of the permanent easement in October 2002 and lithologic sampling resumed (Figure 4). Drilling and lithologic sample collection was begun with new four-inch diameter solid-core augers. Problems occurred with the new augers while drilling from land surface to 40 feet BLS. The augers were removed and drilling continued below 40 feet BLS using the mud-rotary method. Lithologic samples of the unconsolidated sediments were collected from drilling discharge line and from the hydraulic shaker installed in-line with the mud-rotary system. Mud-rotary drilling continued in the unconsolidated sediments to a depth of 265 feet BLS where a clay lens was encountered. The mud-rotary bit and drill rods were removed from the borehole and four-inch diameter HW steel casing was drilled five feet into the clay to a total depth of 270 feet BLS.

Wire-line coring began at 270 feet BLS using 2.75-inch outside diameter (OD) NQ core rods to collect the two-inch core. The 4-inch diameter HW casing was advanced several times while coring between 270 feet BLS and 338 feet BLS, due to the HW casing sliding down the borehole while advancing the core-hole. Coring through this interval was difficult due to the large amount of unconsolidated sediments encountered in the core-hole. Periodic pumping of the core-hole was required between core runs to ensure the core rods or wire-line core barrel did not become stuck. Mud-rotary drilling was again used from 338 feet BLS to 380 feet BLS where limestone was encountered. Mud-rotary drilling was stopped at 408 feet BLS in core-hole number one.

In November 2002, Diversified Drilling Corporation, under contract to the District, drilled a new 23-inch borehole, and installed and grouted 18-inch diameter steel surface casing to 148 feet BLS. A 17.5-inch borehole was then drilled from 148 to 245 feet BLS and 12-inch diameter steel casing was installed and grouted. The new borehole (core-hole number two) was located approximately 100 feet northwest of core-hole number one (Figure 4). In December 2002, wire-line coring resumed at a depth of 245 feet BLS inside the 18-inch steel casing. Wire-line coring continued from 245 feet BLS in limestone and clay until unconsolidated sediments were encountered again at 295 feet BLS. Several core runs were attempted with no recovery before resorting to mud-rotary drilling. Mud-rotary drilling was used in the unconsolidated sediments from 295 feet BLS to 379 feet BLS. Wire-line coring was attempted from 379 to 381 BLS after encountering a thin limestone lens at 379 feet BLS. Unconsolidated sediments below 381 feet BLS necessitated the use of the mud-rotary drilling again from 381 feet BLS to 410 feet BLS. The 4-inch diameter HW steel casing was advanced to 410 feet BLS and wire-line coring resumed at 410 feet BLS. The 4-inch diameter HW steel casing was periodically advanced while wire-line coring from 410 feet BLS to 576 feet BLS. Wire-line coring was stopped at 576 feet BLS while coring in highly fractured dolostone that prevented further advancement of the core-hole.

In February 2003, Diversified Drilling Corporation drilled an 11.5-inch borehole from 245 feet BSL to 450 feet BLS inside the 12-inch steel casing. Eight-inch diameter steel casing was installed and grouted to 450 feet BLS. Diversified Drilling Corporation then began reverse-air drilling a six-inch diameter borehole inside the 8-inch steel casing from 450 feet BLS to

610 feet BLS where a hard lens of limestone was encountered. Wire-line coring resumed at 610 feet BLS after installing the 4-inch diameter HW steel casing to 610 feet BLS. The HW steel casing was periodically advanced and the wire-line coring continued from 610 feet BLS to 1,560 feet BLS. Wire-line coring was terminated while drilling in the evaporite sediments of the Oldsmar Formation. Figures 7 and 8 present the configuration of core-holes 1 and 2 during the coring process.

3.2 GROUND-WATER SAMPLING

Ground-water samples were collected from selected intervals while wire-line coring below the unconsolidated surficial sediments. The samples were collected from the discharge line while pumping the intervals using the air-lifting method. Most samples were collected from zones isolated with an off-bottom packer. Figure 9 presents a diagram of the off-bottom packer. The ground-water samples were split and one sample was analyzed in the field for temperature, specific conductance, pH, chloride, sulfate, and density, while the other sample was delivered to the District Environmental Chemistry Laboratory for more extensive analyses. Chain-of-Custody forms were used to track the samples. Results of the ground-water sample analyses are discussed in Section 7.0.

3.3 HYDRAULIC TESTING

Hydraulic testing was performed during the exploratory wire-line coring phase and aquifer performance testing phase of the project. Water levels measurements were colleted daily and formation packer tests were performed periodically during the exploratory coring phase. Aquifer performance tests were conducted to estimate the hydraulic parameters of the permeable and confining units. Results of the hydraulic testing are presented in Section 8.0.

3.3.1 Water Levels

Measurements of the core-hole and HW casing water levels were taken daily during the coring phase. Discrete zone water levels were also measured during off-bottom packer testing.

3.3.2 Formation Packer Testing

The off-bottom packer was used to isolate specific intervals of the core hole for hydraulic testing. With the packer installed, a slug of water was introduced into the core hole and the resulting change in water level was measured with a pressure transducer and recorded on a data logger. The water level recovery curves were then analyzed with aquifer testing software to determine the horizontal hydraulic conductivity. The off-bottom packer was usually installed in confining units to test the hydraulic conductivity, however some permeable units were also tested. The slug test hydraulic results are discussed in Section 8.1.

3.3.2 Aquifer Performance Testing

Aquifer performance tests were conducted on the surficial aquifer, Upper Floridan aquifer, and Lower Floridan aquifer. A pumped well and an observation well were constructed for both the surficial aquifer and the Upper Floridan aquifer. Due to the difficult drilling conditions only one well was constructed in the Lower Floridan aquifer. Water-level changes were measured in all monitor wells during each test. Water-level changes were measured with In-Situ® pressure transducers and recorded on an In-Situ® Hermit 3000 datalogger. The APT results are discussed in Section 8.2.

3.4 GEOPHYSICAL LOGGING

Borehole geophysical logs were collected using the District-owned Century® geophysical logging equipment. Logs were run in core hole 2 while core drilling and in the Upper and Lower Floridan monitor wells during the construction process.

The first suite of geophysical logs was run in the core-hole in February 2003 prior to installing the 8-inch steel casing to 450 feet BLS. The 9074C caliper tool was used to collect a caliper log of the borehole. The 8043 tool was used to collect natural gamma (GAM(NAT)), single-point resistance (SP), resistivity (RES), short normal resistivity (RES(16N)), long-normal resistivity (RES(64N)), temperature (TEMP), and specific conductance (SP COND) logs. The tools were run from land surface to 450 feet BLS. The open-hole interval of the well begins below the 12-inch steel casing installed to 243 feet

BLS. In addition to the geophysical logs collected, a down-hole video camera was used to collect analog video of the borehole from land surface to 450 feet BLS.

The next geophysical logs were run in the core-hole after core drilling stopped at 1,560 feet BLS in June 2003. The 9060 slim-line electric-gamma log tool was run inside the NQ core rods installed to 1,560 feet BLS to ensure the core hole did not collapse before or during logging. The gamma log was the only useable log due to logging through the steel NQ rods. Following collection of the gamma log to 1,560 feet BLS an attempt was made to collect additional logs after removing the NQ rods. During this attempt the 9060 geophysical log tool became stuck in the core hole. The tool was recovered but no geophysical logs were collected.

Additional logs were run in June 2003 during construction of the temporary Upper Floridan APT well. The 8043C multi tool and 9074C caliper tool was run in the open borehole from 40 feet BLS to 284 feet BLS.

Geophysical logs were run December 2004 during construction of the Lower Floridan aquifer monitor well. The 9074C caliper tool, the 8044C multi tool, and the 9512C Induction tool was run in the open borehole from 721feet BLS to 1250 feet BLS.

4.0 MONITOR WELL CONSTRUCTION

Diversified Drilling, Inc. under contract to the District performed the drilling and monitor well construction from May 2003 to July 2004 at ROMP 74X. GIC Water Systems, Inc. under contract to the District performed drilling and monitor well construction from September 2004 to January 2005.   Lloyd Johnson, Senior Well Driller for the District was the Contract Supervisor during well construction. The monitor wells were designed from the lithologic and hydrologic data collected during the initial wire-line coring phase.

The larger diameter temporary wells constructed at the site were designed to accommodate various size pumps for the APT's. These wells will be back-plugged and abandoned following completion of the APT's. The 6-inch diameter permanent monitor wells were designed as observation wells for the APT's. Following the APT's these wells will be equipped with continuous water-level recorders and will be periodically sampled by the District's Water Quality Monitoring Program (WQMP).

The varied geology at the site (thick sand zones, highly fractured carbonates zones and sand-filled cavities) created very difficult drilling conditions. The difficult conditions necessitated the use of several different drilling methods. Cable-tool, mud-rotary, reverse-air, and dual rotary drilling methods were used to drill the boreholes and install the casings. The cable-tool method was used initially to drill and install casing in the unconsolidated sediments. The reverse-air and mud-rotary methods were used to drill and ream the open hole for installing casing at various depths while drilling in sediments and carbonate rocks. The dual-rotary method was used to drill and advance the casing through lost circulation zones in the highly fractured dolostone and sand layers. Figure 4 shows the locations of the monitor wells. Table 6 presents the well construction details.

4.1 TEMPORARY 6-INCH SURFICIAL CORING WATER SUPPLY WELL

The District-owned CME drilling rig was used to construct the first well on-site, a 6-inch partially penetrating surficial monitor well to supply water for the core drilling process. The borehole was drilled using 10-inch diameter augers from land surface to 45 feet BLS. Six-inch poly-vinyl chloride (PVC) casing was installed from three feet above land surface to five feet below land surface. Six-inch diameter 0.010-slot schedule 40 PVC screen was installed from five feet below land surface to 40 feet BLS. Six-twenty (.06-.20-inch) grain size silica sand was installed in the annulus from two feet BLS to 40 feet BLS. Portland cement was installed from land surface to 2 feet below land surface in the annulus. Figure 6 presents the as-built diagram for the surficial water supply well.

4.2 TEMPORARY 12-INCH SURFICIAL AQUIFER APT WELL

Diversified Drilling, Inc. constructed the 12-inch diameter temporary surficial APT well in June 2003. A 32-inch diameter borehole was drilled using the mud-rotary method from land surface to 20 feet BLS. Twenty-four inch diameter steel surface casing was installed to the bottom of the borehole and grouted. A 22-inch diameter borehole was drilled from 20 feet BLS to 225 feet BLS using the mud-rotary method. Twelve-inch diameter polyvinyl-chloride (PVC) casing was installed from 3 feet above land surface (ALS) to 30 feet BLS. Twelve-inch diameter 0.030-inch slot schedule 40 PVC well screen was installed from 30 feet to 225 feet BLS. Six-twenty silica sand was installed in the annulus around the PVC screen from 25 feet BLS to 225 feet BLS. Bentonite pellets were installed in the annulus to form a seal from 21-25 feet BLS. Portland type II grout was installed in the annulus from land surface to 21 feet BLS. A locking steel cover was installed around the well casing. Figure 15 presents the as-built diagram.

4.3 PERMANENT 6-INCH SURFICIAL MONITOR WELL

Diversified Drilling, Inc. constructed the 6-inch diameter permanent surficial aquifer monitor well in February 2004. A 23-inch diameter borehole was drilled from land surface to 21 feet BLS using the mud-rotary method. Sixteen-inch diameter steel casing was installed to 21 feet BLS. A 15-inch diameter borehole was then drilled from 21 feet BLS to 225 feet BLS using the mud-rotary method. Six-inch diameter 0.030-inch slot schedule 40 well screen was installed in the borehole from 25 to 225 feet BLS. Six-inch diameter schedule 40 PVC casing was installed from 3 feet above land surface to 25 feet BLS. Six-twenty size silica sand was installed in the annulus from 17 feet BLS to 225 feet BLS. A bentonite seal was installed in the annulus from 13 to 17 feet BLS. Portland type II cement grout was installed in the annulus from land surface to 13 feet BLS. Figure 16 presents the as-built diagram.

4.4 TEMPORARY 8-INCH UPPER FLORIDAN APT WELL

Diversified Drilling, Inc. worked on the temporary Upper Floridan aquifer APT well intermittently from June 2003 to January 2004. In June 2003 a 44-inch borehole was drilled from land surface to 40 feet BLS using the mud-rotary method. Thirty-six inch diameter steel casing was installed and grouted from land surface to 40 feet BLS. In August 2003, a 22-inch borehole was drilled from 40 to 250 feet BLS and 22-inch steel casing was installed from land surface to 250 feet BLS, using the cable tool method. In January 2004, a 19.5-inch borehole was drilled from 250 feet BLS to 456 feet BLS. Sixteen-inch steel casing was installed into the borehole but could not be lowered below 300 feet BLS. The 16-inch casing was removed and a caliper log was run on the borehole. The caliper log showed no obstructions in the borehole. The casing was reinstalled but again stopped at 300 feet BLS. A decision was made to use 16-inch diameter steel casing from land surface to 240 feet BLS and 12-inch steel casing from

240 feet BLS to 456 feet BLS. The two casing strings were joined with a 16 x 12-inch steel reducer coupling. The casing was installed and grouted in the borehole. An 11.5-inch borehole was then drilled with difficulty from 456 feet BLS to 682 feet BLS. Lost circulation zones of sand and permeable limestone and dolostone complicated the drilling. The borehole had to be re-drilled several times due to quartz sand infilling the borehole. Drilling was stopped and the measured total depth was 562 feet BLS. A decision was made to install PVC screen in the borehole due to the presence of the quartz sand. Eight-inch diameter 0.025-inch slot schedule 40 PVC screen was installed from 452 feet BLS to 563 feet BLS. Eight-inch diameter schedule 40 PVC casing was installed from 3 feet ALS to 452 feet BLS. Six-twenty grain-size quartz sand was installed in the annulus of the borehole from 415 feet BLS to 562 feet BLS. Ten gallons of bentonite pellets were installed into the annulus to form a bentonite seal from 410 feet BLS to 415 feet BLS. Portland cement grout was then installed in the annulus from land surface to 410 feet BLS. Figure 17 presents the well as-built diagram.

4.5 PERMANENT UPPER FLORIDAN MONITOR WELL

Construction on this well was begun during wire-line coring to 1560 feet BLS. A 23-inch diameter borehole was drilled using the mud-rotary method to 150 feet BLS and 18-inch steel casing was installed and grouted from 150 feet BLS to land surface. A 17-inch borehole was then drilled using mud-rotary from 150 feet BLS to 243 feet BLS and 12-inch diameter steel casing was installed and grouted to land surface. An 11.5-inch borehole was then drilled using mud-rotary from 243 feet BLS to 450 feet BLS and 8-inch diameter steel casing was installed and grouted to land surface. An 8-inch borehole was then drilled from 450 to 505 feet BLS using the mud-rotary method before circulation was lost. Drilling continued without circulation to 525 feet BLS. The drilling method was changed to reverse-air after failing to obtain circulation after several attempts. The 8-inch borehole was temporarily advanced to 540 feet BLS before caving in to 520 feet BLS. Several failed attempts to clear the borehole from 520 to 540 feet BLS necessitated installing grout into the borehole. A total of 17 cubic yards of grout was installed in the borehole from 540 to 518 feet BLS. Drilling then resumed and the 8-inch borehole was advanced from 518 to 608 feet BLS. The 4-inch temporary HW steel casing was then installed from land surface to 608 feet BLS by District staff. The 3-inch diameter core hole was drilled 608 to 1,560 feet BLS. Core drilling was stopped at 1,560 feet BLS and the 4-inch HW casing was removed from the borehole. Figure 18 presents the core-hole configuration prior to modification to the Upper Floridan well. Modification of the core-hole began in February 2004. The existing 3-inch diameter borehole was reamed to 8-inches from 608 feet BLS to 740 feet BLS. This well will be lined with 4-inch diameter PVC casing from land surface to 450 feet BLS following all APT's. Figure 19 presents the current configuration of the permanent Upper Floridan monitor well.

4.6 PERMANENT 8-INCH LOWER FLORIDAN MONITOR WELL

Diversified Drilling, Inc. began construction on the permanent Lower Floridan well in October 2003. The cable-tool method was used initially to install the 22-inch diameter steel surface casing from land surface to 314 feet BLS. Cable tool drilling was completed in December 2003. Reverse-air drilling began on the well in February 2004. An 8-inch borehole was drilled inside the 22-inch diameter casing from 314 feet BLS to 519 feet BLS. The borehole filled with formation sand to 388 feet BLS. Diversified Drilling, Inc. began reaming the hole with a 21-inch bit using the mud-rotary method from 388 feet BLS. Drilling circulation was lost and drilling continued with difficulty until stopping at 465 feet BLS. The drill rods were removed from the borehole and a subsequent measurement of the total borehole depth indicated the borehole had caved in to 315 feet BLS. Eighteen-inch diameter steel casing was installed in the borehole from land surface to 294 feet BLS (the borehole collapsed again from 294 to 315 feet BLS). The cable-tool drilling method was used again in May 2004 to advance the 18-inch diameter steel casing from 284 to 476 feet BLS. An 18-inch borehole was drilled from 476 to 519 feet BLS. In July 2004, the reverse-air drill rig returned to the site. The 18-inch steel was pressure grouted from 476 feet BLS to land surface. An 18-inch borehole was drilled with difficulty using mud-rotary, then the reverse-air method from 466 to 519 feet BLS. Sand and large cuttings repeatedly plugged off the reverse-air flow and continued to refill the bottom of the borehole. In mid-July cement grout was pumped through tremie pipe to the bottom of the borehole near 500 feet BLS in an attempt to seal off the sand and loose cuttings. Reverse-air drilling resumed from 427 feet BLS to 519 feet BLS. The borehole again sanded in from 512 to 519 feet BLS. Diversified Drilling stopped drilling at this point and moved off the well. Figure 20 presents the well diagram as drilled by Diversified Drilling, Inc.

In September 2004, the District contracted GIC Water Systems, Inc., to perform drilling services on the Lower Floridan Exploratory Well. GIC Water Systems, Inc. used the dual-rotary drilling method to drill and install 14-inch steel casing from 512 feet BLS to 721 feet BLS. In December 2004 GIC Water Systems, Inc. drilled a 13-inch borehole from 721 to 1250 feet BLS using the reverse-air drilling method. Geophysical logs were then run in the open borehole interval from 721 to 1250 feet BLS. Figure 14 presents the geophysical logs. Eight-inch diameter steel casing was then installed and grouted from land surface to 1,250 feet BLS. An 8-inch borehole was then drilled from 1,250 feet BLS to 1,400 feet BLS to form the open-hole interval in the permeable section of the Lower Floridan. Figure 21 presents a diagram of the Lower Floridan well after completion by GIC Water Systems, Inc.

5.0 GEOLOGY

The ROMP 74X well site is located on the Lake Wales Ridge, a long narrow ridge that extends from Highlands County in the north to Lake County in the south. White (1970) describes the Lake Wales Ridge as the most prominent of several ridges that exist in the Central Highlands physiographic province. White also states that the Lake Wales Ridge is a relict shoreline that has been above sea level since formation.

The elevation at the ROMP 74X site is approximately 91feet NGVD. Holocene to Miocene age unconsolidated sediments overly Eocene age sedimentary rocks. The ROMP 74X stratigraphy was defined from lithologic descriptions of core samples collected while wire-line coring from land surface to 1,560 feet BLS. Figure 12 presents the stratigraphy and hydrogeology of the ROMP 74X well site. The lithologic log for ROMP 74X is presented as Appendix A.

The rocks and sediments encountered during drilling was indicative of karst topography. Quartz sand, clay and other sediments were encountered periodically while drilling through layers of limestone and dolostone. Sand and clay sediments were entrained within cavities located in the limestone and dolostone formations.

5.1 UNDIFFERENTIATED SURFICIAL DEPOSITS

The Holocene to Pliocene age undifferentiated surficial deposits are the uppermost geologic unit at the ROMP 74X well site. The surficial deposits are comprised of unconsolidated medium to very coarse-grained quartz sand and some silt. The quartz sand coarsened downward with very coarse grains described between 165 and 225 feet BLS. The undifferentiated surficial deposits extend from land surface to approximately 225 feet BLS.

5.2 HAWTHORN GROUP

The Hawthorn Group underlies the undifferentiated surficial deposits. Stiff green clay interbedded with sand, silt, soft clayey limestone and some hard limestone fragments extend from 225 to 375 feet BLS. Past erosional processes appear to have removed much of the previously deposited sediments and reworked the remaining sediments. The clay and limestone present are probably undifferentiated Peace River Formation sediments. The clay layers are indicated on the GAMMA log near 250, 300 and 350 feet BLS in Figure 11. The Hawthorn Group unconformably overlies the Ocala Limestone. The lower part of the Ocala limestone is the uppermost limestone present due to past erosion. The Suwannee limestone appears is absent. In adjacent Osceola County, Schiner (1993) reports the absence of the Ocala Limestone in parts of northwestern and north-central Osceola County.

5.3 OCALA LIMESTONE

The remaining portion of the Ocala Limestone at ROMP 74X has been weathered to a very soft, clayey, white limestone. Some very thin lenses of hard, fossiliferous limestone are also present. Thick sequences of quartz sand, silt, and clay lenses within the limestone appear to be unconsolidated sediment that filled in cavities within the highly weathered Ocala Limestone. The interbedding of sands, clays, silts and limestone is indicative of a paleokarst surface (see Figure 12). The Ocala Limestone extends from 375 to 445 feet BLS.

5.4 AVON PARK FORMATION

The Avon Park Formation is Eocene in age and extends from 445 feet BLS to greater than 1,560 feet BLS at the ROMP 74X well site. In this part of Polk County the lithologic character of the Avon Park Formation is highly variable (Murray and Halford, 1996).

The uppermost part of the Avon Park Formation is comprised of hard, dense, dolomite with some quartz sand and clay present in fractures. The zone from 445 to 575 is highly permeable due to the numerous fractures and voids in the dolomite. A down-hole video log run in this zone revealed large fractures and solution features capable of transmitting large volumes of water. The portion of the Avon Park Formation from 575 to 740 feet BLS is characterized by layers of hard, fractured, moldic dolomite separated by lenses of soft clayey, unconsolidated silt-sized dolomite. The porosity and permeability of this section of the Avon Park is markedly less than the overlying fractured dolomite zone. The permeable section of the Avon Park Formation from 445 to 740 feet BLS forms the Upper Floridan aquifer.

Below 740 feet BLS alternating layers of hard, dense dolomite and soft, clayey, nearly unconsolidated dolomite, characterize the Avon Park. These alternating layers extend from 740 to 1,100 feet BLS and form the middle semi-confining unit (O'Reilly and others, 2002)(also known as middle confining unit I, mapped by Miller, 1986) between the Upper and Lower Floridan aquifers.

Evaporite sediments appear in the Avon Park Formation below 1,100 feet BLS at ROMP 74X. Hard dense dolomite with large voids and fractures completely filled with gypsum extends from 1,100 to 1,250 feet BLS. The evaporite sediments mark the top of the middle confining unit. The middle confining unit and the semi-confining unit (also known as middle confining unit II), separate the Upper and Lower Floridan aquifers in this part of Florida (O'Reilly and others, 2002).

Hard, moldic and fractured dolomite occurs from 1,250 to 1,560 feet BLS. The porosity of the unit was characterized by the absence of gypsum in the numerous fossil molds and fractures. Numerous dolomite and some small quartz crystals were present along fracture planes. This permeable zone is located within the Lower Floridan aquifer at the ROMP 74X site.

6.0 HYDROGEOLOGY

The ROMP 74X well site hydrogeology was defined during initial wire-line coring. Aquifer systems were delineated from lithologic descriptions, hydraulic testing, potentiometric levels, geophysical log data, and water quality data collected during drilling.

6.1 SURFICIAL AQUIFER

The surficial aquifer at ROMP 74X is unconfined and extends from land surface to approximately 225 feet BLS. Medium to very coarse-grained quartz sand and silt of the undifferentiated surficial deposits form the surficial aquifer. The base of the surficial aquifer is formed by layers of clay and limestone of the Hawthorn Group. The water level in the surficial aquifer ranged from 0.5 to 2.5 feet BLS while wire-line coring from December 2002 to June 2003. A 6-inch diameter surficial well (screened from 5 to 30 feet BLS) drilled to supply water for the coring drilling phase had a specific capacity of 10 gallons per minute/foot (GPM/FT).

6.2 INTERMEDIATE CONFINING UNIT

The intermediate confining unit underlies the surficial aquifer in the area of ROMP 74X. The intermediate confining unit is comprised of low permeability clay and limestone sediments of the Hawthorn Group and the low permeability sediments of the Ocala Limestone. The intermediate confining unit extends from 225 to 445 feet BLS. The intermediate confining unit helps to retard vertical movement of water between the overlying surficial aquifer and the underlying Upper Floridan aquifer.

In parts of Polk County, permeable zones may occur in the sand beds and permeable limestone formations within the Hawthorn Group. At the ROMP 74X site, no permeable zones were delineated within Hawthorn Group. The clay lenses are identified by the gamma response in Figures 11 and 13.

6.3 FLORIDAN AQUIFER SYSTEM

The Floridan aquifer system underlies the intermediate confining unit and is comprised of limestone and dolomite rocks of Eocene to Late Paleocene age. The Floridan aquifer is approximately 2,300 feet thick in the area of the wellsite and consists of the Avon Park Formation, Oldsmar Formation, and part of the Cedar Keys Formation (O'Reilly and others, 2002). In the area of ROMP 74X the Floridan aquifer system contains two permeable zones, the Upper and Lower Floridan aquifers separated by a thick sequence of low permeability sediments termed the middle semi-confining unit and the middle confining unit (O'Reilly and others, 2002). Table 3 presents the water level easurements with depth while core drilling. A water level graph is presented as Figure 10.

The top of the Upper Floridan aquifer (UFA) occurs near the contact between the Ocala Limestone and Avon Park Formation at ROMP 74X. Highly weathered clayey limestone, sand and clay filled solution features of the Ocala Limestone, and clays of the Hawthorn Group form a thick confining unit between the surficial and Upper Floridan aquifers. The UFA extends from 445 to 740 feet BLS in a permeable section of the Avon Park Formation. The most permeable section occurs from 450 feet BLS to 570 feet BLS in a highly fractured section of dolomite. Moderately permeable beds of hard, moldic dolomite and soft, weathered clayey limestone characterize the remainder of the UFA from 570 to 740 feet BLS. The potentiometric surface of the UFA ranged from 1 to 3 feet above land surface (approximately 92 to 94 feet above NGVD) while coring between 450 to 740 feet BLS during the period of December 12, 2003 to March 27, 2003. Figure 22 presents the potentiometric surface map of the UFA for May 2004 and September 2002.

The middle semi-confining unit extends from 740 to approximately 1,100 feet BLS in the Avon Park Formation. This low permeability unit is comprised of thin alternating beds of soft, clayey, weathered dolomite and hard, dense dolomite lenses.

The top of the middle-confining unit occurs at 1,100 feet BLS in the Avon Park Formation. This unit is comprised of hard, dense, dolomite with gypsum filled fractures, molds and cavities. Horizontal hydraulic conductivity values obtained from slug tests in this unit were an order of magnitude less than values collected in the overlying semi-confining unit.

A permeable unit delineated as part of the Lower Floridan aquifer (LFA) was encountered at 1,250 feet BLS in the Avon Park Formation. A major change in water level was noted after penetrating the permeable dolomite in the LFA. The potentiometric surface ranged from 40 to 43 feet BLS (51 to 48 feet above sea level) while coring from 1,250 to 1,550 feet BLS. The permeable unit consists of a hard, fractured and moldic dolomite without the presence of gypsum. Well-developed secondary porosity was observed in this zone when viewed with the District-owned down-hole video camera. The permeable unit extends from 1,250 to 1,400 feet BLS.

Nearly impermeable hard, dense dolostone with gypsum filled molds, fractures, and voids was again encountered while core drilling from 1,400 to 1,550 feet BLS. The full extent of the LFA has not yet been defined at ROMP 74X.

7.0 GROUND-WATER QUALITY

Ground-water samples were collected periodically while core drilling from 436 feet BLS to 1,486 feet BLS in the Floridan aquifer system. The field analyses and laboratory analyses of the ground-water samples are presented in Tables 1 and 2, respectively. Figure 23 presents a graph of the chloride and sulfate concentrations and specific conductance measurements of the ground-water samples collected while core drilling from land surface to 1,486 feet BLS.

7.1 SURFICIAL AQUIFER

One ground-water sample was collected from the surficial water supply well (screened interval 5 to 35 feet BLS) with a centrifugal pump in October 2003. Water quality in the surficial aquifer is within secondary drinking water standards for most parameters. The field measured chloride concentration was four milligrams/liter (mg/L), sulfate was two mg/L, and specific conductance was 129 umhos/centimeter.

7.2 UPPER FLORIDAN AQUIFER

Ground-water samples were collected from isolated intervals using the off-bottom packer while core drilling in the Upper Floridan aquifer. Several ground-water samples were collected while coring in the permeable zone from 450 to 740 feet BLS. All constituents were within secondary drinking water standards. Chloride concentrations ranged from 10 mg/L at the 436-461 feet BLS sample interval to 5 mg/L at the 720-786 feet BLS sample interval. Sulfate concentrations ranged from 23 mg/L at the 436-461sample interval to 7 mg/L at the 720-786 feet BLS sample interval. Total dissolved solids (TDS) ranged from 146 mg/L at the 436-461 feet BLS sample interval to 115 mg/L at the 720-786 feet BLS sample interval.

7.3 LOWER FLORIDAN AQUIFER

Ground-water samples were collected while coring in the Lower Floridan aquifer permeable zone (1,250 to 1,400 feet BLS). Secondary drinking water standards were exceeded for several constituents. Chloride concentrations ranged from 7 mg/L at the 1,256-1,286 feet BLS sample interval to 9 mg/L at the 1,351-1,381 feet BLS sample interval. Sulfate concentrations ranged from 320 mg/L at the 1,256-1,286 feet BLS sample interval to 1,340 mg/L at the 1,351-1,381 feet BLS sample interval. TDS ranged from 615 mg/L at the 1,256-1,286 feet BLS sample interval to 2,220 mg/L at the 1,351-1,381 feet BLS sample interval.

8.0 HYDRAULIC DATA

Slug testing and APT's were performed during the course of the project to collect data on the hydraulic properties of the aquifer systems and confining units. The slug tests were performed during the wire-line core-drilling phase. APT's were performed after all monitor wells were constructed at the site.

8.1 FORMATION PACKER SLUG TESTING

Slug tests were performed on isolated borehole intervals using an off-bottom packer during the wire-line core-drilling phase of the project. The packer was installed through the NQ core rods isolating both permeable and confining units for slug testing. During the slug tests the water level changes were measured with a pressure transducer installed in the core rods and recorded with a datalogger. A second pressure transducer was installed in the annulus between the NQ rods and the HW casing to detect water-level changes. Water level changes in the annulus between the NQ rods and HW casing can be caused by a poor seal between the packer and the borehole wall or by fractures or other porosity features in the borehole wall.

During slug tests the water from the slug moves through the NQ core rods (2.38-inch inside diameter (I.D.)) until reaching the off-bottom packer, then moves through the 0.51-inch inside diameter packer before reaching the 2.99-inch diameter open hole test interval (Figure 9). The change in diameter from the 2.38-inch core rod to the 0.51-inch packer causes a restriction in the flow of water during the slug test. This restriction increases the velocity of the water moving through the packer orifice. The restriction and increase in velocity usually results in under-predicted hydraulic conductivity values for the permeable zones tested.

The slug test data was analyzed with AQTESOLVE® for Windows® Professional Version 3.50 software (Hydrosolve, 1996-2000). The KGS (Hyder et al., 1994) and Butler (1998) analytical models were used to obtain the horizontal hydraulic conductivity values. The horizontal hydraulic conductivity values ranged from 0.01 to 13.79 feet/day. **Note**: the values for the permeable zones are under predicted and should only be used for comparative purposes. The curve matches for the slug tests are presented in Appendix B.

Table 4 presents the estimated hydraulic values. Figure 24 presents a graph of the hydraulic conductivity versus depth below land surface.

8.2 AQUIFER PERFORMANCE TESTING

APT's were conducted to estimate the hydraulic conductivity, transmissivity, storativity, specific yield and leakance of the permeable and confining units at ROMP 74X. Three APT's were conducted at the ROMP 74X site from June to August 2005: Surficial APT, Upper Floridan APT, and Lower Floridan APT. Water-level data was measured with In-Situ® pressure transducers and recorded on an In-Situ® Hermit 3000 datalogger. The data collected from the tests was analyzed with AQTESOLVE® software using various analytical solutions. Figure 32 presents a hydrograph of all wells during the APT's.

8.2.1 Lower Floridan APT

Background water levels were monitored in all wells prior to the Lower Floridan aquifer (LFA) test. The water levels were collected from June 12, 2005 to July 17, 2005. The drawdown test for the LFA was started on July 17, 2005. The 8-inch permanent LFA well was pumped with a diesel-powered 6-inch line-shaft turbine pump at 1,080 GPM for the first 0.5 hour then the discharge rate was reduced to 1015 GPM for the next 23.5 hours hours. The rate was reduced to ensure the water level did not reach the pump intake. The pump intake was installed to 70 feet BLS. This discharge was measured with an in-line flowmeter and a circular orifice weir. The flow was routed east through 12-inch aluminum discharge pipe and exited 150 feet away into a marsh area adjacent to the site that drains to Horse

Creek. Figure 25 presents the water levels in all wells before the LFA drawdown phase and Figure 26 presents the water levels during the drawdown phase. Figure 27 presents a graph the LFA recovery phase.

The static water-level in the 8-inch LFA pumped well was 38.20 feet BTOC or 56.76 feet NGVD on July 12, 2005. During pumping, the maximum drawdown in the pumped well was 21 feet. The recovery phase began after 24 hours of pumping. A pronounced oscillatory response was observed during the recovery phase. The oscillatory response is likely caused by the very long casing and water column height in the well (casing: 0 -1250 feet BLS, open hole interval: 1250 - 1400 feet BLS).

The drawdown data from the 8-inch LFA well was analyzed with AQTESOLV® software. The Cooper-Jacob (1946) and Theis (1935) methods were used in the analysis. The data analyzed only included the first 30 minutes of pumping at the 1080 GPM rate. The portion of the data affected by the reduction in discharge rate was not analyzed. The transmissivity values ranged from 17,000 feet^2/day to 18,000 feet^2/day. These values agree reasonably well with the 19,000 feet^2/day value for transmissivity estimated from the specific capacity test of the LFA well. The storativity values calculated from the test were outside the normal range for confined aquifers and are not presented here. The curve matches and specific capacity data for the 8-inch LFA well are presented in Appendix E.

8.2.2 Upper Floridan Aquifer APT

The 8-inch temporary Upper Floridan APT well was pumped with a 30 Horse Power (HP) 6-inch electric submersible pump at 230 GPM for 24 hours. The pump intake was installed to 80 feet BLS. This discharge was measured with an in-line flowmeter and a circular orifice weir. The flow was routed east through 12-inch aluminum discharge pipe and exited 150 feet away into a marsh area adjacent to the site that drains to Horse Creek.

The static water level in the 8-inch UFA observation well was 3.19 feet BTOC or 94.13 feet above NGVD on July 25, 2005. During pumping, the maximum drawdown in the pumped well was 63 feet. Maximum drawdown in the 6-inch UFA observation well located 130 feet from the pumped well was 1.7 feet on July 27, 2005. The water level in the 12-inch surficial aquifer temporary well located 10 feet from the pumped well, decreased 0.4 feet during the drawdown phase. Figures 28 and 29 present the UFA drawdown and recovery graphs, respectively.

The drawdown data from the 6-inch UFA observation well was analyzed with AQTESOLV® software. The Hantush-Jacob (1955) method and Theis (1935) method were used in the analysis. Transmissivity values for the UFA ranged from 13,970 $feet^2$/day to 18,710 $feet^2$/day. Storativity values ranged from 0.0001 to 0.0003. The value for leakance, calculated from the Hantush-Jacob method was 3.8E-03 $days^{-1}$. The curve matches for 6-inch UFA observation well are presented in Appendix D.

The relatively low transmissivity for the UFA at this site is likely caused by the large amount of unconsolidated sediment infilling the secondary porosity features of the carbonates in the area surrounding the borehole. In addition, the pumped well screen and surrounding sand pack also add friction and decrease the flow of water to the well during pumping. Additionally, grout installed into the permeable zone (519 to 540 feet BLS) during construction of the 8-inch permanent UFA well likely decreased the permeability of the formation around the well.

8.2.3 Surficial Aquifer System APT

The 12-inch temporary surficial APT well was pumped with a diesel-powered 6-inch line-shaft pump at 1,000 GPM for 72 hours. The pump intake was installed to 80 feet BLS. This discharge was measured with an in-line flowmeter and with a circular orifice weir. The flow was routed east through 12-inch aluminum discharge pipe and exited 150 feet away into a marsh area adjacent to the site that drains to Horse Creek.

The static water level in the 12-inch surficial pumped well was 1.44 feet Below Top of Casing (BTOC) or 91.08 feet above NGVD on August 8, 2005. During pumping, the maximum drawdown in the pumped well was 62 feet. Maximum drawdown in the 6-inch surficial observation well located 120 feet from the pumped well was 12 feet on August 9, 2005. The water level in the UFA wells declined approximately 1 foot during the drawdown phase, again illustrating the leakiness of the confining unit between the UFA and surficial aquifer. Figures 30 and 31 present the drawdown and recovery graphs, respectively.

The drawdown data from the 6-inch surficial observation well was analyzed with AQTESOLV® software. The Neuman (1974) and Moench (1997) methods were used in the analysis. Transmissivity values for the surficial aquifer ranged from 2605 feet^2/day to 5569 feet^2/day. The specific yield value calculated by the Neuman method was 3.E-01. The curve matches for 6-inch surficial observation well are presented in Appendix C.

9.0 SUMMARY

A hydrogeologic investigation was completed in three phases at the ROMP 74X well site in Polk County, Florida. The investigation began in October 2002 and was completed in August 2005. During the first phase, wire-line coring and hydraulic testing was performed to define the stratigraphy of the site and to identify the permeable zones and confining units of all aquifers present at the site. In addition, water quality samples were collected to get baseline water quality information on the aquifers. Based on the data collected during coring, monitor wells were designed for each aquifer and APT's were planned.

Phase two of the project involved construction of the permanent and temporary monitor wells. Difficult drilling conditions necessitated multiple drilling methods to complete the wells. One permanent monitor well and one temporary pumped well was constructed in the surficial and Upper Floridan aquifers, and one permanent well was constructed in the Lower Floridan aquifer. The temporary wells were designed to accommodate pumps for the APT's. The permanent monitor wells were designed to function as observation wells during the APT's and later as long-term water-level and water-quality monitors wells.

The third and final phase of the project, aquifer performance testing, was conducted to determine the hydraulic properties of the permeable zones and confining units at the site. The data collected during the APT's was analyzed using AQTESOLV® software to determine hydraulic conductivity, transmissivity, storativity and leakance values.

Following all APT's the temporary monitor wells will be plugged and the permanent monitor wells will be equipped with automatic water-level recorders. The monitor wells will also be sampled by the District's Water Quality Monitoring Program (WQMP) on a quarterly or annual basis.

Additional exploratory drilling and testing in the Lower Floridan aquifer may be performed at this site in the future. The additional drilling would be performed in the 8-inch Lower Floridan monitor well (current open hole 1250 –1400 feet BLS). The additional drilling would provide information on the lithology, water quality, and hydraulic properties of the permeable and confining units of the Lower Floridan aquifer.

10.0 REFERENCES

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TABLES

Table 1. Field Analyses of ROMP 74X Ground-Water Samples Collected During Coring[a]

UID 2865-2209

Date (M/D/Y)	Time	Casing Depth (feet BLS)	Sample Depth[1] (feet BLS)	Specific Cond (umhos)	H_2O Temp (Celcius)	Chloride	Sulfate	pH	Sample Collection Method	Sent to District Lab
12/16/2002	1435	436	436-461	232	23.2	40	<50	7.66	Off-bottom packer/RA[b]	Yes
1/9/2003	1325	436	512-541	246	25.6	40	<50	8.13	Off-bottom packer/RA	Yes
1/22/2003	1520	436	542-566	235	25.7	NA[c]	NA	8.23	Off-bottom packer/RA	Yes
3/20/2003	1030	610	610-651	202	26.4	40	<50	7.14	Open Hole RA	Yes
3/25/2003	1115	610	670-686	199	25.9	NA	NA	8.20	Off-bottom packer/RA	No
3/26/2003	1345	610	706-726	199	25.7	NA	NA	8.18	Off-bottom packer/RA	No
3/27/2003	1330	610	710-736	184	26.3	40	<50	8.28	Off-bottom packer/RA	Yes
4/2/2003	1215	610	720-786	180	25.7	40	<50	8.25	Off-bottom packer/RA	Yes
4/8/2003	1550	610	853-886	350	27.1	60	75	8.09	Off-bottom packer/RA	Yes
4/11/2003	1225	610	926-956	404	25.8	60	150	7.92	Off-bottom packer/RA	Yes
4/15/2003	1545	632	981-1011	338	26.2	40	80	8.16	Off-bottom packer/RA	Yes
4/18/2003	1530	632	1021-1051	397	27.2	60	90	8.21	Off-bottom packer/RA	Yes
4/22/2003	1240	632	1040-1071	813	27.2	60	300	8.00	Off-bottom packer/RA	Yes
4/29/2003	1515	632	1100-1136	804	30.9	60	300	8.15	Off-bottom packer/RA	Yes
5/12/2003	1245	632	1256-1286	775	27.0	40	500	7.81	Off-bottom packer/RA	Yes
5/21/2003	1300	632	1351-1381	2080	27.2	80	1000	7.72	Off-bottom packer/RA	Yes
5/30/2003	1200	632	1456-1486	2880	27.1	80	1000	7.74	Off-bottom packer/RA	Yes

[a] All concentrations reported in mg/L unless otherwise noted

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[b]RA - Reverse Air

[c] NA - Not Analyzed

Table 2. Laboratory Analyses of ROMP 74X Ground-Water Samples Collected During Coring[a] UID 2865-2209

Date (M/D/Y)	Time	Casing Depth (feet BLS)	Sample Depth (feet BLS)	Specific Cond. (umhos)	CL	SO_4	pH	TDS	Ca	Mg	Alkalinity as ($CaCO_3$)	K	Na	Si	Fe (ug/l)	Strontium	ION Balance %	Sample Method
10/30/2003	1230	5	30	129	4	2	7.11	76	17	4.3	55.9	0.57	2.85	8.8	14	0.29	NA[b]	Pumped from surf well
12/16/2002	1435	436	436-461	238	10	23	7.64	146	30	5.6	80.6	0.72	5.65	8.90	40	<0.25	NA	Off-bottom packer/RA[c]
1/9/2003	1325	436	512-541	260	12	29	7.53	160	34	6.5	77.2	1.46	5.92	8.20	<30	<0.25	0.74	Off-bottom packer/RA
1/22/2003	1520	436	542-566	249	12	27	7.61	146	34	6.8	80.4	1.31	5.84	8.10	30	<0.25	0.67	Off-bottom packer/RA
3/20/2003	1030	610	610-651	194	8	15	7.48	119	26	5.5	71.2	0.82	4.76	8.70	<13	0.32	NA	Open-hole/RA
3/27/2003	1330	610	710-736	175	5	7	7.52	112	25	5.7	76.4	0.71	3.69	9.60	<12.5	0.39	NA	Off-bottom packer/RA
4/2/2003	1215	610	720-786	171	5	7	7.53	115	23	5.8	75.6	0.57	3.43	9.70	<13	0.42	NA	Off-bottom packer/RA
4/8/2003	1550	610	853-886	334	8	62	8.09	217	43	14.5	96.4	0.98	5.44	11.20	19	2.79	NA	Off-bottom packer/RA
4/11/2003	1225	610	926-956	392	9	80	8.04	265	44	15.3	102.0	1.26	6.00	12.10	18	22.70	NA	Off-bottom packer/RA
4/15/2003	1545	632	981-1011	333	9	54	8.14	213	36	12.1	105.0	1.47	5.87	12.00	14	15.30	NA	Off-bottom packer/RA
4/18/2003	1530	632	1021-1051	398	9	66	8.20	267	42	13.8	125.0	1.54	5.57	15.80	16	25.30	NA	Off-bottom packer/RA
4/22/2003	1240	632	1040-1071	827	9	314	8.05	638	108	35.3	114.0	1.88	5.48	15.60	37	25.20	NA	Off-bottom packer/RA
4/29/2003	1515	632	1100-1136	809	6	341	8.03	619	145	16.5	74.9	1.13	4.44	5.40	<13	7.76	NA	Off-bottom packer/RA
5/12/2003	1245	632	1256-1286	792	7	320	7.89	615	129	24.8	84.8	1.20	4.82	10.70	<13	7.05	NA	Off-bottom packer/RA
5/21/2003	1300	632	1351-1381	2280	9	1340	7.91	2220	468	87.2	103.0	1.99	7.60	13.20	498	8.87	NA	Off-bottom packer/RA
5/30/2003	1200	632	1456-1486	3360	14	2210	7.84	3460	613	221.0	119.0	9.90	20.40	16.50	71	12.30	NA	Off-bottom packer/RA

[a]All concentrations in mg/L unless otherwise noted

[b]NA= Not Analyzed

[c]RA - Reverse Air used as pumping method

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Table 3. Daily Corehole Water Levels at ROMP 74X

Date	Time	HW Casing Depth (feet BLS)	HW casing Water Level (feet BLS)	Open Hole Depth (feet BLS)	Core Hole Water Level (feet above or (-) below land surface)	Core Hole Approximate Water Level (feet NGVD)	Comments
12/16/2002	1130	436	0.77	461	1.10	83.90	Site Elevation ~85 feet
12/17/2002	0915	436	1.05	461	1.10	83.90	
12/18/2002	0900	436	0.14	481	1.00	84.00	
1/6/2003	1245	436	6.55	491	1.76	83.24	
1/8/2003	0900	436	0.95	531	1.07	83.93	
1/9/2003	0900	436	2.69	541	NR	NR	
1/9/2003	1300	436	NR[a]	512-541	2.88	82.12	packer installed
1/13/2003	1145	436	2.80	541	2.80	82.20	
1/14/2003	0800	436	2.74	551	NR	NR	
1/16/2003	0800	436	2.59	556	NR	NR	
1/20/2003	0900	436	1.20	561	NR	NR	
1/21/2003	0730	436	2.27	561	NR	NR	
1/22/2003	0800	436	1.57	566	NR	NR	
1/22/2003	1500	436	2.39	542-566	1.62	83.38	packer installed
1/23/2003	0700	436	2.50	566	NR	NR	
3/19/2003	0900	608	1.15	608	NR	NR	elevation datum change
3/20/2003	0850	610	1.15	651	1.17	83.83	
3/24/2003	0915	610	1.52	676	1.40	83.60	
3/25/2003	0915	610	1.55	686	1.37	83.63	
3/25/2003	1100	610	NR	670-686	1.25	83.75	packer installed
3/26/2003	0920	610	1.54	706	1.39	83.61	
3/27/2003	0905	610	1.61	736	1.42	83.58	
3/27/2003	1330	610	NR	710-736	2.45	82.55	packer installed
3/31/2003	1015	610	1.25	736	1.15	83.85	
4/1/2003	0900	610	1.20	756	1.10	83.90	
4/2/2003	0915	610	1.18	786	1.17	83.83	
4/2/2003	1200	610	1.15	720-786	1.17	83.83	packer installed
4/3/2003	0900	610	1.20	786	1.13	83.87	
4/7/2003	925	610	1.25	826	1.12	83.88	
4/8/2003	0905	610	1.13	866	0.96	84.04	
4/8/2003	1500	610	0.97	853-886	0.96	84.04	packer installed
4/10/2003	0905	610	1.01	926	0.89	84.11	
4/11/2003	0905	610	1.04	956	0.83	84.17	
4/11/2003	1200	610	NR	926-956	0.66	84.34	packer installed
4/14/2003	0905	610	0.91	966	0.70	84.30	added 22' of HW casing
4/15/2003	0900	632	0.65	991	0.58	84.42	
4/16/2003	0900	632	0.67	981-1011	0.08	84.92	packer installed
4/17/2003	0920	632	0.49	1031	0.38	84.62	
4/18/2003	0910	632	0.49	1031	0.37	84.63	
4/21/2003	1005	632	0.68	1021-1051	0.45	84.55	packer installed
4/22/2003	1000	632	0.46	1071	0.09	84.91	
4/22/2003	1310	632	-1.10	1040-1071	-3.07	81.93	packer installed
4/23/2003	0910	632	0.28	1076	-0.17	84.83	NQ rods at 1000'bls
4/24/2003	0850	632	0.17	1081	NR	NR	NQ was tripped out
4/25/2003	0900	632	0.22	1081	-0.54	84.46	NQ is still 3' off bottom
4/28/2003	0920	632	0.40	1096	-0.97	84.03	
4/29/2003	0920	632	0.41	1116	-0.53	84.47	
4/30/2003	0920	632	0.36	1100-1136	-8.61	76.39	packer installed
5/1/2003	0915	632	0.34	1166	-1.58	83.42	
5/2/2003	0945	632	0.42	1186	-0.98	84.02	
5/5/2003	0955	632	0.27	1206	-0.79	84.21	
5/6/2003	0915	632	0.14	1226	-1.02	83.98	
5/7/2003	0900	632	-0.07	1196-1226	-18.67	66.33	packer installed
5/8/2003	0920	632	-0.11	1246	NR	NR	
5/9/2003	0900	632	-0.34	1266	-14.01	70.99	Lower Floridan Aquifer
5/12/2003	0935	632	-0.49	1286	-40.67	44.33	
5/12/2003	1200	632	-0.31	1256-1286	-39.49	45.51	packer installed
5/13/2003	0920	632	-0.64	1286	-39.75	45.25	
5/14/2003	0900	632	-0.58	1306	-40.61	44.39	
5/15/2003	0905	632	-0.74	1326	-41.22	43.78	
5/19/2003	0940	632	-0.52	1346	-41.63	43.37	
5/20/2003	0900	632	-0.37	1366	-41.41	43.59	
5/21/2003	0915	632	-0.39	1381	-42.92	42.08	
5/21/2003	1200	632	-0.39	1351-1381	-42.37	42.63	packer installed
5/22/2003	0910	632	-0.40	1381	-43.05	41.95	
5/26/2003	0850	632	-0.28	1401	-42.78	42.22	HW casing slipped 1'
5/27/2003	0915	633	-0.36	1416	-42.71	42.29	
5/28/2003	1025	633	-0.41	1446	-43.42	41.58	
5/29/2003	0900	633	-0.39	1466	-42.58	42.42	
5/30/2003	0915	633	-0.50	1486	-43.37	41.63	
5/30/2003	1100	633	-0.48	1456-1486	-43.51	41.49	packer installed
6/2/2003	915	633	-0.79	1496	-43.32	41.68	
6/3/2003	900	633	-0.98	1516	-43.20	41.80	
6/4/2003	915	633	-0.02	1556	-42.59	42.41	

[a] *NR=Not Recorded*

R74Xcore_wl.xls

Table 4. ROMP 74X Corehole Slug Test Results using Off-Bottom Packer

Date	Test No.	Test Interval (feet BLS)	Interval Thicknes (feet BLS)	Airlift Rate (GPM)	Airline Length (feet)	Lithologic Characterization	Hydrogeologic Zone	Analytical Method	Horizontal Hydraulic Conductivity[a] (K) (feet/day)	Notes
12/11/2002	1	415-436	21	NR	200	Clay-Soft	Intermediate confining unit	NT[b]	NT	Test Failed,Open Hole may have caved in
12/16/2002	2	436-461	25	NR	200	Confining Clay & Dolostone	confining unit/UFA	KGS	**13.79**[c]	Good Packer Set
12/18/2002	3	455-481	26	NR	200	Fractured Dolostone	UFA	Butler	**5.73**[c]	Slight Drawdown in HW casing annulus
1/9/2003	4	512-541	29	25	200	Fractured Dolostone & Clay	UFA	Butler	**10.18**[c]	Slight Drawdown in HW casing annulus
1/22/2003	5	542-566	24	20	200	Fractured Dolostone	UFA	Butler	**7.90**[c]	
3/25/2003	6	670-686	16	17	200	Permeable Granular Dolostone & Clay	UFA	Butler	**13.32**[c]	Slight Drawdown in HW during Airlifting
3/27/2003	7	710-736	26	14	200	Fossiliferous Dolostone	UFA	Butler	**7.10**[c]	Slight Drawdown in HW casing annulus
4/2/2003	8	720-786	66	21	200	Dolostone with Dolosilt lenses	UFA/confining unit	Bultler	**2.58**[c]	Good Packer Set
4/8/2003	9	853-886	33	12	200	Dolosilt,soft	mid semi-confining unit	KGS	1.68	Hole not making much water
4/11/2003	10	926-956	30	15	200	Dolostone with Dolosilt lenses	mid semi-confining unit	NT	NT	Good Packer Set -Water qualiy sample collected
4/15/2003	11	981-1011	30	5	200	Dolosilt, clayey	mid semi-confining unit	NT	NT	Good Packer Set -Water qualiy sample collected
4/17/2003	12	1000-1031	31	7	200	Dolostone & Dolosilt	mid semi-confining unit	KGS	0.67	Good Packer Set
4/18/2003	13	1021-1051	30	7	200	Dolostone-Crystals in fractures	mid semi-confining unit	NT	NT	Good Packer Set -Water qualiy sample collected
4/22/2003	14	1040-1071	31	13	200	Hard Dolostone	mid semi-confining unit	KGS	0.71	Good Packer Set
4/29/2003	15	1100-1136	36	0.6	200	Dolostone & Evaporites	middle confing unit	KGS	0.04	Good Packer Set, Very Low Pump rate
5/6/2003	16	1196-1226	30	<0.5	200	Dolostone & Evaporites	middle confing unit	KGS	0.01	Good Packer Set-after it was repaired
5/12/2003	17	1256-1286	30	15	200	Permeable Dolostone	LFA	Bultler	**2.86**[c]	Good Packer Set
5/21/2003	18	1351-1381	30	18	200	Fractured Dolostone, Hard, Dense	LFA	Butler	**2.54**[c]	Good Packer Set
5/30/2003	19	1456-1486	30	8	240	Hard, Dense, Tight, Dolostone & Evaporites	confining unit	KGS	0.84	Good Packer Set

hydraulilc.xls

[a] Values obtained from AQTESOLV slug test analysis
[b]NT=Not Tested
[c]**hydraulic conductivity values for high-*K* zones are underpredicted with NQ packer**

Table 5. APT Hydraulic Values

Aquifer Tested	Aquifer Thickness b (feet)	Overlying Confining Unit Thickness b' (feet)	Well Analyzed	Distance from Pumped well r (feet)	Test Phase	Analytical Method	Transmissivity T (ft^2/day)	Horizontal Hydraulic Conductivity of Aquifer K_h (ft/day)	Specific Yield S_y dimensionless	Storativity S dimensionless	r/B	Vertical Hydraulic Conductivity of Overlying Confining Unit K' (ft/day)	Leakance K'/b' (days-1)
Surficial	223	NA	Surficial OB	120	Drawdown	Neuman (1974)	5429	24	3.E-01	ND[1]	ND	ND	ND
Surficial	223	NA	Surficial OB	120	Drawdown	Theis (1935)	7608	34	ND	1.E-03	ND	ND	ND
UFA	285	225	UFA OB	130	Drawdown	Hantush-Jacob (1955)	8435	30	ND	8.E-04	9.E-02	8.5E-01	3.8E-03
UFA	285	225	UFA OB	130	Drawdown	Cooper-Jacob (1946)	9993	35	ND	6.E-04	ND	ND	ND
LFA	150	510	LFA pumped	0.5	Drawdown	Cooper-Jacob (1946)	14830	99	ND	1.E-06 [2]	ND	ND	ND
LFA	150	510	LFA pumped	0.5	Drawdown	Theis (1935)	17700	118	ND	4.E-08 [2]	ND	ND	ND

[1] Not Determined

[2] Values are outside the normal range for confined aquifers

aptresults.xls

Table 6. Well Construction Details

Category	Aquifer Monitored	Well Type	UID#	WCP#	TOC (feet NGVD)	Casing Depth (feet BLS)	Total Depth (feet BLS)	Depth to Water (feet BTOC)	Water Level (feet NGVD)	Latitude (deg min sec)	Longitude (deg min sec)
Temporary	Surficial	12"screened	WEL-2865-2439-0	685838.01	94.05	30	225	2.94	91.11	28 09 24.6	81 33 53.3
Permanent	Surficial	6" screened	WEL-2865-2440-0	695538.01	94.38	25	225	3.15	91.23	28 09 24.1	81 33 54.8
Temporary	UFA	8" screened	WEL-2865-2441-0	696430.01	97.32	452	562	3.23	94.09	28 09 24.9	81 33 53.2
Permanent	UFA	8" open hole	WEL-2865-2209-0	695560.01	96.76	450	740	3.45	93.31	28 09 24.4	81 33 54.8
Permanent	LFA	8" open hole	WEL-2865-2443-0	701509.03	94.96	1250	1400	40.81	54.15	28 09 23.7	81 33 55.3
Temporary	water supply	6" screened	WEL-2865-2361-0	673702.02	93.28	5	40	3.08	90.20	28 09 23.5	81 33 54.2

wellspecs.xls

FIGURES

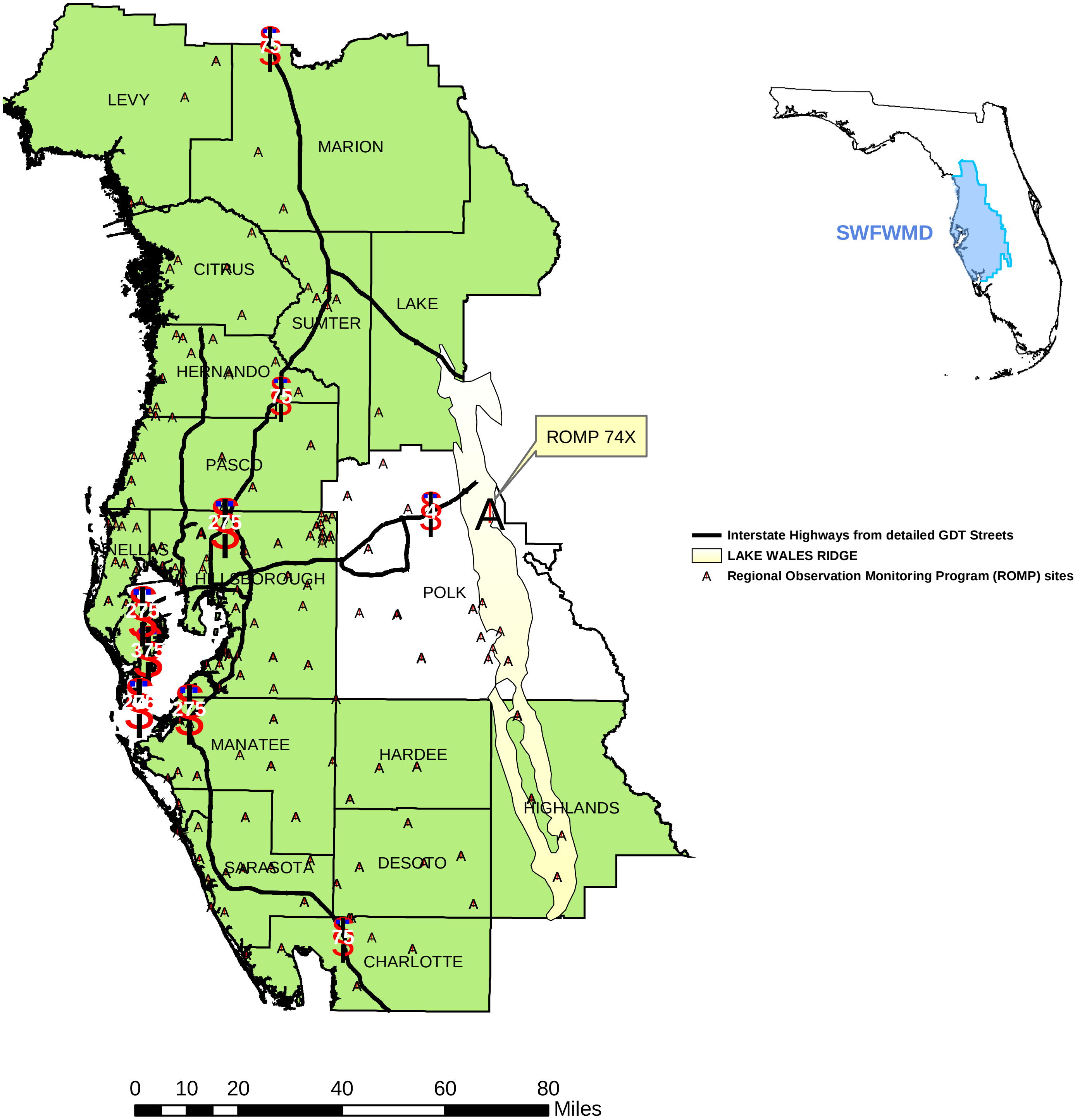
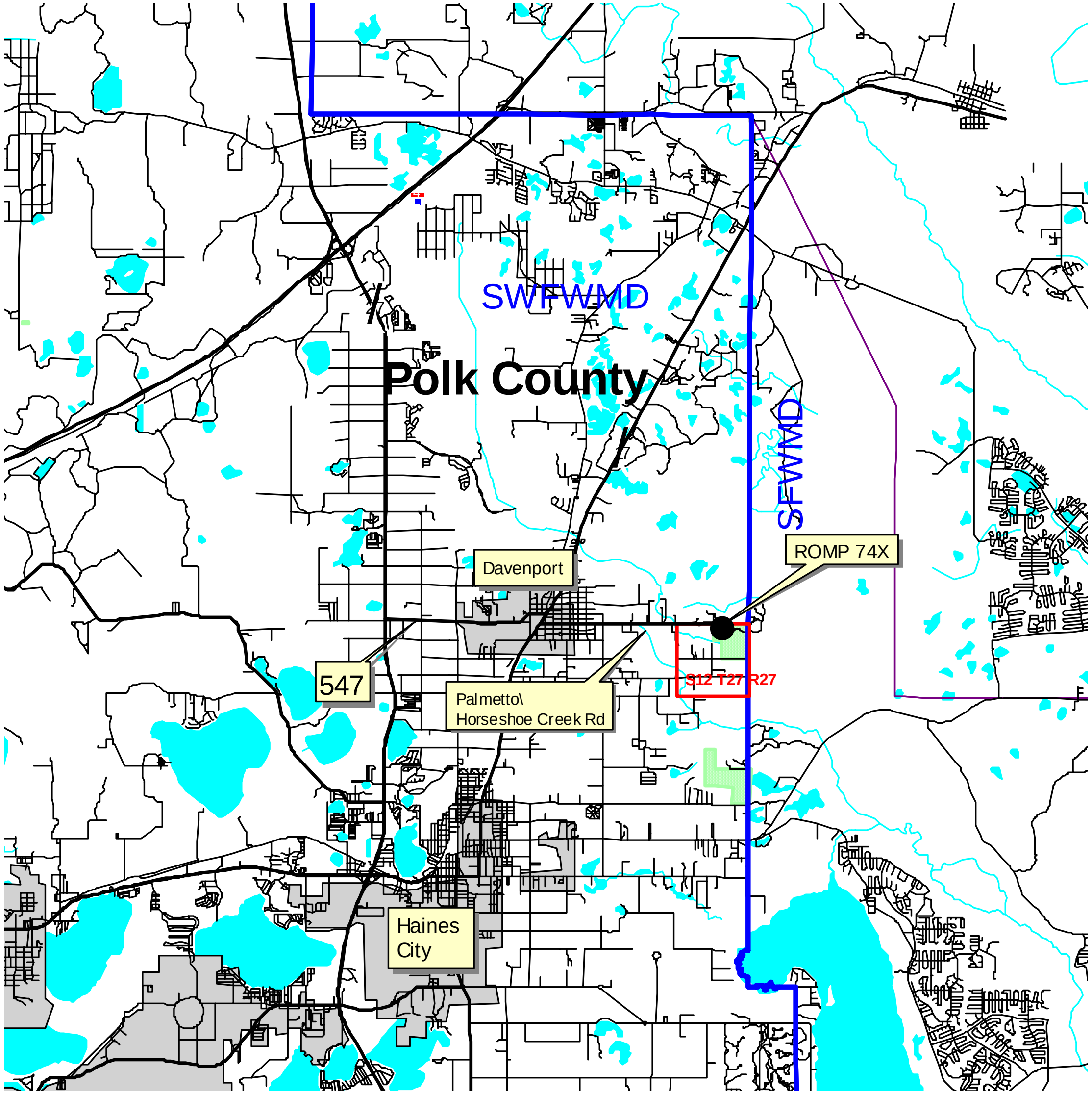
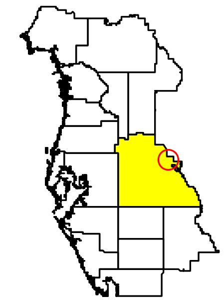


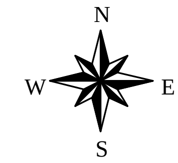
Figure 1. ROMP 74X Davenport

General Location Map

Fig1.apr







Section: NW 1/4 of the NE 1/4 of S 12
Township: 27 South
Range: 27 East
Elevation: ~85 feet NGVD
Lattitude: 28 09 25.96
Longitude: 81 33 55.28
Davenport Quadrangle

LWDT

Water Management Districts
Major Roads
Water Management Districts
Detailed Roads
City Boundaries
State County Boundaries
Distlands-Owned Lands - Fee
1:100,000 Streams
1:100,000 Lakes

Directions: From I-4 go south on Hwy 27 to State Rd 547. Go east on 547 to Hwy 17 in the city of Davenport. Go south on Hwy 17 ~2 blocks to Palmetto St. Go East on Palmetto (Palmetto becomes Horshoe Creek Rd) for approximately 3 miles to the Lake Marion Creek Wildlife Management Area (WMA). Wellsite is located just inside the Lake Marion Creek WMA gate.

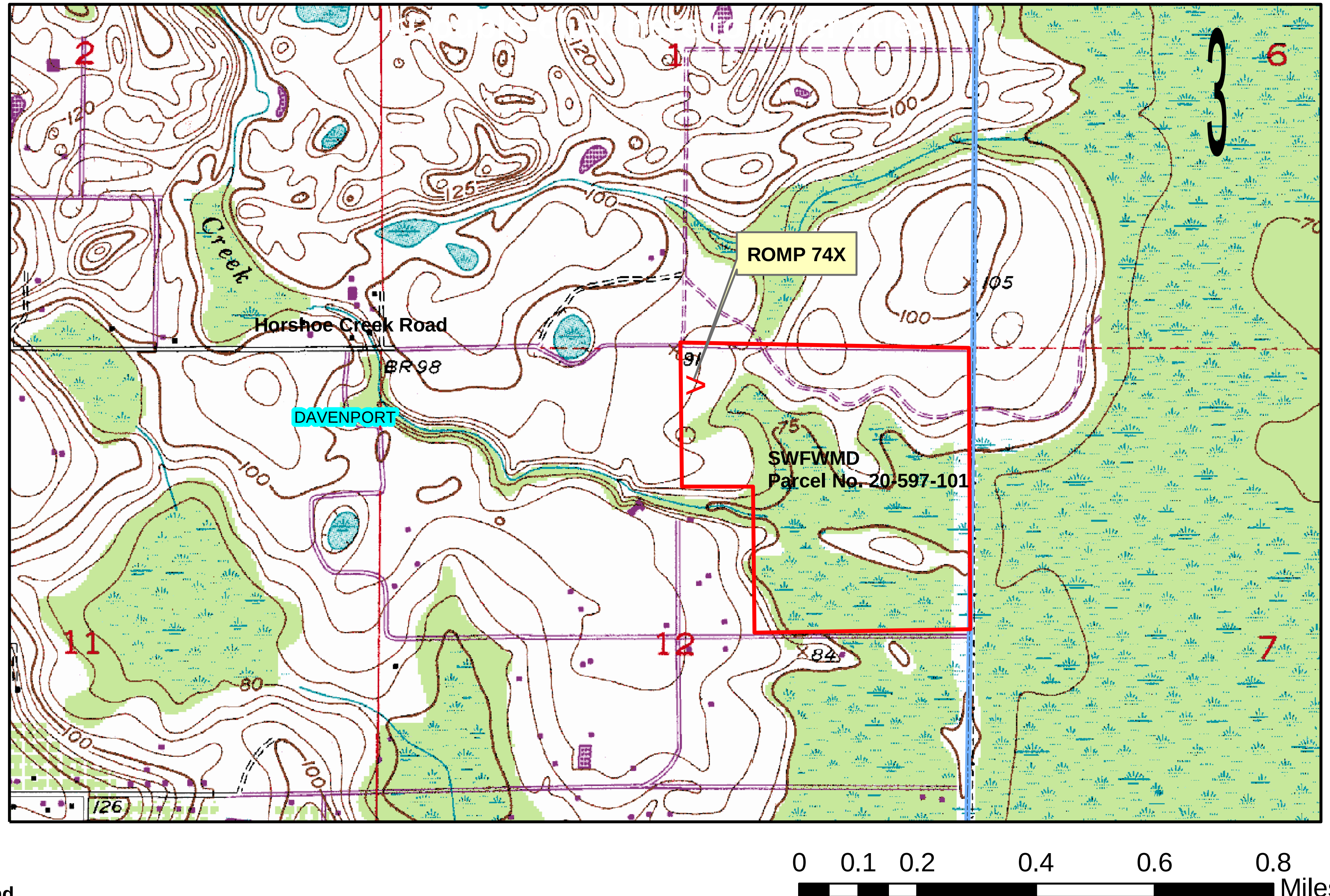
3 0 3 6 Miles

figure2.apr

Figure2.ppt

Figure 2. ROMP 74X Davenport

Project Location Map



Legend

SWFWMD's County Boundaries

Boundary

State

Polk County
Davenport Quadrangle
NW1/4 of NE1/4 of Section 12 Township 27S Range 27E
Elevation 91 Feet NGVD
Lattitude: 28 09 25.96
Longitude: 81 33 55.28

Figure 3. ROMP 74X Davenport

Well Site Topographic Map

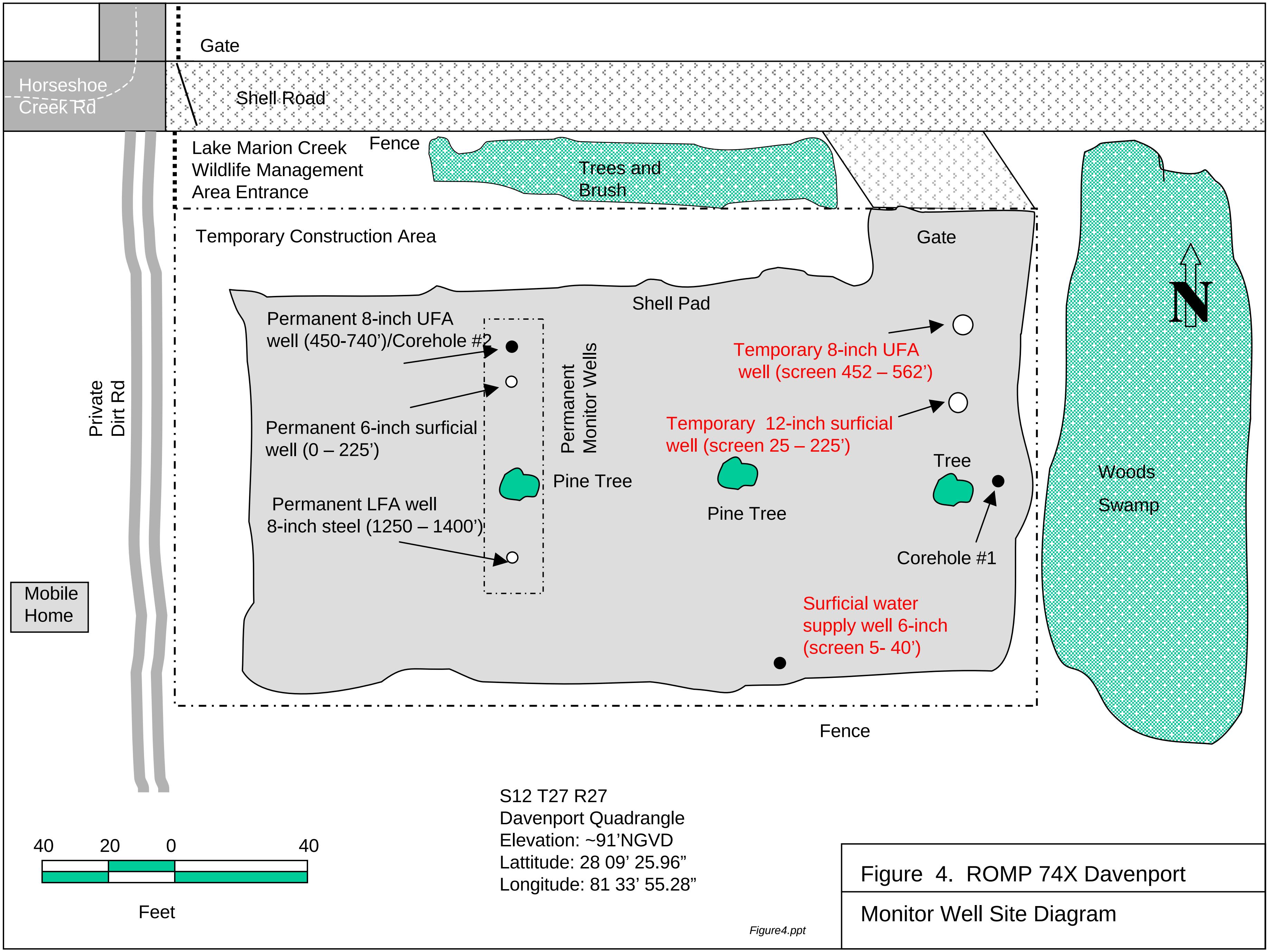


Figure 4. ROMP 74X Davenport

Monitor Well Site Diagram

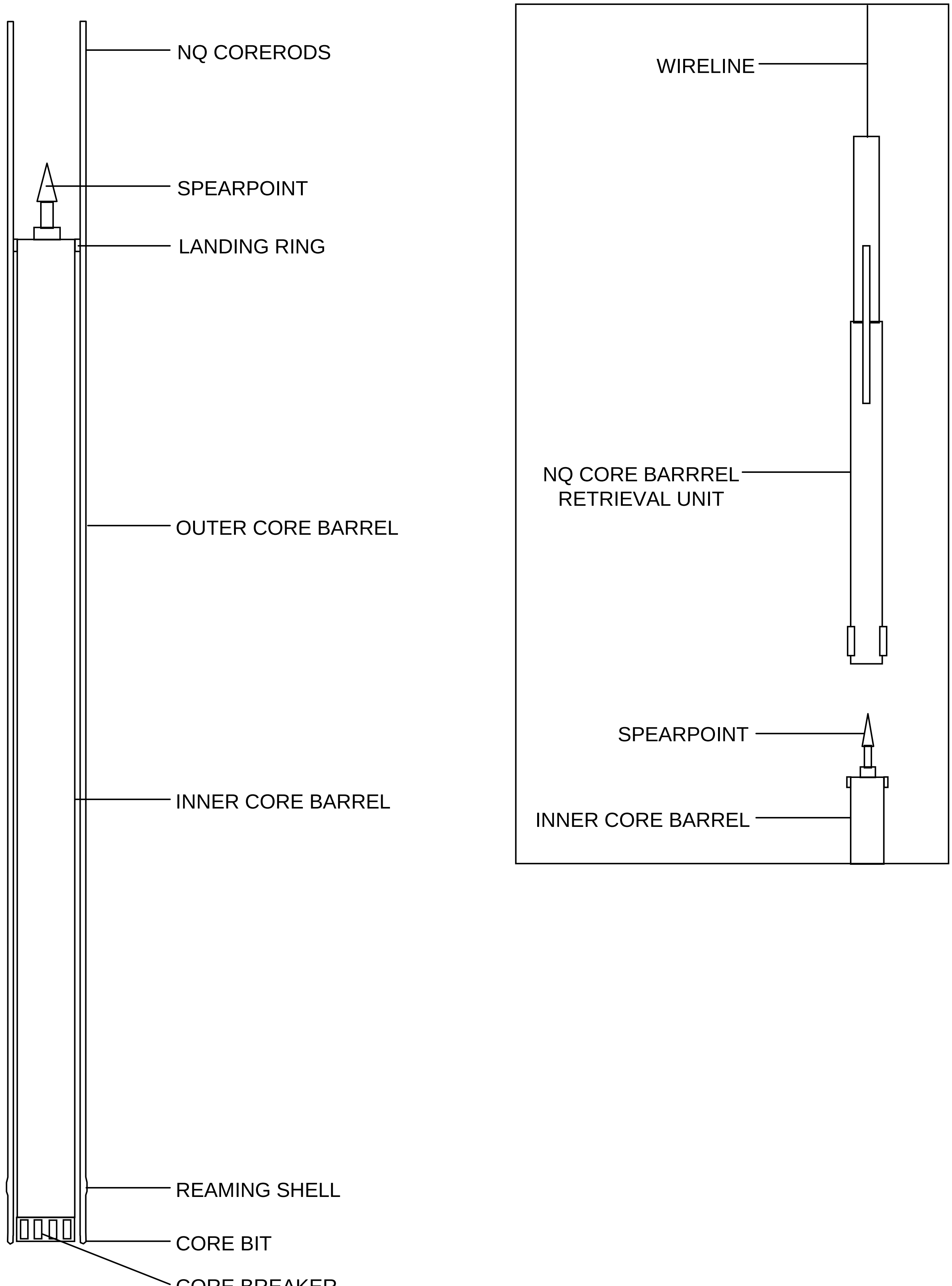


Fig5_coringapparatus.ppt

FIGURE 5. ROMP 74X Davenport

Wire Line Coring Apparatus

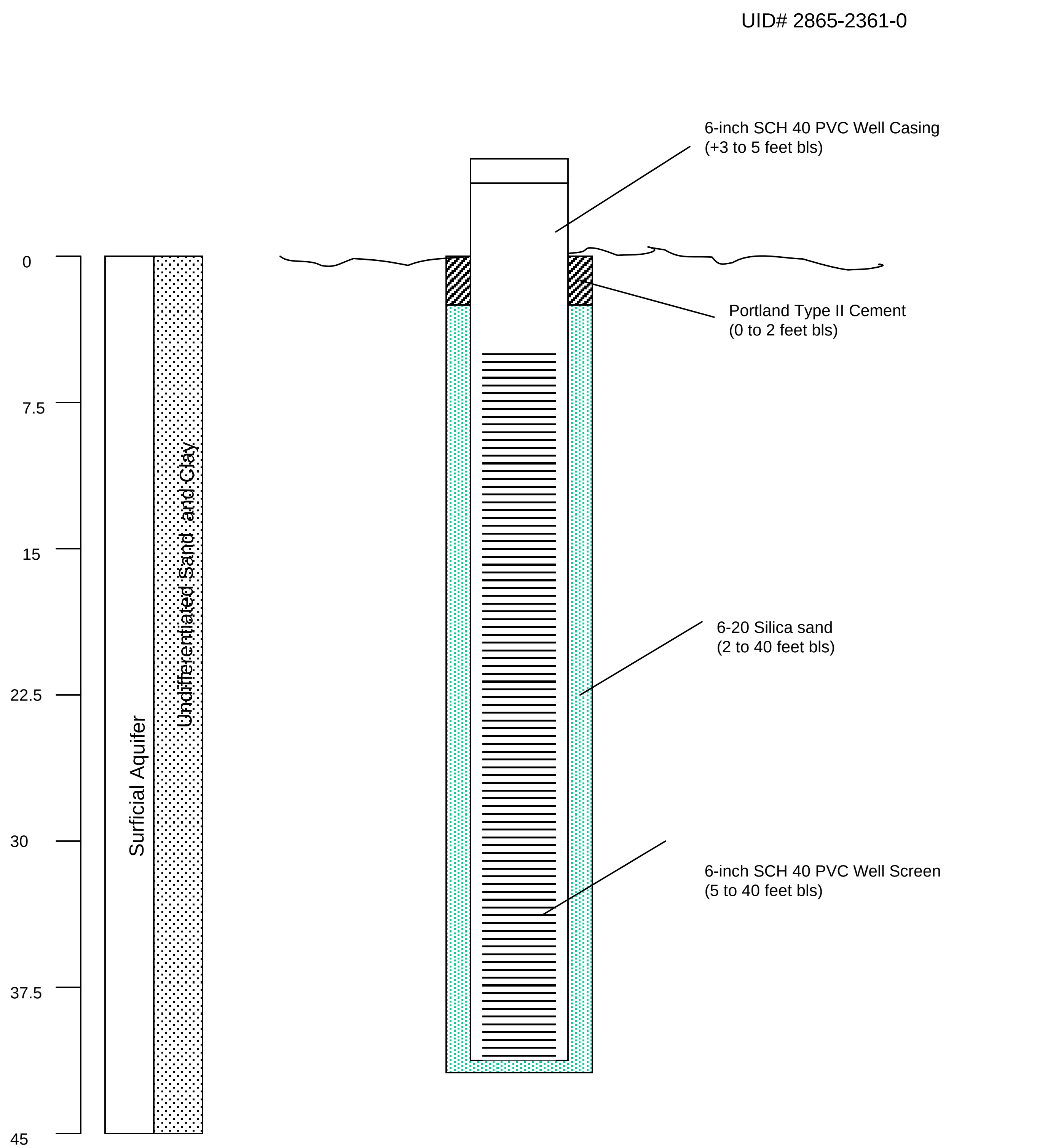
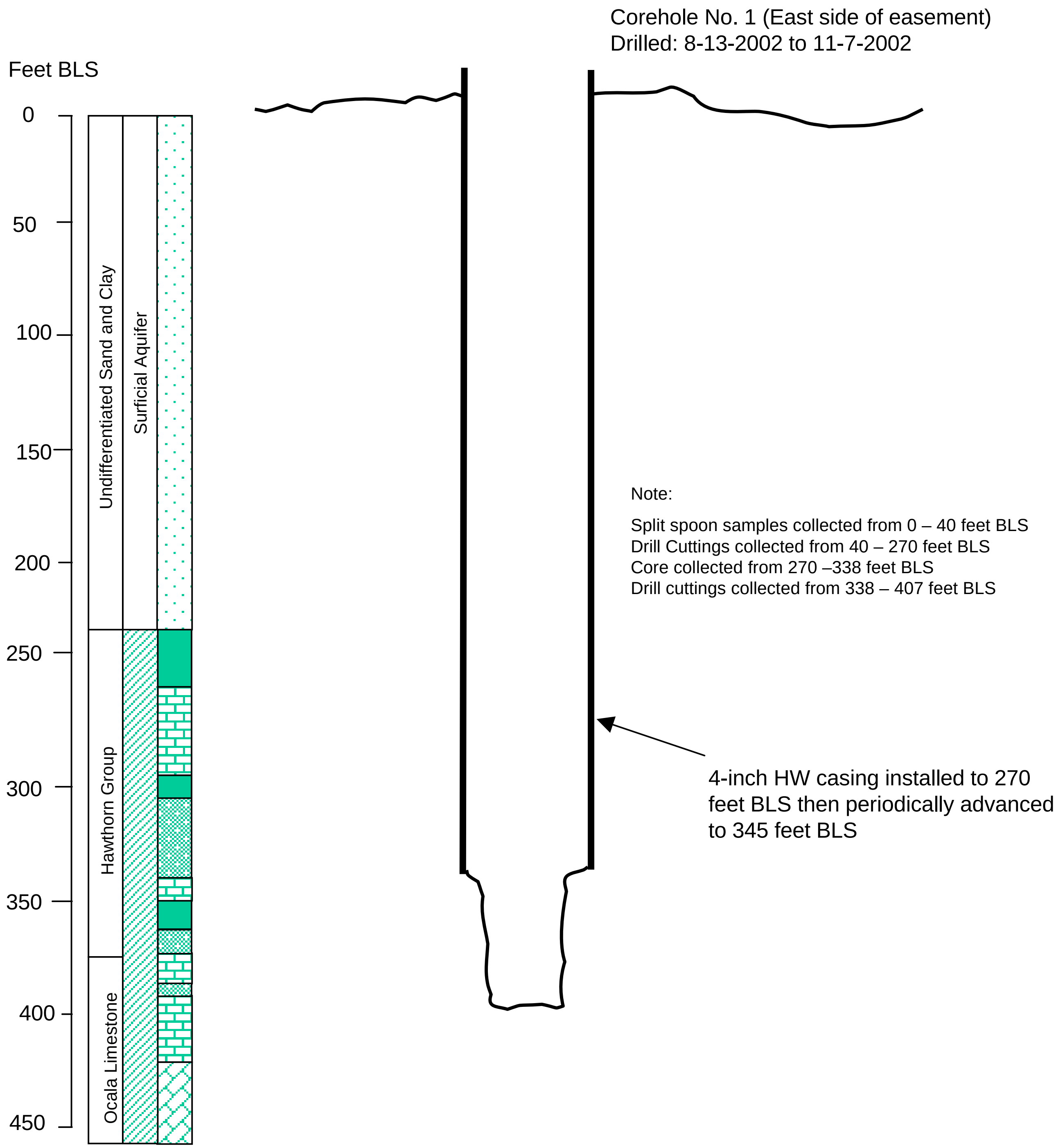


Figure 6. ROMP 74X Davenport

Surficial Water Supply Well As-Built

Fig6_watersupply.ppt



S/T/R: 12/27/27

Lattitude: 28 09 25.96

Longitude: 81 35 55.28

WCP#: 673702.02

Fig7_corehole_1.ppt

Figure 7. ROMP 74X Davenport

Corehole No. 1 Configuration

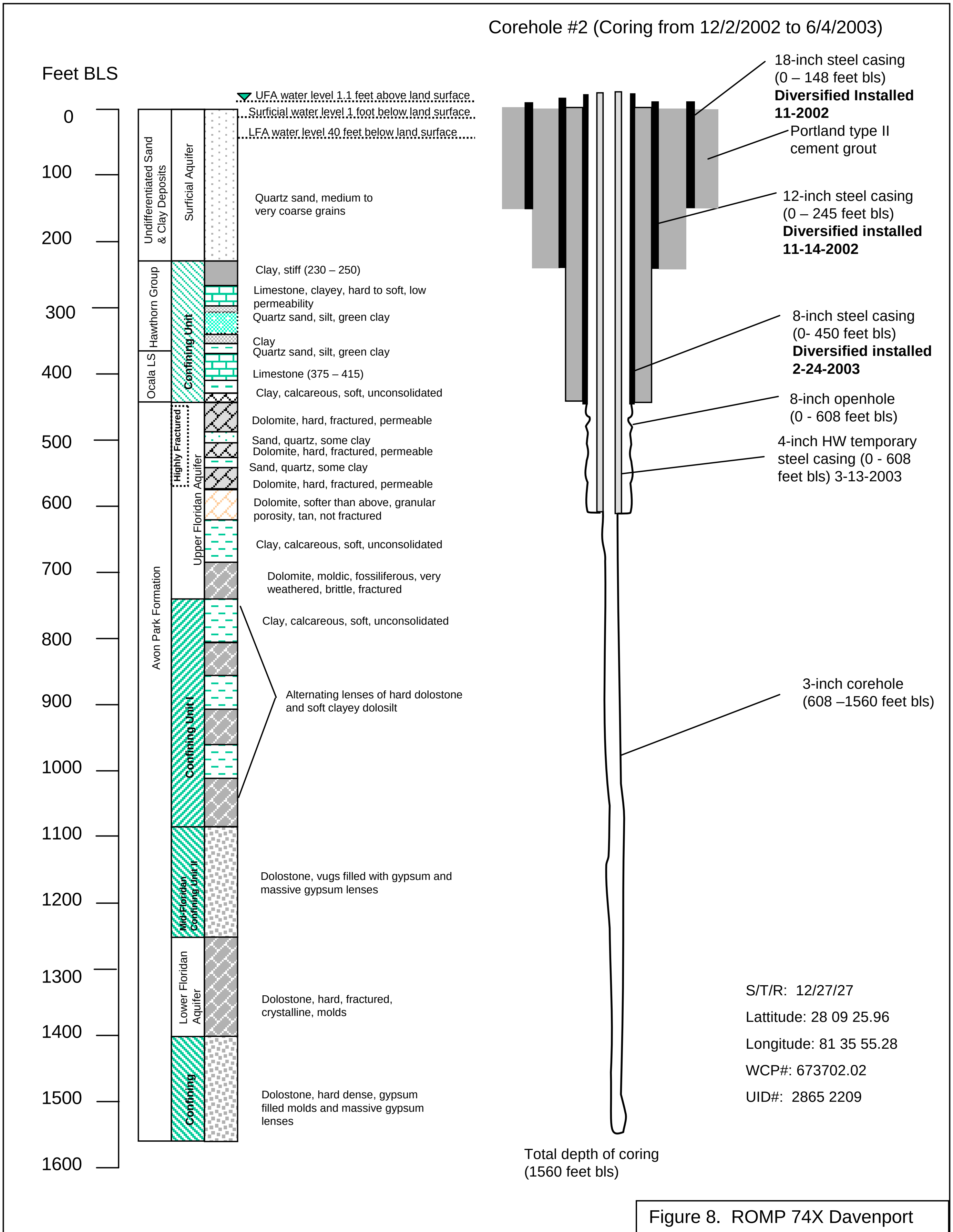


Figure 8. ROMP 74X Davenport

Corehole No. 2 Configuration

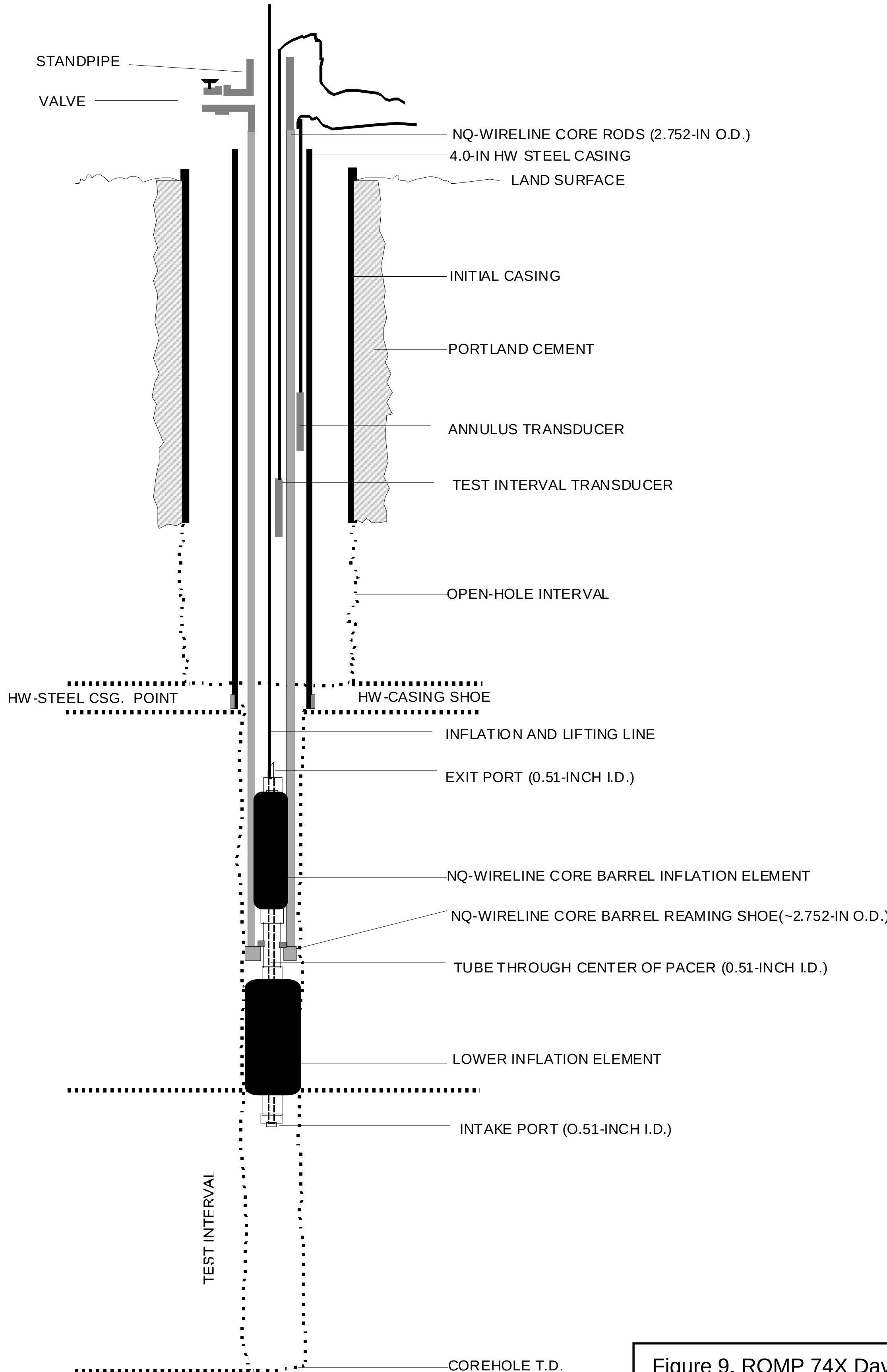
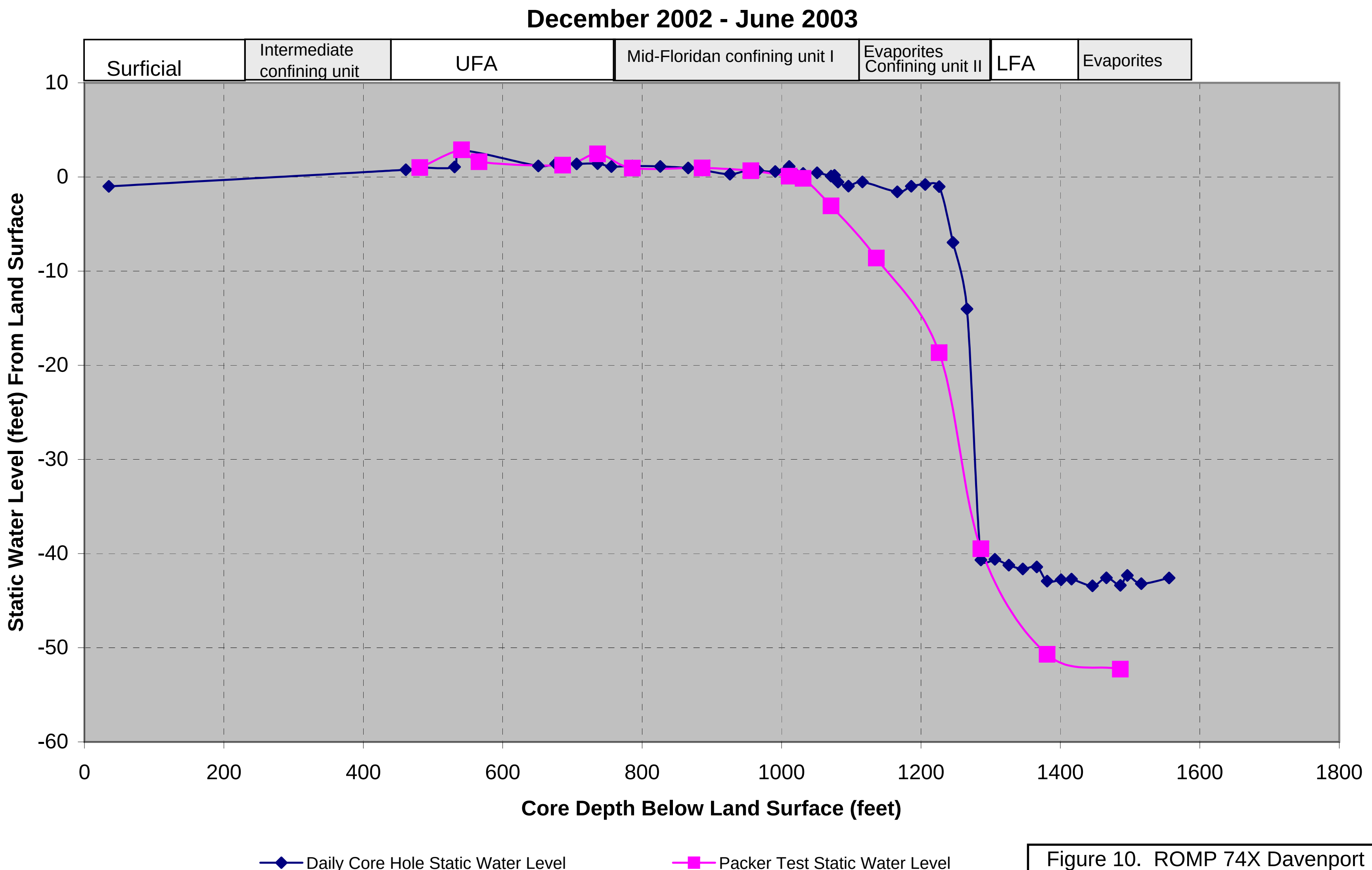


Figure 9. ROMP 74X Davenport

Off-bottom Packer Diagram

Fig9_offbottompacker.ppt



core_wl.xls

Figure 10. ROMP 74X Davenport

Corehole Water Level Graph

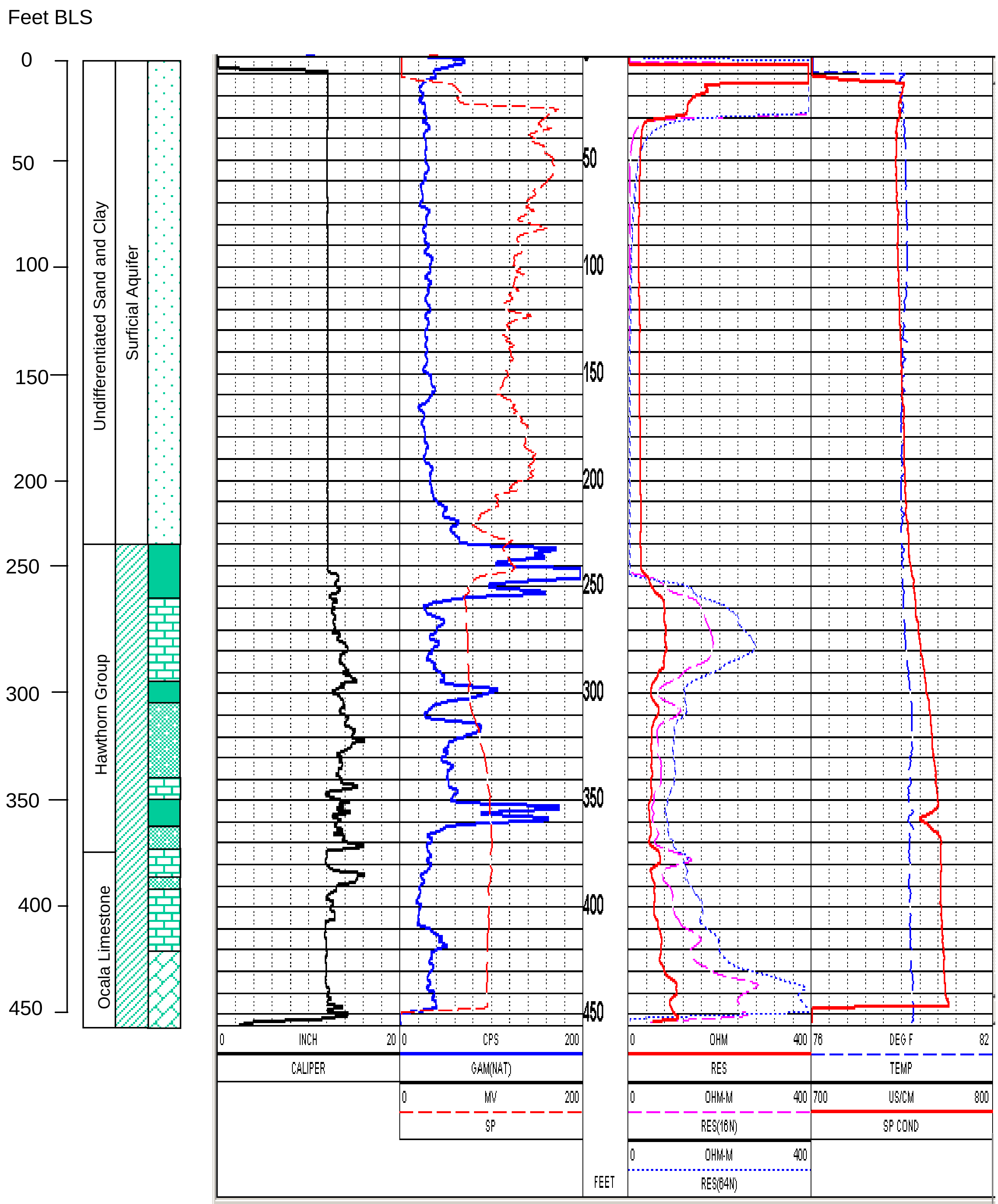


Figure 11. ROMP 74X Davenport

Geophysical Logs Run February 2003 in Corehole (0 – 450 Feet BLS)

Fig11_geologs0-450.ppt

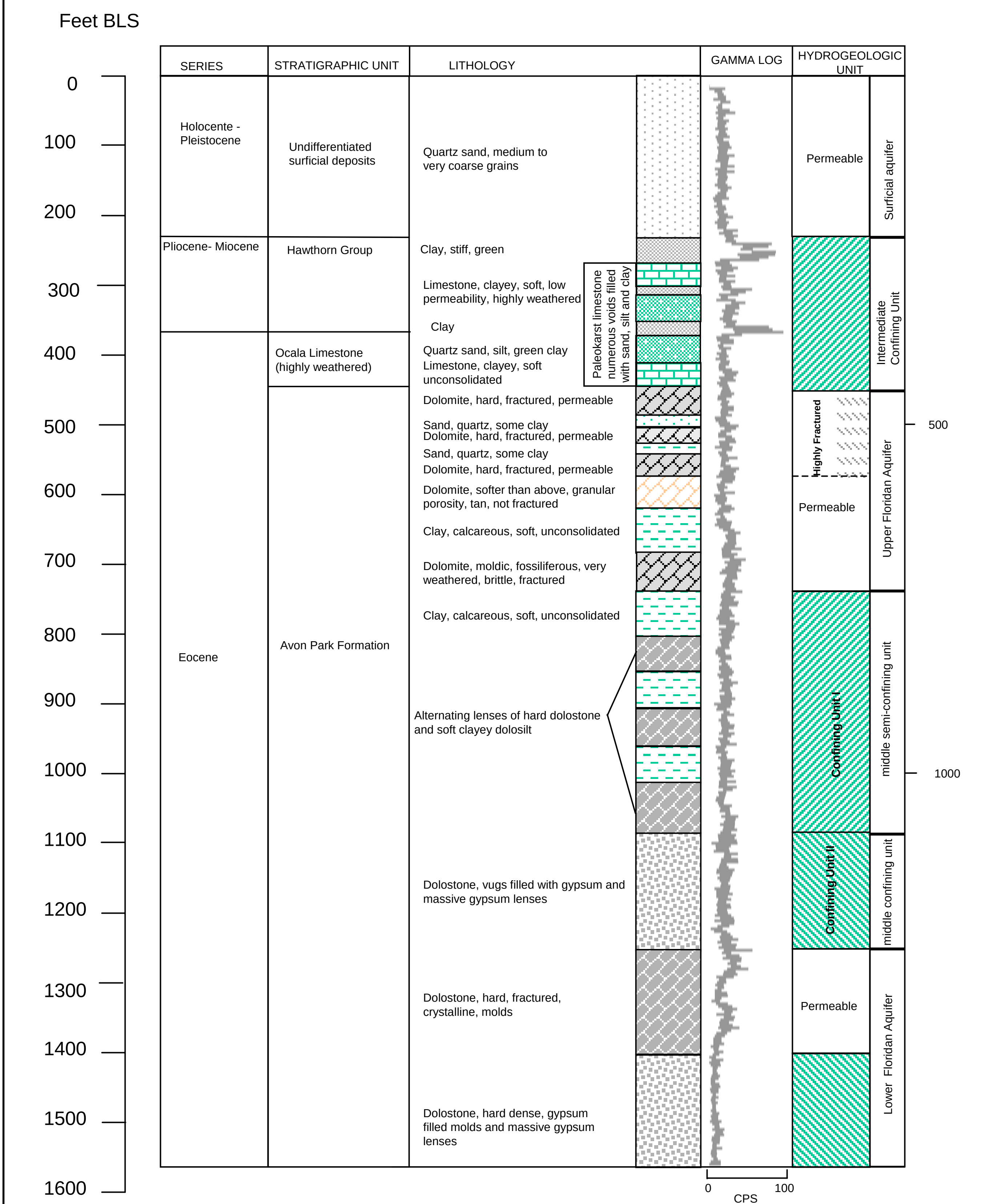


Figure 12. ROMP 74X Davenport

Wellsite Hydrogeology

Fig12_gamma.ppt

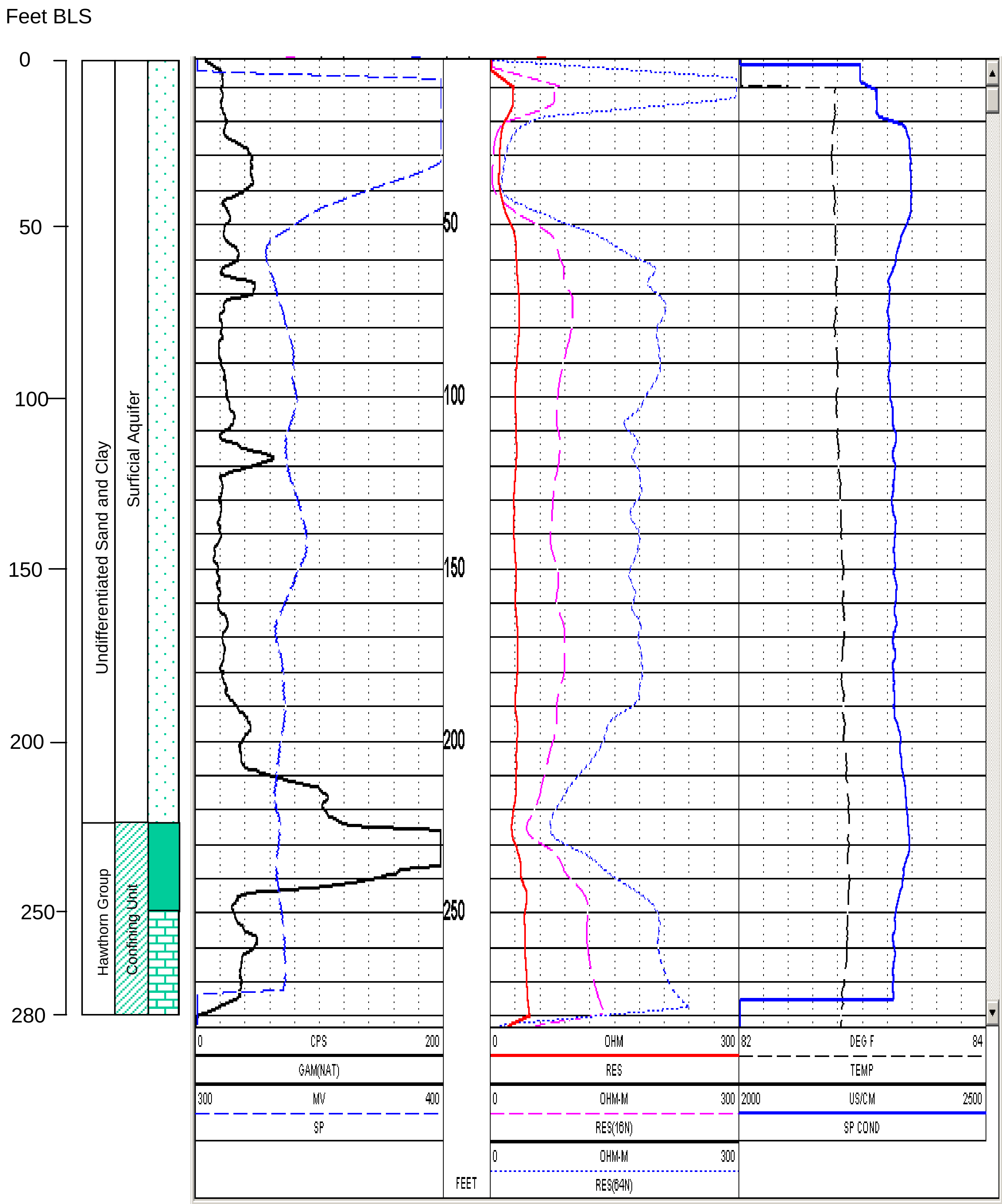


Figure 13. ROMP 74X Davenport

Geophysical Logs run June 2003 while constructing Temporary UFA Well (40 – 284 feet BLS)

Fig13_log284.ppt

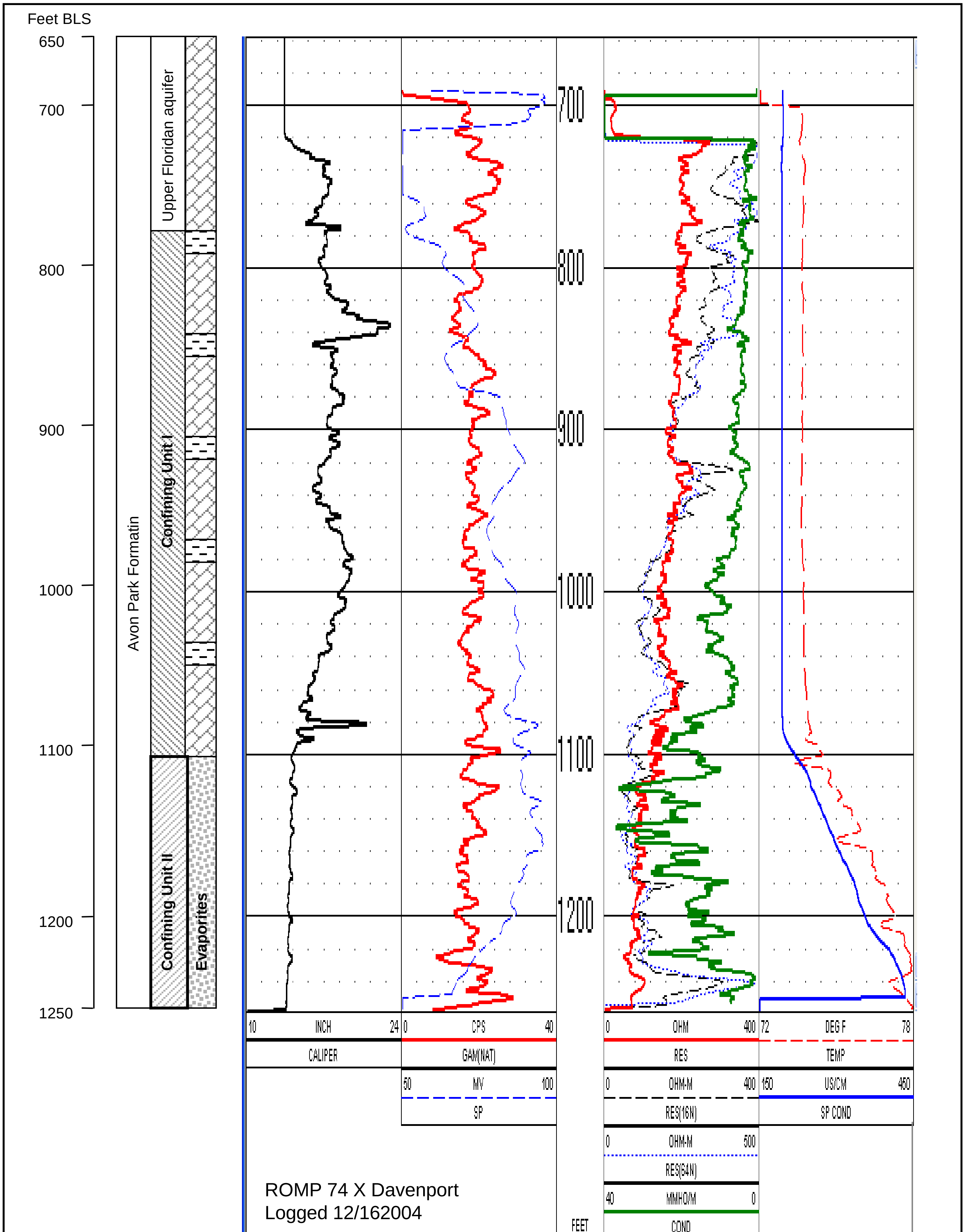
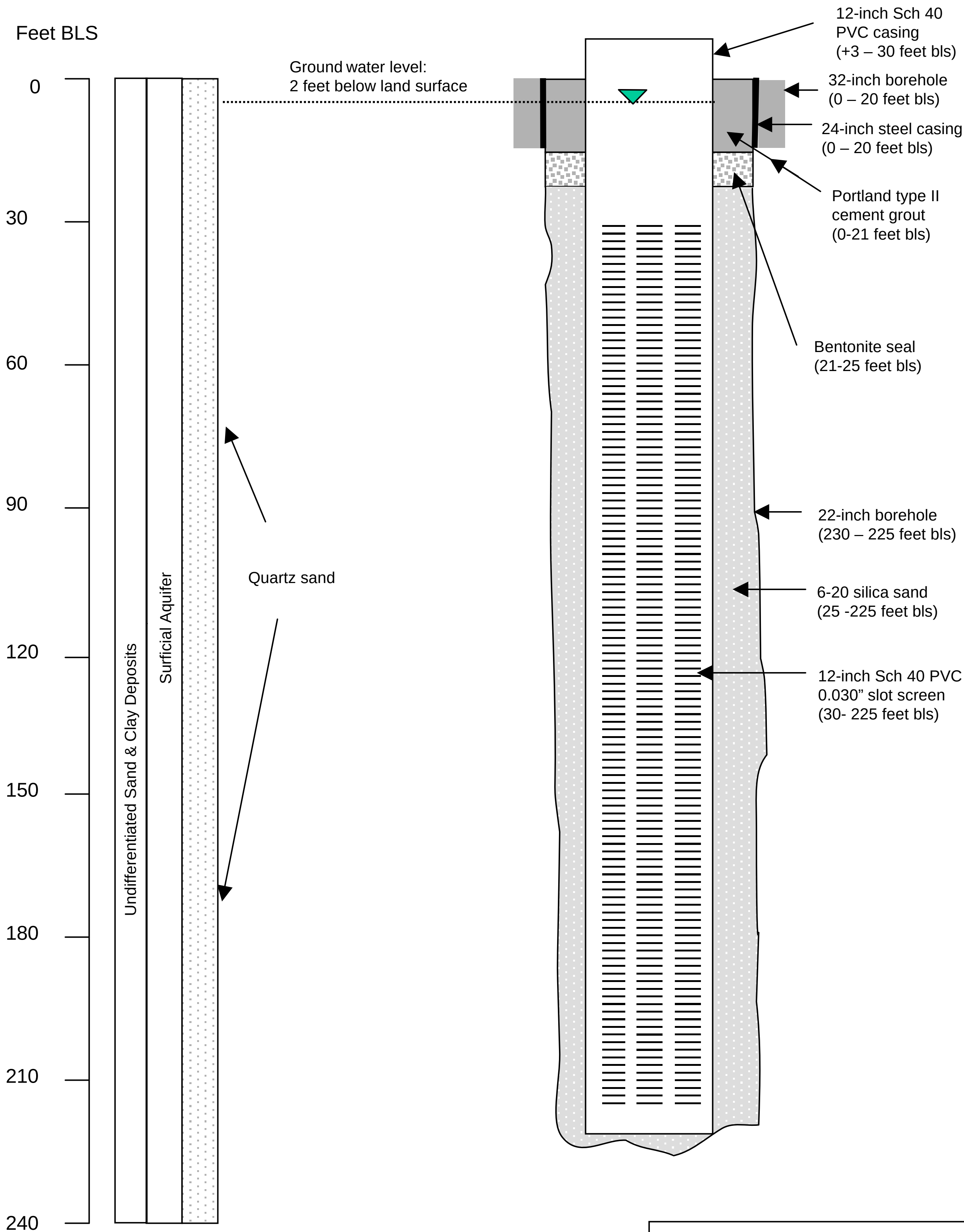


Figure 14. ROMP 74X Davenport Geophysical Logs run December 2004 during construction of LFA well.

Fig11geophysicallogs.ppt

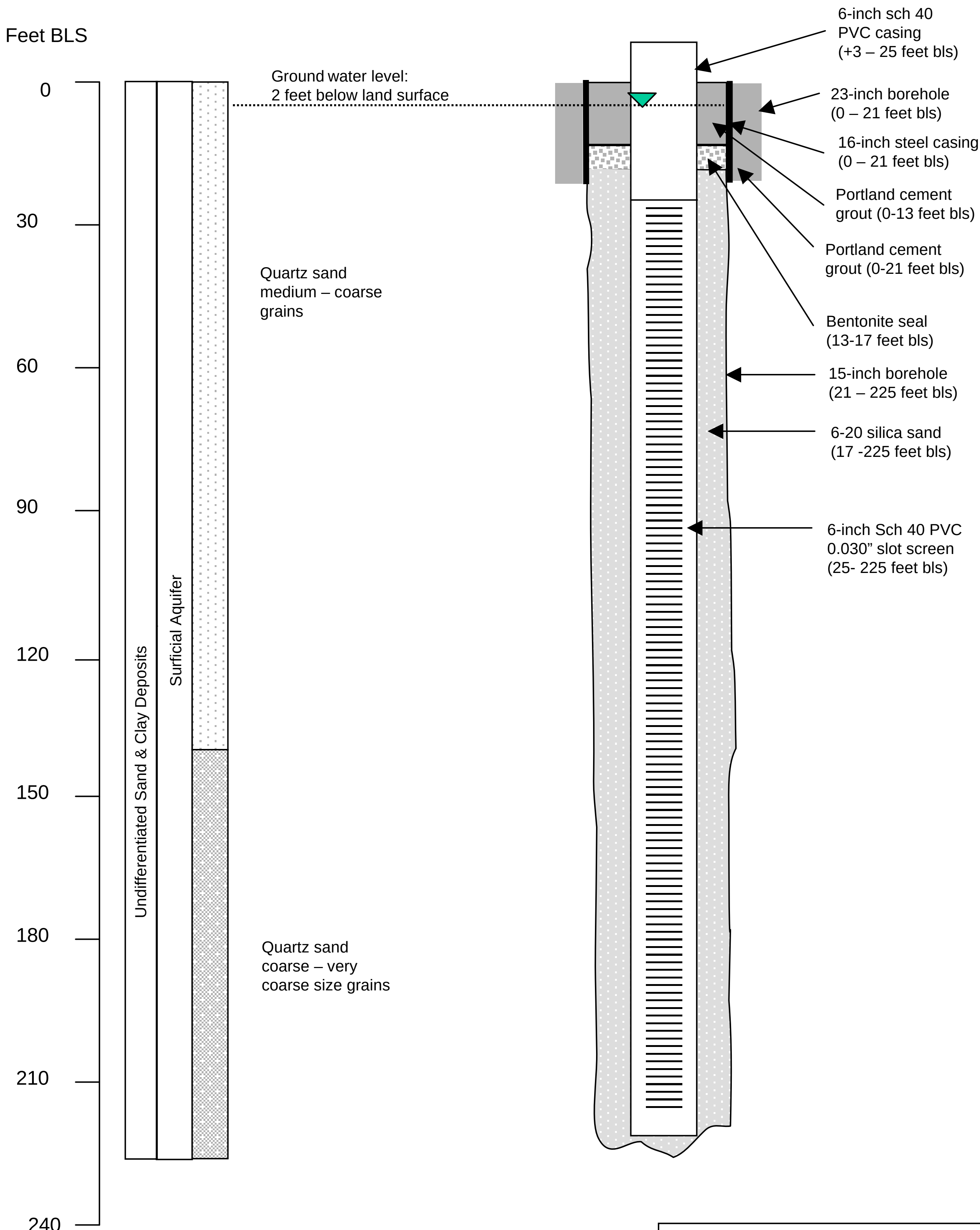


S/T/R: 12/27/27
Lattitude: 28 09' 24.6"
Longitude: 81 33' 53.3"

Fig15_12inchsurficial_APT.ppt

Figure 15. ROMP 74X Davenport

Temporary 12-inch Surficial Well As-Built Diagram

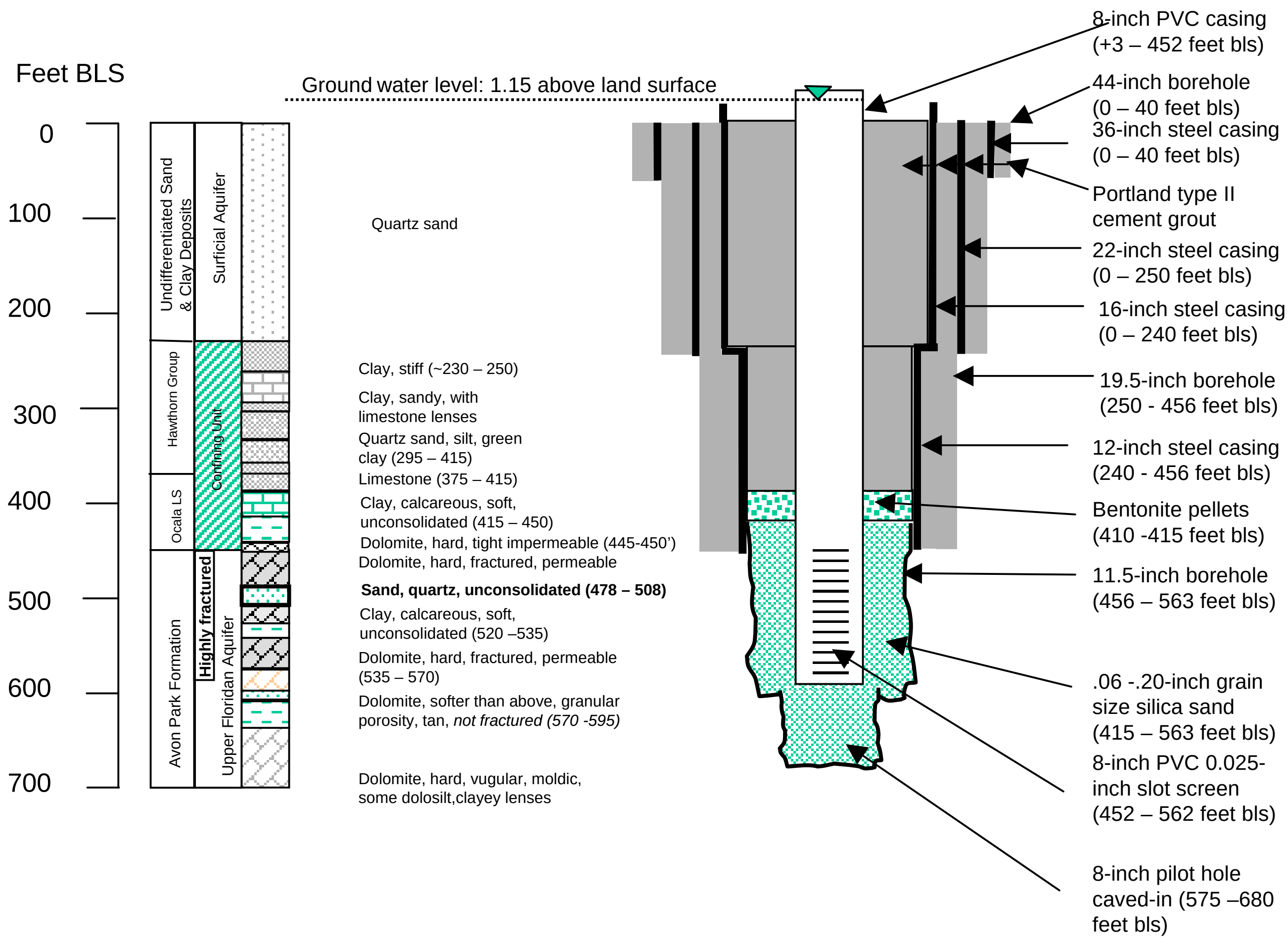


S/T/R: 12/27/27
Lattitude: 28 09’ 24.1”
Longitude: 81 33’ 54.8”

Fig16_Sixinchperm_surf.ppt

Figure 16. ROMP 74X Davenport

Permanent 6-inch Surficial Well
As-built Diagram



S/T/R: 12/27/27

Lattitude: 28 09' 24.9"

Longitude: 81 33' 53.2"

WCP: 696430.01

UID: WEL-2865-2441-0

Figure 17. ROMP 74X Davenport

Temporary 8-inch UFA Well
As-built Diagram

Fig17_8-inchtemp_ufa.ppt

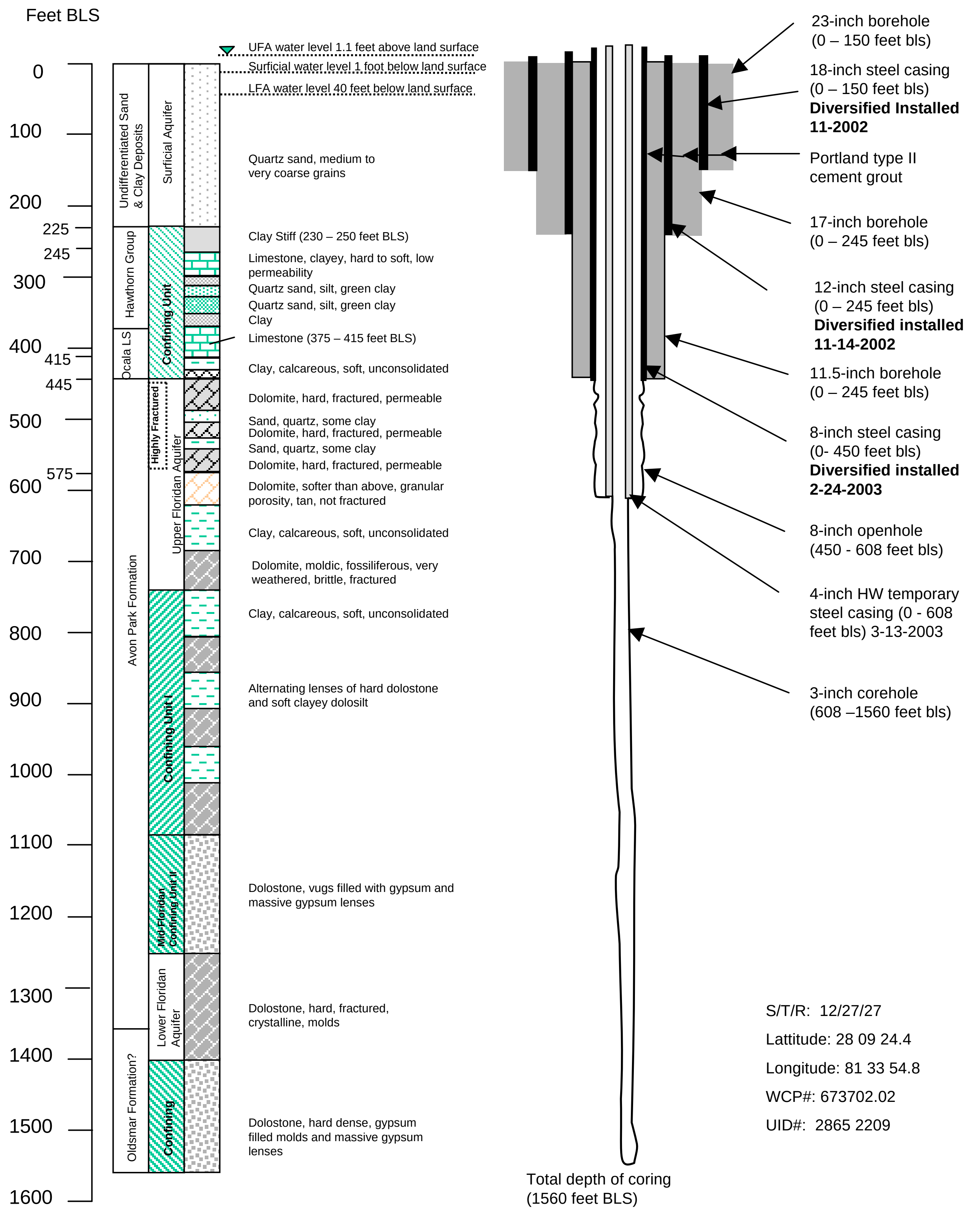


Figure 18. ROMP 74X Davenport

Corehole 2 prior to conversion to Permanent Upper Floridan Monitor Well

Figure18_coreholeprior.ppt

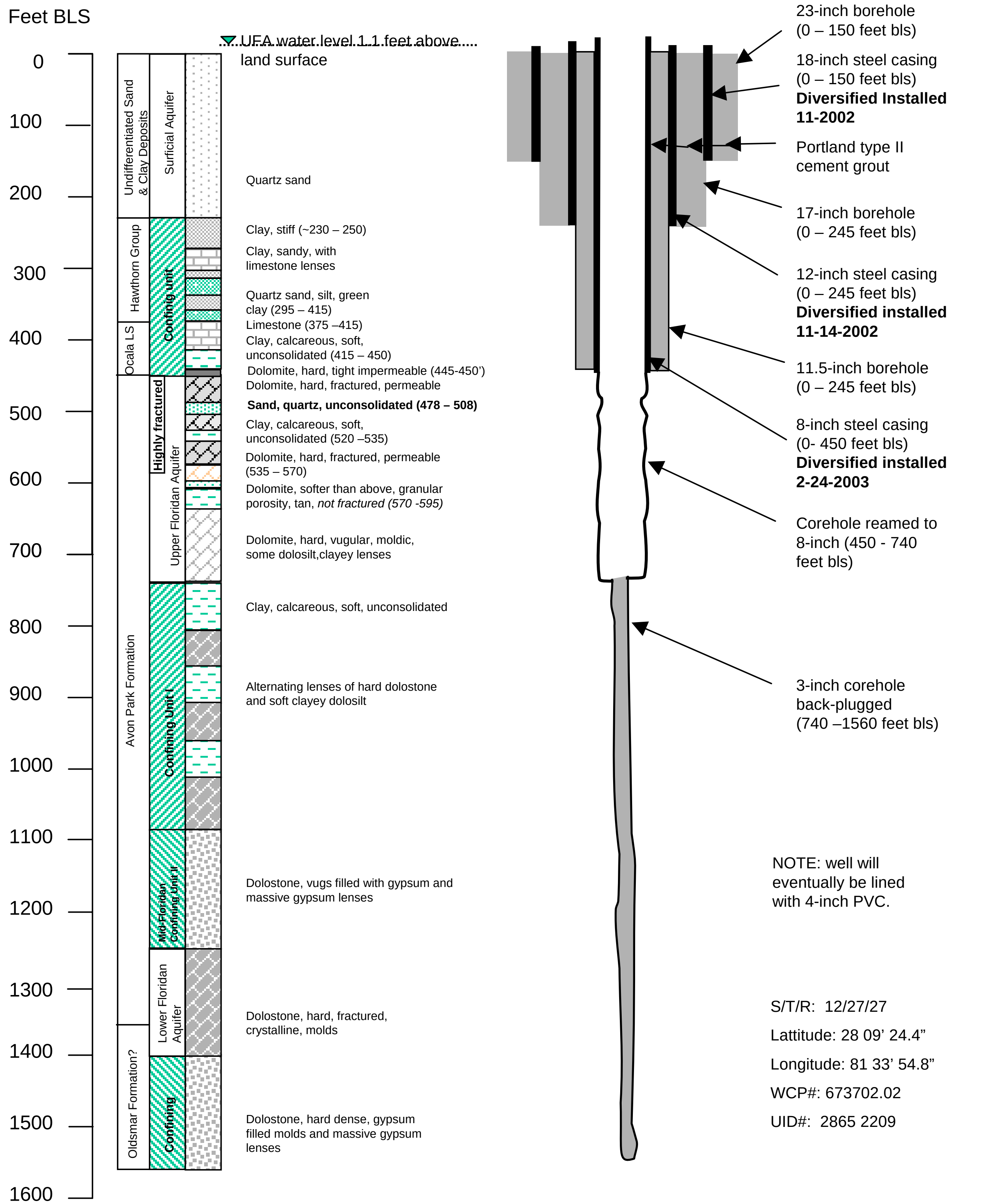


Figure 19. ROMP 74X Davenport

Permanent 8-inch UFA Monitor Well after modification from corehole.

Figure19_eightinchpermufa.ppt

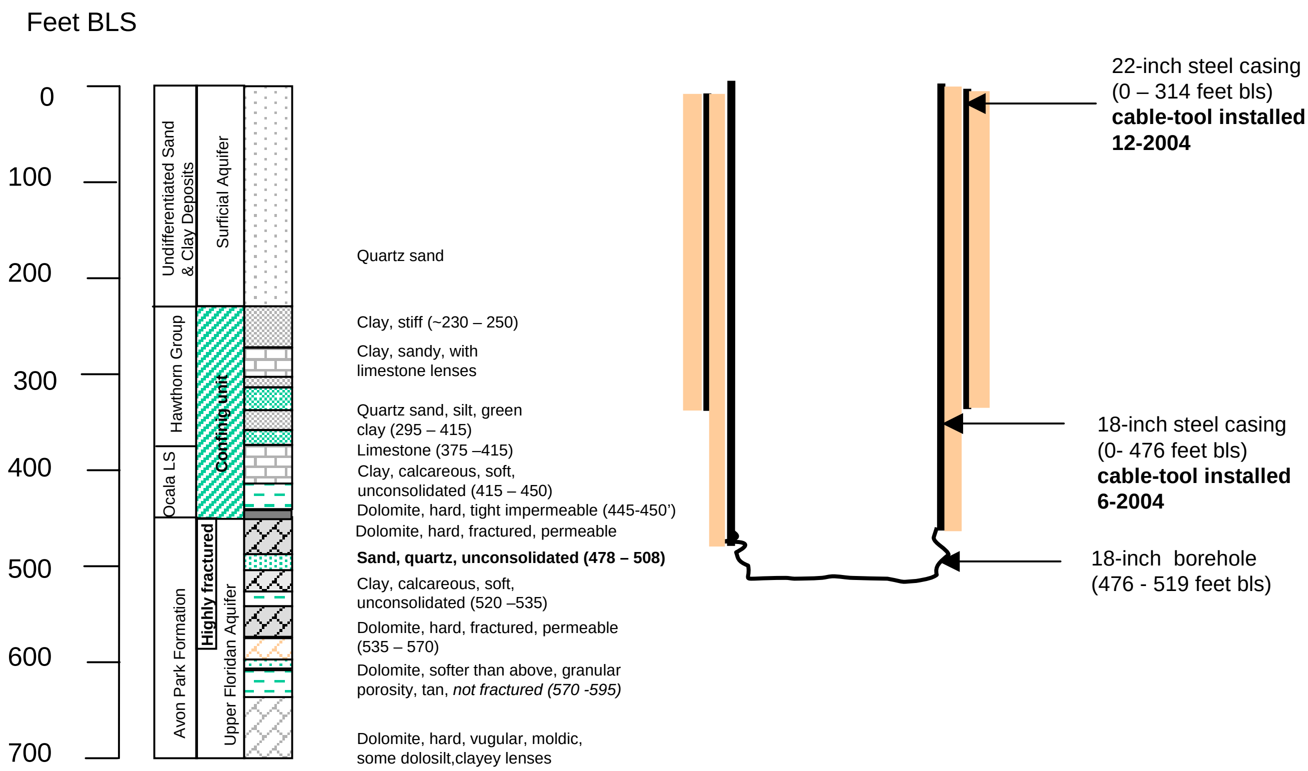


fig20_lf_nocasing-2004.ppt

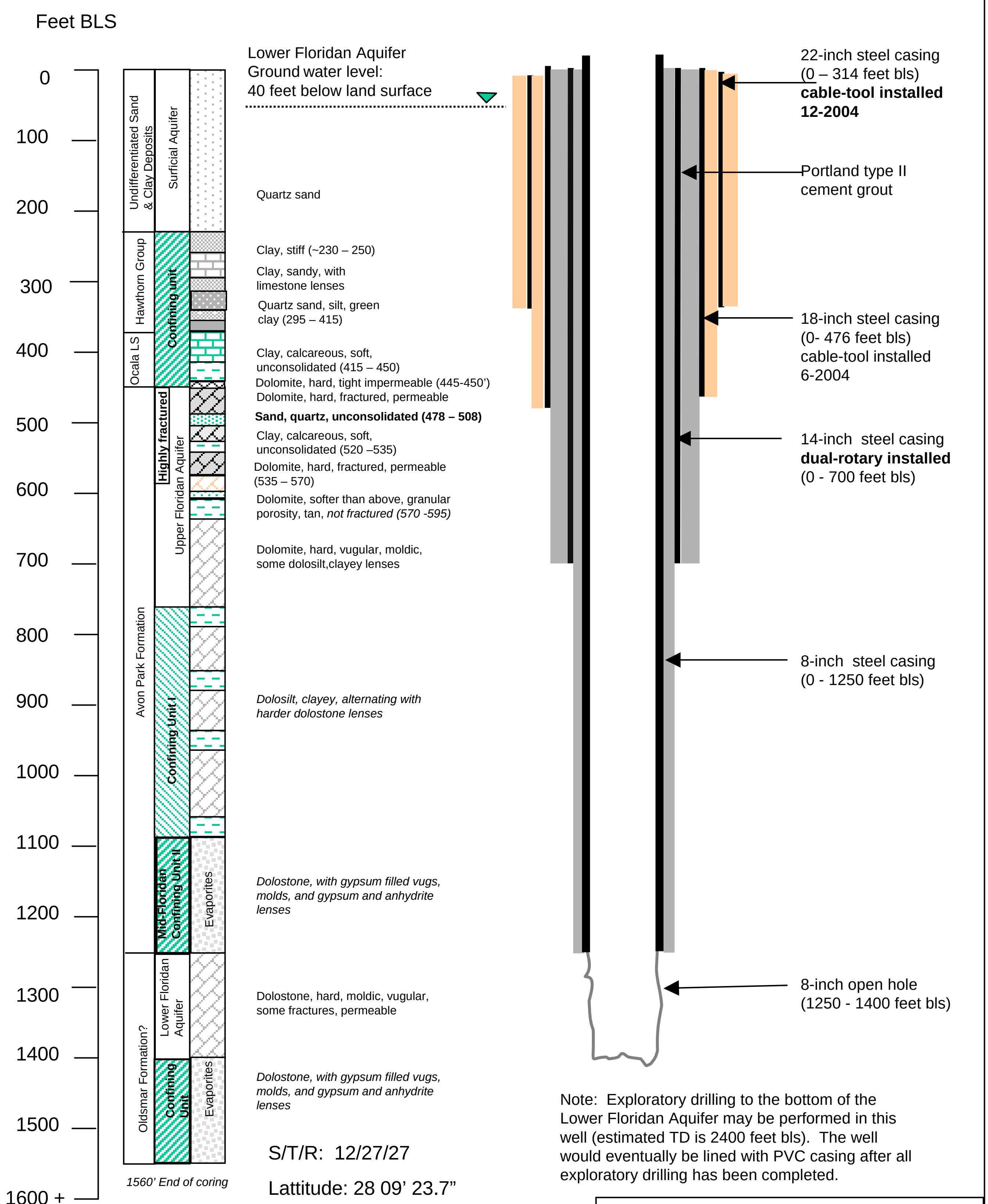
S/T/R: 12/27/27

Lattitude: 28 09 23.7

Longitude: 81 33 55.3

Figure 20. ROMP 74X Davenport

Permanent 8-inch Lower Floridan Monitor Well as drilled by Diversified Drilling, Inc.



Note: Exploratory drilling to the bottom of the Lower Floridan Aquifer may be performed in this well (estimated TD is 2400 feet bls). The well would eventually be lined with PVC casing after all exploratory drilling has been completed.

S/T/R: 12/27/27

Lattitude: 28 09' 23.7"

Longitude: 81 33' 55.3"

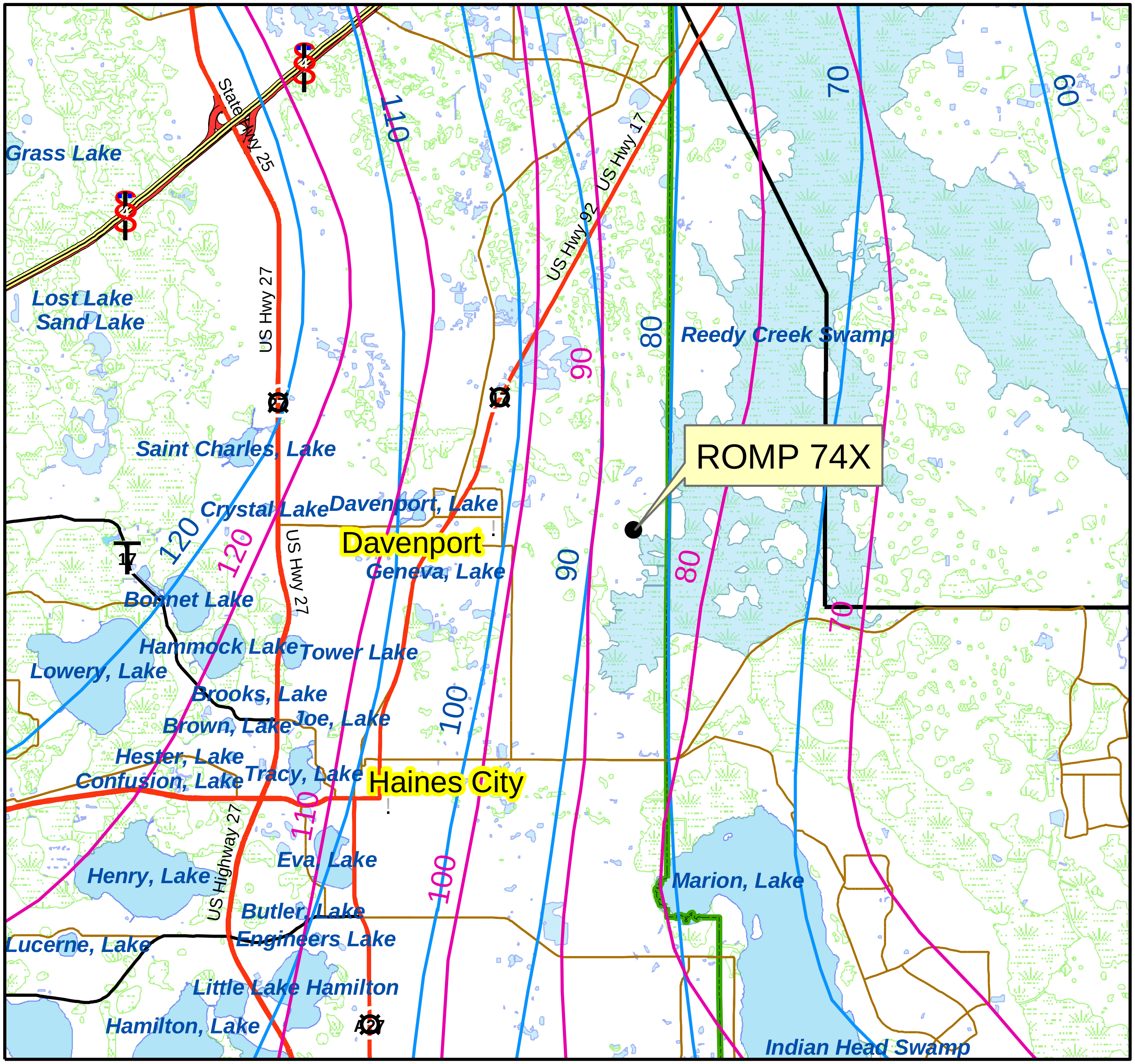
WCP: 701509.03

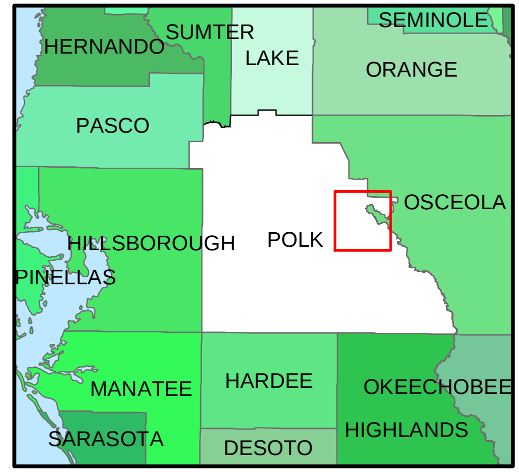
UID: WEL-2865-2443-0

Figure 21. ROMP 74X Davenport

Permanent Lower Floridan Monitor Well as completed by GIC, Inc.

Fig21_lfasbuilt.ppt
Updated: 4/26/2006ppt





WMD Boundaries

Boundary

State

Florida's County Boundaries

September 2002 Floridan Aquifer

May 2004 Floridan Aquifer

NHD Waterbodies with GNIS Names

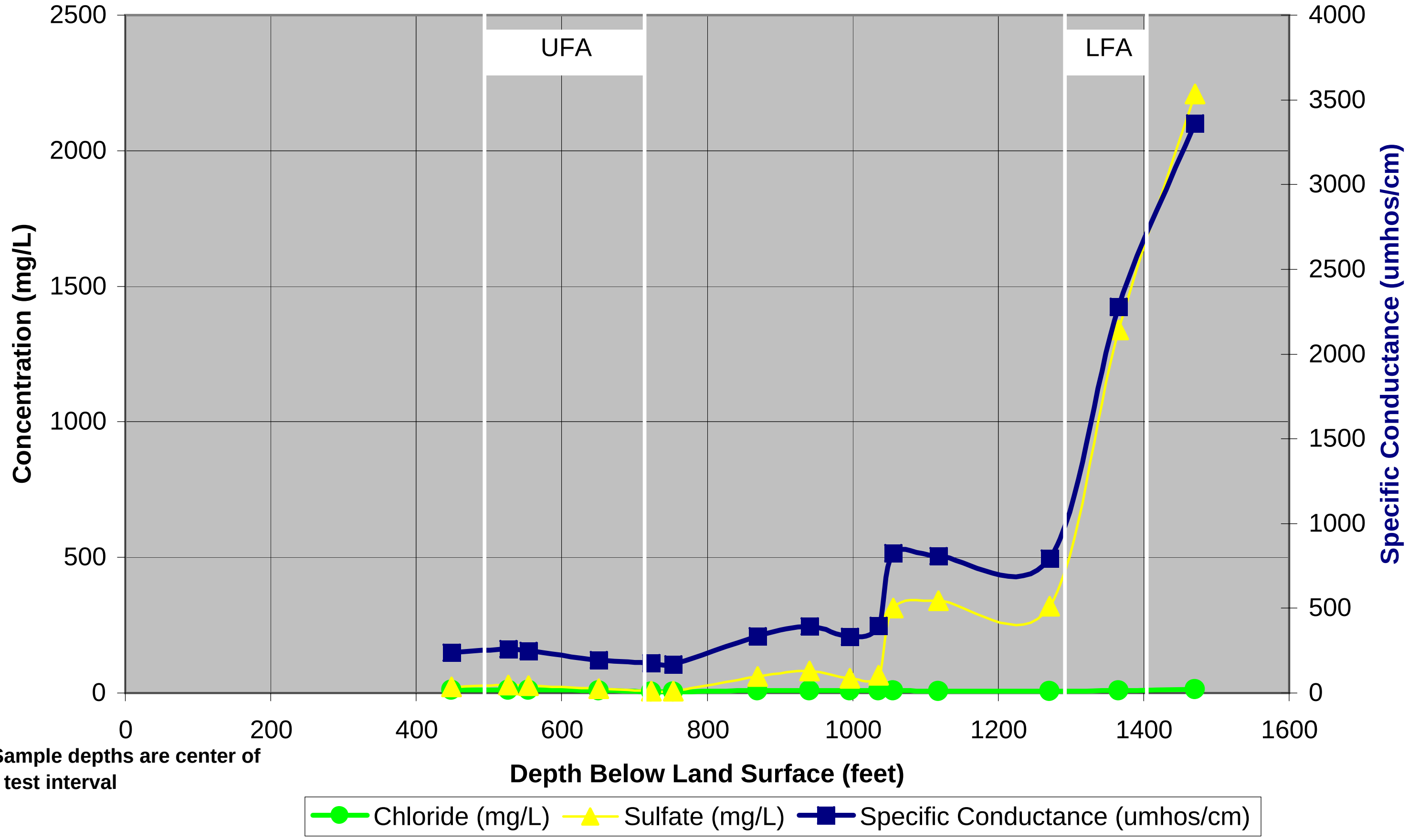
Site Elevation ~ 91 Feet NGVD

0 1 2 4 Miles

Figure 22. ROMP 74 X Davenport

Potentiometric Surface Map of UFA for May 2004 and September 2002

UFA_may2002.mxd



Note: Sample depths are center of packer test interval

core_wq.xls

Figure 23. ROMP 74X Davenport
Graph of Water Quality Samples Collected During Coring

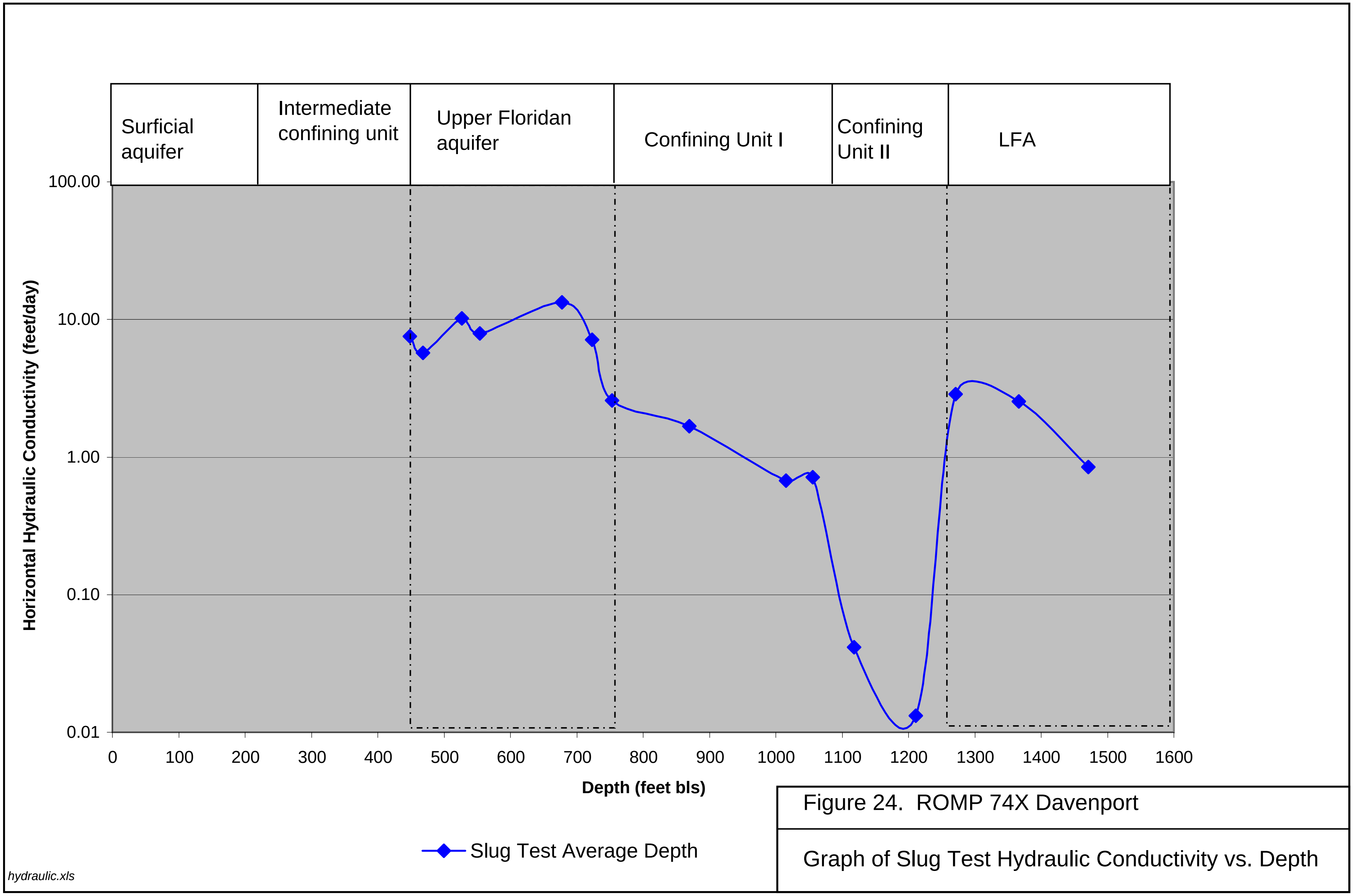
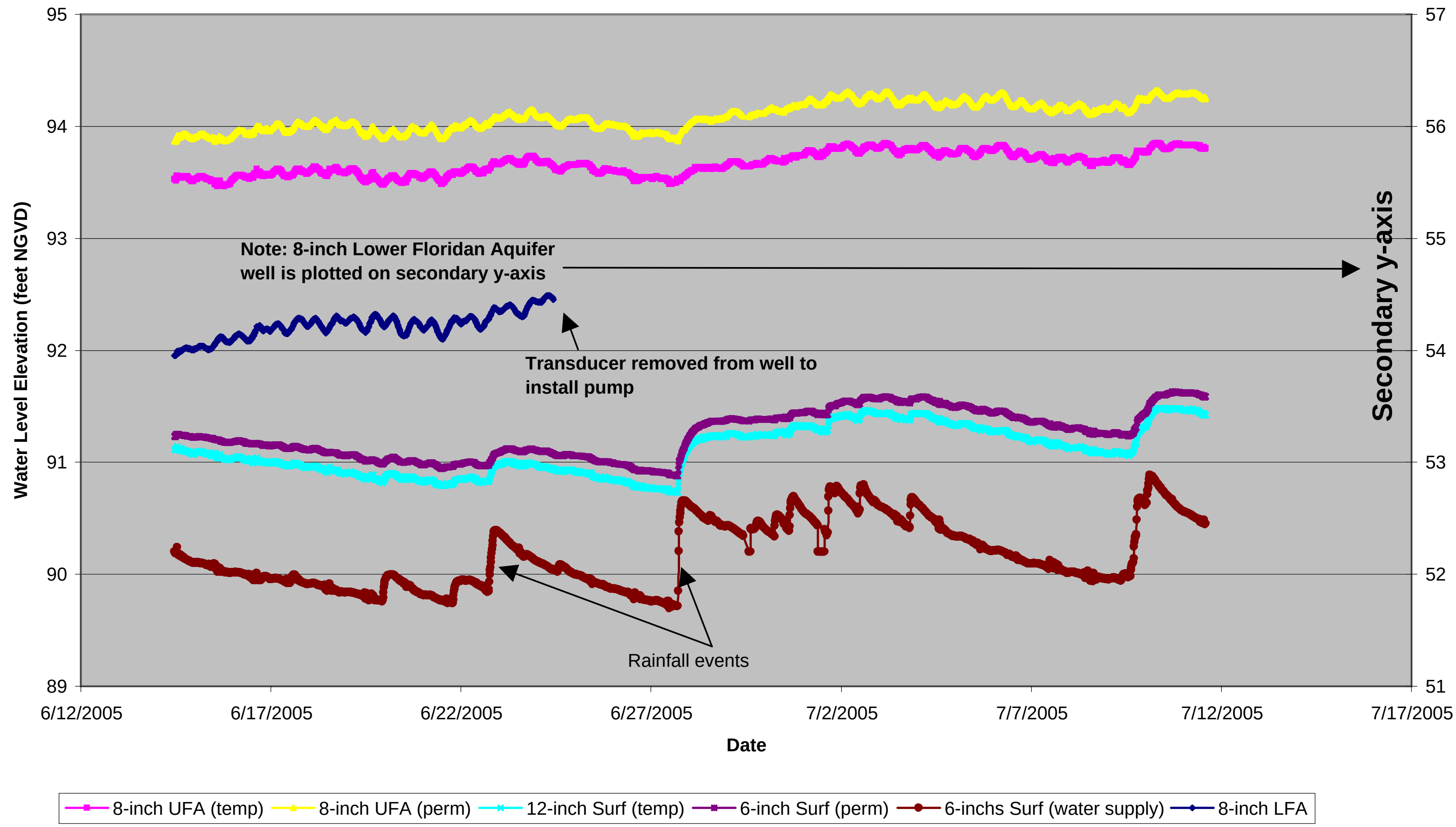


Figure 24. ROMP 74X Davenport

Graph of Slug Test Hydraulic Conductivity vs. Depth



lfa_background_7-11-2005.xls

Figure 25. ROMP 74X Davenport

Hydrograph before Lower Floridan APT.

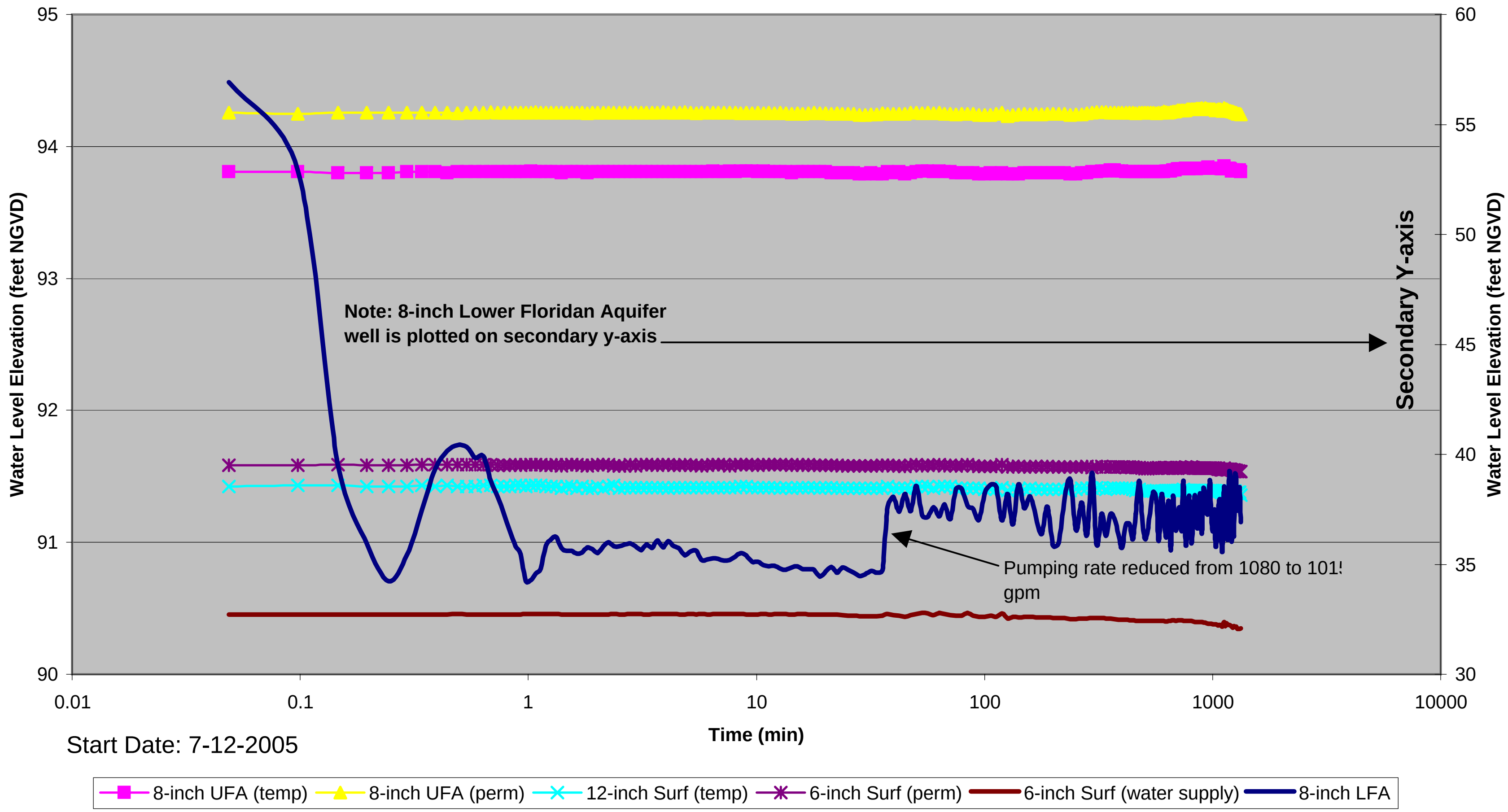


Figure 26. ROMP 74X Davenport

Lower Floridan APT Drawdown Graph

dd.xls

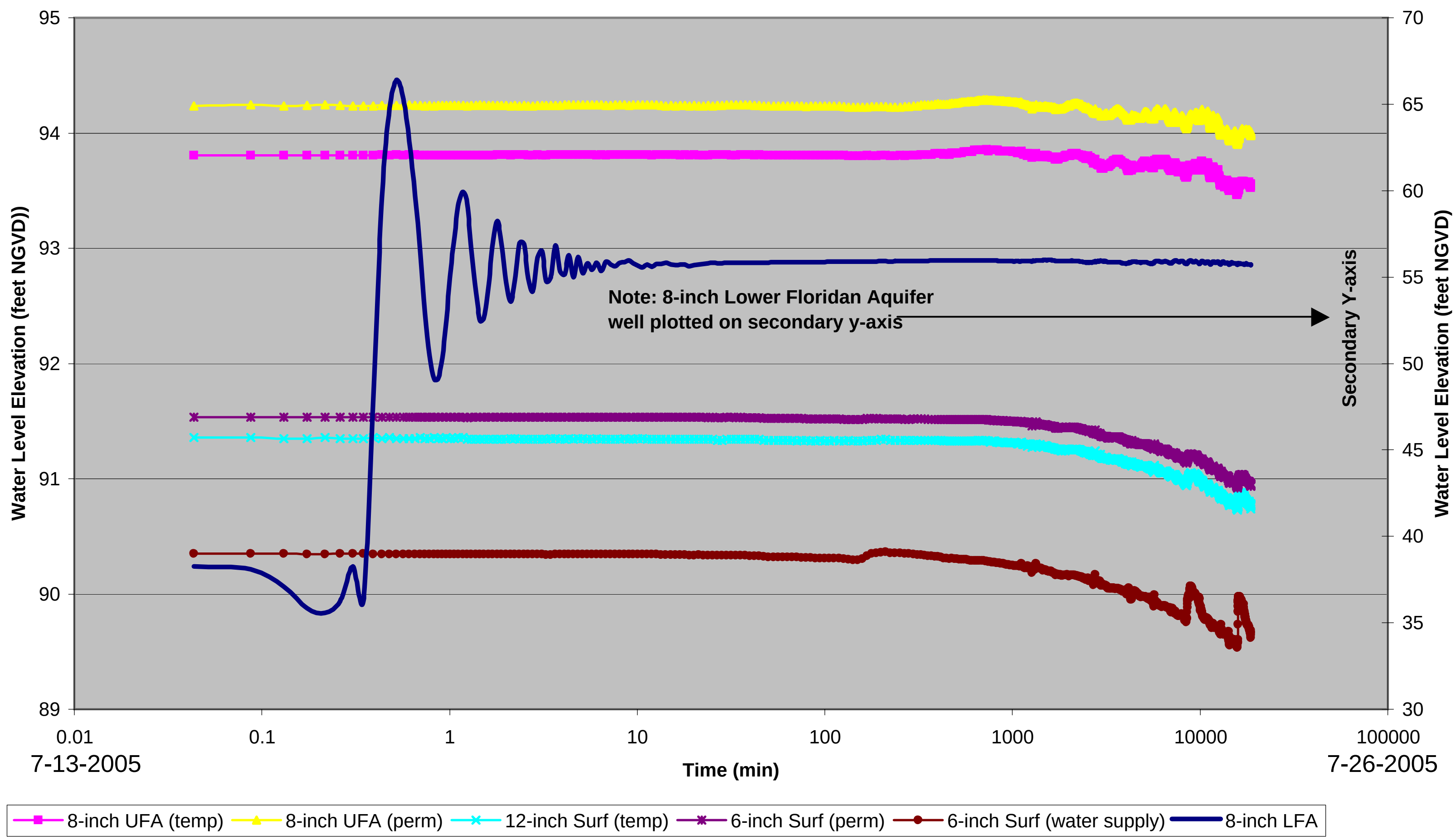
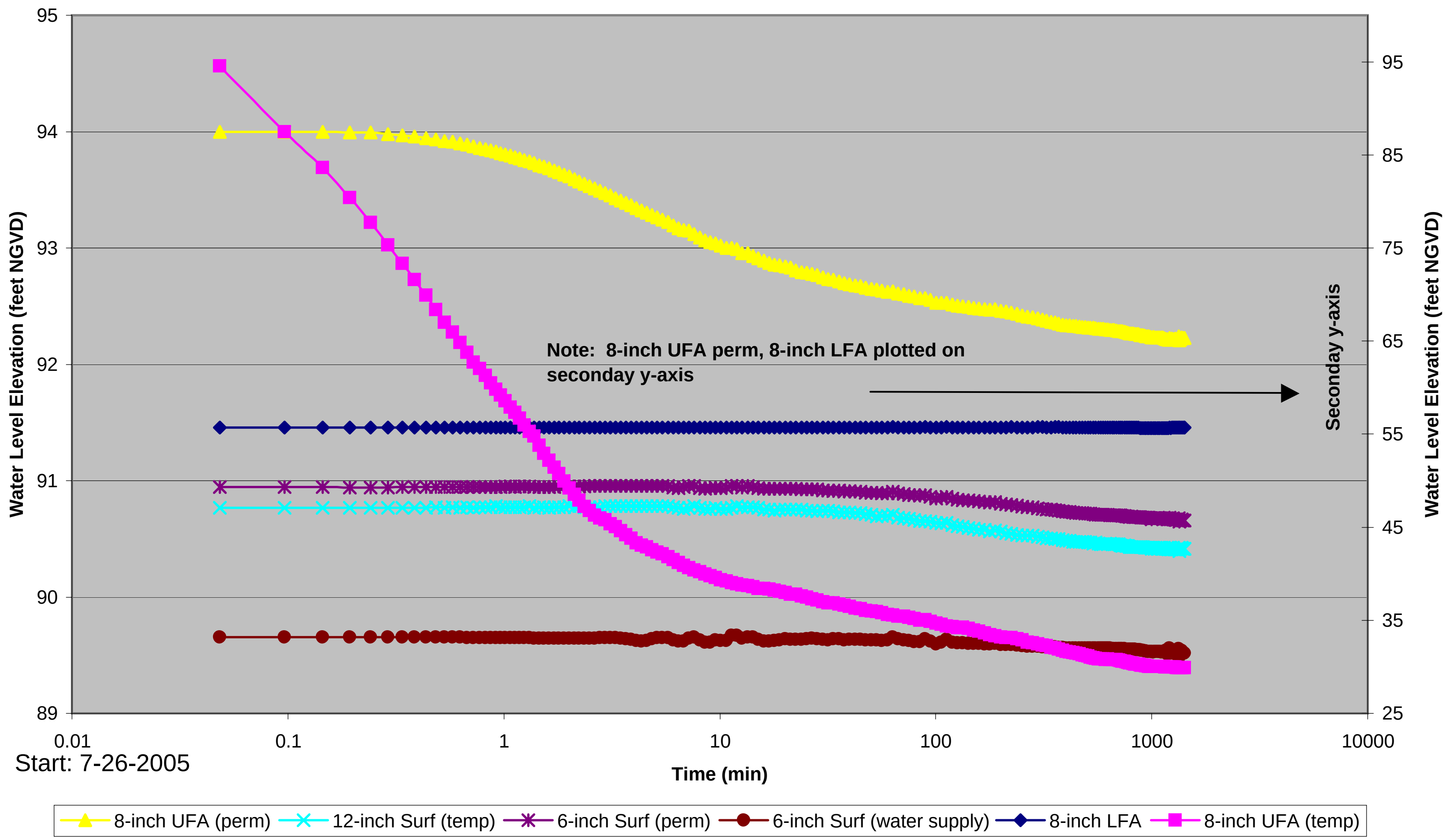


Figure 27. ROMP 74X Davenport

Lower Floridan APT Recovery Graph and Hydrograph before Upper Floridan APT

recovery_background-ufa.xls



ufa_dd.xls

Figure 28. ROMP 74X Davenport

Upper Floridan APT Drawdown Graph

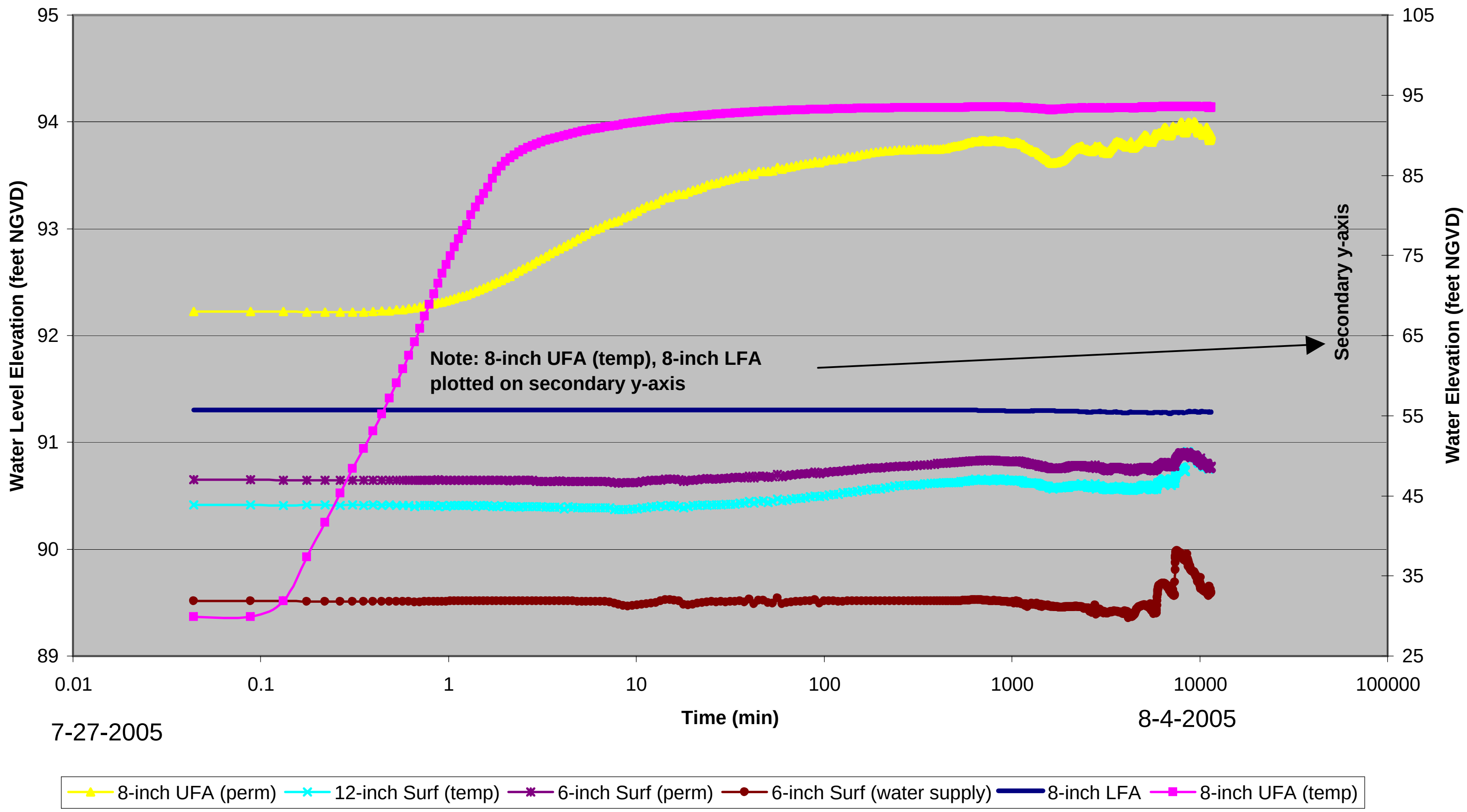


Figure 29. ROMP 74X Davenport

Upper Floridan APT Recovery Graph and Hydrograph before Surficial APT

ufa_rec2.xls

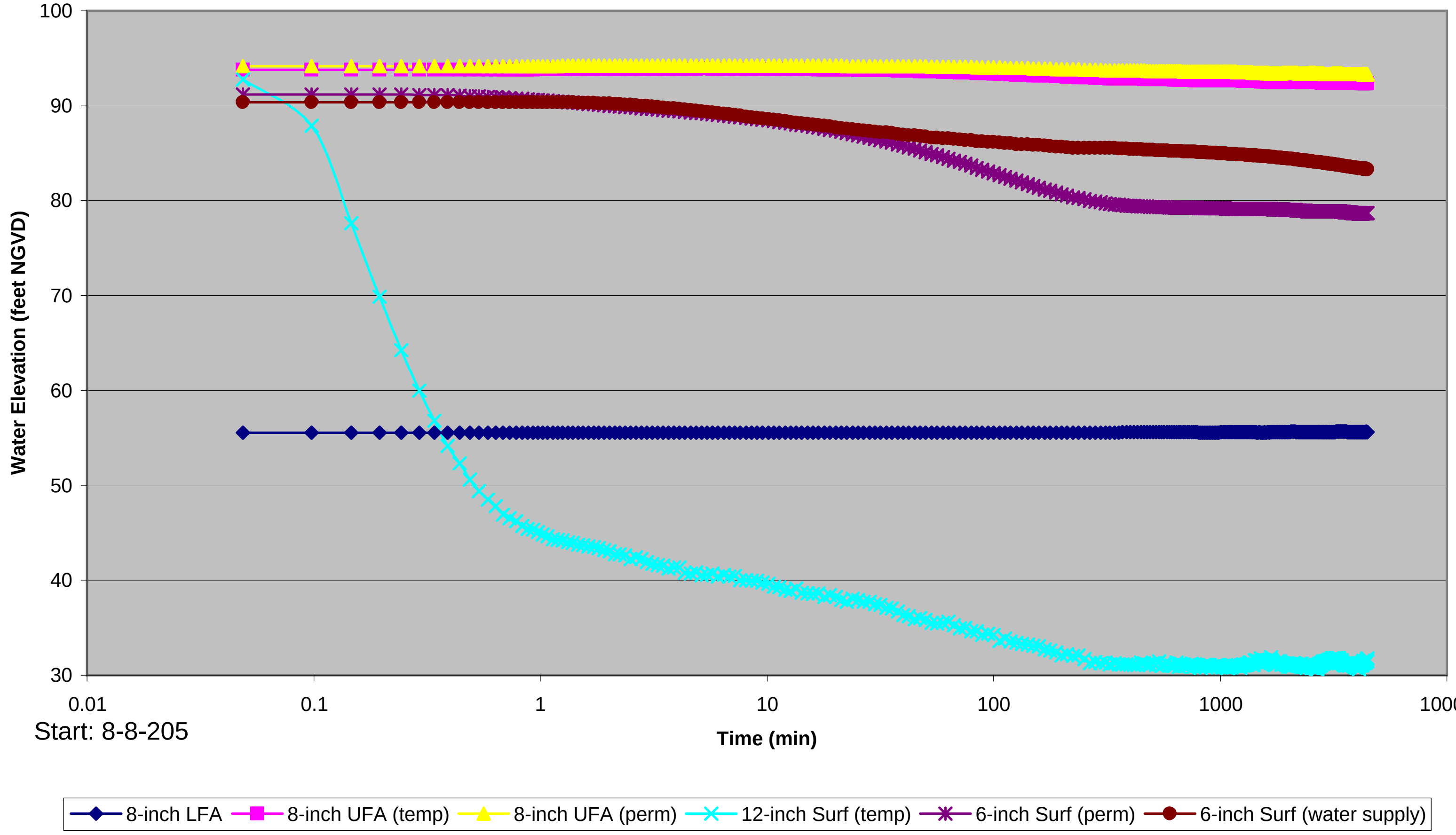
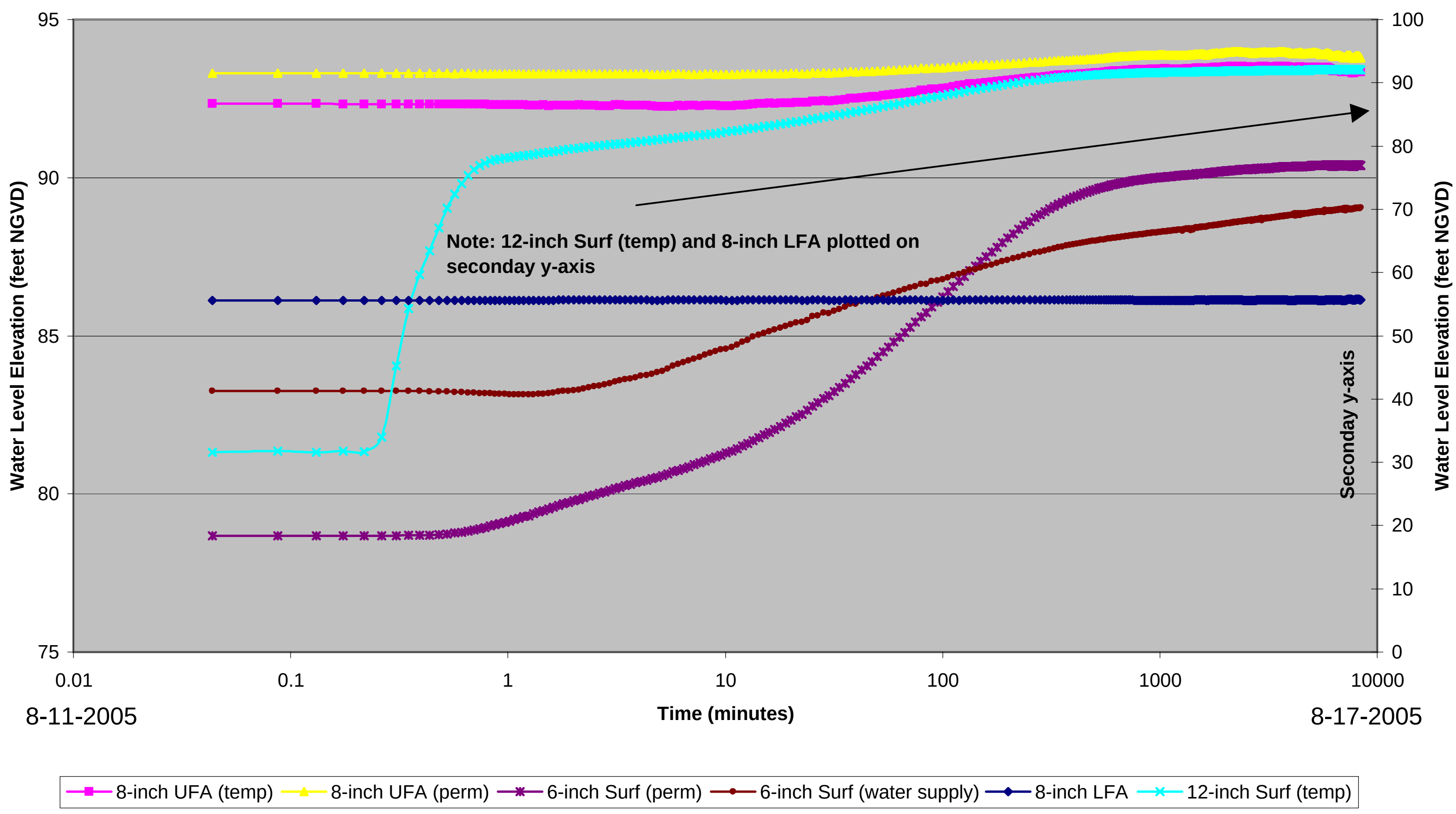


Figure 30. ROMP 74X Davenport

Surficial APT Drawdown Graph

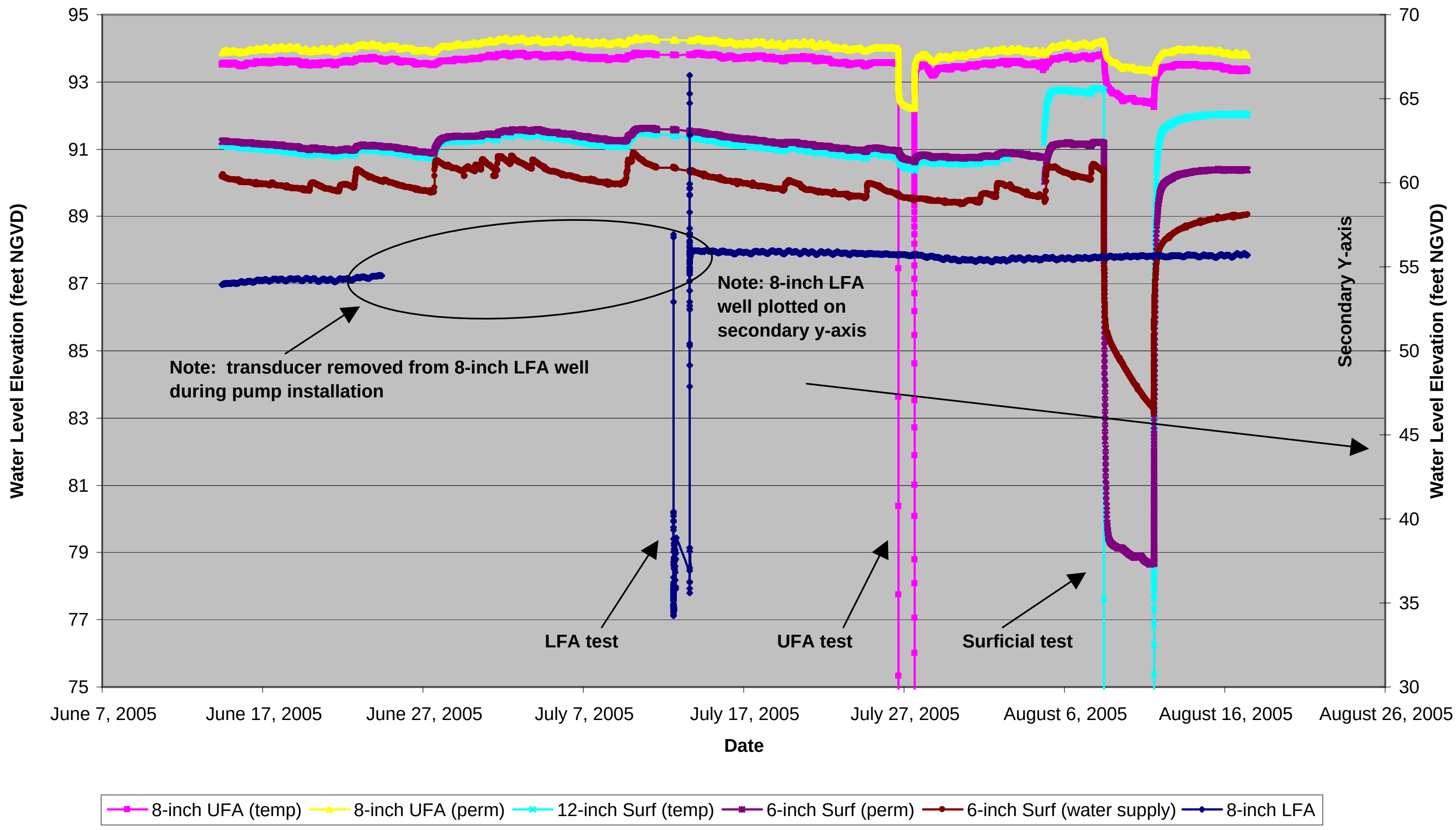
dd.xls



recovery.xls

Figure 31. ROMP 74X Davenport

Surfical APT Recovery Graph



NGVD-alltest.xls

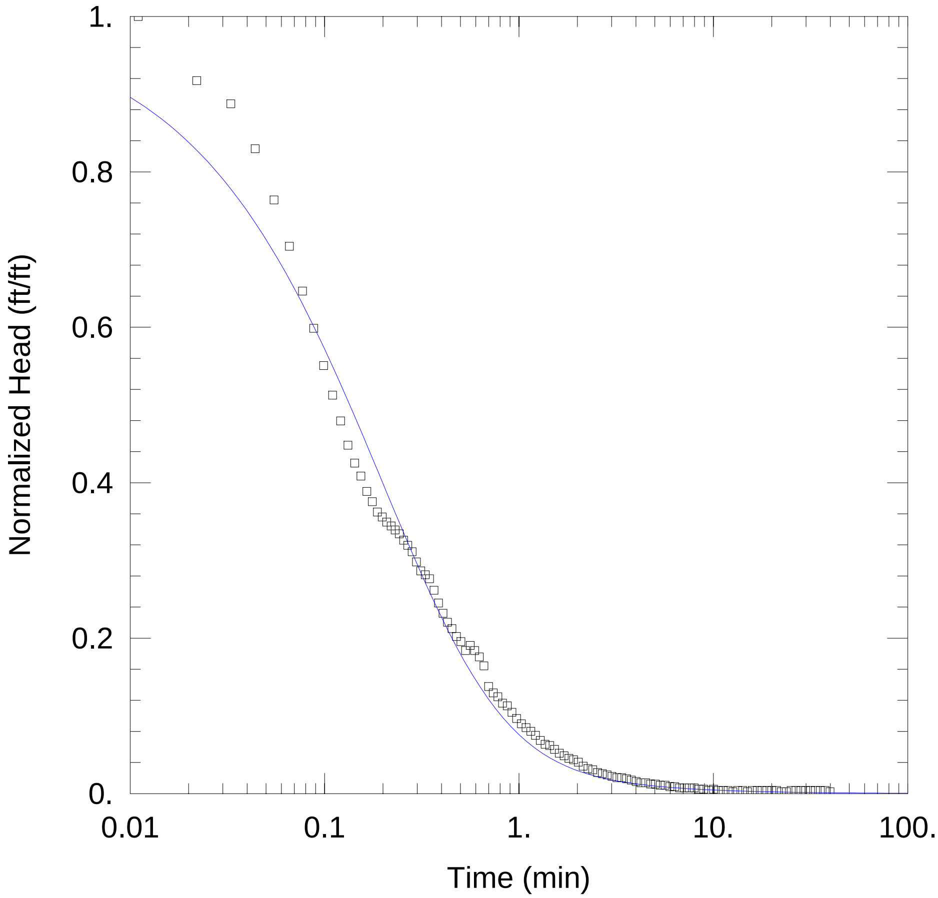
Figure 32. ROMP 74X Davenport

ROMP 74X Hydrograph during APT's

APPENDIX A
Lithologic Log

Lithologic log not processed by the Florida Geological Survey at time of printing.

APPENDIX B
Slug Test Curve Analyses



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT2_436-461.aqt
Date: 05/01/06 Time: 11:22:21

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT436-461
Test Date: 12/16/2002

AQUIFER DATA

Saturated Thickness: 6. ft

WELL DATA (PT436-461)

Initial Displacement: 4.383 ft
Total Well Penetration Depth: 6. ft
Casing Radius: 0.099 ft

Static Water Column Height: 461. ft
Screen Length: 6. ft
Wellbore Radius: 0.12 ft

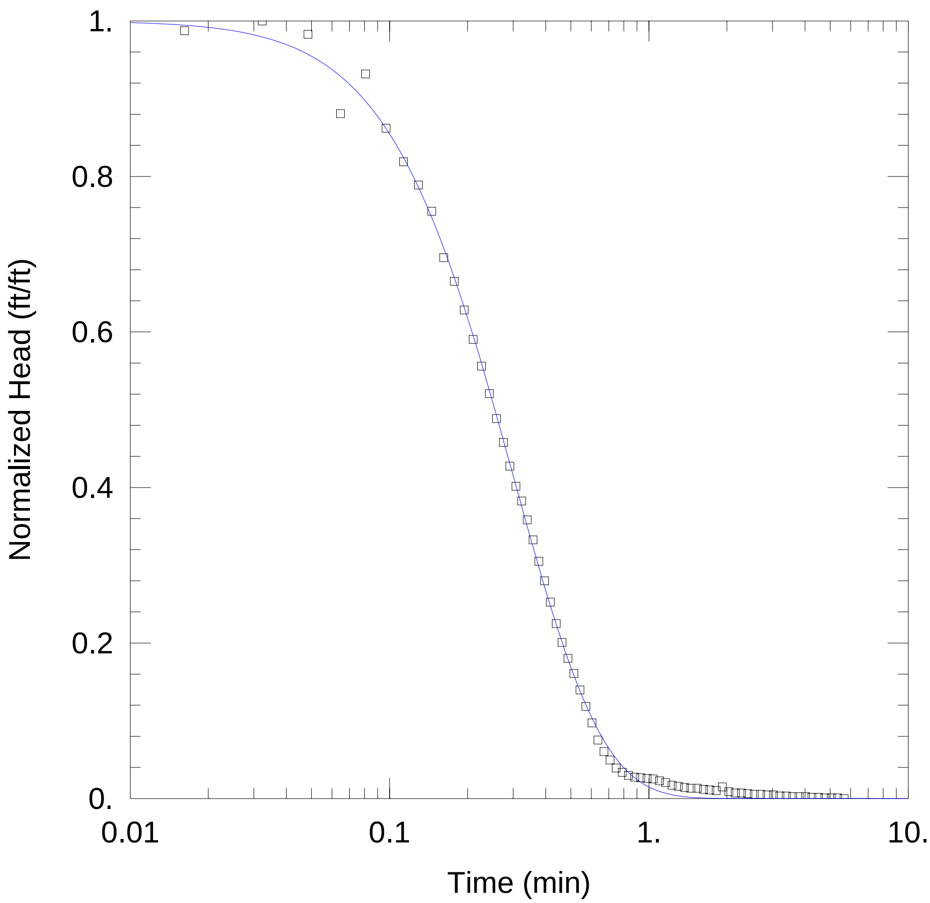
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 13.79 ft/day
Kz/Kr = 0.1

Ss = 0.001579 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT3_455-481.aqt
Date: 05/01/06 Time: 11:23:29

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT455-481
Test Date: 12/18/2002

AQUIFER DATA

Saturated Thickness: 290. ft
Anisotropy Ratio (Kz/Kr): 0.1

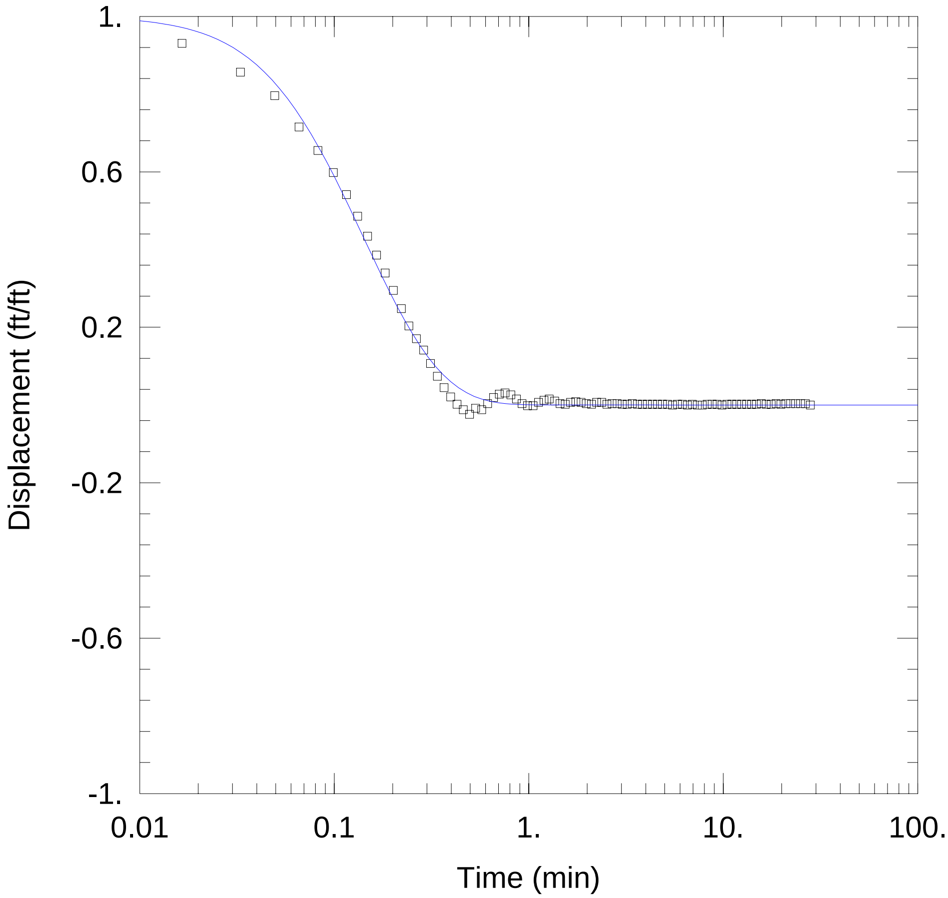
WELL DATA (PT455-481)

Initial Displacement: 9.229 ft
Total Well Penetration Depth: 31. ft
Casing Radius: 0.099 ft
Static Water Column Height: 481. ft
Screen Length: 26. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 5.727 ft/day
C(D) = 1.046



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT4_512-541.aqt
Date: 05/01/06 Time: 11:24:22

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT512-541
Test Date: 1/09/2003

AQUIFER DATA

Saturated Thickness: 290. ft Anisotropy Ratio (Kz/Kr): 0.1

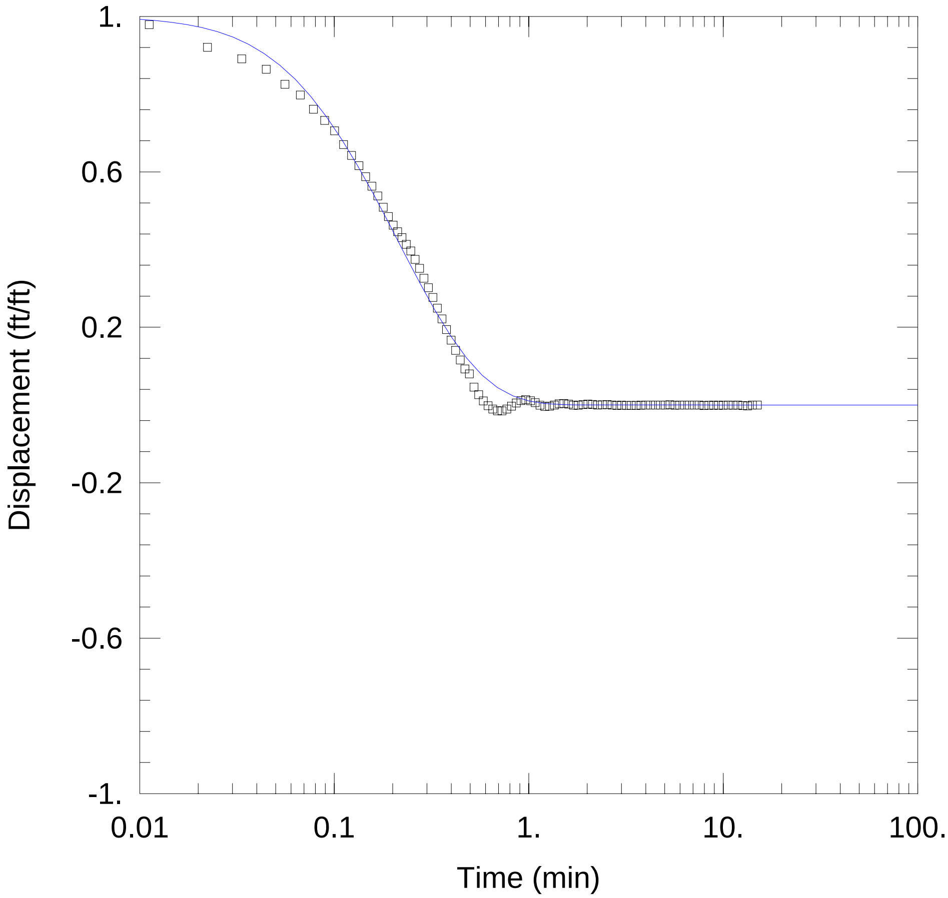
WELL DATA (PT512-541)

Initial Displacement: 4.2 ft
Total Well Penetration Depth: 91. ft
Casing Radius: 0.099 ft
Static Water Column Height: 541. ft
Screen Length: 29. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 10.18 ft/day
C(D) = 1.282



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT5_542-566.aqt
Date: 05/01/06 Time: 11:25:04

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT542-566
Test Date: 01/22/2003

AQUIFER DATA

Saturated Thickness: 290. ft
Anisotropy Ratio (Kz/Kr): 0.1

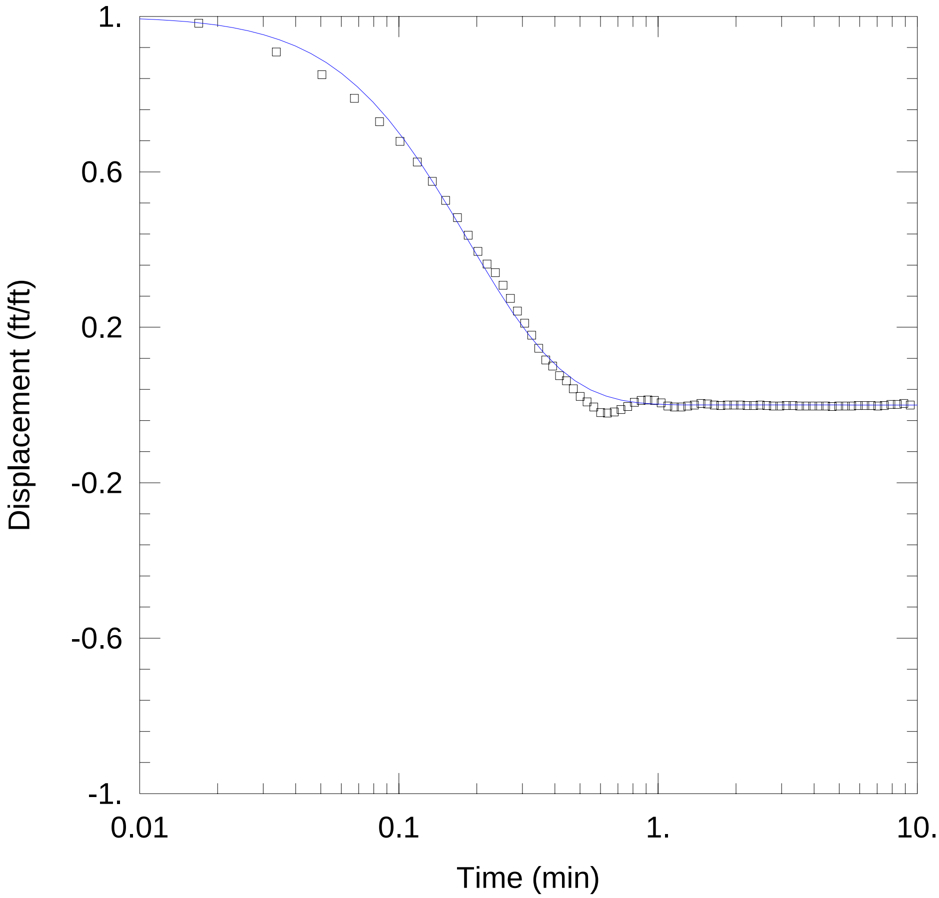
WELL DATA (PT542-566)

Initial Displacement: 8.526 ft
Total Well Penetration Depth: 116. ft
Casing Radius: 0.099 ft
Static Water Column Height: 566. ft
Screen Length: 24. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 7.896 ft/day
C(D) = 1.579



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT6_670-686.aqt
Date: 05/01/06 Time: 11:25:50

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT670-686
Test Date: 3/25/2003

AQUIFER DATA

Saturated Thickness: 290. ft
Anisotropy Ratio (Kz/Kr): 0.1

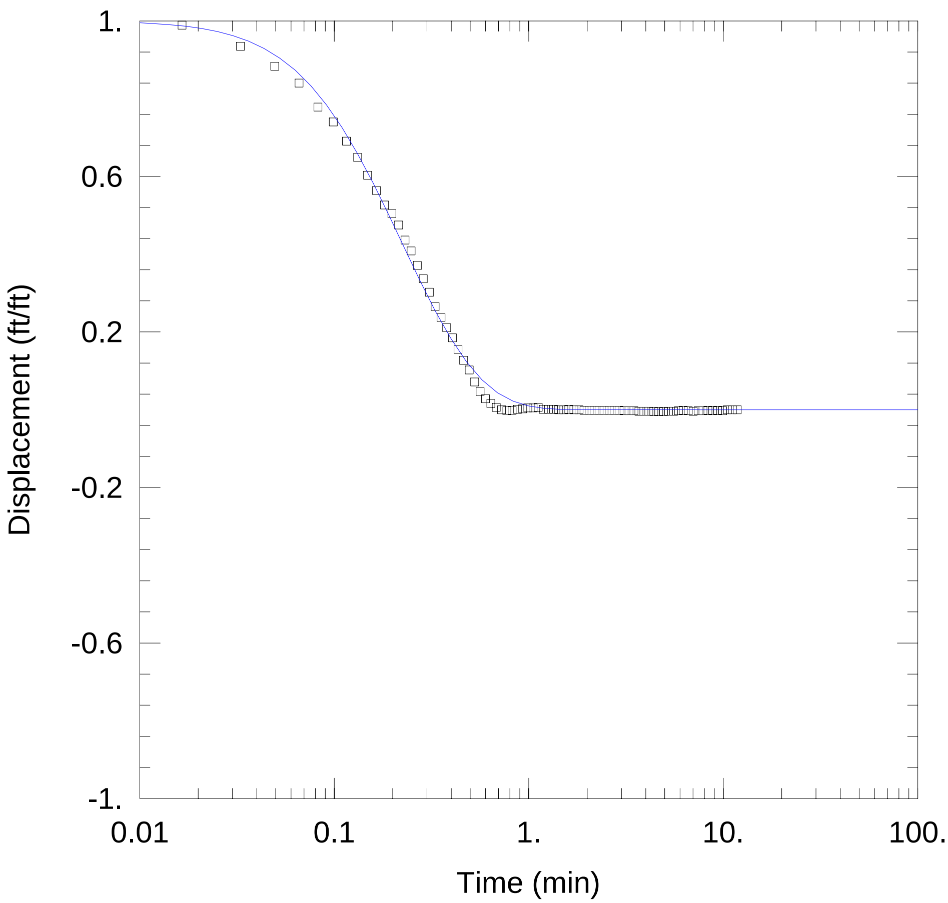
WELL DATA (PT542-566)

Initial Displacement: 5.6 ft
Total Well Penetration Depth: 116. ft
Casing Radius: 0.099 ft
Static Water Column Height: 566. ft
Screen Length: 16. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 13.32 ft/day
C(D) = 1.164



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT7_710-736.aqt
Date: 05/01/06 Time: 11:26:42

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT710-736
Test Date: 3/27/2003

AQUIFER DATA

Saturated Thickness: 290. ft
Anisotropy Ratio (Kz/Kr): 0.1

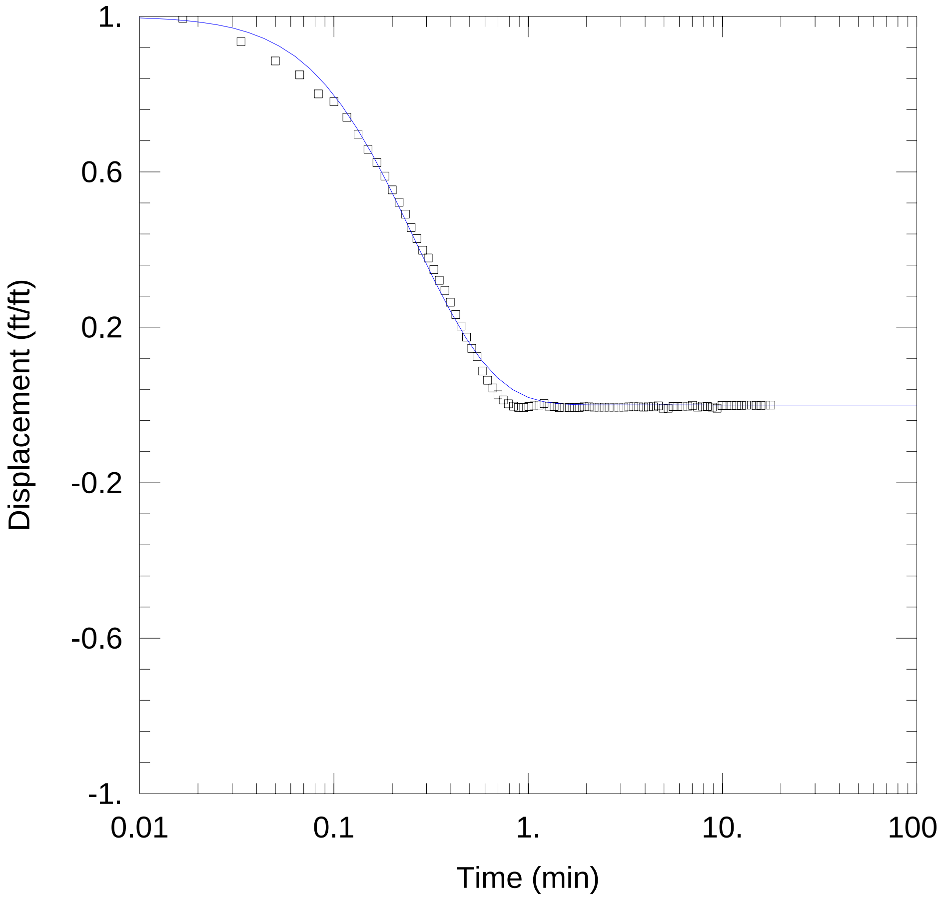
WELL DATA (PT710-736)

Initial Displacement: 5.9 ft
Static Water Column Height: 736. ft
Total Well Penetration Depth: 286. ft
Screen Length: 26. ft
Casing Radius: 0.099 ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 7.102 ft/day
C(D) = 1.296



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT8_720-786.aqt
Date: 05/01/06 Time: 11:27:34

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT720-786
Test Date: 4/02/2003

AQUIFER DATA

Saturated Thickness: 66. ft
Anisotropy Ratio (Kz/Kr): 0.1

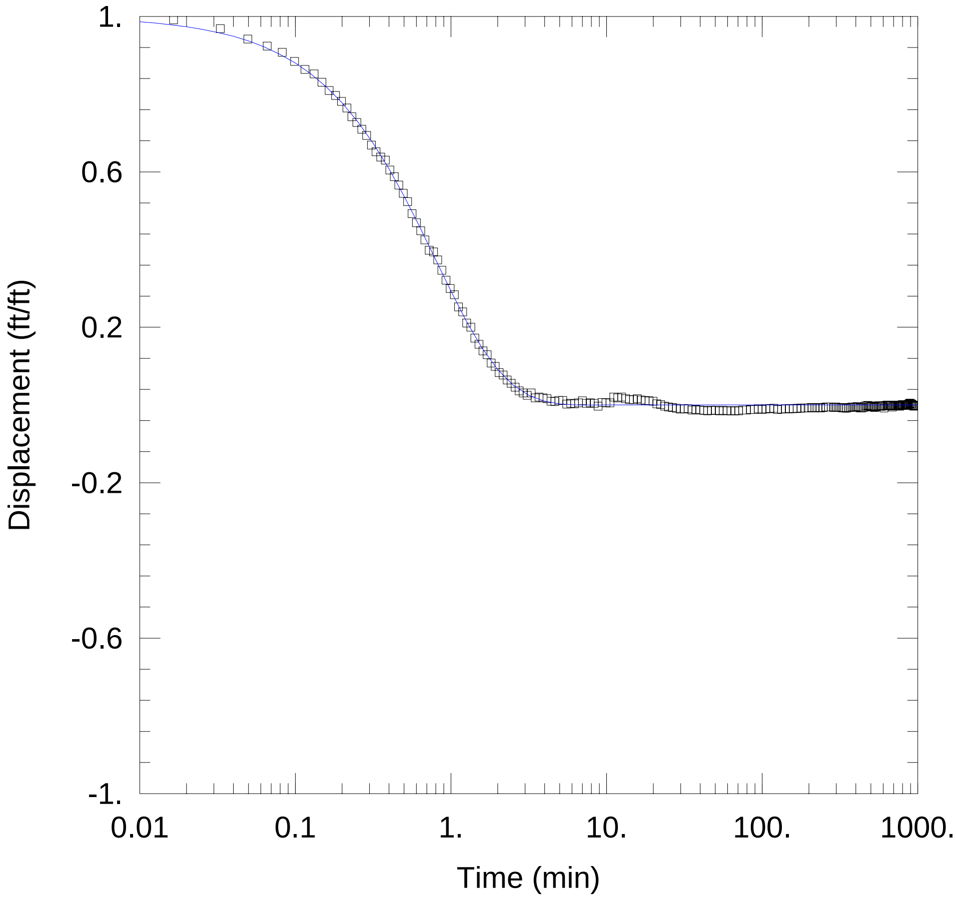
WELL DATA (PT720-786)

Initial Displacement: 9.5 ft
Total Well Penetration Depth: 66. ft
Casing Radius: 0.099 ft
Static Water Column Height: 786. ft
Screen Length: 66. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 2.578 ft/day
C(D) = 1.32



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT9_853-886.aqt
Date: 05/01/06 Time: 11:28:40

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT853-886
Test Date: 4/08/2003

AQUIFER DATA

Saturated Thickness: 510. ft

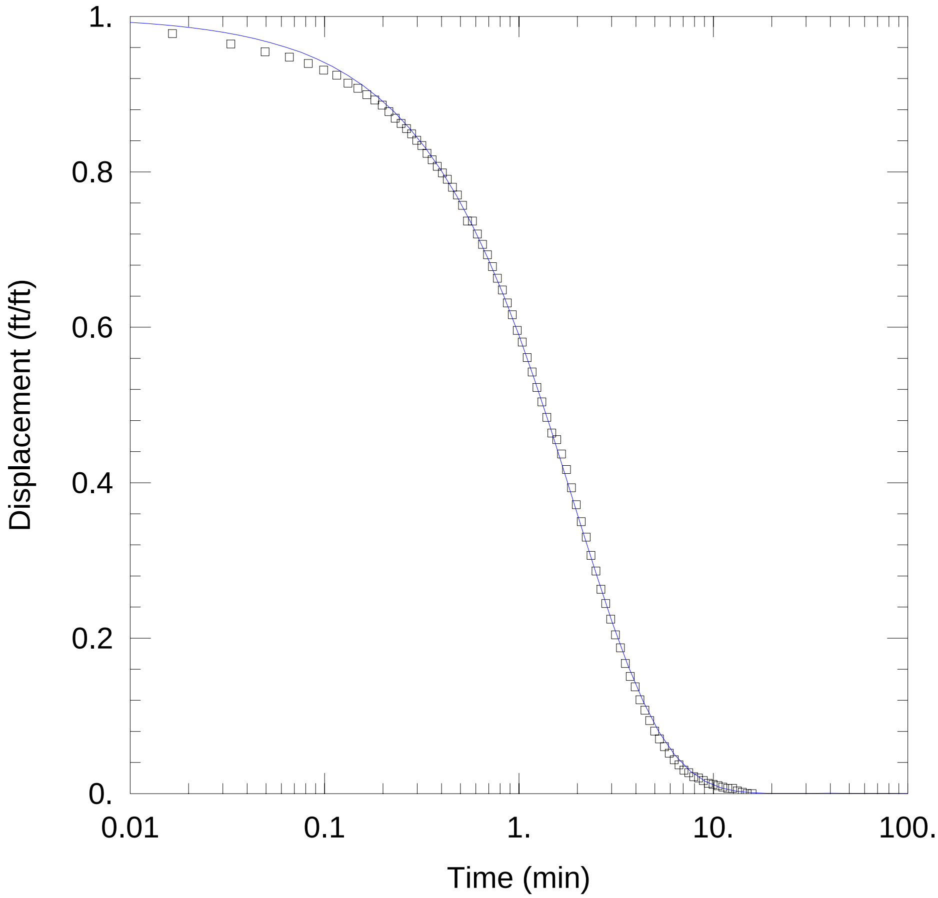
WELL DATA (PT853-886)

Initial Displacement: 6.8 ft
Total Well Penetration Depth: 146. ft
Casing Radius: 0.099 ft
Static Water Column Height: 886. ft
Screen Length: 33. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 1.68 ft/day
Kz/Kr = 0.1
Ss = 3.246E-9 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT12_1000-1031.aqt
Date: 05/01/06 Time: 11:29:50

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1000-1031
Test Date: 4/17/2003

AQUIFER DATA

Saturated Thickness: 510. ft

WELL DATA (PT1000-1031)

Initial Displacement: 8.6 ft
Total Well Penetration Depth: 146. ft
Casing Radius: 0.099 ft

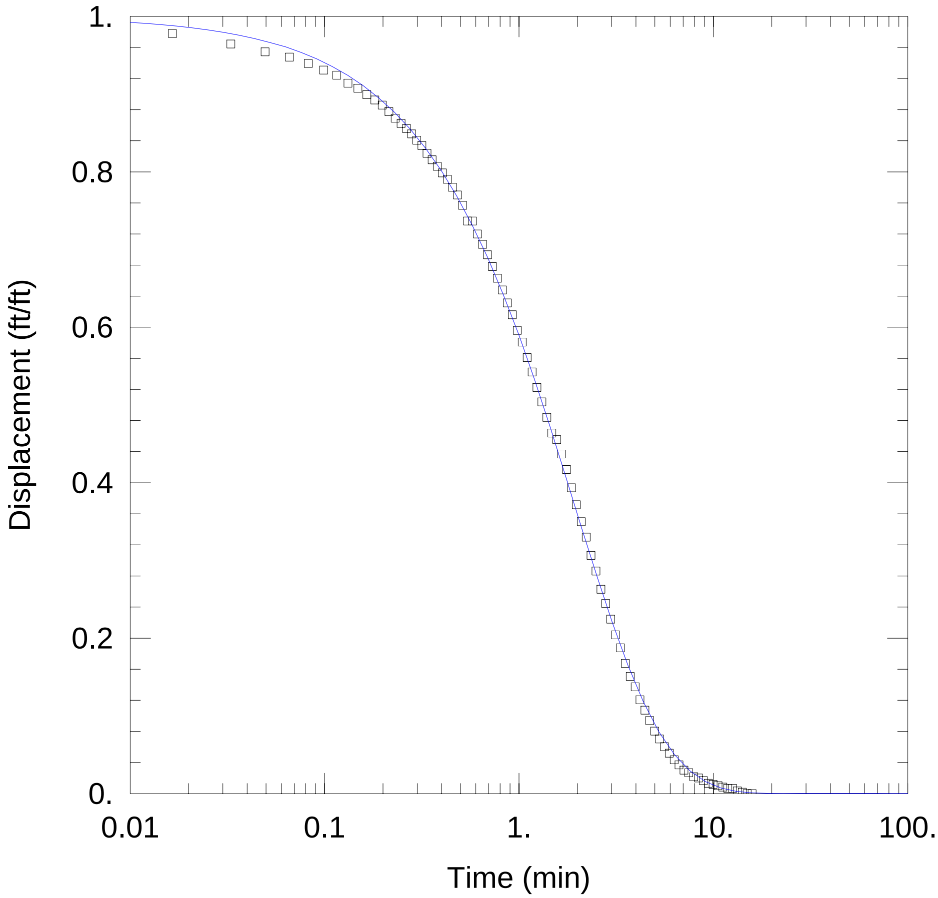
Static Water Column Height: 1031. ft
Screen Length: 33. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.6746 ft/day
Kz/Kr = 0.1

Ss = 5.65E-8 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT14_1040-1071.aqt
Date: 05/01/06 Time: 11:31:05

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1040-1071
Test Date: 4/22/2003

AQUIFER DATA

Saturated Thickness: 510. ft

WELL DATA (PT1040-1071)

Initial Displacement: 8.6 ft
Total Well Penetration Depth: 331. ft
Casing Radius: 0.099 ft

Static Water Column Height: 1071. ft
Screen Length: 31. ft
Wellbore Radius: 0.12 ft

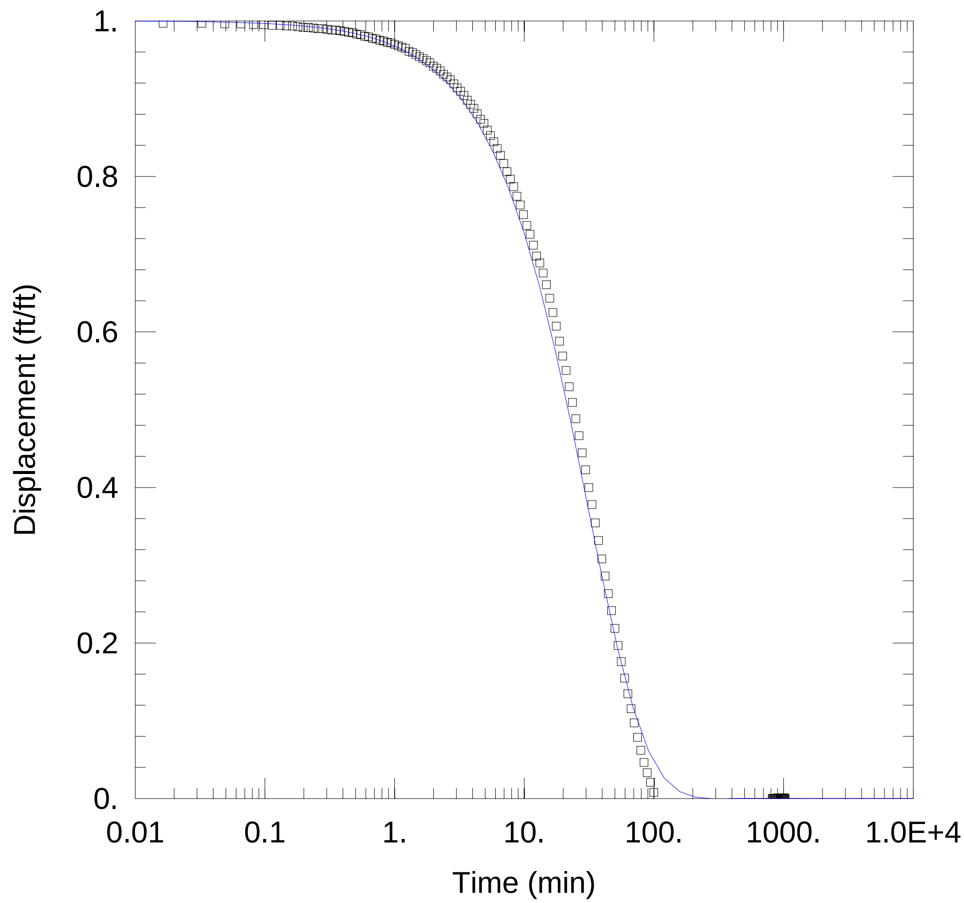
SOLUTION

Aquifer Model: Confined

Kr = 0.711 ft/day
Kz/Kr = 0.1

Solution Method: KGS Model

Ss = 6.599E-8 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT15_1100-1136_kgs.aqt
Date: 05/01/06 Time: 11:32:07

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1100-1136
Test Date: 4/29/2003

AQUIFER DATA

Saturated Thickness: 510. ft

WELL DATA (PT1100-1136)

Initial Displacement: 16.45 ft
Total Well Penetration Depth: 396. ft
Casing Radius: 0.099 ft

Static Water Column Height: 1136. ft
Screen Length: 36. ft
Wellbore Radius: 0.12 ft

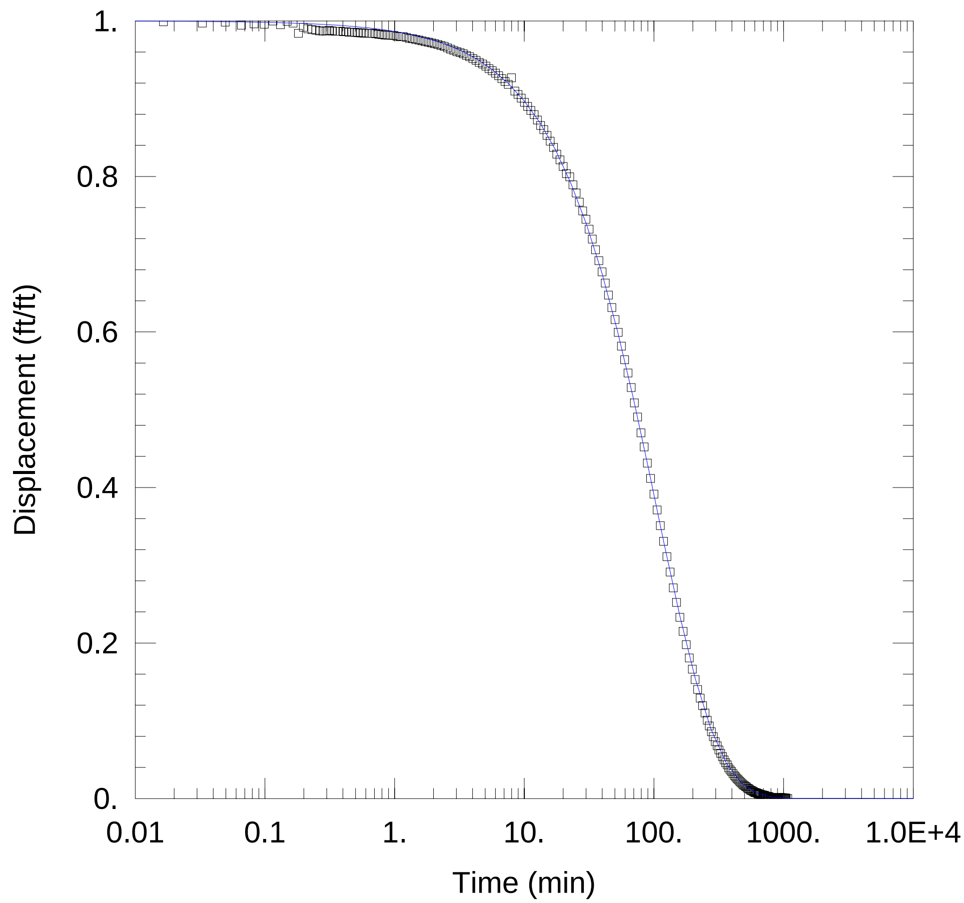
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.04155 ft/day
Kz/Kr = 0.1

Ss = 4.185E-12 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT16_1196-1226_kgs.aqt
Date: 05/01/06 Time: 11:33:16

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1196-1226
Test Date: 5/06/2003

AQUIFER DATA

Saturated Thickness: 510. ft

WELL DATA (PT1196-1226)

Initial Displacement: 27. ft
Total Well Penetration Depth: 386. ft
Casing Radius: 0.099 ft

Static Water Column Height: 1226. ft
Screen Length: 30. ft
Wellbore Radius: 0.12 ft

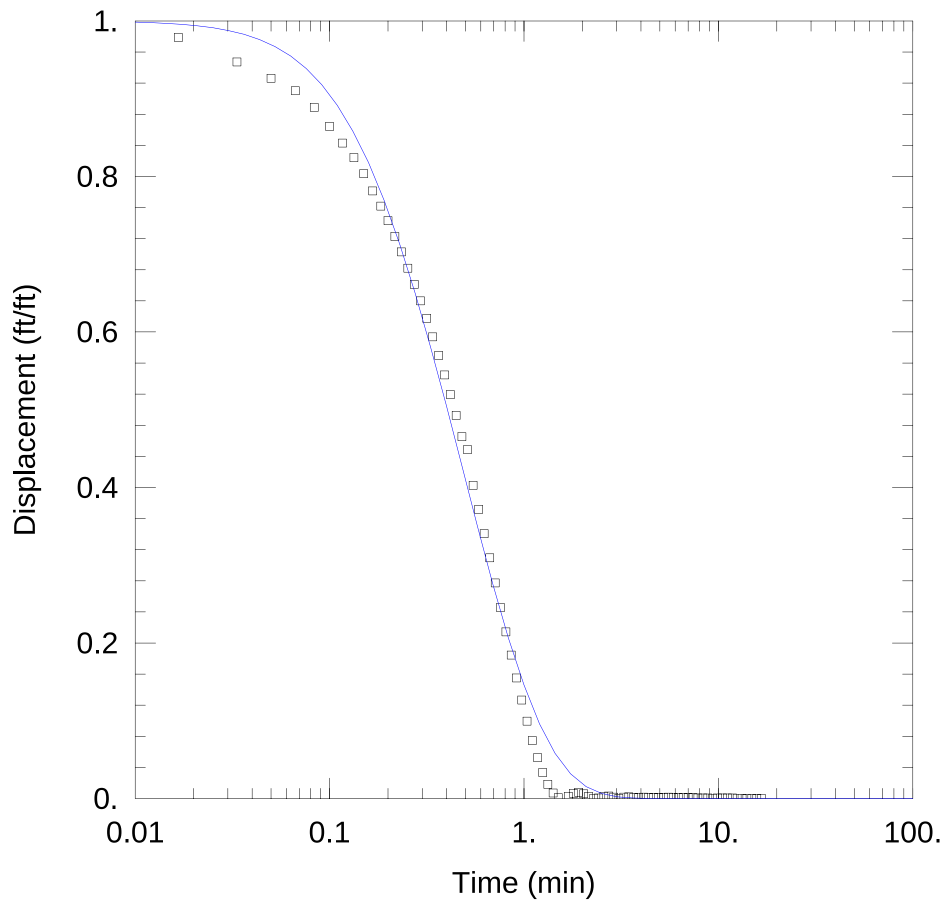
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.01323 ft/day
Kz/Kr = 0.1

Ss = 1.024E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT17_1256-1286_butler.aqt
Date: 05/01/06 Time: 11:33:54

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1256-1286
Test Date: 5/12/2003

AQUIFER DATA

Saturated Thickness: 150. ft
Anisotropy Ratio (Kz/Kr): 0.1

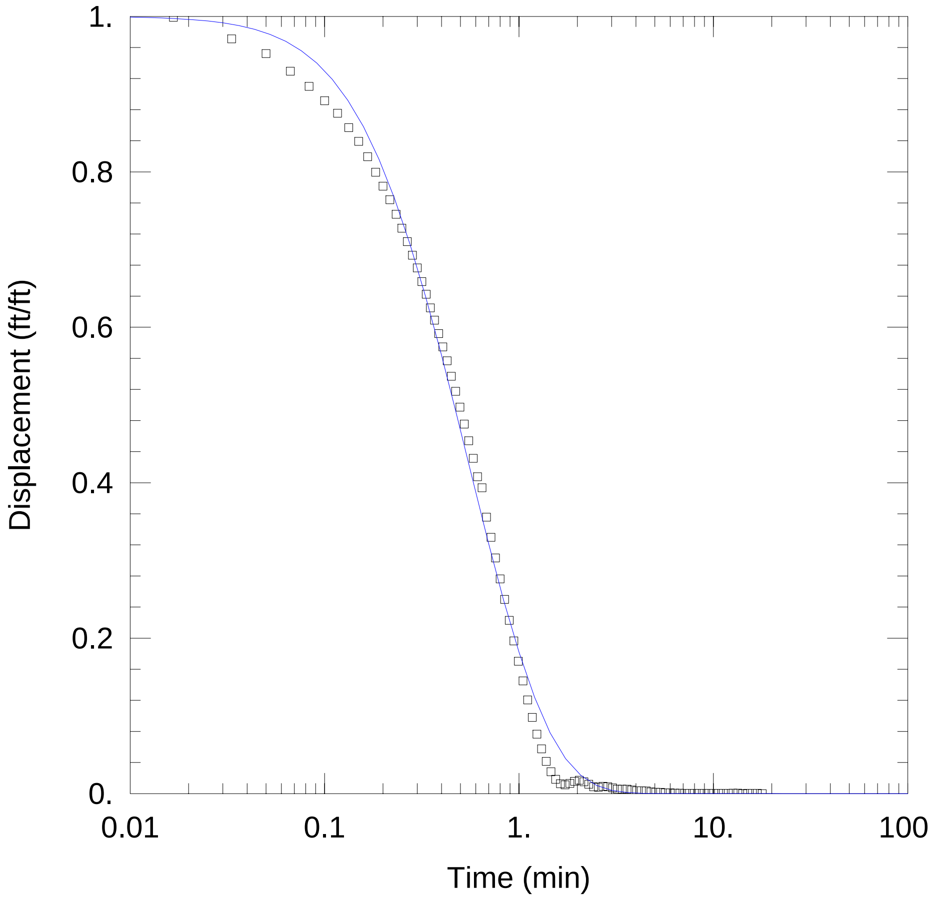
WELL DATA (PT1256-1286)

Initial Displacement: 40.5 ft
Total Well Penetration Depth: 36. ft
Casing Radius: 0.099 ft
Static Water Column Height: 1246. ft
Screen Length: 30. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 2.864 ft/day
C(D) = 1.555



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT18_1351-1381_butler.aqt
Date: 05/01/06 Time: 11:34:36

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1351-1381
Test Date: 5/21/2003

AQUIFER DATA

Saturated Thickness: 150. ft
Anisotropy Ratio (Kz/Kr): 0.1

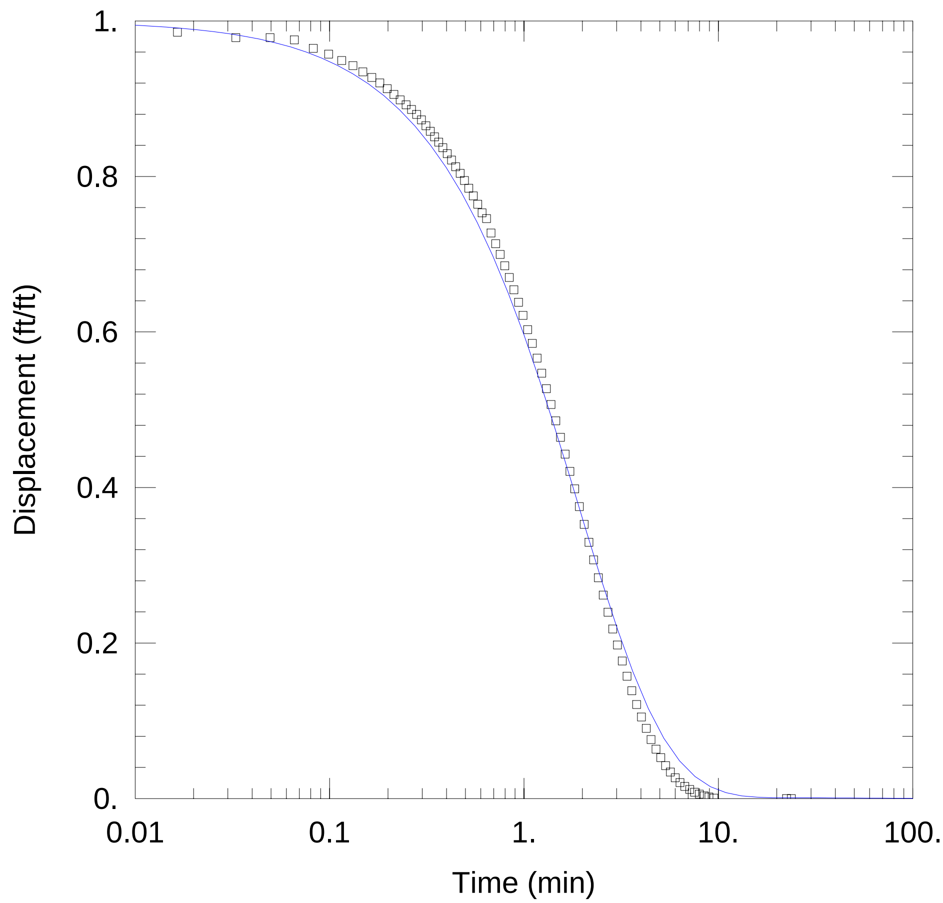
WELL DATA (PT1351-1381)

Initial Displacement: 47.6 ft
Total Well Penetration Depth: 131. ft
Casing Radius: 0.099 ft
Static Water Column Height: 1341. ft
Screen Length: 30. ft
Wellbore Radius: 0.12 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 2.535 ft/day
C(D) = 1.415



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\CME Packer Tests\PT19_1456-1486_kgs.aqt
Date: 05/01/06 Time: 11:35:30

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport, FL
Test Well: PT1456-1486
Test Date: 5/30/2003

AQUIFER DATA

Saturated Thickness: 160. ft

WELL DATA (PT1456-1486)

Initial Displacement: 51.2 ft
Total Well Penetration Depth: 86. ft
Casing Radius: 0.099 ft
Static Water Column Height: 1446. ft
Screen Length: 30. ft
Wellbore Radius: 0.12 ft

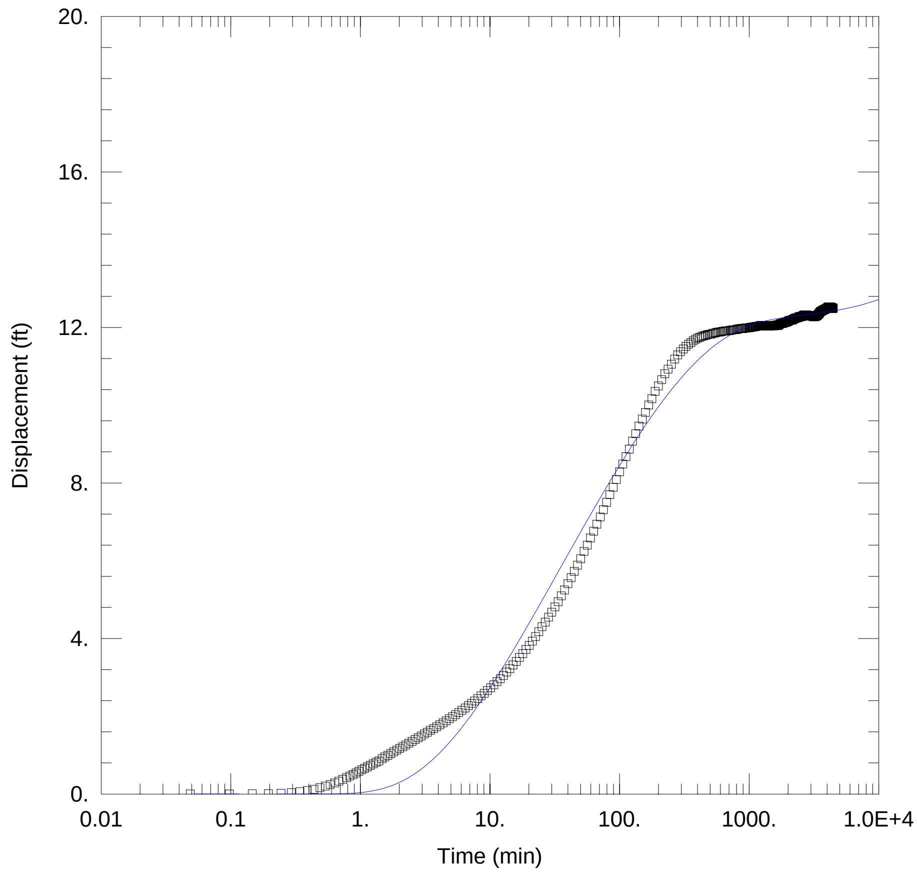
SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.8443 ft/day
Kz/Kr = 0.1
Ss = 3.923E-12 ft^{-1}

APPENDIX C

Surficial APT Curve Matches



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\Surficial\surf_ob_neuman.aqt
Date: 05/01/06 Time: 13:57:26

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport
Test Well: Surficial
Test Date: 8-8-2005

AQUIFER DATA

Saturated Thickness: 223. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
12" Surf	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ 6" Surf OB	120	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 5428.5 ft^2/day
S = 0.003221
Sy = 0.343
ß = 0.008719

Data Set: D:\MyFiles\ROMP 74X\APT data files\Surficial\surf_ob_neuman.aqt
Date: 05/01/06
Time: 13:56:22

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport
Test Date: 8-8-2005
Test Well: Surficial

AQUIFER DATA

Saturated Thickness: 223. ft
Anisotropy Ratio (Kz/Kr): 0.03011

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: 12" Surf

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.5 ft
Wellbore Radius: 0.9 ft

Partially Penetrating Well
Depth to Top of Screen: 28. ft
Depth to Bottom of Screen: 223. ft

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	1005.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: 6" Surf OB

X Location: 120. ft
Y Location: 0. ft

Radial distance from 12" Surf: 120. ft

Partially Penetrating Well
Depth to Top of Screen: 23. ft
Depth to Bottom of Screen: 223. ft

No. of Observations: 400

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0488	0.003	1481.2	12.04
0.0977	0.003	1496.2	12.04
0.1465	0.006	1511.2	12.05
0.1953	0.012	1526.2	12.04
0.2442	0.02	1541.2	12.04
0.293	0.035	1556.2	12.05
0.3418	0.058	1571.2	12.04
0.3907	0.09	1586.2	12.06
0.4395	0.122	1601.2	12.06

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.4883	0.162	1616.2	12.06
0.5372	0.203	1631.2	12.06
0.586	0.243	1646.2	12.06
0.6348	0.284	1661.2	12.05
0.6837	0.333	1676.2	12.06
0.7325	0.377	1691.2	12.06
0.7813	0.417	1706.2	12.07
0.8302	0.461	1721.2	12.08
0.879	0.501	1736.2	12.1
0.9278	0.542	1751.2	12.1
0.9767	0.583	1766.2	12.1
1.027	0.623	1781.2	12.1
1.079	0.661	1796.2	12.1
1.135	0.696	1811.2	12.1
1.194	0.739	1826.2	12.11
1.257	0.777	1841.2	12.11
1.323	0.817	1856.2	12.12
1.394	0.849	1871.2	12.13
1.468	0.907	1886.2	12.13
1.547	0.953	1901.2	12.13
1.631	0.994	1916.2	12.14
1.719	1.04	1931.2	12.14
1.813	1.084	1946.2	12.14
1.912	1.13	1961.2	12.14
2.018	1.174	1976.2	12.15
2.129	1.217	1991.2	12.16
2.247	1.263	2006.2	12.16
2.373	1.307	2021.2	12.17
2.505	1.353	2036.2	12.18
2.646	1.403	2051.2	12.18
2.794	1.446	2066.2	12.19
2.952	1.492	2081.2	12.19
3.119	1.545	2096.2	12.19
3.296	1.591	2111.2	12.19
3.483	1.64	2126.2	12.19
3.681	1.687	2141.2	12.19
3.891	1.73	2156.2	12.19
4.114	1.779	2171.2	12.21
4.35	1.831	2186.2	12.21
4.6	1.881	2201.2	12.22
4.864	1.936	2216.2	12.22
5.145	1.988	2231.2	12.23
5.441	2.04	2246.2	12.23
5.756	2.098	2261.2	12.23
6.089	2.153	2276.2	12.24
6.442	2.211	2291.2	12.24
6.816	2.275	2306.2	12.24
7.212	2.333	2321.2	12.24
7.631	2.393	2336.2	12.25
8.075	2.454	2351.2	12.25
8.546	2.524	2366.2	12.25
9.045	2.59	2381.2	12.25
9.573	2.66	2396.2	12.26
10.13	2.732	2411.2	12.27
10.72	2.808	2426.2	12.27
11.35	2.889	2441.2	12.27
12.02	2.967	2456.2	12.27
12.72	3.048	2471.2	12.28
13.47	3.138	2486.2	12.28
14.26	3.225	2501.2	12.27
15.09	3.317	2516.2	12.28
15.98	3.41	2531.2	12.28
16.92	3.511	2546.2	12.28
17.91	3.61	2561.2	12.29
18.97	3.717	2576.2	12.3
20.08	3.821	2591.2	12.3

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
21.27	3.934	2606.2	12.3
22.52	4.05	2621.2	12.31
23.84	4.174	2636.2	12.32
25.25	4.302	2651.2	12.32
26.74	4.421	2666.2	12.32
28.31	4.548	2681.2	12.32
29.98	4.675	2696.2	12.32
31.75	4.814	2711.2	12.32
33.63	4.945	2726.2	12.32
35.61	5.098	2741.2	12.32
37.71	5.251	2756.2	12.32
39.94	5.408	2771.2	12.32
42.3	5.567	2786.2	12.32
44.8	5.726	2801.2	12.32
47.44	5.888	2816.2	12.31
50.25	6.053	2831.2	12.31
53.22	6.241	2846.2	12.3
56.36	6.401	2861.2	12.31
59.7	6.586	2876.2	12.31
63.22	6.759	2891.2	12.3
66.96	6.939	2906.2	12.3
70.92	7.124	2921.2	12.3
75.12	7.312	2936.2	12.31
79.56	7.503	2951.2	12.31
84.27	7.703	2966.2	12.3
89.25	7.891	2981.2	12.29
94.53	8.09	2996.2	12.31
100.1	8.284	3011.2	12.3
106.1	8.487	3026.2	12.3
112.3	8.678	3041.2	12.29
119.	8.871	3056.2	12.31
126.	9.077	3071.2	12.3
133.5	9.271	3086.2	12.3
141.4	9.461	3101.2	12.27
149.8	9.644	3116.2	12.28
158.6	9.811	3131.2	12.28
168.	10.01	3146.2	12.28
178.	10.17	3161.2	12.27
188.5	10.36	3176.2	12.28
199.7	10.49	3191.2	12.27
211.5	10.66	3206.2	12.27
224.	10.81	3221.2	12.28
237.3	10.93	3236.2	12.28
251.3	11.06	3251.2	12.3
266.2	11.19	3266.2	12.29
281.2	11.3	3281.2	12.29
296.2	11.38	3296.2	12.29
311.2	11.45	3311.2	12.3
326.2	11.51	3326.2	12.3
341.2	11.57	3341.2	12.31
356.2	11.61	3356.2	12.31
371.2	11.66	3371.2	12.32
386.2	11.7	3386.2	12.32
401.2	11.73	3401.2	12.33
416.2	11.75	3416.2	12.34
431.2	11.77	3431.2	12.34
446.2	11.78	3446.2	12.35
461.2	11.8	3461.2	12.35
476.2	11.81	3476.2	12.36
491.2	11.82	3491.2	12.37
506.2	11.83	3506.2	12.38
521.2	11.85	3521.2	12.39
536.2	11.86	3536.2	12.4
551.2	11.86	3551.2	12.41
566.2	11.88	3566.2	12.41
581.2	11.88	3581.2	12.41

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
596.2	11.89	3596.2	12.42
611.2	11.89	3611.2	12.42
626.2	11.9	3626.2	12.43
641.2	11.9	3641.2	12.43
656.2	11.91	3656.2	12.43
671.2	11.91	3671.2	12.43
686.2	11.92	3686.2	12.43
701.2	11.92	3701.2	12.44
716.2	11.93	3716.2	12.45
731.2	11.93	3731.2	12.45
746.2	11.94	3746.2	12.45
761.2	11.94	3761.2	12.45
776.2	11.94	3776.2	12.46
791.2	11.95	3791.2	12.45
806.2	11.95	3806.2	12.45
821.2	11.96	3821.2	12.46
836.2	11.97	3836.2	12.47
851.2	11.97	3851.2	12.47
866.2	11.97	3866.2	12.48
881.2	11.97	3881.2	12.47
896.2	11.97	3896.2	12.48
911.2	11.98	3911.2	12.48
926.2	11.98	3926.2	12.48
941.2	11.98	3941.2	12.48
956.2	11.99	3956.2	12.49
971.2	11.99	3971.2	12.49
986.2	11.99	3986.2	12.49
1001.2	11.99	4001.2	12.5
1016.2	12.	4016.2	12.5
1031.2	12.	4031.2	12.5
1046.2	12.01	4046.2	12.52
1061.2	12.01	4061.2	12.52
1076.2	12.01	4076.2	12.52
1091.2	12.02	4091.2	12.53
1106.2	12.02	4106.2	12.52
1121.2	12.02	4121.2	12.53
1136.2	12.03	4136.2	12.53
1151.2	12.03	4151.2	12.53
1166.2	12.03	4166.2	12.53
1181.2	12.03	4181.2	12.53
1196.2	12.04	4196.2	12.53
1211.2	12.04	4211.2	12.53
1226.2	12.05	4226.2	12.53
1241.2	12.05	4241.2	12.53
1256.2	12.05	4256.2	12.53
1271.2	12.05	4271.2	12.52
1286.2	12.05	4286.2	12.52
1301.2	12.05	4301.2	12.52
1316.2	12.05	4316.2	12.51
1331.2	12.04	4331.2	12.51
1346.2	12.04	4346.2	12.51
1361.2	12.04	4361.2	12.5
1376.2	12.04	4376.2	12.49
1391.2	12.04	4391.2	12.51
1406.2	12.05	4406.2	12.48
1421.2	12.04	4421.2	12.49
1436.2	12.03	4436.2	12.49
1451.2	12.04	4451.2	12.49
1466.2	12.05	4466.2	12.5

SOLUTION

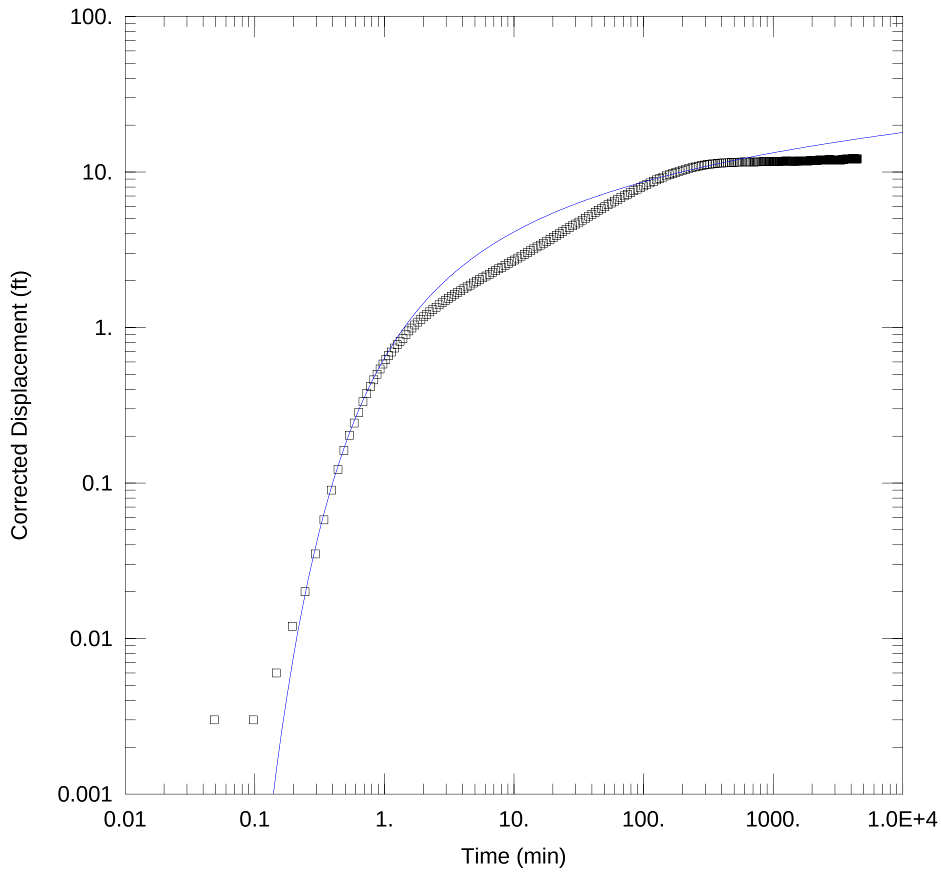
Aquifer Model: Unconfined
Solution Method: Neuman

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	5428.5	ft^2/day
S	0.003221	
Sy	0.343	
ß	0.008719	

K = T/b = 24.34 ft/day



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\Surficial\surf_ob_theis.aqt
Date: 05/01/06 Time: 13:58:57

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport
Test Well: Surficial
Test Date: 8-8-2005

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
12" Surf	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ OW 1	120	0

SOLUTION

Aquifer Model: Unconfined

Solution Method: Theis

T = 7607.7 ft^2/day
Kz/Kr = 0.4481

S = 0.001168
b = 223. ft

Data Set: D:\MyFiles\ROMP 74X\APT data files\Surficial\surf_ob_theis.aqt
Date: 05/01/06
Time: 16:18:50

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 74X
Location: Davenport
Test Date: 8-8-2005
Test Well: Surficial

AQUIFER DATA

Saturated Thickness: 223. ft
Anisotropy Ratio (Kz/Kr): 0.4481

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: 12" Surf

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.5 ft
Wellbore Radius: 0.9 ft

Partially Penetrating Well
Depth to Top of Screen: 28. ft
Depth to Bottom of Screen: 223. ft

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	1005.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: OW 1

X Location: 120. ft
Y Location: 0. ft

Radial distance from 12" Surf: 120. ft

Partially Penetrating Well
Depth to Top of Screen: 23. ft
Depth to Bottom of Screen: 223. ft

No. of Observations: 400

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0488	0.003	1481.2	12.04
0.0977	0.003	1496.2	12.04
0.1465	0.006	1511.2	12.05
0.1953	0.012	1526.2	12.04
0.2442	0.02	1541.2	12.04
0.293	0.035	1556.2	12.05
0.3418	0.058	1571.2	12.04
0.3907	0.09	1586.2	12.06
0.4395	0.122	1601.2	12.06
0.4883	0.162	1616.2	12.06
0.5372	0.203	1631.2	12.06
0.586	0.243	1646.2	12.06

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.6348	0.284	1661.2	12.05
0.6837	0.333	1676.2	12.06
0.7325	0.377	1691.2	12.06
0.7813	0.417	1706.2	12.07
0.8302	0.461	1721.2	12.08
0.879	0.501	1736.2	12.1
0.9278	0.542	1751.2	12.1
0.9767	0.583	1766.2	12.1
1.027	0.623	1781.2	12.1
1.079	0.661	1796.2	12.1
1.135	0.696	1811.2	12.1
1.194	0.739	1826.2	12.11
1.257	0.777	1841.2	12.11
1.323	0.817	1856.2	12.12
1.394	0.849	1871.2	12.13
1.468	0.907	1886.2	12.13
1.547	0.953	1901.2	12.13
1.631	0.994	1916.2	12.14
1.719	1.04	1931.2	12.14
1.813	1.084	1946.2	12.14
1.912	1.13	1961.2	12.14
2.018	1.174	1976.2	12.15
2.129	1.217	1991.2	12.16
2.247	1.263	2006.2	12.16
2.373	1.307	2021.2	12.17
2.505	1.353	2036.2	12.18
2.646	1.403	2051.2	12.18
2.794	1.446	2066.2	12.19
2.952	1.492	2081.2	12.19
3.119	1.545	2096.2	12.19
3.296	1.591	2111.2	12.19
3.483	1.64	2126.2	12.19
3.681	1.687	2141.2	12.19
3.891	1.73	2156.2	12.19
4.114	1.779	2171.2	12.21
4.35	1.831	2186.2	12.21
4.6	1.881	2201.2	12.22
4.864	1.936	2216.2	12.22
5.145	1.988	2231.2	12.23
5.441	2.04	2246.2	12.23
5.756	2.098	2261.2	12.23
6.089	2.153	2276.2	12.24
6.442	2.211	2291.2	12.24
6.816	2.275	2306.2	12.24
7.212	2.333	2321.2	12.24
7.631	2.393	2336.2	12.25
8.075	2.454	2351.2	12.25
8.546	2.524	2366.2	12.25
9.045	2.59	2381.2	12.25
9.573	2.66	2396.2	12.26
10.13	2.732	2411.2	12.27
10.72	2.808	2426.2	12.27
11.35	2.889	2441.2	12.27
12.02	2.967	2456.2	12.27
12.72	3.048	2471.2	12.28
13.47	3.138	2486.2	12.28
14.26	3.225	2501.2	12.27
15.09	3.317	2516.2	12.28
15.98	3.41	2531.2	12.28
16.92	3.511	2546.2	12.28
17.91	3.61	2561.2	12.29
18.97	3.717	2576.2	12.3
20.08	3.821	2591.2	12.3
21.27	3.934	2606.2	12.3
22.52	4.05	2621.2	12.31
23.84	4.174	2636.2	12.32
25.25	4.302	2651.2	12.32
26.74	4.421	2666.2	12.32
28.31	4.548	2681.2	12.32

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.98	4.675	2696.2	12.32
31.75	4.814	2711.2	12.32
33.63	4.945	2726.2	12.32
35.61	5.098	2741.2	12.32
37.71	5.251	2756.2	12.32
39.94	5.408	2771.2	12.32
42.3	5.567	2786.2	12.32
44.8	5.726	2801.2	12.32
47.44	5.888	2816.2	12.31
50.25	6.053	2831.2	12.31
53.22	6.241	2846.2	12.3
56.36	6.401	2861.2	12.31
59.7	6.586	2876.2	12.31
63.22	6.759	2891.2	12.3
66.96	6.939	2906.2	12.3
70.92	7.124	2921.2	12.3
75.12	7.312	2936.2	12.31
79.56	7.503	2951.2	12.31
84.27	7.703	2966.2	12.3
89.25	7.891	2981.2	12.29
94.53	8.09	2996.2	12.31
100.1	8.284	3011.2	12.3
106.1	8.487	3026.2	12.3
112.3	8.678	3041.2	12.29
119.	8.871	3056.2	12.31
126.	9.077	3071.2	12.3
133.5	9.271	3086.2	12.3
141.4	9.461	3101.2	12.27
149.8	9.644	3116.2	12.28
158.6	9.811	3131.2	12.28
168.	10.01	3146.2	12.28
178.	10.17	3161.2	12.27
188.5	10.36	3176.2	12.28
199.7	10.49	3191.2	12.27
211.5	10.66	3206.2	12.27
224.	10.81	3221.2	12.28
237.3	10.93	3236.2	12.28
251.3	11.06	3251.2	12.3
266.2	11.19	3266.2	12.29
281.2	11.3	3281.2	12.29
296.2	11.38	3296.2	12.29
311.2	11.45	3311.2	12.3
326.2	11.51	3326.2	12.3
341.2	11.57	3341.2	12.31
356.2	11.61	3356.2	12.31
371.2	11.66	3371.2	12.32
386.2	11.7	3386.2	12.32
401.2	11.73	3401.2	12.33
416.2	11.75	3416.2	12.34
431.2	11.77	3431.2	12.34
446.2	11.78	3446.2	12.35
461.2	11.8	3461.2	12.35
476.2	11.81	3476.2	12.36
491.2	11.82	3491.2	12.37
506.2	11.83	3506.2	12.38
521.2	11.85	3521.2	12.39
536.2	11.86	3536.2	12.4
551.2	11.86	3551.2	12.41
566.2	11.88	3566.2	12.41
581.2	11.88	3581.2	12.41
596.2	11.89	3596.2	12.42
611.2	11.89	3611.2	12.42
626.2	11.9	3626.2	12.43
641.2	11.9	3641.2	12.43
656.2	11.91	3656.2	12.43
671.2	11.91	3671.2	12.43
686.2	11.92	3686.2	12.43
701.2	11.92	3701.2	12.44
716.2	11.93	3716.2	12.45

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
731.2	11.93	3731.2	12.45
746.2	11.94	3746.2	12.45
761.2	11.94	3761.2	12.45
776.2	11.94	3776.2	12.46
791.2	11.95	3791.2	12.45
806.2	11.95	3806.2	12.45
821.2	11.96	3821.2	12.46
836.2	11.97	3836.2	12.47
851.2	11.97	3851.2	12.47
866.2	11.97	3866.2	12.48
881.2	11.97	3881.2	12.47
896.2	11.97	3896.2	12.48
911.2	11.98	3911.2	12.48
926.2	11.98	3926.2	12.48
941.2	11.98	3941.2	12.48
956.2	11.99	3956.2	12.49
971.2	11.99	3971.2	12.49
986.2	11.99	3986.2	12.49
1001.2	11.99	4001.2	12.5
1016.2	12.	4016.2	12.5
1031.2	12.	4031.2	12.5
1046.2	12.01	4046.2	12.52
1061.2	12.01	4061.2	12.52
1076.2	12.01	4076.2	12.52
1091.2	12.02	4091.2	12.53
1106.2	12.02	4106.2	12.52
1121.2	12.02	4121.2	12.53
1136.2	12.03	4136.2	12.53
1151.2	12.03	4151.2	12.53
1166.2	12.03	4166.2	12.53
1181.2	12.03	4181.2	12.53
1196.2	12.04	4196.2	12.53
1211.2	12.04	4211.2	12.53
1226.2	12.05	4226.2	12.53
1241.2	12.05	4241.2	12.53
1256.2	12.05	4256.2	12.53
1271.2	12.05	4271.2	12.52
1286.2	12.05	4286.2	12.52
1301.2	12.05	4301.2	12.52
1316.2	12.05	4316.2	12.51
1331.2	12.04	4331.2	12.51
1346.2	12.04	4346.2	12.51
1361.2	12.04	4361.2	12.5
1376.2	12.04	4376.2	12.49
1391.2	12.04	4391.2	12.51
1406.2	12.05	4406.2	12.48
1421.2	12.04	4421.2	12.49
1436.2	12.03	4436.2	12.49
1451.2	12.04	4451.2	12.49
1466.2	12.05	4466.2	12.5

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

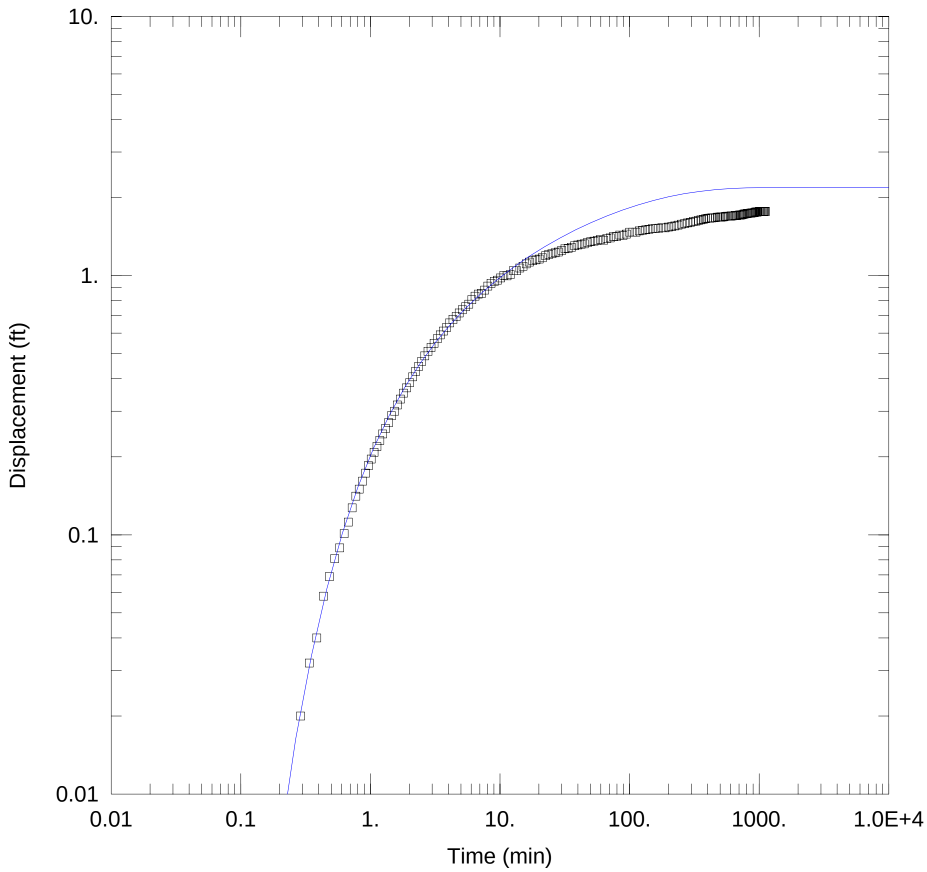
Estimated Parameters

Parameter	Estimate	
T	7607.7	ft^2/day
S	0.001168	
Kz/Kr	0.4481	
b	223.	ft

K = T/b = 34.12 ft/day

APPENDIX D

Upper Floridan APT Curve Matches



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\UFA\Drawdown\ufa-ob_dd_hantush.aqt
Date: 05/01/06 Time: 14:02:26

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport
Test Well: 8" UFA pumped
Test Date: 7-27-2005

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
8" UFA scr	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ 8" Steel OB	130	0

SOLUTION

Aquifer Model: Leaky

Solution Method: Hantush-Jacob

T = 8435. ft^2/day
r/B = 0.08706
b = 285. ft

S = 0.0008037
Kz/Kr = 0.1

Data Set: D:\MyFiles\ROMP 74X\APT data files\UFA\Drawdown\ufa-ob_dd_hantush.aqt
Date: 05/01/06
Time: 14:03:07

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport
Test Date: 7-27-2005
Test Well: 8" UFA pumped

AQUIFER DATA

Saturated Thickness: 285. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: 8" UFA scr

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.33 ft
Wellbore Radius: 0.33 ft

Partially Penetrating Well
Depth to Top of Screen: 0. ft
Depth to Bottom of Screen: 107. ft

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	235.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: 8" Steel OB

X Location: 130. ft
Y Location: 0. ft

Radial distance from 8" UFA scr: 130. ft

Fully Penetrating Well

No. of Observations: 177

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0483	0.	47.43	1.341
0.0967	0.003	50.24	1.352
0.145	0.003	53.21	1.358
0.1933	0.006	56.35	1.367
0.2417	0.009	59.69	1.378
0.29	0.02	63.21	1.37
0.3383	0.032	66.95	1.39
0.3867	0.04	70.91	1.398
0.435	0.058	75.11	1.413
0.4833	0.069	79.55	1.416
0.5317	0.081	84.26	1.433

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.58	0.089	89.24	1.43
0.6283	0.101	94.52	1.447
0.6767	0.112	100.1	1.47
0.725	0.127	106.	1.47
0.7733	0.141	112.3	1.47
0.8217	0.15	119.	1.488
0.87	0.161	126.	1.496
0.9183	0.173	133.5	1.502
0.9667	0.185	141.4	1.508
1.017	0.196	149.7	1.517
1.069	0.208	158.6	1.519
1.125	0.219	168.	1.525
1.184	0.231	177.9	1.531
1.247	0.245	188.5	1.528
1.313	0.257	199.6	1.54
1.384	0.271	211.5	1.545
1.458	0.288	224.	1.554
1.537	0.3	237.3	1.566
1.621	0.317	251.3	1.58
1.709	0.334	266.2	1.589
1.803	0.352	281.2	1.597
1.902	0.369	296.2	1.606
2.008	0.386	311.2	1.617
2.119	0.407	326.2	1.623
2.237	0.427	341.2	1.635
2.362	0.447	356.2	1.641
2.495	0.467	371.2	1.649
2.636	0.49	386.2	1.658
2.784	0.51	401.2	1.664
2.942	0.528	416.2	1.667
3.109	0.548	431.2	1.669
3.285	0.571	446.2	1.672
3.473	0.591	461.2	1.675
3.671	0.611	476.2	1.681
3.881	0.631	491.2	1.681
4.104	0.657	506.2	1.684
4.34	0.678	521.2	1.684
4.59	0.695	536.2	1.687
4.854	0.718	551.2	1.692
5.135	0.738	566.2	1.695
5.431	0.758	581.2	1.695
5.746	0.776	596.2	1.695
6.079	0.807	611.2	1.698
6.432	0.833	626.2	1.701
6.806	0.848	641.2	1.704
7.202	0.853	656.2	1.707
7.621	0.879	671.2	1.704
8.066	0.911	686.2	1.71
8.536	0.934	701.2	1.713
9.035	0.949	716.2	1.713
9.563	0.96	731.2	1.716
10.12	0.98	746.2	1.721
10.71	1.001	761.2	1.727
11.34	0.998	776.2	1.73
12.01	1.009	791.2	1.733
12.71	1.044	806.2	1.736
13.46	1.044	821.2	1.736
14.25	1.07	836.2	1.739
15.08	1.087	851.2	1.741
15.97	1.11	866.2	1.741
16.91	1.127	881.2	1.747
17.9	1.142	896.2	1.747
18.96	1.15	911.2	1.75
20.07	1.159	926.2	1.753
21.26	1.171	941.2	1.759
22.51	1.194	956.2	1.759

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
23.83	1.208	971.2	1.759
25.24	1.214	986.2	1.765
26.73	1.225	1001.2	1.77
28.3	1.234	1016.2	1.765
29.97	1.251	1031.2	1.767
31.74	1.269	1046.2	1.77
33.62	1.274	1061.2	1.767
35.6	1.286	1076.2	1.767
37.7	1.303	1091.2	1.767
39.93	1.312	1106.2	1.77
42.29	1.323	1121.2	1.77
44.79	1.326		

SOLUTION

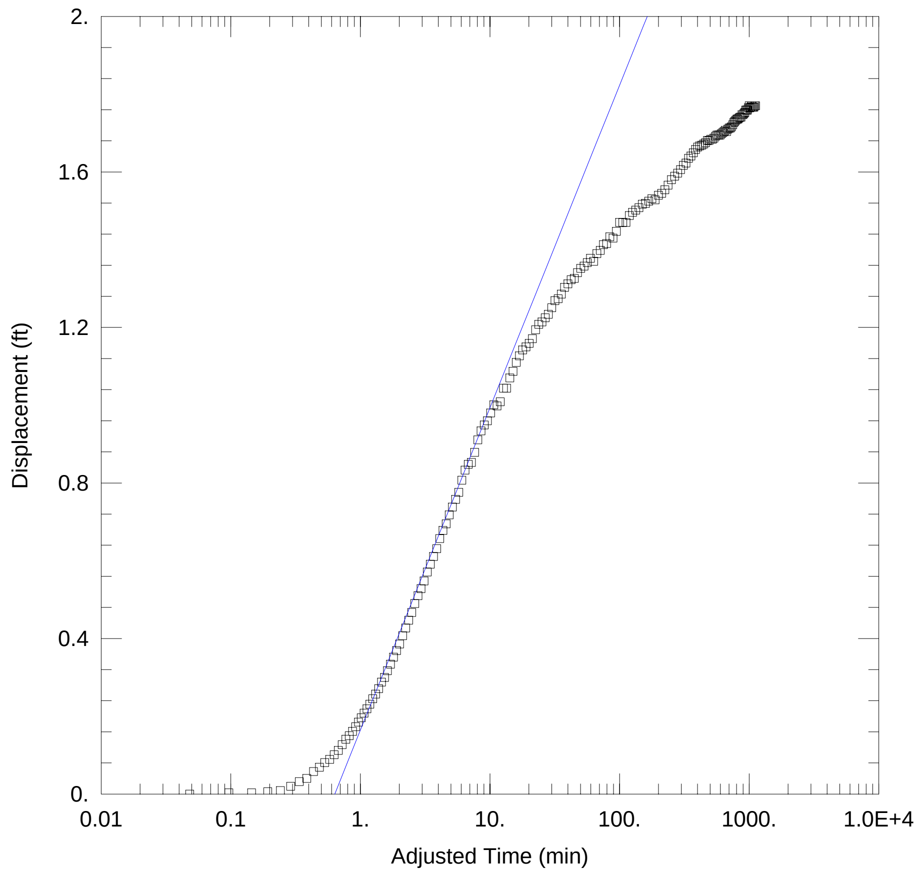
Aquifer Model: Leaky
Solution Method: Hantush-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	8435.	ft^2/day
S	0.0008037	
r/B	0.08706	
Kz/Kr	0.1	
b	285.	ft

K = T/b = 29.6 ft/day



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\UFA\Drawdown\ufa-ob_dd_Cooper-Jacob.aqt
Date: 05/01/06 Time: 14:04:20

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport
Test Well: 8" UFA pumped
Test Date: 7-27-2005

AQUIFER DATA

Saturated Thickness: 285. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW 1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ OW 1	130	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 9993. ft^2/day S = 0.0005855

Data Set: D:\MyFiles\ROMP 74X\APT data files\UFA\Drawdown\ufa-ob_dd_Cooper-Jacob.aqt
Date: 05/01/06
Time: 14:04:59

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport
Test Date: 7-27-2005
Test Well: 8" UFA pumped

AQUIFER DATA

Saturated Thickness: 285. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PW 1

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.33 ft
Wellbore Radius: 0.33 ft

Partially Penetrating Well
Depth to Top of Screen: 0. ft
Depth to Bottom of Screen: 107. ft

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	235.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: OW 1

X Location: 130. ft
Y Location: 0. ft

Radial distance from PW 1: 130. ft

Fully Penetrating Well

No. of Observations: 177

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0483	0.	47.43	1.341
0.0967	0.003	50.24	1.352
0.145	0.003	53.21	1.358
0.1933	0.006	56.35	1.367
0.2417	0.009	59.69	1.378
0.29	0.02	63.21	1.37
0.3383	0.032	66.95	1.39
0.3867	0.04	70.91	1.398
0.435	0.058	75.11	1.413
0.4833	0.069	79.55	1.416
0.5317	0.081	84.26	1.433

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.58	0.089	89.24	1.43
0.6283	0.101	94.52	1.447
0.6767	0.112	100.1	1.47
0.725	0.127	106.	1.47
0.7733	0.141	112.3	1.47
0.8217	0.15	119.	1.488
0.87	0.161	126.	1.496
0.9183	0.173	133.5	1.502
0.9667	0.185	141.4	1.508
1.017	0.196	149.7	1.517
1.069	0.208	158.6	1.519
1.125	0.219	168.	1.525
1.184	0.231	177.9	1.531
1.247	0.245	188.5	1.528
1.313	0.257	199.6	1.54
1.384	0.271	211.5	1.545
1.458	0.288	224.	1.554
1.537	0.3	237.3	1.566
1.621	0.317	251.3	1.58
1.709	0.334	266.2	1.589
1.803	0.352	281.2	1.597
1.902	0.369	296.2	1.606
2.008	0.386	311.2	1.617
2.119	0.407	326.2	1.623
2.237	0.427	341.2	1.635
2.362	0.447	356.2	1.641
2.495	0.467	371.2	1.649
2.636	0.49	386.2	1.658
2.784	0.51	401.2	1.664
2.942	0.528	416.2	1.667
3.109	0.548	431.2	1.669
3.285	0.571	446.2	1.672
3.473	0.591	461.2	1.675
3.671	0.611	476.2	1.681
3.881	0.631	491.2	1.681
4.104	0.657	506.2	1.684
4.34	0.678	521.2	1.684
4.59	0.695	536.2	1.687
4.854	0.718	551.2	1.692
5.135	0.738	566.2	1.695
5.431	0.758	581.2	1.695
5.746	0.776	596.2	1.695
6.079	0.807	611.2	1.698
6.432	0.833	626.2	1.701
6.806	0.848	641.2	1.704
7.202	0.853	656.2	1.707
7.621	0.879	671.2	1.704
8.066	0.911	686.2	1.71
8.536	0.934	701.2	1.713
9.035	0.949	716.2	1.713
9.563	0.96	731.2	1.716
10.12	0.98	746.2	1.721
10.71	1.001	761.2	1.727
11.34	0.998	776.2	1.73
12.01	1.009	791.2	1.733
12.71	1.044	806.2	1.736
13.46	1.044	821.2	1.736
14.25	1.07	836.2	1.739
15.08	1.087	851.2	1.741
15.97	1.11	866.2	1.741
16.91	1.127	881.2	1.747
17.9	1.142	896.2	1.747
18.96	1.15	911.2	1.75
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21.26	1.171	941.2	1.759
22.51	1.194	956.2	1.759

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
23.83	1.208	971.2	1.759
25.24	1.214	986.2	1.765
26.73	1.225	1001.2	1.77
28.3	1.234	1016.2	1.765
29.97	1.251	1031.2	1.767
31.74	1.269	1046.2	1.77
33.62	1.274	1061.2	1.767
35.6	1.286	1076.2	1.767
37.7	1.303	1091.2	1.767
39.93	1.312	1106.2	1.77
42.29	1.323	1121.2	1.77
44.79	1.326		

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	9993.	ft^2/day
S	0.0005855	

K = T/b = 35.06 ft/day

APPENDIX E

Specific Capacity Data and Lower Floridan APT Curve Matches

Estimating Aquifer Transmissivity and Hydraulic Conductivity from Specific Capacity Data

$$T = \frac{Q}{(h_o - h)} \frac{2.3}{4\pi} \log \frac{2.25Tt}{r^2 S}$$

where

$\frac{Q}{(h_o - h)}$	is specific Capacity of the well (L^2/T)
t	is the period of pumping (T)
r	is the radius of the pumping well (L)
T	is the aquifer transmissivity (L^2/T)
S	is the aquifer storativity (d'less)

INPUTS

$\frac{Q}{(h_o - h)}$	=	51	gpm/ft
t	=	1440	min.
r	=	4	in.
T_i	=	20,000	ft^2/d - INITIAL ESTIMATE
S	=	0.00001	d'less - ESTIMATE
b	=	150	ft

OUTPUTS

				Discrepancy
T_1	=	19,069	ft^2/d	4.88%
T_2	=	19,032	ft^2/d	0.20%
T_3	=	19,030	ft^2/d	0.01%
T_4	=	**19,030**	ft^2/d	0.00%
T_4	=	**142,363**	gpd/ft	
K_4	=	**126.9**	ft/d	

Instructions: Complete the "Inputs" using the indicated units. You must enter an initial estimate for the transmissivity and an estimate for storitivity. The calculated transmissivity and hydraulic conductivity are in the "Outputs" section indicted by the subscript 4.

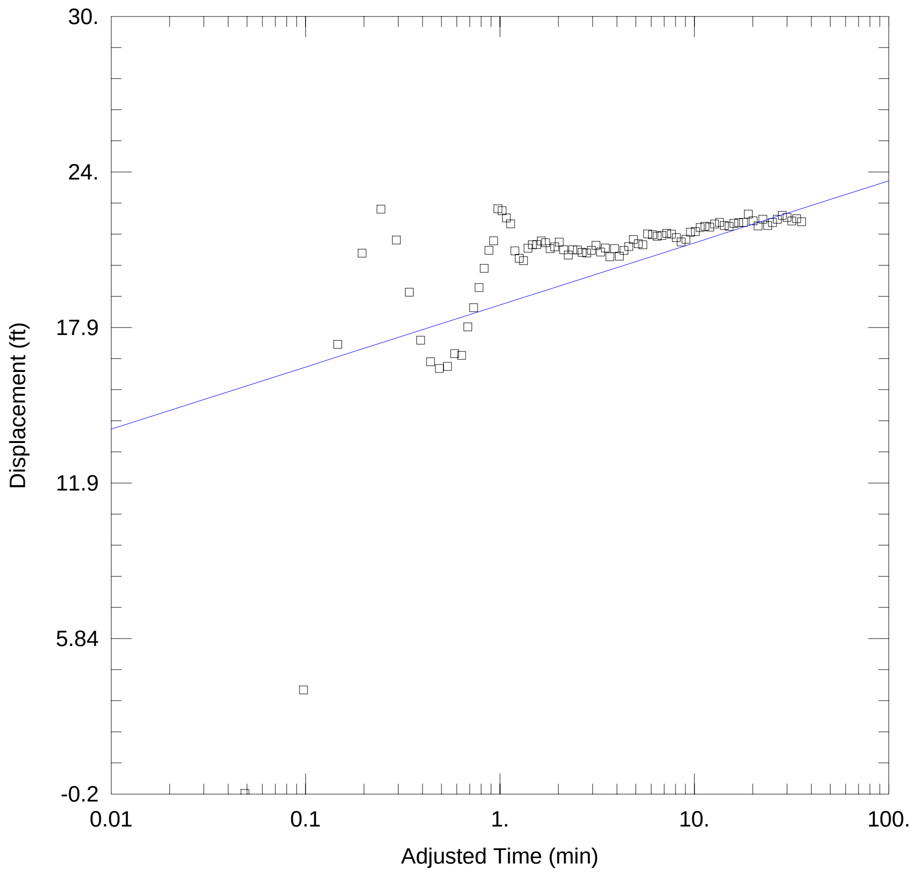
Note: Discrepancy is the ratio of the T_i and T_4. This method may be referred to Herr's Method.

Assumptions: Thies assumptions & pumped well 100% efficient.

Reference: Thies 1963

Storage: well-confined -> 0.00001; semi-confined -> 0.0001; poorly-confined -> 0.001; and unconfinded -> 0.01 - 0.1

Comments: ROMP 74X Lower Florida Aquifer APT drawdown phase performed 7-12-2005 to 7-13-2005. Pumping Rate: 1,015 GPM Drawdown: ~20 feet



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\LFA\Drawdown\dd_cooper-jacob.aqt
Date: 05/01/06 Time: 14:09:10

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport, FL
Test Well: 8" LFA
Test Date: 7-12-2005

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW 1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ PW 1	0.5	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 1.483E+4 ft^2/day S = 1.486E-6

Data Set: D:\MyFiles\ROMP 74X\APT data files\LFA\Drawdown\dd_cooper-jacob.aqt
Date: 05/01/06
Time: 16:35:20

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport, FL
Test Date: 7-12-2005
Test Well: 8" LFA

AQUIFER DATA

Saturated Thickness: 150. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PW 1

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.33 ft
Wellbore Radius: 0.328 ft

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	1014.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: PW 1

X Location: 0.5 ft
Y Location: 0. ft

Radial distance from PW 1: 0.5 ft

Fully Penetrating Well

No. of Observations: 85

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0488	-0.176	3.483	21.01
0.0977	3.845	3.681	20.66
0.1465	17.26	3.891	20.98
0.1953	20.8	4.114	20.69
0.2442	22.51	4.35	20.91
0.293	21.32	4.6	21.06
0.3418	19.29	4.864	21.34
0.3907	17.43	5.145	21.17
0.4395	16.59	5.441	21.13
0.4883	16.33	5.756	21.55
0.5372	16.41	6.089	21.52
0.586	16.91	6.442	21.47
0.6348	16.84	6.816	21.5

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.6837	17.94	7.212	21.58
0.7325	18.69	7.631	21.54
0.7813	19.47	8.075	21.41
0.8302	20.22	8.546	21.24
0.879	20.92	9.045	21.35
0.9278	21.28	9.573	21.62
0.9767	22.52	10.13	21.64
1.027	22.46	10.72	21.8
1.079	22.17	11.35	21.85
1.135	21.94	12.02	21.82
1.194	20.9	12.72	21.93
1.257	20.61	13.47	22.
1.323	20.51	14.26	21.88
1.394	21.	15.09	21.85
1.468	21.13	15.98	21.96
1.547	21.15	16.92	21.98
1.631	21.28	17.91	22.
1.719	21.21	18.97	22.32
1.813	20.98	20.08	22.06
1.912	21.05	21.27	21.86
2.018	21.24	22.52	22.12
2.129	20.94	23.84	21.88
2.247	20.73	25.25	22.
2.373	20.94	26.74	22.12
2.505	20.93	28.31	22.27
2.646	20.84	29.98	22.2
2.794	20.81	31.75	22.06
2.952	20.92	33.63	22.14
3.119	21.11	35.61	22.03
3.296	20.85		

SOLUTION

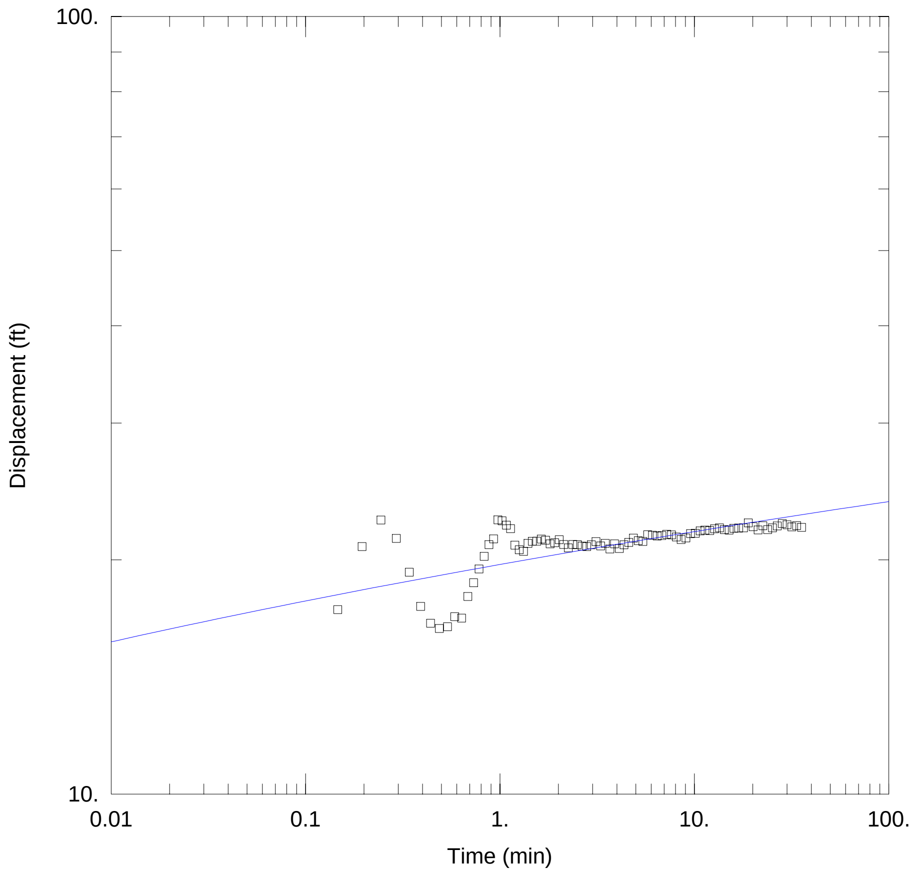
Aquifer Model: Confined
Solution Method: Cooper-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1.483E+4	ft^2/day
S	1.486E-6	

K = T/b = 98.89 ft/day



WELL TEST ANALYSIS

Data Set: D:\MyFiles\ROMP 74X\APT data files\LFA\Drawdown\ddtheis.aqt
Date: 05/01/06 Time: 14:12:40

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport, FL
Test Well: 8" LFA
Test Date: 7-12-2005

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW 1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ PW 1	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.77E+4 ft^2/day
S = 4.39E-8
Kz/Kr = 0.1
b = 150. ft

Data Set: D:\MyFiles\ROMP 74X\APT data files\LFA\Drawdown\ddtheis.aqt
Date: 05/01/06
Time: 14:13:28

PROJECT INFORMATION

Company: SWFWMD
Project: R74X
Location: Davenport, FL
Test Date: 7-12-2005
Test Well: 8" LFA

AQUIFER DATA

Saturated Thickness: 150. ft
Anisotropy Ratio (Kz/Kr): 0.1

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PW 1

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.33 ft
Wellbore Radius: 0.328 ft

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (gal/min)
0.	1014.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: PW 1

X Location: 0. ft
Y Location: 0. ft

Radial distance from PW 1: 0. ft

Fully Penetrating Well

No. of Observations: 85

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0488	-0.176	3.483	21.01
0.0977	3.845	3.681	20.66
0.1465	17.26	3.891	20.98
0.1953	20.8	4.114	20.69
0.2442	22.51	4.35	20.91
0.293	21.32	4.6	21.06
0.3418	19.29	4.864	21.34
0.3907	17.43	5.145	21.17
0.4395	16.59	5.441	21.13
0.4883	16.33	5.756	21.55
0.5372	16.41	6.089	21.52
0.586	16.91	6.442	21.47
0.6348	16.84	6.816	21.5

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.6837	17.94	7.212	21.58
0.7325	18.69	7.631	21.54
0.7813	19.47	8.075	21.41
0.8302	20.22	8.546	21.24
0.879	20.92	9.045	21.35
0.9278	21.28	9.573	21.62
0.9767	22.52	10.13	21.64
1.027	22.46	10.72	21.8
1.079	22.17	11.35	21.85
1.135	21.94	12.02	21.82
1.194	20.9	12.72	21.93
1.257	20.61	13.47	22.
1.323	20.51	14.26	21.88
1.394	21.	15.09	21.85
1.468	21.13	15.98	21.96
1.547	21.15	16.92	21.98
1.631	21.28	17.91	22.
1.719	21.21	18.97	22.32
1.813	20.98	20.08	22.06
1.912	21.05	21.27	21.86
2.018	21.24	22.52	22.12
2.129	20.94	23.84	21.88
2.247	20.73	25.25	22.
2.373	20.94	26.74	22.12
2.505	20.93	28.31	22.27
2.646	20.84	29.98	22.2
2.794	20.81	31.75	22.06
2.952	20.92	33.63	22.14
3.119	21.11	35.61	22.03
3.296	20.85		

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1.77E+4	ft^2/day
S	4.39E-8	
Kz/Kr	0.1	
b	150.	ft

K = T/b = 118. ft/day