Executive Summary
TR14-3 "Countryside Park"
T28S, R16E, S.31

July 24, 1985

G. L. Henderson
J. L. Decker

I. GENERAL DESCRIPTION

The TR14-3 well site is located approximately 2.3 miles east of the city of Dunedin in Pinellas County, Florida. The well site can be found by proceeding approximately 0.6 miles east on S.R. 580 from its intersection with U.S. 19 (near Countryside Mall); turning north onto the Florida Power utilities' easement from S.R. 580, then proceeding north on this dirt trail approximately 1,000 feet. The well site can be found adjacent to the eastern side of the Florida Power easement. The TR14-3 well site encompasses a 20' x 20' perpetual easement within a construction area of 100' x 100', which is part of the Countryside Community Park.

The TR14-3 well site is located in NW 1/4 of SW 1/4 of NW 1/4 of Section 29, Township 28 South, Range 16 East; at latitude 28°01'18" North, longitude 82°43'45" West.

II. REASONS FOR MONITOR

The primary objectives of these monitor wells are: acquire water level data in the surficial sand and upper Floridan Aquifer System, determine the extent of horizontal migration of saline waters by the channeling effect described in Pinellas County, monitor the production zone in the Tampa and upper Suwannee Formations (permeable Zone A in Floridan Aquifer System), and collecting hydrogeological data relating to saltwater intrusion due to municipal, industrial, and domestic pumpage in the Countryside area.

These ROMP monitor wells are designed to emulate several City of Clearwater and City of Dunedin wells that are or will be constructed in the near future. Most of these city wells along with the TR14 and TR13 series' wells will

monitor the same hydrogeologic zones. All these wells establish a much needed network of data points that can be used to more accurately define the geology, hydrology, and extent of salt-water intrusion in the northern half of Pinellas County.

III. GEOLOGY

The TR14-3 well site is located on the Wicomico Terrace at an elevation of 95.6 feet above MSL. The TR14-3 well site is located on the highest coastal terrace in Pinellas County.

The TR14-3 well site was cored to a total depth of 429 feet below LSD (333.4 feet below MSL) in order to gather the lithologic and hydrologic data needed for designing the monitor wells designated for this well site. The stratigraphic sequence described below was interpreted utilizing geophysical logs and core descriptions.

DEPTH IN FEET BELOW LSD	STRATIGRAPHIC UNIT (AGE)	LITHOLOGIC DESCRIPTION
LSD - 47.0'	TERRACE SANDS (Pleistocene)	Sand = yellowish gray - yellowish brown, fine-coarse grained, subangular to rounded, frosted quartz sands, trace organics, moderate-high porosity.
47.0' - 116.6'	HAWTHORN FORMATION (Miocene)	Clay = grayish green-yellowish brown, sandy-marly, sticky clay, low-moderate porosity; trace black phosphatic sands; trace yellowish gray dolomite lenses, very low porosity.
116.6' - 260.0'	TAMPA FORMATION (Miocene)	Limestone = pale orange - yellowish sandy-clayey, chalky-sticky, bio-micrite,low-high porosity; some pale green-grayish green clay lenses or seams, low porosity; trace greenish gray-bluish gray, very fine-microcrys-

		microcrystalline, dolomite seams, very low porosity.
260.0' - 429.0'	SUWANNEE FORMATION	Limestone = pale orange - yellowish gray, some light olive gray, chalky-friable, millioloidal biomicrite, trace of thin, organic clay seams, moderate-high porosity; some grayish green-yellowish gray to dark yellowish brown, slightly calcareous clay, low porosity.

Suites of geophysical logs were completed on the test corehole and the dual zone/Floridan Monitor. Caliper, gamma ray, electric (spontaneous potential, single point resistivity), fluid conductivity and temperature logs were completed, interpreted and correlated with lithologic descriptions to a depth of 325'.

IV. HYDROGEOLOGY

Two aquifers were identified at the TR14-3 well site, the Surficial Aquifer (water table) and the Floridan Aquifer System (See Figure I).

The Surficial Aquifer extends from LSD to the first bedded clay at approximately 47 feet below LSD. It is expected that the water table wll be within 8 feet of land surface. The following parameters were taken from Appendix B - Summary of Aquifer Parameters for Pinellas County in the "Interim Report I: Pinellas County Saltwater Modeling Project" prepared by GeoTrans for the Southwest Florida Water Management District. For the Surficial Aquifer; transmissivity (T) was calculated to be between 200 ft^2/d and 6700 ft^2/d by Spechler (1983), vertical hydraulic conductivity (K_v) was estimated by Hickey (1980) at 0.36 ft/d to 13 ft/d (avg. 2.6 ft/d), and horizontal hydraulic conductivity (K_h) was estimated at 33 ft/d by Hickey (1980). The unconsolidated sands of this aquifer are quite porous and permeable. Due to the sensitivity of this aquifer to varying precipitation and pumpage rates, it is expected that the water level will fluctuate considerably in the water table monitor well.

The confining bed between the Surficial Aquifer and the Floridan Aquifer System is primarily composed of gray-green, sandy-marly clay with some thin dolomite lenses. This confiner extends from approximately 47' to 116.6' below LSD. This encompasses the entire Hawthorn Formation. This material is expected to be an adequate confiner locally but may be leaky or missing in its lateral extent. The following parameters were taken from Appendix B in the "Interim Report I" by Geo Trans. The vertical hydraulic conductivity (K_v) for this Hawthorn confining unit is estimated at 2×10^{-2} ft/d by Hutchinson (1983), 3×10^{-3} ft/d by Rosentein and Hickey (1977), and 1.3×10^{-4} ft/d by Hickey (1980). These values being orders of magnitude apart illustrate the variability of K_v for this confiner and/or they illustrate the difficulty in determining an accurate K_v.

As per John J. Hickey in the USGS Water-Supply Paper #2183 the Floridan Aquifer in Pinellas County "includes permeable parts of the Hawthorn Formation that are in hydrologic contact with the rest of the aquifer, and all or parts of the Tampa Limestone, Suwannee Limestone, Ocala Limestone, Avon Park Limestone, and Lake City Limestone." The core at TR 14-3 demonstrated no hydrologic contact between the Hawthorn Formation and the Floridan Aquifer System, therefore, for this site the top of the Floridan Aquifer and the top of the Tampa Formation are coincident.

The core at TR14-3 went to a total depth of 429 feet below LSD, into the Suwannee Limestone. The Ocala Limestone, Avon Park Limestone, and Lake City Formation were not penetrated. As discussed in the USGS Water-Supply Paper #2183 there are four permeable zones in the Floridan Aquifer System in Pinellas County, Zones A, B, C, and D from top to bottom. Only Zone A and a small portion of the semiconfiner between Zones A and B were penetrated in this corehole (See Figure I).

Permeable Zone A includes the entire Tampa Formation and the upper Suwannee Formation and extends from about 116.6'-409' below LSD (21'-313.4' below MSL) at this well site. The major water producing interval in Zone A was found from 220'-409' below LSD (124.4'-313.4' below MSL). Estimated porosities from core samples in Zone A range from about 5% to 35%. From the USGS

Paper #2183, Hickey (1982) calculated transmissivity to be 2.5-3.0 x 10^4 ft^2/d while Spechler (1983) in the GeoTrans "Interim Report I" estimated transmissivity to be 2.2-7.4 x 10^4 ft^2/d. Hickey (1980) in the "Interim Report I" calculated horizontal hydraulic conductivity (K_h) to be 167 ft/d.

Water throughout the Tampa Formation at TR14-3 was considered potable as far as chlorides and sulfates were concerned (less than 250 mg/l). Water levels fluctuated during the coring operation from 87.7' to 89.4' below LSD in the Tampa Formation. Differences in static level may be attributed to tidal effects.

The upper Suwannee Formation (bottom of permeable Zone A) had potable water to the approximate depth of 349' below LSD, where upon water quality rapidly deteriorated. Specific conductivity rose from 460 Umhos (349' depth) to 1200 Umhos (359' depth) and chloride values rose from 22 mg/l to 255 mg/l. Sulfate values did not change and remained the same as those values (1-9 mg/l), found earlier in the Tampa Formation. Water levels fluctuated during the coring operation from 87.5' to 89.1' below LSD in the Suwannee Formation. Difference in static level may be attributed to tidal effects.

Following the drilling of the dual zoned Floridan Monitor and before the 4" monitor tube and the well screen were inserted into the well, two water samples were retrieved at a depth of 145' and 320' below LSD. The specific conductivities were 179 Umhos and 260 Umhos respectively. The chlorides for both depths were 13 mg/l. The sulfate value at 145' below LSD was 9 mg/l, while the sulfate value at 320' below LSD was 8 mg/l.

Temperatures while coring ranged between 22_oC - 25^oC, while the two thief sample temperatures were 26^oC and 26.5^oC respectively.

Two months following the completion of the dual zoned monitor and the water table monitor, water level measurements were taken. The Tampa Monitor (upper open hole monitor) indicated a water level of 86.45' below LSD, while the Suwannee monitor (4" dia. monitor) indicated a water level of approximately 86.4 below LSD. The water level measurement for the surficial water table monitor was 2.7' below LSD.

The semiconfiner between permeable Zones A and B, the Suwannee semiconfiner, was composed of limestone (calcarenite) with some clay laminations. This semiconfiner was partially penetrated by the corehole and extends from approximately 409'-429' (total depth) below LSD at the TR14-3 wellsite. K_v from the "Interim Report I" by GeoTrans for this semiconfiner was estimated to be 1.3 x 10^{-3} ft/d to 2.5 ft/d (avg. 0.6 ft/d) by Hickey (1980) and 1 x 10^{-2} ft/d to 1 x 10^{-1} ft/d by Hickey (1982) from the USGS Water-Supply Paper #2183. These vertical hydraulic conductivity values illustrate the probable lateral variability of the Suwannee semiconfiner. Estimated porosities from core samples in this zone ranged from about 5% to 15%. Overall, average permeability for this zone was found to be low.

V. Well Construction

A deep, dual zone monitor and a shallow water table monitor were constructed at the TR14-3 wellsite. The two monitor wells were constructed in the following manner.

For the deep dual zoned Floridan monitor a 15" nominal borehole was drilled to a depth of 125' below LSD using mud rotary drilling techniques. A 10" PVC casing was then set (+2' to 125') and cemented to land surface. After the grout set, drilling was resumed with a 9 5/8" bit to drill a 10" nominal borehole from 125' to 325' below LSD.

A full suite of geophysical logs was completed before setting the 4" diameter PVC monitor tube.

A 4" dia. PVC footer extended from 325' to 319' below LSD to be utilized as a sediment trap. This section of PVC was coupled to a 4" dia. PVC well screen (.030") with an interval of 20' between 299' and 319' below LSD. The well screen was coupled to 301' of 4" dia. monitor tube extending from 299' below LSD to 2' above LSD. Silica sand (6-20 type) was inserted into the well's annulus from a depth 325' to 289' below LSD. The well was then cement grouted from 289' to 176' below LSD. The 4" dia. tube is monitoring the lower portion of permeable Zone A for any potentiometric or water quality changes. The open-hole interval from 176' to 125' below LSD will monitor the upper portion of permeable Zone A

for any potentiometric changes.

The shallow water table monitor was drilled to a depth of 30' below LSD with a 9 5/8" bit using mud rotary drilling techniques. Approximately 20' of 6" PVC (0.030" slot) well screen (10'-30' below LSD) was coupled to 12' of 6" PVC casing (+2'to 20') and inserted in the borehole. The well's annulus from 30' to 2' below LSD was sand-packed utilizing (6-20 type). The remainder of the well's annulus from -2' below LSD to land surface was cement grouted.

Both the dual zoned Floridan monitor and the shallow water table monitor were developed and/or pumped until the discharge water was clean. The wells were injected with a solution of HTH (5% chlorine). A steel casing was placed around each well to protect the 10" and 6" PVC casings against vandalism.

Outside Sources Used:

GeoTrans, Inc., June 5, 1984; Preliminary Conceptual Model and Analysis of Existing Data, Interim Report I: Pinellas County Saltwater Modeling Project.

A. E. Gilboy, 1983; Pinellas County Geologic Section Map, Southwest Florida Water Management District.

John J. Hickey, 1982; Hydrogeology and Results of Injection Tests at Waste-Injection Test Sites in Pinellas County, Florida, United States Geological Survey Water-Supply Paper #2183.

R. c. Health/P. C. Smith, 1954; Groundwater Resources of Pinellas County, Florida, Florida Bureau of Geology, Reports of Investigations #12.

GLH:cwpah

COMP TR 14-3 (COUNTRYSIDE PARK)

AS-BUILT
WELL DESIGN DIAGRAMS