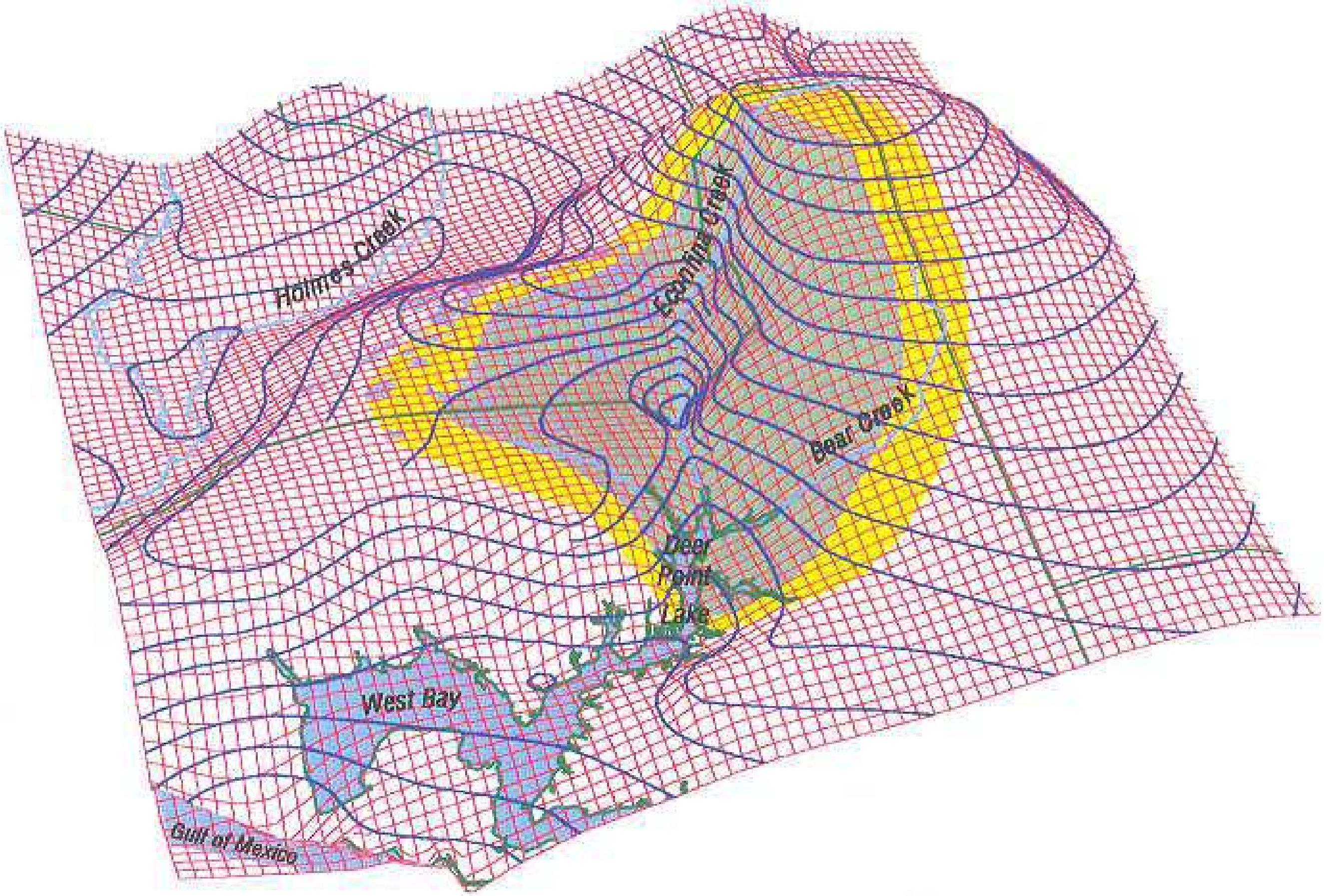
DELINEATION OF THE FLORIDAN AQUIFER ZONE OF CONTRIBUTION FOR ECONFINA CREEK AND DEER POINT LAKE BAY AND WASHINGTON COUNTIES, FLORIDA



NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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DELINEATION OF THE FLORIDAN AQUIFER ZONE OF CONTRIBUTION FOR ECONFINA CREEK AND DEER POINT LAKE

BAY AND WASHINGTON COUNTIES, FLORIDA

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Northwest Florida Water Management District
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ACKNOWLEDGEMENTS

The Northwest Florida Water Management District (District) gratefully acknowledges Rosewood Timber Company and Mr. George Eubanks, Manager, for their full support of this project, including providing access to their lands for the purpose of test well construction. The author also acknowledges the scores of property owners and public supply water system managers who allowed District personnel access to their wells for data collection. In addition, the professionalism exhibited by Brown Well Company during the construction of the test wells is much appreciated. Finally, the project oversight by Tom Pratt, Chief—Bureau of Ground Water, and his many thoughtful suggestions were most helpful throughout the duration of this project. The report was prepared under the general supervision of Ronald L. Bartel, Director—Division of Resource Management.

INTRODUCTION

Deer Point Lake currently supplies, on average, 45 million gallons per day (Mgal/d) of water to various public supply and industrial water systems in Bay County. Bay County is reliant on Deer Point Lake as a primary source of water due to inadequate ground-water resources in the coastal portions of the county. In the more developed coastal area of Bay County, the Floridan Aquifer is not capable of providing withdrawals sufficient to meet the local demand. For this reason, Deer Point Lake is a critically-important water supply for Bay County. Because of this use as a potable supply source, Deer Point Lake and its tributaries are designated Class I waters. The use of water withdrawn from Deer Point Lake is equally split between public supply and industrial uses.

The source of water flowing into Deer Point Lake is a combination of ground-water discharge and surface-water runoff. The Floridan Aquifer discharges large amounts of ground water to Econfina Creek. This ground-water discharge is concentrated along the middle reach of the Econfina Creek, near Highway 20, where numerous springs occur. Surface runoff, which is the result of storm events within the Deer Point Lake basin, also contributes inflow to Deer Point Lake. Under base-flow conditions, the flow of the Econfina Creek into Deer Point Lake is approximately 500 cubic feet per second (cfs) or 300 Mgal/d. The Floridan Aquifer is the source of much of this flow. Spring discharge from the aquifer contributes roughly 200 Mgal/d to the base flow of the Econfina Creek.

The area immediately west of the middle Econfina Creek, including southern Washington and northern Bay counties, locally known as the Sand Hill Lakes area, is characterized by karst topography, closed surface-water drainage basins and very sandy soils. These types of geologic features indicate high ground-water recharge potential and, when combined with the local hydrology, show this area to be a significant ground-water recharge area, which directly contributes to the spring discharge to Econfina Creek and Deer Point Lake.

The Northwest Florida Water Management District has identified acquisition of lands along Econfina Creek as a priority. The Econfina acquisition project includes both the stream corridor and adjacent uplands. Uplands purchases are intended, primarily, to preserve the function of these areas as a source of clean, plentiful recharge to the Floridan Aquifer, to Econfina Creek and, ultimately, to Deer Point Lake and the Bay County public water supply system. To date, approximately 8,300 acres lying along the stream corridor have been acquired. An additional 48,000 acres (primarily uplands) have been identified as a priority for acquisition.

Purpose and Scope

Due to the large amount of ground water discharged from the Floridan Aquifer along the middle stretch of the Econfina Creek, protecting the water quality of Deer Point Lake requires the protection of the Floridan Aquifer recharge area. The purpose of this study is to delineate the area where the Floridan Aquifer flows toward and discharges to Econfina Creek. Of particular interest is the location of the ground-water divide which separates the portion of the Floridan Aquifer contributing flow to Econfina Creek from the portion contributing flow to Holmes Creek. This will allow the Northwest Florida Water Management District to effectively target efforts to protect this vital recharge area.

The delineation of the Econfina Creek recharge area requires an accurate determination of the potentiometric surface of the Floridan Aquifer. The potentiometric surface map forms the basis for determining the location of ground-water divides, establishing ground-water flow directions, and helps identify the local discharge areas for the Floridan Aquifer. Accurate determination of the potentiometric surface is enhanced by measuring water levels in as many Floridan Aquifer wells as is practical and establishing good location and elevation data for these wells.

The scope of this project includes a test well drilling program designed to better define the hydrostratigraphy of the area and allow improved definition of the aquifer's potentiometric surface. In addition, a numerical model was developed to examine the relative importance of the Sand Hill Lakes region as a recharge area for the Econfina Creek/Deer Point Lake system.

Description of the Study Area

Deer Point Lake is located in the central portion of Bay County in northwest Florida (Figure 1). The study area encompasses the Deer Point Lake surface-water drainage basin and the area which contributes ground-water inflow to Deer Point Lake or its tributaries. In order to determine the location of areas which contribute ground-water discharge to Deer Point Lake, the study area also extends to adjacent major ground-water discharge areas including Holmes Creek, Chipola River and the Gulf of Mexico.

The Deer Point Lake basin lies in two major physiographic regions. The southernmost portion of the basin is situated in the Coastal Lowlands while the central and northern portions of the basin are situated in the southernmost extent of the Dougherty Karst physiographic district (Brooks, 1981). The Deer Point Lake basin includes three distinct physiographic subregions which include the Sand Hills in the northern portion of the basin, the sinks and lakes (Sand Hill Lakes) in the central portion of the basin and the Flatwood Forests in the southern portion of the basin (NWFWMD, 1988). The physiography of the basin developed on a series of marine terraces and wave-cut bluffs formed by the successive rise and fall of sea level.

The Sand Hills subregion occupies the higher marine terraces in the northern portion of the basin. The Sand Hill Lakes subregion is situated mostly west of the middle Econfina Creek in northernmost Bay and southern Washington counties. In this subregion, the dissolution of the underlying limestone and collapse of the overlying sand hills formed numerous sinkholes and sinkhole lakes. Much of this area is internally drained and exhibits no surface-water outlets. The Flatwood Forests physiographic subregion is found in the southern portion of the Deer Point Lake basin and consists of rolling to flat land situated on terraces with elevations less than 70 feet (ft) in elevation (Musgrove et al., 1965).

Moderately well-drained to excessively well-drained soils are typical within the Deer Point Lake basin. In the Sand Hill area of the basin (northern and central portions) excessively well-drained soils are common, while in the Flatwood Forests subregion, moderately well-drained to somewhat poorly-drained soils with a locally high water table are more typical.

The climate of the study area is humid, subtropical with the an average annual temperature of 68° F. The average annual rainfall is 58 inches (Schmidt and Clark, 1980).

Deer Point Lake Watershed

Deer Point Lake was formed in 1961 by impounding the upper portion of a brackish estuary known as North Bay. Freshwater inflow, primarily from Econfina Creek, quickly displaced the brackish water establishing Deer Point Lake as a freshwater reservoir. Bear Creek, Bayou George and Cedar Creek also contribute flow into the reservoir. Deer Point Lake covers 4,700 acres (Musgrove et al., 1965).

The Deer Point Lake watershed covers about 442 square miles (mi^2) (NWFWMD, 1988). Most of the watershed is situated in Bay and Washington counties, with small portions of the watershed located in adjacent areas of Jackson and Calhoun counties. Figure 2 shows the extent of the Deer Point Lake watershed.

Musgrove et al. (1965), compared the average flow and the low flow of the four largest creeks which discharge into Deer Point Lake (Table 1). The flow data for the three smaller tributaries were "estimated from short-term continuous discharge records or from periodic discharge measurements." Although not explicitly defined, Musgrove et al.'s "low flow" data clearly lie within the drier part of the flow regime. For comparison, recent USGS analysis of the entire 50-year period of record for the Econfina Creek shows an annual mean flow of 542 cfs, a Q_{90} flow of 404 cfs, and a seven-day minimum flow of 308 cfs (Franklin and Meadows, 1994). Q_{90} is the flow exceeded 90 percent of the time. Both the Musgrove et al. and the more recent USGS data were collected where State Highway 388 crosses Econfina Creek.

Based on Musgrove et al.'s data, Econfina Creek contributes approximately 58 percent of the average annual streamflow going into Deer Point Lake. Bear Creek also contributes substantial amounts of flow to Deer Point Lake providing about 36 percent of the annual flow. Bayou George and Big Cedar Creek provide considerably less input to the lake. Several smaller tributaries contribute minor amounts of flow into Deer Point Lake. In addition, ground water discharging directly to Deer Point Lake also contributes minor amounts of water.

Table 1. Drainage Area and Flow of Subbasins within the Deer Point Lake Watershed.

Creek Basin	Drainage Area (mi^2)	Average Flow Mgal/d (cfs)	Low Flow Mgal/d (cfs)
Econfina Creek	129	355 (549)	226 (350)
Bear Creek	128	226 (350)	52 (80)
Bayou George	51	26 (40)	2 (3)
Big Cedar Creek	62	12 (19)	4 (6)

Note: (Modified from Musgrove et al., 1965)

During low-flow (base flow) conditions, the relative contributions from these creeks change considerably. Under low-flow conditions, the portion of flow contributed by the Econfina Creek increases to almost 80 percent while the contribution of Bear Creek decreases to 18 percent. Under low-flow conditions, Bayou George and Big Cedar Creek together contribute about 2 percent of the streamflow into Deer Point Lake.

The high base flow of the Econfina Creek is attributable to significant ground-water discharge which occurs at several large springs along the middle Econfina Creek near Highway 20. In this area, the Econfina Creek has eroded into and exposed the Floridan Aquifer, thus resulting in the formation of numerous springs along the creek. The springs include Gainer Springs, one of 27 first-magnitude springs in Florida. By definition, first-magnitude springs have a discharge of at least 64.6 Mgal/d (greater than 100 cfs). Base-flow rates along the upper Econfina Creek (above Walsingham Bridge) are more typical for northwest Florida. In this area, base flow is the result of diffuse discharge from the Surficial Aquifer System.

The Econfina Creek watershed, for the most part, lies in the Sand Hills and Sand Hill Lakes subregions. The excessively drained, deep sandy soils, combined with the internal drainage associated with closed basins, give rise to much higher than typical base-flow rates for Econfina Creek. Bear Creek and Big Cedar Creek watersheds lie partially within the Sand Hills subregion and partially within the Flatwood Forests subregion. Bayou George basin lies within the Flatwood Forests subregion. These three creeks exhibit base-flow rates more typical of northwest Florida.

Given an estimated average annual flow of 619 Mgal/d into Deer Point Lake, and assuming spring flow contributes about two-thirds of the total flow of Econfina Creek (Musgrove et al., 1965), Floridan Aquifer discharge via springs along the middle Econfina Creek likely contributes 35 to 40 percent of the total flow into Deer Point Lake. Due to the high base flow of Econfina Creek, which is attributable to discharge from the Floridan Aquifer, an understanding of the ground-water system is essential in any effort to protect the water quality of Deer Point Lake.

HYDROGEOLOGY OF THE DEER POINT LAKE BASIN

Within the study area, four hydrogeologic units define the regional ground-water-flow system. In descending order from land surface these units are the Surficial Aquifer System, the Intermediate System, the Floridan Aquifer System and the Sub-Floridan System. The Surficial Aquifer System and the Floridan Aquifer System are composed of moderately to highly-permeable sediments, capable of transmitting and storing large quantities of water. The Intermediate System and the Sub-Floridan System are primarily composed of low-permeability sediments and form regionally-extensive confining units which serve to restrict the vertical flow of ground water. The age of the sediments comprising the ground-water-flow system ranges from Paleocene to Holocene (Pratt et al., 1996).

The Surficial Aquifer System consists of unconsolidated, quartz sand ranging in age from Pliocene to Holocene. Ground water within the Surficial Aquifer System exists, for the most part, under unconfined conditions. The thickness of the Surficial Aquifer generally ranges from 40 to 80 ft in southern and central Bay County to 0 to 40 ft further north within the study area. In central and southern Bay County, the saturated thickness and permeability of the surficial sands are sufficient to form a locally-important source of ground water typically utilized for lower volume, non-potable uses. Elsewhere, lower permeability and smaller saturated interval greatly restricts the use of the Surficial Aquifer System as a significant water-supply source.

The Intermediate System is defined as all sediments that collectively retard the exchange of water between the overlying Surficial Aquifer System and the underlying Floridan Aquifer System. It consists primarily of fine-grain clastic sediments which exhibit low permeability as compared to either the Surficial Aquifer System or the Floridan Aquifer. In the southern portion of the study area, particularly Bay County, carbonate beds and/or coarse-grain clastic sediments are interbedded with the fine-grain clastic sediments forming minor aquifers within the Intermediate System.

The Intermediate System is Middle Miocene to Upper Pliocene in age. It includes several different stratigraphic formations including the Jackson Bluff Formation, Chipola Formation, Alum Bluff Group and the Intracoastal Formation. In the northern portion of the study area (northernmost Washington, Holmes and Jackson counties), the Intermediate System consists primarily of weathered limestone residuum. The Chipola Formation is found over much of the central and eastern portions of the study area. The Jackson Bluff Formation and Alum Bluff Group are found throughout much of the southern and central portions of the study area while the Intracoastal Formation is found in the southern portion of the study area, generally south of the Bay/Washington county line.

Throughout the Econfina Creek basin and to the north of the basin, the thickness of the Intermediate System generally ranges from less than 50 ft to approximately 100 ft. The Intermediate System thickens to the south where the Intracoastal Formation occurs. In coastal Bay County, the Intermediate System reaches a thickness of 200 to 300 ft. Figure 3 shows the thickness of the Intermediate System.

The Floridan Aquifer System occurs throughout the study area and consists of a carbonate sequence of sediments of varying permeability. The age of the Floridan Aquifer System ranges from Upper Eocene to Middle Miocene. Included in the Floridan Aquifer are the Bruce Creek Limestone, Chattahoochee Formation, Suwannee Limestone and the Ocala Limestone.

Across the study area, the top of the Floridan Aquifer System dips to the south, ranging from over 100 ft above sea level near the Alabama border to more than 300 ft below sea level in coastal areas of Bay County. Throughout most of the Econfina Creek basin, the elevation of the top of the Floridan Aquifer System ranges from 50 ft above to 50 ft below sea level. The thickness of the aquifer ranges from as little as 100 ft along the Alabama state line to over 700 ft in Bay County. In the Econfina Creek basin, the Floridan Aquifer is approximately 500 to 600 ft thick.

The Sub-Floridan System consists of low-permeability sediments which form the base of the Floridan Aquifer System. The Sub-Floridan System is Middle Eocene in age and includes the Lisbon and Tallahatta formations. In the northern portion of the study area, carbonate beds of relatively low permeability form the Claiborne Aquifer which is included within the Sub-Floridan System. The top of the Sub-Floridan System ranges from near sea level along the Florida/Alabama state line to over 1,000 ft below sea level in coastal Bay County.

Floridan Aquifer Ground-Water Availability

Ground-water availability of the Floridan Aquifer System is quite variable across the study area and is a function of aquifer permeability, thickness of the aquifer, proximity to poor-quality water and aquifer recharge rates. Permeability of the Floridan Aquifer is, in general, related to the thickness and permeability of the Intermediate System and aquifer recharge rates. Where the Intermediate System is relatively thin and permeable, higher aquifer recharge rates generally occur. In areas where recharge rates are relatively high, development of secondary porosity within the Floridan Aquifer is enhanced, resulting in a substantial increase in aquifer permeability.

Although the Floridan Aquifer is quite thick in the coastal portion of Bay County, low recharge rates, low permeability and the proximity of saline water both within and above the Floridan Aquifer result in low to moderate ground-water availability. In this area, the productivity of the Floridan Aquifer is insufficient to meet the demand of the more populated coastal region and currently serves as a very important secondary source of potable water. Inland throughout northern Bay and Washington counties, where permeability and recharge rates are higher, the aquifer has the capability to meet the current and anticipated future demand and is the primary source of potable water supply.

In the early 1960s, ground-water withdrawals from the Floridan Aquifer in the coastal portion of Bay County ranged between 15 and 20 Mgal/d (Musgrove et al., 1965). This level of withdrawal resulted in water-level drawdowns exceeding 125 ft near the pumping centers and gave rise to concerns of saltwater intrusion. During this time, Deer Point Lake was developed as a potable and industrial water source and became the primary source of water for southern Bay County, greatly reducing the demands on the Floridan Aquifer. Since that time, however, use of the Floridan Aquifer in the coastal area has again increased, resulting in renewed aquifer drawdown. This has raised new concerns regarding the ability of the Floridan Aquifer to provide for ever-increasing withdrawal rates noted over the past two decades and restates the importance of Deer Point Lake as the primary source of water for the area.

Recharge, Discharge and Movement of Ground Water

Recharge to the Floridan Aquifer System originates as rainfall. Depending on the soil and vegetation type and the slope of the land surface, a portion of the rainfall percolates into the Surficial Aquifer. Ground-water flow within the Surficial Aquifer is either horizontal, towards a perennial or intermittent stream, or vertical, leaking through the Intermediate System and recharging the Floridan Aquifer. In limited areas where the Floridan Aquifer exists under unconfined conditions and the Surficial Aquifer is not present, rainfall can percolate through the soils and directly recharge the Floridan Aquifer System.

Recharge to the Floridan Aquifer is dependent on several factors. These factors are: 1) the hydraulic head or water level within the Surficial Aquifer System; 2) the vertical hydraulic conductivity of the Intermediate System; 3) the thickness of the Intermediate System and; 4) the hydraulic head or water level within the Floridan Aquifer System. The actual rate of recharge for a given area is determined by the following equation.

$$Q = \frac{k' A(h_S - h_F)}{L}$$

Q is flow (ft^3/d) (recharge rate)
k' is vertical hydraulic conductivity of the Intermediate System
h_S is the head or water level within the Surficial Aquifer System
h_F is the head or water level within the Floridan Aquifer System
L is the length of the flow path (thickness of the Intermediate System)
A is the geographical area of interest

From this equation it is evident that recharge into the Floridan Aquifer occurs whenever $h_S > h_F$, that is, whenever the head in the Surficial Aquifer is higher than the head in the Floridan Aquifer. However, where the head in the Floridan Aquifer is greater than the head in the Surficial Aquifer, ground water discharges from the Floridan Aquifer to the Surficial Aquifer. Both of these conditions occur within the study area.

Within the Floridan Aquifer, ground water flows horizontally from areas of higher head to areas of lower head. Natural discharge of the Floridan Aquifer occurs as upward leakage through the Intermediate System into the Surficial Aquifer or discharges directly to streams where the Floridan Aquifer is in direct contact with the stream. Major discharge areas for direct spring discharge for the Floridan Aquifer include Econfina and Holmes creeks, and the Choctawhatchee and Chipola rivers. Elsewhere, especially where elevations are lower in the coastal areas, discharge of the Floridan Aquifer occurs as diffuse leakage across the Intermediate System discharging into the Surficial Aquifer, which in turn discharges to local streams or coastal bays and the Gulf of Mexico. Prior to the development of the Floridan Aquifer ground-water resources in the 1930s and 1940s, the coastal portion of Bay County was primarily a discharge area for the Floridan Aquifer where the Floridan Aquifer discharged to the Surficial Aquifer. However, as ground-water development proceeded, Floridan Aquifer water levels declined below the water levels of the Surficial Aquifer, resulting in portions of coastal areas which were once natural discharge areas currently serving as recharge areas.

Where the Intermediate System is thinner and more permeable and where there is a positive, downward head gradient, higher amounts of ground water percolate from the Surficial Aquifer through the Intermediate System to recharge the Floridan Aquifer. This is the case in the northern and central portions of the study area. In these areas, the relatively high amount of Floridan Aquifer recharge has resulted in a greater amount of dissolution of the carbonates which make up the Floridan Aquifer and higher aquifer permeabilities.

In the northern and central portions of the study area continued dissolution of the carbonate aquifer and subsequent collapse of the overlying sediments has breached the confining unit. This has resulted in the development of karst topography and locally-enhanced recharge rates (Grubbs, 1995). In the north, the sinkholes have typically been filled with unconsolidated sand and clay. These paleosinks are particularly abundant throughout northern Washington, Holmes and Jackson counties (Pratt et al., 1996). In southern Washington and Northern Bay counties, the collapse of overlying sediments into solution chambers has resulted in development of a classic karst topography which includes sinkholes, sinkhole lakes and internally drained surface-water basins.

In much of the Sand Hill Lakes area of northern Bay and southern Washington counties, virtually all of the ground water within the Surficial Aquifer percolates through the Intermediate System to recharge the Floridan Aquifer. This is shown by the lack of perennial or intermittent streams, karst topography and closed surface-water drainage basins. Significant portions of this area do not have a surface-water outlet, thus indicating rainfall which is not subject to evapotransporation serves to recharge the Floridan Aquifer System. In these closed-basin areas, virtually all rainfall which percolates into the Surficial Aquifer eventually leaks through the Intermediate System to recharge the Floridan Aquifer.

Floridan Aquifer Zone of Contribution

The determination of the area of the Floridan Aquifer which discharges to Econfina Creek is based on a detailed potentiometric surface map. The potentiometric surface map was generated using water-level data collected from over 130 wells completed in the Floridan Aquifer. These measurements, along with the measurements of numerous other wells completed in the Surficial Aquifer or the Intermediate System, are included in Appendix A.

Wells selected for measurement were carefully screened and documented. Only wells with known construction details were included. The types of wells measured included domestic, public supply, industrial, irrigation and monitor wells. Eleven Floridan Aquifer wells were constructed as part of this project. These wells were constructed in northern Bay and southern Washington counties, west of the Econfina Creek, in order to allow improved definition of the potentiometric surface and to better define the hydrogeology of the area, including the thickness of the Intermediate System and the elevation of the top of the Floridan Aquifer. Figure 4 shows the location of wells constructed for this project. Information regarding these 11 wells are included in Appendix B.

Differential global positioning satellite (GPS) equipment was used to obtain locational information for most of the wells utilized for this study. The differential GPS equipment provided horizontal locational accuracy of approximately two meters. Elevation of 29 of the wells was surveyed to an accuracy of 0.01 ft. The elevation survey was performed on project wells in or near the Sand Hill Lakes area in order to more accurately locate the ground-water divide located between Econfina and Holmes creeks. Elevation of the remaining wells was interpolated from a 1:24,000 United States Geological Survey (USGS) topographic map after careful plotting of the differential GPS location.

Figure 5 is a map showing the observed potentiometric surface of the Floridan Aquifer in August 1996. The direction of ground-water flow is generally perpendicular to the equipotential (contour) lines with flow moving directly downgradient towards areas of lower ground-water potential. The ground-water divide, separating the area where ground water flows toward Holmes Creek from the area where ground water flows toward the Econfina Creek, follows the high potentiometric ridge situated between these two creeks.

The Floridan Aquifer zone of contribution for the Econfina Creek and Deer Point Lake is that area where ground water flows toward and discharges to these features. Figure 6 shows the delineated zones of contribution, including the area where the ground-water flow in the Floridan Aquifer is toward and discharges directly to the major springs along the Econfina Creek. In addition, the area where the aquifer flow is toward and discharge is to the lower Econfina Creek and Deer Point Lake is also shown. The discharge to the lower Econfina Creek and Deer Point Lake occurs as diffuse discharge as ground water leaks upward through the Intermediate System into the Surficial Aquifer, which in turn discharges to the lower Econfina Creek and Deer Point Lake. Surrounding the zone of contribution to the Econfina Creek and Deer Point

Lake is an additional area which may also contribute inflow to Deer Point Lake. This area of uncertainty is primarily the result of the density of data points and accuracy of elevation data. Table 2 shows the area in square miles of the respective Floridan Aquifer zones of contribution and their area of uncertainty.

Table 2. Area of the Floridan Aquifer Zones of Contribution for the Econfina Creek/Deer Point Lake Basin.

Surface Feature Receiving Discharge	Area Known to Contribute (mi^2)	Additional Area Which May Contribute (mi^2)
Middle Econfina Creek	149.3	64.3
Lower Econfina Creek and Deer Point Lake	105.6	115.9

FLORIDAN AQUIFER REGIONAL GROUND-WATER-FLOW MODEL

A two-dimensional regional ground-water-flow model of the Floridan Aquifer was developed. The purpose of the model was to determine recharge rates to the Floridan Aquifer and assess the relative importance of recharge areas within the Econfina Creek/Deer Point Lake zone of contribution.

The USGS Modular Three-Dimensional Ground-Water-Flow Model (McDonald and Harbaugh, 1988) was used to simulate the ground-water-flow system. MODFLOW was configured to access a computer program that simulates stream-aquifer relations (Prudic, 1989). The stream-simulation module was designed for use with MODFLOW and provided additional capability required to more accurately represent the natural flow system.

The Floridan Aquifer is conceptualized as a heterogeneous, isotropic, limestone aquifer which exhibits varying transmissivity within the study area. Recharge to the Floridan Aquifer occurs through the Intermediate System. Discharge occurs as either diffuse discharge through the Intermediate System, or by direct discharge to streams, or by ground-water withdrawal wells. Recharge and discharge through the Intermediate System is controlled by the thickness and vertical hydraulic conductivity of the Intermediate System as well as the head difference between the Floridan Aquifer and the overlying Surficial Aquifer. Likewise, flow between the Floridan Aquifer and streams is controlled by head difference between the stream and the Floridan Aquifer and the conductance of the stream bed. Streams simulated in this way include Econfina Creek, Holmes Creek, Chipola River, Choctawhatchee River and Bear Creek.

The model grid utilized for the regional flow model is shown in Figure 7. The grid shows the extent of the modeled portion of the Floridan Aquifer and consists of 126 rows and 104 columns. Cell size ranges from 0.5 by 0.5 mi to 2 by 2 mi. Pertinent hydraulic data are required for each active cell of the grid and are applied to the area contained within that cell.

Ground water enters and exits the model of the Floridan Aquifer based on the type of boundary conditions applied and the amount of well stress simulated. The Floridan Aquifer as simulated herein, is represented as a single layer bounded beneath by the Sub-Floridan System. The Sub-Floridan System serves as a confining unit for the Floridan Aquifer throughout the study area, and it is assumed that no significant flow of ground water occurs across this unit. For these reasons, the Sub-Floridan System is simulated as a no-flow boundary. The model allows no ground water to enter or exit across the base of the Floridan Aquifer.

The north, east, south and west boundaries of the Floridan Aquifer are also no-flow boundaries. No ground water is allowed to enter or exit the Floridan Aquifer laterally from adjacent geographic areas. The northern boundary is located to coincide with the approximate northern extent of the Floridan Aquifer, where the limestone thins and grades into low-permeability clastic deposits (Miller, 1986). The eastern and western boundaries were selected to coincide with the position of streamlines. The locations of these streamlines were chosen where no significant change in the position of the streamlines appears to have occurred over the past several decades. The east and west no-flow boundaries are far removed from the area of interest, specifically the Econfina Creek/Deer Point Lake basin, and are not expected to significantly affect the simulated recharge rates within the basin or the simulated flow rates of either the Holmes Creek or the Econfina Creek.

A head-dependent boundary is assigned across the upper surface of the Floridan Aquifer throughout the entire model domain. An unlimited amount of ground water can flow either into or out of the Floridan Aquifer across this model boundary. The actual rate of flow is a function of the head difference between the Floridan Aquifer and the Surficial Aquifer, and the thickness and vertical hydraulic conductivity of the Intermediate System.

Several streams within the study area were simulated using a special type of head-dependent boundary. These include the Choctawhatchee River, Holmes Creek, Econfina Creek, Bear Creek and the Chipola River. This type of head-dependent boundary functions as described above, with the head difference defined as the difference between the stream stage and the simulated water level within Floridan Aquifer, and the conductance term represented by the thickness and vertical hydraulic conductivity of the streambed sediments. Using this type of boundary, the amount of flow discharging from the Floridan Aquifer is only limited by the head difference and the streambed conductance. In this model application, under both non-pumping and pumping conditions, simulated streams provide no recharge to the Floridan Aquifer. The simulated streams consistently acted as drains, receiving discharge from the Floridan Aquifer.

Input data required for the model include a potentiometric surface of the Surficial Aquifer, the thickness of the Intermediate System, the vertical hydraulic conductivity of the Intermediate System, transmissivity of the Floridan Aquifer, stage of streams simulated in the model, conductance of the streambed and pumpage. The model was calibrated to observed Floridan Aquifer water-level measurements obtained during late August 1996 and streamflow measurements made during the same time period.

The potentiometric surface of the Surficial Aquifer was generated utilizing water-level data available in the District's well inventory database, Surficial Aquifer water-level data collected during late August 1996, elevation of selected surface-water features (lakes and perennial streams taken from 1:24,000 USGS topographic maps) and a 1:250,000 USGS digital-elevation model (DEM) of the study area. From these sources, a generalized potentiometric surface was generated. The water-level data for the Surficial Aquifer required for the model was then interpolated from this surface. Figure 8 shows the generalized potentiometric surface of the Surficial Aquifer, as used in the model.

The thickness of the Intermediate System was determined from analysis of several hundred geophysical and lithology logs available for northwest Florida (Pratt et al., 1996). Data collected during the test well drilling program were in accordance with the existing map of the thickness of the Intermediate System. Figure 3 shows the thickness of the Intermediate System as used in the model. Thickness data required for the model consists of values interpolated from this map.

The vertical hydraulic conductivity of the Intermediate System is a function of the lithology of the sediments which compose the unit. The vertical hydraulic conductivity of a confining unit can be calculated from aquifer tests. In this area, no suitable aquifer tests were available; therefore, preliminary estimates for the hydraulic conductivity were made based on analysis of geophysical and lithology logs. The vertical hydraulic conductivity was then adjusted during the course of model calibration. The final distribution of the vertical hydraulic conductivity of the Intermediate System, shown in Figure 9, was primarily derived through model calibration.

A preliminary map of the transmissivity of the Floridan Aquifer was derived from analysis of aquifer test data and specific capacity data. The distribution of the transmissivity was then modified through the model calibration process. A contour map showing the distribution of transmissivity of the Floridan Aquifer as used in the model is shown in Figure 10. Transmissivity data required for the model was interpolated from this map.

Pumpage input for the model was obtained from the District's Consumptive Use Permit files. Of particular importance was pumpage for Washington, Bay and Gulf counties. Pumpage was included in the model in order to calibrate the model to observed conditions which included pumping, and to determine if pumpage effects the size of the Econfina Creek/Deer Point Lake zone of contribution or the Floridan Aquifer discharge to the Econfina Creek. Pumpage included in the model was generally limited to water withdrawn in coastal counties and water withdrawn in the Deer Point Lake watershed.

Actual pumpage was available for many of the permitted users whose permitted average daily use is greater than 50,000 to 75,000 gal/d. For those systems for which data was available, model input was calculated as the average pumping for the months of June, July and August 1996. Only those systems with permitted average daily use of greater than 50,000 to 75,000 gal/d were included. When well data was available, actual well pumpage was assigned to specific wells. Where only system totals were available, the pumpage was equally divided among the permitted wells. Where pumpage reports were unavailable, the permitted daily average was included in the model. Well pumpage incorporated into the model calibration is included in Appendix C.

Essentially, only major pumping centers were represented in the model. Pumpage data for a significant number of wells in the coastal area of Bay County was not available and therefore is not included in the model simulations. Specifically excluded are approximately 150 permitted users authorized to pump less then 75,000 gal/d as well as over 1,800 wells, constructed since 1980, which are exempted from the consumptive use permitting process. In addition, an unknown number of wells constructed prior to 1980 were also not accounted for in the model. Individually, these lower-capacity wells likely have a relatively insignificant effect on the potentiometric surface. However, when combined they do contribute to the lowering of the potentiometric surface especially in the southern coastal area. For this model application, involving the Econfina Creek/Deer Point Lake zone of contribution, a full accounting of pumpage and detailed calibration in the coastal area was not required.

Streamflows measured during late August 1996 are shown in Figure 11. For the purposes of model calibration, the portion of Econfina Creek streamflow discharged from the Floridan Aquifer was calculated based on the specific conductance recorded during stream measurement utilizing conversion equations developed by the USGS specifically for the Econfina Creek (Musgrove et al., 1965). Using this equation, Floridan Aquifer discharge to the Econfina Creek was calculated from measured streamflow immediately downstream of Gainer Spring, approximately 0.75 mi south of Highway 20. Measured flow was 404 cfs which resulted in a calculated Floridan Aquifer contribution of 386 cfs. Similar equations are not available for the other spring-fed streams in the study area. It was assumed that virtually all of the base flow of Holmes Creek consists of discharge from the Floridan Aquifer and a substantial portion of the Chipola River flow consists of discharge from the Floridan Aquifer.

Model calibration essentially consists of adjusting the transmissivity distribution and leakance of the Intermediate System, in accordance with available data, to minimize the difference between simulated model output and observed water levels and streamflows described above.

Results of the Regional Ground-Water-Flow Model

Water levels and Floridan Aquifer stream discharge were simulated utilizing the hydraulic setting presented above and assuming steady-state conditions. Simulations were performed both with and without pumping.

A contour map representing the calibrated steady-state potentiometric surface is shown in Figure 12. The mean, absolute difference between observed and simulated water levels for all observed data points within the model domain is 7.0 ft. The area of largest head differences is coastal Bay County where simulated heads were 10 to 25 ft higher than observed heads. This is, in part, attributed to a significant amount of pumpage which was not accounted for in the coastal area. The mean absolute difference for wells with surveyed elevation (elevation accuracy of 0.01 ft) is 2.6 ft. Most of the surveyed wells are located in the Econfina Creek basin, between Econfina Creek and Holmes Creek. The simulation also showed Floridan Aquifer discharge rates to be properly distributed along the length of Econfina Creek and Holmes Creek and to be within 13 percent of expected values.

Presented in Figure 13 is a contour map representing the potentiometric surface under non-pumping (pre-development) conditions. Although simulated pumping reduced the potentiometric surface significantly in the coastal area, virtually no effect is noticed in the Deer Point Lake basin. Simulated flow of the Econfina Creek at Highway 388 remained unchanged. Simulated pumpage had essentially no effect on ground water discharge to the Econfina Creek or on the area of the Floridan Aquifer zone of contribution to Econfina Creek or Deer Point Lake.

The sensitivity of the model to changes in model input was examined by varying selected model inputs including transmissivity of the Floridan Aquifer, elevation of the Surficial Aquifer source head and vertical hydraulic conductivity of the Intermediate System. For each of these input parameters, the effect of the change to the given parameter was plotted against the mean absolute difference in head for wells with surveyed elevations and was also plotted against the simulated flow of Econfina Creek just below Gainer Spring. Figures 14 through Figure 19 show the sensitivity of the model to changes in these parameters.

Model-derived recharge rates for the Deer Point Lake basin are presented in Figure 20. The highest simulated recharge rates are found in the Sand Hill Lakes area where recharge is calculated to be between 30 and 40 inches per year. Average recharge rates for the area of the middle Econfina Creek's Floridan Aquifer zone of contribution is 25.3 inches per year, while the average recharge rate for the lower Econfina Creek/Deer Point Lake zone of contribution is 5.4 inches per year. These figures are derived from simulated Floridan Aquifer discharge and the area of the zone of contribution plus one-half the area of uncertainty (Table 2). For the middle Econfina Creek, the simulated discharge is 338 cfs and the estimated area of the zone of contribution is 181 mi^2. For the lower Econfina Creek and Deer Point Lake, simulated discharge is 65 cfs and the estimated area of the zone of contribution is 164 mi^2.

CONCLUSIONS

Deer Point Lake is a critically-important potable and industrial water supply for Bay County. Floridan Aquifer discharge via springs along the middle Econfina Creek contribute approximately 40 percent of the total flow into Deer Point Lake. Under low-flow conditions, the relative contribution of the Floridan Aquifer springs rises to approximately 64 percent of Deer Point Lake's input.

Due to the importance of Deer Point Lake and the significance of Floridan Aquifer spring discharge along the middle Econfina Creek, the recharge area for the portion of the Floridan Aquifer which contributes flow to the middle Econfina Creek was identified. Model-derived recharge to the Floridan Aquifer averages 25 inches per year within this area. The hydrogeology indicates the Sand Hill Lakes area of northern Bay and southern Washington counties to be a particularly important recharge area. Numeric modeling shows recharge rates ranging up to 30 to 40 inches per year in the vicinity of the Sand Hill Lakes.

Due to the large inflow of ground water from the Floridan Aquifer, protecting the water quality of Deer Point Lake requires protecting the Floridan Aquifer recharge area which contributes to the springflow along the middle Econfina Creek. Long-term preservation of these prime recharge areas will serve to maintain the high quality of water found in Deer Point Lake and Econfina Creek. Protecting this recharge area can be achieved through a combination of efforts including, but not limited to, purchase of portions of the recharge area, purchase of selected development rights, adoption of local zoning ordinances which provide for protection of the recharge area, and public education and awareness initiatives.

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FIGURES

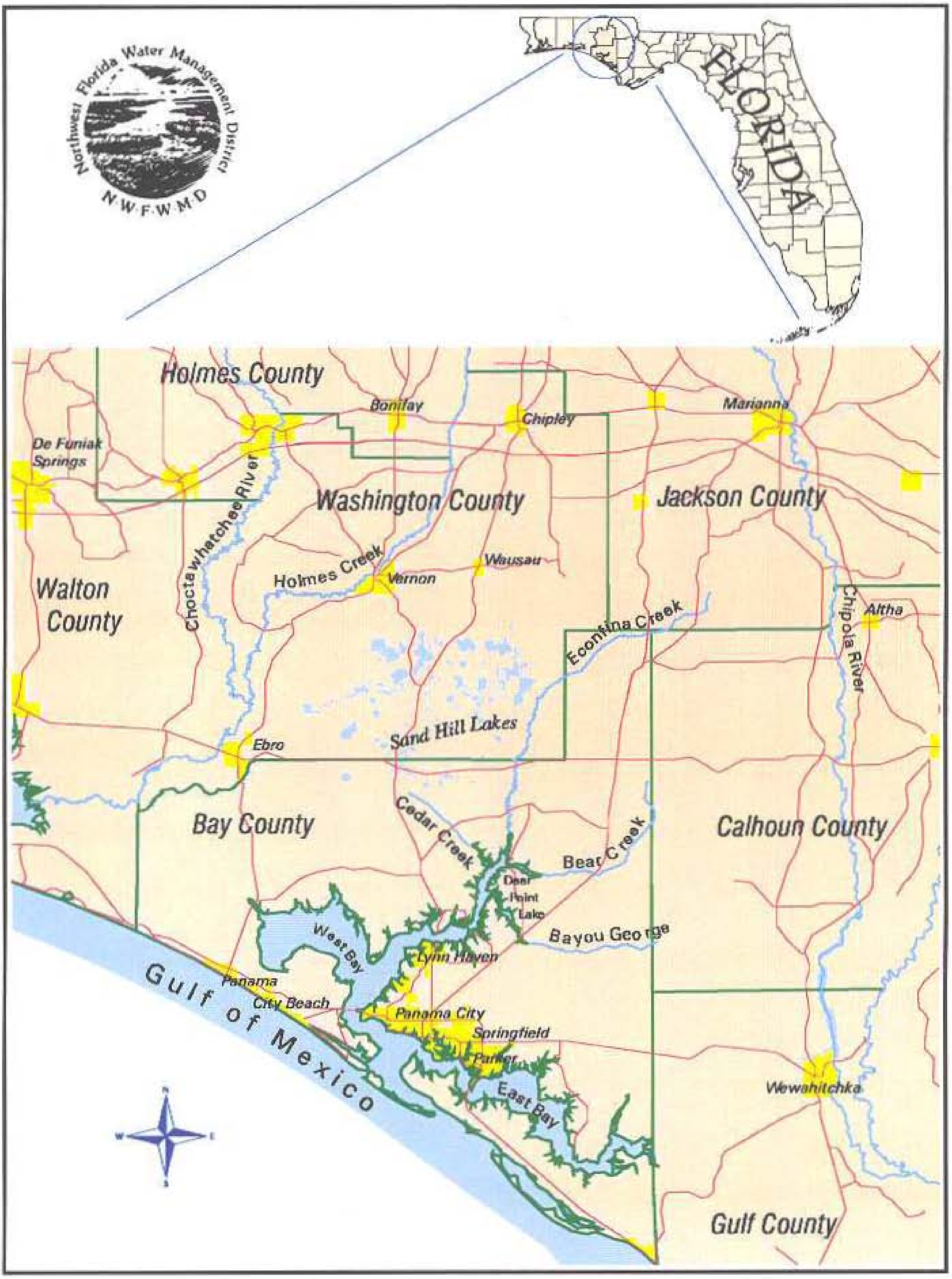


Figure 1. Location of Study Area.

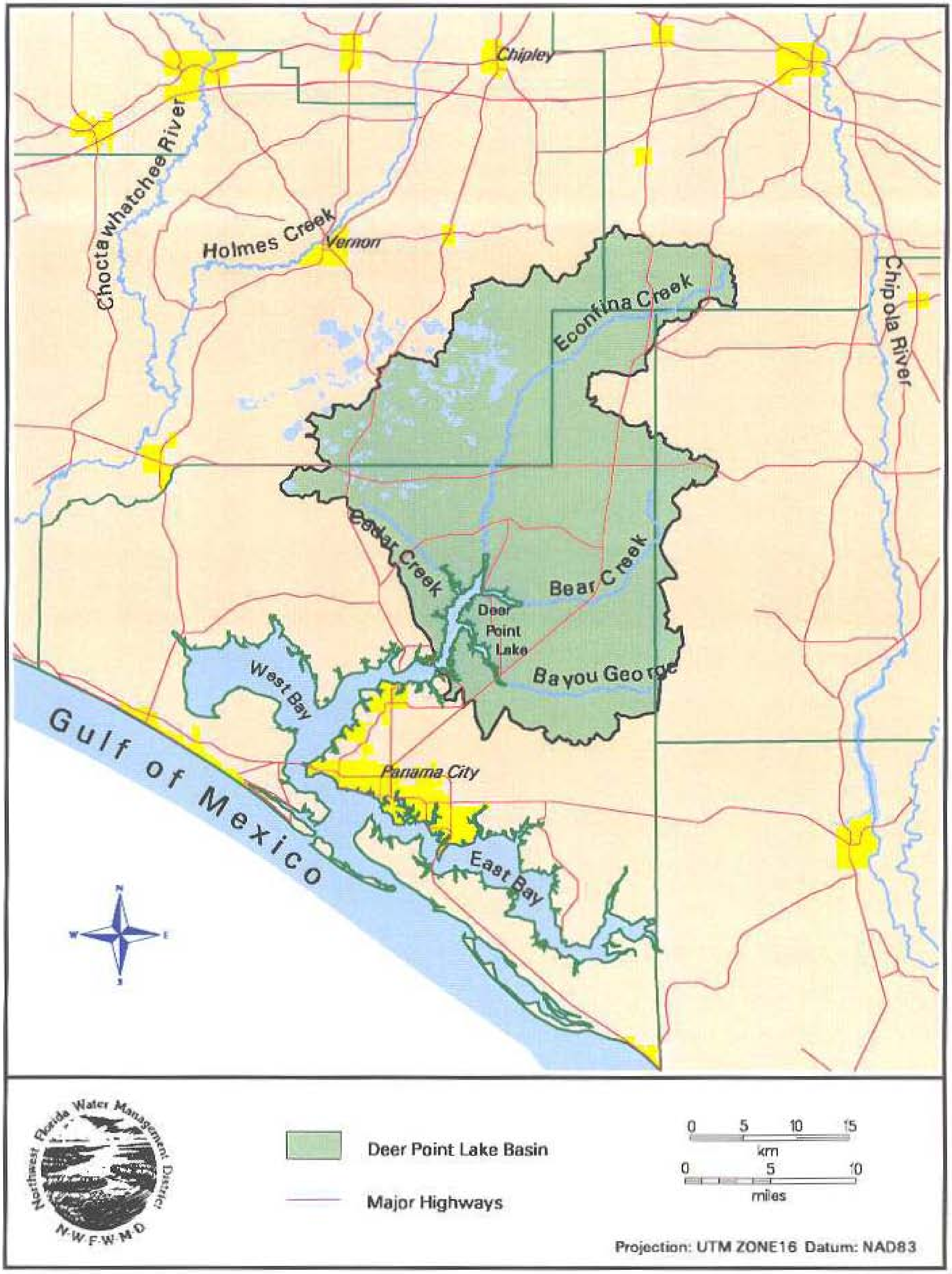


Figure 2. Extent of the Deer Point Lake Drainage Basin.

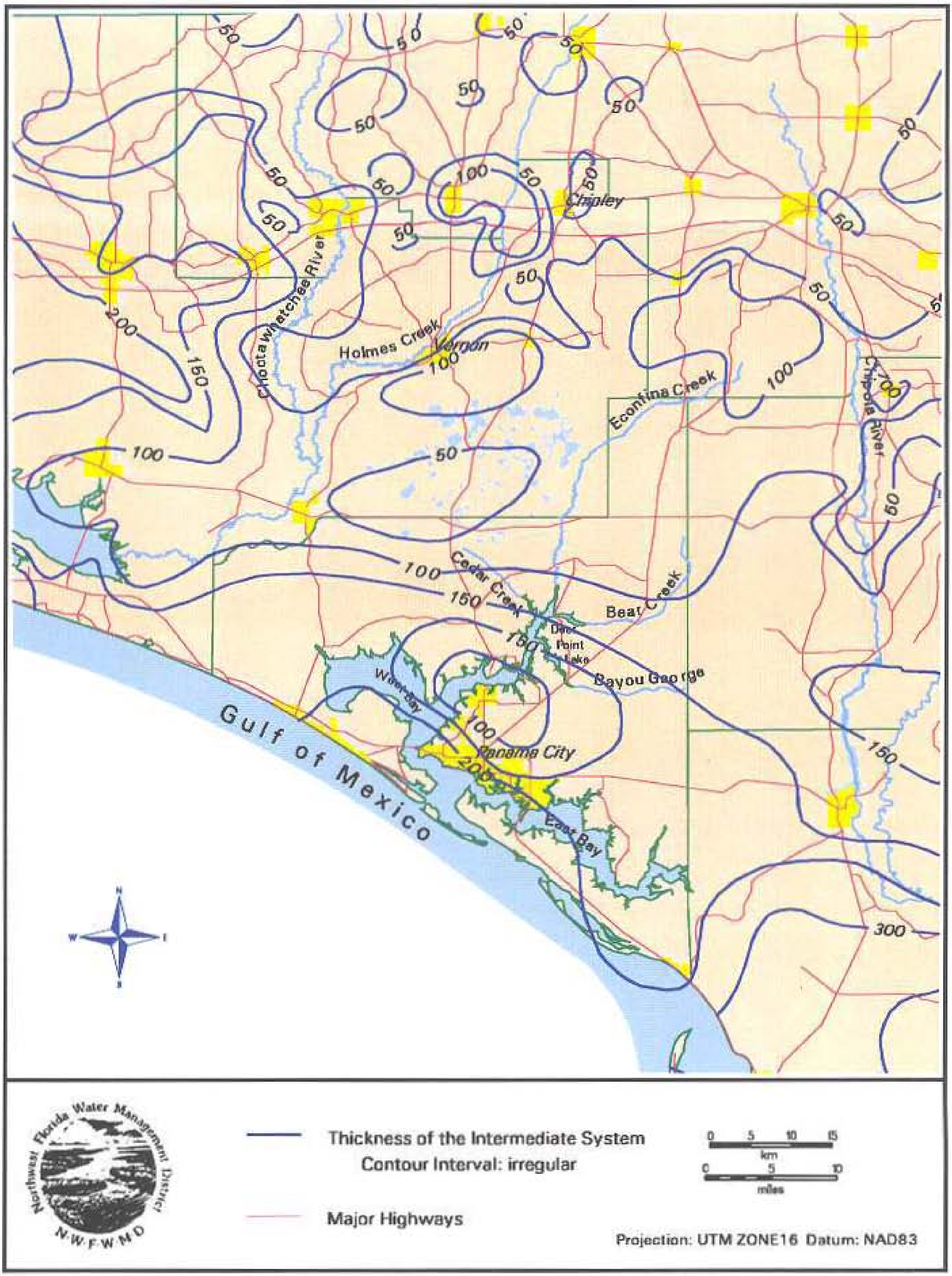


Figure 3. Thickness of the Intermediate System as Used in the Model.

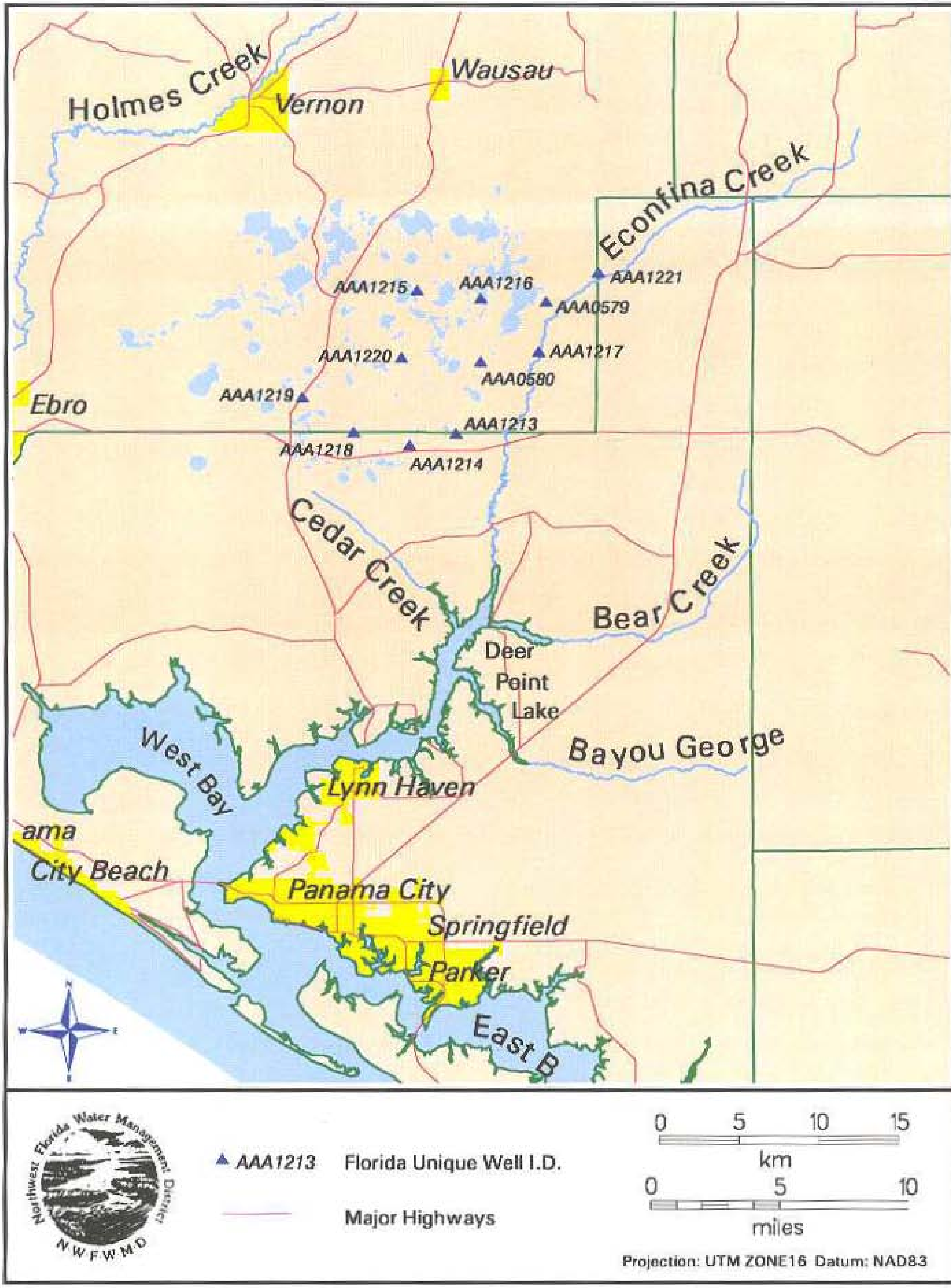


Figure 4. Location of Wells Constructed as Part of the Test Well Drilling Program.

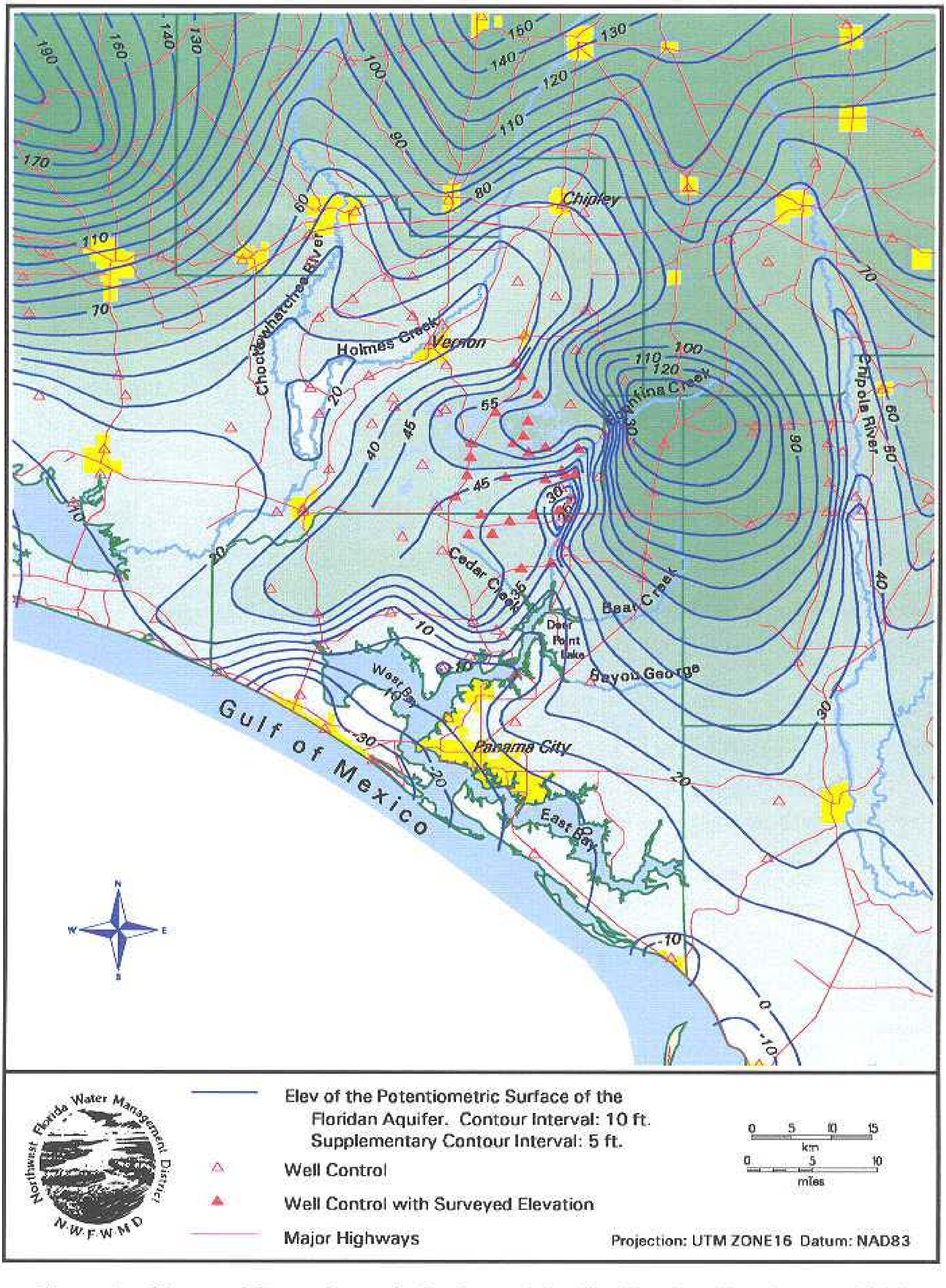


Figure 5. Observed Potentiometric Surface of the Floridan Aquifer, August 1996.

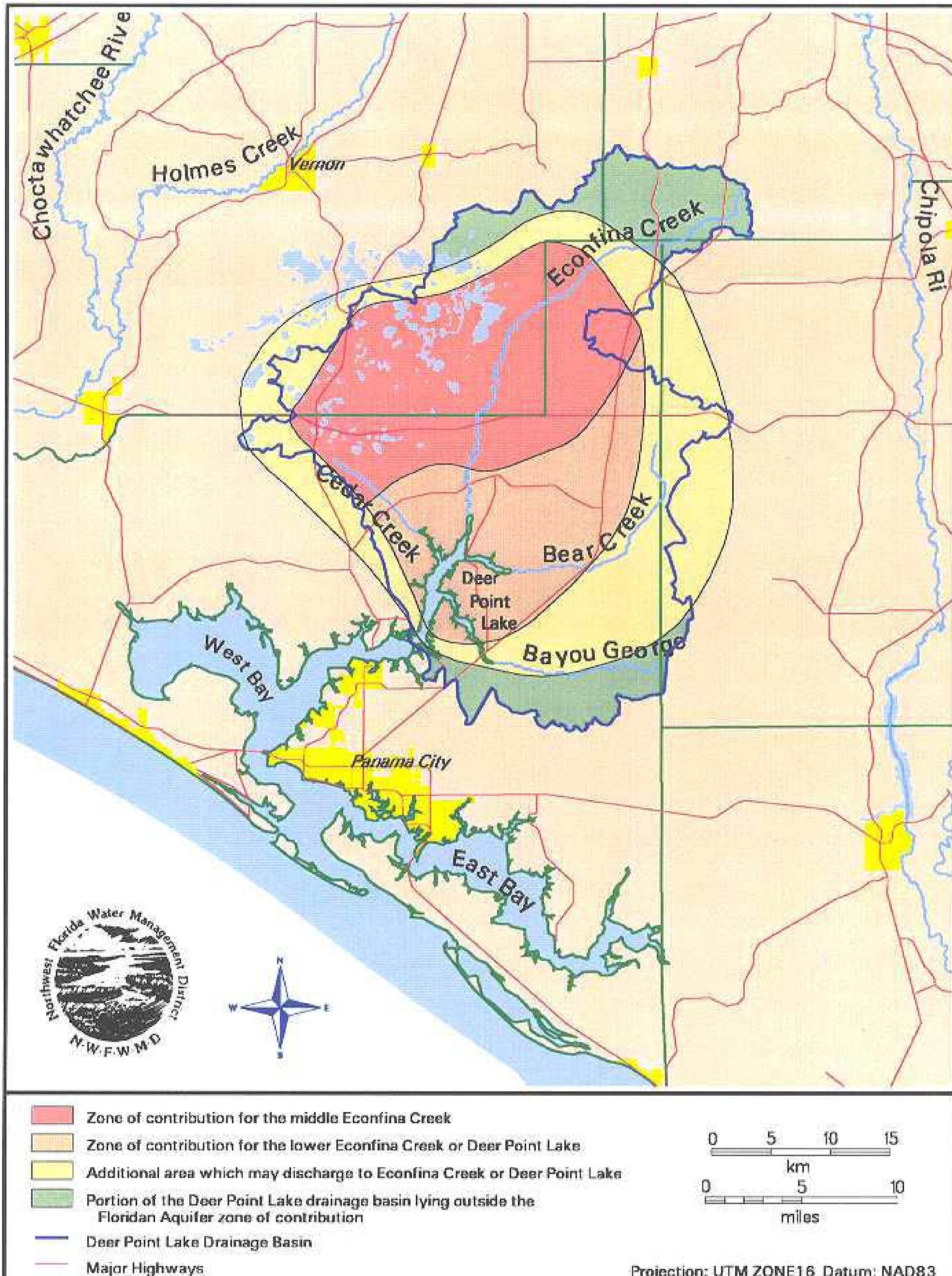


Figure 6. Floridan Aquifer Zone of Contribution to Econfina Creek and Deer Point Lake.

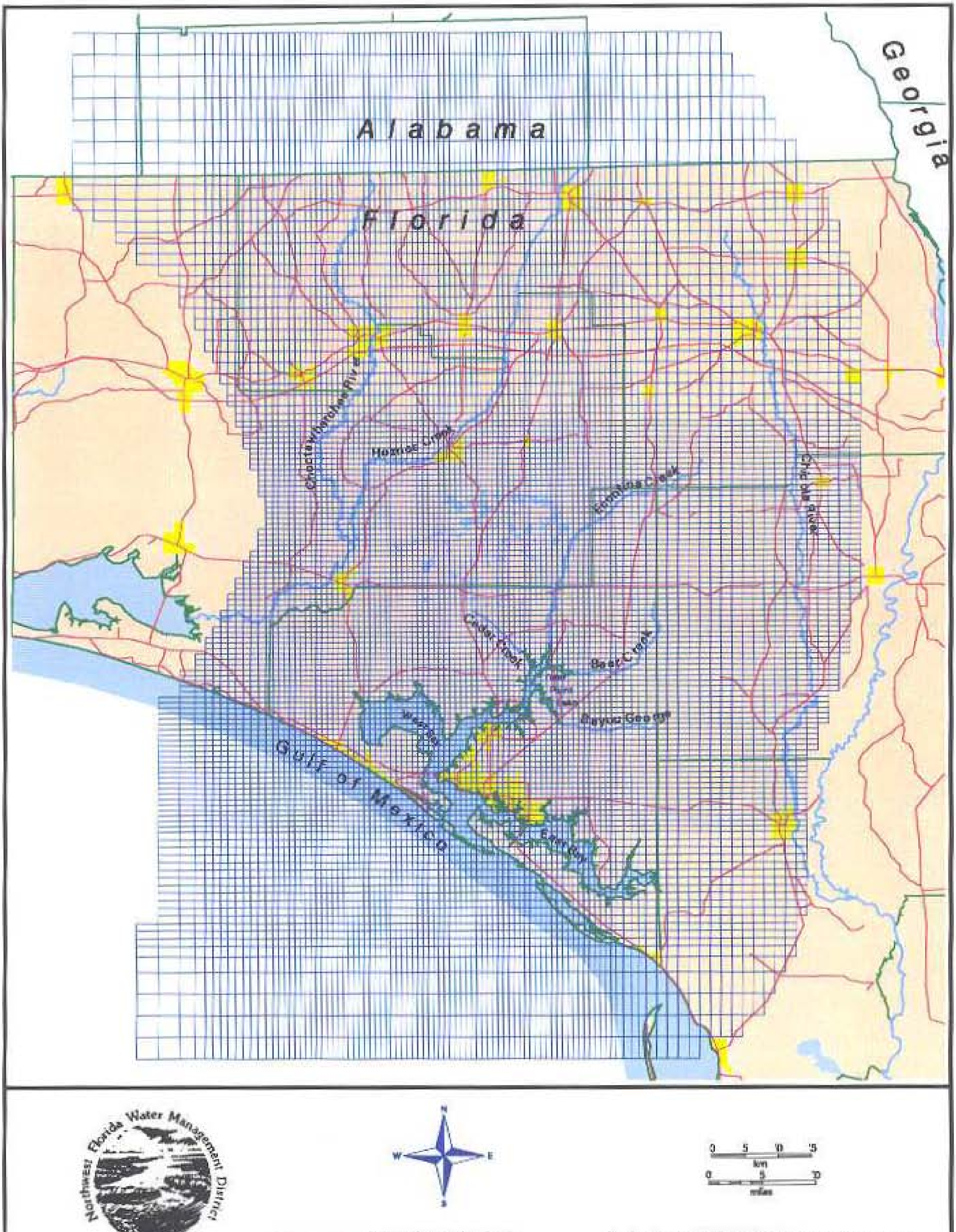


Figure 7. Model Grid as Used in the Regional Ground Water Flow Model.

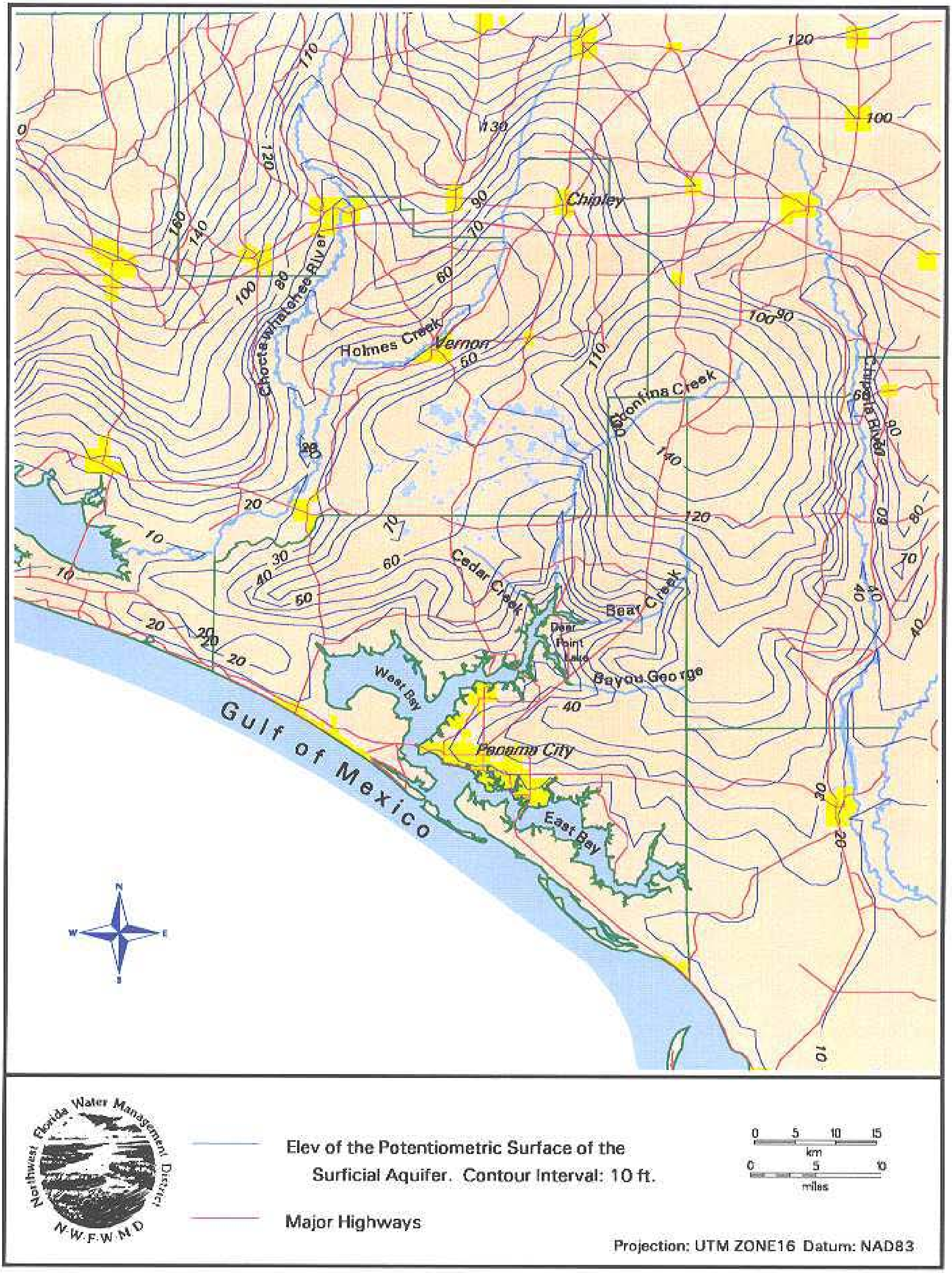


Figure 8. Generalized Potentiometric Surface of the Surficial Aquifer as Used in the Model.

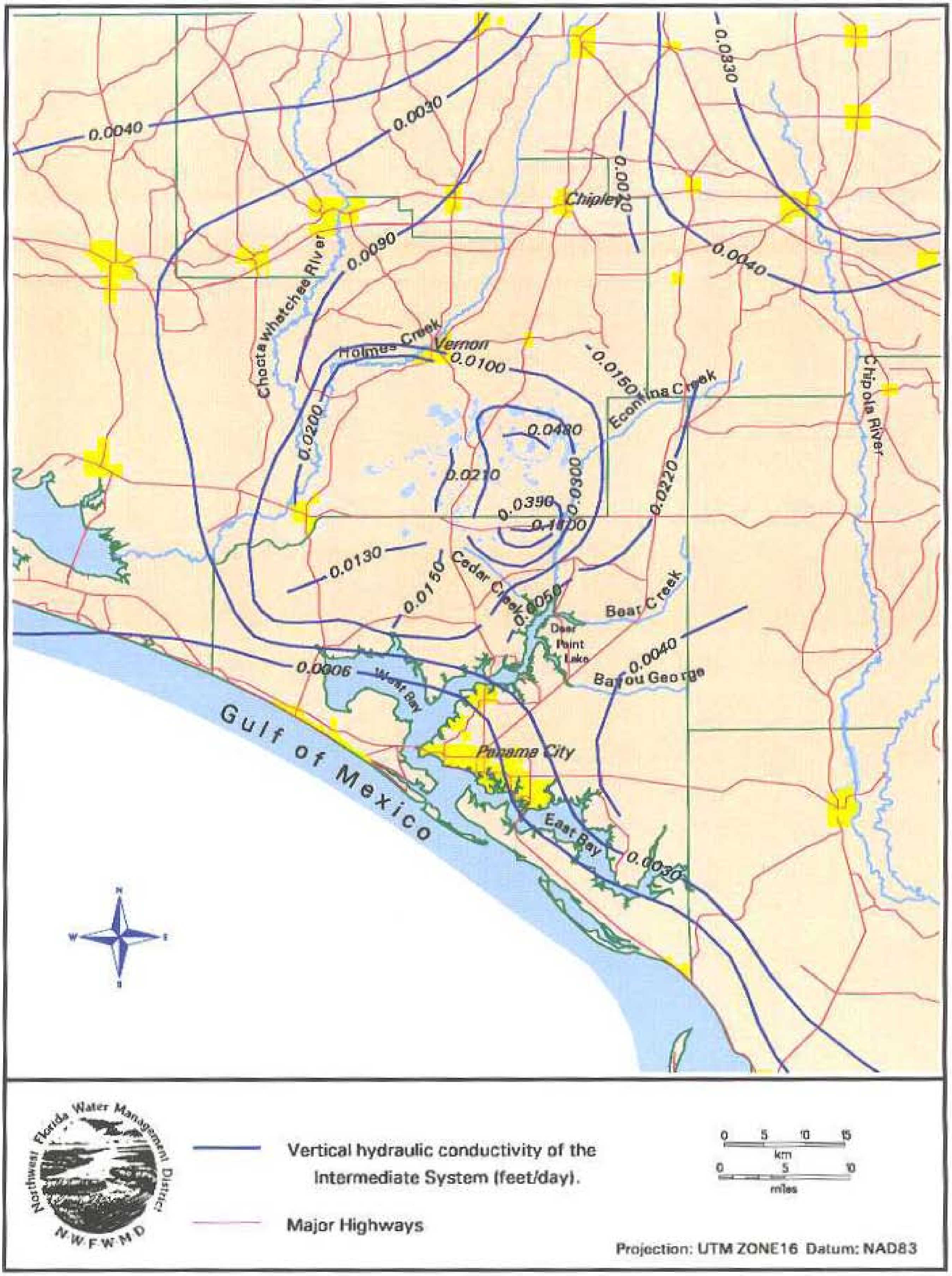
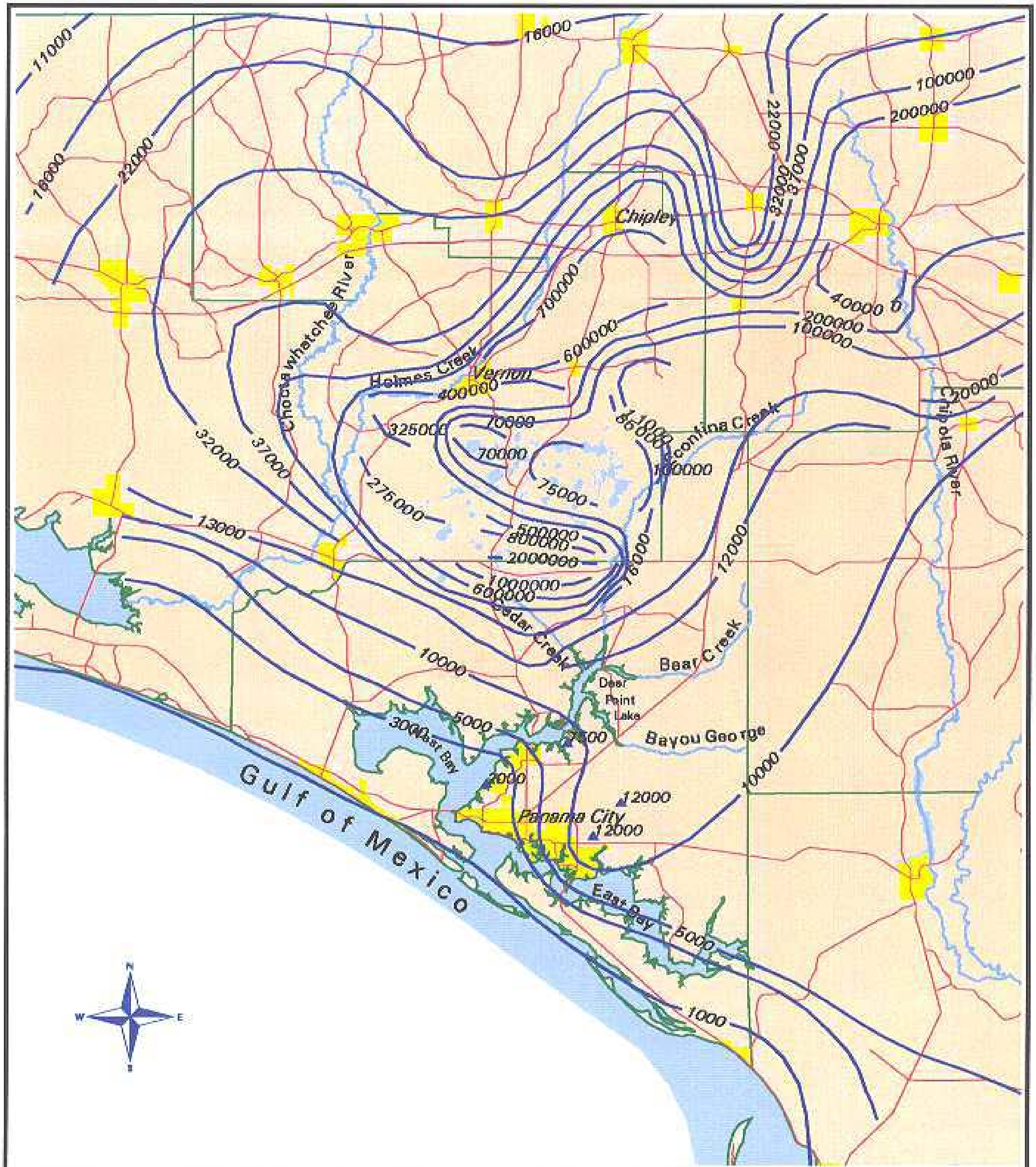


Figure 9. Vertical Hydraulic Conductivity of the Intermediate System as Used in the Model.



Transmissivity of the Floridan Aquifer feet squared/day; Contour interval: irregular

Point value of transmissivity

Major Highways

Projection: UTM ZONE16 Datum: NAD83

Figure 10. Transmissivity of the Floridan Aquifer System as Used in the Model.

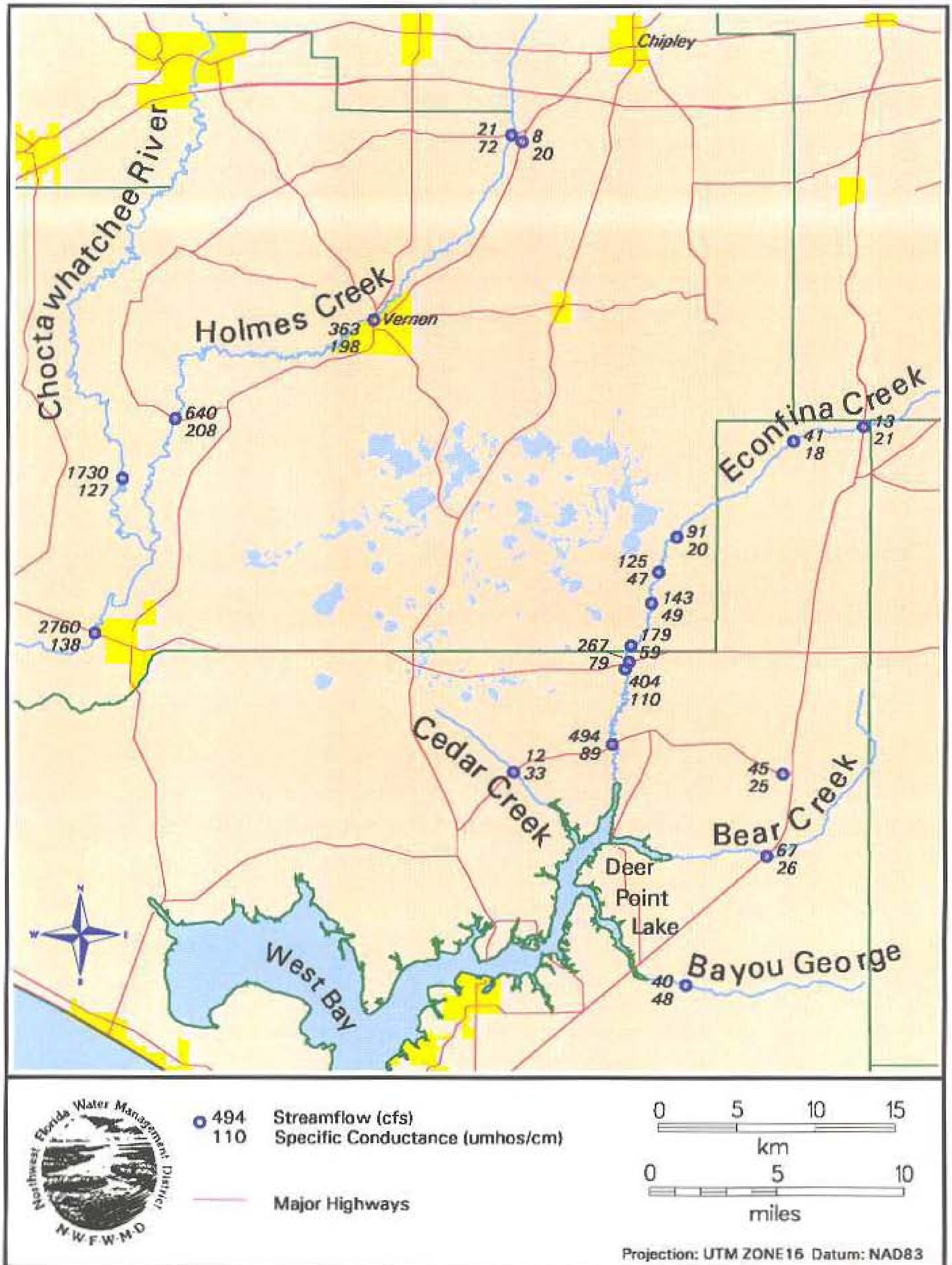


Figure 11. Measured Streamflows Used for Model Calibration, August 19 through August 22, 1996.

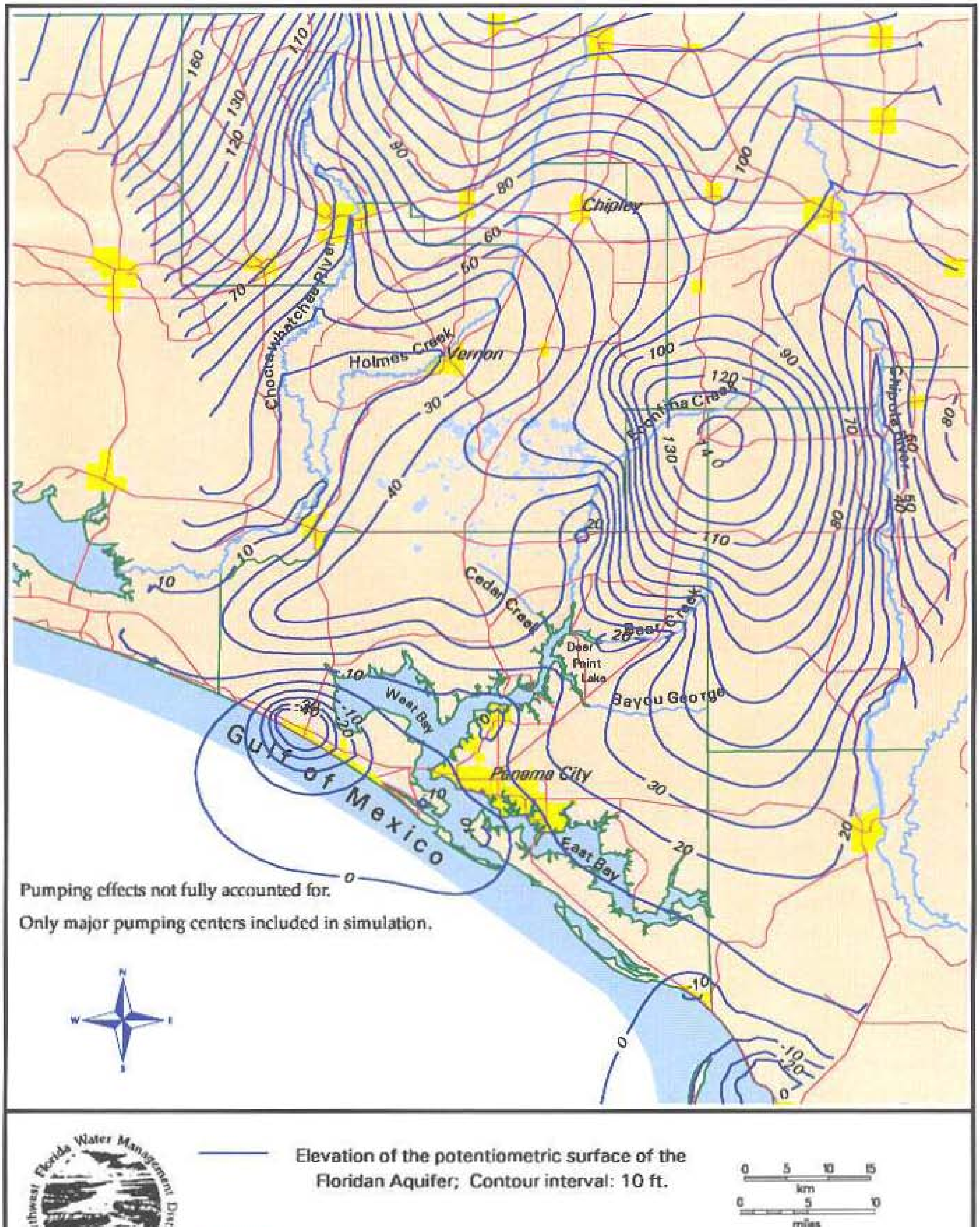


Figure 12. Simulated Potentiometric Surface of the Floridan Aquifer System, Steady State Conditions, August 1996.

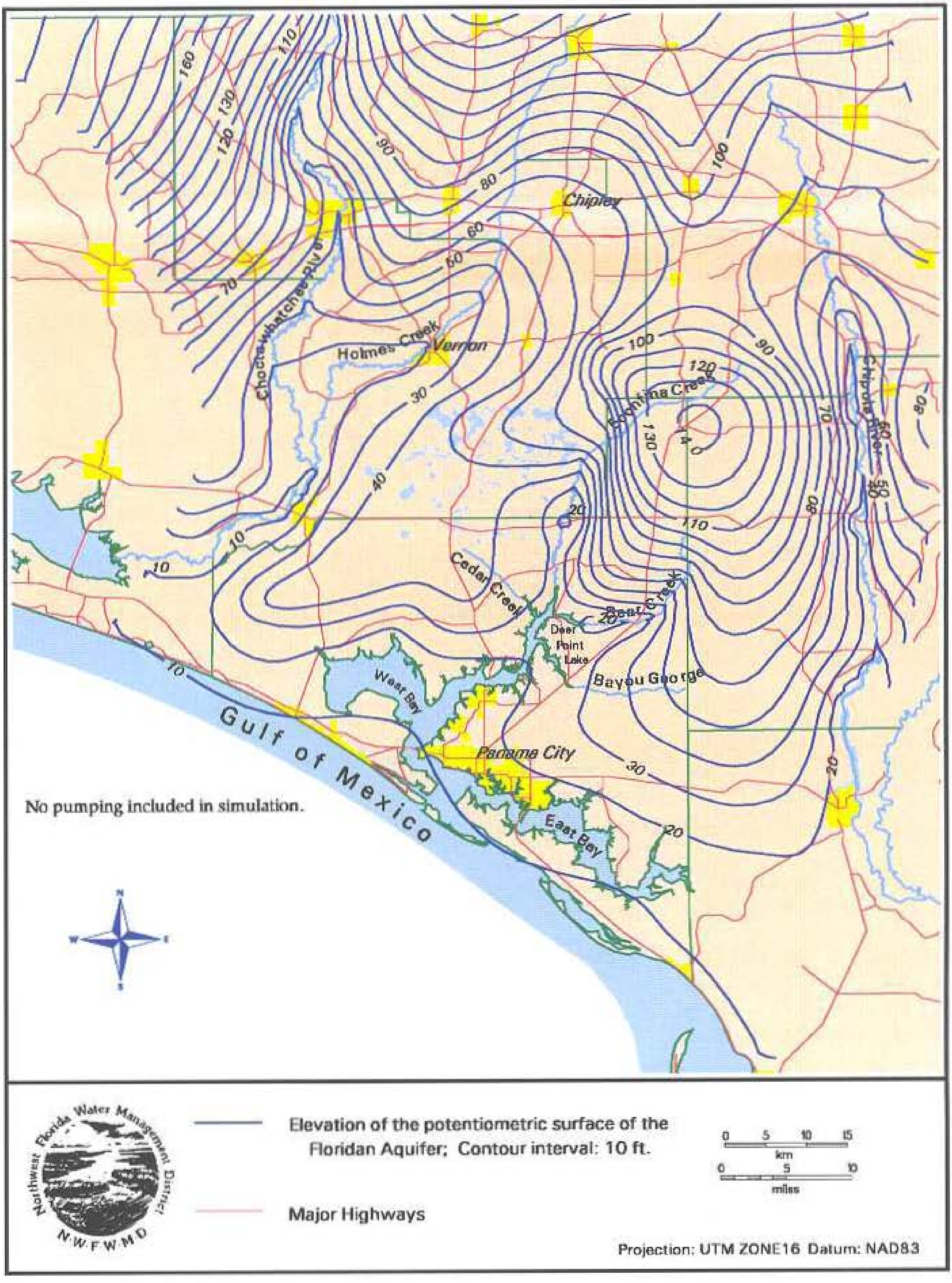


Figure 13. Simulated Pre-Development Potentiometric Surface of the Floridan Aquifer System.

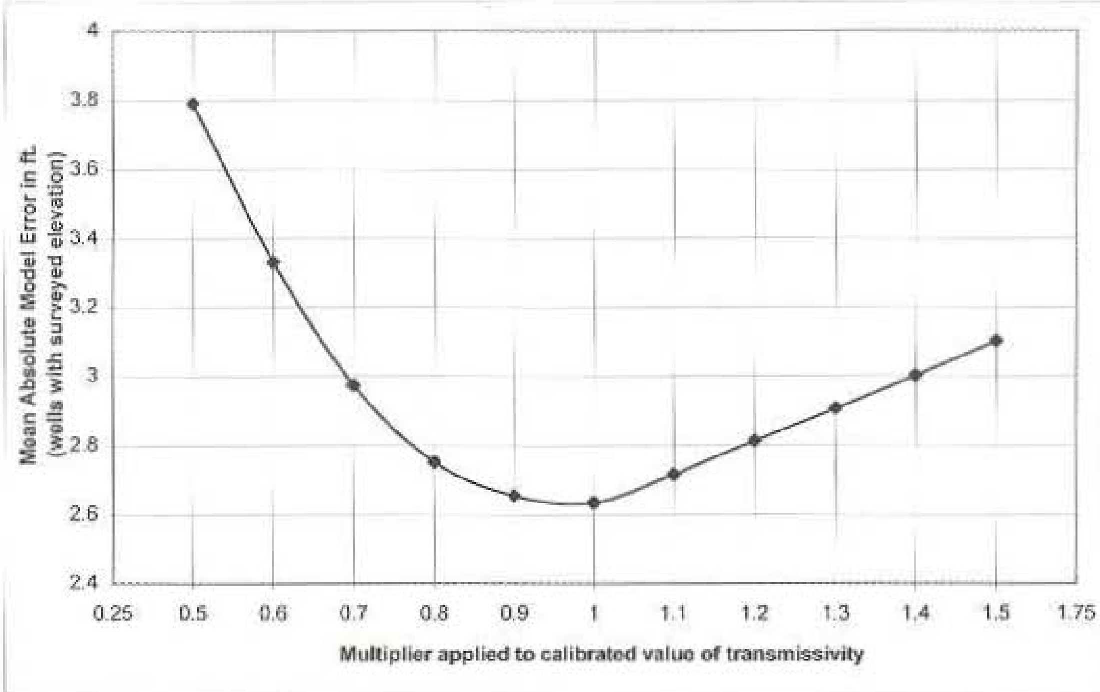


Figure 14. Sensitivity of Simulated Heads to Change in Transmissivity.

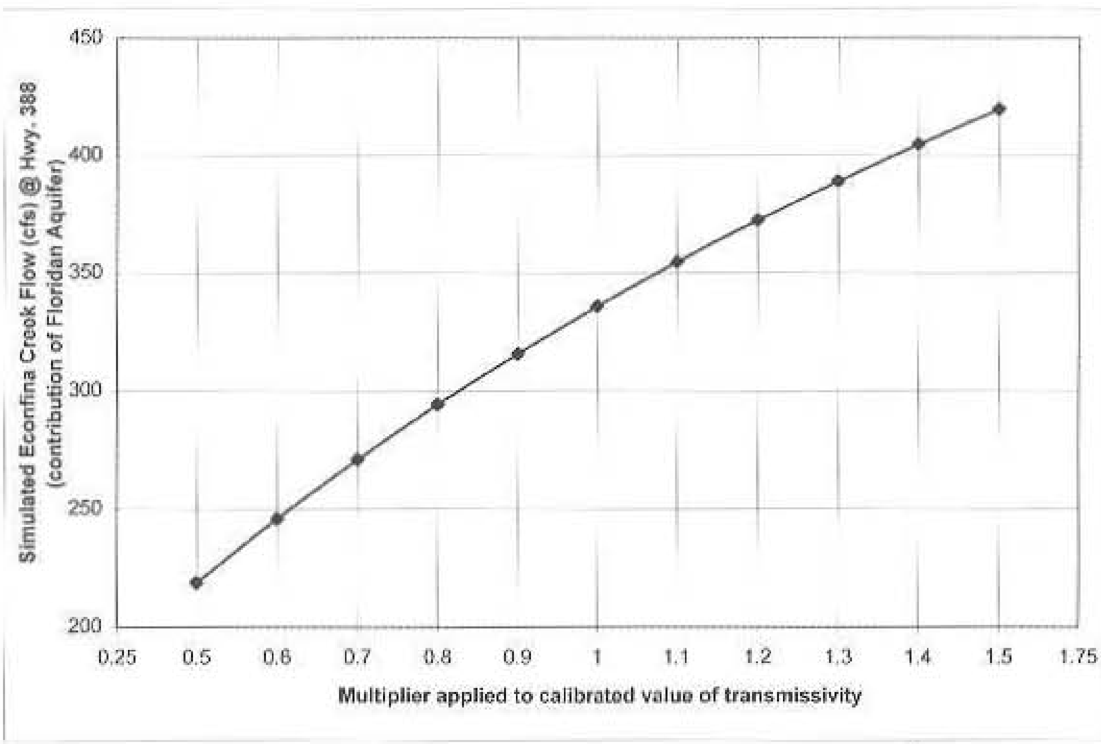


Figure 15. Sensitivity of Simulated Floridan Aquifer Discharge to Change in Transmissivity.

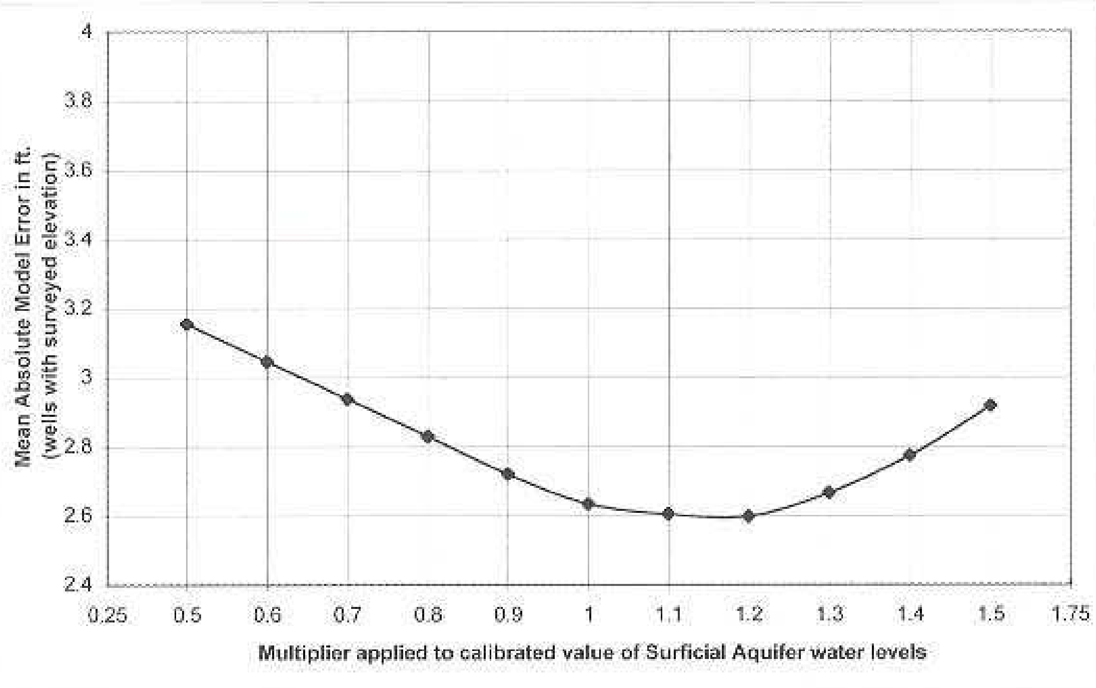


Figure 16. Sensitivity of Simulated Heads to Change in Surficial Aquifer Water Levels.

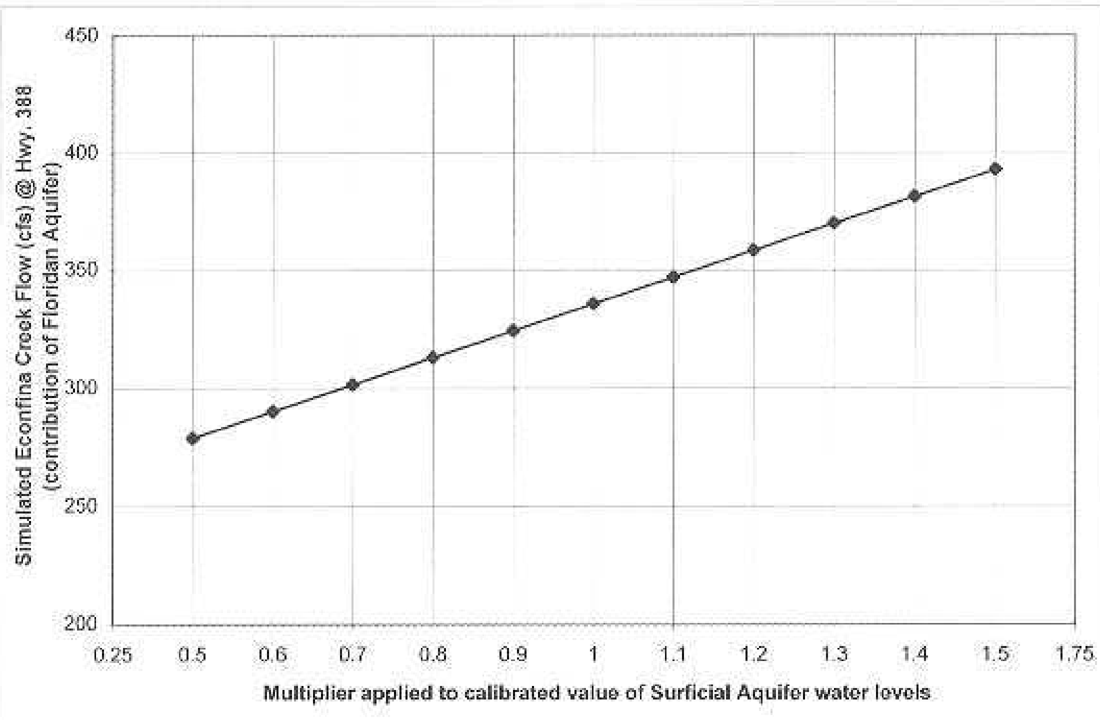


Figure 17. Sensitivity of Simulated Floridan Aquifer Discharge to Change in Surficial Aquifer Water Levels.

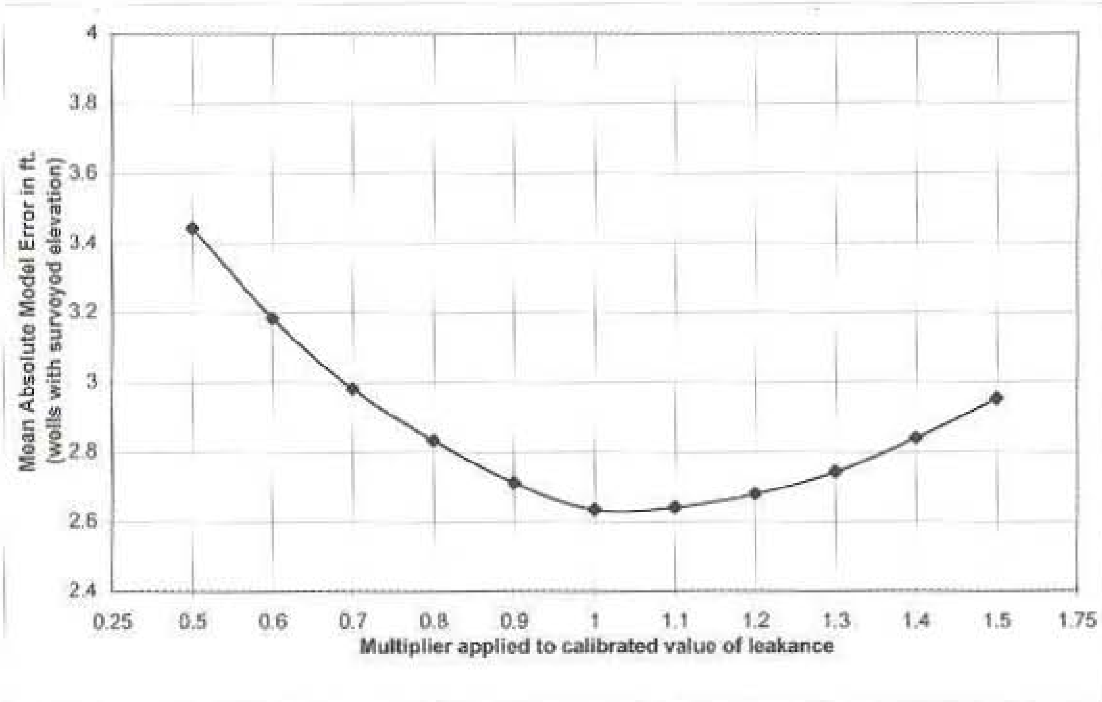


Figure 18. Sensitivity of Simulated Heads to Change in the Vertical Hydraulic Conductivity of the Intermediate System.

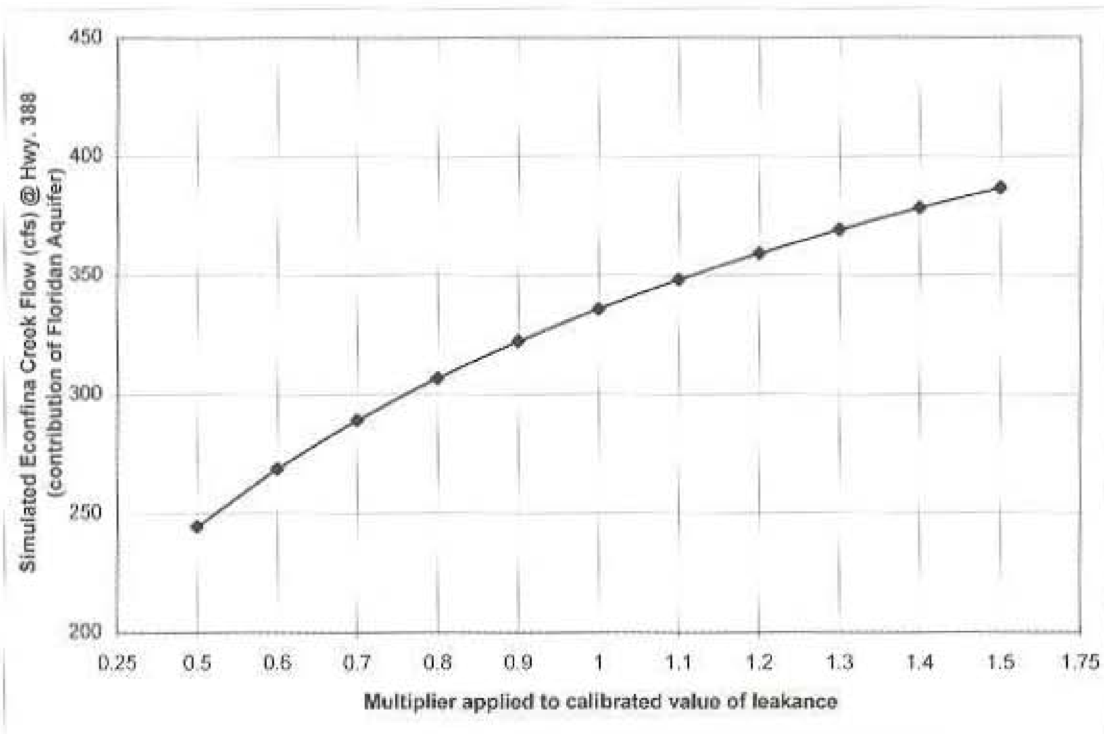


Figure 19. Sensitivity of Simulated Floridan Aquifer Discharge to Change in the Vertical Hydraulic Conductivity of the Intermediate System.

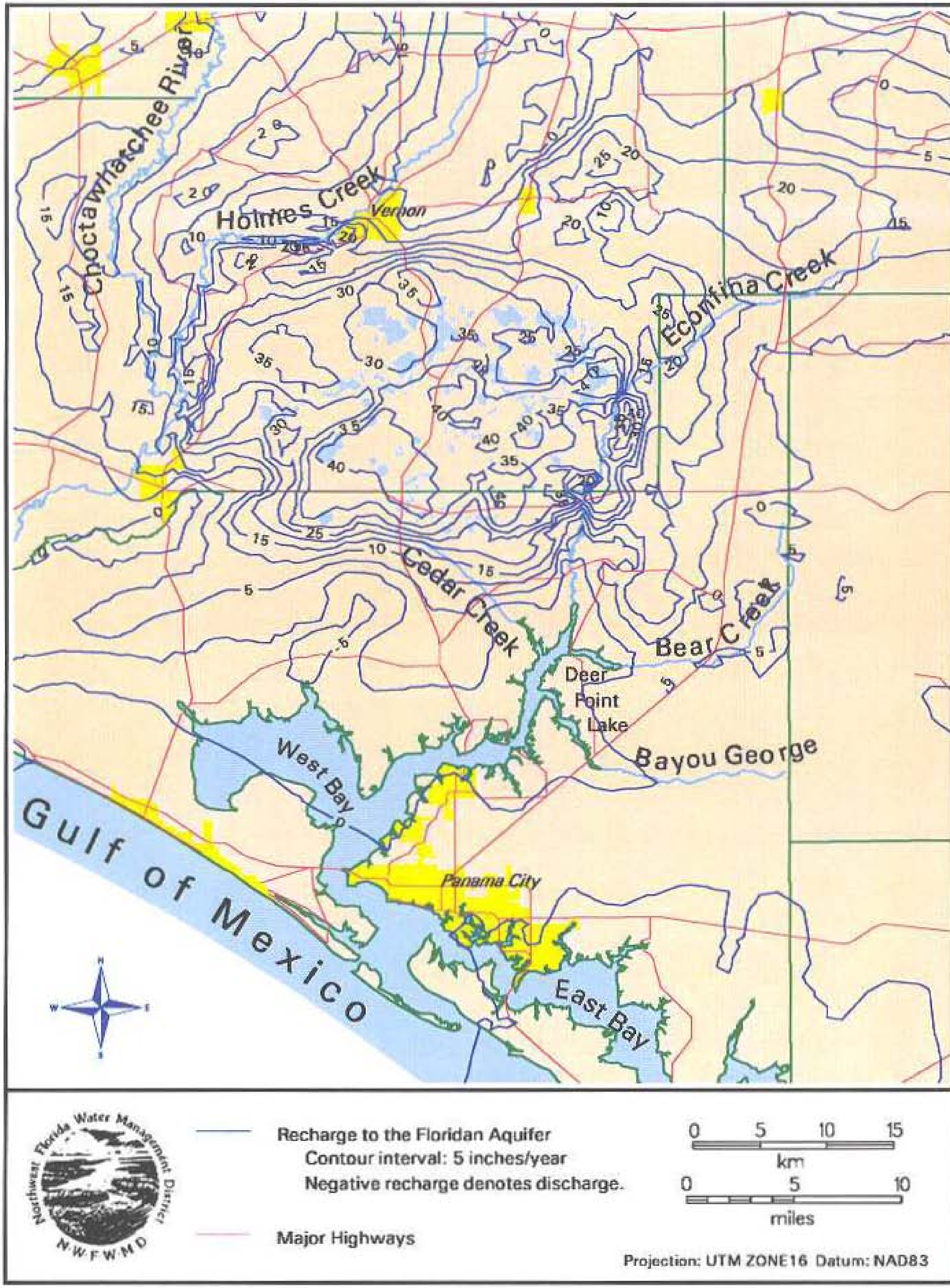


Figure 20. Simulated Floridan Aquifer Recharge Rates for the Deer Point Lake Basin.

APPENDIX A

Water-Level Data Used to Generate the Potentiometric Surface
and Calibrate the Ground-Water-Flow Model

WELL NAME	FLORIDA UNIQUE WELL I.D.	COUNTY	LATITUDE	LONGITUDE	ELEV. LSD	WATER LEVEL ELEV.
PINNACLE PORT OLD IR		Bay	301600.040	855914.120	8.	-1.70
MCCALL SOD FARM MONI		Bay	301838	853741	32.	30.20
USGS - BENNETT		Bay	302302	853325	14.46	30.06
MEXICO BEACH #2	AAA0450	Bay	295645.150	852429.060	13.	-38.21
TYNDALL #7	AAA0451	Bay	300346.580	853454.020	27.85	-7.49
CEDAR GROVE FLORIDAN	AAA0454	Bay	301232.290	853618.320	40.	17.34
ST. THOMAS SQUARE	AAA0455	Bay	301004	854720	10.	-42.35
ARGONAUT STREET 02	AAA0456	Bay	301210.583	855059.870	26.	-37.92
ERIK REPPEN	AAA0475	Bay	302356.530	854149.380	64.	43.96
EDDIE BARNES	AAA0476	Bay	302348.643	853215.934	77.	49.91
J.B. COOLEY	AAA0486	Bay	302501.389	853755.880	87.01	39.08
COUCH CONSTR-	AAA0487	Bay	302326.670	852604.530	92.	82.00
MILTON BIRGE	AAA0488	Bay	302242.3	853543.4	82.83	39.20
CHARLES KAWATA	AAA0489	Bay	301953	854551	13.	3.45
MCCALL SOD FARM #2	AAA0490	Bay	301812.165	853711.166	25.	24.30
MCCALL SOD FARM #1	AAA0491	Bay	301838.157	853741.610	32.	29.45
GEORGE HAZEN	AAA0492	Bay	302739.170	852527.170	154.	110.20
J BABB	AAA0493	Bay	301506.770	853029.099	43.	26.26
NEWTON ALLEN	AAA0494	Bay	301541.845	853616.683	5.	-1.04
FANNIN AIRPORT	AAA0558	Bay	301250	854128	4.03	-7.51
CAROL RICHARDSON	AAA0560	Bay	301657.760	853944.980	14.	7.41
J.H. RAWLS	AAA0561	Bay	301950.630	855128.560	53.	44.97
USGS LAKE FIVE-O 1.5	AAA0582	Bay	302459.042	853947.096	87.56	40.63
EUGENE SANDY	AAA0583	Bay	303051.139	852435.325	200.	141.39
KING POWER EQUIPMENT	AAA0585	Bay	302614.515	852723.436	140.	100.21
COURT MARTIAL SHOP	AAA0586	Bay	302453	854454	95.	46.81
CAMP HEBERT WATTS	AAA0587	Bay	302422.874	853243.441	59.	34.65
STEPHEN SHEA	AAA1121	Bay	301744.572	855104.195	10.	6.56
STEELFIELD LF OFFICE	AAA1123	Bay	302131.466	855504.258	68.	42.85
GULF COAST E.COOP#1P	AAA1125	Bay	301918.223	853931.248	47.	43.22
PANAMA CITY BCH #13	AAA1187	Bay	301429.949	855252.326	21.	-60.94
CLAY PIT	AAA1213	Bay	302613.727	853446.547	79.10	36.25
GEORGE'S 40 FLD	AAA1214	Bay	302550.694	853635.780	105.37	38.74
TRAPP POND FLORIDAN	AAA1221	Bay	303131.838	852908.050	155.	57.56
DEEP SPRINGS PARK	AAA3882	Bay	303053.051	852713.104	180.	127.86
GEORGE STANLEY	AAA6449	Bay	302558.174	853203.833	113.08	30.71
LANSING SMITH #3	AAA6590	Bay	301607.736	854153.877	12.	-13.05
JR. STORE #75	AAA6593	Bay	302157.697	852618.659	83.	70.82
WHITEWATER FM. #1		Calhoun	303131.220	851748.380	195.	124.35
BAKER/MCCOLLUM	AAA0422	Calhoun	301432.890	851130.380	22.	29.11
AQUACULTURE FARM 6"	AAA0423	Calhoun	303324	850120	121.	57.99
BLOUNTSTOWN FLORIDAN	AAA0426	Calhoun	302659.970	850413.230	82.30	66.75
OKALOOSA ASPHALT	AAA0427	Calhoun	302524.310	851755.730	120.	103.30
ALTHA EAST	AAA0497	Calhoun	303417.720	850738.520	205.	41.91
ELBERT SHELTON	AAA0499	Calhoun	302807.150	851149.340	127.00	73.01
KINARD FIRE DEPT.	AAA0500	Calhoun	301615.440	851429.800	57.00	48.81
HARTFORD FARMS @ 275	AAA0501	Calhoun	301855.790	850739.810	81.00	45.64
CHIPOLA EXP. STATION	AAA0584	Calhoun	302550.931	851446.702	158.00	95.20
CLARKESVILLE P.O.	AAA6595	Calhoun	302609.795	851205.080	126.00	70.88
SHELTON PARK	AAA6596	Calhoun	303152.941	851137.655	120.00	67.29
EARL ELLIS	AAA6597	Calhoun	303155.552	851454.376	129.	93.12
WHITEWATER FARMS 4"	AAA6598	Calhoun	303156.630	851729.270	179.	129.88
DREW INNIS	AAA6599	Calhoun	303008.933	851047.953	102.	57.71
BILL WORTH HOME	AAA6600	Calhoun	303043.737	851155.699	111.	48.92
NELLIE FOWLER	AAA6601	Calhoun	302709.881	850949.551	37.	34.25
R. PARRISH	AAA6602	Calhoun	302615.189	850918.283	86.	28.11
EXXON SUPPLY		Gulf	300703	851604	41.	26.07
PORT ST JOE FLORIDAN	AAA0310	Gulf	294846.550	851717.400	20.	-13.05
INDIAN PASS CAMPGRND	AAA0414	Gulf	294103.020	851320.580	7.	3.97

WELL NAME	FLORIDA UNIQUE WELL I.D.	COUNTY	LATITUDE	LONGITUDE	ELEV. LSD	WATER LEVEL ELEV.
USAF SAN BLAS #107	AAA0415	Gulf	294033.440	852047.640	10.	7.75
PT ST JOE #3	AAA0419	Gulf	294936	851750	20.	-82.02
FICO MAIN	AAA0421	Gulf	300316.140	851659.720	30.	19.72
PONCE DE LEON #2	AAA0432	Holmes	304320.7	855706.9	139.	69.75
BONIFAY #2	AAA0434	Holmes	304709.700	854107.190	125.	89.38
ELTON CRUTCHFIELD	AAA0437	Holmes	305623.615	854838.904	103.	91.04
ESTO FLORIDAN	AAA0438	Holmes	305915.910	853825.010	219.10	165.24
B MILLER	AAA0495	Holmes	304456	855158	62.	50.87
L DENNING	AAA0496	Holmes	304312.510	855149.540	60.	41.97
CAMPBELLTON WELCOME	AAA0441	Jackson	305943.260	852430.090	148.21	131.83
COTTONDALE #3	AAA0442	Jackson	304746.170	852232.750	133.92	108.85
DOLOMITE INC	AAA0502	Jackson	303928.080	851001.180	85.	52.18
DONALD WYATT	AAA0503	Jackson	304248.070	851625.960	110.	66.15
L REHBERG	AAA0504	Jackson	304417.720	851921.360	115.	65.27
COMPASS LAKE TOWER	AAA6642	Jackson	303659.444	852312.754	305.	101.18
HOMER HIRT USGS #39	AAA6651	Jackson	304231.780	845400.980	98.75	72.96
N OF SNEADS BUCKHALT	AAA6652	Jackson	304932.770	845706.600	99.77	77.76
PITTMAN VISA MONITOR	AAA6653	Jackson	305113.310	850437.550	127.63	82.48
DITTY JC-1 (JK-28)	AAA6655	Jackson	305903.090	850634.030	147.	109.39
HW. 71 N. OF MALONE	AAA6657	Jackson	305825.770	851002.820	146.32	116.35
FRANCES RETTIG 4 INC	AAA6658	Jackson	304917.040	851239.300	106.84	73.03
INTERNATIONAL PAPER	AAA6659	Jackson	304413	850644	166.75	89.65
THOMPSON		Walton	303053	860753	59.79	14.26
CITY OF FREEPORT		Walton	302913	860812	2.70	13.53
POINT WASHINGTON		Walton	302221	860652	2.30	10.32
PT WASH FLRD TEST	AAA0304	Walton	301936	860401	41.93	20.20
M. FOUNTAIN	AAA0467	Walton	302231	862143	23.	-48.70
E. ALLEN	AAA0468	Walton	302058	861432	6.	0.46
FAF #2	AAA0469	Walton	303426	860611	153.46	35.52
FAF #72	AAA0470	Walton	303214	855804	123.	25.83
SELMA MADARA	AAA0471	Walton	302720.860	861017.080	4.	11.13
WEST HEWETT FLORIDAN	AAA0474	Walton	302223.541	861717.128	18.	-16.19
EAFB FLD-1 #2 #1204	AAA0557	Walton	304044	862116	230.17	70.52
OLD COWFORD	AAA0562	Walton	302636.380	855433.830	16.	21.98
EAFB ROCK HILL TWR	AAA0563	Walton	303545.030	860645.220	211.	27.36
USGS-NWFWMD/REDHORSE	AAA0564	Walton	302856	861834	20.	-2.72
EAFB SITE C-62	AAA0565	Walton	303954	861338	214.88	75.74
GEOGHAGAN	AAA0566	Walton	305110	861648	261.	176.94
PAXTON WELCOME CTR	AAA0567	Walton	305804.990	861807.930	324.	213.39
JACKSON STILL FLORD	AAA0568	Walton	305359.380	861225.700	270.	201.48
ARGYLE TOWER	AAA0570	Walton	304334	860324	261.	84.50
CAMP EUCHEE - BSA	AAA0572	Walton	304358	861208	274.	106.61
PETER	AAA0573	Walton	305043	860833	279.	184.32
EAFB - ALAQUA TOWER	AAA6662	Walton	304219	861404	201.	97.60
EAFB RANGE 63 #32	AAA6663	Walton	303426	861254	141.94	15.53
USGS PORTER POND FLD		Washington	303037.425	853113.692	140.33	52.43
BLUE SPRG SCOUT CAMP		Washington	302711.537	853148.104	37.	22.86
BEAR BAY OIL SITE-W		Washington	303223.682	854709.371	131.	36.43
USGS SECTION 1		Washington	303130.217	853527.132	75.98	64.38
USGS WALSINGHAM ROAD		Washington	302909.163	853229.186	117.18	46.58
USGS WALSINGHAM WEST		Washington	302850.357	853213.187	119.77	38.94
USGS STRICTLAND FLD		Washington	302628.228	853249.900	39.18	20.37
JOHN WALTON	AAA0428	Washington	303331.470	854526.440	197.	40.01
WILLIAMSON/YATES	AAA0429	Washington	303449.450	855155.880	78.	19.85
RICHARD JACKSON #1	AAA0430	Washington	303927.840	854358.040	74.	33.68
A. CHANDLER	AAA0477	Washington	303708	853119	100.	78.20
DOT WALLACE	AAA0478	Washington	304142.667	853547.116	104.	33.85
J. DORCH	AAA0479	Washington	304207.584	854356.252	90.	73.66
M. CONDRY	AAA0480	Washington	304039.643	854837.141	61.	45.61
L. TYSON	AAA0481	Washington	303926.276	855114.339	103.	38.76

WELL NAME	FLORIDA UNIQUE WELL I.D.	COUNTY	LATITUDE	LONGITUDE	ELEV. LSD	WATER LEVEL ELEV.
VERNON #1	AAA0482	Washington	303732	854242	45.	26.31
WCI #2	AAA0484	Washington	303103.576	853930.752	163.26	54.19
DELTONA CORP.	AAA0485	Washington	303413.994	853420.072	256.45	56.18
CARYVILLE #2	AAA0506	Washington	304705.8	854808.2	86.87	45.45
RICHARD CHUNDNER	AAA0507	Washington	303855.7	854140.7	42.	28.00
VERNON YOUTH CAMP	AAA0508	Washington	303614.2	854124.4	79.	34.04
NEW JERUSALEM	AAA0509	Washington	303317.7	854129.0	81.	55.00
ST MARKS/LUCAS LAKE	AAA0511	Washington	303306.406	854207.694	76.	55.33
TRACY AT GREENHEAD	AAA0512	Washington	303008.5	853934.2	143.52	53.14
ED ROGERS #2	AAA0513	Washington	302855.760	853951.290	120.36	48.46
PORTER POND EAST	AAA0579	Washington	303035.173	853111.753	136.62	50.37
SECTION 20	AAA0580	Washington	302836.441	853346.418	136.68	38.11
ALEX MEYER	AAA0581	Washington	302939.540	854317.490	138.	48.98
LEAMON HICKS 1996	AAA1094	Washington	302841.845	852938.476	110.	69.31
SOUTHERN STATES U.#5	AAA1095	Washington	303332.581	853147.047	224.	66.44
QUAIL RUN	AAA1096	Washington	302802.126	853235.136	130.	33.05
ERBO MOTEL	AAA1099	Washington	302636.914	855234.032	66.	31.45
GOLF LAKE	AAA1215	Washington	303101.594	853614.321	106.24	59.50
BLACKWATER SLOUGH	AAA1216	Washington	303043.215	853345.003	85.09	63.48
WALSINGHAM BRIDGE	AAA1217	Washington	302854.812	853130.368	45.84	37.23
POWER LINE	AAA1218	Washington	302618.631	853846.741	102.13	40.77
HIGHWAY 77	AAA1219	Washington	302730.368	854046.890	112.84	44.22
GREENHEAD ROAD	AAA1220	Washington	302846.773	853652.449	112.13	44.86
DANIEL POPE	AAA1222	Washington	303505.003	852729.950	270.	130.70
DUREN	AAA3902	Washington	302653.910	854212.019	102.	44.17
H. C. STRICTLAND	AAA6448	Washington	302628.831	853239.467	27.55	19.64
DURRELL HAYES	AAA6544	Washington	303941.559	853033.400	155.	54.56
FIVE POINT TOWER	AAA6547	Washington	304204.316	854549.005	122.	49.07
MOODY FIRE TOWER	AAA6548	Washington	302925.315	855029.610	104.	23.10
PITTS	AAA6549	Washington	302710.204	853141.068	49.	25.27
E. DAVIS	AAA6587	Washington	304040.239	853249.478	99.	46.63
D. SPIKER	AAA6588	Washington	303227.696	853504.975	124.89	65.84
SUNNY HILLS MAIN ENT	AAA6589	Washington	303304.504	853735.308	147.55	58.29
WAUSAU FIRE TOWER	AAA6640	Washington	303527.400	853535.437	271.79	51.68
CHIPLEY #3	AAA6643	Washington	304644.8	853219.4	106.92	59.72
WAUSAU #2	AAA6644	Washington	303808.683	853519.287	85.89	34.94
L. WALSINGHAM	AAA6645	Washington	303407.0	854532.7	210.	34.07
FINANCIAL HELP STORE	AAA6646	Washington	303305.2	855116.2	30.	18.62
KENNEL CLUB #1	AAA6647	Washington	302648.313	855233.267	59.	28.57
DYSON #1	AAA6650	Washington	303533.968	854723.414	39.	21.92
WILLIAM FISHER	AAA6667	Washington	304611.180	853037.910	128.	60.62
L. ROGERS	AAA6671	Washington	303618.910	853607.957	168.93	37.74
USGS 422A NR GREENHD	AAA6986	Washington	303024.780	853502.990	67.11	60.44

Latitude/Longitude Datum: NAD27

APPENDIX B

Construction Information for Wells Installed as Part of the Test Well Drilling Program

Site ID #: 302613085344601 Type: G Key: 5959
Well Name: CLAY PIT Map #: 62660
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 5 Phone: 904-539-5999
Latitude: 302613.727 Longitude: 853446.547
Method: 2 Accy: .1
Land Net Location: AABS006T01SR13W Elevation: 79.1
Location Map: BENNETT FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 248 Depth Of Casing: 185
MP Distance From LSD: 1.57 Diameter: 4
Source 1: S Casing Material: P
Finish: X Driller License #: 2226
Date of Construction: 02-JUL-96 Method of Construction: H
Screen Length:
Screened Intervals:

Water Level: -43.77 Measure Date: 12-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601189
Fl Geological Survey #: W17440 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1213
Project #'s: 54
Geophysical Log #: 52 Depth Logged: 248
Available LOG Data: C J E

Data Reliability: C Visited By: C.RICHARDS
Date Visited 02-JUL-96
Data Entry By: CR Date Entered: 22-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,22-JUL-96) AKA WELL #3;MP = TOP OF 4 INCH PVC CASING = +1.57 FT LSD;MP ELEVATION = 80.67;ELEVATION LEVELED BY NWFWMD NGVD 1929;THREADED FLUSH JOINT WELL CASING USED; STEEL SURFACE CASING USED AND RETREIVED

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17440
TOTAL DEPTH: 248 FT.
14 SAMPLES FROM 0 TO 248 FT.

COUNTY - BAY
LOCATION: T.01S R.13W S.06 AB
LAT = 30D 26M 14S
LON = 85D 34M 46S

COMPLETION DATE: 07/02/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 79 FT

OWNER/DRILLER:CLAY PIT/ NORTHWEST FL WATER MGT DIST, C. RICHARDS

WORKED BY:C. TRIMBLE; 8/28/96; 14 BAGS WASHED CUTTINGS

0.	-	28.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
28.	-	48.	000NOSM	NO SAMPLES
48.	-	100.	122JKBL	JACKSON BLUFF FM.
100.	-	185.	000NOSM	NO SAMPLES
185.	-	195.	122CTTC	CHATTAHOOCHEE FM.
195.	-	248.	123SWNN	SUWANNEE LIMESTONE

0 - 8 SAND; VERY LIGHT ORANGE TO PINKISH GRAY
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; UNCONSOLIDATED
ACCESSORY MINERALS: HEAVY MINERALS-01%
OTHER FEATURES: GRANULAR
FOSSILS: NO FOSSILS
LARGE GRAINS FROSTED; <1% CHARCOAL; <1% MICA

8 - 18 AS ABOVE

18 - 28 AS ABOVE

28 - 48 NO SAMPLES

48 - 50 SHELL BED; YELLOWISH GRAY
15% POROSITY: INTERGRANULAR; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
CLAY MATRIX
ACCESSORY MINERALS: MICA-01%, CLAY-02%, QUARTZ SAND-05%
SPAR-02%
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, SPICULES
BENTHIC FORAMINIFERA
FOSSILERFOUS LIMESTONE, MICRITE/CLAY MATRIX

50 - 60 SHELL BED; LIGHT OLIVE GRAY TO OLIVE GRAY
20% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-02%, CLAY-01%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, SPICULES, ECHINOID
SHELL BED:WHITE AND BLACK SHELL IN OLIVE GRAY MICRITE
MATRIX <1% MICA; LARGE MOLLUSK SHELL FRAGMENTS

60 - 70 SHELL BED; LIGHT OLIVE GRAY TO VERY LIGHT GRAY
35% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-03%, MICA-02%, CLAY-02%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID, SPICULES
UNCONSOLIDATED SHELL BED, MANY MOLLUSK SHELLS AND FRAGMENTS
A FEW GASTROPODS, BUT MOSTLY PELECYPODS

70 - 80 SHELL BED; YELLOWISH GRAY TO LIGHT OLIVE GRAY
30% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-05%, MICA-02%, CLAY-02%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, SPICULES, BRYOZOA
ECHINOID
<1% PYRITE

80 - 100 AS ABOVE

100 - 185 NO SAMPLES

185 - 195 LIMESTONE; VERY LIGHT ORANGE TO LIGHT BLUISH GRAY
25% POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-02%, LIMONITE-01%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS
CALCARENITE, PALE ORANGE WITH PALE BLUE-GRAY A FEW IRON
CONCRETIONS

195 - 206 DOLOSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, LIMESTONE-20%
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CORAL
MOLLUSKS
MICROCRYSTALLINE LIMESTONE AND DOLOMITE, WITH SOME FOSSILS
SOME FINE-GRAINED CALCILUTITE IS MIXED WITH THESE CUTTINGS

206 - 216 DOLOSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
INTERGRANULAR; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT
CALCILUTITE MATRIX
ACCESSORY MINERALS: PYRITE-01%, LIMESTONE-30%
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CORAL
BRYOZOA
HARD, BROWN, VUGGY DOLOMITE

216 - 227 AS ABOVE

227 - 237 LIMESTONE; WHITE TO PINKISH GRAY
30% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MEDIUM TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%, PYRITE-01%
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, MOLLUSKS
CORAL, BRYOZOA
SOME DOLOSTONE FROM ABOVE INTERMIXED, A SMALL AMOUNT OF
PEACOCK ORE

237 - 248 AS ABOVE

248 TOTAL DEPTH

Northwest Florida Water Management District

Site ID #: 302550085363501 Type: G Key: 5958
Well Name: GEORGE'S 40 FLD Map #: 62659
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 5 Phone: 904-539-5999
Latitude: 302550.694 Longitude: 853635.78
Method: 2 Accy: .1
Land Net Location: DCBS002T01NR14W Elevation: 105.37
Location Map: BENNETT FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 270 Depth Of Casing: 170
MP Distance From LSD: 2.12 Diameter: 4
Source 1: S Casing Material: P
Finish: X Driller License #: 2226
Date of Construction: 08-JUL-96 Method of Construction: H
Screen Length:
Screened Intervals:

Water Level: -67.42 Measure Date: 12-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601188
Fl Geological Survey #: W17442 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1214
Project #'s: 54
Geophysical Log #: 58 Depth Logged: 227
Available LOG Data: C J

Data Reliability: C Visited By: C.RICHARDS
Date Visited 08-JUL-96
Data Entry By: CR Date Entered: 22-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,22-JUL-96) AKA WELL #9;MP = TOP OF 4 INCH PVC CASING = +2.12 FT LSD;MP ELEVATION = 107.49;ELEVATION LEVELED BY NWFWMD NGVD 1929;THREADED FLUSH JOINT PVC WELL CASING AND 8 INCH SOLVENT BONDED (GLUE) SURFACE CASING USED, SURFACE CASING NOT GROUTED AND NOT RETREIVED

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17442
TOTAL DEPTH: 00270 FT.
23 SAMPLES FROM 0 TO 270 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.14W S.02 CB
LAT = 20D 25M 51S
LON = 85D 36M 36S

COMPLETION DATE: 07/08/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 105 FT

OWNER/DRILLER:GEORGE'S #40/NORTHWEST FL WATER MGT DISTRICT C. RICHARDS

WORKED BY:C. TRIMBLE, 9/4/96, 23 BAGS OF WASHED CUTTINGS

0.	-	81.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
81.	-	89.	122JKBL	JACKSON BLUFF FM.
89.	-	151.	122CHPL	CHIPOLA FM.
151.	-	170.	000NOSM	NO SAMPLES
170.	-	249.	122CTTC	CHATTAHOOCHEE FM.

0 - 18 SAND; GRAYISH ORANGE TO DARK YELLOWISH ORANGE
33% POROSITY: INTERGRANULAR
GRAIN SIZE: COARSE; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: CLAY-01%, IRON STAIN-01%
LIMESTONE-02%
OTHER FEATURES: FROSTED
FOSSILS: BRYOZOA, FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID

18 - 28 SAND; WHITE TO PINKISH GRAY
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMESTONE-01%
OTHER FEATURES: VARVED, GREASY, FROSTED
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
BENTHIC FORAMINIFERA
BIMODAL SAND: LARGER, ROUNDER GRAINS ARE FROSTED, ABOUT 60%
IS MED SAND OR FINER CONTAINS FRAGMENTS OF YELLOWISH WHITE
LIMESTONE & FOSSIL FROM KARST

28 - 39 AS ABOVE

39 - 49 SAND; WHITE TO PINKISH GRAY
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMESTONE-02%, MICA-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
BENTHIC FORAMINIFERA
1ST OCCURANCE OF MICA, HEAVY MINERALS <1%;LARGE GRAINS
FROSTED DECREASING COARSER FRACTION WITH DEPTH (COARSENING
UPWARD?)

49 - 60 SAND; WHITE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
ACCESSORY MINERALS: MICA-01%, LIMESTONE-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
BENTHIC FORAMINIFERA
A FEW AGGREGATES OF IRON/CLAY CEMENTED SAND

60 - 70 SAND; WHITE
30% POROSITY: INTERGRANULAR, FRACTURE, VUGULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: SUB-ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: HEAVY MINERALS-02%, CLAY-01%, MICA-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
ABOUT 2% CLAY CEMENTED SAND AGGREGATES

70 - 81 SAND; VERY LIGHT ORANGE
28% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: HEAVY MINERALS-02%, CLAY-02%, MICA-01%
OTHER FEATURES: MUDDY
FOSSILS: NO FOSSILS
COARSE FRACTION FONE, ABOUT 50% CLAY COATED AGGREGATES
VERY WEAKLY CEMENTED <1% IRON STAIN/CEMENT

81 - 86 SHELL BED; LIGHT BROWN TO DARK YELLOWISH ORANGE
25% POROSITY: INTERGRANULAR; POOR INDURATION
ACCESSORY MINERALS: CLAY-05%, MICA-01%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS
ECHINOID
MOLLUSCAN SHELL BED IN A CLAYEY SAND MATRIX, <1% SPARRY
CALCITE

86 - 89 SHELL BED; WHITE TO LIGHT OLIVE GRAY
20% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: CLAY-01%, QUARTZ SAND-03%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS
ECHINOID, BRYOZOA
HEAVY MINERALSAND MICA <1%, ORANGE MOTTLED, WHITE TO LIGHT
ORANGE SOME FOSSILS COMPLETELY REPLACED BY SPAR POORLY TO
MODERATELY CEMENTED

89 - 100 LIMESTONE; YELLOWISH GRAY
10% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO VERY COARSE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-20%, MICA-01%, CLAY-01%
OTHER FEATURES: VARVED, MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS
ECHINOID, BRYOZOA
MODERATE TO HIGH REPALCEMENT OF MOLLUSKS; A FEW PYRITE
GRAINS

100 - 110 LIMESTONE; LIGHT GRAY TO YELLOWISH GRAY
10% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO VERY COARSE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-10%, CLAY-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS
ECHINOID, BRYOZOA
HEAVY MINERALS <1%, SPAR AS ABOVE

110 - 119 LIMESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
20% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-01%, MICA-01%
OTHER FEATURES: MUDDY
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, MOLLUSKS
ALGAE, BRYOZOA
MUDDY CALCILUTITE: OYSTERS, PECTINS, AND FOLDS OF
GASTROPODS

119 - 140 AS ABOVE

140 - 151 AS ABOVE

151 - 170 NO SAMPLES

170 - 186 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
15% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO GRANULE; MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: LIMESTONE-35%, QUARTZ SAND-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
MILIOLIDS
FEW RECOGNIZABLE FOSSILS

186 - 196 AS ABOVE

196 - 207 AS ABOVE

207 - 217 AS ABOVE

217 - 228 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: VUGULAR, PIN POINT VUGS; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: LIMESTONE-35%, QUARTZ SAND-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS
FOSSIL MOLDS

228 - 238 AS ABOVE

238 - 249 AS ABOVE

249 - 259 LIMESTONE; VERY LIGHT ORANGE TO WHITE
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
65% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
ACCESSORY MINERALS: DOLOMITE-25%, QUARTZ SAND-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
FOSSIL FRAGMENTS, FOSSIL MOLDS
FORAM RICH, CALCARENITE; MODERATE TO HIGH RECRYSTALIZATION
FOSSILS INCLUDE NUMMULITES AND LEPIDOCYCLINA

259 - 270 LIMESTONE; PINKISH GRAY
30% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
98% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%, QUARTZ SAND-01%
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
FOSSIL FRAGMENTS, MOLLUSKS
VERY LITTLE CEMENT; INDEX FOSSILS INCLUDE: PARAROTALIA
BYRAMENSIS, L. MANTELLI

270 TOTAL DEPTH

Site ID #: 302618085384601 Type: G Key: 5953
Well Name: POWER LINE Map #: 62654
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 133 Phone: 904-539-5999
Latitude: 302618.631 Longitude: 853846.741
Method: 2 Accy: .1
Land Net Location: CCDS033T01NR14W Elevation: 102.13
Location Map: CRYSTAL LAKE FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 247 Depth Of Casing: 147
MP Distance From LSD: 2.15 Diameter: 4
Source 1: S Casing Material: S
Finish: X Driller License #: 2226
Date of Construction: 09-MAY-96 Method of Construction: C
Screen Length:
Screened Intervals:

Water Level: -62.03 Measure Date: 11-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601187
Fl Geological Survey #: W17439 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1218
Project #'s: 54
Geophysical Log #: 51 Depth Logged: 247
Available LOG Data: C J E B

Data Reliability: C Visited By: C.RICHARDS
Date Visited 11-JUL-96
Data Entry By: CR Date Entered: 18-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,18-JUL-96) AKA WELL #2; MP = TOP OF 4 INCH STEEL CASING = +2.15 FT LSD; MP ELEVATION = 104.28 FT; ELEVATION LEVELED BY NWFWMD NGVD 1929.

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17439
TOTAL DEPTH: 247 FT.
23 SAMPLES FROM 0 TO 247 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.14W S.33 CD
LAT = 30D 26M 18S
LON = 85D 38M 46S

COMPLETION DATE: 05/09/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 102 FT

OWNER/DRILLER:POWERLINE/NW FLORIDA WATER MANAGEMENT DISTRICT, C. RICHARDS

WORKED BY:C. TRIMBLE, 8/27/96, 23 BAGS OF WASHED CUTTINGS

0. -	57.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
57. -	59.	000NOSM	NO SAMPLES
59. -	69.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
69. -	122.	122JKBL	JACKSON BLUFF FM.
122. -	132.	122CHPL	CHIPOLA FM.
132. -	146.	000NOSM	NO SAMPLES
146. -	184.	122CTTC	CHATTAHOOCHEE FM.
184. -	247.	123SWNN	SUWANNEE LIMESTONE

0 - 7 SAND; LIGHT YELLOWISH ORANGE
30% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: CHERT-01%
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
A FEW PIECES OF CHARCOAL; <1% HEAVY MINERALS, LARGER GRAINS ARE FROSTED

7 - 17 SAND; VERY LIGHT ORANGE
30% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: CHERT-01%
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
<1% HEAVY MINERALS; LARGE QUARTZ GRAINS FROSTED

17 - 27 SAND; PINKISH GRAY TO YELLOWISH GRAY
30% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: COARSE; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: CHERT-02%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS
TAR BALLS AND OTHER DRILLING TRASH, CHERT MAY BE WHITE OF <1% MICRITE

27 - 37 SAND; VERY LIGHT ORANGE TO LIGHT YELLOWISH ORANGE
30% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: HEAVY MINERALS-01%, CHERT-02%
MICA-01%, CLAY-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS
FROSTED SAND INCLUDES SOME CLAY CEMENTED PARTICLES, FOSSIL
ALGAE?

37 - 47 AS ABOVE

47 - 57 AS ABOVE

57 - 69 SAND; LIGHT BROWN TO LIGHT BROWN
25% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
ACCESSORY MINERALS: MICA-02%, CLAY-03%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, SPICULES
BENTHIC FORAMINIFERA
BROWN CLAY COATED SAND AND SILT AGGREGATES WITH COMMON
MOLLUSCAN FOSSILS, MICA OF COARSE TO LARGE SAND SIZE; < 1%
HEAVY MINERALS

69 - 80 SHELL BED; YELLOWISH GRAY TO GRAYISH BROWN
30% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-08%, MICA-01%, CLAY-03%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, SPICULES
BENTHIC FORAMINIFERA, ECHINOID
SHELL BED, MICRITE AND CLAY CEMENT, <1% HEAVY MINERALS

80 - 84 SHELL BED; LIGHT OLIVE GRAY TO OLIVE GRAY
30% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-10%, MICA-02%, CLAY-01%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
SPICULES, MILIOLIDS
SHELL BED, MICRITE CEMENT, <1% HEAVY MINERALS

84 - 95 AS ABOVE

95 - 98 AS ABOVE

98 - 122 LIMESTONE; YELLOWISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-01%
HEAVY MINERALS-02%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, SPICULES
BENTHIC FORAMINIFERA, BRYOZOA
DECREASING FOSSILS WITH DEPTH, QUARTZ SAND FROM FINE TO
VERY COARSE SIZE

122 - 130 LIMESTONE; VERY LIGHT ORANGE
30% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-11%
HEAVY MINERALS-02%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, CORAL
BENTHIC FORAMINIFERA, BRYOZOA
ABOUT 2% CLAY

130 - 132 AS ABOVE

132 - 147 AS ABOVE

147 - 163 LIMESTONE; WHITE TO VERY LIGHT GRAY
30% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-05%, PHOSPHATIC SAND-01%
QUARTZ SAND-01%
FOSSILS: MOLLUSKS, WORM TRACES, FOSSIL FRAGMENTS, BRYOZOA
BENTHIC FORAMINIFERA

163 - 173 LIMESTONE; WHITE TO VERY LIGHT ORANGE
30% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-01%
FOSSILS: MOLLUSKS, WORM TRACES, FOSSIL FRAGMENTS
BENTHIC FORAMINIFERA, FOSSIL MOLDS
GASTROPOD MOLDS AND FRAGMENTS OF MOLLUSKS

173 - 184 LIMESTONE; VERY LIGHT ORANGE TO PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-10%, QUARTZ SAND-01%
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
ALGAE, WORM TRACES
PINKISH GRAY LST, VERY LITTLE RECRYSTALIZATION

184 - 194 LIMESTONE; VERY LIGHT ORANGE TO PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-20%, QUARTZ SAND-01%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: BRYOZOA, CORAL, ALGAE, MOLLUSKS, FOSSIL FRAGMENTS
DOLOMITE INCREASING WITH DEPTH, ALSO INCREASING AMOUNTS OF
SPAR FOSSILS BECOMING MORE RECRYSTALLIZED WITH DEPTH

194 - 205 DOLOSTONE; VERY LIGHT ORANGE
25% POROSITY: PIN POINT VUGS, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
FOSSILS UNRECOGNIZABLE

Site ID #: 302730085404601 Type: G Key: 5954
Well Name: HIGHWAY 77 Map #: 62655
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 133 Phone: 904-539-5999
Latitude: 302730.368 Longitude: 854046.89
Method: 2 Accy: .1
Land Net Location: CADS030T01NR14W Elevation: 112.84
Location Map: CRYSTAL LAKE FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 268 Depth Of Casing: 166
MP Distance From LSD: 2.09 Diameter: 4
Source 1: S Casing Material: S
Finish: X Driller License #: 2226
Date of Construction: 10-MAY-96 Method of Construction: C
Screen Length:
Screened Intervals:

Water Level: -69.12 Measure Date: 11-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601386
Fl Geological Survey #: W17446 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1219
Project #'s: 54
Geophysical Log #: 50 Depth Logged: 265
Available LOG Data: J E

Data Reliability: C Visited By: C.RICHARDS
Date Visited 11-JUL-96
Data Entry By: CR Date Entered: 19-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,19-JUL-96) AKA WELL #1; MP = TOP OF 4 INCH STEEL CASING = +2.09 FT LSD; MP ELEVATION = 114.93; ELEVATION LEVELED BY NWFWMD NGVD 1929

LITHOLOGIC WELL LOG PRINTOUT   SOURCE - FGS

WELL NUMBER: W-17446
TOTAL DEPTH: 00268 FT.
25 SAMPLES FROM 0 TO 268 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.14W S.03 AD
LAT = 30D 27M 30S
LON = 85D 40M 47S

COMPLETION DATE: 05/10/96
ELEVATION: 113 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER:HIGHWAY 77/NORTHWEST FL WATER MGT DISTRICT, C. RICHARDS

WORKED BY:TRIMBLE,9/9/96, 25 BAGS WASHED CUTTINGS

0.	- 69.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
69.	- 79.	122JKBL	JACKSON BLUFF FM.
79.	- 149.	122CHPL	CHIPOLA FM.
149.	- 168.	000NOSM	NO SAMPLES
168.	- 218.	122BCCK	BRUCE CREEK LIMESTONE
218.	- 248.	122CTTC	CHATTAHOOCHEE FM.
248.	- 268.	123SWNN	SUWANNEE LIMESTONE

0 - 10 SAND; LIGHT BROWN TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, MOLLUSKS
HEAVY MINERALS, CHERT,CLAY,AND LIMESTONE:ALL <1% LARGER
GRAINS: FROSTED, SUBROUNDED AND COATED WITH CLAY SMALLER
GRAINS: CLEAR AND ANGULAR FOSSILS AND FOSSIL FRAGMENTS
PROBALBY DUE TO KARST: OCALA OR SWNN

10 - 19 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, BRYOZOA
ECHINOID
ACCESSORY MINERALS AS ABOVE, FRAGMENTS OF FOSSILIFEROUS
LIMESTONE SPARRY CEMENT, OUT OF PLACE: OCALA OR SUWANNEE

19 - 29 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
LARGER GRAINS FROSTED & ROUNDED; LIMESTONE DISAPPEARS

29 - 38 AS ABOVE

38 - 39 NO SAMPLES

39 - 49 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS

49 - 59 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED, VARVED
FOSSILS: FOSSIL FRAGMENTS
MICA, CHERT, LST: <1%; FOSSIL FRAGMENTS REAPPEAR

59 - 69 SAND; MODERATE YELLOWISH BROWN TO LIGHT OLIVE GRAY
30% POROSITY: INTERGRANULAR
GRAIN SIZE: VERY COARSE; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: MICA-01%, CLAY-03%, CALCILUTITE-01%
FOSSILS: BENTHIC FORAMINIFERA
SMALL AMOUNTS OF CLAYS WEAKLY CEMENTING SAND AGGREGATES
HEAVY MINERALS AND CHERT <1%

69 - 79 SHELL BED; LIGHT OLIVE GRAY TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-15%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID
BENTHIC FORAMINIFERA, BRYOZOA
MOLLUSCAN SHELL BED, INCLUDES FRAGMENTS OF DOLOSTONE AND
AND CRYSTALLINE LIMESTONE

79 - 89 LIMESTONE; LIGHT OLIVE GRAY TO LIGHT GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
35% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-15%, CLAY-03%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, FOSSIL MOLDS, BRYOZOA
SANDY LIMESTONE

89 - 99 AS ABOVE

99 - 109 LIMESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-10%
OTHER FEATURES: CHALKY
FOSSILS: BRYOZOA, ECHINOID, FOSSIL FRAGMENTS, MOLLUSKS
BENTHIC FORAMINIFERA

109 - 119 AS ABOVE

119 - 129 LIMESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-03%
OTHER FEATURES: CHALKY, MEDIUM RECRYSTALLIZATION
FOSSILS: BRYOZOA, BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS
MOLLUSKS, ECHINOID
FRAGMENTS OF CALC ALGAE,CORAL & FOSSIL MOLDS; HEAVY
MINERALS <1%

129 - 139 LIMESTONE; YELLOWISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-10%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CORAL, BRYOZOA, FOSSIL MOLDS, FOSSIL FRAGMENTS
CALARENITE: ALSO INCLUDES SPONGE SPICULES AND ECHINOID
SPINES

139 - 149 LIMESTONE; VERY LIGHT ORANGE
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-10%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CORAL, BRYOZOA, FOSSIL MOLDS, FOSSIL FRAGMENTS
RESEMBLES ST. MARKS; MOTTLED GRAY TO LT ORANGE LST

149 - 168 NO SAMPLES

168 - 179 LIMESTONE; WHITE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: CHALKY, HIGH RECRYSTALLIZATION
FOSSILS: ALGAE, BRYOZOA, FOSSIL FRAGMENTS, FOSSIL MOLDS
ECHINOID
MICRITIC LST WITH FEW FOSSILS

179 - 188 AS ABOVE

188 - 198 AS ABOVE

198 - 208 AS ABOVE
INCREASING AMOUNTS OF CALC. ALGAE AT THE BOTTOM OF THE
INTERVAL

208 - 218 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO GRANULE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
FOSSILS: ALGAE, BRYOZOA, FOSSIL FRAGMENTS

218 - 228 DOLOSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
15% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-25%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: ALGAE
FOSSILS APPEAR TO BE FROM OVERLYING INTERVALS

Site ID #: 303035085311101
Type: G Key: 5960
Well Name: PORTER POND EAST
Map #: 62661
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA
State: FL Zip: 32333
County: 133
Phone: 904-539-5999
Latitude: 303035.173
Longitude: 853111.753
Method: 2
Accy: .1
Land Net Location: AAAS011T01NR13W
Elevation: 136.62
Location Map: GAP LAKE FL
GW Region: 3

Use of Site: M
Use of Water: MO

Well Depth: 263
Depth Of Casing: 165
MP Distance From LSD: 2.22
Diameter: 4
Source 1: S
Casing Material: P
Finish: X
Driller License #: 2226
Date of Construction: 24-JUN-96
Method of Construction: H
Screen Length:
Screened Intervals:

Water Level: -85.35
Measure Date: 15-JUL-96
Source 2: S
Method 2: S

Hydrogeologic Units: A
Stratigraphic Units:

Type of Lift: N
Type of Power:
Horsepower:
Pump Intake:
Normal Yield:
Test Discharge:
Source 3:
Method of Measurement:
Static Level:
Pumping Level:
Drawdown:
Hours Pumped:
Specific Capacity

FIELD WATER QUALITY
Date of Sample:
Temperature:
pH:
Specific Conductance:
Chloride:

Consumptive Use Permit #:
Construction Permit #: 9601391
Fl Geological Survey #: W17441
Abandonment Permit #:
DEP PWSID #:
Well Tag #: AAA0579
Project #'s: 54
Geophysical Log #: 57
Depth Logged: 263
Available LOG Data: C J E

Data Reliability: C
Visited By: C.RICHARDS
Date Visited 24-JUN-96
Data Entry By: CR
Date Entered: 23-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,23-JUL-96) AKA WELL #8;MP = TOP OF 4 INCH PVC CASING = +2.22 FT LSD;MP ELEVATION = 138.84;ELEVATION LEVELED BY NWFWMD NGVD 1929;THREADED FLUSH JOINT PVC WELL CASING AND 8 INCH SOLVENT BONDED (GLUE)SURFACE CASING USED, SURFACE CASING NOT GROUTED AND NOT RETREIVED.

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17441
TOTAL DEPTH: 263 FT.
26 SAMPLES FROM 0 TO 263 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.13W S.11 AA
LAT = 30D 30M 35S
LON = 85D 31M 12S

COMPLETION DATE: 06/24/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 134 FT

OWNER/DRILLER:PORTER POND EAST/NORTHWEST FL WATER MGT DIST, C. RICHARDS

WORKED BY:C. TRIMBLE, 8/30/96, 26 BAGS WASHED CUTTINGS

0.	-	81.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
81.	-	100.	122JKBL	JACKSON BLUFF FM.
100.	-	110.	000NOSM	NO SAMPLES
110.	-	120.	122CTTC	CHATTAHOOCHEE FM.
120.	-	121.	000NOSM	NO SAMPLES
121.	-	161.	122CTTC	CHATTAHOOCHEE FM.
161.	-	263.	123SWNN	SUWANNEE LIMESTONE

0 - 9 SAND; GRAYISH ORANGE TO LIGHT BROWN
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMESTONE-02%, CHERT-01%
OTHER FEATURES: FROSTED
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, MOLLUSKS
<1% HEAVY MINERALS, DOLOMITE AND LIMONITE; <0.5% QUARTZ OF
CONTAINS FRAGMENTS OF FOSSILIFEROUS LIMESTONE INCLUDING:
FORAMS, AND OTHER FOSSILS PROBABLY OUT OF PLACE (KARST
AREA)

9 - 18 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMESTONE-02%, CHERT-01%
HEAVY MINERALS-01%
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, CORAL, MOLLUSKS
CONTAINS FOSSILS AS ABOVE, ALSO FRAGMENTS OF DOLOMITE WITH
INCLUSIONS OF MICROCRYSTALLINE PYRITE

18 - 28 SAND; VERY LIGHT ORANGE TO GRAYISH BROWN
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMESTONE-01%, CHERT-02%, MICA-01%
OTHER FEATURES: FROSTED
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA
BIMODEL GRAIN SIZE: 20% LARGER, ROUNDER, FROSTED GRAINS
MIXED WITH 80 % FINER UNFROSTED SAND GRAINS HEAVY MINERALS
< 1%

28 - 39 AS ABOVE

39 - 60 SAND; WHITE TO VERY LIGHT ORANGE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: CHERT-01%
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA
FINE WHITE SAND MIXED WITH ABOUT 10% COARSER, FROSTED
GRAINS HEAVY MINERALS <1%, MICA <1%.

60 - 70 SAND; WHITE TO PINKISH GRAY
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: MICA-01%, CHERT-01%, CLAY-01%
OTHER FEATURES: FROSTED
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA
HEAVY MINERALS <1%

70 - 81 SAND; GRAYISH ORANGE TO MODERATE BROWN
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: LIMONITE-03%, LIMESTONE-05%, CLAY-05%
MICA-01%
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID
15% AGGREGATES OF BROWN CLAY, CEMENTED SANDS HEAVY MINERALS
<1%, LARGER GRAINS FROSTED

81 - 86 SHELL BED; OLIVE GRAY TO WHITE
35% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-15%
FOSSILS: MOLLUSKS, ECHINOID, CORAL, BRYOZOA
BENTHIC FORAMINIFERA
SHELL BED, CEMENTED WITH MICRITE AND CLAY, SOME MOLLUSK
SHELLS SHOW ALGAL BORINGS

86 - 90 SHELL BED; OLIVE GRAY TO YELLOWISH GRAY
30% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-10%
FOSSILS: MOLLUSKS, ECHINOID, BRYOZOA, FOSSIL FRAGMENTS
LESS SHELL, OTHERWISE AS ABOVE, A FEW CLASTS OF FINE
GRAINED UNFOSSILIFERSOUS CALCILUTITE

90 - 100 SHELL BED; YELLOWISH GRAY TO OLIVE GRAY
25% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-30%
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS
SHELLS MORE FRAGMENTED, LESS WELL PRESERVED, MORE
TERRIGENOUS SANDS AND CLAYS

100 - 110 NO SAMPLES

110 - 120 LIMESTONE; PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, QUARTZ SAND-30%
OTHER FEATURES: VARVED, POOR SAMPLE, SUCROSIC, GREASY
MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, SPICULES
FOSSIL MOLDS, MOLLUSKS
LITHOLOGY SIMILAR TO ST. MARKS

120 - 121 NO SAMPLES

121 - 131 LIMESTONE; VERY LIGHT ORANGE
10% POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE, BIOGENIC
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-30%, QUARTZ SAND-02%
PYRITE-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
DOLOSILT, RECRYSTALLIZED LIMESTONE AND DOLOSTONE, FEW
FOSSILS CONTAINS SPAR, LOOKS LIKE CHATTAHOOCHEE

131 - 141 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY
10% POROSITY: INTERCRYSTALLINE, INTERGRANULAR
PIN POINT VUGS
GRAIN TYPE: CRYSTALS, CALCILUTITE, BIOGENIC
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: CHERT-15%, QUARTZ SAND-03%
PHOSPHATIC SAND-01%, MICA-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS

141 - 151 LIMESTONE; LIGHT BROWNISH GRAY TO MODERATE DARK GRAY
10% POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE, BIOGENIC
03% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%, QUARTZ SAND-05%
MICA-02%, CLAY-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
CONTAINS < 1% CHERT, ALSO FINE GRAINED TERRIGENOUS
MATERIAL: SILT AND SAND SIZE QUARTZ

151 - 161 LIMESTONE; LIGHT OLIVE GRAY
20% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CRYSTALS, CALCILUTITE, BIOGENIC
01% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-15%, MICA-02%, CLAY-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
TERRIGENOUS CLASTIC RICH LIMESTONE FEW FOSSILS, FRAGMENTS
OF WHITE TO GRAY LIMESTONE IN A FINE SAND/ CLAY/MICRITE
MATRIX

161 - 165 LIMESTONE; WHITE TO YELLOWISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-05%, MICA-01%, CLAY-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, FROSTED, VARVED
MEDIUM RECRYSTALLIZATION, BROWN ANHYDRITE CRYSTALS
FOSSILS: ECHINOID
PARAROTALIA, LEPS., GYPSINA; CALCARENITE, NO CEMENT

165 - 179 LIMESTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
98% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
ACCESSORY MINERALS: PYRITE-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, MOLLUSKS
BRYOZOA

179 - 189 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
98% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
ACCESSORY MINERALS: PYRITE-01%, DOLOMITE-05%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, MOLLUSKS
BRYOZOA, ECHINOID

189 - 200 LIMESTONE; YELLOWISH GRAY TO MODERATE LIGHT GRAY
10% POROSITY: INTERGRANULAR, VUGULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
55% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: PYRITE-01%, DOLOMITE-30%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, MOLLUSKS
STREAKS OF CHALCOPYRITE WITHIN SPARRY DOLOMITE

200 - 210 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY
20% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
FOSSIL FRAGMENTS
UNCEMENTED TO POORLY CEMENTED FORAM SAND, SPAR PRESENT

210 - 221 LIMESTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
FOSSIL FRAGMENTS

221 - 231 LIMESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
10% POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
30% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
DOLOMITE CEMENT
ACCESSORY MINERALS: PYRITE-01%, DOLOMITE-30%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, FOSSIL FRAGMENTS
PARTIALLY DOLOMITIZED, HIGHLY RECRYSTALLIED IN PARTS

231 - 242 AS ABOVE

242 - 252 AS ABOVE

252 - 263 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY
10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
PIN POINT VUGS
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: GLAUCONITE-01%, DOLOMITE-30%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY
HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, BRYOZOA
VERTEBRATE
SMALL AMOUNTS OF GLAUCONITE APPEAR, INDURATION MODERATE TO GOOD, PARTIALLY DOLOMITIZED, HIGHLY RECRYSTALLIED, COULD BE MARIANNA LIMESTONE

263 TOTAL DEPTH

Site ID #: 302836085334601 Type: G Key: 5961
Well Name: SECTION 20 Map #: 62662
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 133 Phone: 904-539-5999
Latitude: 302836.441 Longitude: 853346.418
Method: 2 Accy: .1
Land Net Location: BDAS020T01NR13W Elevation: 136.68
Location Map: BENNETT FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 290 Depth Of Casing: 195
MP Distance From LSD: 1.7 Diameter: 4
Source 1: S Casing Material: P
Finish: X Driller License #: 2226
Date of Construction: 12-JUL-96 Method of Construction: H
Screen Length:
Screened Intervals:

Water Level: -98.94 Measure Date: 15-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601388
Fl Geological Survey #: W17443 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA0580
Project #'s: 54
Geophysical Log #: 54 Depth Logged: 290
Available LOG Data: C J E

Data Reliability: C Visited By: C.RICHARDS
Date Visited 12-JUL-96
Data Entry By: CR Date Entered: 23-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,23-JUL-96) AKA WELL #5;MP = TOP OF 4 INCH PVC CASING = +1.70 FT LSD;MP ELEVATION = 138.38;ELEVATION LEVELED BY NWFWMD NGVD 1929;THREADED FLUSH JOINT WELL CASING USED;8 INCH SOLVENT BONDED (GLUE) SURFACE CASING USED AND RETREIVED

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17443
TOTAL DEPTH: 00267 FT.
21 SAMPLES FROM 0 TO 258 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.13W S.20 DA
LAT = 30D 28M 36S
LON = 85D 33M 46S

COMPLETION DATE: 07/12/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 137 FT

OWNER/DRILLER:SECTION 20/NORTHWEST FL WATER MGT DIST, C. RICHARDS

WORKED BY:TRIMBLE, 9/3/96, 21 BAGS OF WASHED CUTTINGS

0. - 94.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
94. - 110.	122JKBL	JACKSON BLUFF FM.
110. - 152.	122CHPL	CHIPOLA FM.
152. - 195.	000NOSM	NO SAMPLES
195. - 267.	123SWNN	SUWANNEE LIMESTONE

0 - 18 SAND; VERY LIGHT ORANGE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
BIMODAL SAND: ABOUT 20% COARSE TO GRANULE, ROUNDER, FROSTED GRAINS, ABOUT 80 % VERY FINE TO MEDIUM, ANGULAR AND CLEAR HEAVY MINERALS <1%, ABOUT 10% OF SAND GRAINS ARE IRON STAINED

18 - 28 AS ABOVE

28 - 39 SAND; VERY LIGHT ORANGE TO WHITE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
GENERALLY AS ABOVE; HEAVY MINERALS AND MICA <1%

39 - 49 AS ABOVE

49 - 60 SAND; WHITE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: MICA-01%
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
APPEARS TO COARSEN UPWARD, LARGER FROSTED GRAINS DECREASING WITH DEPTH, HEAVY MINERALS <1%, NUMBER OF IRON STAINED GRAINS ALSO DECREASING WITH DEPTH

60 - 70 AS ABOVE

70 - 87 AS ABOVE

87 - 94.8 SAND; YELLOWISH GRAY
20% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-15%, MICA-02%, HEAVY MINERALS-03%
OTHER FEATURES: MUDDY, LOW RECRYSTALLIZATION
FOSSILS: NO FOSSILS
CLAYEY SAND, DARK OLIVE GRAY WITH ORANGE MOTTLES

94.8- 100 SHELL BED; LIGHT OLIVE GRAY TO WHITE
20% POROSITY: INTERGRANULAR; MODERATE INDURATION
CEMENT TYPE(S): CLAY MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: CLAY-03%, QUARTZ SAND-05%, PYRITE-03%
LIMESTONE-10%
OTHER FEATURES: MUDDY, MEDIUM RECRYSTALLIZATION
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID
FOSSIL MOLDS, BRYOZOA
SHELL BED IN SANDY CLAY MATRIX, SOME MICRITE AND SPAR, MICA <1%

100 - 110 AS ABOVE

110 - 123 LIMESTONE; VERY LIGHT GRAY TO YELLOWISH GRAY
15% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CRYSTALS
35% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): CLAY MATRIX, SPARRY CALCITE CEMENT
CALCILUTITE MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-05%, PYRITE-02%
MICA-01%
OTHER FEATURES: MUDDY, MEDIUM RECRYSTALLIZATION
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID
FOSSIL MOLDS

123 - 133 LIMESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): CLAY MATRIX, SPARRY CALCITE CEMENT
CALCILUTITE MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-05%, PYRITE-02%
MICA-01%
OTHER FEATURES: MUDDY, MEDIUM RECRYSTALLIZATION
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID
FOSSIL MOLDS

133 - 143 AS ABOVE

143 - 152 AS ABOVE

152 - 195 NO SAMPLES

195 - 206 LIMESTONE; PINKISH GRAY
25% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-02%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, BRYOZOA, ALGAE
ECHINOID
CONTAINS FRAGMENTS OF GRAYISH, SPECKLED, UNFOSSILIFEROUS
LST PROBABLY FROM THE MISSING INTERVAL

206 - 216 LIMESTONE; VERY LIGHT GRAY TO YELLOWISH GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CRYSTALS
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-04%, DOLOMITE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID
FOSSIL MOLDS, BRYOZOA
CALCARENITE; PIECES OF SPAR INTERMIXED WITH SAND SIZE
FOSSILS ALSO ALGAE AND MOLLUSK FRAGMENTS

216 - 227 AS ABOVE

227 - 239 AS ABOVE

239 - 248 LIMESTONE; WHITE
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
98% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID
INDEX FOSSILS INCLUDE: PARAROTALIA BYRAMENSIS, GYPSINA
VARIOUS NUMMULITES AND MANY LEPIDOCYCLINA

248 - 258 AS ABOVE

258 - 267 AS ABOVE

267 TOTAL DEPTH

Site ID #: 302854085313001 Type: G Key: 5955
Well Name: WALSINGHAM BRIDGE Map #: 62656
Owner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 133 Phone: 539-5999
Latitude: 302854.812 Longitude: 853130.368
Method: 2 Accy: .1
Land Net Location: DCDS015T01NR13W Elevation: 45.84
Location Map: BENNETT FL GW Region: 3

Use of Site: M Use of Water: MO

Well Depth: 90 Depth Of Casing: 71
MP Distance From LSD: 2.09 Diameter: 4
Source 1: S Casing Material: S
Finish: X Driller License #: 2226
Date of Construction: 07-MAY-96 Method of Construction: C
Screen Length:
Screened Intervals:

Water Level: -8.71 Measure Date: 11-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601186
Fl Geological Survey #: W17444 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1217
Project #'s: 54
Geophysical Log #: 59 Depth Logged: 90
Available LOG Data: C J B

Data Reliability: C Visited By: C.RICHARDS
Date Visited 07-MAY-96
Data Entry By: CR Date Entered: 22-JUL-96
Ambient Codes:
Rem: **(C.RICHARDS,22-JUL-96) AKA WELL #10; MP = TOP OF 4 INCH STEEL CASING = +2.09 FT LSD; MP ELEVATION = 47.93 FT; ELEVATION LEVELED BY NWFWMD NGVD 1929

LITHOLOGIC WELL LOG PRINTOUT   SOURCE - FGS

WELL NUMBER: W-17444
TOTAL DEPTH: 00102 FT.
7 SAMPLES FROM 0 TO 102 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.13W S.15 CD
LAT = 30D 28M 55S
LON = 85D 31M 30S

COMPLETION DATE: 05/07/96
ELEVATION: 46 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER:WALSINGHAM BRIDGE/NW FL WATER MGT DIST, C. RICHARDS

WORKED BY:C. TRIMBLE, 9/4/96, 7 BAGS OF WASHED CUTTINGS

0.	-	5.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
5.	-	15.	122JKBL	JACKSON BLUFF FM.
15.	-	30.	122CHPL	CHIPOLA FM.
30.	-	71.	000NOSM	NO SAMPLES
71.	-	102.	123SWNN	SUWANNEE LIMESTONE

0 - 5 SAND; VERY LIGHT ORANGE TO YELLOWISH GRAY
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
RIVER GRAVEL MIXED WITH BIMODAL SANDS, COARSER GRAINS FROSTED

5 - 10 SAND; LIGHT BROWN
20% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-10%, MICA-02%, HEAVY MINERALS-01%
LIMESTONE-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS
A FEW FRAGMENTS OF LIMONITE CEMENTED SAND CLAY MATRIX

10 - 15 SHELL BED; LIGHT BROWN
25% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, MICA-01%, HEAVY MINERALS-01%
QUARTZ SAND-45%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, OSTRACODS
MOLLUSCAN SHELL BED WITH CLAYEY SAND MATRIX

LITHOLOGIC WELL LOG PRINTOUT   SOURCE - FGS

WELL NUMBER: W-17444   COUNTY - WASHINGTON
TOTAL DEPTH: 00102 FT.   LOCATION: T.01N R.13W S.15 CD
7 SAMPLES FROM 0 TO 102 FT.   LAT = 30D 28M 55S
LON = 85D 31M 30S

COMPLETION DATE: 05/07/96   ELEVATION: 46 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER:WALSINGHAM BRIDGE/NW FL WATER MGT DIST, C. RICHARDS

WORKED BY:C. TRIMBLE, 9/4/96, 7 BAGS OF WASHED CUTTINGS

0.	-	5.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
5.	-	15.	122JKBL	JACKSON BLUFF FM.
15.	-	30.	122CHPL	CHIPOLA FM.
30.	-	71.	000NOSM	NO SAMPLES
71.	-	102.	123SWNN	SUWANNEE LIMESTONE

0 - 5 SAND; VERY LIGHT ORANGE TO YELLOWISH GRAY
35% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
OTHER FEATURES: FROSTED
FOSSILS: NO FOSSILS
RIVER GRAVEL MIXED WITH BIMODAL SANDS, COARSER GRAINS
FROSTED

5 - 10 SAND; LIGHT BROWN
20% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRAVEL
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-10%, MICA-02%, HEAVY MINERALS-01%
LIMESTONE-01%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS
A FEW FRAGMENTS OF LIMONITE CEMENTED SAND CLAY MATRIX

10 - 15 SHELL BED; LIGHT BROWN
25% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, MICA-01%, HEAVY MINERALS-01%
QUARTZ SAND-45%
OTHER FEATURES: FROSTED
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, OSTRACODS
MOLLUSCAN SHELL BED WITH CLAYEY SAND MATRIX

15 - 20 LIMESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-03%, QUARTZ SAND-15%
HEAVY MINERALS-01%, MICA-01%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID, BRYOZOA
CORAL
SOME SHELLS SHOW ALGAL BORINGS OR OTHER INVASION (ECHNOID
BORINGS)

20 - 30 LIMESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-40%
HEAVY MINERALS-01%, MICA-01%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID
SANDY CALCILUTITE WITH A FEW BROKEN FOSSILS

30 - 71 NO SAMPLES

71 - 82 LIMESTONE; VERY LIGHT ORANGE TO PINKISH GRAY
20% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRAVEL; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY
FOSSILS: FOSSIL FRAGMENTS, MILIOLIDS, BRYOZOA
FEW RECOGNIZABLE FOSSILS OR FOSSIL FRAGMENTS

82 - 102 LIMESTONE; VERY LIGHT ORANGE TO LIGHT YELLOWISH ORANGE
25% POROSITY: PIN POINT VUGS, VUGULAR, INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRAVEL; RANGE: MICROCRYSTALLINE TO GRAVEL
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-15%, MICA-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, ECHINOID
BRYOZOA, FOSSIL MOLDS
SOME COARSE SAND AND GRAVEL INTERMIXED WITH LIMESTONE
MODERATE TO GOOD INDURATION, ALSO SOME CALC. ALGAE

102 TOTAL DEPTH

Northwest Florida Water Management District

ite ID #: 302846085365201 Type: G Key: 5952
Vell Name: GREENHEAD ROAD Map #: 62653
)wner Name: NWFWMD,
Contact: BUREAU OF GROUND WATER
Address: RT 1 BOX 3100
City: HAVANA State: FL Zip: 32333
County: 133 Phone: 904-539-5999
Latitude: 302846.773 Longitude: 853652.449
Method: 2 Accy: .1
Land Net Location: BBAS023T01NR14W Elevation: 112.13
Location Map: BENNETT FL GW Region: 3

Jse of Site: M Use of Water: MO

Vell Depth: 249 Depth Of Casing: 187
MP Distance From LSD: 2.03 Diameter: 4
Source 1: S Casing Material: S
Finish: X Driller License #: 2226
Date of Construction: 10-JUN-96 Method of Construction: C
Screen Length:
Screened Intervals:

Water Level: -67.77 Measure Date: 10-JUL-96
Source 2: S Method 2: S

Hydrogeologic Units: A Stratigraphic Units:

Type of Lift: N Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

IELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: 9601385
Fl Geological Survey #: W17445 Abandonment Permit #:
DEP PWSID #: Well Tag #: AAA1220
Project #'s: 54
Geophysical Log #: 53 Depth Logged: 249
Available LOG Data: C J E B

Data Reliability: C Visited By: C.RICHARDS
Date Visited 10-JUN-96
Data Entry By: CR Date Entered: 18-JUL-96
Ambient Codes:
em: **(C.RICHARDS,18-JUL-96) AKA WELL #4; ELEVATION LEVELED BY NWFWMD NGVD 1929; MP = TOP OF 4 INCH STEEL CASING = +2.03 FT LSD; MP ELEVATION = 114.16 FT

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17445
TOTAL DEPTH: 00249 FT.
21 SAMPLES FROM 0 TO 249 FT.

COUNTY - WASHINGTON
LOCATION: T.01N R.14W S.23 BA
LAT = 30D 28M 47S
LON = 85D 36M 53S

COMPLETION DATE: 06/10/96
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 112 FT

OWNER/DRILLER:GREENHEAD RD/NORTHWEST FL WATER MGT DIST, C. RICHARDS

0.	-	60.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
60.	-	64.	122JKBL	JACKSON BLUFF FM.
64.	-	84.	000NOSM	NO SAMPLES
84.	-	103.	122CHPL	CHIPOLA FM.
103.	-	124.	122BCCK	BRUCE CREEK LIMESTONE
124.	-	144.	122CTTC	CHATTAHOOCHEE FM.
144.	-	166.	000NOSM	NO SAMPLES
166.	-	249.	123SWNN	SUWANNEE LIMESTONE

0 - 9 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
35% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: HEAVY MINERALS-01%
OTHER FEATURES: FROSTED
BIMODAL SAND: 30-50%COARSE TO GRANULE, FROSTED AND ROUNDER
REMAINDER: VERY FINE TO MEDIUM, ANGULAR, CLEAR; CHERT & LST
<1% MANY OF THE LARGER GRAINS ARE ALSO IRON/CLAY COATED

9 - 18 AS ABOVE

18 - 28 SAND; VERY LIGHT ORANGE TO GRAYISH ORANGE
33% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: HEAVY MINERALS-01%, MICA-01%
LIMESTONE-01%, CLAY-01%
OTHER FEATURES: FROSTED
COARSENING UPWARD; 25 TO 33% COARSER, ROUNDER, FROSTED
GRAINS REMAINDER:FINER, ANGULAR AND CLEAR

28 - 39 AS ABOVE

39 - 49 SAND; LIGHT BROWN
30% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN SIZE: GRANULE; RANGE: MEDIUM TO VERY FINE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: HEAVY MINERALS-01%, MICA-01%
LIMESTONE-01%
OTHER FEATURES: FROSTED
IRON STAIN/CLAY COATED SAND; BIMODAL AS ABVOE; CHERT AND
HEAVY MINERALS <1%; A FEW YELLOWIGH GRAY, CLAY RICH
AGGREGATES

49 - 60 SAND; GRAYISH ORANGE TO DARK YELLOWISH ORANGE
30% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, MICA-01%
YELLOW CLAY COATED SAND, MOTTLED WITH GRAY BROWN TO WHITE
WEAKLY CEMENTED BY IRON OXIDES AND CLAY, MOTTLES ARE MICA
RICH SANDS STILL BIMODAL AS ABOVE: LARGER, ROUNDER GRAINS
FROSTED, SMALLER, ANGULAR GRAINS CLEAR, COARSENS UPWARD

60 - 64 SHELL BED; GRAYISH ORANGE TO OLIVE GRAY
35% POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-02%, QUARTZ SAND-15%, MICA-01%
PYRITE-01%
OTHER FEATURES: FROSTED, MUDDY, LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID, BRYOZOA
BENTHIC FORAMINIFERA
SHELL SHELL BED IN SANDY CLAY MATIX, MOLLUSK RICH (ESP
OSTREA) MOTTLED GRAYISH ORANGE TO OLIVE GRAY;PHOSPHATE SAND
<1%

64 - 84 NO SAMPLES

84 - 94 LIMESTONE; PINKISH GRAY TO MODERATE LIGHT GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
30% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-40%, CLAY-01%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BRYOZOA, ALGAE, CORAL
QUARTZ SAND RICH SHELL BED, VERY SMALL POOR SAMPLE, PYRITE
<1%

94 - 103 LIMESTONE; LIGHT OLIVE GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO GRAVEL; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-15%, CLAY-01%
OTHER FEATURES: MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
FOSSIL MOLDS
FOSSILS MUDDY AND FRAGMENTED

103 - 114 LIMESTONE; WHITE TO YELLOWISH GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-02%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, BRYOZOA, ALGAE
BENTHIC FORAMINIFERA, ECHINOID
MICA <1%, POSSILBLY PELLETAL

114 - 124 LIMESTONE; WHITE TO YELLOWISH GRAY
25% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: QUARTZ SAND-02%, CLAY-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BRYOZOA, MOLLUSKS, FOSSIL FRAGMENTS, ALGAE
ECHINOID
MICA AND PHOSPHATE SAND < 1%, THIN DISCONTINUOIS BLUE-GRAY
CLAY LENSES

124 - 134 LIMESTONE; PINKISH GRAY TO YELLOWISH GRAY
15% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
55% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-02%, CLAY-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION, MUDDY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID, BRYOZOA
BENTHIC FORAMINIFERA
ALSO CORAL FRAGMENTS AND FOSSIL MOLDS

134 - 144 AS ABOVE

144 - 166 NO SAMPLES

166 - 176 LIMESTONE; PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: VERY FINE TO GRANULE
UNCONSOLIDATED
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
BRYOZOA
FOSSILIFEROUS; CLEAN, FORAMINIFEROUS, CALCARENITE INDEX
FOSSILS : L. MANTELLI. QUARTZ SAND <1%

176 - 185 AS ABOVE

185 - 187 NO SAMPLES

187 - 197 LIMESTONE; WHITE TO PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: VERY FINE TO GRAVEL
POOR INDURATION
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, BRYOZOA
ECHINOID, MOLLUSKS
VERY LARGE LEPS PLENTIFUL; QUARTZ SAND <1% INDEX FOSSILS AS
ABOVE

197 - 208 LIMESTONE; WHITE TO PINKISH GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
95% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: VERY FINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, BRYOZOA
ECHINOID, CORAL
OCCASIONAL PINPOINT VUGS IN AGGREGATES

208 - 218 AS ABOVE

218 - 229 LIMESTONE; WHITE TO PINKISH GRAY
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: VERY FINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, BRYOZOA
ALGAE, CORAL
ALSO FRAGMENTS OF GASTROPOD MOLDS; INDEX FOSSILS GYPSINA
AND LEPS.

229 - 239 LIMESTONE; PINKISH GRAY TO WHITE
15% POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
65% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: SPAR-10%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, ALGAE
CORAL, BRYOZOA
AS ABOVE BUT MORE CRYSTALLINE CALCITE

239 - 249 DOLOSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
10% POROSITY: PIN POINT VUGS, VUGULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO GRANULE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: LIMESTONE-20%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS
FIST DOLOSTONE CONTACT, PLUS CAVINGS FROM ABOVE

249 TOTAL DEPTH

Northwest Florida Water Management District

Site ID #: **303101085361401** Type: **G** Key: **5957**
Well Name: **GOLF LAKE** Map #: **62658**
Owner Name: **NWFWMD,**
Contact: **BUREAU OF GROUND WATER**
Address: **RT 1 BOX 3100**
City: **HAVANA** State: **FL** Zip: **32333**
County: **133** Phone: **904-539-5999**
Latitude: **303101.594** Longitude: **853614.321**
Method: **2** Accy: **.1**
Land Net Location: **AACS001T01NR14W** Elevation: **106.24**
Location Map: **GAP LAKE FL** GW Region: **3**

Use of Site: **M** Use of Water: **MO**

Well Depth: **311** Depth Of Casing: **246**
MP Distance From LSD: **1.99** Diameter: **4**
Source 1: **S** Casing Material: **S**
Finish: **X** Driller License #: **2226**
Date of Construction: **13-JUN-96** Method of Construction: **C**
Screen Length:
Screened Intervals:

Water Level: **-46.71** Measure Date: **11-JUL-96**
Source 2: **S** Method 2: **S**

Hydrogeologic Units: **A** Stratigraphic Units:

Type of Lift: **N** Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: **9601389**
Fl Geological Survey #: Abandonment Permit #:
DEP PWSID #: Well Tag #: **AAA1215**
Project #'s: **54**
Geophysical Log #: **55** Depth Logged: **311**
Available LOG Data: **C J E B**

Data Reliability: **C** Visited By: **C.RICHARDS**
Date Visited **13-JUN-96**
Data Entry By: **CR** Date Entered: **22-JUL-96**
Ambient Codes:
Rem: ****(C.RICHARDS,22-JUL-96) AKA WELL #6;MP = TOP OF 4 INCH STEEL CASING = +1.99 FT LSD;MP ELEVATION = 108.23;ELEVATION LEVELED BY NWFWMD NGVD 1929**

Northwest Florida Water Management District

Site ID #: **303043085334501** Type: **G** Key: **5956**
Well Name: **BLACKWATER SLOUGH** Map #: **62657**
Owner Name: **NWFWMD,**
Contact: **BUREAU OF GROUND WATER**
Address: **RT 1 BOX 3100**
City: **HAVANA** State: **FL** Zip: **32333**
County: **133** Phone: **904-539-5999**
Latitude: **303043.215** Longitude: **853345.003**
Method: **2** Accy: **.1**
Land Net Location: **DDCS005T01NR13W** Elevation: **85.09**
Location Map: **GAP LAKE FL** GW Region: **3**

Use of Site: **M** Use of Water: **MO**

Well Depth: **240** Depth Of Casing: **157**
MP Distance From LSD: **2.12** Diameter: **4**
Source 1: **S** Casing Material: **S**
Finish: **X** Driller License #: **2226**
Date of Construction: **17-JUN-96** Method of Construction: **C**
Screen Length:
Screened Intervals:

Water Level: **-21.67** Measure Date: **11-JUL-96**
Source 2: **S** Method 2: **S**

Hydrogeologic Units: **A** Stratigraphic Units:

Type of Lift: **N** Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: **9601390**
Fl Geological Survey #: Abandonment Permit #:
DEP PWSID #: Well Tag #: **AAA1216**
Project #'s: **54**
Geophysical Log #: **56** Depth Logged: **240**
Available LOG Data: **C J E B**

Data Reliability: **C** Visited By: **C.RICHARDS**
Date Visited **17-JUN-96**
Data Entry By: **CR** Date Entered: **22-JUL-96**
Ambient Codes:
Rem: ****(C.RICHARDS,22-JUL-96) AKA WELL #7; MP = TOP OF 4 INCH STEEL CASING = +2.12 FT LSD; MP ELEVATION = 87.21 FT,ELEVATION LEVELED BY NWFWMD NGVD 1929.**

Northwest Florida Water Management District

Site ID #: **303131085290801** Type: **G** Key: **5950**
Well Name: **TRAPP POND FLORIDAN** Map #: **62651**
Owner Name: **NWFWMD,**
Contact: **BUREAU OF GROUND WATER**
Address: **RT.1 BOX 3100**
City: **HAVANA** State: **FL** Zip: **32333**
County: **5** Phone: **904-539-5999**
Latitude: **303131.838** Longitude: **852908.05**
Method: **2** Accy: **.1**
Land Net Location: **CCCS031T02NR12W** Elevation: **155**
Location Map: **COMPASS LAKE FL** GW Region: **3**

Use of Site: **M** Use of Water: **MO**

Well Depth: **331** Depth Of Casing: **224**
MP Distance From LSD: **2.1** Diameter: **4**
Source 1: **S** Casing Material: **S**
Finish: **X** Driller License #: **2226**
Date of Construction: **19-JUN-96** Method of Construction: **C**
Screen Length:
Screened Intervals:

Water Level: **-97.39** Measure Date: **15-JUL-06**
Source 2: **S** Method 2: **S**

Hydrogeologic Units: **A** Stratigraphic Units:

Type of Lift: **N** Type of Power:
Horsepower: Pump Intake:
Normal Yield: Test Discharge:
Source 3: Method of Measurement:
Static Level: Pumping Level:
Drawdown: Hours Pumped:
Specific Capacity

FIELD WATER QUALITY Date of Sample:
Temperature: pH:
Specific Conductance: Chloride:

Consumptive Use Permit #: Construction Permit #: **9601384**
Fl Geological Survey #: **W17438** Abandonment Permit #:
DEP PWSID #: Well Tag #: **AAA1221**
Project #'s: **54**
Geophysical Log #: **60** Depth Logged: **331**
Available LOG Data: **C J E B**

Data Reliability: **C** Visited By: **C.RICHARDS**
Date Visited **19-JUN-96**
Data Entry By: **CR** Date Entered: **18-JUL-96**
Ambient Codes:
Rem: ****(C.RICHARDS,18-JUL-96) AKA WELL #11;MP = TOP OF 4 INCH STEEL CASING = +2.1 FT LSD; ELEVATION FROM GPS LOCATION AND TOPO SHEET**

APPENDIX C

Average Pumpage for June, July and August 1996 as Used in the Model

WELL NAME	FLORIDA UNIQUE WELL I.D.	NWFWMD KEY I.D.	COUNTY	LATITUDE	LONGITUDE	PUMPAGE: GAL/DAY	SOURCE OF PUMPAGE DATA*
PANAMA CITY BCH #9	AAA1183	743	BAY	301354	855242	629141	O
PANAMA CITY BCH #12	AAA1186	794	BAY	301450.9	855502.3	581891	O
PANAMA CITY BCH #13	AAA1187	765	BAY	301429.949	855252.326	515957	O
ARIZONA CHEMICAL #2		415	BAY	300815	853715	480630	O
LYNN HAVEN WELL #1	AAA7566	773	BAY	301429	853855	472840	O
LYNN HAVEN WELL #4		760	BAY	301414	853853	472840	O
LYNN HAVEN #5	AAA7569	718	BAY	301326	853930	472840	O
LYNN HAVEN #3	AAA7567	6043	BAY	301445	853850	472840	O
PANAMA CITY BCH #3	AAA1177	756	BAY	301409	855317	446293	O
PANAMA CITY BCH #4	AAA1178	745	BAY	301359	855332	441467	O
PANAMA CITY BCH #1	AAA1175	739	BAY	301346.4	855325.4	438728	O
WASTE ENERGY #1		835	BAY	301612	853130	350000	E
PANAMA CITY BCH #10	AAA1184	768	BAY	301425	855424	319163	O
TYNDALL GC #1-3010		358	BAY	300630	854017	318676	O
STONE CONTAINER #5	AAA9308	430	BAY	300834	853722	241207	O
TYNDALL GC #3-#3071		379	BAY	300649	854057	211573	O
MEXICO BEACH #2	AAA0450	207	BAY	295645.150	852429.060	211065	O
MEXICO BEACH #1		205	BAY	295645	852439	195728	O
BAY POINT GC #1		449	BAY	300855	854429	169000	E
TYNDALL GC #2-#3019		6060	BAY	300600	854000	162978	O
PANAMA CITY BCH #5	AAA1179	684	BAY	301223	855008	142228	O
US NAVY COASTAL #1		627	BAY	301109	854531	123620	O
LANSING SMITH #2	AAA6591	842	BAY	301615.532	854139.725	116667	E
LANSING SMITH #1	AAA6592	843	BAY	301615.601	854153.514	116667	E
LANSING SMITH #3	AAA6590	834	BAY	301607.736	854153.877	116667	E
PANAMA CITY BCH #6	AAA1180	685	BAY	301224	855037	95946	O
PANAMA CITY BCH #2	AAA1176	747	BAY	301402	855317	77446	O
MIDWEST PIPE #1		599	BAY	301045	854342	75000	E
PANAMA CITY BCH #11	AAA1185	681	BAY	301218	854937	64261	O
SANDY CREEK	AAA9310	366	BAY	300638	852905	58489	O
MCCALL SOD FARM #1	AAA0491	975	BAY	301838.157	853741.610	40696	O
ARIZONA CHEMICAL #1		437	BAY	300842	853701	27435	O
SURFSIDE SCHOOL #1		690	BAY	301228	855113	21130	O
SIGNAL HILL GC #2		6061	BAY	301040	854730	11663	O
SIGNAL HILL GC #3		6062	BAY	301041	854735	5087	O
CITY SPORTS #1		5066	BAY	301455	853100	1604	O
SEWAGE PLANT #1		103	GULF	294949	851814	455491	O
PORT ST. JOE #3	AAA0419	95	GULF	294936	851750	433526	O
SEWAGE PLANT #3		98	GULF	294940	851818	303661	O
PORT ST. JOE #1	AAA2251	92	GULF	294933	851803	296066	O
SYLVACHEM #3 WEST		99	GULF	294940	851837	281522	O
SYLVACHEM #1 EAST		6045	GULF	294905	851830	281522	O
WEWAHITCHKA	AAA8325	371	GULF	300644	851146	145500	E
WEWAHITCHKA #3		357	GULF	300629	851207	145500	E
PRISON SITE #2		597	GULF	301044	851537	91950	O
PRISON SITE #1	AAA8329	596	GULF	301044	851604	91950	O
RAFFIELDS		105	GULF	294953	851844	49300	E
MARIANNA #6		5044	JACKSON	304727	851405	378728	O
MARIANNA #5	AAA8680	4953	JACKSON	304630	851321	300196	O
MARIANNA #1		5028	JACKSON	304712	851514	164196	O
DELTONA CORP.	AAA0485	3786	WASHINGTON	303413.994	853420.072	257033	O
CHIPLEY #2	AAA5165	5002	WASHINGTON	304654.3	853214.5	227500	E
CHIPLEY #3	AAA6643	5833	WASHINGTON	304644.8	853219.4	227500	E
CHIPLEY #1	AAA5164	5834	WASHINGTON	304526.3	853111.8	227500	E
CHIPLEY #4	AAA5163	5835	WASHINGTON	304654.3	853122.8	227500	E
SOUTHERN STATES U.#4		5994	WASHINGTON	303436	853354	166087	O
WCI #2	AAA0484	3312	WASHINGTON	303103.576	853930.752	104457	O
WCI #1		3313	WASHINGTON	303114	853949	87870	O
VERNON #1	AAA0482	4244	WASHINGTON	303732.4	854242.5	56951	O
VERNON #2	AAA5159	5998	WASHINGTON	303732.3	854242.6	56951	O
WAUSAU #2	AAA6644	4292	WASHINGTON	303808.683	853519.287	49000	E
DYSON #2	AAA6649	4014	WASHINGTON	303537.338	854708.125	40261	O
SOUTHERN STATES U.#5	AAA1095	5951	WASHINGTON	303332.5812	853147.047	11304	O
DYSON #1	AAA6650	4074	WASHINGTON	303533.968	854723.414	7435	O
SOUTHERN STATES U.#1	AAA5155	5993	WASHINGTON	303239.300	853551.800	163	O

* O: OWNER SUPPLIED E: ESTIMATED, PERMITTED ADR USED Latitude/Longitude Datum: NAD27