SFWMD

TECHNICAL PUB #89-1

SOUTH FLORIDA WATER MANAGEMENT DISTRICT AMBIENT GROUND WATER QUALITY

February 1989

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by

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EXECUTIVE SUMMARY

As a result of the passage of the Water Quality Assurance Act of 1983 by the Florida Legislature, the Department of Environmental Regulation (DER) was directed to work with the five regional water management districts to establish a ground water quality monitoring network. Through interagency agreements, funds were provided by the DER to the South Florida Water Management District (SFWMD), which resulted in the establishment of an Ambient Ground Water Quality Monitoring Network (AGWQMN). This publication documents the current background water quality for each county within the SFWMD, as determined by the sampling of the AGWQMN.

A total of approximately 340 monitor wells from 15 of the 16 counties within the SFWMD were chosen for inclusion in the AGWQMN following established selection criteria. (Monroe County is not monitored by the AGWQMN because of the limited ground water withdrawals which occur within the county at the present time, and the low potential for withdrawals in the future). Water quality sampling began in September 1984. The results of approximately 800 samples from 13 counties are presented in this report. Ground water sampling within Dade and Broward Counties is presently subcontracted by the SFWMD to the Department of Environmental Resources Management and the Broward County Environmental Quality Control Board, respectively. Because of the sampling loads involved, the analytical results were not available prior to publication of this report. However, these results will be included in future publications detailing ground water quality trends within the SFWMD.

The majority of the samples collected from the AGWQMN met Primary Drinking Water Standards. Secondary Drinking Water Standards were exceeded more frequently. Primary Drinking Water Standards are based on health considerations, while Secondary Drinking Water Standards are based on aesthetic considerations such as taste and odor.

Three aquifer systems are present within the SFWMD and were sampled for this publication. They are: 1) The Surficial Aquifer System, 2) The Intermediate Aquifer System, and 3) The Floridan Aquifer System.

The Surficial Aquifer System supplies both irrigation and drinking water throughout the SFWMD. In the southern portion of the SFWMD, the Surficial Aquifer System is the major source of drinking water. Areas of poor water quality within the Surficial Aquifer System were found in: 1) areas where natural connate water had not been completely flushed from the aquifer, 2) areas of salt water intrusion near the coast, 3) areas having uncontrolled flow from artesian wells, and 4) areas that have been contaminated by man's activities.

The Intermediate Aquifer System is a significant water supply source within Lee, Collier, Charlotte, Hendry, and Glades Counties. This aquifer system is either not present, or does not produce significant quantities of water throughout the remainder of the SFWMD.

The Intermediate Aquifer System is partially protected from anthropogenic contamination due to the fact that it is overlain by the Surficial Aquifer System. Contaminants introduced at land surface must first filter through the Surficial Aquifer System to reach the Intermediate Aquifer System.

Areas of poor water quality within the Intermediate Aquifer System occur in areas where the presence of connate water and/ or salt water intrusion has rendered the water nonpotable. Heavy withdrawals of water from this aquifer system in other areas, have lowered the potentiometric surface with respect to underlying aquifers, and allowed the upconing of poorer quality water from deeper aquifer systems. Improperly constructed and/ or corroded wells open to deeper formations also allow for inter-aquifer migration of poor quality water.

The Floridan Aquifer System is present beneath the entire SFWMD, but serves as a predominant source of drinking water only in the northern portion of the SFWMD. In the central portion of the SFWMD the Floridan Aquifer System serves as a major source of water for irrigation and livestock. In the southern portion of the SFWMD water within the Floridan Aquifer System is too highly mineralized for most uses, but can be treated by reverse osmosis filtration for potable use.

Most areas of poor water quality within the Floridan Aquifer System are due to the presence of connate seawater that has not been completely flushed, or from the upconing of poor quality water from deeper producing zones of the aquifer due to over pumping.

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ABSTRACT

This publication documents the current background (unaffected) ground water quality existing within the three principal aquifer systems of the South Florida Water Management District (SFWMD). These systems include the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. In order to monitor the ground water quality within the SFWMD, an Ambient Ground Water Quality Monitor Network (AGWQMN) is being established in cooperation with the Florida Department of Environmental Regulation (DER).

The AGWQMN is being established as a result of the Water Quality Assurance Act (Act) of 1983. This Act states that DER, in cooperation with other state and federal agencies, water management districts, and local governments, shall establish a ground water quality monitoring network designed to detect or predict contamination of the state's ground water resources.

The initial phase of the AGWQMN is designed to determine "background" ground water quality. Monitor wells with known point source contamination were specifically excluded from the AGWQMN sampled for this publication. Monitor wells that may have been influenced slightly by non-point source contamination were used in this report provided no other sources of data were available. Those monitor wells that have been heavily influenced by man's activities will be discussed in future publications, as will trends in ground water quality over time.

A total of approximately 340 monitor wells from 15 of the counties within the SFWMD were chosen for inclusion in the AGWQMN following established selection criteria. Water quality sampling began in September 1984. The results of over approximately 800 sampling events are presented in this report.

The majority of the samples collected from the AGWQMN met Primary Drinking Water Standards. Secondary Drinking Water Standards were more commonly exceeded. Primary Drinking Water Standards are based on health considerations, while Secondary Drinking Water Standards are based on aesthetic considerations such as taste and odor.

Some of the AGWQMN wells sampled appear to have been adversely impacted by man, and the quality of the water has been degraded. These adverse impacts can be broken into two broad categories: movement of existing poor quality water, and the introduction of contaminants. The majority of the wells impacted by the movement of water were affected by: 1) uncontrolled flow from artesian wells, 2) upconing of poor quality water from deeper producing zones or aquifers, and 3) salt water intrusion. The wells that were affected by the introduction of contaminants were located in the vicinity of landfills and industrial parks.

INTRODUCTION

In 1983 the State of Florida passed the Water Quality Assurance Act (WQAA). Part of the WQAA provided for the establishment of a statewide Ambient Ground Water Quality Monitoring Network (AGWQMN). The purpose of this network is to establish a ground water quality monitoring network designed to detect or predict contamination of the state's ground water resources. This publication addresses the initial phase of the AGWQMN by determining "background" ground water quality that has been influenced only minimally by man. The identification of background water quality will facilitate the detection of subtle ground water contamination involving long term changes.

The State of Florida Department of Environmental Regulation (DER) was given the responsibility of implementing the WQAA. In December 1983, the DER entered into agreement with the South Florida Water Management District (SFWMD) to establish an AGWQMN within the SFWMD boundaries.

As a result of this agreement, the SFWMD began evaluating existing ground water monitor wells for inclusion into the AGWQMN. In areas where existing wells were scarce, additional monitor wells were installed. In addition, the SFWMD subcontracted with Dade County Department of Environmental Resources Management (DERM) and the Broward County Environmental Quality Control Board (BCEQCB) to establish the AGWQMN within Dade and Broward Counties, respectively. Monitor wells with known contamination were specifically excluded from the AGWQMN discussed in this report since they did not represent background water quality.

Water quality sample collection began in September 1984. By the end of 1987, approximately 800 samples had been collected. These water quality samples were analyzed for physical parameters, major anions and cations, nutrients, trace metals, and organic compounds. The sampling results for the individual counties are discussed in each of the county supplements.

Sampling results from DERM and BCEQCB were not available when this publication was prepared. This information has since been supplied to the SFWMD and will be described in future publications along with ground water quality trends within the SFWMD. In addition, no AGWQMN wells are located within Monroe County because of the currently limited ground water withdrawals occurring within this county. Water quality information from existing literature was used to describe the ground water quality within Dade, Broward, and Monroe Counties.

PURPOSE AND SCOPE

The purpose of this report is to satisfy four major objectives. They are: 1) to provide documentation of the establishment and location of the AGWQMN; 2) to document the results of the water quality data collected from the AGWQMN from 1984 to 1987; 3) to provide broad interpretation of several key water quality parameters; and 4) to assist local governments in their development of comprehensive plans. To meet these objectives, this report is being prepared in cooperation with the DER and provides an introductory section followed by individual county supplements depicting the ground water quality of each county within the SFWMD boundaries.

This report documents the location of the AGWQMN wells within the SFWMD by both latitude and longitude and on base maps for each county. Well construction information is also provided. By assessing this network, data gaps and overlaps can be determined to plan for future monitoring sites.

While the raw data has been computerized and transferred to the DER, interpretation of the data has not been transferred. This report not only documents the results of the water quality data collected, but also provides a broad interpretation of several key water quality parameters as well as specific comments on any organic contaminants detected.

Local governments following state guidelines are preparing comprehensive land use plans. These plans call for identifying areas for potential water supply. Each supplement found herein should prove to be very useful in addressing water quality issues that are required under the plan.

ESTABLISHMENT OF AN AMBIENT GROUND WATER QUALITY MONITORING NETWORK

As a result of the WQAA, a major emphasis was placed on the establishment of an AGWQMN throughout the SFWMD. The purpose of this network is to monitor ground water that is both affected and unaffected by man's activities. This report is designed to address only the background (unaffected) portion of the AGWQMN, the affected portion of the network will be discussed in future publications. By periodically sampling these wells, changes in water quality that may indicate a potential threat to the ground water supply can be detected. Pertinent well information is shown in Appendix 1 of each individual county supplement.

Monitor Well Selection Criteria

Wells were placed in the AGWQMN based upon both well selection criteria and well distribution criteria. Well selection criteria defines the pool from which wells are drawn and also includes well construction and use limitations. Well distribution criteria define the allowable aerial coverage based upon the maximum number of wells that can be maintained in the network.

In order for a monitor well to be included in the network, it must meet the eight primary criteria listed as follows: 1) cooperation of owner; 2) likelihood of well being accessible for future sampling; 3) precise site location (in coordinates of latitude and longitude, measured to seconds, is known). Cross index with section, Township and Range; 4) measurements of well depth and casing length (referenced to land surface datum) are known; 5) prior activity at the site is known (operation of the well) and present activities do not affect sample quality; 6) prior ground water quality monitoring data (preferable); 7) open hole portion of well penetrates only one aquifer and that aquifer is known; 8) likelihood that water sampled is representative of the water quality from the aquifer and does not become contaminated or altered in the sampling process.

Availability of information for the four secondary criteria listed below is desirable and may be used to select between nearby wells which meet all of the primary criteria: 1) geologic logs from driller's completion report or cuttings analysis by a geologist; 2) borehole geophysical logs; 3) assessment of hydrologic properties such as specific capacity, transmissivity, storage coefficient, hydraulic conductivity, and leakance; 4) potentiometric head data.

Monitor Well Distribution Criteria

When work began on the WQAA program, it was decided that approximately 200 ambient background monitor wells would be used to monitor the water quality of the three major aquifer systems within the SFWMD (excluding Dade and Broward Counties). As of December 1987, there were 109 Surficial Aquifer System monitor wells, 31 Intermediate Aquifer System monitor wells, and 47 Floridan Aquifer System monitor wells. This number of wells gives a coverage of approximately one well per 100 square miles..

SAMPLING METHODOLOGY

Sampling procedures used are outlined in Scalf et al. (1981). Additional references are DER (1981); Gibb et al. (1981); and Claassen (1982). The handling of the sample varies for the collection of the many types of parameters analyzed for in this report. Table I-1 is a list of the inorganic parameters by group and the units used to report the results. In addition, all samples were analyzed for purgeable organic compounds using Environmental Protection Agency (EPA) methods 601 and 602. A list of these compounds is shown on Table I-2. All results discussed for purgeable organic compounds are in micrograms per liter (µG/L).

TABLE I-1. TABLE OF PARAMETERS AND UNITS BY MAJOR GROUPINGS

Physical Parameters	Units
Temperature	C
Specific Conductivity	µmhos/cm
pH	-
Total Dissolved Solids	MG/L
Nutrients	**Units**
Nitrite	MG N/L
Nitrate	MG N/L
Ammonia	MG N/L
Ortho Phosphorus	MG P/L
Major Ions	**Units**
Alkalinity	$CACO_3$ MG/L
Chloride	MG/L
Iron	MG/L
Silica	MG/L
Sulfate	MG/L
Sulfate	MG/L
Sodium	MG/L
Potassium	MG/L
Calcium	MG/L
Magnesium	MG/L
Fluoride	MG/L
Trace Metals	**Units**
Copper	µG/L
Zinc	µG/L
Arsenic	µG/L
Lead	µG/L
Strontium	µG/L
Chromium	µG/L
Manganese	µG/L

TABLE I-2. PURGEABLE ORGANIC COMPOUNDS

Purgeable Halocarbons - Method 601
Bromodichloromethane (1)*
Bromoform (1)
Bromomethane (1)
Carbon tetrachloride (1)
Chlorobenzene(1)
Chloroethane (1)
2-Chloroethylvinyl ether (1)
Chloroform (1)
Chloromethane (1)
Dibromochloromethane (1)
Dichlorodifluoromethane (1)
1,1-Dichloroethane (1)
1,2-Dichloroethane (1)
1,1-Dichloroethene (1)
trans-1,2-Dichloroethene (1)
1,2-Dichloropropane(1)
cis-1,3-Dichloropropene (1)
trans-1,3-Dichloropropene (1)
Methylene chloride (1)
1,1,2,2-Tetrachloroethane (1)
Tetrachloroethene (1)
1,1,1-Trichloroethane (1)
1,1,2-Trichloroethane (1)
Trichloroethene (1)
Trichloroflouromethane (1)
Vinyl chloride (1)
1,2-Dibromoethane (1)
**cis-1,2-Dichloroethene
Purgeable Aromatics - Method 602
Benzene
Toluene
Ethylbenzene
o-Dichlorobenzene
m-Dichlorobenzene
p-Dichlorobenzene

* MINIMUM DETECTION OF LEVEL IN UG/L

** COMPOUND NOT ON EPA 601 LIST

Sample bottles of the appropriate materials are pre-cleaned and preserved as necessary for each parameter and were supplied by the laboratory. The wells were purged using one of several techniques depending on well casing diameter and depth to water. Typically a 2 inch centrifugal pump was used to purge the well. After the well was purged of a minimum of three casing volumes and pH, temperature, and conductivity stabilized, a 1.25 inch diameter Teflon bailer was suspended in the well using a Teflon coated stainless steel cord. Sample bottles were then filled in the appropriate manner and stored on ice for shipment within the holding period for each parameter. Field parameters of temperature, pH, and specific conductance were measured at the well site.

Every effort was made to avoid contamination of the samples. Sampling equipment was thoroughly cleaned with phosphate free detergent, triple rinsed with deionized water, and wrapped in aluminum foil.

WATER QUALITY

Ambient Ground Water Quality

The ground water quality is influenced to a great extent by the lithology of the aquifer materials. The ground water is high in calcium and bicarbonate due to the dissolution of limestone and shell beds within the aquifer. Iron concentrations are also high due to its presence in most soils and rocks. High concentrations of sodium, potassium, sulfate, and chloride may be associated with ancient (connate) seawater which is trapped in the aquifer. Water samples from the AGWQMN are collected on an annual basis in order to evaluate natural background water quality and detect any deviation (contamination) possibly due to anthropogenic effects. The results of the inorganic laboratory analysis for the first four years of sampling (1984-1987) are shown in Appendix 2 of each individual county supplement. The presence or absence of any organic compounds detected will be specifically noted in the water quality discussion of each county supplement.

Samples collected from AGWQMN wells are analyzed for physical parameters, major anions and cations, nutrients, trace metals, and organic compounds. Three key chemical parameters that are generally used to characterize an aquifer are total dissolved solids, chloride, and hardness.

The distribution of total dissolved solids, chloride, and hardness concentrations throughout each county is used in this report as an indicator of general ambient ground water quality conditions. These concentrations are represented by contour maps which incorporate AGWQMN data as well as information from prior investigations.

Another graphical technique used to represent ground water quality is the Stiff pattern. Using three parallel axes, the concentration of cations are plotted to the left of a vertical zero axis and anions to the right; all values are in milliequivalents per liter. When the points are connected, they form an irregular polygon which indicates water of a distinct type (Todd, 1980). The size of the Stiff pattern is also indicative of the ionic strength of the water. These patterns are displayed for selected AGWQMN wells to indicate the water type present within different aquifers for each county.

Additional water quality parameters will be discussed when the results indicate concentrations exceeding drinking water standards. The State of Florida has adopted both primary and secondary drinking water standards. The primary standards are based on health considerations, while the secondary standards are based predominantly on esthetics considerations.

Primary standards are enforceable and, therefore, concentrations higher than those listed would lead to the water supply being considered unsuitable unless subjected to treatment to lower the concentration of the undesirable constituent below the set limit. Concentration levels for secondary standards are desirable goals. These standards are taken from Florida Statutes Chapter 17-3 and 17-22, the standards are summarized in Table I-3.

Total Dissolved Solids

Values of total dissolved solids represent all of the solid minerals in solution. It does not include suspended solids, colloids, or dissolved gases. Total dissolved solids in water for domestic and industrial use should be less than 1,000 MG/L, and water for agricultural purposes less than 3,000 MG/L (Davis, 1966). The recommended standard for total dissolved solids in drinking water is 500 MG/L.

Chloride

Chloride is generally present as the chloride ion, Cl^-. Chloride occurs when porous rocks are submerged and seawater enters and impregnates the rock with soluble salts, usually in the form of chloride crystals, or as a solution of sodium and chloride ions (Hem, 1970). The chloride ion is considered a "conservative" ion in that it reacts very little with the surrounding environment. When the major cation is sodium, water with chloride concentrations in excess of 250 MG/L has a salty taste. In water where the predominant cations are calcium and magnesium, the chloride concentration may be as high as 1,000 MG/L before the water tastes salty (American Public Health Association, 1980). The recommended maximum concentration for chloride in drinking water is 250 MG/L.

Hardness

Hardness is a term that is calculated by multiplying the concentrations of calcium and magnesium by constant factors. Hardness reflects the amount of soap needed to produce suds and is indicative of the amount of scale buildup that will occur in boilers. Table I-4 shows the concentrations that coincide with common hardness descriptions.

Trace Metals

The following seven trace metals were analyzed for: arsenic, chromium, lead, manganese, copper, zinc, and strontium. Arsenic, chromium, lead, and manganese all have a maximum contaminant level (MCL) of 50 µG/L. The MCL's for copper (Cu) and zinc (Zn) are 1 MG/L and 5 MG/L, respectively. Strontium has no drinking water standard. High concentrations of trace metals in the water are toxic and pose a serious threat to the user.

Purgeable Organic Compounds

The purgeable organic compounds and aromatic hydrocarbons listed in Table I-2 were sampled and analyzed for using a gas chromatograph (GC) with a Hall detector following EPA methodologies 601 and 602. **Eight of these compounds have established drinking water standards as shown on Table I-3.**

Regional Ground Water Quality Results

The following section presents a regional perspective on the status of ground water quality existing within the SFWMD. In addition, in order to assist local government in the preparation of Comprehensive Land Use Plans and to further identify ground water quality information available for the counties within the SFWMD, water quality information is presented for each of the 16 counties within the SFWMD in separate sections later in the report. As previously mentioned, water quality information for Dade, Broward, and Monroe Counties was taken from existing literature.

In this section, general water quality types will be discussed and water quality sampling results will be compared to the inorganic parameters of the State of Florida Primary and Secondary Drinking Water Standards (Table I-3) from Chapter 17-22 of the Florida Administrative Codes. (Trace metal concentrations from metal cased wells were not used to determine the number of wells exceeding drinking water standards. Iron concentrations are discussed separately from the rest of the secondary standards.) The percentage of wells that exceed standards within the various regions sampled by the SFWMD (excluding Dade, Broward, and Monroe Counties) is shown in Figure I-1.

TABLE I-3. STATE OF FLORIDA PRIMARY DRINKING WATER STANDARDS

Inorganics	MCL* (MG/L)
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05
Sodium	160.
Flouride	1.4 - 2.4 (varies with temperature)
Turbidity	1 TU Monthly Average 5 TU Two Day Average
Microbiological	
Coliform Bacteria	Total Coliform 4/100 ml (see rules FAC 17-22)
Organics	**MC (MG/L)**
Chloridated Hydrocarbons	
Endrin	0.0002
Lindane	0.04
Methoxychlor	0.1
Toxaphene	0.005
Chlorophenoxys	
2,4,-D	0.1
2,4,5-TP, Silvex	0.01
Volatile Organics	micrograms/l
Trichloroethylene	3
Tetrachloroethylene	3
Carbon Tetrachloride	1
Vinyl Chloride	1
1,1,1-Trichloroethane	200
1,2-Dichloroethane	3
Benzene	1
Ethylene Dibromide	0.02
Radionuclides	**MCL**
Radium 226, 228	5 pCi/L
Gross Alpha Activity (Including 226Ra, excluding Rn, V0	15 pCi/L
Beta Activity	4 mrem/yr
Tritium	20,000 pCi/L
Strontium-90	8 pCi/L
Trihalomethane	**MCL**
TTHM	10 mg/L

TABLE I-3 CONTINUED. STATE OF FLORIDA SECONDARY DRINKING WATER STANDARDS

Contaminant	Levels, Milligrams Per Liter**
Chloride	250
Color	15 Color Unit
Copper	1
Corrosivity	***Neither Corrossive nor Scale Forming
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 (threashold odor number)
pH (at Collection Point)	6.5 (min allowable - no max)
Sulfate	250
TDS	500 (may be greater if no other MCL is exceeded)
Zinc	5

* MAXIMUM CONTAMINANT LEVEL

** EXCEPT COLOR, ODOR, CORROSIVITY, AN DPH

*** ASSESSMENT OF DEGREE OF CORROSION OR SCALE FORMING TENDENCIES MUST BE BASED ON HISTORICAL WATER CHARACTERISTICS OF THE SYSTEM. A LANGELIER INDEX RANGE OF -0.2 TO +0.2 SHOULD BE USED AS A GUIDELINE TOWARD OBTAINING WATER STABILITY IF CALCIUM CARBONATE IS PRESENT. IF STABILIZERS ARE USED, THE -0.2 TO +0.2 RANGE MAY NOT BE APPLICABLE

TABLE I-4. CLASSIFICATION OF WATER BY HARDNESS CONTENT

Concentration MG/L $CaCO_3$	Description
0 - 60	Soft
61 - 120	Moderately Hard
121 - 180	Hard
> 180	Very Hard

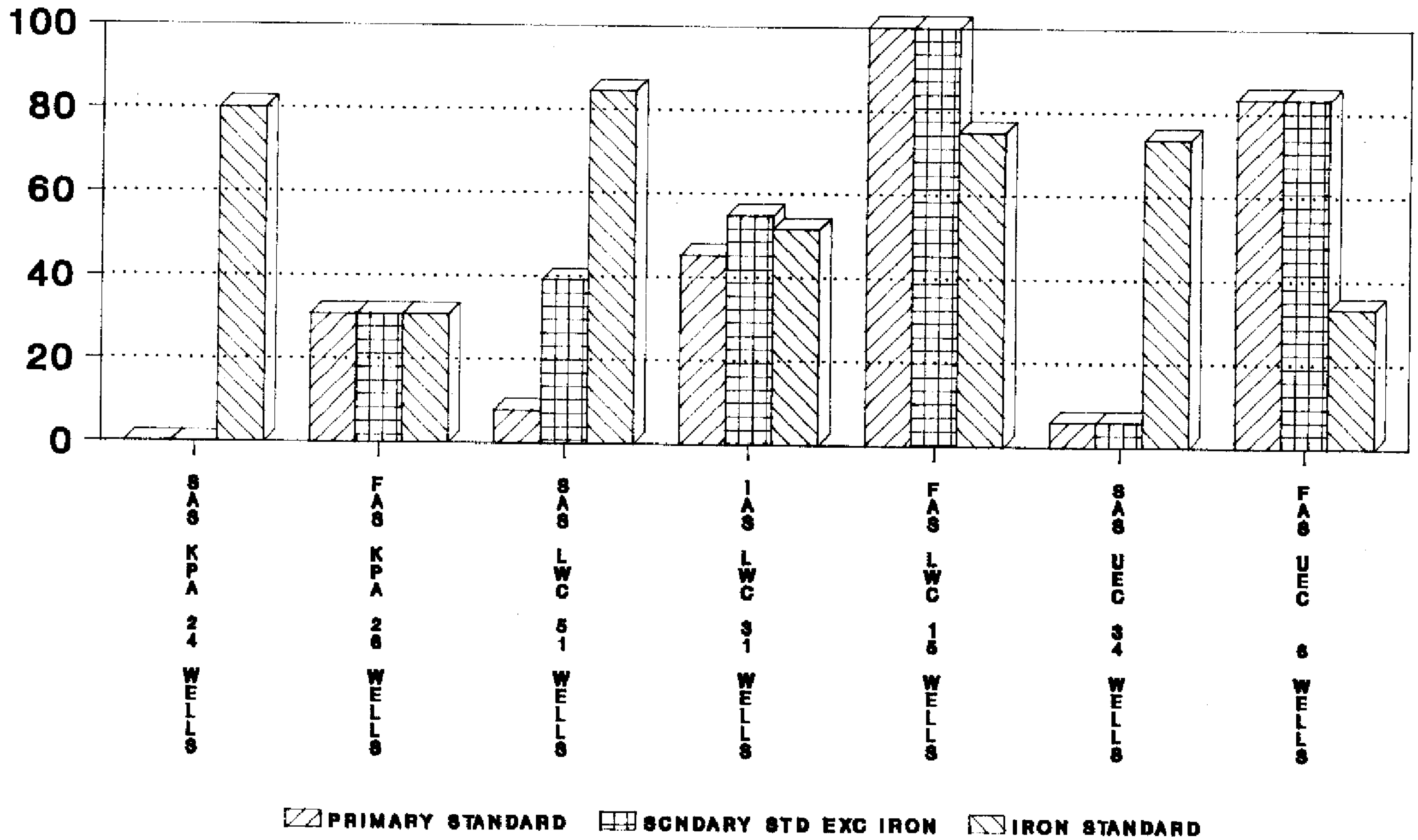
Sampling results are presented by aquifer system within four major regions of the SFWMD. These regions include the Kissimmee Planning Area, the Lower West Coast, the Upper East Coast, and the Lower East Coast (Figure I-2). Localized areas within these regions appear to have been impacted by man, and the quality of the water existing within the aquifer sampled has been degraded. These impacts can be broken into two broad categories: 1) the movement of existing poor quality water, and 2) the introduction of anthropogenic contaminants. Impacts on ground water quality from the movement of existing poor quality appear to be more common and widespread than impacts from the introduction of anthropogenic compounds. The movement of existing poor quality water includes: a) uncontrolled flow from artesian wells, b) upconing of poor quality water from deeper producing zones or aquifers, and c) salt water intrusion. Areas that were affected by the introduction of contaminants were located near landfills and industrial parks.

Kissimmee Planning Area

The Kissimmee Planning Area is located in the northern portion of the SFWMD, and is composed of Highlands, Okeechobee, Orange, Osceola, and Polk Counties (Figure I-2). The Surficial Aquifer System and the Floridan Aquifer System are the two major aquifer systems present within this area. Twenty-four Surficial Aquifer System monitor wells and 26 Floridan Aquifer System monitor wells have been sampled within this area on an annual basis over the past four years.

Results indicate that the Surficial Aquifer System water within the Kissimmee Planning Area is predominantly a calcium-carbonate water of relatively low ionic strength. Overall water quality is variable, however, it is potable throughout most of the Kissimmee Planning Area. The Surficial Aquifer System did not exceed primary or secondary drinking water standards in any of the areas sampled. However, the drinking water standard for iron was

AMBIENT GROUND WATER QUALITY BY REGION
PERCENTAGE OF MONITOR WELLS EXCEEDING DRINKING WATER STANDARDS



KPA-KISSIMMEE PLANNING AREA, UEC-UPPER EAST COAST, LWC-LOWER WEST COAST

FIGURE I-1

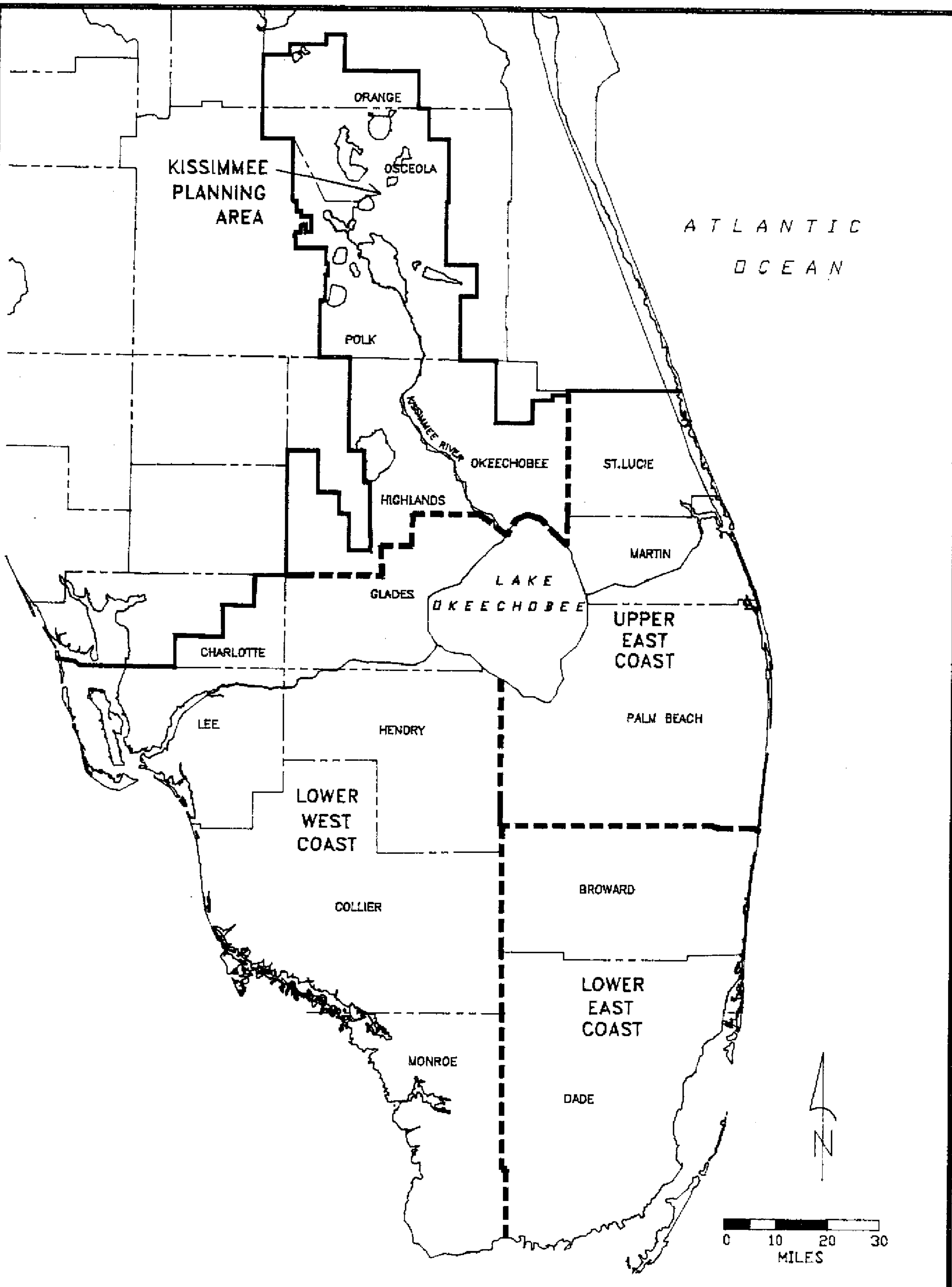


Figure I-2 REGIONS WITHIN THE AMBIENT GROUND WATER QUALITY MONITOR NETWORK exceeded at most of the monitor wells. Table I-5 provides a list of all of the drinking water standards that were sampled.

TABLE I-5. STATE OF FLORIDA PRIMARY AND SECONDARY DRINKING WATER STANDARDS SAMPLED BY THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT

PRIMARY DRINKING WATER STANDARDS

Inorganic	MCL* (MG/L)
Arsenic	0.05
Chromium	0.05
Lead	0.05
Nitrate (as N)	10.00
Sodium	160.00
Fluoride	1.40 - 2.40 (varies with temperature

SECONDARY DRINKING WATER STANDARDS

Contaminant	Levels** (MG/L)
Chloride	250.00
Copper	1.00
Iron	0.30
Manganese	0.05
pH (at collection point)	6.50 (min. allowable - no max)
Sulfate	250.00
TDS	500.00 (may be greater if no other MCL is exceeded)
Zinc	5.00

* MAXIMUM CONTAMINANT LEVEL
** EXCEPT PH

Floridan Aquifer System water in the northern portion of the Kissimmee Planning Area is a calcium-carbonate type water of low to moderate ionic strength. The Floridan Aquifer System's prime water quality is located near recharge areas in the western and northern portions of the Kissimmee Planning Area. Sodium and chloride concentrations in the aquifer increase to the south, so that within Okeechobee County the water has become highly mineralized and is dominated by the sodium and chloride ions.

The Floridan Aquifer System exceeds the primary drinking water standard for sodium within Okeechobee and southern Osceola Counties. Secondary drinking water standards were also exceeded for chlorides, total dissolved solids, and sulfates in these areas as well. Within the Kissimmee Planning Area 30 percent of the monitor wells exceeded primary drinking water standards, secondary drinking water standards, and iron standards (Figure I-1).

Lower West Coast

The Lower West Coast region is located along the southwest coast of the SFWMD and is composed of Charlotte, Collier, Glades, Hendry, Lee, and Monroe Counties (Figure I-2). Three aquifer systems are present within this region. They include the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. Water quality within this region generally becomes poorer with increased depth. Fifty-one Surficial Aquifer System, 31 Intermediate Aquifer System, and 15 Floridan Aquifer System monitor wells have been sampled within this area on an annual basis for the past four years.

Results indicate that the Surficial Aquifer System water within most areas of the Lower West Coast is representative of a calcium-carbonate type water of moderate ionic strength. Water quality is generally potable except for some coastal areas which show increased sodium and chloride concentrations due to salt-water intrusion, and some localized areas of contamination due to mineralized water from deeper aquifers. Primary drinking water standards (sodium) were exceeded in 8 percent of the monitor wells. Secondary drinking water standards (predominantly total dissolved solids, and chloride) were exceeded in slightly less than 40 percent of the monitor wells and approximately 80 percent exceeded the iron standard (Figure I-1).

The Intermediate Aquifer System within the Lower West Coast is composed of the Sandstone aquifer and the lower-Hawthorn aquifer. The Sandstone aquifer contains primarily calcium-carbonate water while the deeper lower-Hawthorn aquifer contains predominantly sodium-chloride type water.

Water quality within the Intermediate Aquifer System in the Lower West Coast is variable. Approximately half of the monitor wells exceeded primary drinking water standards (predominantly sodium). Nearly 60 percent of the areas sampled exceeded at least one secondary drinking water standard (predominantly total dissolved solids, and chlorides). Half of the monitor wells exceeded the drinking water standard for iron (Figure I-1). Although water from the Intermediate Aquifer System is not potable in many areas, it is possible to treat this water by reverse osmosis filtration in order to obtain potable water standards.

Water within the Floridan Aquifer System in the Lower West Coast is a sodium chloride type of high ionic strength. The water quality is poor and all samples that were collected exceeded both primary (predominantly sodium) and secondary drinking water standards (predominantly total dissolved solids and chlorides). Approximately 75 percent of the monitor wells exceeded the drinking water standard for iron (Figure I-1).

Upper East Coast

The Upper East Coast region is located in the northeast portion of the SFWMD and is composed of Martin, Palm Beach, and St. Lucie Counties (Figure I-2). Both the Surficial Aquifer System and the Floridan Aquifer System are present within the Upper East Coast region. Thirty-four Surficial Aquifer System and six Floridan Aquifer System wells have been sampled within this area on an annual basis over the past four years.

The Surficial Aquifer System is the primary source of public drinking water supplies throughout the region. Results indicate that the Surficial Aquifer System water within the Upper East Coast is representative of a calcium-carbonate type water of low to moderate ionic strength. Water quality is generally potable throughout the area. Some coastal areas, however, display increased sodium and chloride concentrations due to saltwater intrusion. In western Palm Beach County the incomplete flushing of connate seawater has left high sodium, chloride, and total dissolved solids concentrations.

Primary drinking water standards (sodium) were exceeded in only 6 percent of the monitor wells, these areas are located in northwestern Martin County and in southwestern St. Lucie County. Secondary drinking water standards for total dissolved solids were also exceeded at these areas. Total dissolved solids concentrations within other areas were high, but were not considered to have violated drinking water standards. Seventy-five percent of the monitor wells within the Upper East Coast exceeded the drinking water standard for iron (Figure I-1).

The Floridan Aquifer System within the Upper East Coast region contains a sodium chloride type water of relatively high ionic strength. Water from the Floridan Aquifer System exceeded the primary drinking water standards for sodium in five of the six monitor wells sampled. In addition, secondary drinking water standards for total dissolved solids and chlorides were exceeded in all of the areas that were sampled (Figure I-1).

Lower East Coast

The Lower East Coast is located along the southeast coast of the SFWMD (Figure I-2) and is composed of Broward and Dade Counties. The SFWMD entered into agreements with the BCEQCB and DERM for the expressed purpose of sampling the AGWQMN in their respective counties. The sampling results from Dade and Broward Counties are not included in this publication. The following discussion of water quality within the Lower East Coast will be limited to information that is available through published literature.

The Surficial Aquifer System and the Floridan Aquifer System are present within the Lower East Coast region. However, the water quality of the Floridan Aquifer System is so poor that it is not used. Therefore, the Surficial Aquifer System, composed primarily of the Biscayne Aquifer, will be the focus of this discussion. Information regarding water quality of the Surficial Aquifer System within Broward County was obtained from Howie, 1986, and the information regarding the Surficial Aquifer System within Dade County is taken from Howie and Miller, 1986.

In Broward County water in the Surficial Aquifer System beneath the Atlantic Coastal Ridge is a calcium bicarbonate type and is potable, under existing State standards, to a depth of 200 feet or more. Exceptions are in areas of seawater intrusion along the coast and in the vicinity of the New River near Ft. Lauderdale. Dissolved iron concentrations beneath the Atlantic Coastal Ridge are variable, but generally exceed 1 MG/L.

Water in the Surficial Aquifer System between the coastal ridge and the water conservation areas is potable and is usually a calcium bicarbonate type for the first 140 feet or more below land surface. Below 140 feet the water gradually becomes more mineralized. Dissolved iron concentrations between the coastal ridge and the conservation areas are variable, but generally exceed 1 MG/L.

Beneath the conservation areas and in the western edge of Broward County, ground water in the first 100 feet below land surface is either a calcium-bicarbonate type or a mixed ion type.

At depths of 100-200 feet diluted residual seawater occurs, except along the far western edge of the county. Residual seawater is least diluted to the north. Dissolved iron concentrations are generally between 0.3 and 1 MG/L but increase to the east of the conservation areas.

Some sites within the coastal areas of Dade County and in southern Dade County are affected by saltwater intrusion, either throughout the vertical extent of the Surficial Aquifer System or in specific zones. In central Dade County, sites located farther inland, generally between the coastal areas and the eastern part of the Everglades, have water with low specific conductance from land surface to the base of the Surficial Aquifer System.

In central Dade County the upper 100 feet of the Surficial Aquifer System probably have been flushed of residual seawater, and ground water within these units is suitable for most uses within the county. Calcium carbonate is the type of water generally associated with these units.

Beneath the water conservation areas in northwestern Dade County, more highly mineralized water occurs in the Surficial Aquifer System than elsewhere in the county (except areas where saltwater intrusion occurs). Calcium bicarbonate water and calcium sodium bicarbonate water occur in this part of the Surficial Aquifer System at depths from about 20 to 60 feet below land surface. Water in this part of the Surficial Aquifer System is an extension of highly mineralized water found in western Broward County that has been diluted by less mineralized recharge water. Beneath these depths, however, restriction of recharge by low permeability materials results in the occurrence of sodium bicarbonate water and calcium sodium bicarbonate water that are similar in composition to that in Broward County.

In general, ground water in the Surficial Aquifer System of Dade County is suitable for most purposes. However, maximum concentrations of sodium, chloride, color, fluoride, iron, and dissolved solids in some parts of Dade County exceed drinking water standards.

Trace Metals and Casing Material

Trace metal analyses from all regions that were sampled (excluding Dade, Broward, and Monroe Counties) show that the percentage of monitor wells that exceed drinking water standards is higher for metallic cased wells, than it is for non-metallic cased wells. Figure I-3 shows the percentage of the metallic and non-metallic cased wells that exceed: 1) primary drinking water standards, 2) secondary drinking water standards (excluding iron), and 3) iron standards. Sampling results from the AGWQMN show that 3.7 percent of the metal cased wells exceeded primary drinking water standards for metals, while only 0.9 percent of the non-metal cased wells exceeded these standards. Metal cased wells exceeded secondary drinking water standards for metals (excluding iron) in 32.1 percent of the wells sampled. Non-metal cased wells exceeded these secondary rinking water standards in only 7.6 percent of the dwells sampled. Metal cased wells exceeded secondary drinking water standards for iron in 67.9 percent of the wells sampled. Non-metal cased wells exceeded the same standard for iron in 39.6 percent of the wells sampled.

There is evidence in existing literature (Barcelona, 1983) that metal cased wells may leach trace metals into the sample water and induce elevated trace metal concentrations. Metal casing is presently allowed for the construction of private drinking water supply wells. The potential of metal casing to leach into private drinking water supply wells and elevate trace metal concentrations is an area that needs further study.

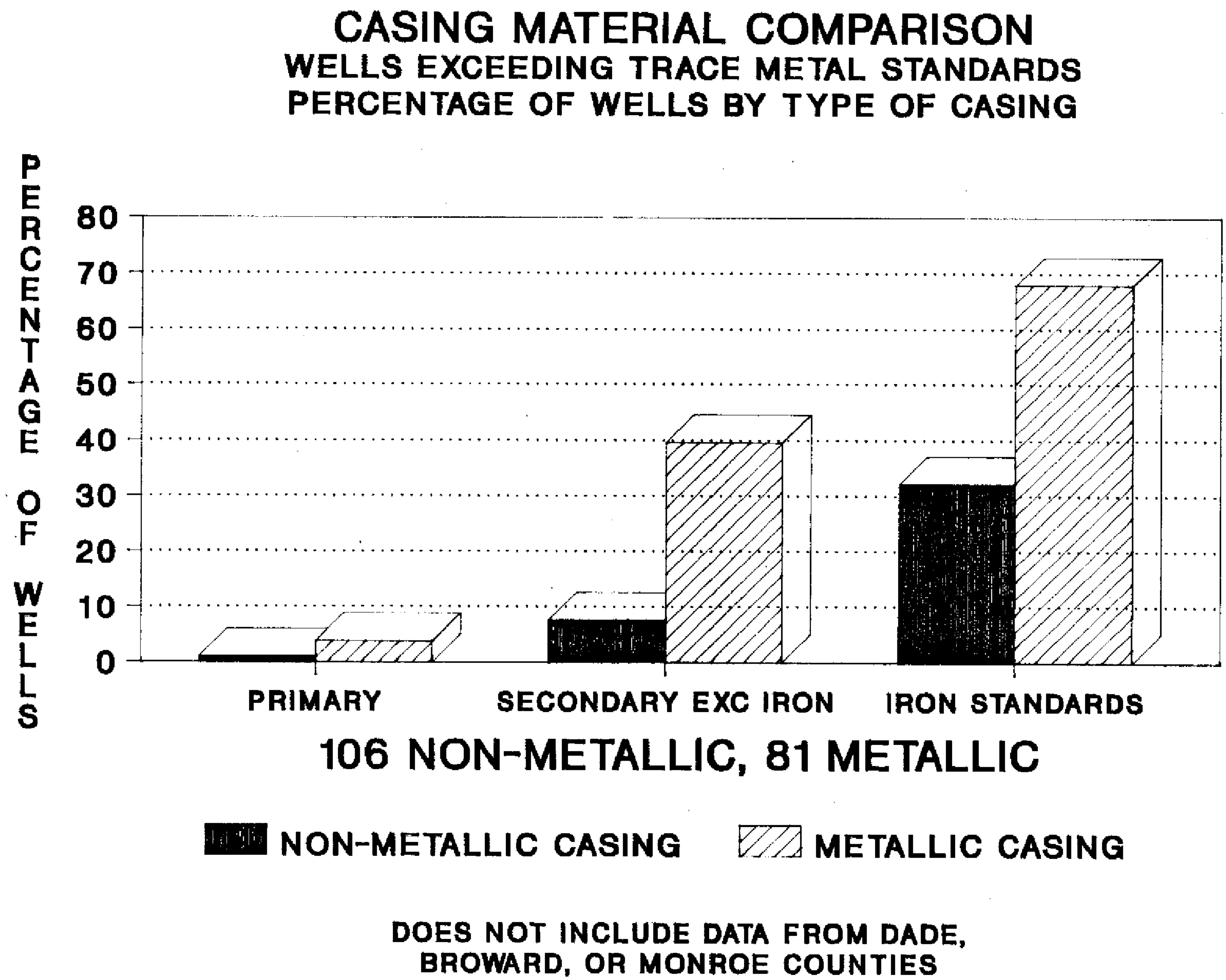

CASING MATERIAL COMPARISON
WELLS EXCEEDING TRACE METAL STANDARDS
PERCENTAGE OF WELLS BY TYPE OF CASING
PERCENTAGE OF WELLS
80
70
60
50
40
30
20
10
0
PRIMARY
SECONDARY EXC IRON
IRON STANDARDS
106 NON-METALLIC, 81 METALLIC
NON-METALLIC CASING
METALLIC CASING
DOES NOT INCLUDE DATA FROM DADE, BROWARD, OR MONROE COUNTIES

FIGURE I-3

SECTION 1

BROWARD COUNTY

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LOCATION AND EXTENT OF AREA

Broward County is located on the southeast coast of Florida and comprises an area of approximately 1,220 square miles, measuring 50 miles from east to west and 26 miles from north to south. The county lies between 26° 57' 24" and 25° 57' 23" north latitude and 80° 52' 47" and 80° 04' 32" west longitude. It is bounded on the north by Palm Beach County, to the south by Dade County, to the west by Collier and Hendry Counties, and to the east by the Atlantic Ocean (Figure 1-1).

HYDROGEOLOGY

Two aquifer systems are present within Broward County, these are the Surficial Aquifer System and the Floridan Aquifer System. These aquifer systems are separated from one another by the Hawthorn formation. The Surficial Aquifer System is composed primarily of the Biscayne Aquifer within Broward County.

The Biscayne Aquifer is the only reliable source of potable water within the county, and has been designated a sole source aquifer by the United States Environmental Protection Agency under the provisions of the Safe Drinking Water Act. The Biscayne Aquifer is one of the most productive of the shallow non-artesian aquifers in the United States and one of the most permeable aquifers in the world (Bower, 1978). The aquifer underlies all of Broward County except for the western edge. It is wedge shaped and is more than 200 feet thick in eastern Broward County, it thins to the west until it is nonexistent in the western areas of the county.

The Floridan Aquifer System is present beneath all of Broward County, however, water within this aquifer system is so highly mineralized that it is not suitable for most uses. Table 1-1 shows a schematic representation of the generalized hydrogeology present within Broward County.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The South Florida Water Management District has entered into an agreement with the Broward County Environmental Quality Control Board (BCEQCB) whereby the BCEQCB will establish and monitor the Ambient Ground Water Quality Monitoring Network (AGWQMN) within Broward County.

Since 1986, BCEQCB has annually collected water quality samples from the AGWQMN wells within Broward County. The BCEQCB water quality sampling results were not available prior to publication of this report and will instead by included in a future publication dealing with water quality trends within the SFWMD. The well construction and location information was available for these wells. Figure 1-2 shows the distribution and approximate location of the AGWQMN monitor wells within the county. A complete listing of the well locations, screened intervals, construction materials and other pertinent information is summarized and presented in Appendix 1-1.

This report will not interpret the results of the AGWQMN sampling. A summary of the water quality within Broward County from existing literature will be discussed to indicate general ambient ground water quality conditions.

Surficial Aquifer System (Biscayne Aquifer)

Total dissolved solids concentrations within the Biscayne Aquifer range from less than 200 MG/L in eastern Broward County to greater than 400 MG/L to the west near the water conservation areas, Figure 1-3 (from Broward County Planning Council, 1981). The secondary drinking water standard for total dissolved solids is 500 MG/L; however, it may be greater if no other standards are exceeded.

Chloride concentrations within the Biscayne Aquifer range from less than 60 MG/L in eastern Broward County to over 500 MG/L in the north-western portion of the county, Figure 1-4 (from Broward County Planning Council, 1981). The secondary drinking water standard for chloride is 250 MG/L. The high chloride concentrations in western and northwestern Broward County are the result of incomplete flushing of connate seawater.

Chloride concentrations along the coast are elevated by salt water intrusion. Salt water intrusion is delineated by measuring the chloride concentration at the base of the Surficial Aquifer System. Figure 1-5 shows where the chloride concentration exceeds 1,000 MG/L, indicating the landward extent of the salt water intrusion front.

Hardness concentrations range from a low of less than 200 MG/L in the east beneath the coastal ridge to a high of over 400 MG/L in the western portion of the

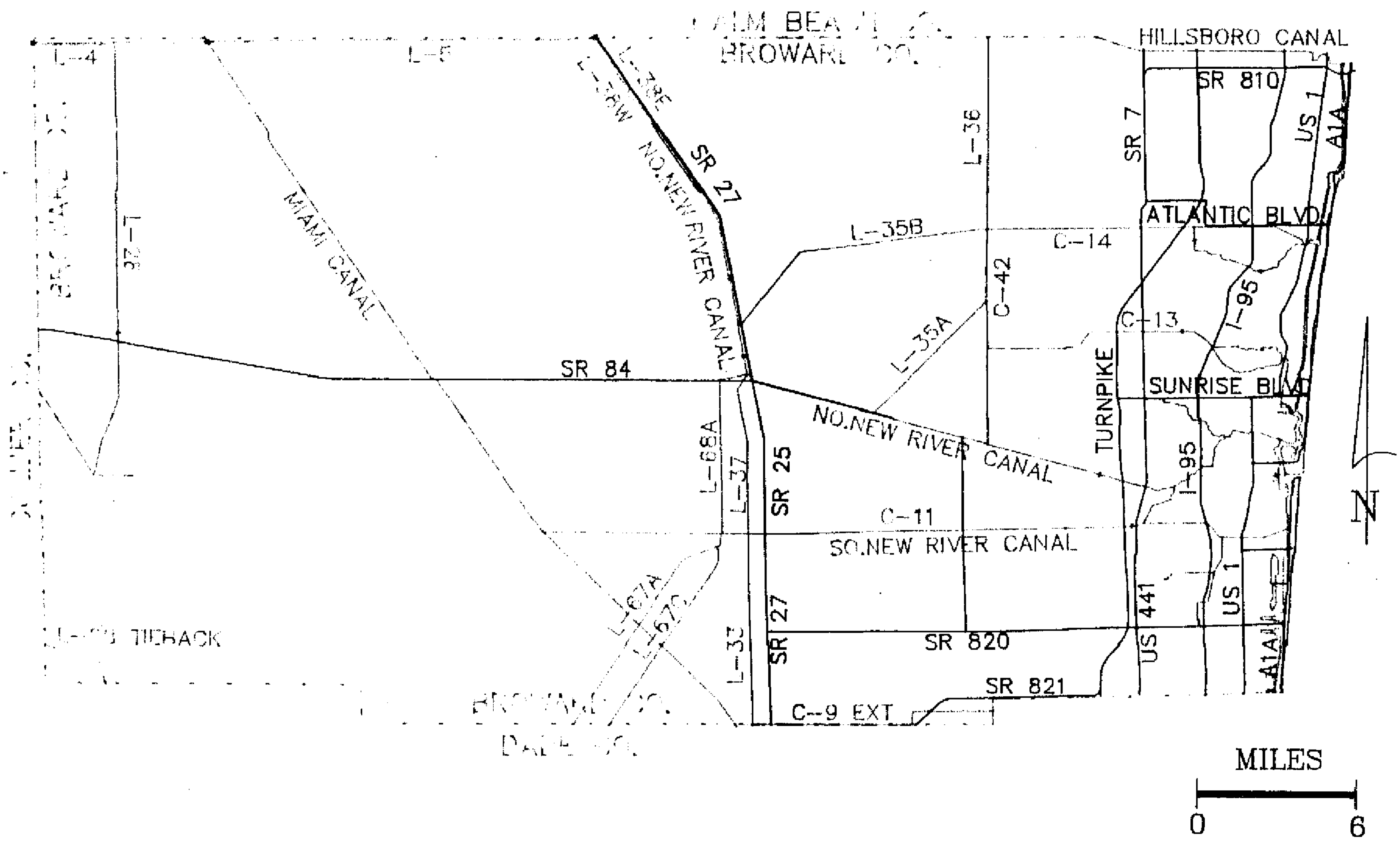

Figure 1-1 MAP OF BROWARD COUNTY

TABLE 1-1. GENERALIZED HYDROGEOLOGY OF BROWARD COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFER-ENTIATED DEPOSITS	0-240	MODERATE TO HIGH TRANSMISSIVITY	MEDIUM TO FINE GRAINED QUARTZ SAND WITH VARYING PERCENTAGES OF SHELL AND CLAY
	ANASTASIA FORMATION		MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	SANDY LIMESTONE, CALCAREOUS SANDSTONE, SHELLS, AND COQUINA
	KEY LARGO LIMESTONE		HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	CORALLINE LIMESTONE COMPRISED OF CORAL SKELETONS, FINE TO MEDIUM GRAINED CEMENTED CALCAREOUS SAND, AND OTHER REEEF DETRITUS
	FT. THOMPSON FORMATION		HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	ALTERNATING MARINE, BRACKISH, AND FRESH WATER MARLS, LIMESTONES, AND SANDSTONES
INTERMEDIATE CONFINING ZONE	TAMIAMI FORMATION	450-800	HIGH TO LOW PERMEABILITY WATER QUALITY: GOOD TO POOR	CREAMY-WHITE LIMESTONE, AND GREENISH-GRAY CLAYEY AND CALCAROUS MARL, SILTY AND SHELLY SANDS, AND SHELL MARL
	HAWTHORN GROUP		IMPERMEABLE	GRAY GREEN SANDY CLAYW ITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2400-3800	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

county, Figure 1-6, (from Broward County Planning Council, 1981). These concentrations place the water in the very hard range.

Floridan Aquifer System

The water quality of the Floridan Aquifer System in Broward County is poor and the water is nonpotable. The Floridan Aquifer is not monitored in Broward County by the AGWQMN.

SUMMARY AND CONCLUSIONS

The BCEQCB has established the AGWQMN in Broward County. Since 1986, BCEQCB has annually collected water quality samples from approximately 60 (AGWQMN) wells within the county.

The water quality of the Biscayne Aquifer in most areas of Broward County meets the state of Florida drinking water standards. Areas of decreased water quality exist in northwestern Broward County and are the result of incompletely flushed connate seawater. Poor water quality also exists in some coastal areas where salt water intrusion has occurred.

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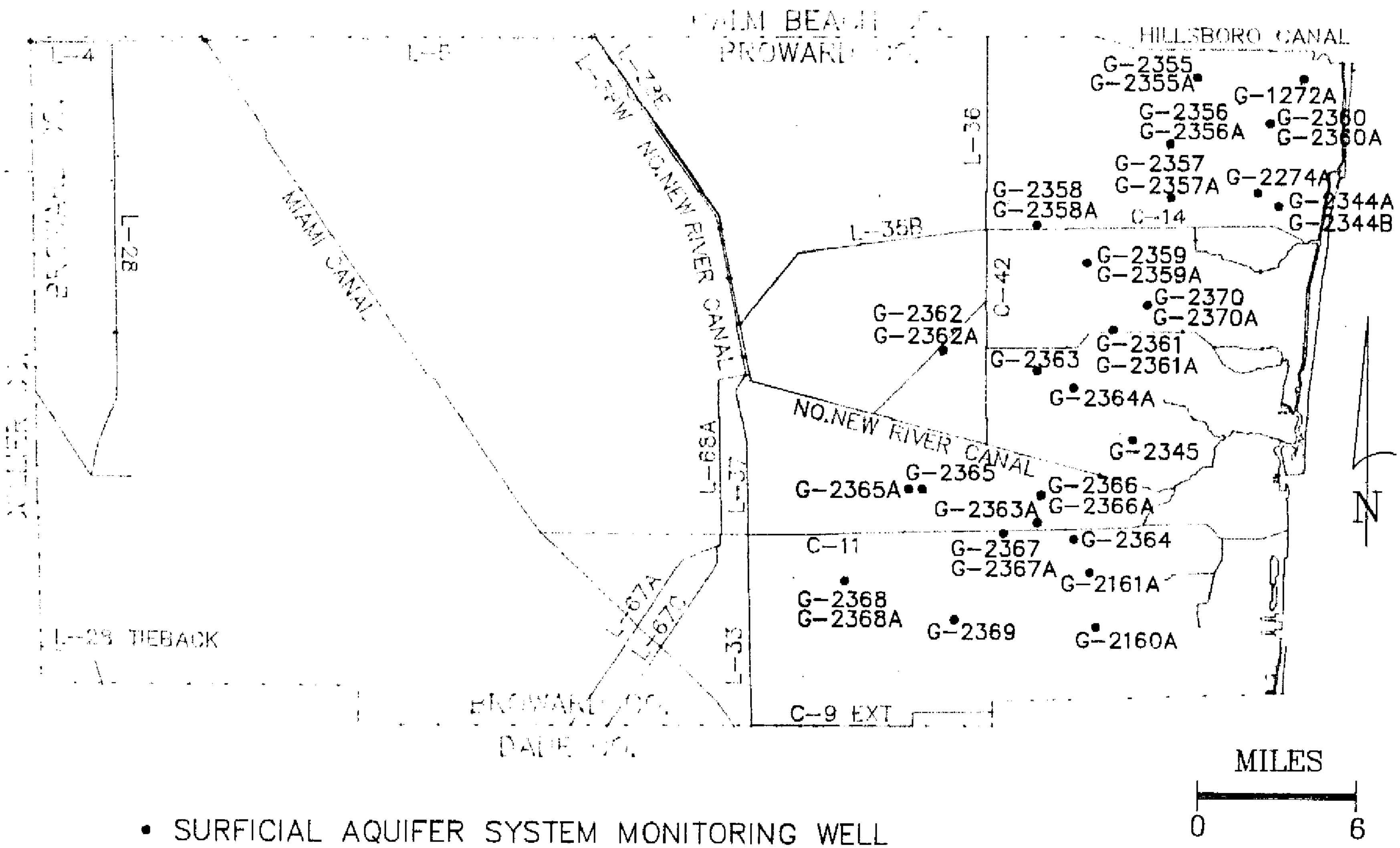


Figure 1-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

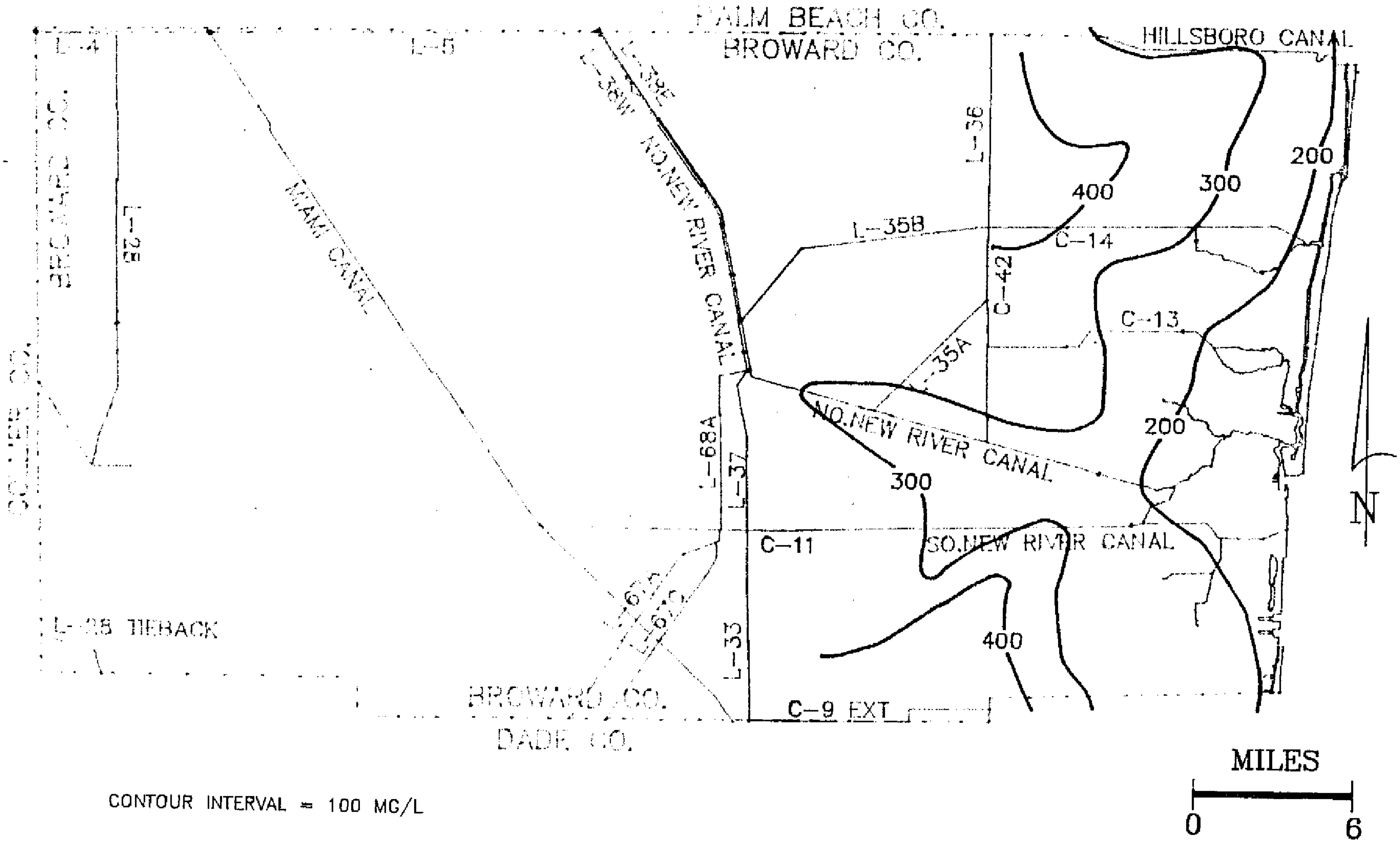


Figure 1-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (BROWARD COUNTY PLANNING COUNCIL, 1981)

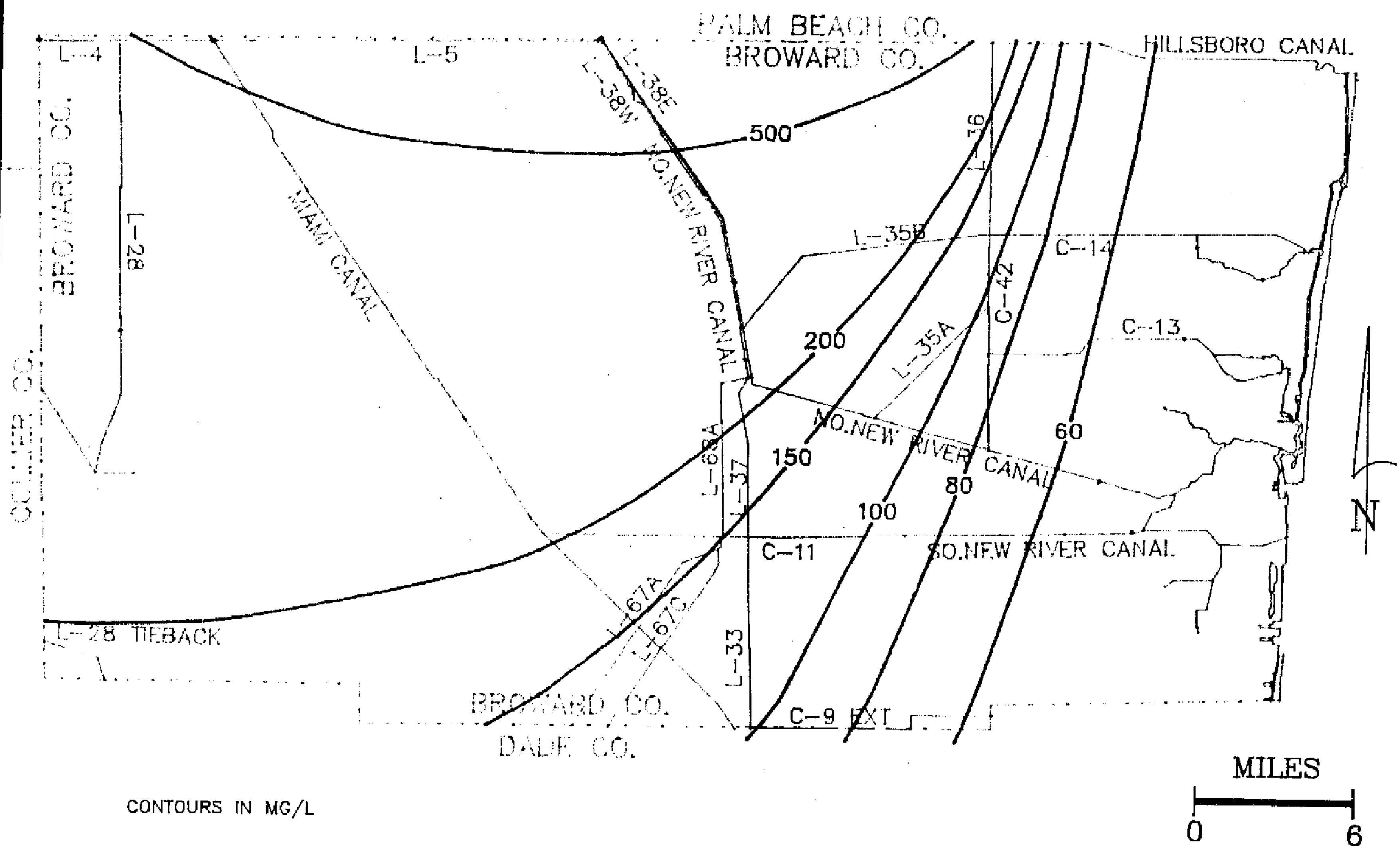
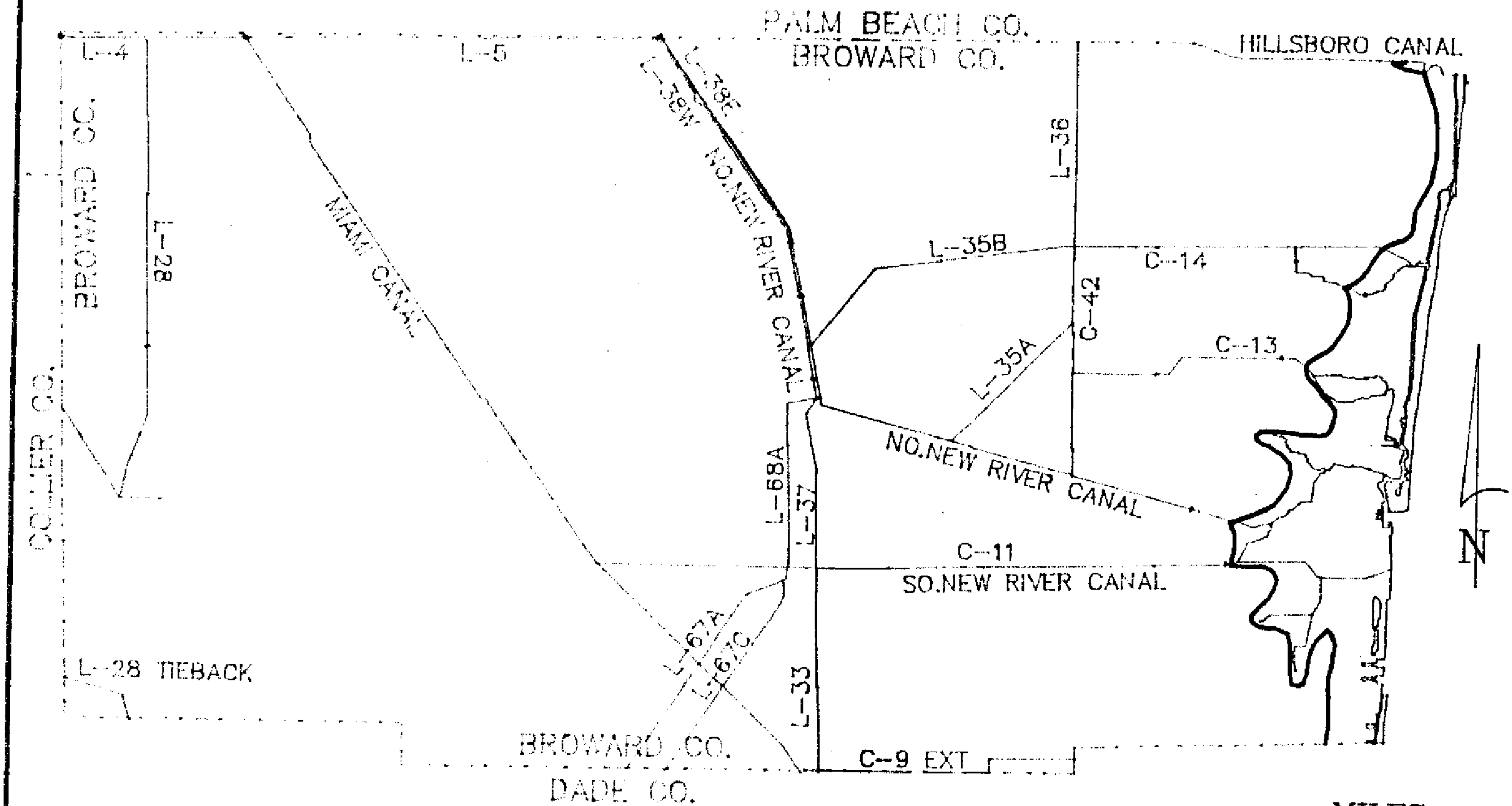


Figure 1-4 CHLORIDE CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (BROWARD COUNTY PLANNING COUNCIL, 1981)



INDICATES LOCATION OF THE 1000 PPM ISOCHLOR AT THE BASE OF THE SURFICIAL AQUIFER SYSTEM

Figure 1-5 EXTENT OF SALT-WATER INTRUSION (1982)

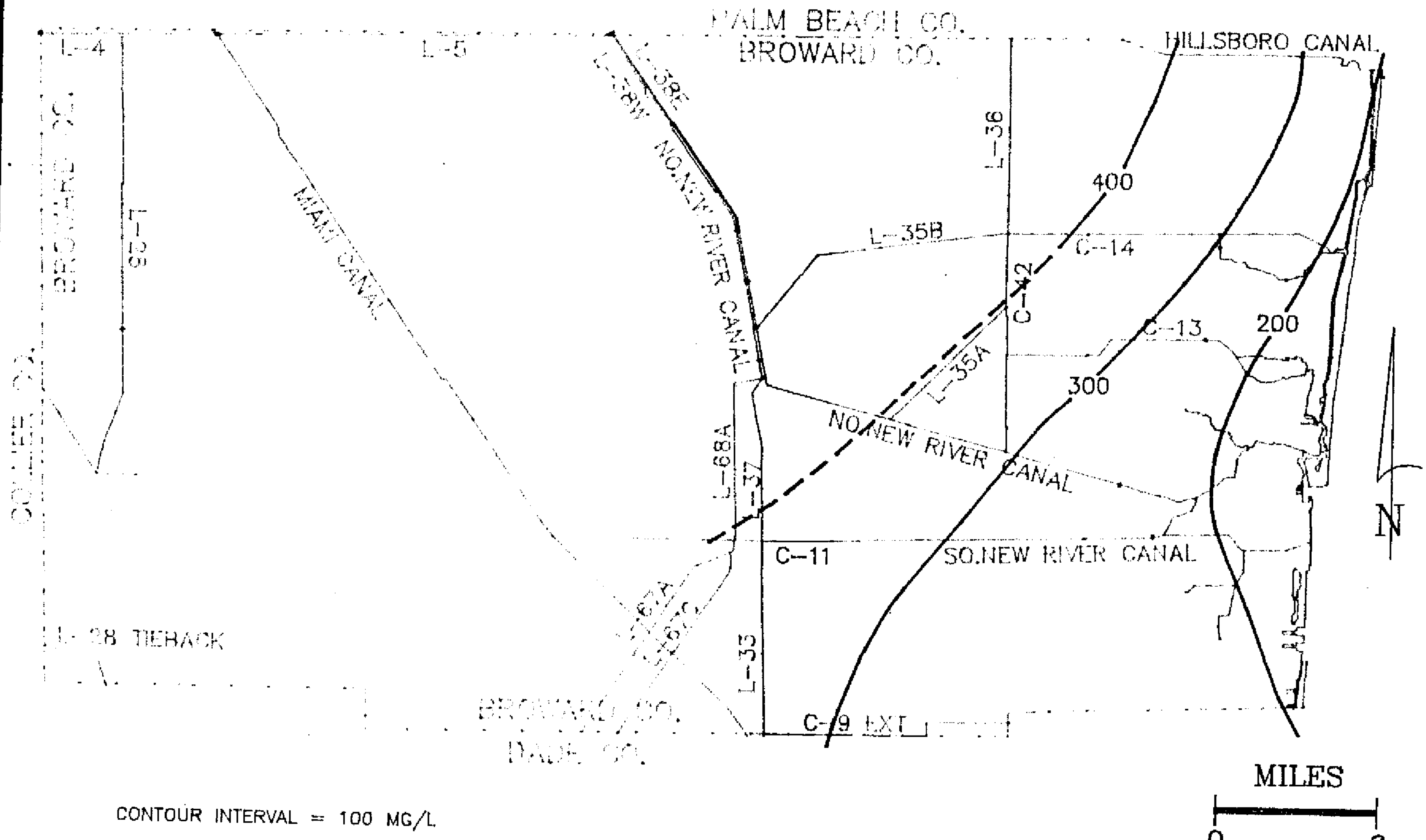


Figure 1-6 HARDNESS CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (BROWARD COUNTY PLANNING COUNCIL, 1981)

SECTION 2

CHARLOTTE COUNTY

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LOCATION AND EXTENT OF AREA

Charlotte County is located on the southwest coast of Florida and comprises an area of approximately 705 square miles, measuring 50 miles from east to west and 19 miles from north to south. The county lies between 26° 46' and 27° 02' north latitude, and 81° 34' and 82° 23' west longitude. It is bounded on the north by De Soto and Sarasota Counties, to the south by Lee County, to the west by the Gulf of Mexico and to the east by Glades County (Figure 2-1). Approximately 234 square miles, the southeastern one-third of the county are within the South Florida Water Management District boundaries.

HYDROGEOLOGY

Three aquifer systems are present beneath the southeastern portion of Charlotte County. These are the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. These aquifer systems are separated from one another by relatively impermeable sediments. Table 2-1 shows a schematic representation of the generalized hydrogeology of the southeastern portion of the county. Table 2-1 was constructed using information from Sutcliffe (1975).

The Surficial Aquifer System yields moderate quantities of potable water in the southeastern area of Charlotte County. The Intermediate Aquifer System in this area exceeds the secondary drinking water standard for several parameters but may be suitable for uses other than drinking water supplies. The Floridan Aquifer System is too highly mineralized for most uses.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of the aquifer to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and high water table also increase the susceptibility of this aquifer to contamination.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Charlotte County consists of two Surficial Aquifer System wells and one Intermediate Aquifer System well. Figure 2-2 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials and other pertinent information is summarized and presented in Appendix 2-1. The results of the inorganic laboratory analysis for the first three years of sampling (1985-1987) are shown in Appendix 2-2.

The AGWQMN was designed to provide extensive coverage, but is concentrated in areas with heavy ground water withdrawals. Ground water withdrawals from the portion of Charlotte County that lies within the SFWMD are limited and consequently only three wells are monitored. Although data from adjacent counties was used to estimate water quality within Charlotte County the scarcity of data limits the accuracy of the estimations of ground water quality and the reader must remember that these are approximations.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit total dissolved solids concentrations ranging from a low of 360 MG/L to a high of 550 MG/L, with an average concentration of 450 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; however, it may be greater if no other standards are exceeded. Total dissolved solids concentrations for the Surficial Aquifer System in Charlotte County are shown in Figure 2-3 was constructed using total dissolved solids data from Surficial Aquifer System AGWQMN wells in Charlotte and adjacent counties.

Chloride concentrations within the Surficial Aquifer System range from a low of 32 MG/L to a high of 46 MG/L, with an average concentration of 41 MG/L. The secondary drinking water standard for chloride is 250 MG/L. Chloride concentrations are highest in the extreme southeastern corner of the county (Figure 2-4), but are still within drinking water standards. Figure 2-4 was constructed using chloride data from Surficial Aquifer System AGWQMN wells in Charlotte and adjacent counties.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 212 MG/L to a high of 321 MG/L, with an average concentration of 256 MG/L. These concentrations place the water in the very hard range. Hardness concentrations are lowest in the southeastern corner of the county (Figure 2-5). Figure 2-5 was constructed using hardness data from Surficial Aquifer System monitor wells in Charlotte and adjacent counties.

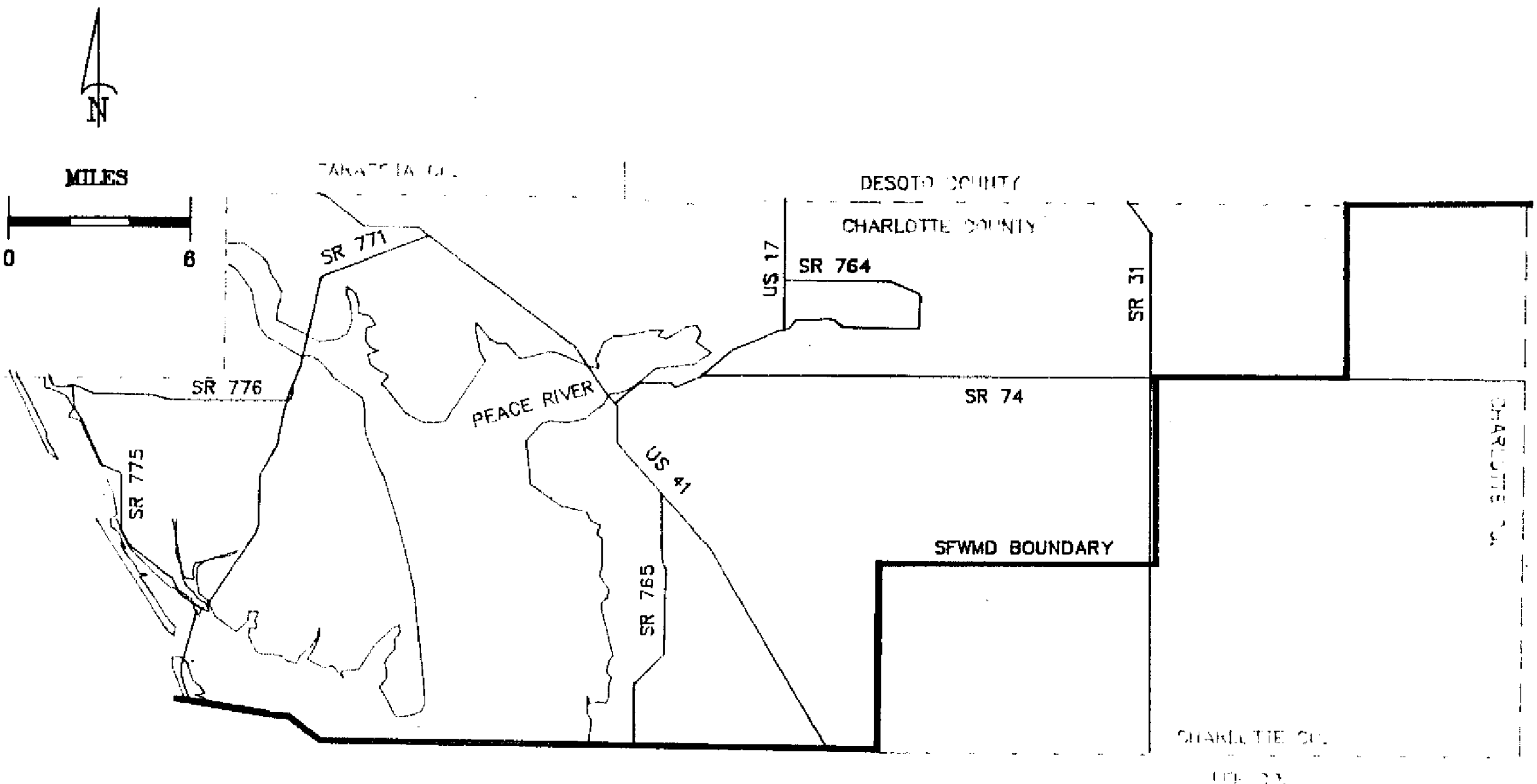


Figure 2-1 MAP OF CHARLOTTE COUNTY

TABLE 2-1. GENERALIZED HYDROGEOLOGY OF CHARLOTTE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	WATER TABLE AQUIFER	20-75	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	MEDIUM TO FINE GRAINED QUARTZ SAND, SHELL, MARL, AND LIMESTONE
	TAMIAMI CONFINING BEDS	20-75	LOW TRANSMISSIVITY	GREEN CLAY
	LOWER TAMIAMI AQUIFER	50-150	MODERATE TO GOOD TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	TAN LIMESTONE AND GRAY SANDSTON, SOME SILT AND MICRITE
INTERMEDIATE AQUIFER SYSTEM	UPPER HAWTHORN CONFINING ZONE	300-500	LOW TRANSMISSIVITY	PHOSPHATIC CLAYEY DOLOSILTS AND SAND
	SANDSTONE AQUIFER		MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	LIMESTONES, SANDSTONES, SANDY DOLOMITES, AND CALCAREOUS SANDS
	MID-HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	CLAYEY DOLOSILTS WITH THIN SEAMS OF POROUS LIMESTONE, SAND, AND DOLOMITE
	MID-HAWTHORN AQUIFER		MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO POOR	PHOSPHATIC LIMESTONES AND DOLOMITES
	LOWER HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	SANDY PHOSPHATIC MARL, INTERBEDDED WITH CLAY, SHELL MARL, SILT, AND SAND
FLORIDAN AQUIFER SYSTEM		270-300	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES

One pH measurement taken from well CHWQ-01 was slightly below the secondary drinking water standard of 6.5. A pH reading taken from this well on another occasion was 7.3, well above the pH standard of 6.5.

Samples collected from well CHWQ-02 exceeded the secondary drinking water standard for iron of 0.3 MG/L. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

No purgeable halocarbons or aromatics were detected in any of the samples collected from the Surficial Aquifer System AGWQMN wells within Charlotte County.

Intermediate Aquifer System

Water quality data for the Intermediate Aquifer System is available from only one AGWQMN well in southeastern Charlotte County. Because of the scarcity of data concerning the Intermediate Aquifer System in this area, it was not possible to generate maps delineating the concentration of various parameters.

Total dissolved solids concentrations within the Intermediate Aquifer System AGWQMN well in Charlotte County average 966 MG/L, significantly above the secondary drinking water standard for total dissolved solids of 500 MG/L.

Chloride concentrations within this well average 453 MG/L. This concentration is also significantly above the drinking water standard of 250 MG/L.

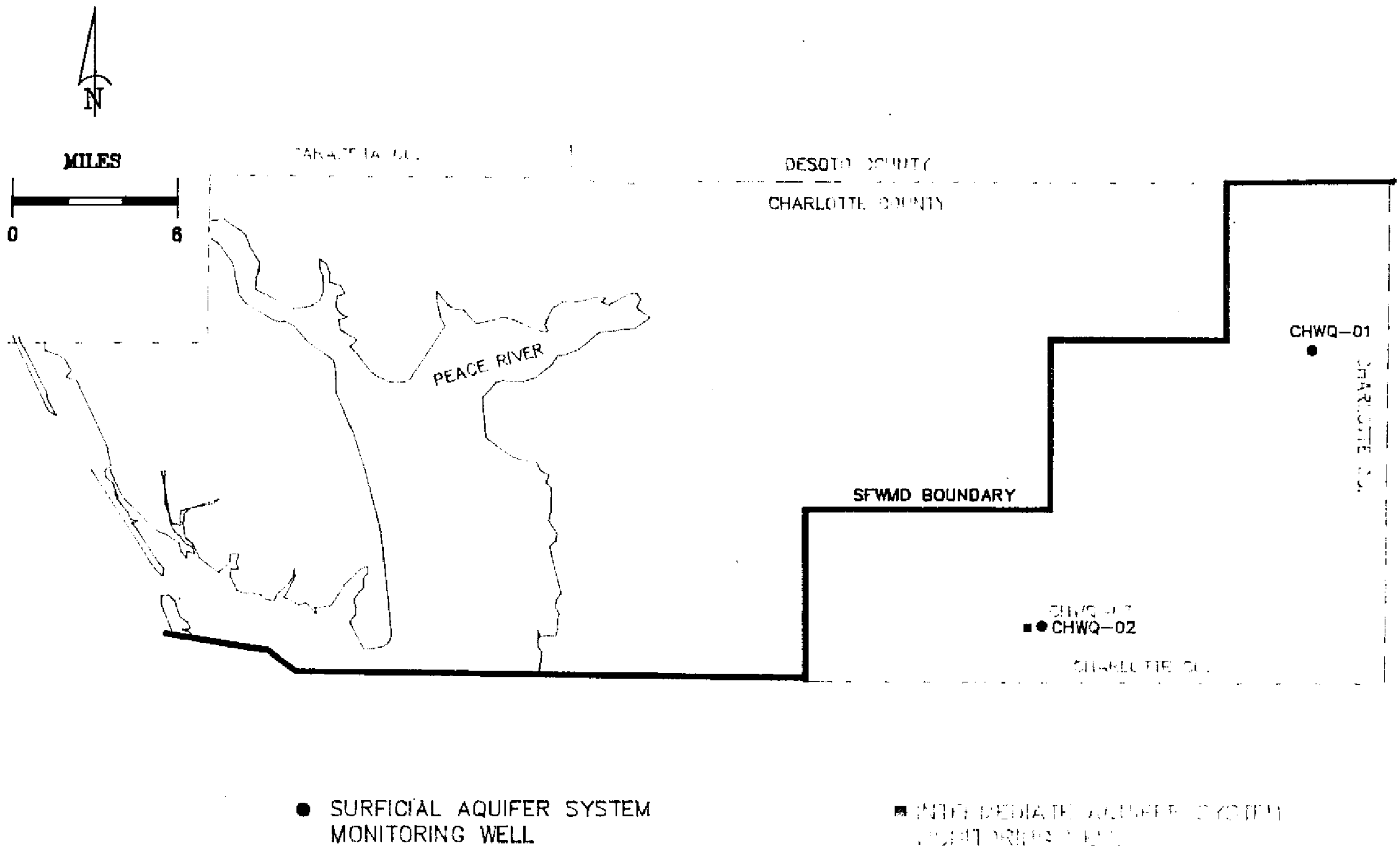
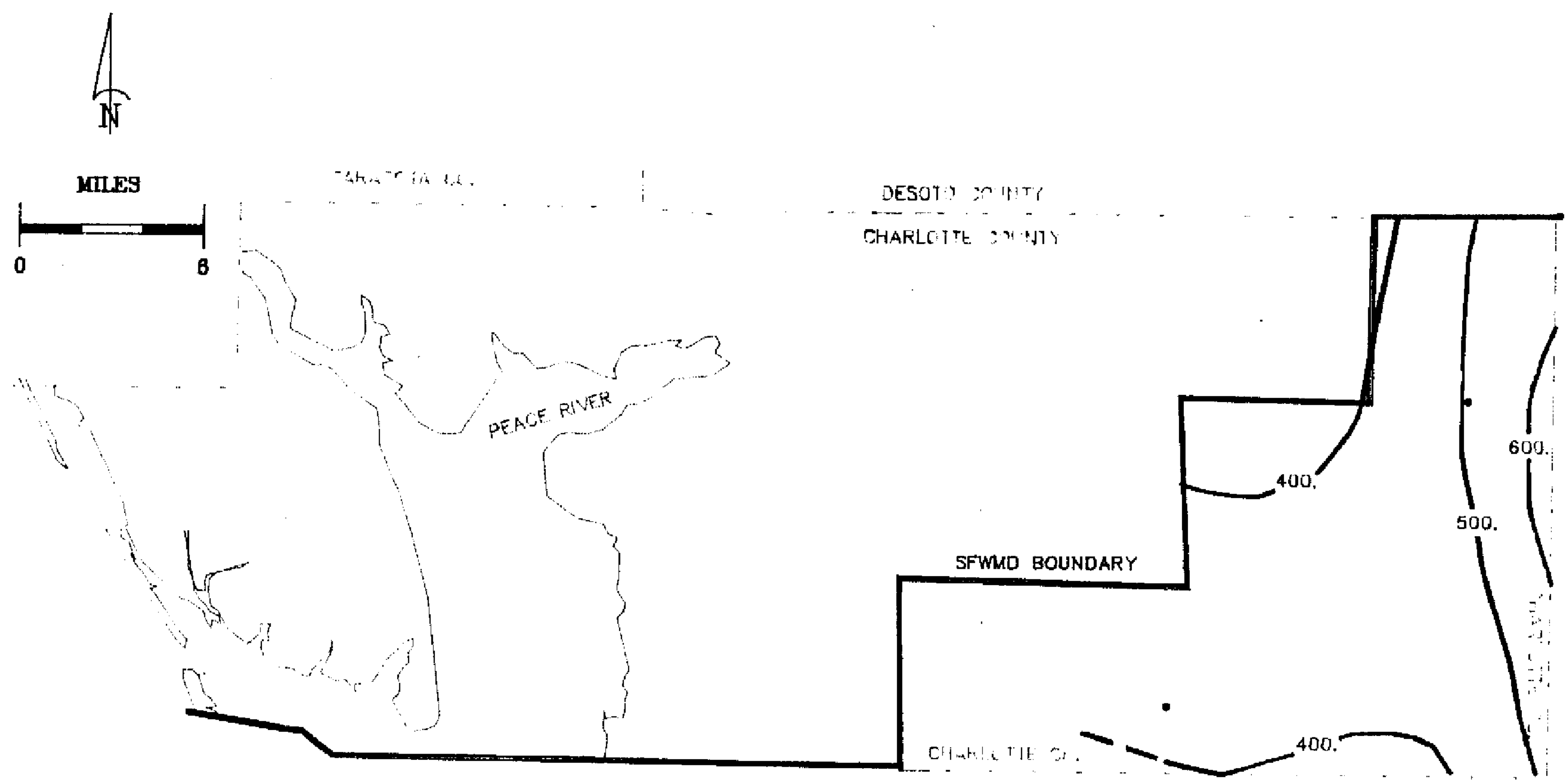


Figure 2-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS



CONTOUR INTERVAL = 100 MG/L

• DATA POINTS

Figure 2-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

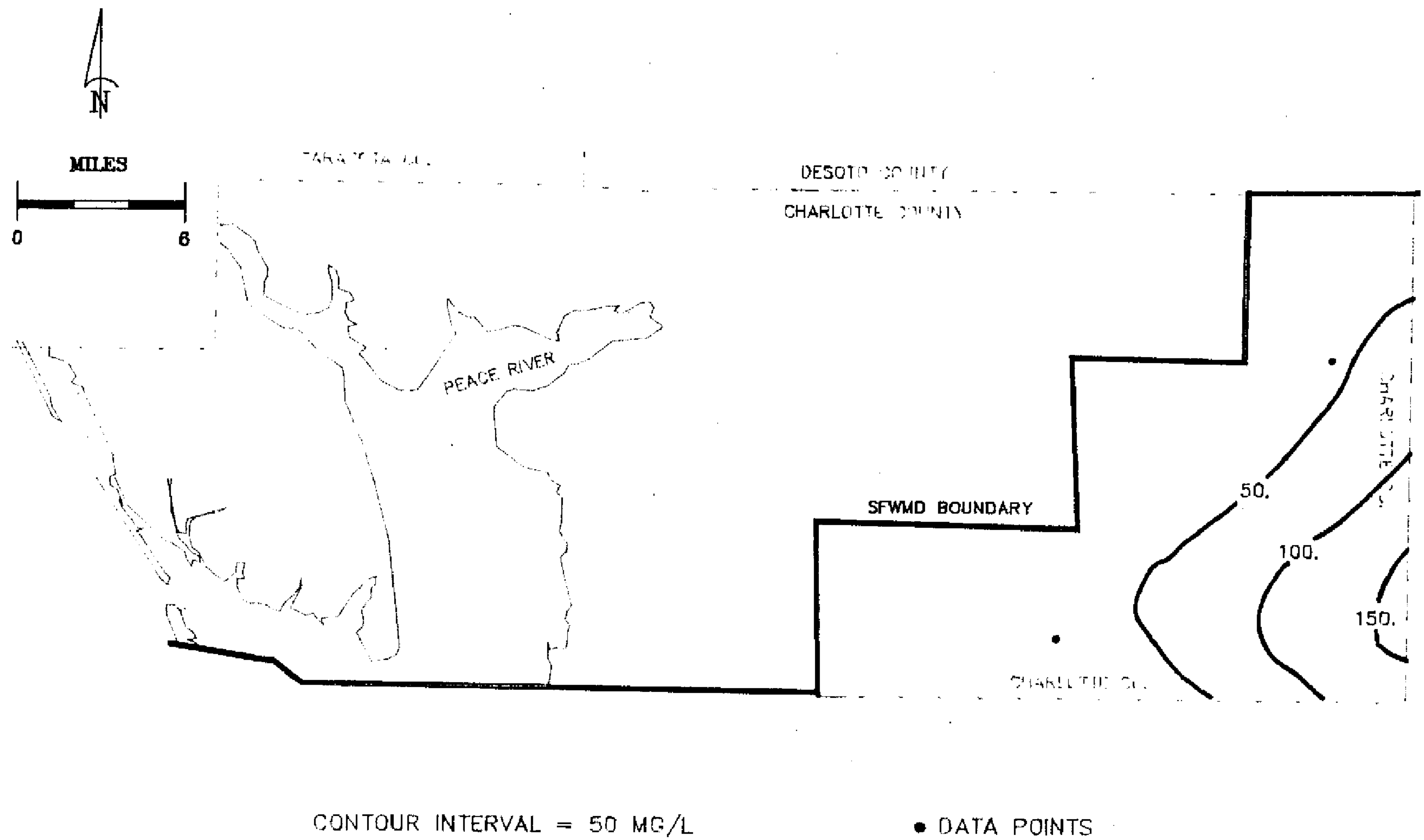


Figure 2-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

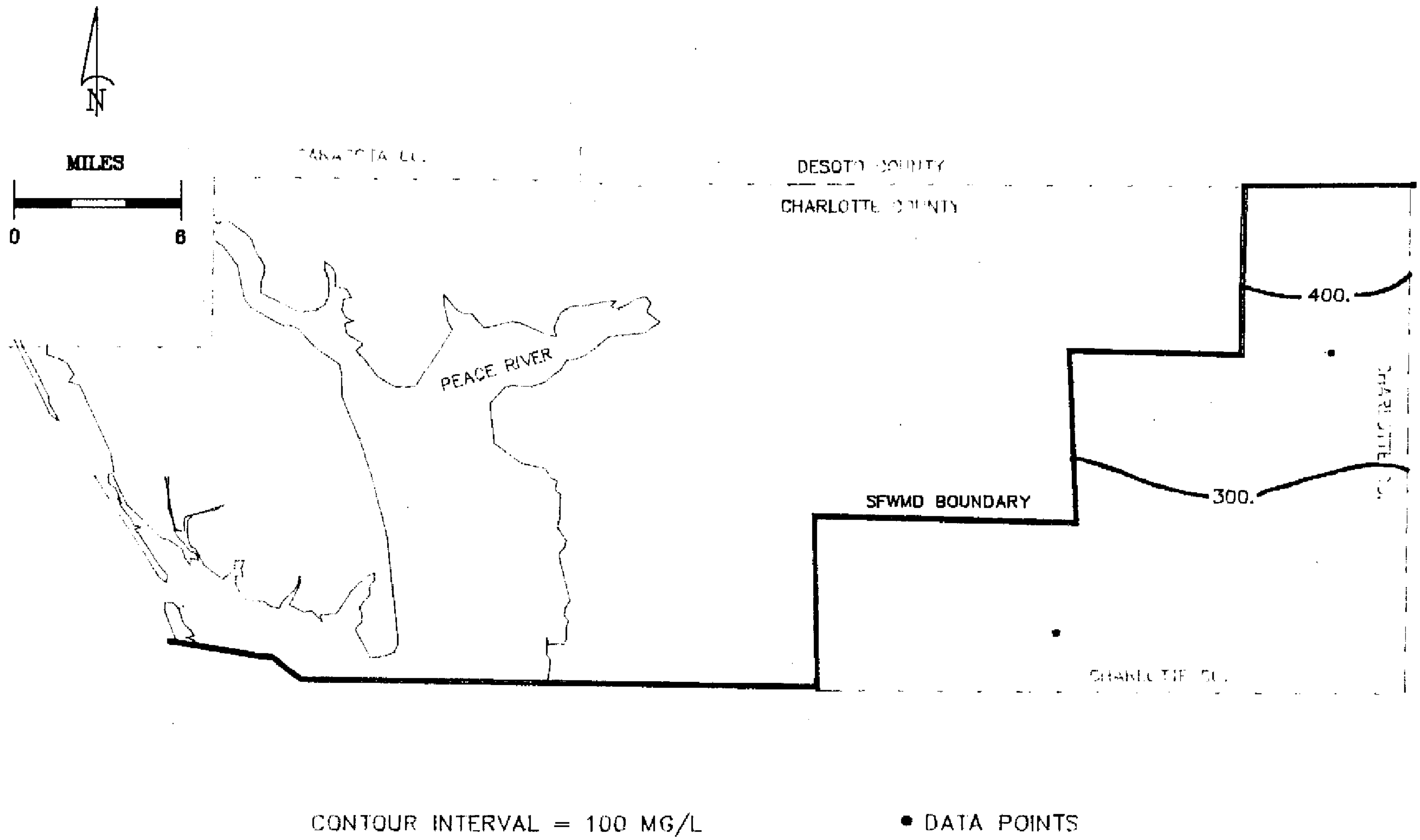


Figure 2-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

Hardness concentrations within this well average 166 MG/L, placing the water in the hard range.

Sodium concentrations of both samples collected from this well exceeded the primary drinking water standard for sodium of 160 MG/L. Sodium was measured at concentrations of 169.5 and 203 MG/L.

No purgeable halocarbons or aromatics were detected in any of the samples collected from the Intermediate Aquifer System AGWQMN wells within Charlotte County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of the AGWQMN wells within southeastern Charlotte County are shown in Figure 2-6. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 2-6 shows Stiff patterns for the three AGWQMN wells in southeastern Charlotte County. The Stiff patterns for the Surficial Aquifer System are widest along the central axis, indicating a calcium bicarbonate type of water. The Stiff pattern for the Intermediate Aquifer System well is widest along the top axis, indicating a sodium chloride type of water. The increased width of the Intermediate Aquifer System Stiff pattern is due to the increased ionic strength within that aquifer system.

SUMMARY AND CONCLUSIONS

There are three major aquifer systems present in Charlotte County, these are the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. These aquifer systems are separated from one another by relatively impermeable beds.

The South Florida Water Management District annually collects water quality samples from two Surficial Aquifer System, and one Intermediate Aquifer System AGWQMN wells in Charlotte County.

Water quality data from these wells indicates that water from the Surficial Aquifer System is potable within southeastern Charlotte County. Water from the Intermediate Aquifer System in this area exceeds the primary drinking water standard for sodium, and the secondary drinking water standard for total dissolved solids and chlorides. This water is not suitable for use as a drinking water supply source without treatment but may be suitable for irrigation and other uses.

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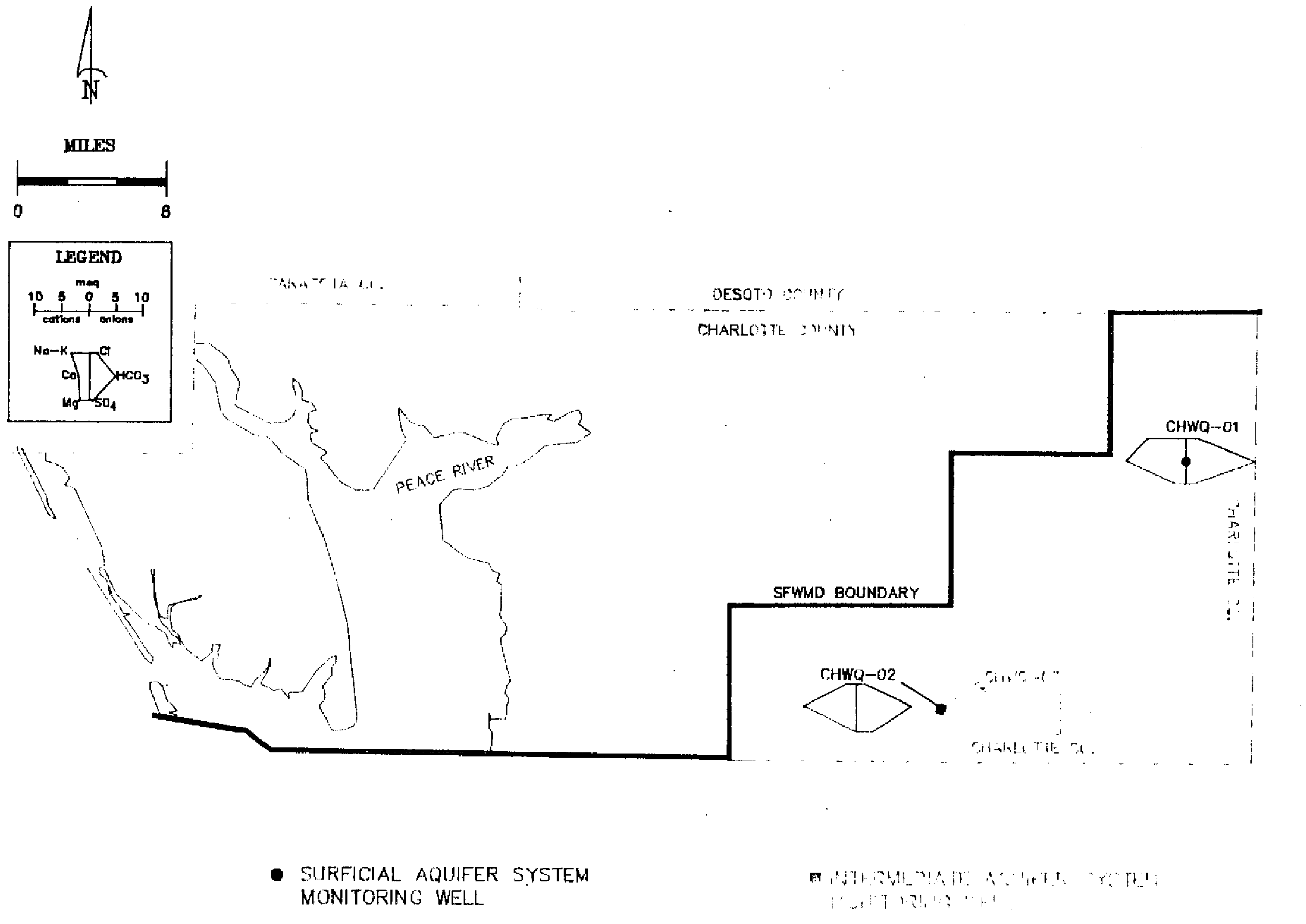

Figure 2-6 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL DATA

SECTION 3

COLLIER COUNTY

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LOCATION AND EXTENT OF AREA

Collier County is located on the southwest coast of Florida and comprises an area of approximately 2,032 square miles, measuring 60 miles from east to west and 49 miles from north to south. The county lies between 25° 48' 10" and 26° 30' 56" north latitude and 82° 50' 46" and 81° 52' 25" west longitude. It is bounded on the north by Lee and Hendry Counties, to the south by Monroe County, to the east by Dade and Broward Counties, and to the west by the Gulf of Mexico (Figure 3-1).

HYDROGEOLOGY

Three aquifer systems are present within Collier County, these are the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. The Surficial Aquifer System and the Intermediate Aquifer System serve as sources of drinking and irrigation water. The Floridan Aquifer System is too highly mineralized for most uses within the county.

The Surficial Aquifer System is composed of two aquifers, the water table aquifer and the lower Tamiami aquifer. The Intermediate Aquifer System is composed of the Sandstone aquifer and the mid-Hawthorn aquifer. Table 3-1 shows a schematic representation of the generalized hydrogeology of Collier County.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and a high water table in most areas all increase the susceptibility of this aquifer system to contamination.

The Intermediate Aquifer System and Floridan Aquifer System are less susceptible to contamination from anthropogenic sources due to the presence of low permeability confining zones below the Surficial Aquifer System. Generally the greater the depth of an aquifer, the lower its susceptibility to contamination from anthropogenic compounds. However, within Collier County mineralization tends to increase with depth, and excessive pumping can cause upconing of poorer quality water from deeper aquifers.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitoring Network (AGWQMN) in Collier County is composed of seventeen Surficial Aquifer System, fourteen Intermediate Aquifer System, and two Floridan Aquifer System wells. Figure 3-2 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 3-1. The results of the inorganic laboratory analysis for the first three years of sampling (1985-1987) are shown in Appendix 3-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 196 MG/L to a high of 1,169 MG/L, with an average concentration of 447 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; however, it may be greater if no other standards are exceeded. High total dissolved solids values in excess of 500 MG/L occur in the southwestern and east central areas of the county (Figure 3-3).

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 6 MG/L to a high of 420 MG/L, with an average concentration of 66 MG/L. The secondary drinking water standard for chloride is 250 MG/L. The chloride concentration of the Surficial Aquifer System in Collier County is shown in Figure 3-4. A small area of increased chloride concentration appears in the east central portion of the county.

High chloride concentrations along the coast are due to salt water intrusion. Salt water intrusion is delineated by measuring the chloride concentration at the base of the Surficial Aquifer System. Figure 3-5 shows where the chloride concentration exceeds 1,000 MG/L, indicating the landward extent of the salt water intrusion front.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 135 MG/L to a high of 358 MG/L, with an average concentration of 261 MG/L. Areas of high hardness

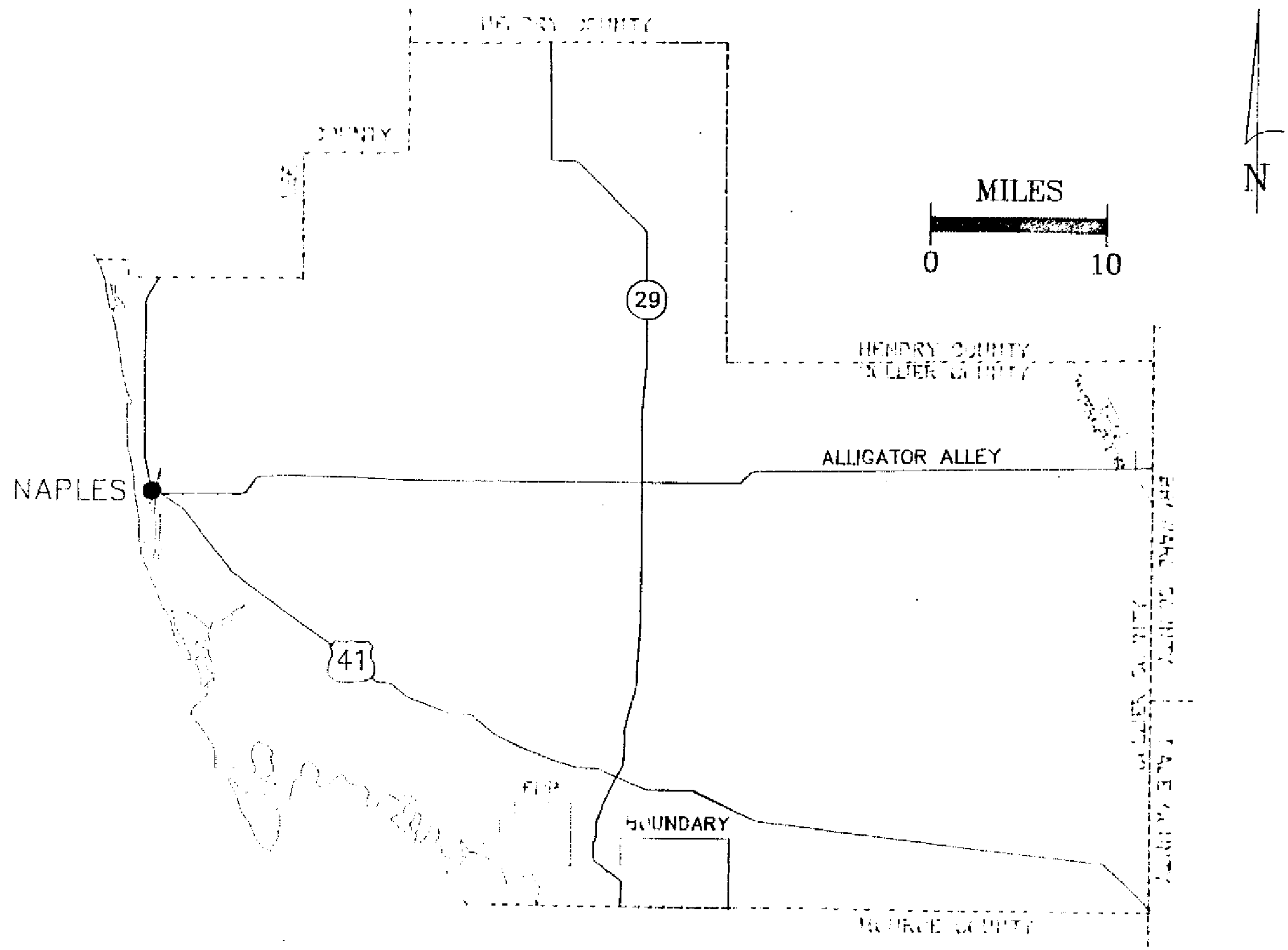


Figure 3-1 MAP OF COLLIER COUNTY

TABLE 3-1. GENERALIZED HYDROGEOLOGY OF COLLIER COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	WATER TABLE AQUIFER	25-150	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	FINE TO MEDIUM GRAINED, WELL SORTED QUARTZ SANDS WITH MINOR AMOUNTS OF SHELL AND ORGANIC MATERIAL, SANDY BIOGENIC LIMESTONES
	TAMIAMI CONFINING BEDS	0-50	POOR TRANSMISSIVITY	POORLY INDURATED LIMESTONES, DOLOSILTS AND CALCAREOUS SANDY CLAYS
	LOWER TAMIAMI AQUIFER	75-200	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	LIMESTONE, QUARTZ SAND, SOME SILT AND MICRITE
INTERMEDIATE AQUIFER SYSTEM	UPPER HAWTHORN CONFINING ZONE	30-80	LOW PERMEABILITY	PHOSPHATIC CLAYEY DOLOSILTS AND SAND
	SANDSTONE AQUIFER	0-75	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	LIMESTONES, SANDSTONES, SANDY DOLOMITES, AND CALCAREOUS SANDS
	MID-HAWTHORN CONFINING ZONE	75-175	LOW PERMEABILITY	CLAYEY DOLOSILTS WITH THIN SEAMS OF POROUS LIMESTONE, SAND, AND DOLOMITE
	MID-HAWTHORN AQUIFER	100	MODERATE TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	IPHOSPHATIC LIMESTONES AND DOLOMITES
	LOWER HAWTHORN CONFINING ZONE	200	LOW PERMEABILITY	SANDY PHOSPHATIC MARL, INTERBEDDED WITH CLAY, SHELL MARL, SILT, AND SAND
FLORIDAN AQUIFER SYSTEM		2400-3200	HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	INTERBEDDED LIMESTONES AND DOLOMITES

occur east of Naples (Figure 3-6). The ground water from the majority of the county would be considered hard to very hard.

The pH levels in Surficial Aquifer System AGWQMN well C-00532 were below the secondary drinking water standard of 6.5. This well is very shallow and withdraws water from a shallow sandy soil composed of quartz sand. Water withdrawn from this sandy zone would be expected to have a lower pH than water withdrawn from deeper in the aquifer where the amount of limestone in the aquifer is much greater.

Sodium concentrations within Surficial Aquifer System AGWQMN well C-00296 exceeded the primary drinking water standard for sodium of 160 MG/L. This well has the highest concentrations within the Surficial Aquifer System of several parameters. These concentrations may be representative of the aquifer in this region, or the well may have been impacted by water from a deeper aquifer.

More than half of the Surficial Aquifer System AGWQMN samples collected exceeded the secondary drinking water standard for iron of 0.3 MG/L. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria which can subsequently clog the wells or plumbing fixtures.

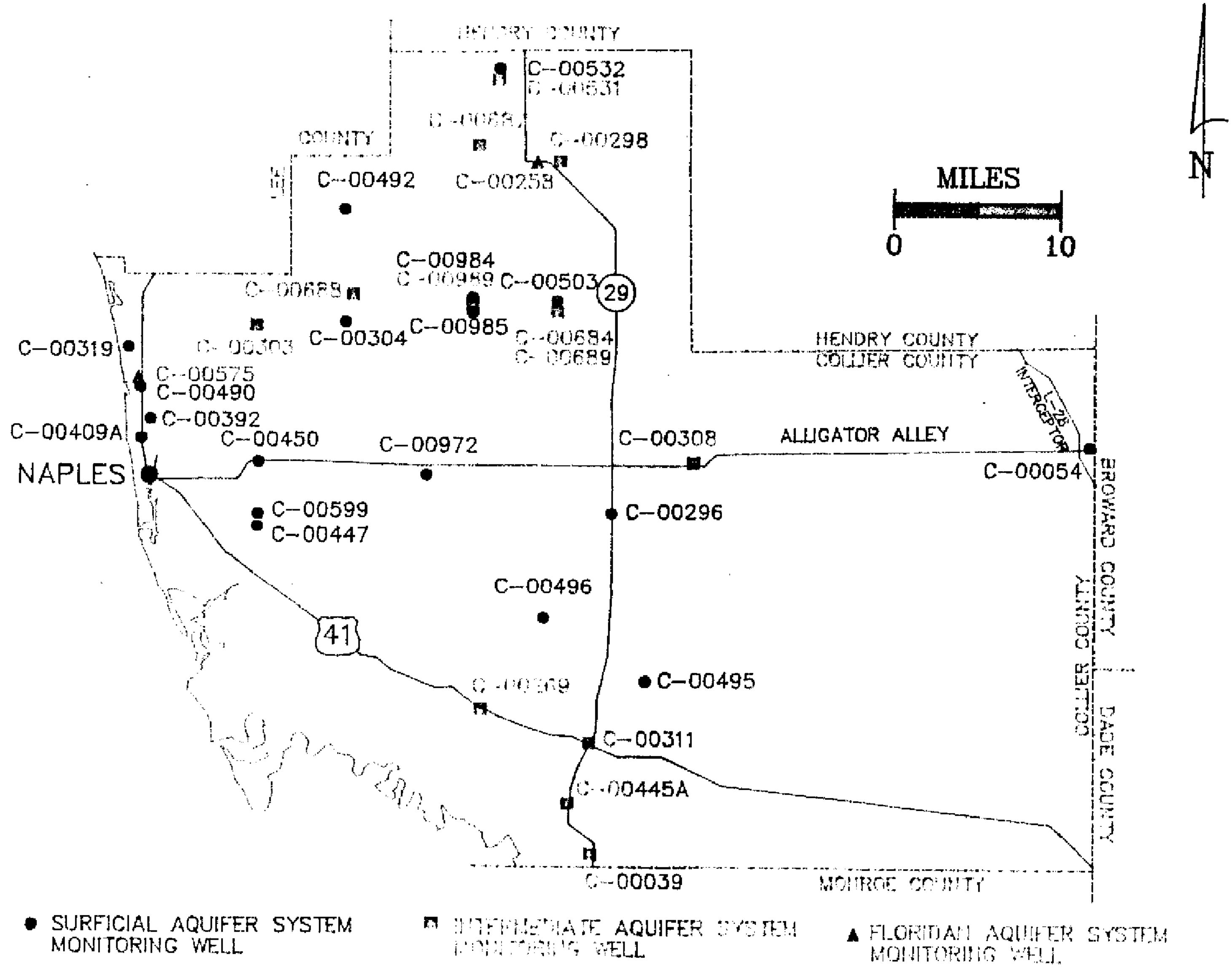


Figure 3-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

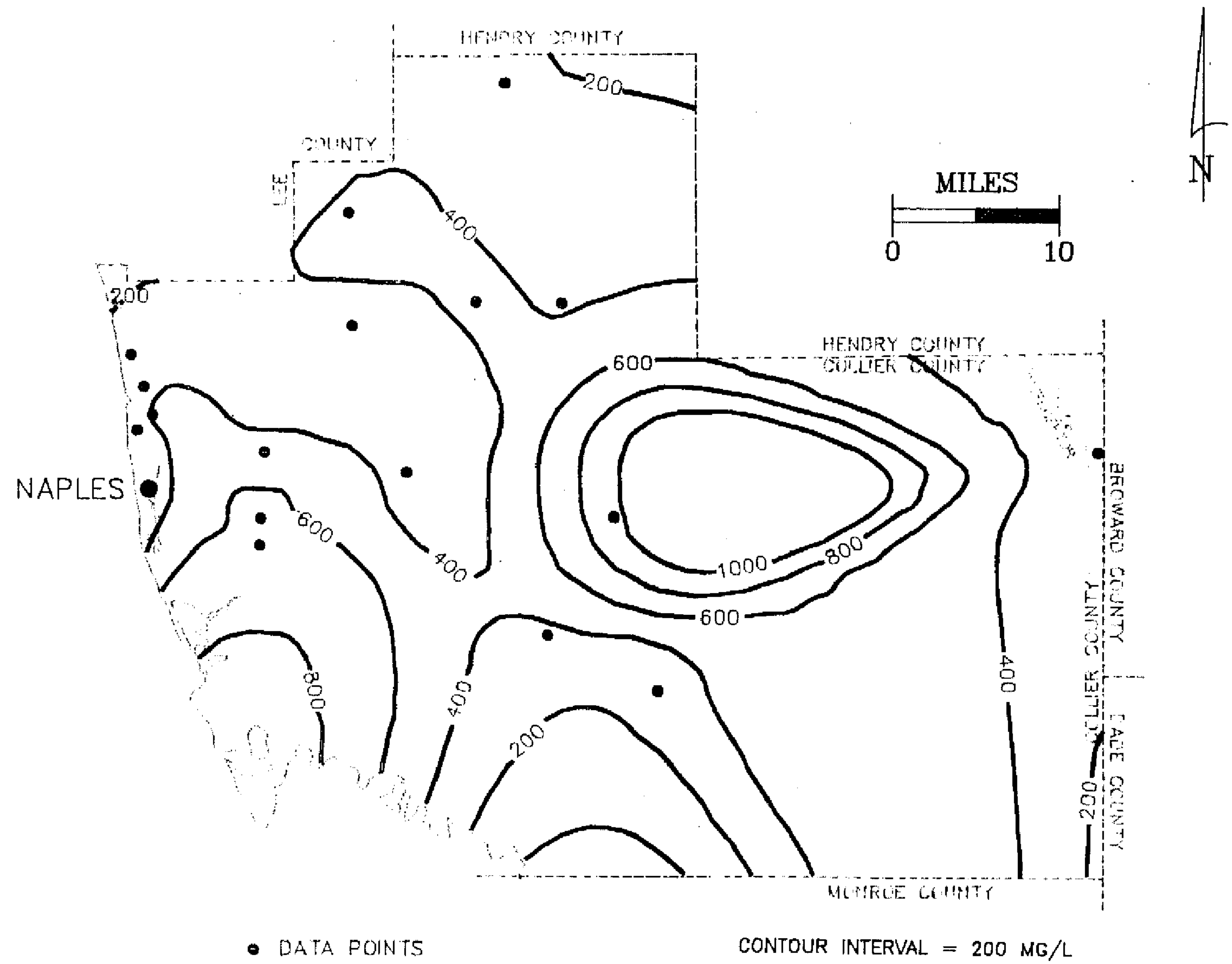


Figure 3-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

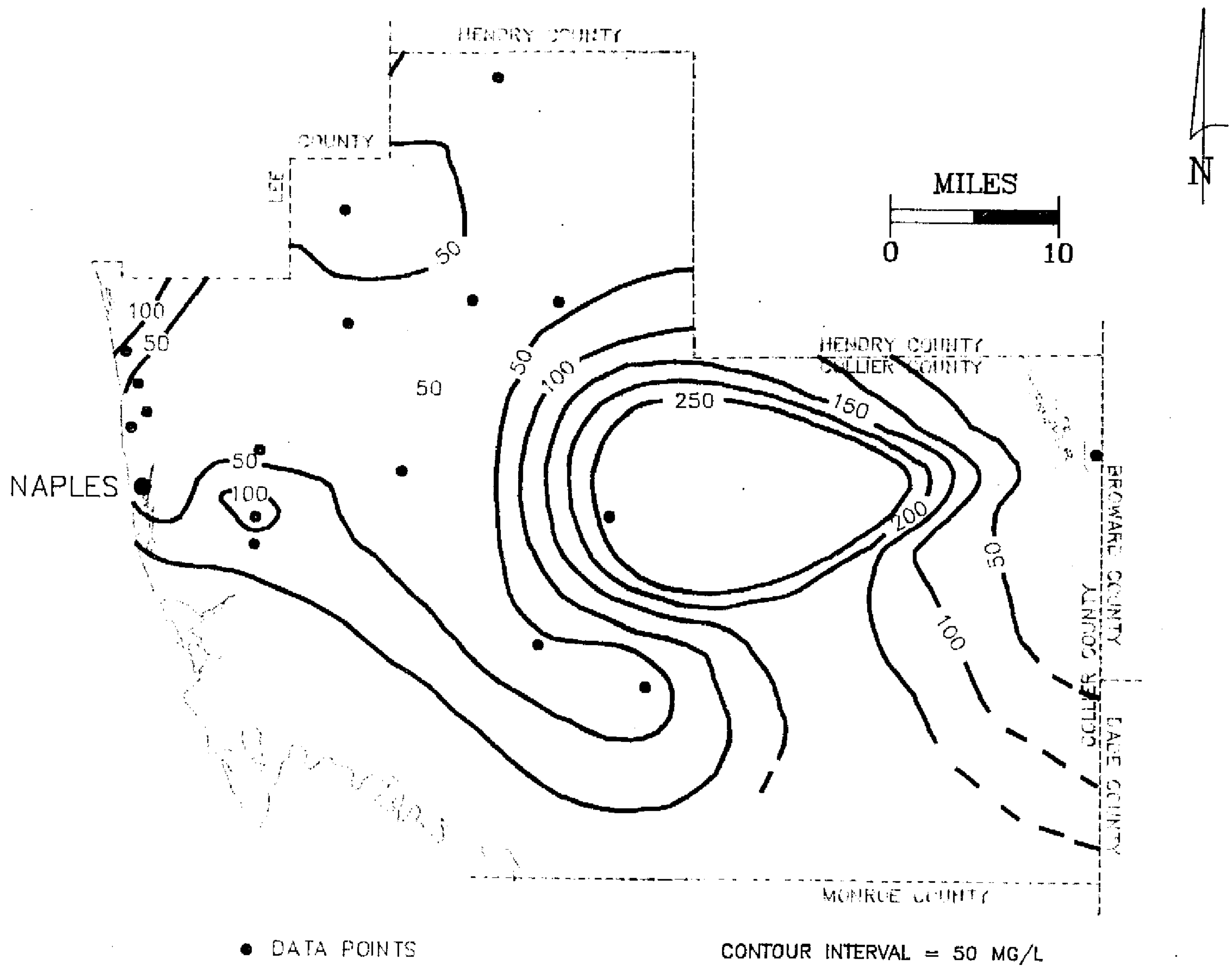


Figure 3-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

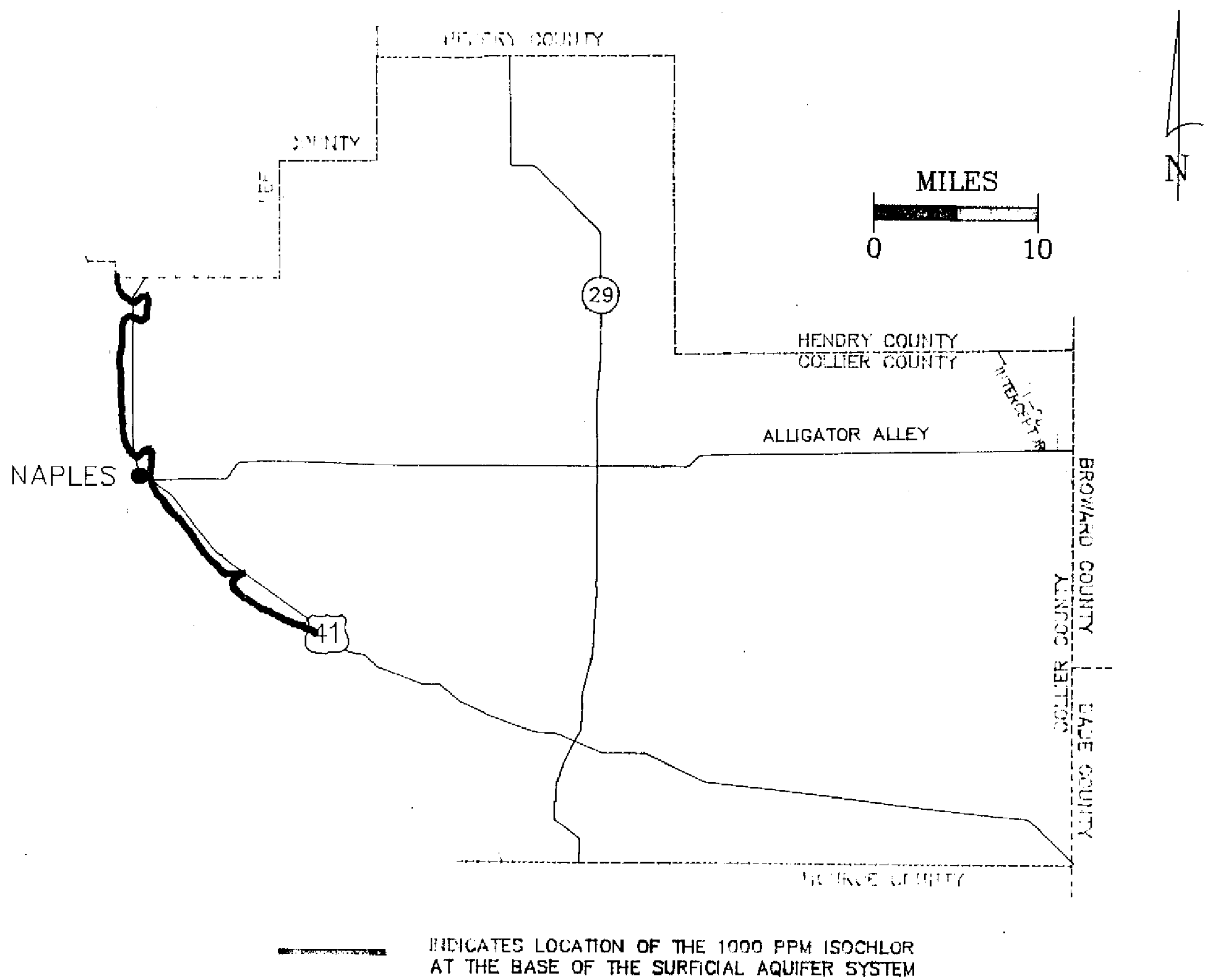


Figure 3-5 EXTENT OF SALT-WATER INTRUSION (1982)

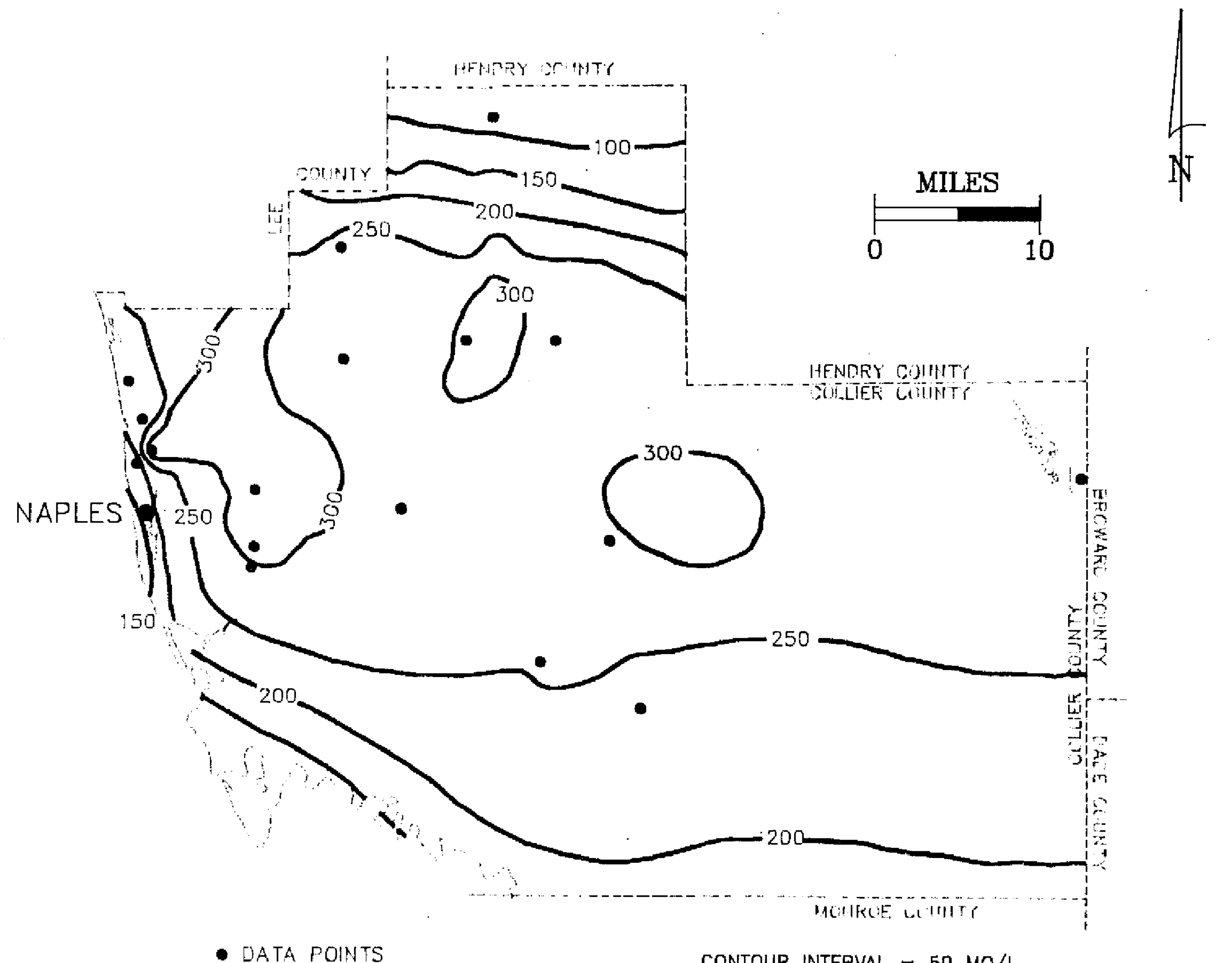


Figure 3-6 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

Manganese was detected at concentrations slightly exceeding the secondary drinking water standard within six AGWQMN wells in Collier County. Four of these wells have metal casings and it is probable that the manganese concentrations from these metal cased wells is not representative of conditions within the aquifer. High manganese concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and can impart objectionable tastes to beverages.

Five Surficial Aquifer System AGWQMN wells within Collier County slightly exceeded the primary drinking water standard for lead of 50 µG/L. Each of these wells exceeded the standard on only one occasion although three of the wells were sampled on three occasions and two were sampled on four occasions.

AGWQMN well C-00490 exceeded the secondary drinking water standard for zinc of 5 MG/L. This well has a galvanized casing, which is almost certainly the source of the high zinc concentrations. Zinc concentrations are two orders of magnitude below the standard in most of the AGWQMN wells.

Benzene was detected at a concentration of 3.0 µG/L in Surficial Aquifer System AGWQMN well C-00972. Benzene was also detected in two Intermediate Aquifer System AGWQMN wells at concentrations of 2.1 and 1.9 µG/L. All of these purgeable organic compounds or aromatic hydrocarbons were detected in samples collected in June of 1985. None have been detected in any subsequent sampling within Collier County.

The two Intermediate Aquifer System AGWQMN wells in which benzene was detected are deep flowing mid-Hawthorn wells. It is extremely unlikely that this aquifer could have been contaminated by benzene. The presence of benzene in the samples was likely due to a sample contamination problem. All of the wells in which benzene was detected were sampled on the same day and are more than ten miles apart.

Intermediate Aquifer System

The Intermediate Aquifer System in Collier County is composed of two regional aquifers, the Sandstone aquifer and the mid-Hawthorn aquifer. The Sandstone aquifer is present in northwestern Collier County and is absent in eastern Collier County. The southern extent of the Sandstone aquifer is marked by Alligator Alley (Knapp et al., 1986). The mid-Hawthorn aquifer is a confined aquifer present beneath most of Collier County. The potentiometric surface of the mid-Hawthorn aquifer is above land surface in most areas of Collier County, creating flowing artesian conditions in wells that are open to this aquifer.

All of the Intermediate Aquifer System monitor wells used in this report that are north of Alligator Alley are Sandstone aquifer wells, with the exception of C-00684, which is a mid-Hawthorn well. All of the Intermediate Aquifer System monitor wells south of Alligator Alley are mid-Hawthorn wells.

Total dissolved solids concentrations within the Intermediate Aquifer System AGWQMN wells in Collier County range from a low of 257 MG/L to a high of 4,188 MG/L, with an average concentration of 1,233 MG/L. The drinking water standard for total dissolved solids is 500 MG/L. Figure 3-7 shows the concentration of total dissolved solids in the ground water of the Intermediate Aquifer System in Collier County. Total dissolved solids concentrations are lowest in northern Collier County, where the Intermediate Aquifer System wells are completed into the Sandstone aquifer.

Chloride concentrations within the Intermediate Aquifer System AGWQMN wells range from a low of 25 MG/L to a high of 2,092 MG/L, with an average concentration of 410 MG/L. Five of the fourteen AGWQMN Intermediate Aquifer System wells exceeded the secondary drinking water standard for chloride.

Chloride concentrations within the Intermediate Aquifer System are below drinking water standards in the northwestern half of the county (Figure 3-8). Chloride concentrations increase to the southwest with contours roughly paralleling the coastline. Well C-00039, which had a chloride concentrations of 2,092 MG/L, was not used to construct the chloride concentration map since it is on an island and had a disproportionate affect on the contours far inland.

Hardness concentrations within the Intermediate Aquifer System AGWQMN wells range from a low of 121 MG/L to a high of 358 MG/L, with an average concentration of 240 MG/L. These values are in the hard to very hard range. Figure 3-9 shows the hardness concentrations within the Intermediate Aquifer System in Collier County.

The primary drinking water standard for sodium was exceeded by samples collected from half of the Intermediate Aquifer System AGWQMN wells. Sodium concentrations are below the primary drinking water standards in the northern and northeastern areas of the county.

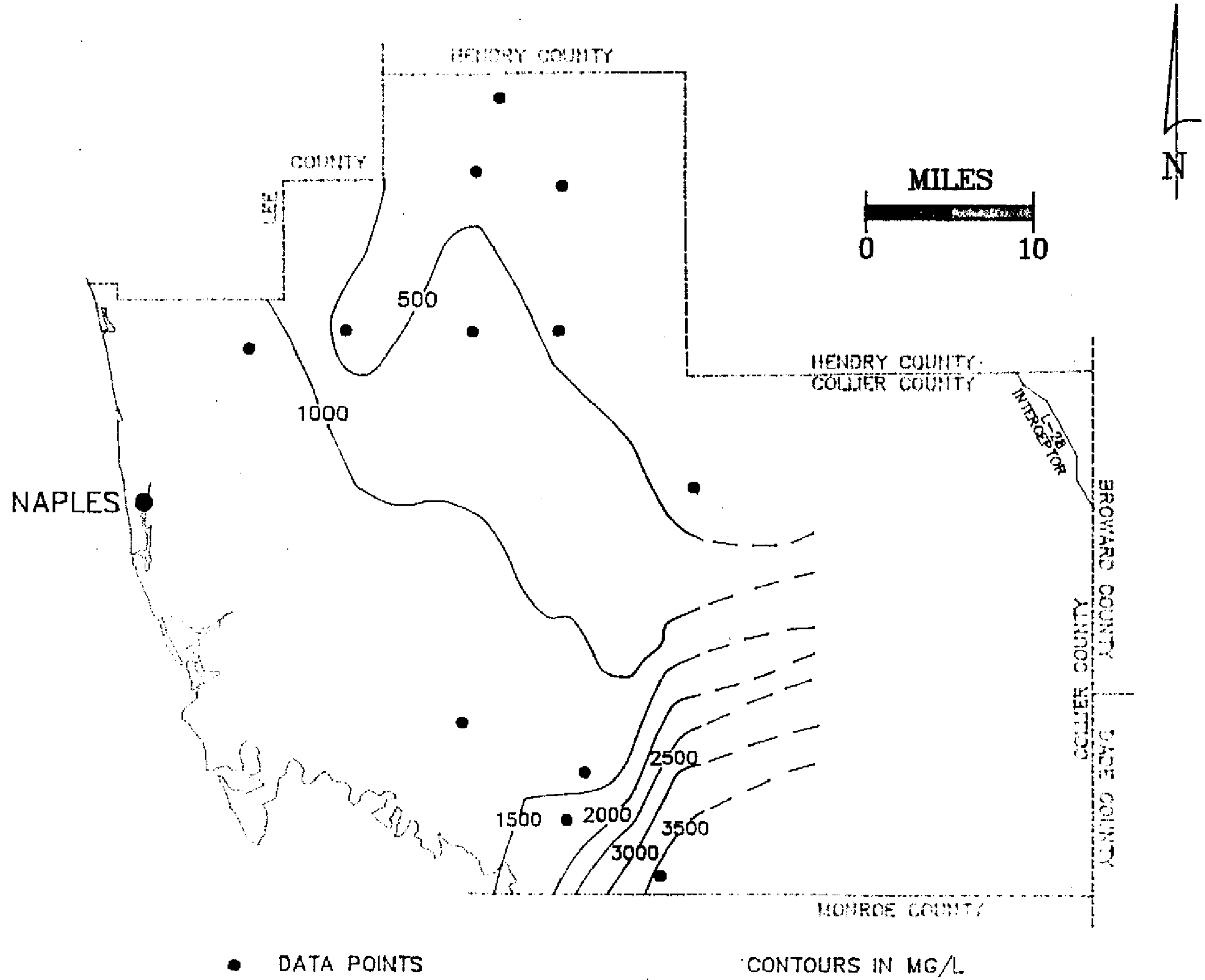
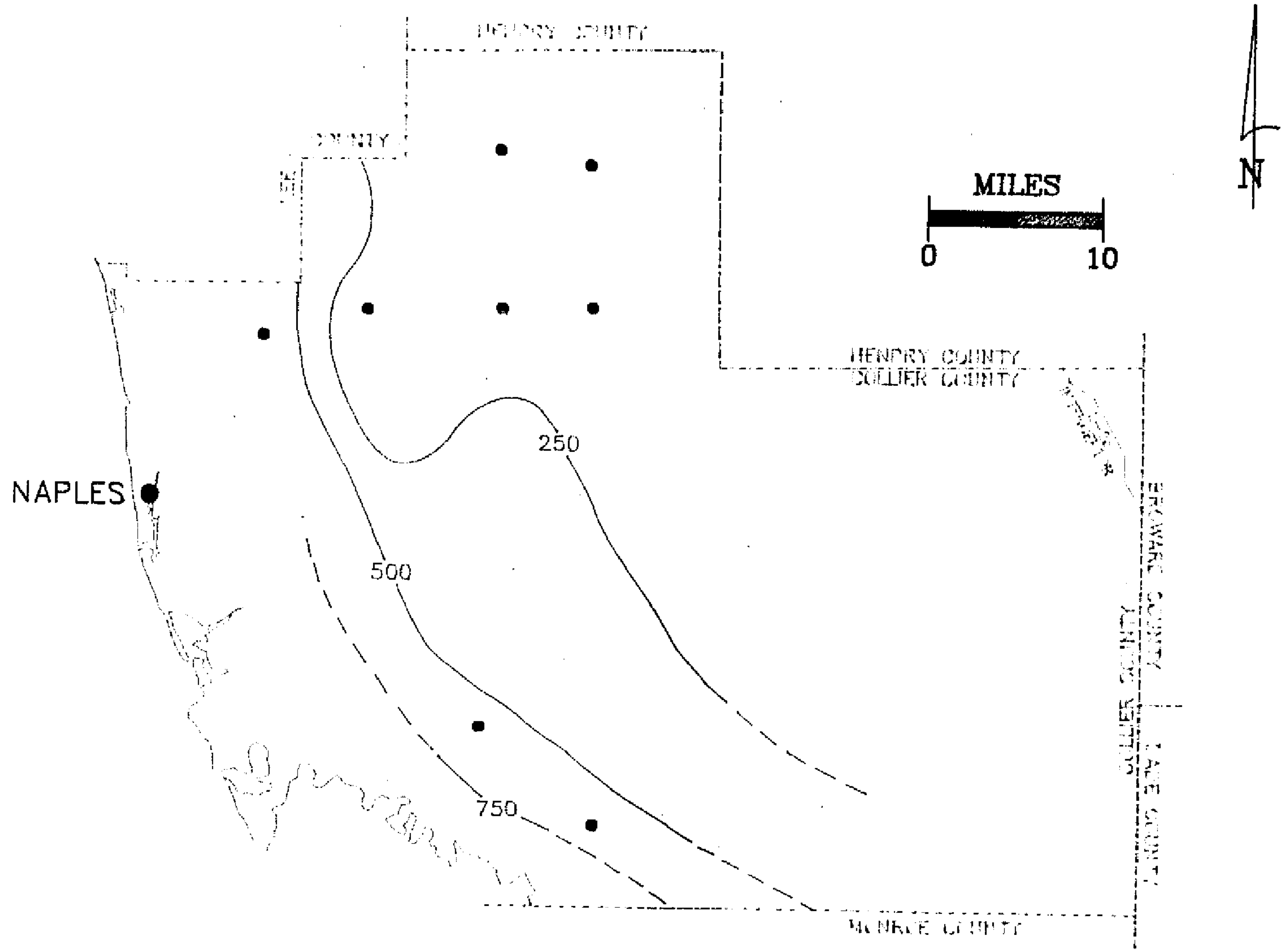


Figure 3-7 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM



• DATA POINTS

CONTOUR INTERVAL = 250 MG/L

Figure 3-8 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

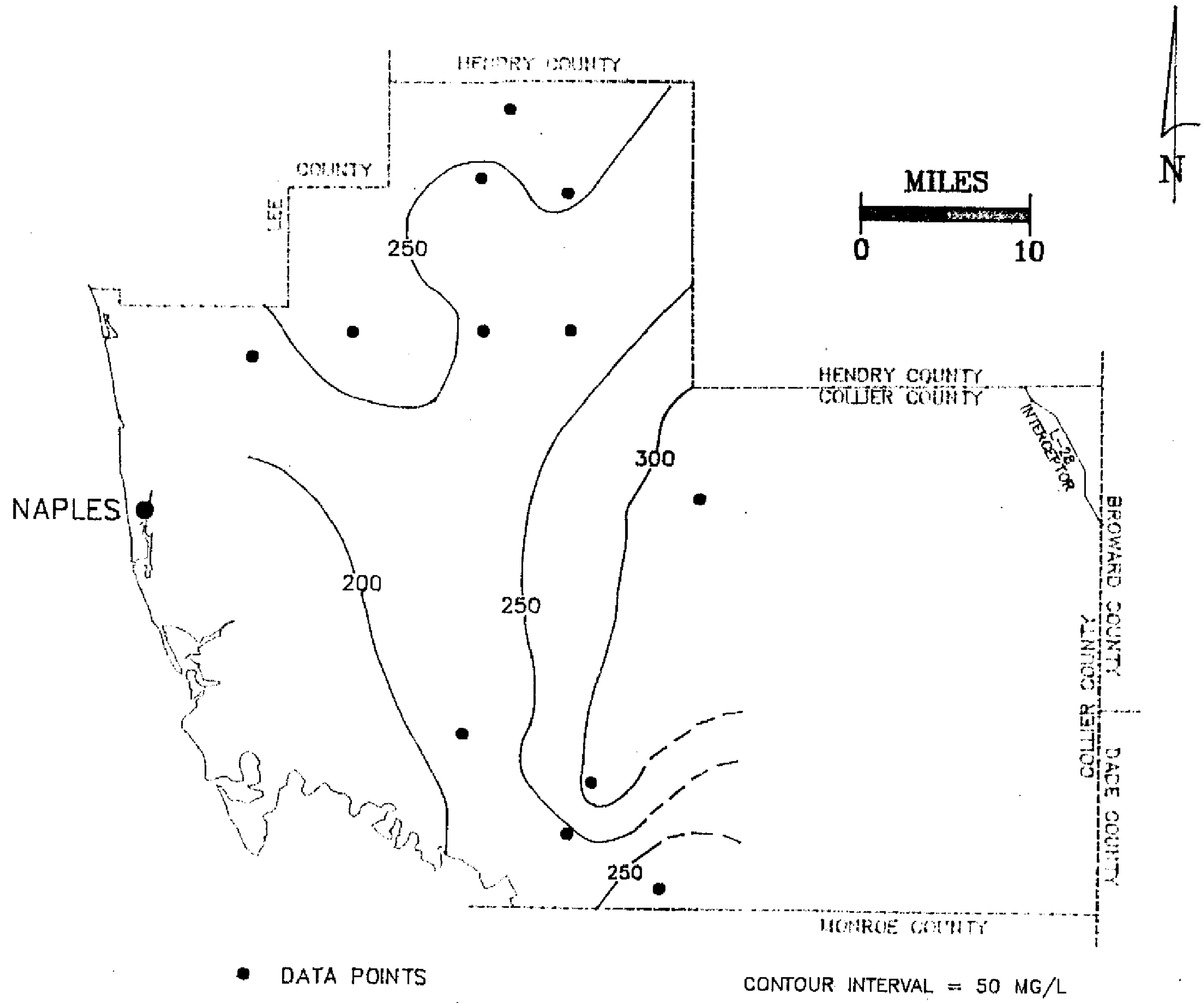


Figure 3-9 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

Two Intermediate Aquifer System wells exceeded the drinking water standard for sulfate of 250 MG/L. Both of these wells are mid-Hawthorn wells with very poor water quality.

Five Intermediate Aquifer System AGWQMN wells exceeded the secondary drinking water standard for iron of 0.3 MG/L. As previously discussed, high iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Three Intermediate Aquifer System AGWQMN wells exceeded the primary drinking water standard for fluoride. All of these wells were sampled for fluoride on more than one occasion but exceeded the standard only in June 1985. Fluoride concentrations within these same wells were below drinking water standards on all other occasions.

Intermediate Aquifer System AGWQMN well C-00495A exceeded the secondary drinking water standard for zinc of 5 MG/L. This well has a galvanized casing, which is the source of the high zinc concentrations. Zinc concentrations are two orders of magnitude below the standard in most of the Intermediate Aquifer System AGWQMN wells.

Benzene was detected at concentrations 1.9 and 2.1 µG/L in Intermediate Aquifer System AGWQMN wells C-00039 and C-00311, respectively, in June 1985. As previously mentioned, benzene was also detected in one Surficial Aquifer System AGWQMN well at a concentration of 3.0 µG/L. These purgeable organic compounds were detected only during the June 1985 sampling event.

Floridan Aquifer System

Water quality within the Floridan Aquifer System in Collier County is poor and the water is nonpotable. Both of the Floridan Aquifer System AGWQMN wells sampled in Collier County exceeded the drinking water standards for sodium, chloride, sulfate, and total dissolved solids. Because of the poor water quality, this aquifer is not used as a source for public drinking water supplies.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells throughout Collier County are shown in Figures 3-10 and 3-11. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Stiff patterns for the Surficial Aquifer System AGWQMN wells within Collier County are shown in Figure 3-10. These Stiff patterns for the Surficial Aquifer System are elongated along the central axis, indicating a calcium-bicarbonate type of water.

Stiff patterns for the Intermediate Aquifer System and the Floridan Aquifer System AGWQMN wells within Collier County are shown in Figure 3-11. Stiff patterns from the Intermediate Aquifer System show two distinct water types. Water from the Sandstone aquifer is predominantly a sodium-calcium bicarbonate (with the exception of well C-00303), while water from the mid-Hawthorn aquifer is predominantly sodium chloride (elongated along the upper axis). The Floridan Aquifer System is predominantly sodium chloride. These diagrams also show the greatly increased ionic strength of water from the Floridan Aquifer System and the mid-Hawthorn aquifer.

SUMMARY AND CONCLUSIONS

The AGWQMN in Collier County is composed of seventeen Surficial Aquifer System, thirteen Intermediate Aquifer System, and two Floridan Aquifer System AGWQMN wells. The water quality of the Surficial Aquifer System in most areas of Collier County meets the state of Florida drinking water standards.

The Intermediate Aquifer System is composed of the Sandstone aquifer and the mid-Hawthorn aquifer. In northeastern Collier County water from the Sandstone aquifer is potable. The mid-Hawthorn aquifer exceeds drinking water standards for sodium, chloride, and total dissolved solids, but may be suitable for irrigation and other uses in some areas.

The Floridan Aquifer System within Collier County is highly mineralized and is not suitable for most uses.

REFERENCES

Knapp, M.P., W.S. Burns, and T.S. Sharp, 1986. Preliminary Assessment of the Groundwater Resources of Western Collier County, Florida: South Florida Water Management District, Technical Publication 86-1.

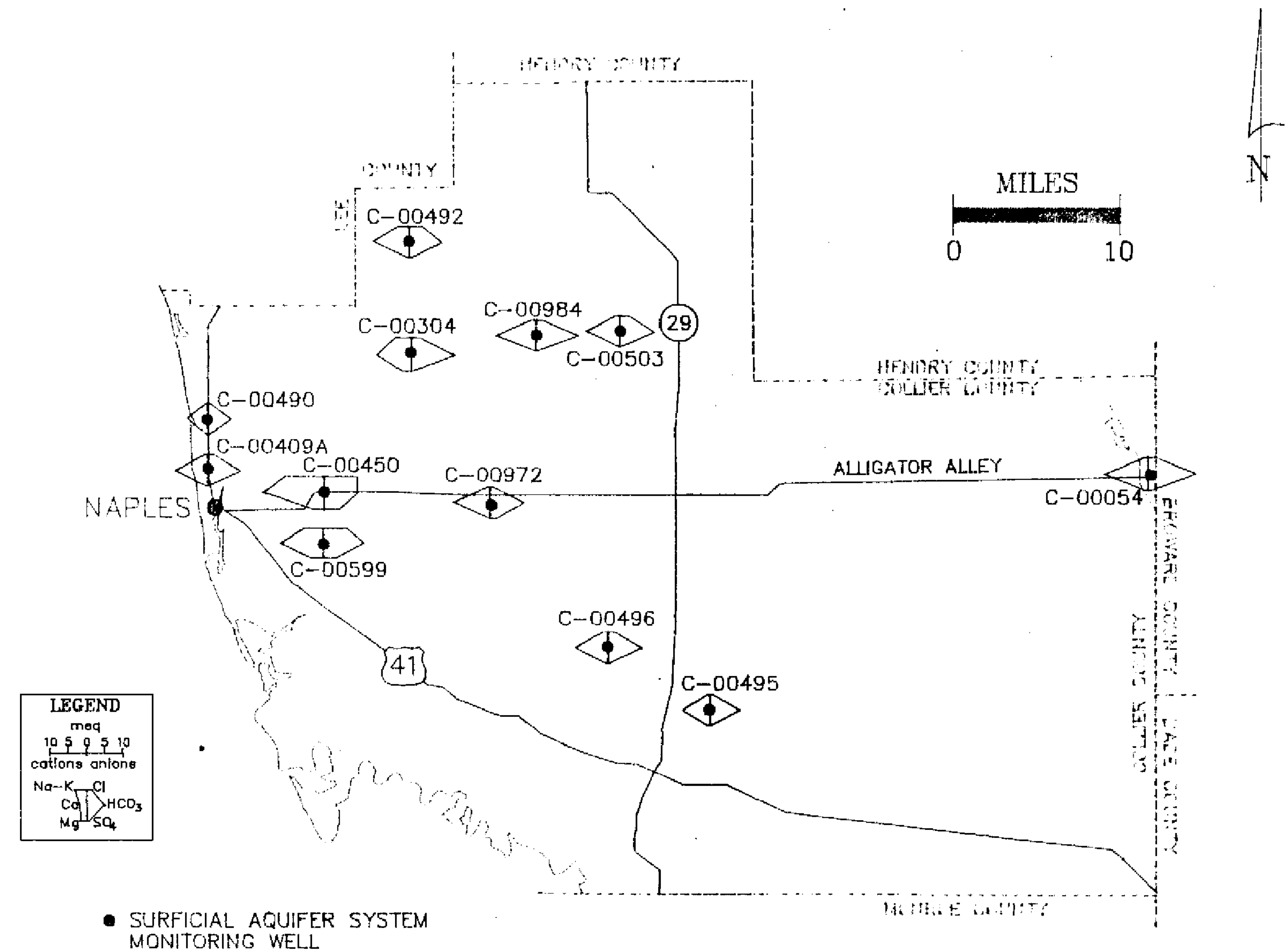


Figure 3-10 STIFF PATTERN DIAGRAMS FROM SURFICIAL AQUIFER SYSTEM AGWQMN WELL DATA

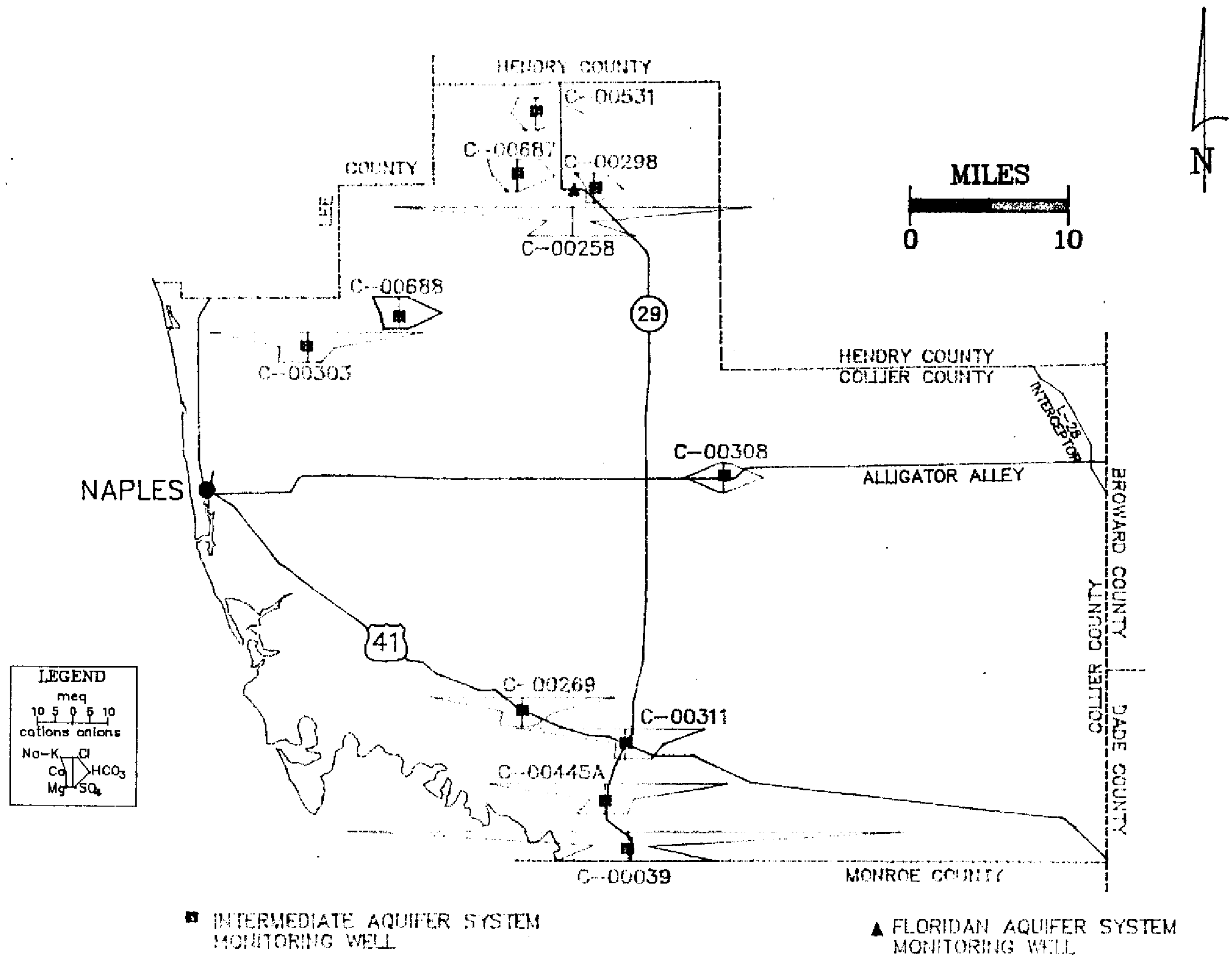


Figure 3-11 STIFF PATTERN DIAGRAMS FROM INTERMEDIATE AQUIFER SYSTEM, AND FLORIDAN AQUIFER SYSTEM AGWQMN WELL DATA

SECTION 4

DADE COUNTY

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LOCATION AND EXTENT OF AREA

Dade County is located on the southeast coast of the Florida peninsula and comprises an area of approximately 2,054 square miles, measuring 45 miles from east to west and 55 miles from north to south. The county lies between 25° 59' 49" and 25° 08' 00" north latitude and 80° 52' 47" and 80° 07' 07" west longitude. It is bounded on the north by Broward County, to the south by Monroe County, to the west by Collier and Monroe Counties, and to the east by the Atlantic Ocean (Figure 4-1).

HYDROGEOLOGY

Two aquifer systems are present within Dade County, these are the Surficial Aquifer System and the Floridan Aquifer System. These aquifer systems are separated from one another by the Hawthorn formation. The Surficial Aquifer System is composed primarily of the Biscayne Aquifer within Dade County.

The Biscayne Aquifer is the only reliable source of potable water within the county and has been designated a sole source aquifer by the United States Environmental Protection Agency under the provisions of the Safe Drinking Water Act.

The Biscayne Aquifer is one of the most productive of the shallow non-artesian aquifers in the United States and one of the most permeable aquifers in the world (Bower, 1978). The aquifer underlies all of Dade County except for the extreme northwestern corner. The aquifer is wedge shaped and is more than 200 feet thick in eastern Dade County, it thins to the west until it is nonexistent just west of the border with Monroe County.

The Floridan Aquifer System is present beneath all of Dade County. However, water within this aquifer system in Dade County is so highly mineralized that it is not suitable for most uses. Table 4-1 shows a schematic representation of the generalized hydrogeology of Dade County.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The South Florida Water Management District has signed an agreement with the Metropolitan Dade County Department of Environmental Resources Management (DERM) whereby DERM will establish and monitor the Ambient Ground Water Quality Monitoring Network (AGWQMN) within Dade County.

Since 1986 DERM has annually collected water quality data from approximately 80 (AGWQMN) wells within Dade County. The DERM water quality sampling results were not available in time to be included in this report and will instead by included in a future publication dealing with water quality trends within the SFWMD. The well construction and location information was available for these wells. Figure 4-2 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 4-1.

This report will not interpret the results of the AGWQMN sampling. A summary of the water quality within Dade County from existing literature will be discussed to indicate general ambient ground water quality conditions.

Surficial Aquifer System (Biscayne Aquifer)

Water quality data from Anderson (1986), and Pitt et al. (1975) is used to depict water quality concentrations within Dade County. Data from Anderson (1986) consisted of results from 20 monitor wells that were sampled on one occasion. These wells are located in southern Dade County. Data from Pitt et al. (1975) consisted of average values for 42 wells at 7 sites throughout eastern Dade County.

Total dissolved solids concentrations from Anderson (1986) range from a low of 181 MG/L to a high of 414 MG/L, with an average concentration of 283 MG/L. Total dissolved solids concentrations from Pitt and others (1975) range from a low of 245 MG/L to a high of 379 MG/L, with an average concentration of 320 MG/L. All of these values are below the secondary drinking water standard for total dissolved solids of 500 MG/L.

Chloride concentrations from Anderson (1986) range from a low of 14 MG/L to a high of 64 MG/L, with an average concentration of 32 MG/L. Chloride concentrations from Pitt et al. (1975) range from a low of 7.9 MG/L to a high of 41 MG/L, with an average of concentration 27 MG/L. All of these values are well below the secondary drinking water standard for chloride of 250 MG/L. Chloride concentrations are higher near the coast due to salt water intrusion.

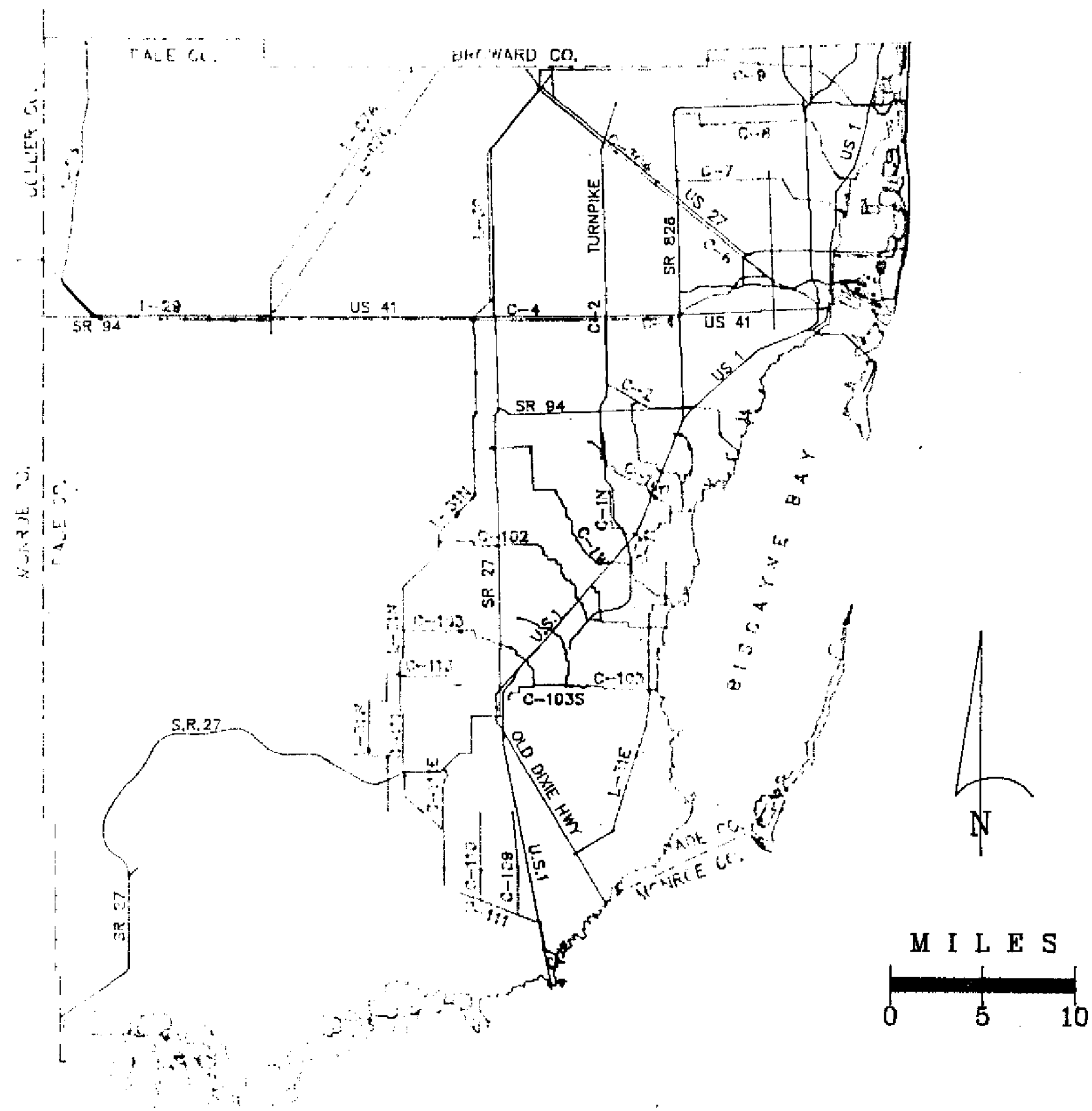

Figure 4-1 MAP OF DADE COUNTY

TABLE 4-1. GENERALIZED HYDROGEOLOGY OF DADE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	MIAMI LIMESTONE	0-20	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	WHITE TO YELLOW ORANGE MASSIVE OOLITIC LIMESTONE, HIGH PERCENTAGES OF BRYOZOMS PRESENT IN SOME AREAS
	KEY LARGO LIMESTONE	0-60	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	CORALLINE LIMESTONE, COMPRISED OF CORAL SKELETONS, FINE TO MEDIUM GRAINED CEMENTED CALCAREOUS SAND AND OTHER REEF DETRITUS
	FT. THOMPSON FORMATION	0-200	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	ALTERNATING MARINE, BRACKISH, AND FRESH WATER MARL, LIMESTONES AND SANDSTONES
INTER-MEDIATE CONFINING ZONE	TAMIAMI FORMATION	0-150	HIGH TO LOW PERMEABILITY WATER QUALITY: GOOD TO POOR	CREAMY-WHITE LIMESTONE, AND GREENISH-GRAY CLAYEY AND CALCAREOUS MARL, SILTY AND SHELLY SANDS, AND SHELL MARL
	HAWTHORN GROUP	650-800	IMPERMEABLE	GRAY-GREEN SANDY CLAY WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	AVON PARK LIMESTONE	2400-2800	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES

Most of the salt water intrusion took place before 1946 when canal flow in Dade County was virtually uncontrolled and ground water levels were greatly lowered (Klein and Hull, 1978). Salt water intrusion is delineated by measuring the chloride concentration at the base of the Surficial Aquifer System. Figure 4-3 shows where the chloride concentration exceeded 1,000 MG/L, indicating the landward extent of the salt water intrusion front.

Hardness concentrations from Anderson (1986) range from a low of 120 MG/L to a high of 222 MG/L with an average concentration of 200 MG/L. Hardness concentrations from Pitt et al. (1975) range from a low of 178 MG/L to a high of 263 MG/L, with an average concentration of 210 MG/L. These values place the water in the hard to very hard range.

Floridan Aquifer System

The water quality of the Floridan Aquifer System within Dade County is poor and the water is generally nonpotable. The Floridan Aquifer is not monitored in Dade County by the AGWQMN.

SUMMARY AND CONCLUSIONS

DERM has established the AGWQMN within Dade County. Since 1986 DERM has annually sampled approximately 80 AGWQMN wells within the county. The water quality of the Biscayne Aquifer in most areas of Dade County meets the state of Florida drinking water standards. Poor water quality exists in some coastal areas where salt water intrusion has occurred.

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Bower, 1978. Groundwater Hydrology: U. S. Geological Survey, Water-Resources Investigation 78-107

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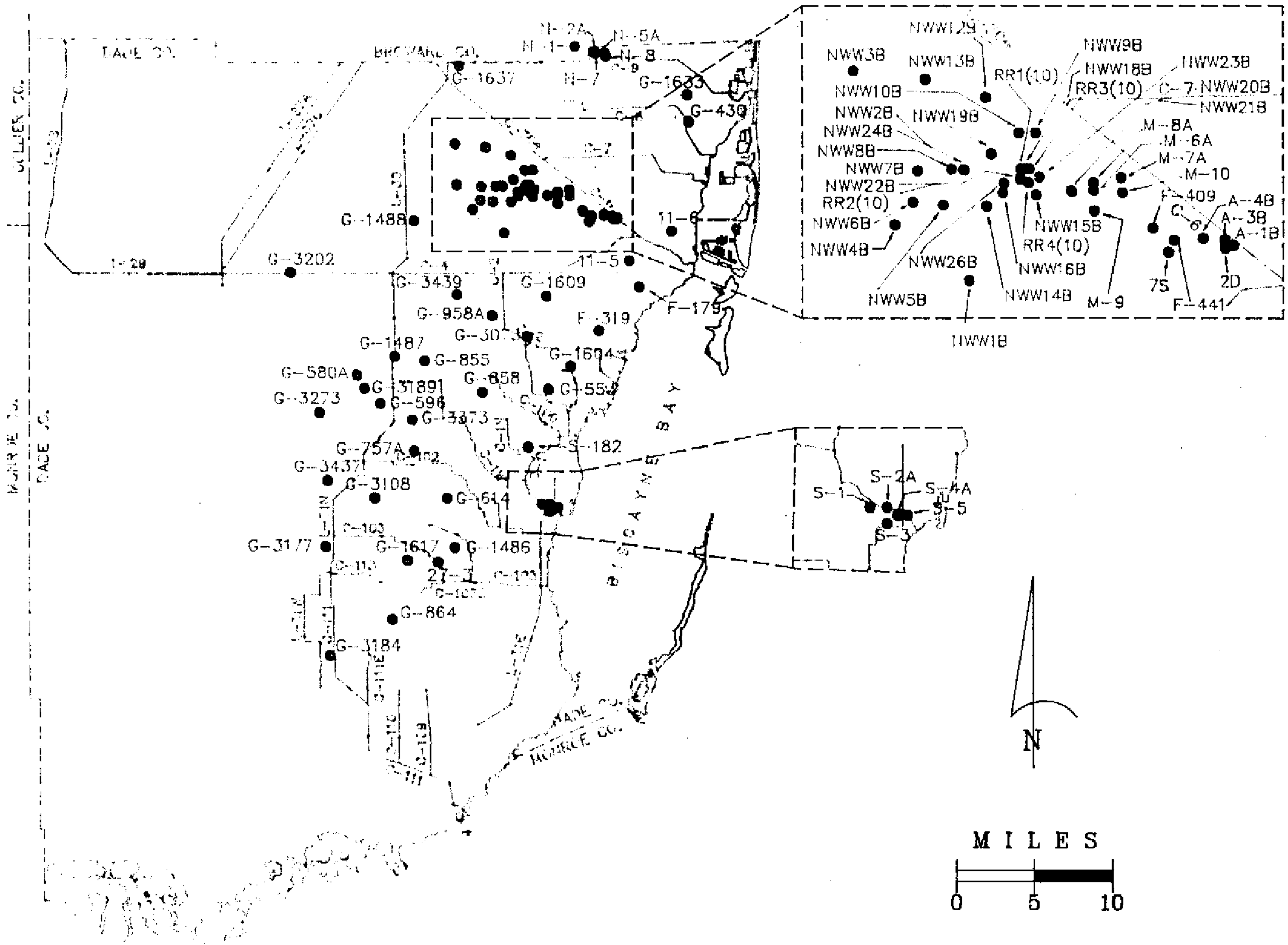
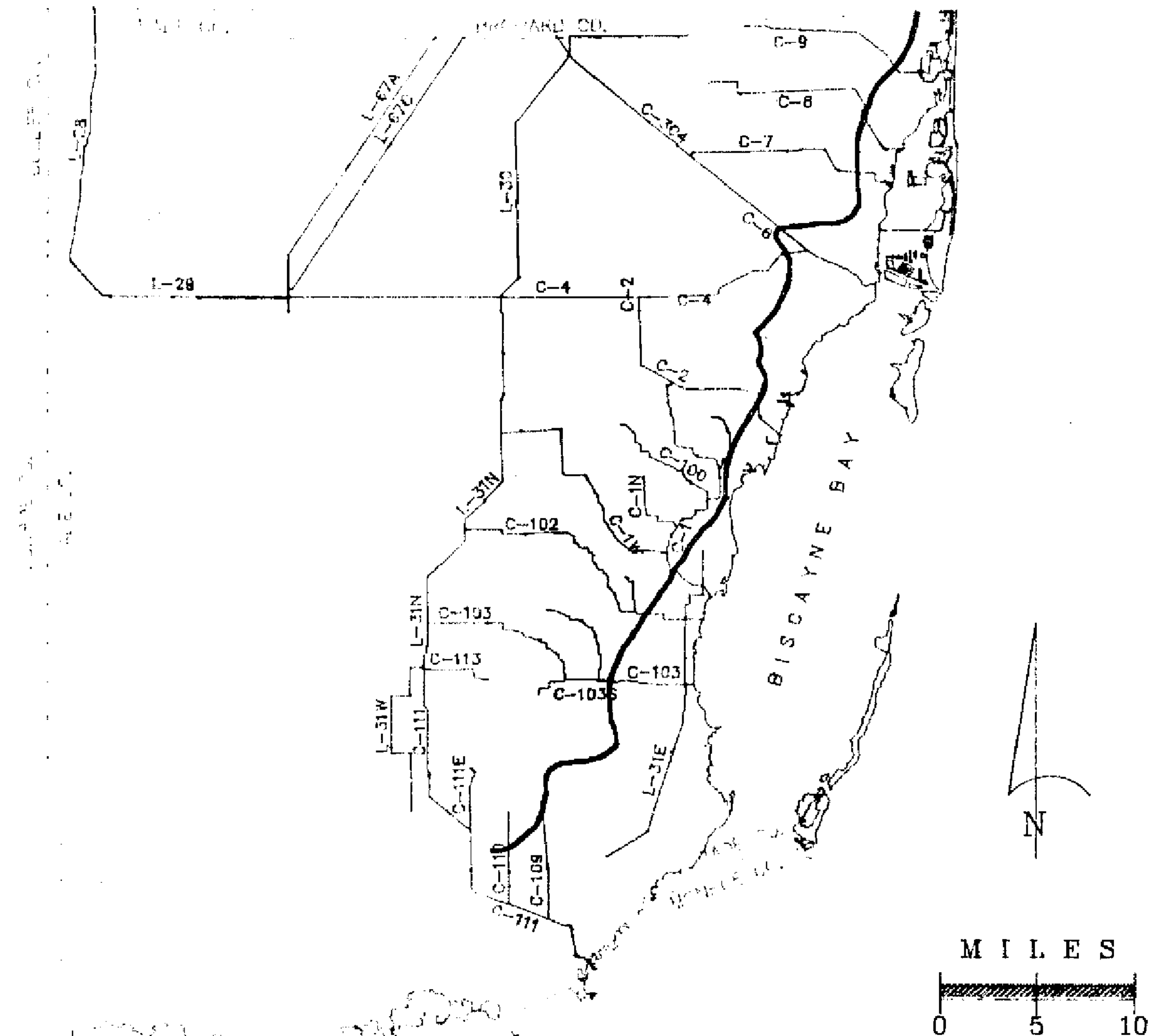


Figure 4-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS



INDICATES LOCATION OF THE 1000 PPM ISOCHLOR AT THE BASE OF THE SURFICIAL AQUIFER SYSTEM

Figure 4-3 EXTENT OF SALT WATER INTRUSION (1982)

Pitt, W. A. J. Jr., H.C.Mattraw, Jr., and H. Klein, 1975. Ground Water Quality in Selected Areas Serviced by Septic Tanks, Dade County, Florida: U. S. Geological Survey, Open-File Report 75-607.

SECTION 5

GLADES COUNTY

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LOCATION AND EXTENT OF AREA

Glades County is located in the southwestern portion of Florida and comprises an area of approximately 746 square miles, measuring 42 miles from east to west and 30 miles from north to south. The county lies between 26° 46' 05" and 27° 12' 07" north latitude, and 80° 52' 17" and 81° 33' 57" west longitude. It is bounded on the north by Highlands County, to the south by Hendry County, to the west by Charlotte County, and to the east by Lake Okeechobee and Okeechobee County (Figure 5-1).

HYDROGEOLOGY

Two aquifer systems are present beneath all of Glades County, these are the Surficial Aquifer System and the Floridan Aquifer System. The Intermediate Aquifer System is present in the western third of the county. These aquifer systems are separated from one another by relatively impermeable beds. Table 5-1 shows a schematic representation of the generalized hydrogeology of Glades County (from Smith, Sharp, and Shih, 1988).

The Surficial Aquifer System yields low to moderate quantities of potable water in most areas of Glades County, except for near Lake Okeechobee, and in the western area of the county near the border with Charlotte County.

The Intermediate Aquifer System is present in the western portion of Glades County but yields only small to moderate quantities of relatively good quality water. The Floridan Aquifer System is utilized primarily for irrigation. Throughout most of the county it is highly mineralized and exceeds public drinking water standards. However, in the northwestern corner of the county the Floridan Aquifer System water quality meets drinking water standards.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitoring Network (AGWQMN) in Glades County consists of nine Surficial Aquifer System, three Intermediate Aquifer System, and three Floridan Aquifer System monitor wells. Figure 5-2 shows the distribution and approximate location of the AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 5-1. The results of inorganic analyses for approximately the first four years of sampling (1984-1987) are shown in Appendix 5-2.

Surficial Aquifer System

Water quality samples within the Surficial Aquifer System AGWQMN wells in Glades County exhibit concentrations of total dissolved solids ranging from a low of 31 MG/L to a high of 1,032 MG/L, with an average concentration of 620 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; although, it may be greater if no other standards are exceeded.

High total dissolved solids values occur in eastern Glades County near Lake Okeechobee and in western Glades County. The lowest total dissolved solids concentrations occur in central Glades County near wells GLWQ-01 and GLWQ-09 (Figure 5-3).

Chloride concentration within the Surficial Aquifer System AGWQMN wells range from a low of 7 MG/L to a high of 334 MG/L, with an average concentration of 107 MG/L. The secondary drinking water standard for chloride is 250 MG/L. Only one Surficial Aquifer System AGWQMN well (GLWQ-06) exceeded the drinking water standard. This well is located in an area of poor water quality near Lake Okeechobee (Figure 5-4).

Hardness concentrations within the Surficial Aquifer System AGWQMN wells in Glades county range from a low of 4 MG/L to a high of 505 MG/L, with an average concentration of 285 MG/L. Hardness concentrations are highest in northeastern and northwestern Glades County, and lowest in the central portion of the county (Figure 5-5). The ground water from the Surficial Aquifer System ranges from soft to very hard throughout Glades County.

Two of the nine Surficial Aquifer System wells have exceeded the minimum secondary drinking water standard for pH of 6.5. Both of these wells are located in the central portion of Glades County and are screened in a zone of quartz pebbles.

Sodium was detected in concentrations exceeding the primary drinking water standard (160 MG/L) in one Surficial Aquifer System AGWQMN well, GLWQ-06. This well is located near Lake Okeechobee in eastern Glades County and was also the only Surficial Aquifer System AGWQMN well to exceed the secondary drinking water standard for chloride. Well GLWQ-06 is located in an area of poor water quality which surrounds Lake Okeechobee. This poor

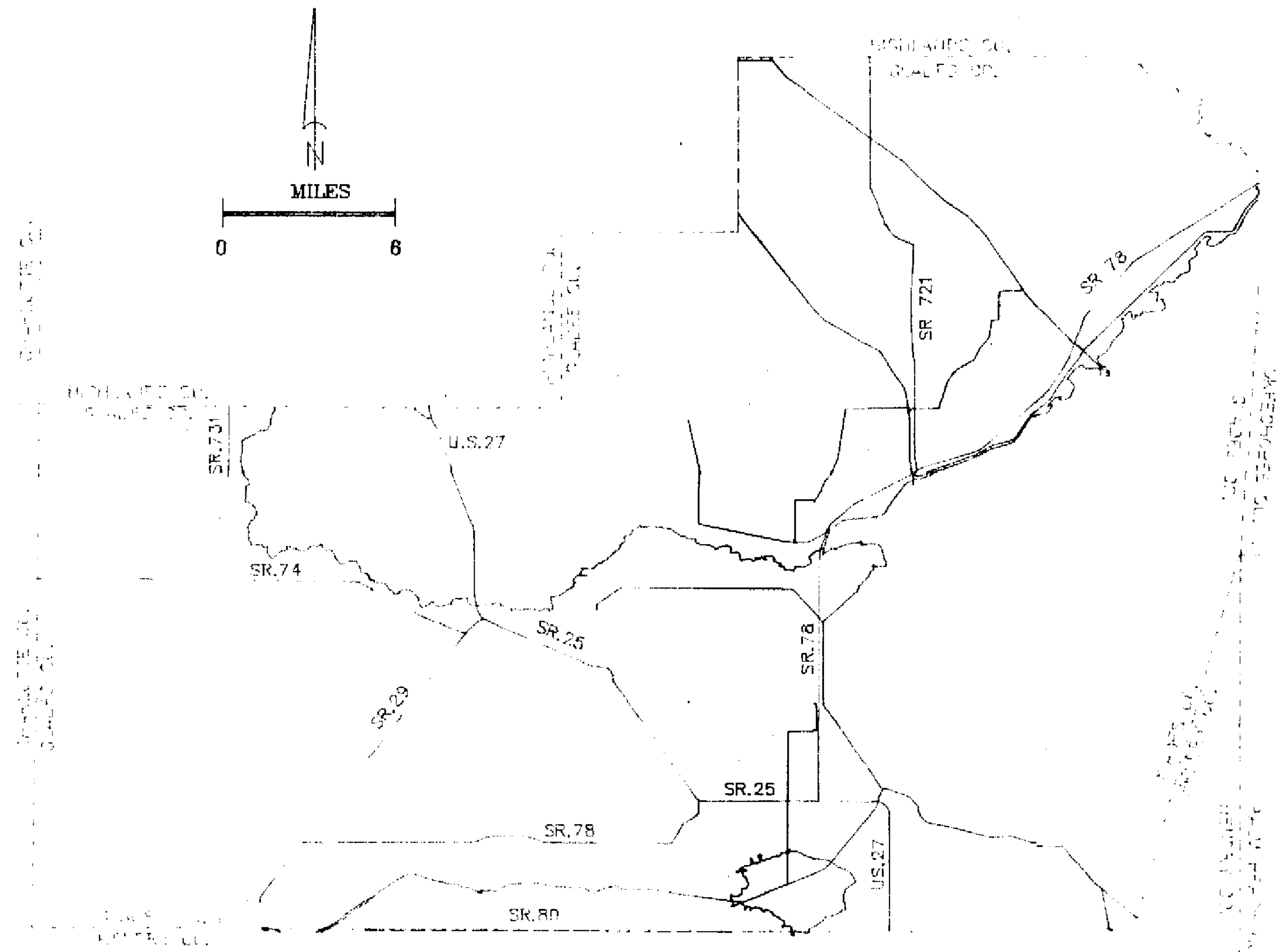

Figure 5-1 MAP OF GLADES COUNTY

TABLE 5-1. GENERALIZED HYDROGEOLOGY OF GLADES COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	WATER TABLE AQUIFER	30-65	LOW TO HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO GOOD	SHELL, LIMESTONE, SAND, AND GRAVEL
	TAMIAMI CONFINING BEDS	0-30	LOW TRANSMISSIVITY	LOW PERMEABILITY MICRITES AND SILT
	LOWER TAMIAMI AQUIFER	30-100	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO GOOD	SAND, MARL, SHELL BEDS, AND LIMESTONE
INTERMEDIATE AQUIFER SYSTEM	UPPER HAWTHORN CONFINING ZONE	300-500	LOW PERMEABILITY	PHOSPHATIC CLAYEY DOLOSILTS AND SAND
	SANDSTONE AQUIFER		MODERATE TRANSMISSIVITY	LIMESTONES, SANDSTONES, SANDY DOLOMITES, AND CALCAREOUS SANDS
	MID-HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	CLAYEY DOLOSILTS WITH THIN SEAMS OF POROUS LIMESTONE, SAND, ANDSILT
	MID-HAWTHORN AQUIFER		MODERATE TO LOW TRANSMISSIVITY WATER QUALITY: FAIR TO POOR	IPHOSPHATIC LIMESTONES AND DOLOMITES
	LOWER HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	SANDY PHOSPHATIC MARL, INTERBEDDED WITH CLAY, SHELL MARL, SILT, AND SAND
FLORIDAN AQUIFER SYSTEM		290-330	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	INTERBEDDED LIMESTONES AND DOLOMITES

water quality near the lake is due to incomplete flushing of connate seawater.

Eight of the nine Surficial Aquifer System AGWQMN wells exceeded the secondary drinking water standard for iron (0.3 MG/L), at least once. High iron concentrations are not a health threat, but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

The primary drinking water standard for fluoride was exceeded by two of the three samples collected from well RTA-007S. Data from this well is questionable. Results of samples from this well are virtually identical to sample results from an Intermediate Aquifer System AGWQMN well nearby. The Intermediate Aquifer System is under flowing artesian conditions in this area and may have contaminated the Surficial Aquifer System AGWQMN well.

Manganese concentrations within one of the three samples collected from Surficial Aquifer System AGWQMN well GLWQ-05 slightly exceeded the secondary drinking water standard. High manganese concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining

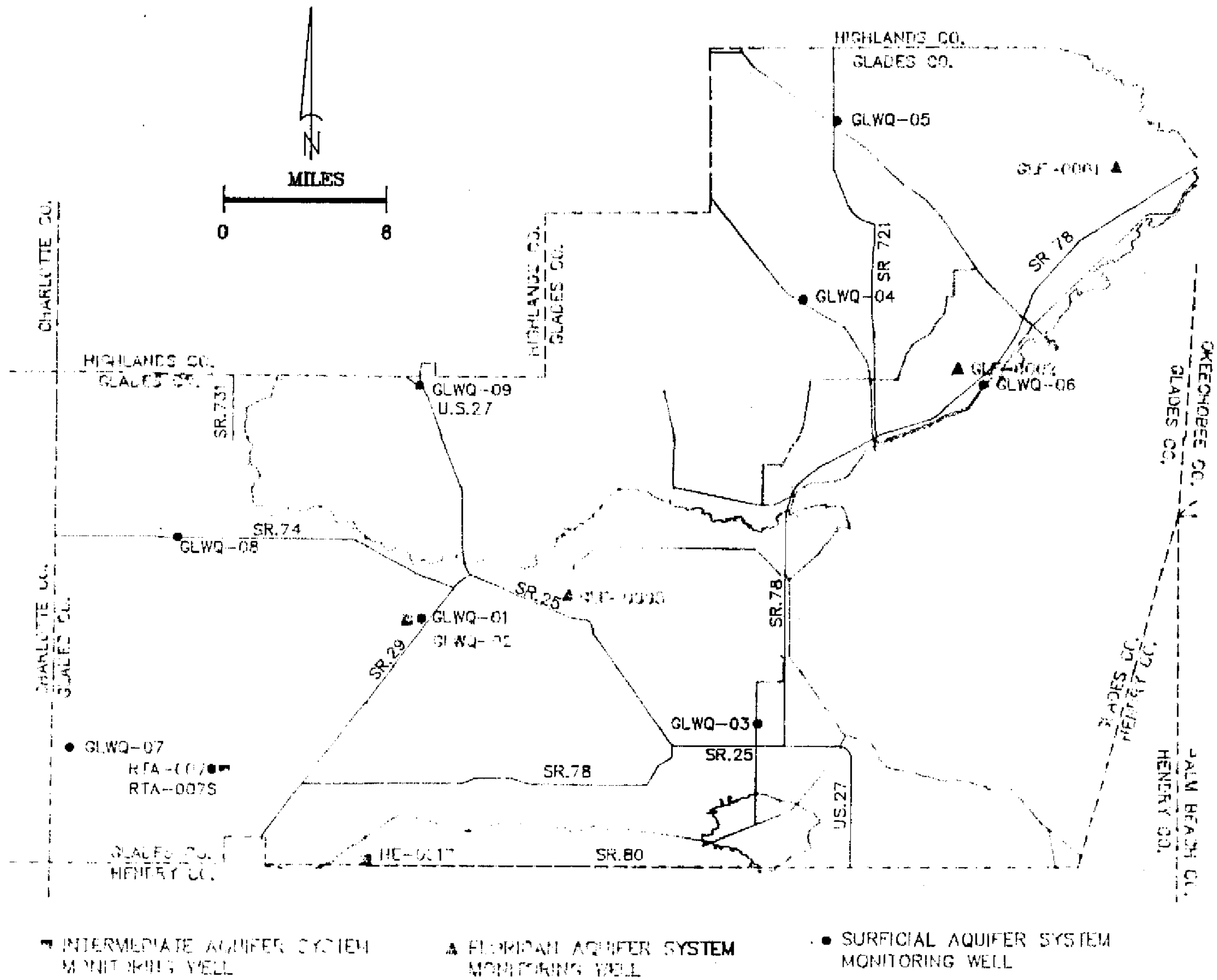

Figure 5-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

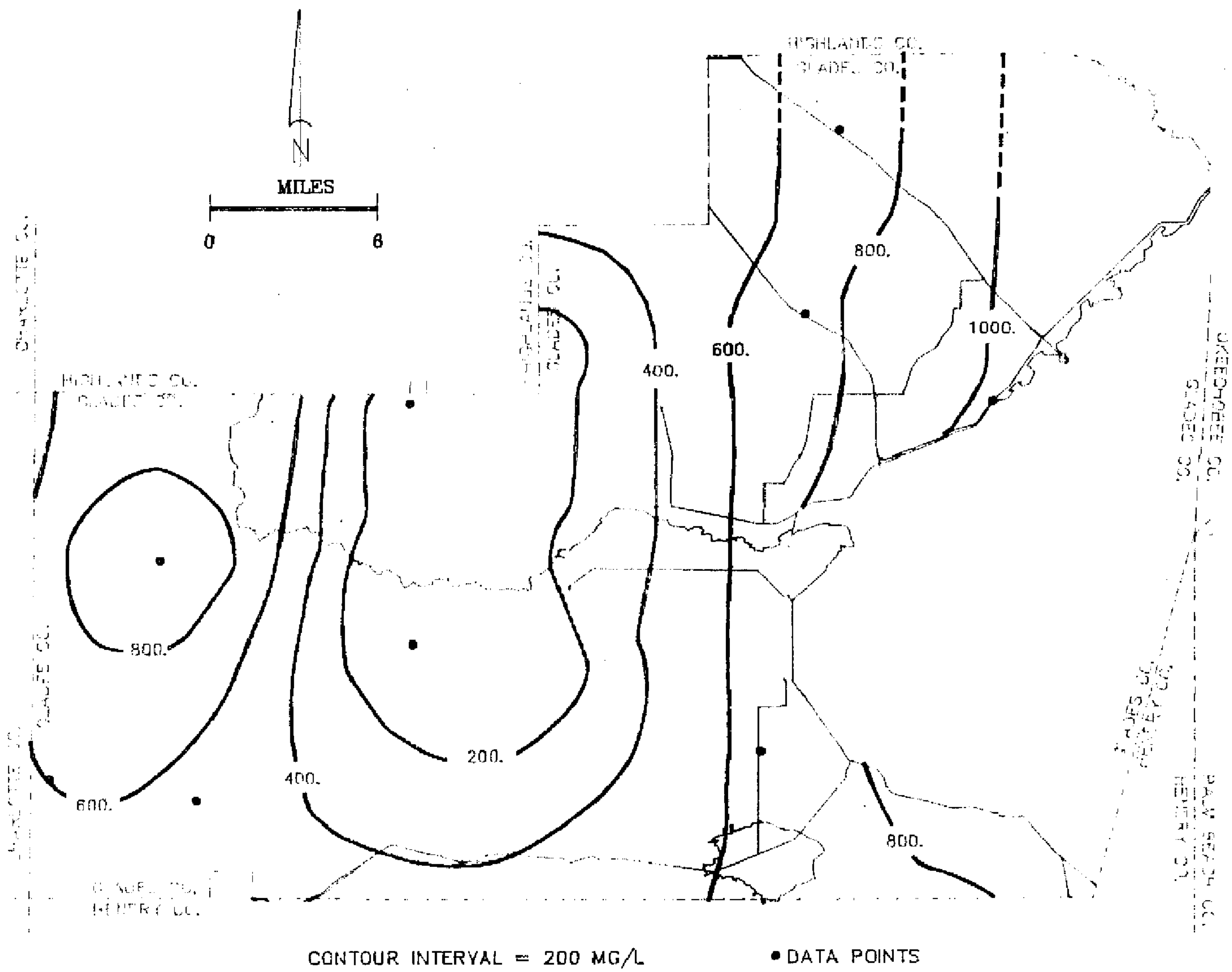

Figure 5-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

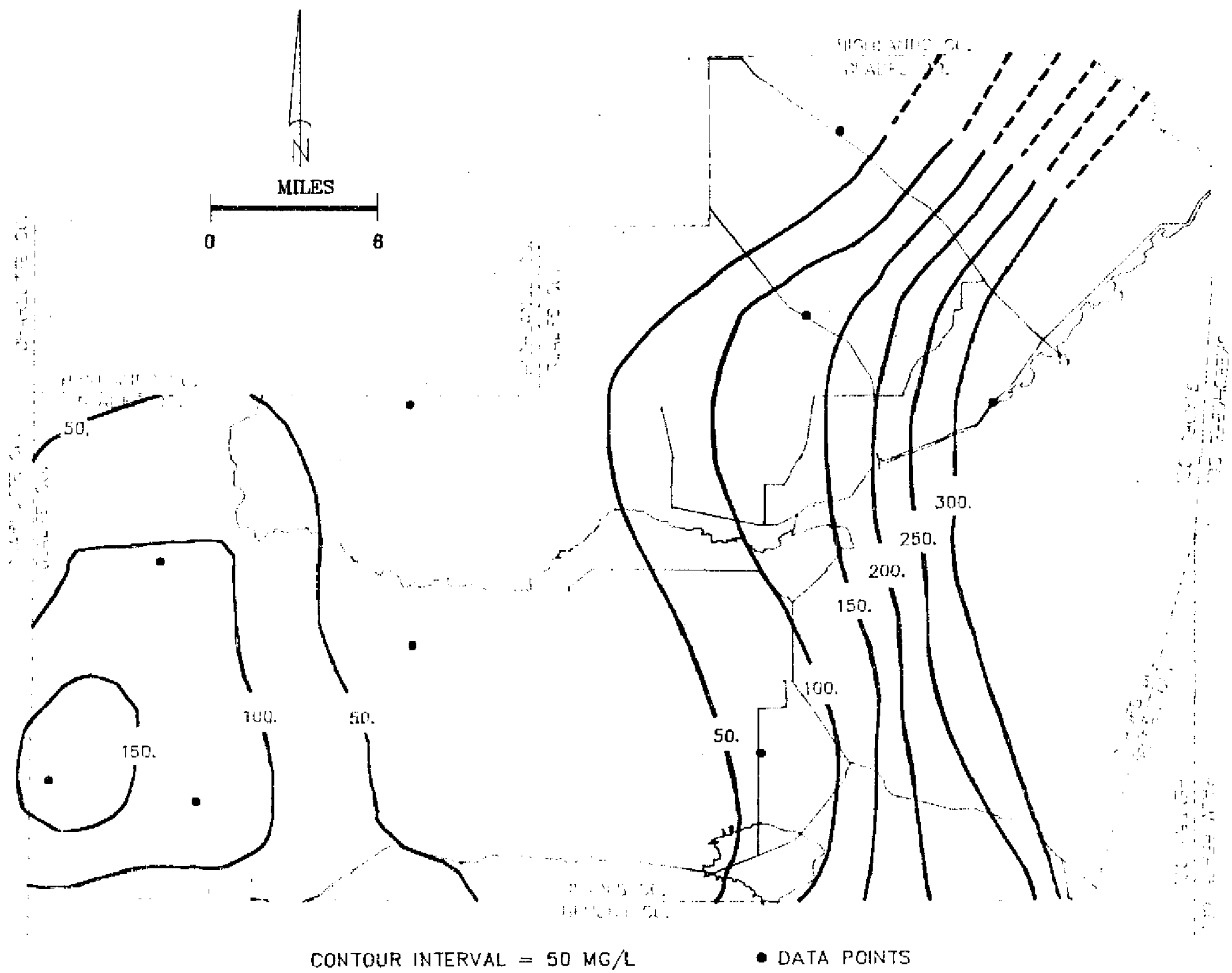

Figure 5-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

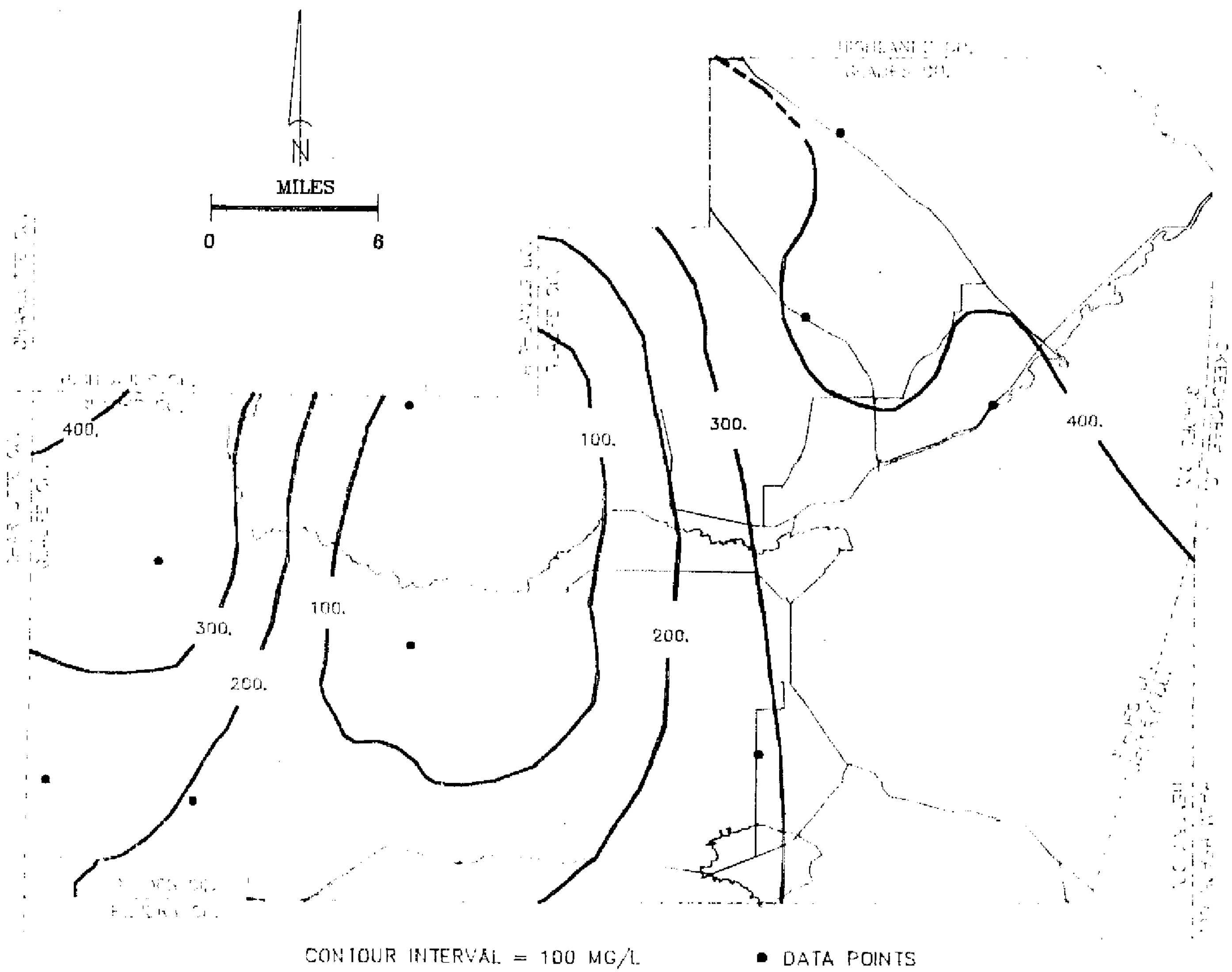

Figure 5-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

of clothes and can impart objectionable tastes to beverages.

No purgeable organic compounds or aromatic hydrocarbons were detected in any samples collected from the Surficial Aquifer System.

Intermediate Aquifer System

Water quality data for the Intermediate Aquifer System is available for only the southwestern corner of the county. The total dissolved solids concentrations of the Intermediate Aquifer System AGWQMN wells sampled in Glades County range from a low of 255 MG/L to a high of 508 MG/L, with an average concentration of 378 MG/L. Concentrations of total dissolved solids within the Intermediate Aquifer System increase to the southwest (Figure 5-6).

Chloride concentrations within the Intermediate Aquifer System AGWQMN wells range from a low of 23 MG/L to a high of 114 MG/L, with an average concentration of 53 MG/L. Chloride concentrations may be as high as 750 MG/L in the extreme southwestern corner of the county (Figure 5-7). Figure 5-7 was generated using data from AGWQMN wells in Glades and adjacent counties.

Hardness concentrations within the Intermediate Aquifer System range from a low of 175 MG/L, to a high of 305 MG/L, with an average concentration of 222 MG/L. These concentrations are in the hard to very hard range. Hardness concentrations increase to the southeast (Figure 5-8). Figure 5-8 was generated using data from AGWQMN wells in Glades and adjacent counties.

All of the samples collected from Intermediate Aquifer System AGWQMN well HE-0517 exceeded the secondary drinking water standard for iron. This well has a metal casing that probably contributed to the iron concentration in the sample. Iron concentrations within the other Intermediate Aquifer System wells were below the secondary drinking water standards.

Manganese exceeded the secondary drinking water standard in one of the three samples collected from well HE-0517. The metal well casing is believed to be responsible for the increased manganese concentrations. The other Intermediate Aquifer System wells had extremely low levels of manganese. As mentioned before, high manganese concentrations are not a health threat.

Two of the three samples collected from Intermediate Aquifer System AGWQMN wells GLWQ-02 and RTA-007 exceeded the primary drinking water standard for fluoride. High fluoride concentrations can cause the mottling of children's teeth.

P-Dichlorobenzene was detected at a concentration of 1.7 ug/l in well RTA-007 in April of 1986. No purgeable organic compounds or aromatic hydrocarbons had been detected in previous or subsequent samples collected from this well. The presence of this compound in the sample may be due to sample contamination. There are no plausible sources of P-Dichlorobenzene within a half mile radius of the well. Additionally, there is an upward gradient of ground water flow in the area around RTA-007, making the migration of an anthropogenic contaminant into the Intermediate Aquifer System unlikely. P-Dichlorobenzene was not detected in Surficial Aquifer System AGWQMN well RTA-007S located at the same site.

Floridan Aquifer System

Water quality data for the Floridan Aquifer System is available for only the northern half of the county, north of well GLF-0005. The total dissolved solids concentrations within the Floridan Aquifer System AGWQMN wells sampled in Glades County range from a low of 829 MG/L to a high of 3,576 MG/L, with an average concentration of 2,076 MG/L. Total dissolved solids concentrations increase to the southeast in eastern Glades County (Figure 5-9). Figure 5-9 was generated using data from AGWQMN wells in Glades and adjacent counties.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 260 MG/L to a high of 1,720 MG/L, with an average concentration of 857 MG/L. Chloride concentrations are lowest in northern Glades County and increase to the south and southeast (Figure 5-10). Figure 5-10 was generated using water quality data from AGWQMN wells in Glades and adjacent counties.

Hardness concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 65 MG/L to a high of 97 MG/L, with an average concentration of 78 MG/L. It was not possible to generate a hardness concentration map for Glades County due to the lack of variability of the data and the small number of data points available. Hardness values within the Floridan Aquifer System are in the moderately hard range.

No purgeable organic compounds or aromatic hydrocarbons were detected in any samples collected from the Floridan Aquifer System AGWQMN wells within Glades County.

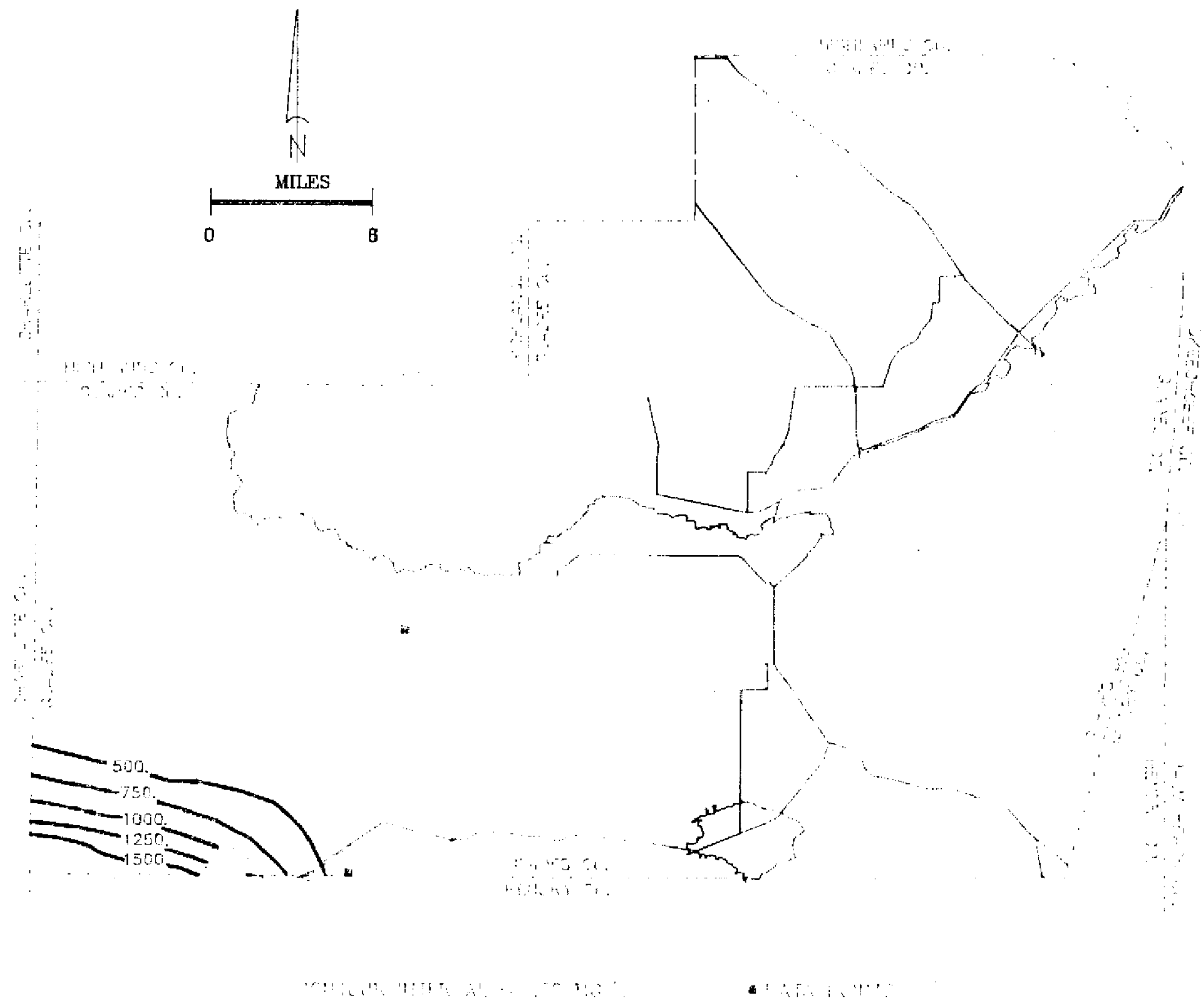

Figure 5-6 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

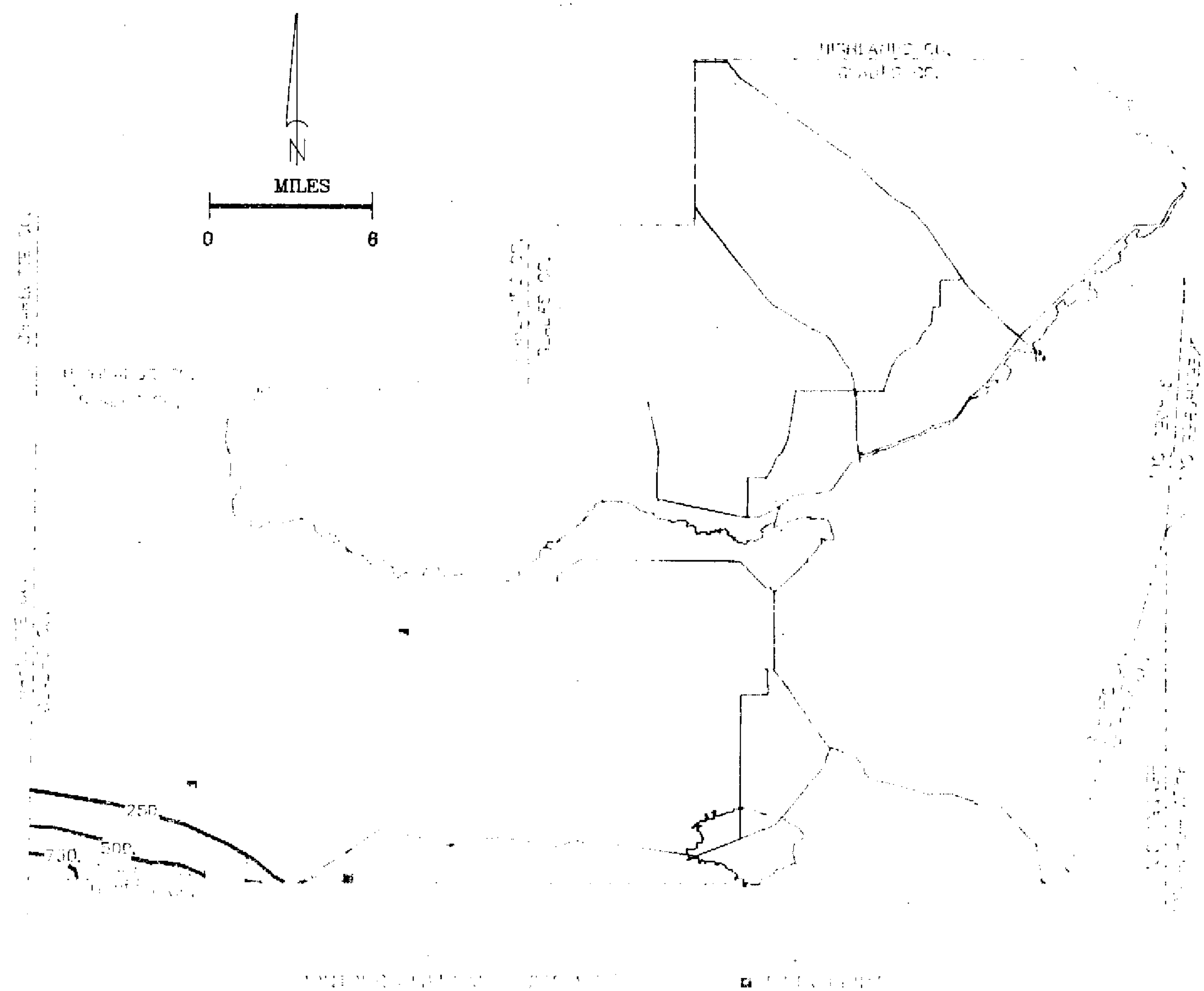

Figure 5-7 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

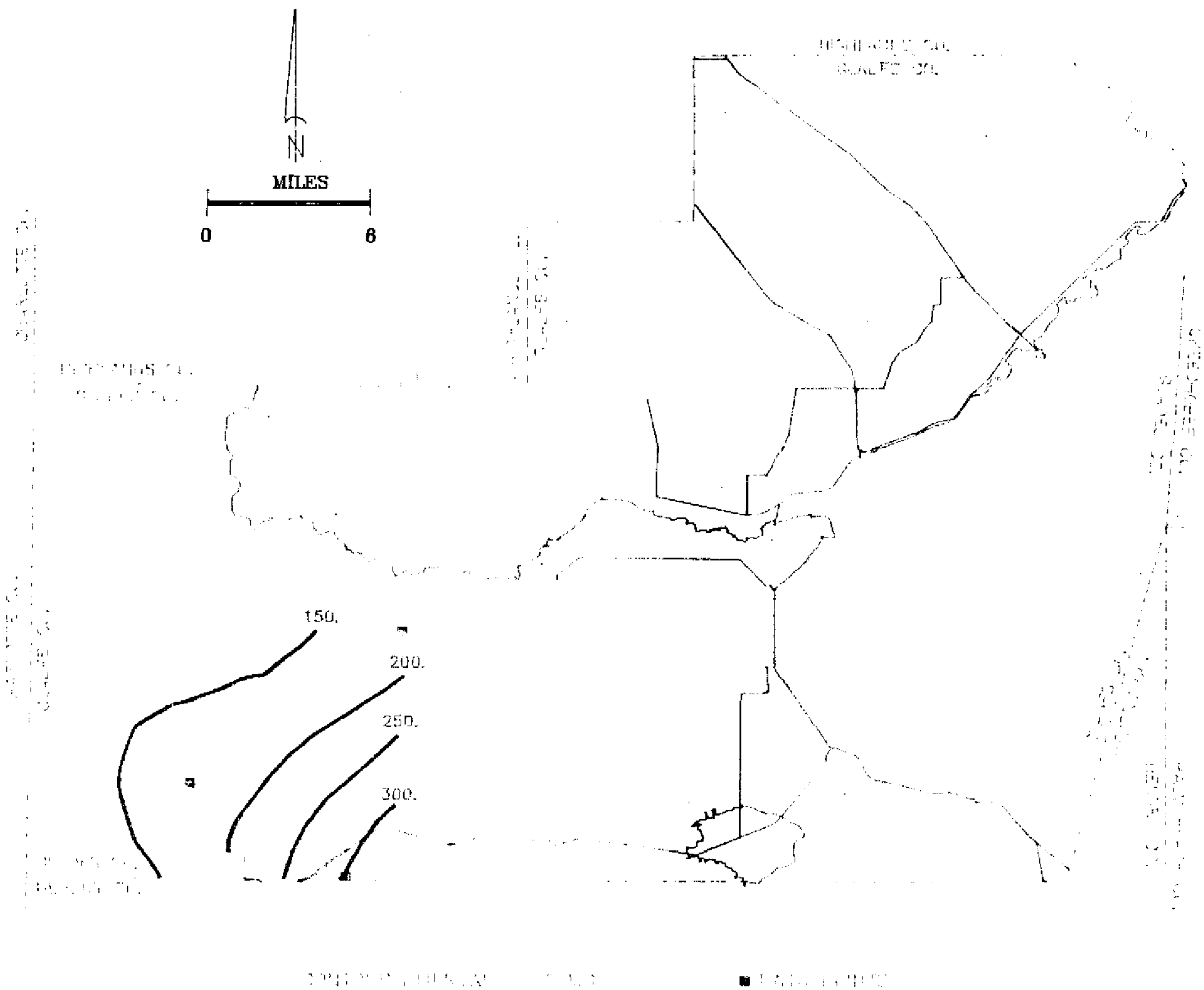

Figure 5-8 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

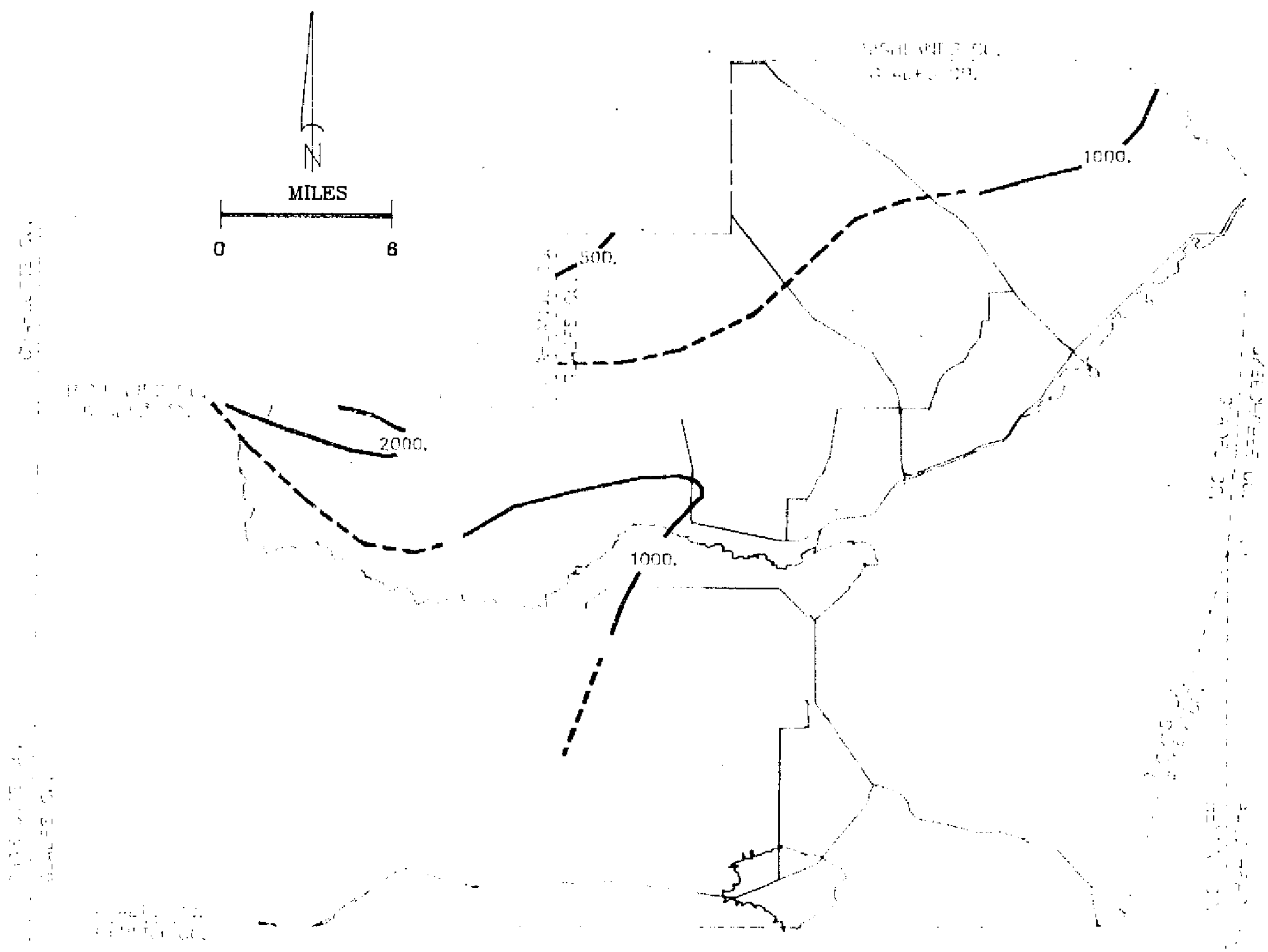

Figure 5-9 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

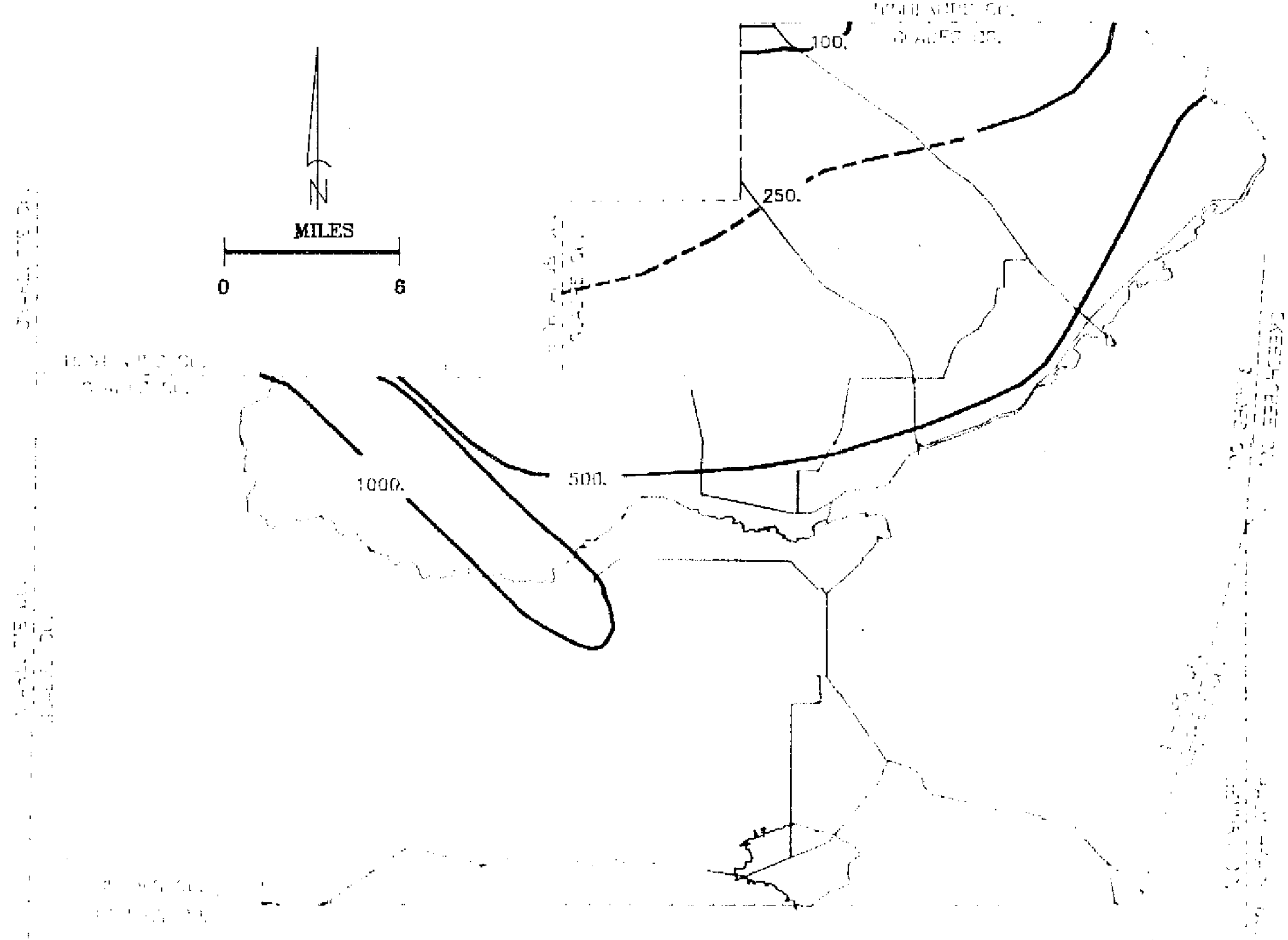

Figure 5-10 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of the AGWQMN wells within Glades County are shown in Figures 5-11 and 5-12. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 5-11 shows Stiff patterns for the Surficial Aquifer System. The Stiff patterns indicate that the water type from the Surficial Aquifer System is predominantly calcium-bicarbonate. The narrow Stiff pattern of wells GLWQ-01 and GLWQ-09 indicate the presence of low ionic strength water. This can indicate newly recharged water from the surface, relatively insoluble aquifer materials, or a combination of the two. Both of these wells were screened in a bed of quartz gravel which has a low solubility in water.

Surficial Aquifer System well GLWQ-06 located near Lake Okeechobee has a sodium-chloride-bicarbonate water. The increased ionic strength of the sodium and chloride ions in this area is due to the incomplete flushing of connate sea water.

The Stiff pattern for Surficial Aquifer System well RTA-007S is identical to the pattern for Intermediate Aquifer System well RTA-007 located at the same site. The similarity of the patterns and concentrations of these two wells indicates possible contamination of the Surficial Aquifer System by water from the Intermediate Aquifer System, which is under flowing artesian conditions at this site. This contamination is probably extremely localized. Both wells were drilled for an aquifer test and are located at the same site.

Figure 5-12 shows Stiff patterns for both the Intermediate and Floridan Aquifer Systems. Stiff patterns for Intermediate Aquifer System AGWQMN well GLWQ-02 indicate a sodium-bicarbonate water that has been naturally softened. The water has been softened by the action of clays exchanging sodium for calcium in what was originally a calcium-bicarbonate solution. Intermediate Aquifer System well HE-0517 shows a calcium-bicarbonate water type. Well RTA-007 shows a Stiff pattern that is indicative of natural softening and/or mixing with water from the Floridan Aquifer System.

The Stiff patterns of the Floridan Aquifer System AGWQMN wells (Figure 5-12) show a pattern and overall high ionic strength that is common for water from the Floridan Aquifer System in this area of the state. This pattern is commonly dominated by the sodium and chloride ions, with an intermediate concentration (milliequivalents per liter) of magnesium and sulfate, and a lower concentration of calcium and bicarbonate ions.

SUMMARY AND CONCLUSIONS

Water within the Surficial Aquifer System in Glades County is of relatively good quality and is potable throughout most of the county. The best water quality is located in the central portion of the county, and the worst water quality is located near Lake Okeechobee. Ground water near Lake Okeechobee is mineralized and exceeds several drinking water standards. Incomplete flushing of connate seawater near the lake has left high chloride and total dissolved solids concentrations. Water quality in the Surficial Aquifer System also declines in western Glades County near the Charlotte County border.

Water quality data for the Intermediate Aquifer System is available for only the southwestern corner of the county. In this area water quality within the Intermediate Aquifer System is close to the drinking water standards for several parameters and often slightly exceeds standards. Concentrations of most compounds increase to the southwest.

The water quality of the Floridan Aquifer System meets drinking water standards in the northwestern portion of Glades County. However, the water quality decreases quickly to the south and east. Floridan Aquifer System water from southern Glades County, and the eastern portion of the county near Lake Okeechobee is too highly mineralized for most uses.

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Smith, K.R., T.S. Sharp, and C.C. Shih. 1988. Investigation of Water Use, Land Use, and the Ground Water Monitor Network in Hendry County, Florida: South Florida Water Management District, Technical Memorandum, West Palm Beach, Florida.

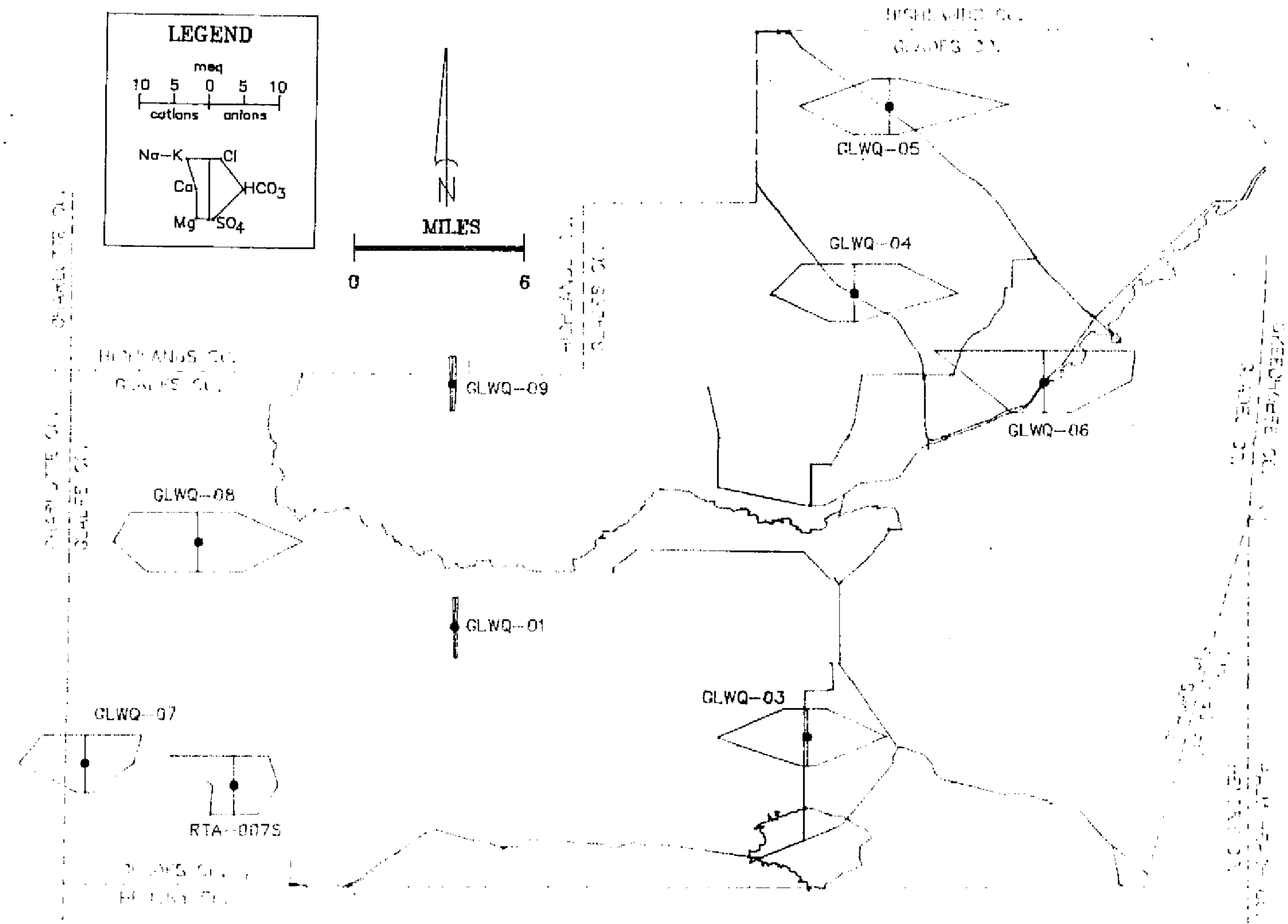

Figure 5-11 STIFF PATTERN DIAGRAMS FROM MONITOR AGWQMN WELL DATA SURFICIAL AQUIFER SYSTEM

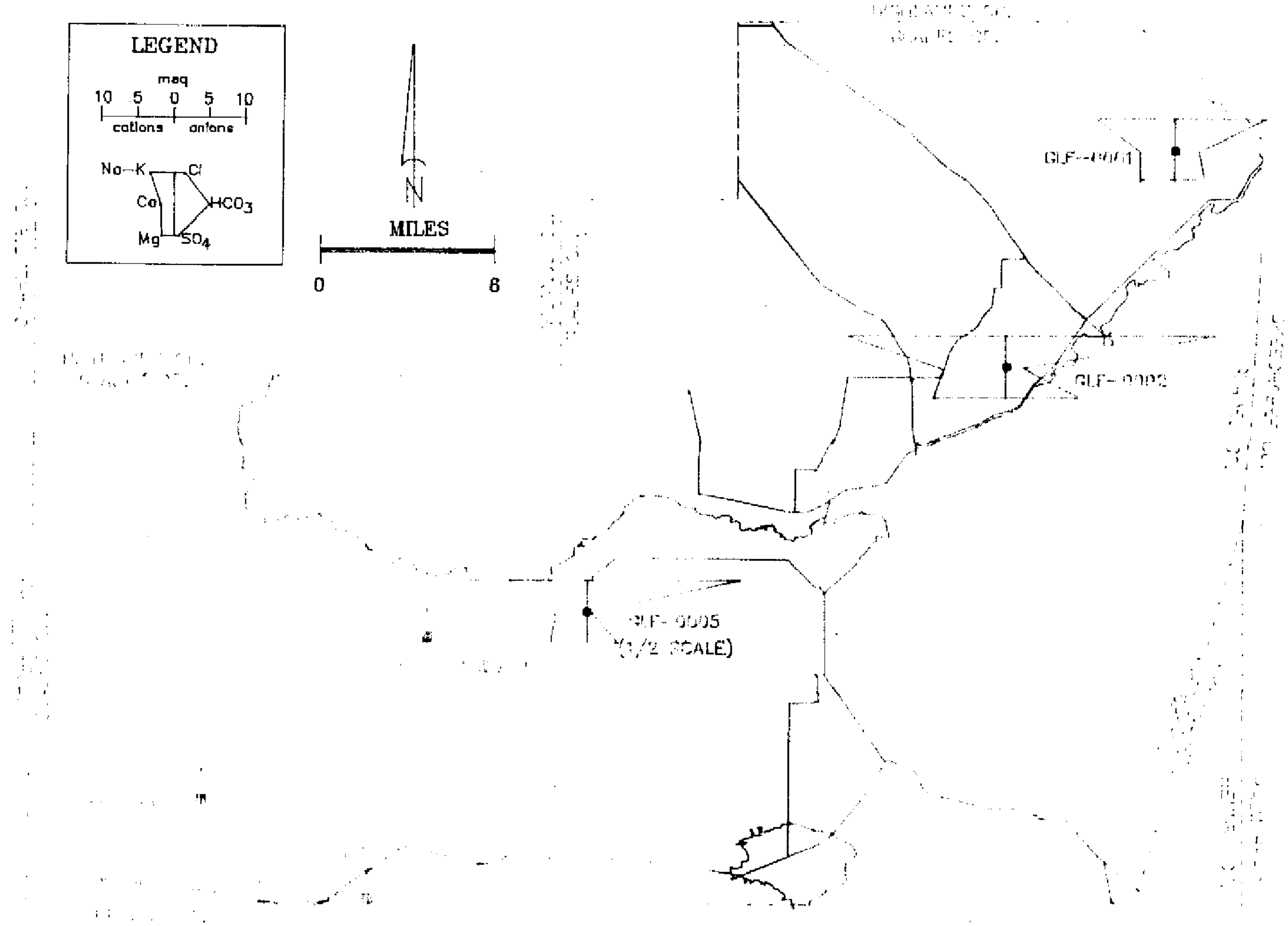

Figure 5-12 STIFF PATTERN DIAGRAMS FROM MONITOR AGWQMN WELL DATA FLORIDAN AND INTERMEDIATE AQUIFER SYSTEMS

Shaw, J.E. and S.M. Trost, 1984. Hydrogeology of the Kissimmee Planning Area, South Florida Water Management District. South Florida Water Management District, Technical Publication #84-1. West Palm Beach, Florida.

SECTION 6

HENDRY COUNTY

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LOCATION AND EXTENT OF AREA

Hendry County is located in the southwestern portion of Florida and comprises an area of approximately 945 square miles, measuring 42 miles from east to west and 34 miles from north to south (excluding Lake Okeechobee). The county lies between 26° 15' 10" and 26° 46' 59" north latitude, and 80° 52' 47" and 81° 33' 57" west longitude. It is bounded on the north by Glades County and Lake Okeechobee, to the south by Collier County, to the west by Lee and Collier Counties, and to the east by Palm Beach and Broward Counties (Figure 6-1).

HYDROGEOLOGY

Three aquifer systems are present in Hendry County that provide drinking and irrigation water these are the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. The Surficial Aquifer System is the primary source of ground water throughout the county and is composed of two aquifers, the Water Table Aquifer and the Lower Tamiami Aquifer.

The Intermediate Aquifer System accounts for the majority of other ground water withdrawals within the county and is composed of the Sandstone aquifer and the mid-Hawthorn aquifer. The Floridan Aquifer System is too highly mineralized for use as a water supply source.

Table 6-1 shows a schematic representation of the generalized hydrogeology of Hendry County (from Smith, Sharp, and Shih, 1988).

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitoring Network (AGWQMN) in Hendry County is composed of eleven Surficial Aquifer System, and four Intermediate Aquifer System monitor wells. Figure 6-2 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 6-1. The results of the inorganic laboratory analyses for the first three years of sampling (1985-1987) are shown in Appendix 6-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN exhibit concentrations of total dissolved solids ranging from a low of 200 MG/L to a high of 2,305 MG/L, with an average concentration of 562 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; however, it may be greater if no other standards are exceeded.

High total dissolved solids values in excess of 500 MG/L occur in northeastern Hendry County and in the area around La Belle. The lowest total dissolved solids concentrations occur in southern Hendry County (Figure 6-3).

Data from well HE-0558 was not used to construct Figure 6-3. High total dissolved solids concentrations in this well and in the area around La Belle are the result of improperly cased Floridan Aquifer System wells that have contaminated the Surficial Aquifer System.

Chloride concentrations within the Surficial Aquifer System range from a low of 2 MG/L to a high of 1,100 MG/L, with an average concentration of 119 MG/L. The secondary drinking water standard for chloride is 250 MG/L. Only one Surficial Aquifer System AGWQMN well (HE-0558) has chloride concentrations exceeding drinking water standards, and as mentioned earlier, this well has been contaminated by water from the Floridan Aquifer System.

Figure 6-4 shows the chloride concentrations within Hendry County. Chloride concentrations are below 50 MG/L throughout most of the county. Concentrations are higher in the northeastern corner of the county and in the contaminated area around La Belle (not shown in Figure 6-4 because it had a disproportionate impact on contours outside of this contaminated area).

Hardness concentrations range from a low of 120 MG/L to a high of 401 MG/L with an average concentration of 262 MG/L. Hardness concentrations are highest in northeastern Hendry County and in the area around HE-0851. Hardness concentrations are lowest in the southwestern portion of the county (Figure 6-5). The ground water from the Surficial Aquifer System would be considered hard to very hard throughout Hendry County.

Nine of the eleven Surficial Aquifer System AGWQMN wells had pH values that were below the secondary drinking water standard of 6.5. The pH

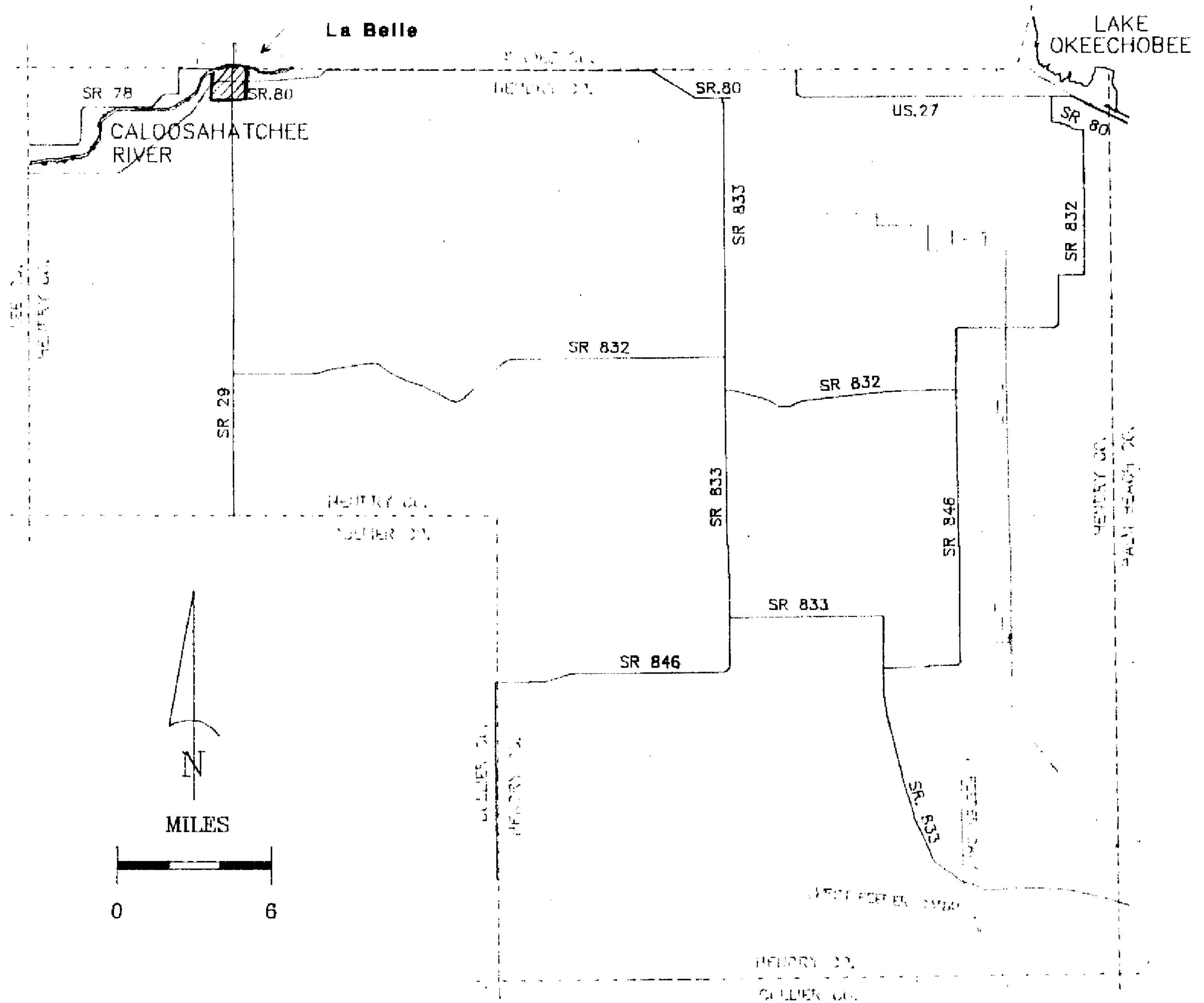

Figure 6-1 MAP OF HENDRY COUNTY

TABLE 6-1. GENERALIZED HYDROGEOLOGY OF HENDRY COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	WATER TABLE AQUIFER	175-300	LOW TO HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO GOOD	SHELL, LIMESTONE, SAND, AND GRAVEL
	TAMIAMI CONFINING BEDS		LOW TRANSMISSIVITY	LOW PERMEABILITY MICRITES AND SILT
	LOWER TAMIAMI AQUIFER		MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	SAND, MARL, SHELL BEDS, AND LIMESTONE
INTERMEDIATE AQUIFER SYSTEM	UPPER HAWTHORN CONFINING ZONE	300-500	LOW TRANSMISSIVITY	PHOSPHATIC CLAYEY DOLOSILTS AND SAND
	SANDSTONE AQUIFER		MODERATE TRANSMISSIVITY	SANDSTONES, SANDY LIMESTONES, AND SANDY DOLOMITES, INTER-BEDDED WITH CLAYEY DOLOSILT
	MID-HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	CLAYEY DOLOSILTS WITH THIN SEAMS OF POROUS LIMESTONE, SAND, AND SILT
	MID-HAWTHORN AQUIFER		MODERATE TO LOW TRANSMISSIVITY WATER QUALITY: FAIR TO POOR	PHOSPHATIC LIMESTONES AND DOLOMITES
	LOWER HAWTHORN CONFINING ZONE		LOW TRANSMISSIVITY	SANDY PHOSPHATIC MARL, INTERBEDDED WITH CLAY, SHELL MARL, SILT, AND SAND
FLORIDAN AQUIFER SYSTEM		290-320	HIGH TRANSMISSIVITY WATER QUALITY: FAIR TO POOR	INTERBEDDED LIMESTONES AND DOLOMITES

values in the Surficial Aquifer System range from 5.2 to 7.2.

Sodium was detected in concentrations exceeding the primary drinking water standard (160 MG/L) in one Surficial Aquifer System well, HE-0558. This is the well located near La Belle that has been contaminated by water from the Floridan Aquifer System. Well HE-0558 was also the only Surficial Aquifer System AGWQMN well to exceed the secondary drinking water standard for chloride.

Concentrations within eight of the eleven Surficial Aquifer System AGWQMN wells exceeded the secondary drinking water standard for iron of 0.3 MG/L. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Manganese concentrations within three Surficial Aquifer System AGWQMN wells in Hendry County exceeded the secondary drinking water standards. All of these wells were sampled on two occasions, and the manganese concentrations exceeded the standard on only one occasion at each well.

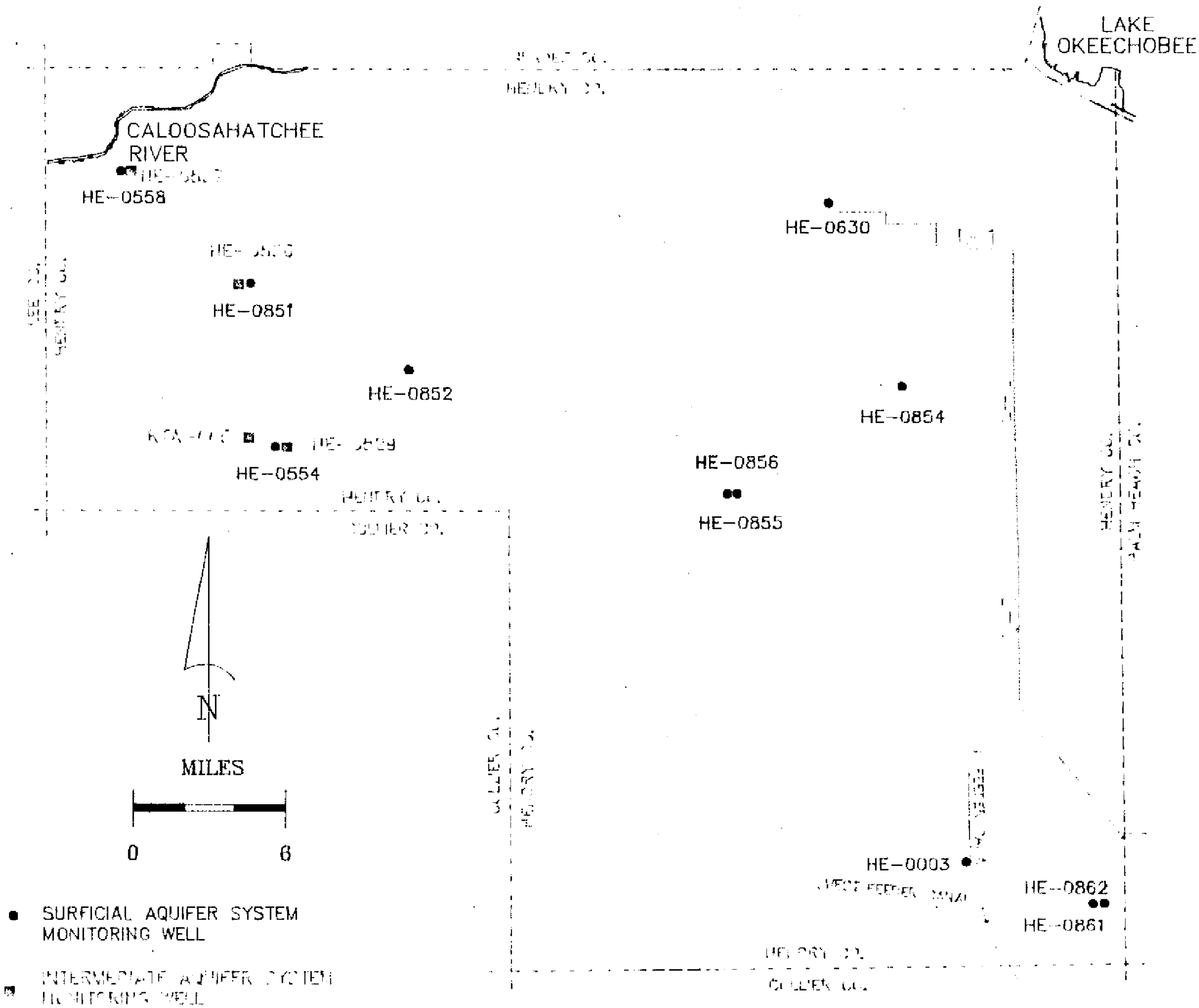

Figure 6-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

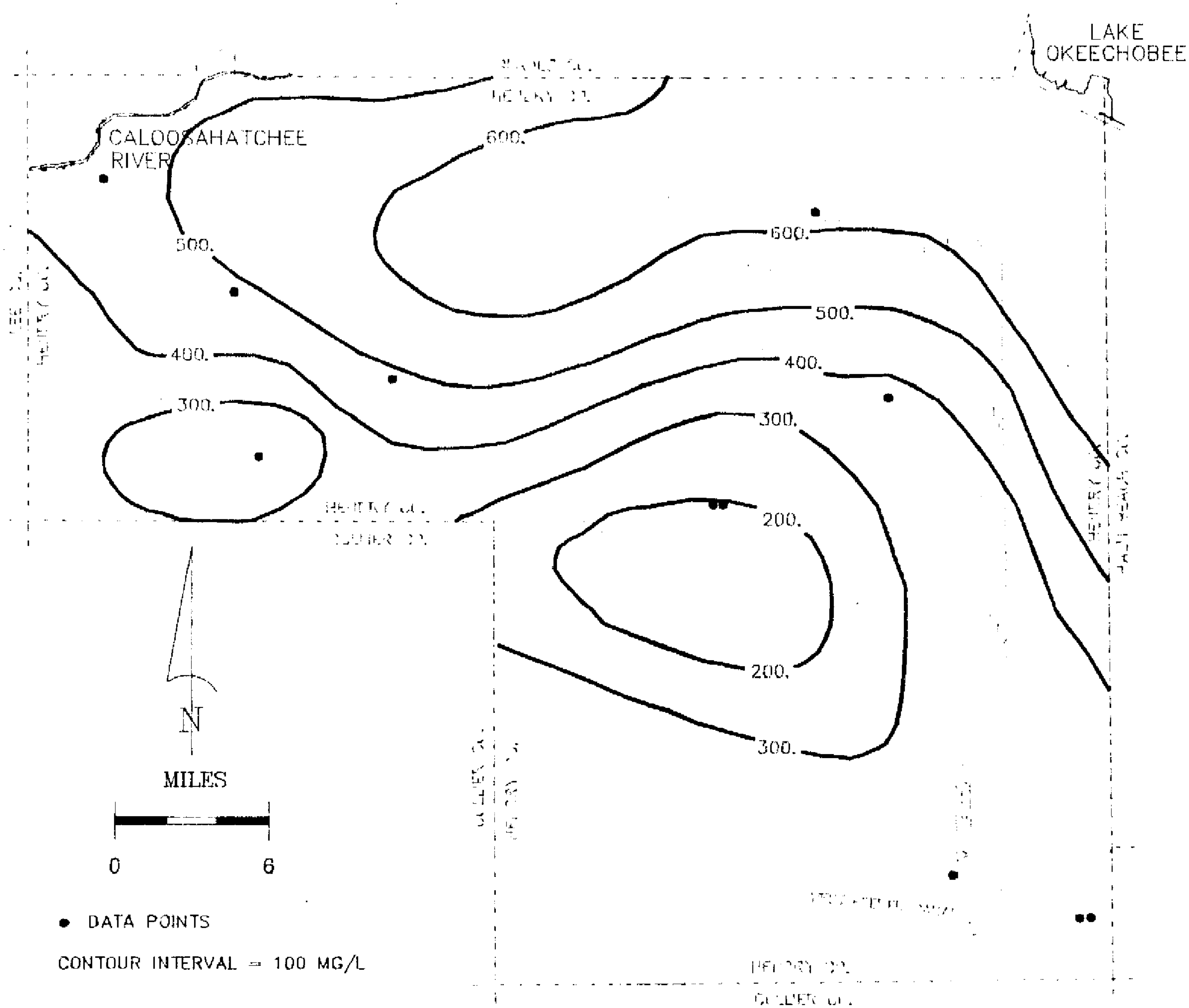

Figure 6-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

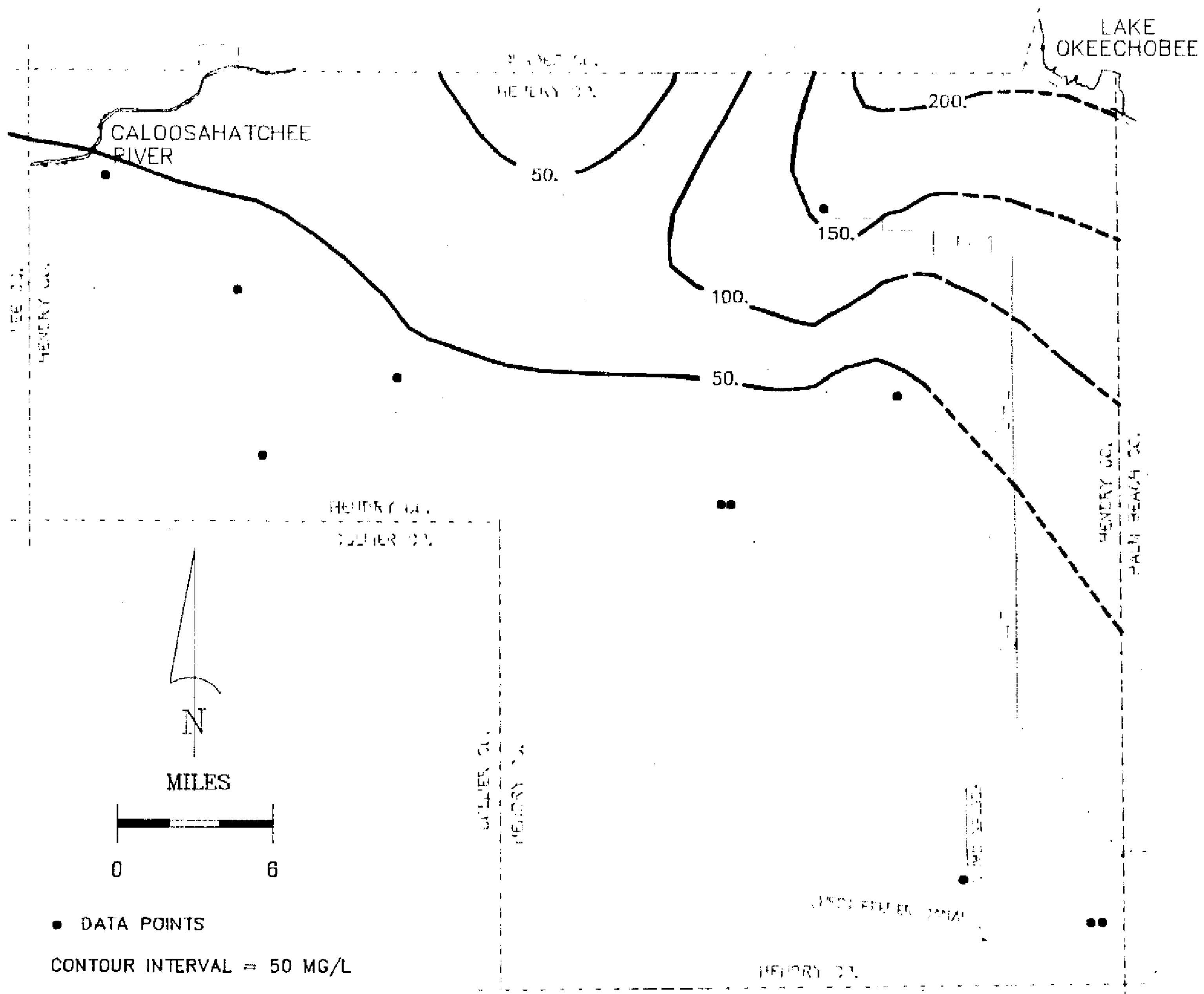

Figure 6-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

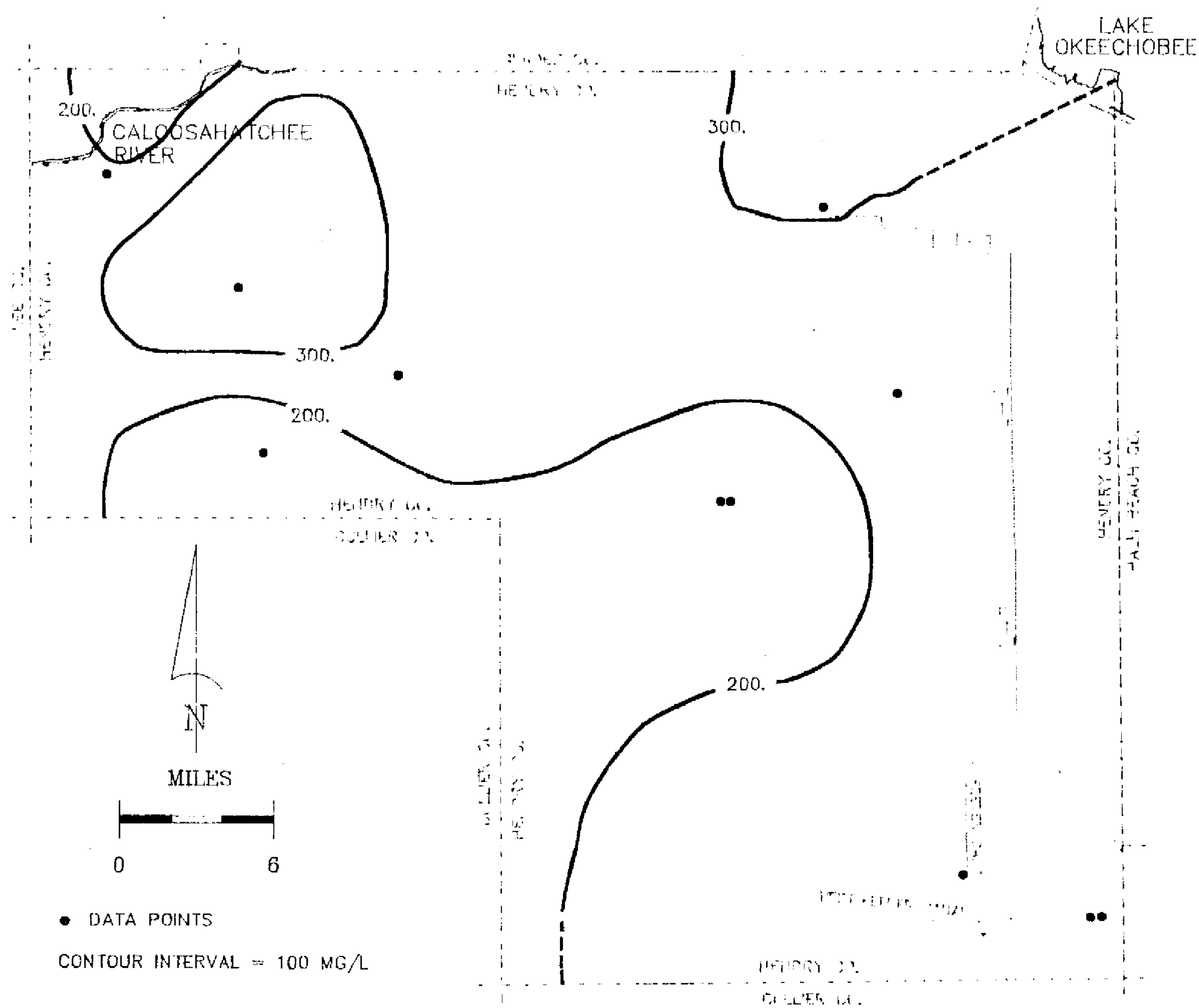

Figure 6-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

Lead was detected in one Surficial Aquifer System AGWQMN well at a concentration that slightly exceeded the primary drinking water standard. However, only one of the two samples from this well exceeded the standard while the other sample was significantly below the standard.

Intermediate Aquifer System

Water quality data for the Intermediate Aquifer System is available for only the western fourth of the county, west of S.R. 29. The Sandstone Aquifer, which is the most productive of the two aquifers in the Intermediate Aquifer Systems, is present in only the western third of the county.

Water quality samples collected from the Intermediate Aquifer System AGWQMN wells in Hendry County exhibit concentrations of total dissolved solids ranging from a low of 390 MG/L to a high of 2,589 MG/L with an average concentration of 1,016 MG/L. The high total dissolved solids concentration is from well HE-0557 near La Belle. This well is located in an area where the Intermediate Aquifer System has been contaminated by water from the Floridan Aquifer System. The drinking water standard for total dissolved solids is 500 MG/L.

Figure 6-6 shows the total dissolved solids concentration of the Intermediate Aquifer System in western Hendry County. Total dissolved solids concentrations are highest in the area of contamination in and around La Belle. Total dissolved solids concentrations decrease to the south and to the east.

Chloride concentrations within the Intermediate Aquifer System AGWQMN wells range from a low of 36 MG/L to a high of 1,225 MG/L with an average concentration of 365 MG/L. Chloride concentrations are highest in the area of contamination in and around La Belle (Figure 6-7).

Hardness concentrations within the Intermediate Aquifer System AGWQMN wells range from a low of 111 MG/L, to a high of 312 MG/L with an average concentration of 235 MG/L. These values are in the hard to very hard range. In the northwestern corner of the county, where the Intermediate Aquifer System has been contaminated, the water has been softened by the increased sodium concentrations present in the water from the Floridan Aquifer System. Hardness concentrations are lowest in this area of contamination near Labelle (Figure 6-8).

The pH of one of the two samples collected from well HE-0556 was slightly below the secondary drinking water standard for pH. All other pH values were above the minimum standard.

Well HE-0557 exceeded the primary drinking water standard for sodium. This well has been contaminated by water from the Floridan Aquifer System. All other Intermediate Aquifer System ambient AGWQMN wells in the county have sodium concentrations that are below the drinking water standard for sodium.

One of the two samples collected from well HE-0529 slightly exceeded the primary drinking water standard for lead. This well is equipped with a water level recorder that uses a lead weight to balance a water level float. This lead weight is the probable source of the lead in the sample.

Well HE-0557 exceeded the secondary drinking water standard for sulfate. Contamination from the Floridan Aquifer System has increased the sulfate concentration within this well. The other Intermediate Aquifer System wells are below the drinking water standard for sulfate.

Purgeable organic compounds were detected in concentrations above detection limits only once in Hendry County. P-Dichlorobenzene was detected at a concentration of 1.1 µG/L in well HE-0557 in June of 1985. No purgeable organic compounds or aromatic hydrocarbons had been detected in previous or subsequent samples collected from the same well. The presence of this compound in the sample at such a low concentration is due to a sample contamination problem and is not thought to be representative of the ground water quality.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of the AGWQMN wells throughout Hendry County are shown in Figures 6-9 and 6-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 6-9 shows Stiff patterns for the Surficial Aquifer System, these Stiff patterns indicate that the water from the Surficial Aquifer System is predominantly a calcium-bicarbonate type. Well HE-0558 that has been contaminated by water from the Floridan Aquifer System shows a sodium chloride dominated Stiff pattern that is common for the Floridan Aquifer System in the area.

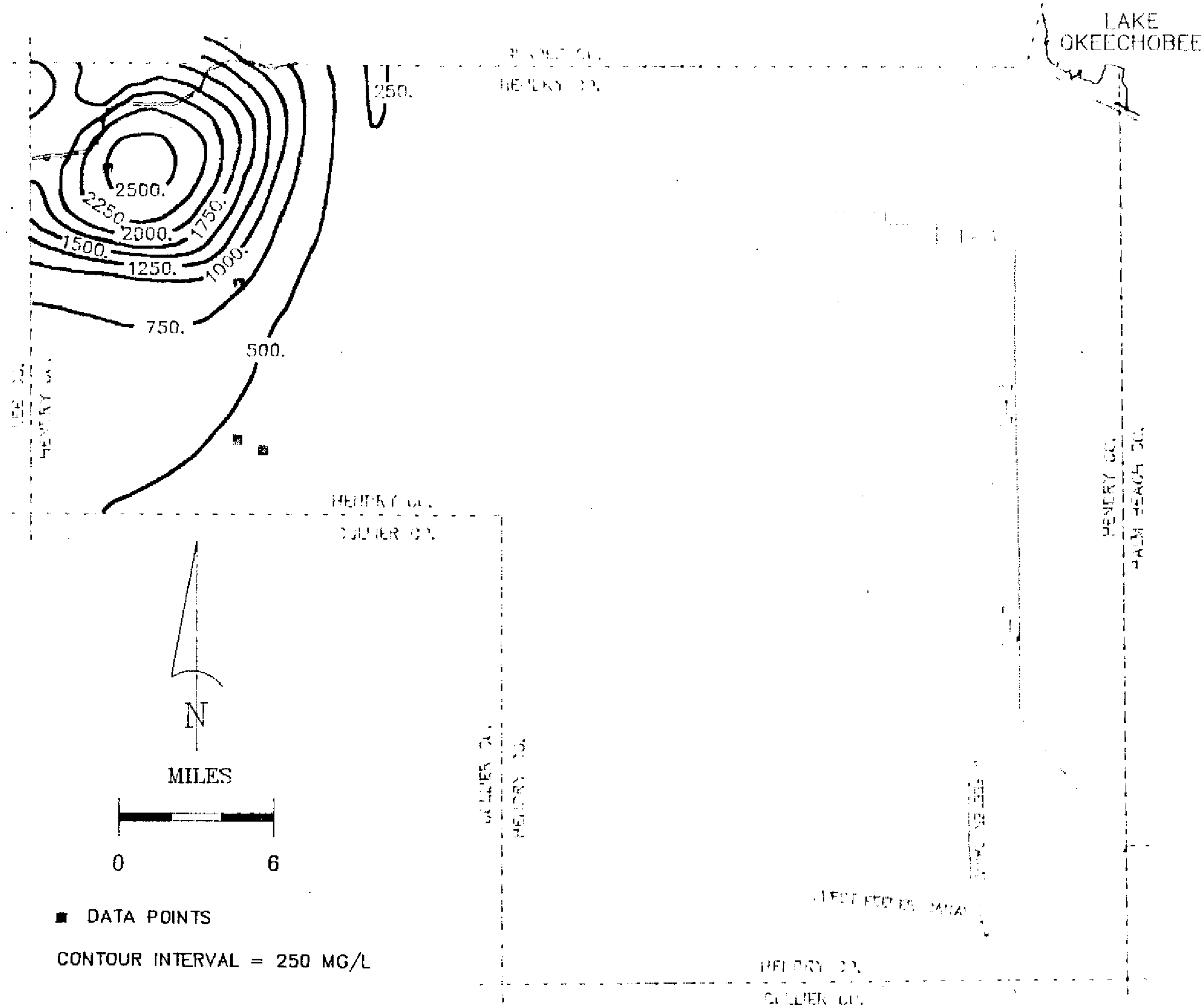

Figure 6-6 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

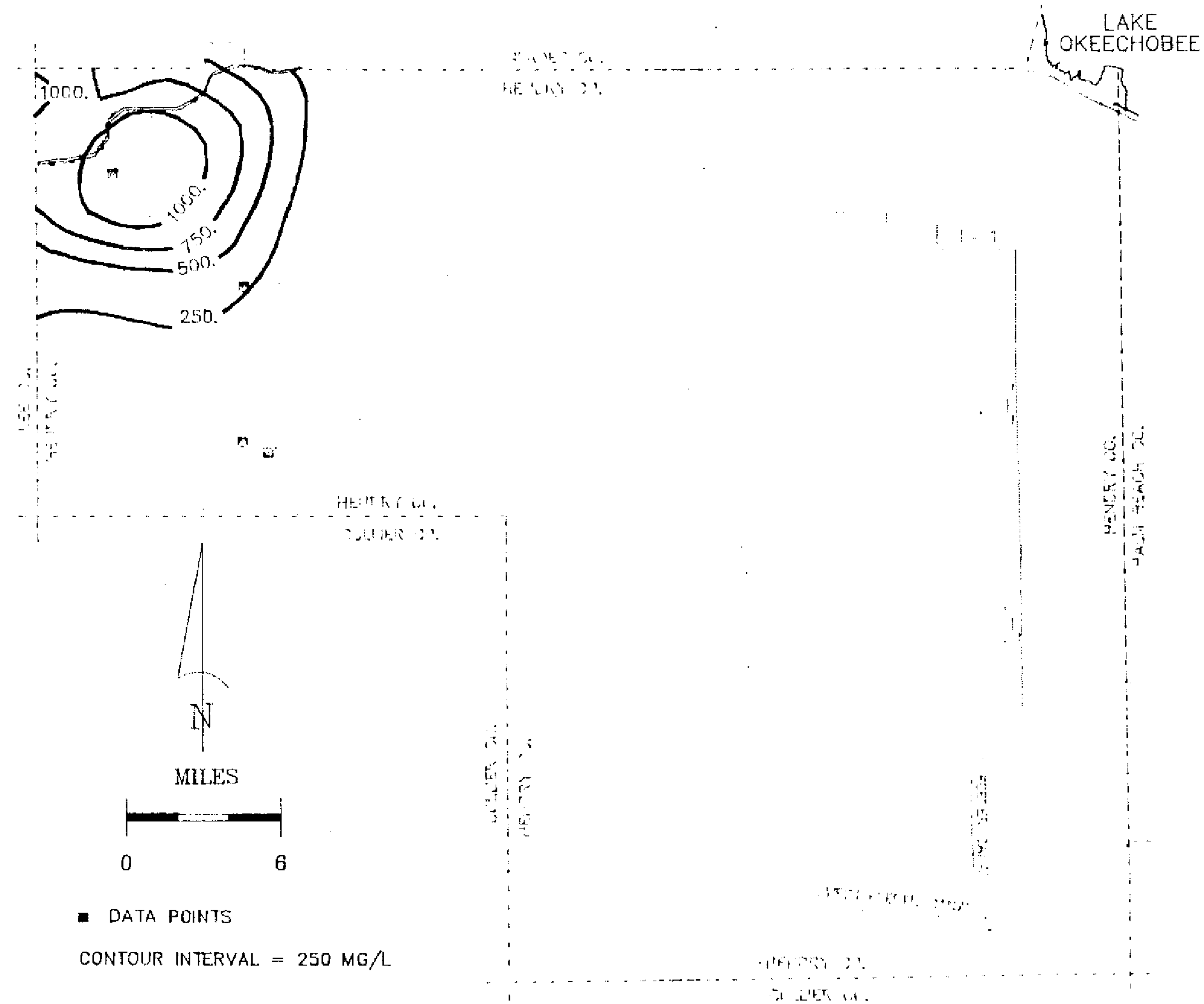

Figure 6-7 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

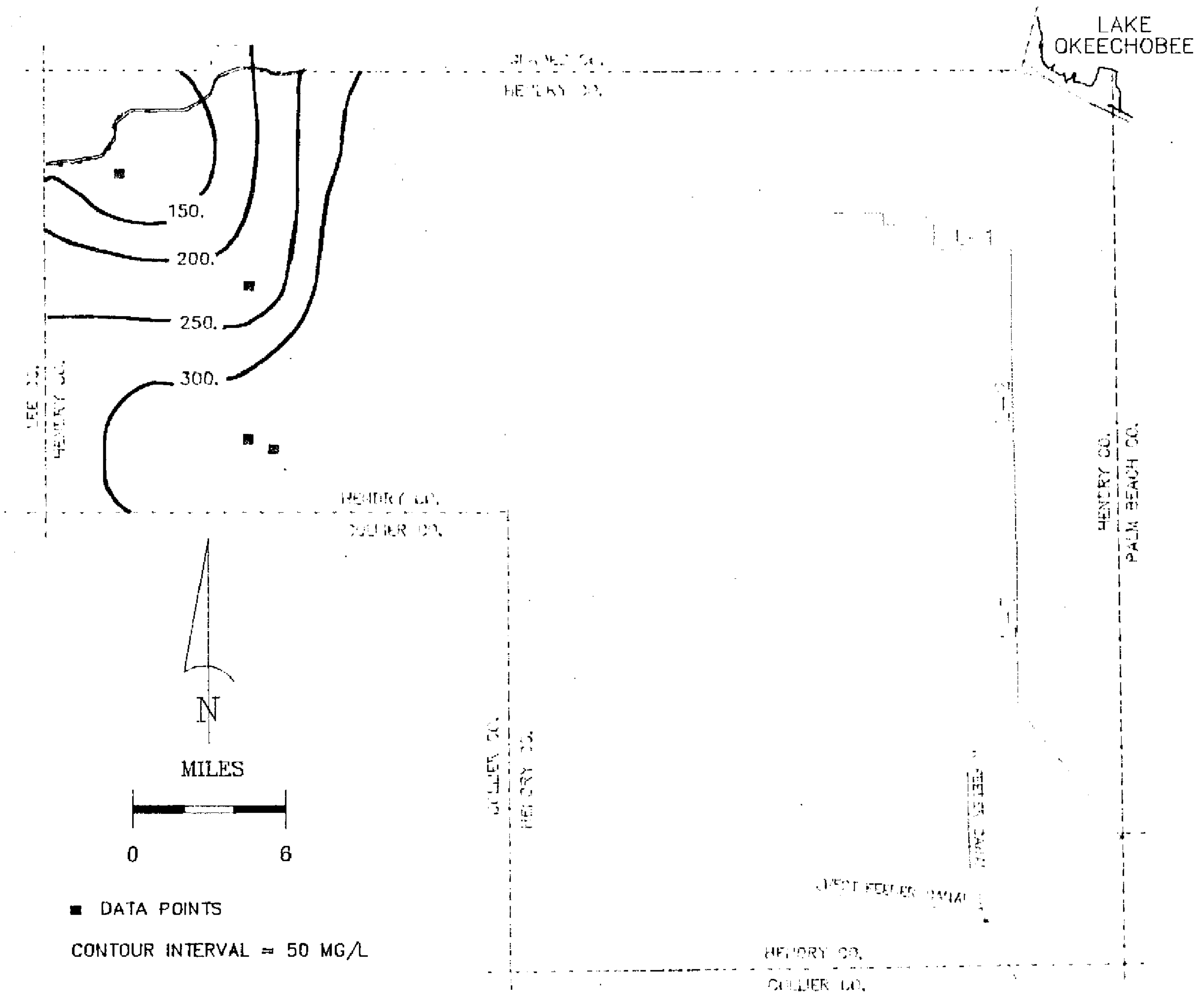

Figure 6-8 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

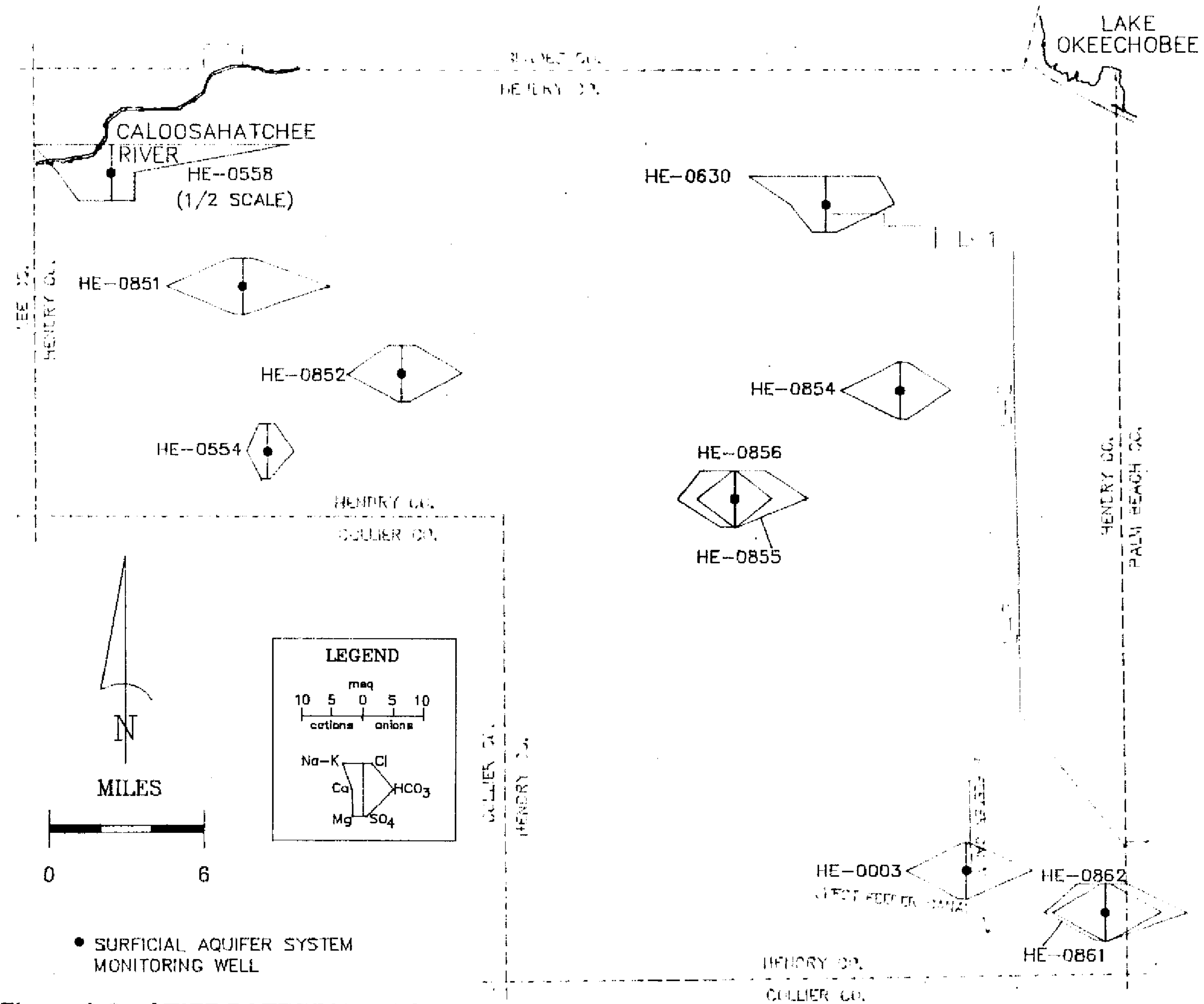

Figure 6-9 **STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM**

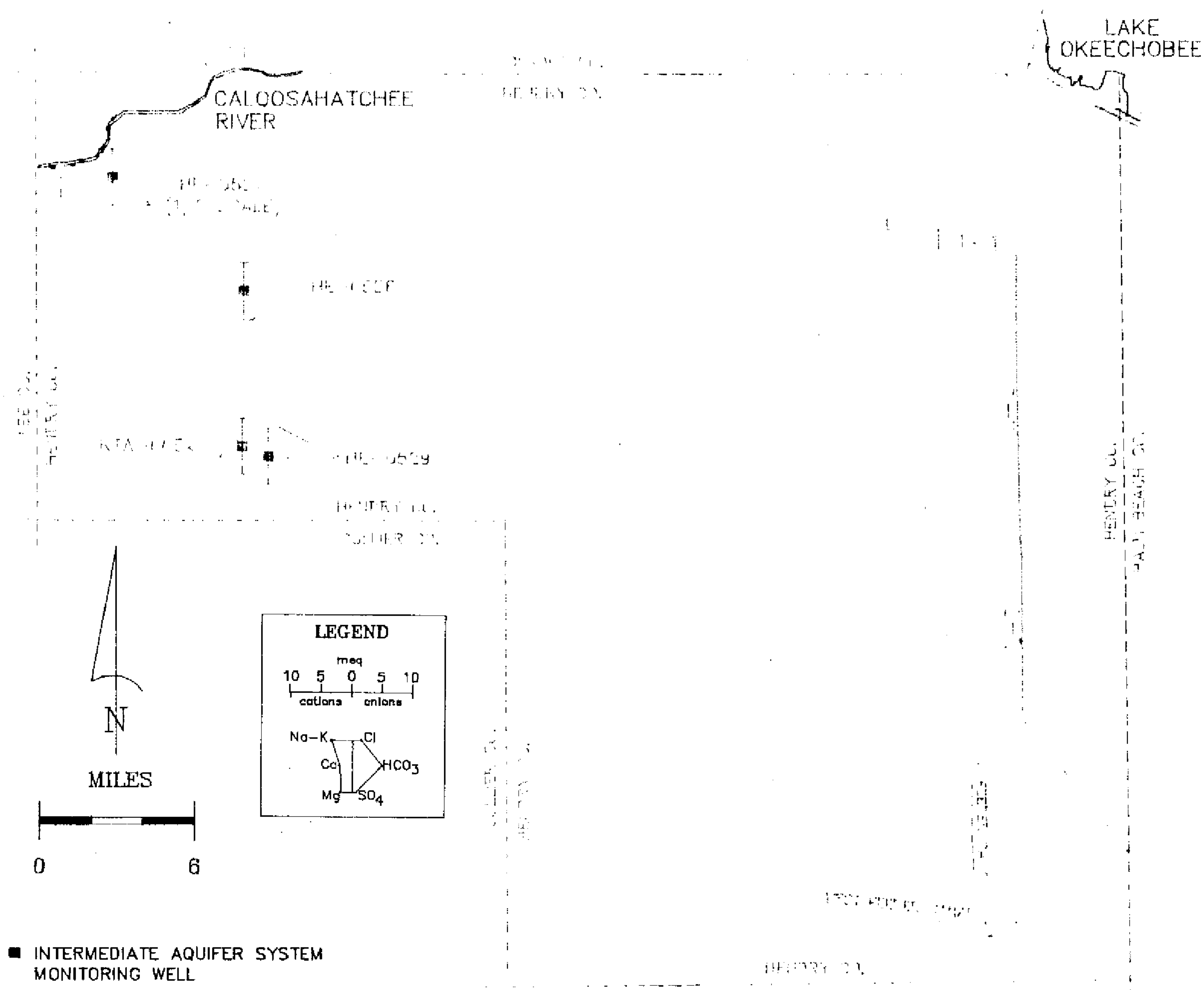

Figure 6-10 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, INTERMEDIATE AQUIFER SYSTEM

Well HE-0630 has a sodium-bicarbonate water, the Surficial Aquifer System in this area of the county has increased sodium and chloride concentrations. These increased concentrations are due to an incomplete flushing of connate seawater or from localized contamination due to flowing artesian wells.

Figure 6-10 shows Stiff patterns for the Intermediate Aquifer System, these Stiff patterns show two distinct Stiff patterns, wells HE-0529 and RTA-005 have calcium-bicarbonate waters, while well HE-0557 shows a sodium-chloride water type. Well HE-0557 has been contaminated by water from the Floridan Aquifer System and shows a Stiff pattern shape that is common for the Floridan Aquifer System in the area. Well HE-0556 has a calcium-sodium-magnesium-bicarbonate-chloride water type that is intermediate between Surficial Aquifer System Water and Floridan Aquifer System water and is indicative of a mixing of the two water types.

The area of contamination around LaBelle can be traced to Floridan Aquifer System wells that were drilled near LaBelle before the 1930's. According to Klein, Schroeder, and Lichtler (1964), seven deep artesian wells were drilled in the populated area south of the Caloosahatchee before 1930. It was reported that the casings for these wells were seated in a limestone layer at a depth of 80 feet and an open bore was drilled to a depth of 600-800 feet. Therefore, a direct connection exists between the open bore of these wells and the Surficial Aquifer System below a depth of 80 feet.

The potentiometric surface of these deep wells was 25 feet above land surface, while the water table of the shallow aquifers was below land surface. Most of the deep wells were not in use, or used sparingly, so that the discharge valves were closed for long periods. As a result of the closed valves, the pressure within the well bore was consistently higher than the pressure in the shallower aquifers, and upward discharge occurred. This upward discharge contaminated the shallower aquifers.

Klein, Schroeder, and Lichtler (1961) state that the pattern of the distribution of the chloride contents and isochlor contours negates the possibility that the Caloosahatchee River is the source of contamination. This assumption is supported by the fact that chloride concentration data for the Caloosahatchee River near LaBelle (Boggess, 1969) shows that chloride concentrations within the river are lower than the concentrations in the Surficial and Intermediate Aquifer Systems. Thus the river could not have been the source of the increased chloride concentrations.

SUMMARY AND CONCLUSIONS

Water from the Surficial Aquifer System is potable in most areas of Hendry County, except for an area of contamination by water from the Floridan Aquifer System in and southwest of La Belle. Water quality within the Surficial Aquifer System is also poor in the Everglades area in the northeastern corner of the county where incomplete flushing of connate seawater, or Floridan Aquifer System irrigation water, has left high chloride and total dissolved solids concentrations.

Water quality data for the Intermediate Aquifer System is available for only the western fourth of the county. In this area the water quality in the Intermediate Aquifer System is good except for the area of contamination in and southwest of La Belle.

Water from the Floridan Aquifer System is highly mineralized in Hendry County and is not suitable for most uses. Assuming present technological standards, water from the Floridan Aquifer System is not considered an economically viable alternative source in order to augment water supply. High levels of sodium, chloride, and total dissolved solids within the Floridan Aquifer System would require expensive treatment methods in order to attain potable water standards.

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SECTION 7

HIGHLANDS COUNTY

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LOCATION AND EXTENT OF AREA

Highlands County is located in the south central portion of the Florida peninsula and comprises an area of approximately 1,041 square miles, measuring 38 miles from east to west and 43 miles from north to south. The county is located between 27° 02' 00" and 27° 38' 52" north latitude and 80° 56' 26" and 81° 33' 48" west longitude. It is bounded on the north by Polk County, to the south by Glades County, to the east by Okeechobee County, and to the west by Hardee and Desoto Counties (Figure 7-1).

Hydrogeology

Two aquifer systems are present within Highlands County that supply drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the Hawthorn formation throughout most of the county. Table 7-1 shows a schematic representation of the generalized hydrogeology of Highlands County.

Both the Surficial Aquifer System and the Floridan Aquifer System yield potable water throughout Highlands County. Floridan Aquifer System wells yield greater quantities of water and provide a more reliable source of water during periods of drought than Surficial Aquifer System wells.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and a high water table in most areas all increase the susceptibility of this aquifer system to contamination.

The Floridan Aquifer System is susceptible to contamination by anthropogenic compounds primarily in areas of high recharge. These areas are susceptible because the confining layers are thin or absent and there is a downward hydraulic gradient. Most of the recharge to the Floridan Aquifer System in Highlands County occurs in Polk County and moves southward within the aquifer into Highlands County. Some recharge to the Floridan Aquifer System occurs in Highlands County along the Lake Wales Ridge (Figure 7-2) where the confining beds above the Floridan Aquifer System are absent or are sufficiently permeable to transmit water downward.

Recharge also takes place in areas where the Hawthorn formation is penetrated by openings such as sinkholes. Sinkholes often bridge the Hawthorn formation, and may offer direct connections between the Floridan Aquifer System and bodies of surface water. These connections can allow contaminants present at land surface to infiltrate the Floridan Aquifer System without being subjected to the attenuation processes that normally occur within the soil and unsaturated zones.

In areas where the Hawthorn formation is thick, impermeable, and unbreached, the Floridan Aquifer System is protected against contamination from anthropogenic compounds; however, excessive pumping can cause upconing of poorer quality water from the deeper producing zones of the Floridan Aquifer System.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Highlands County consists of six Surficial Aquifer System and five Floridan Aquifer System monitor wells. Figure 7-3 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 7-1. The results of the inorganic laboratory analysis for the first four years of sampling (1984-1987) are shown in Appendix 7-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 42 MG/L to a high of 142 MG/L, with an average concentration of 80 MG/L. None of the AGWQMN wells exceeded the secondary drinking water standard for total dissolved solids of 500 MG/L. Figure 7-4 shows the total dissolved solids concentrations within Highlands County. These concentrations appear to be lowest in south central Highlands County and increase to the northwest and to the east. However, the concentrations are well below drinking water standards throughout the county.

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 3 MG/L to a high of 20 MG/L, with an average concentration of 8 MG/L. These concentrations are well below the secondary drinking water standard for chloride of 250 MG/L. The limited variation and low

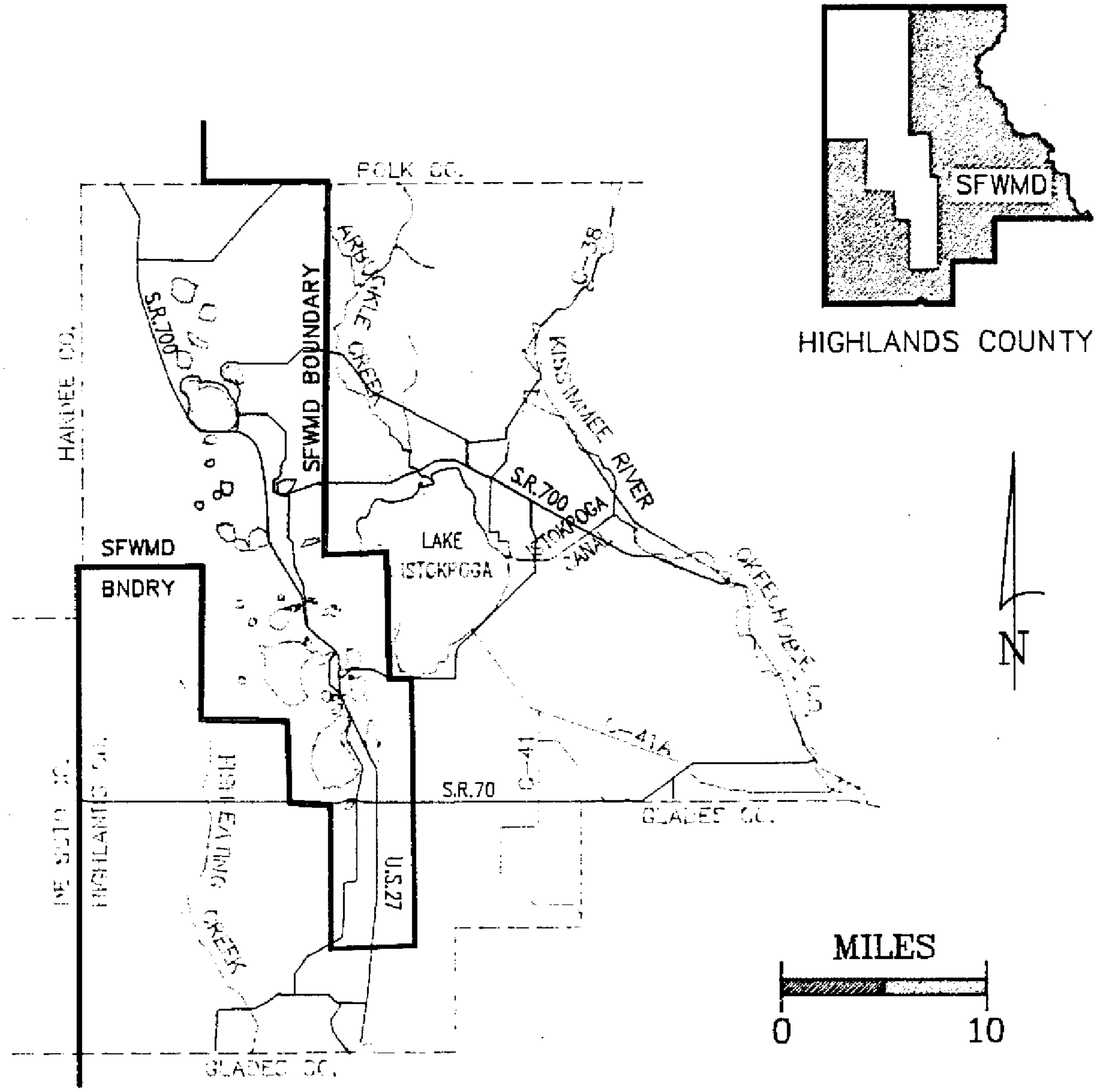


Figure 7-1 MAP OF HIGHLANDS COUNTY

TABLE 7-1. GENERALIZED HYDROGEOLOGY OF HIGHLANDS COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	0-120	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	QUARTZ SAND TO CLAYEY CALCAREOUS QUARTZ SAND
	TAMIAMI FORMATION	0-100	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: MODERATE TO GOOD	CLAYEY SANDY SHELL MARL, SILTY AND SHELLY QUARTZ SAND
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	300-600	LOW TO MODERATE TRANSMISSIVITY	GRAYISH GREEN SANDY CLAY, WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2800-3400	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

concentrations of chloride in the samples prevented the generation of a chloride concentration map for Highlands County.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 5.8 MG/L to a high of 43 MG/L, with an average concentration of 14 MG/L. Figure 7-5 shows the hardness concentrations throughout Highlands County. Data from Bishop (1956) supplemented the AGWQMN data used to construct Figure 7-5. Hardness concentrations are low throughout the county but increase slightly to the east near the Kissimmee River. The concentrations in the sampled wells are all in the soft range.

All of the Surficial Aquifer System wells had pH concentrations below the minimum secondary drinking water standard of 6.5. The pH values in the range encountered in the Surficial Aquifer System AGWQMN wells in Highlands County are not a health threat but may accelerate the corrosion of pipes and plumbing fixtures.

Iron concentrations within four of the five Surficial Aquifer System AGWQMN wells in Highlands County exceed the secondary drinking water standard for iron of 0.3 MG/L. The four wells that exceed the standard all have metal casings that may have contributed to the iron concentrations within the samples. Iron concentrations in the non-metal cased well were below the secondary drinking water standard.

High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Manganese concentrations in four of the Surficial Aquifer System AGWQMN wells exceeded the secondary drinking water standard of 50 µG/L. Three of these wells had metal casings and high iron concentrations. The high manganese present in these wells may have leached from the casings. The fourth well with high manganese concentrations has a PVC casing which would not have contributed to the manganese level. High manganese concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and can impart objectionable tastes to beverages.

Lead was detected in three Surficial Aquifer System AGWQMN wells at concentrations exceeding the primary drinking water standard of 50 µG/L. All of these wells have water level recorders on them. These recorders use lead weights that often come in contact with the water within the wells. These lead weights are believed to be the source of the increased lead concentrations in the wells. These lead samples are not representative of natural conditions within the aquifer.

P-dichlorobenzene was detected in well MR-0158 at a concentration of 1.9 µG/L, and Bromoform was detected in well HI-0014A at a concentration of 1 µG/L. Both of these wells have water level recorders

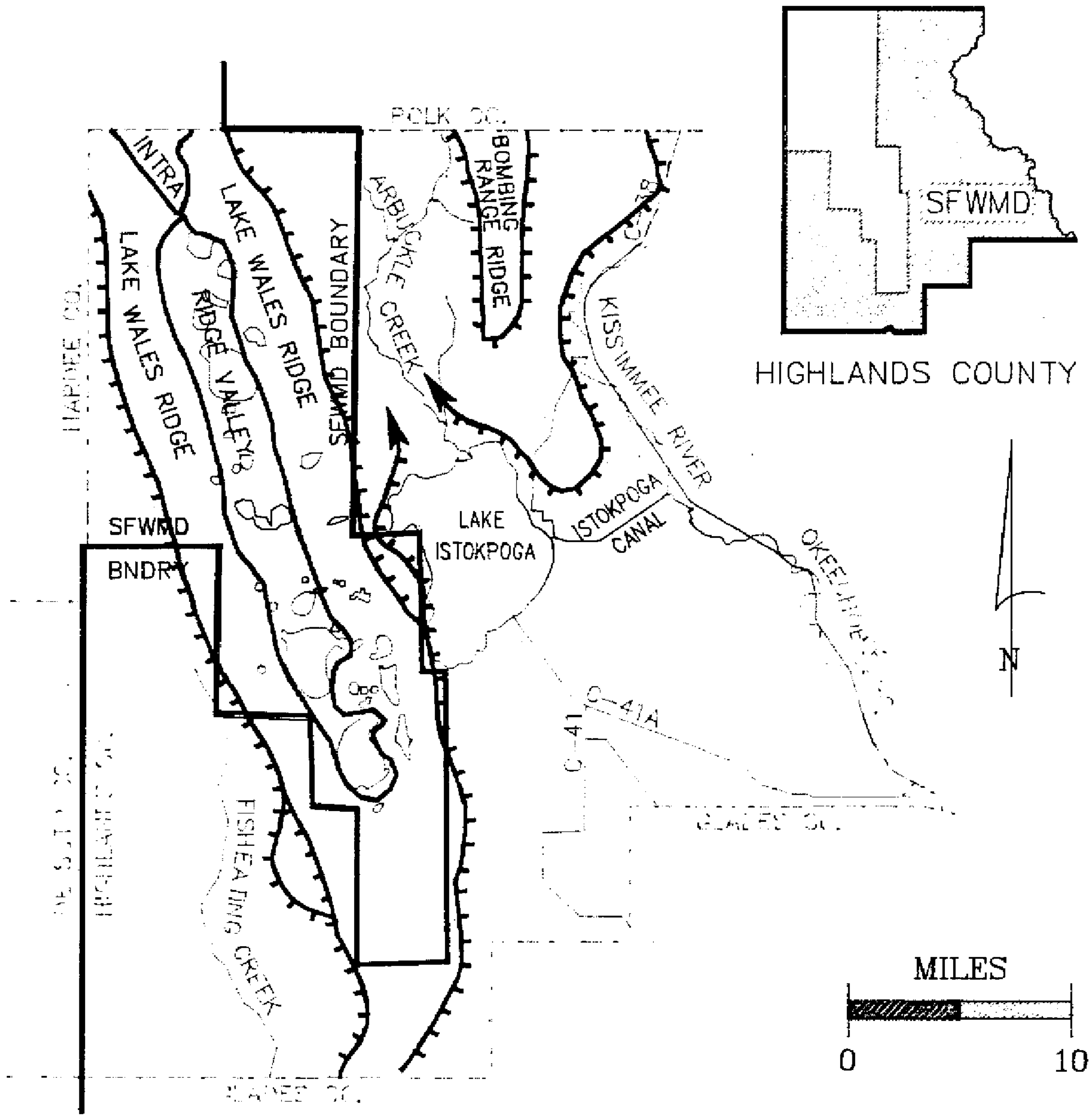
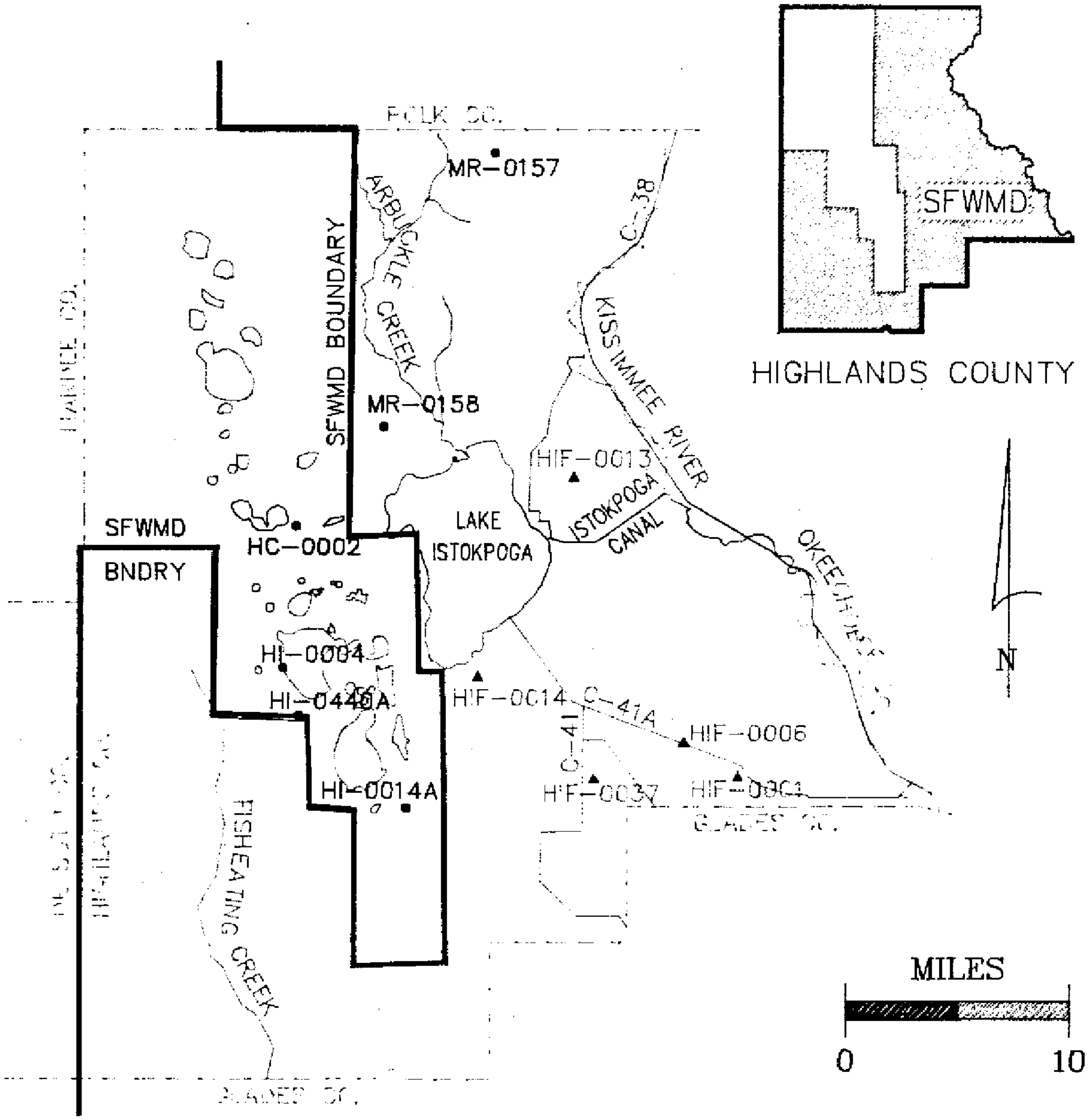


Figure 7-2 MAJOR GEOMORPHIC FEATURES OF HIGHLANDS COUNTY (FROM WHITE, 1970)



▲ FLORIDAN AQUIFER SYSTEM MONITORING WELL

● SURFICIAL AQUIFER SYSTEM MONITORING WELL

Figure 7-3 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

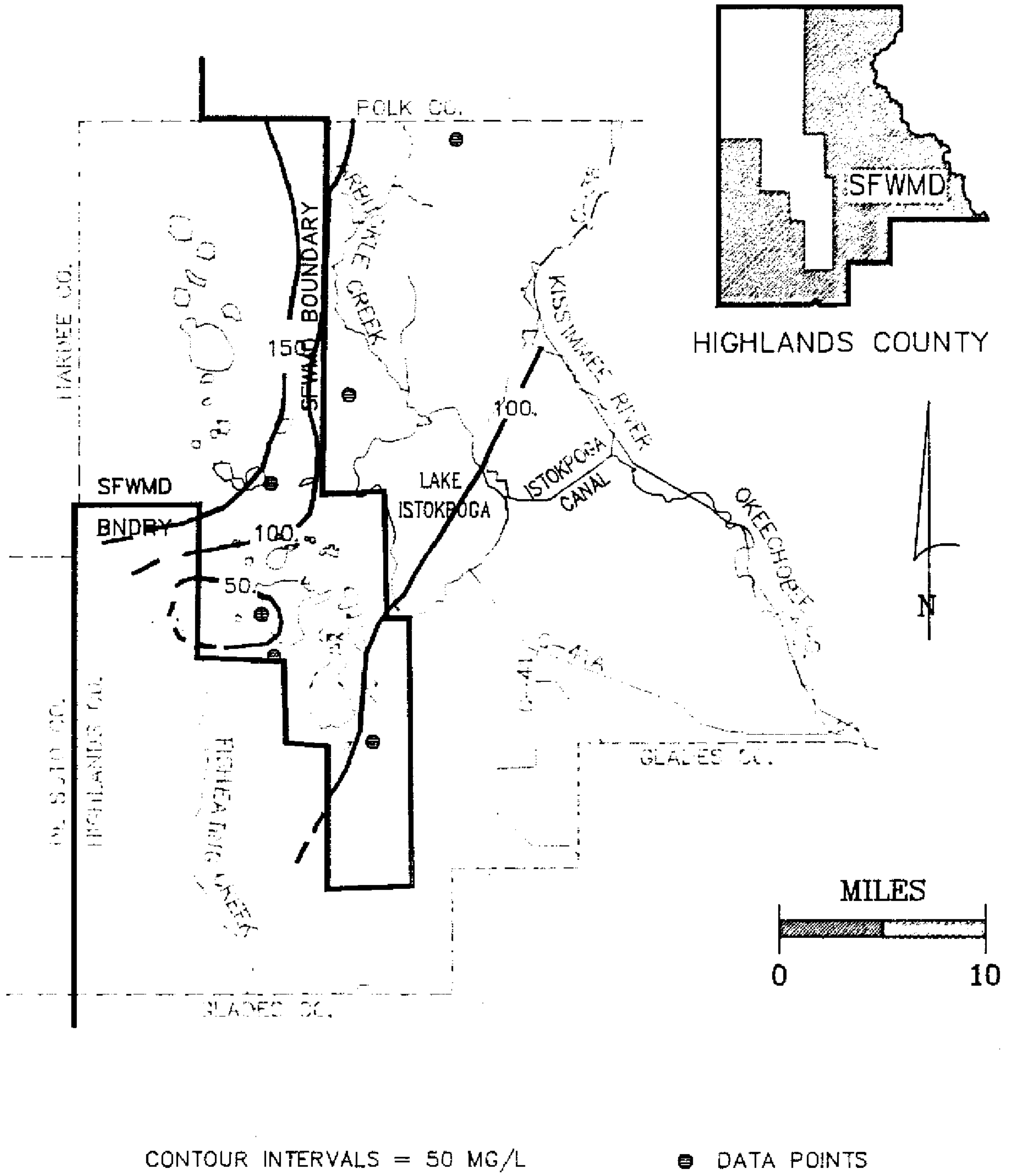


Figure 7-4 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

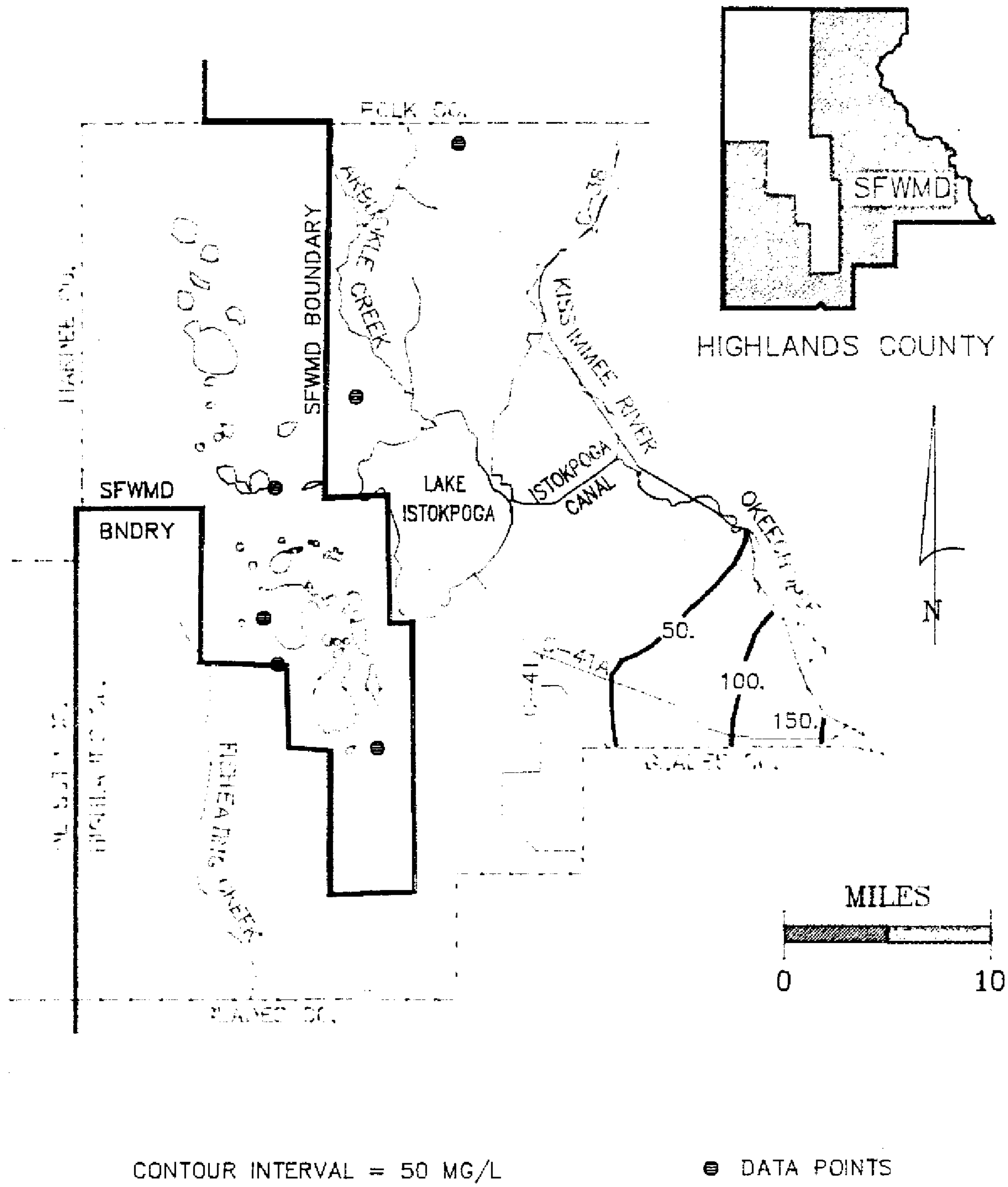


Figure 7-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

mounted at the wellheads. During routine maintenance these recorders are lubricated with a spray. This spray is the probable source of the P-dichlorobenzene and benzene in the wells. These compounds were detected once at each site during the three sampling events.

Floridan Aquifer System

The water quality of the Floridan Aquifer System in Highlands County is variable with the best water quality located in the northwestern area of the county. The water quality decreases to the southeast due to increasing concentrations of hardness, total dissolved solids, and chlorides. The primary recharge areas to the Floridan Aquifer System in Highlands County are located in northwestern Highlands County and to the north in Polk County. The water in the Floridan Aquifer System becomes more mineralized with increased distance from these recharge areas. In order to more accurately estimate the ground water quality of the Floridan Aquifer System within Highlands County, water quality data and figures from Shaw and Trost, 1984 were used to supplement the AGWQMN Floridan Aquifer System data.

Water quality samples collected from the Floridan Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 178 MG/L to a high of 598 MG/L, with an average concentration of 408 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; however it may be greater if no other standards are exceeded.

Figure 7-6 (from Shaw and Trost, 1984) shows the average wellhead total dissolved solids concentration within the Floridan Aquifer System in Highlands County. Total dissolved solids concentrations in this figure range from a low of less than 250 MG/L in the northwestern portion of the county to highs of approximately 1,000 MG/L in the southeastern corner, and 2,000 MG/L in the extreme southern portion of the county. These results agree with the results obtained from the AGWQMN sampling results listed in Appendix 7-2, however, no AGWQMN wells were located in the areas indicated as having total dissolved solids concentrations above 1,000 MG/L.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 28 MG/L to a high of 126 MG/L, with an average concentration of 73 MG/L. These concentrations are well below the secondary drinking water standard for chloride of 250 MG/L.

Figure 7-7 (from Shaw and Trost, 1984) shows the average wellhead chloride concentration within the Floridan Aquifer System in Highlands County. Chloride concentrations in this figure range from a low of less than 100 MG/L in the northwestern half of the county to a high of approximately 1,000 MG/L in the extreme southern portion of the county. These results agree with the results obtained from the AGWQMN sampling results listed in Appendix 7-2. However, no AGWQMN wells were located in the area indicated as having chloride concentrations above 250 MG/L.

Hardness concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 55 MG/L to a high of 140 MG/L, with an average concentration of 94 MG/L. These values vary from soft to hard.

Figure 7-8 (from Shaw and Trost, 1984) shows the hardness concentrations in Highlands County to range from less than 120 MG/L in the northwestern half of the county to more than 180 MG/L in the eastern and southwestern areas of the county. These concentrations agree with the results obtained from the AGWQMN wells listed in Appendix 7-2.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Floridan Aquifer System AGWQMN wells in Highlands County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells within Highlands County are shown in Figures 7-9 and 7-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated AGWQMN well. The shape of the pattern indicates the type of water present.

The narrow Stiff patterns seen in Figure 7-9 indicate that the Surficial Aquifer System has a low ionic strength water. The increased ionic strength of water from the Floridan Aquifer System is represented by the increased width of the Stiff patterns from this aquifer system. The relative equal width of the Floridan Aquifer System Stiff patterns in Figure 7-10 indicates that the ionic strength of the major ions is roughly equivalent and not dominated by any particular anions or cations. Figure 7-10 also shows the increasing ionic concentrations as you move away from the recharge areas, wells (HIF-0014, HIF-0037, HIF-0006, and HIF-0001, respectively).

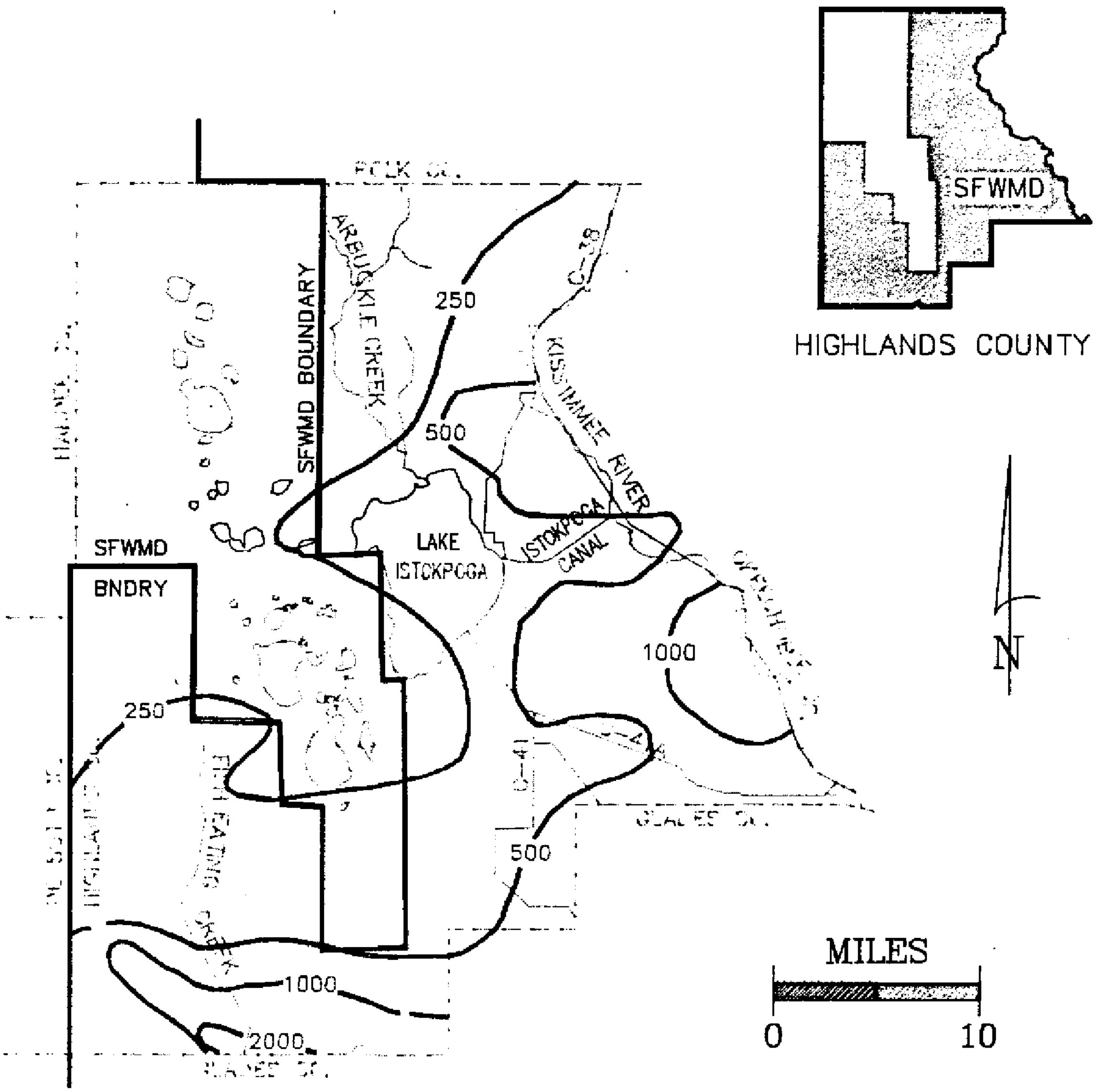


Figure 7-6 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

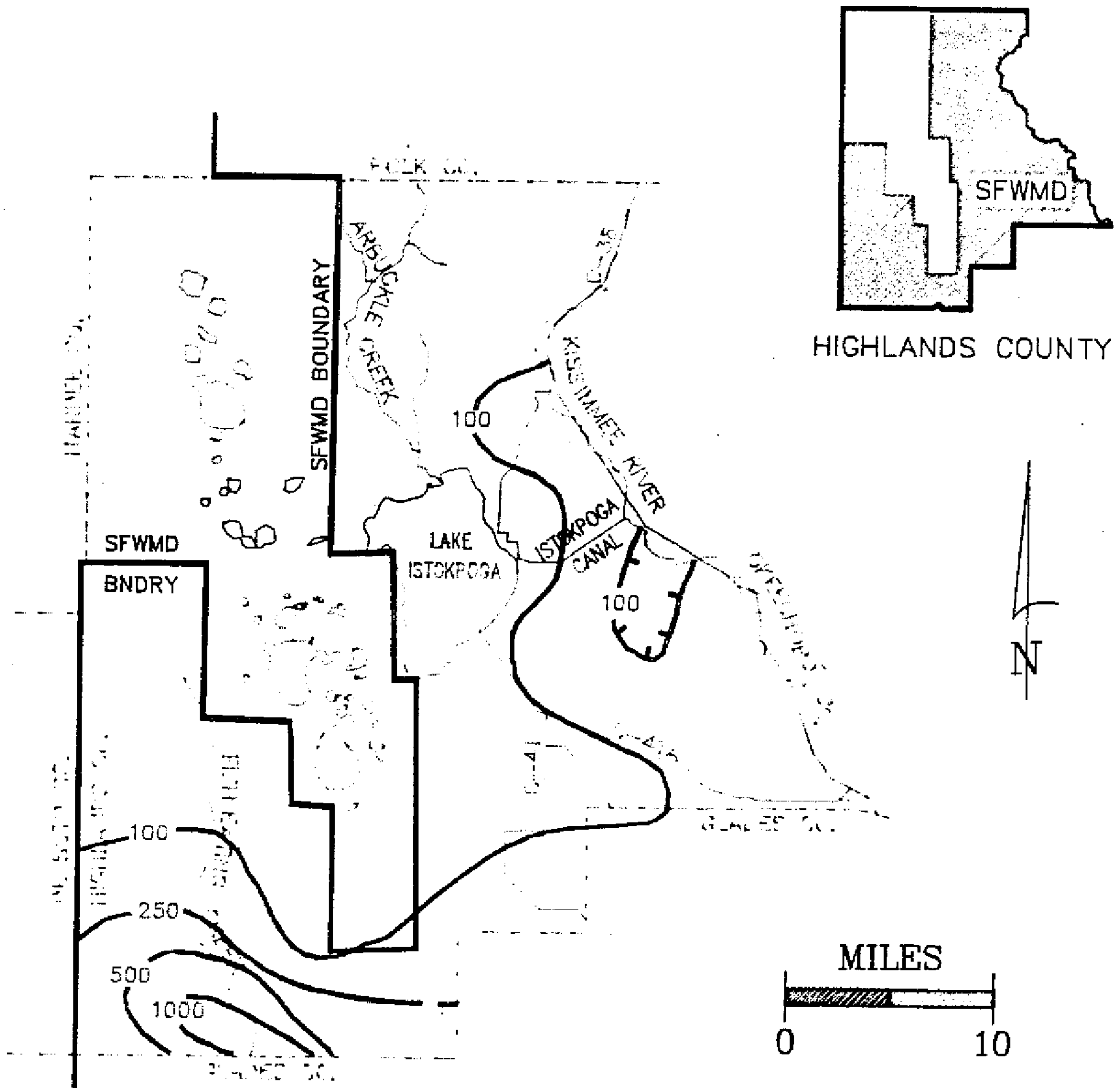


Figure 7-7 **CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)**

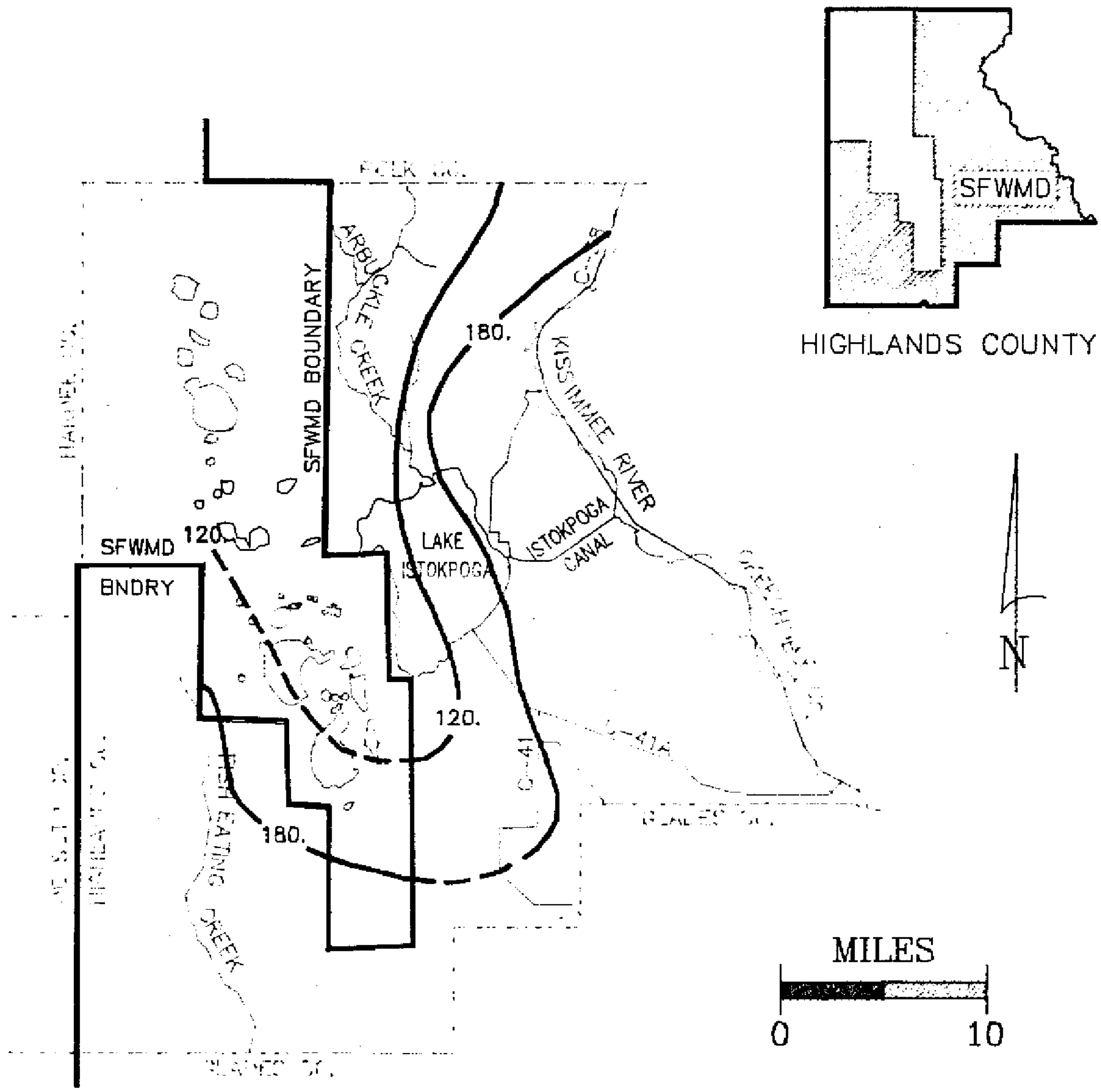


Figure 7-8 HARDNESS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

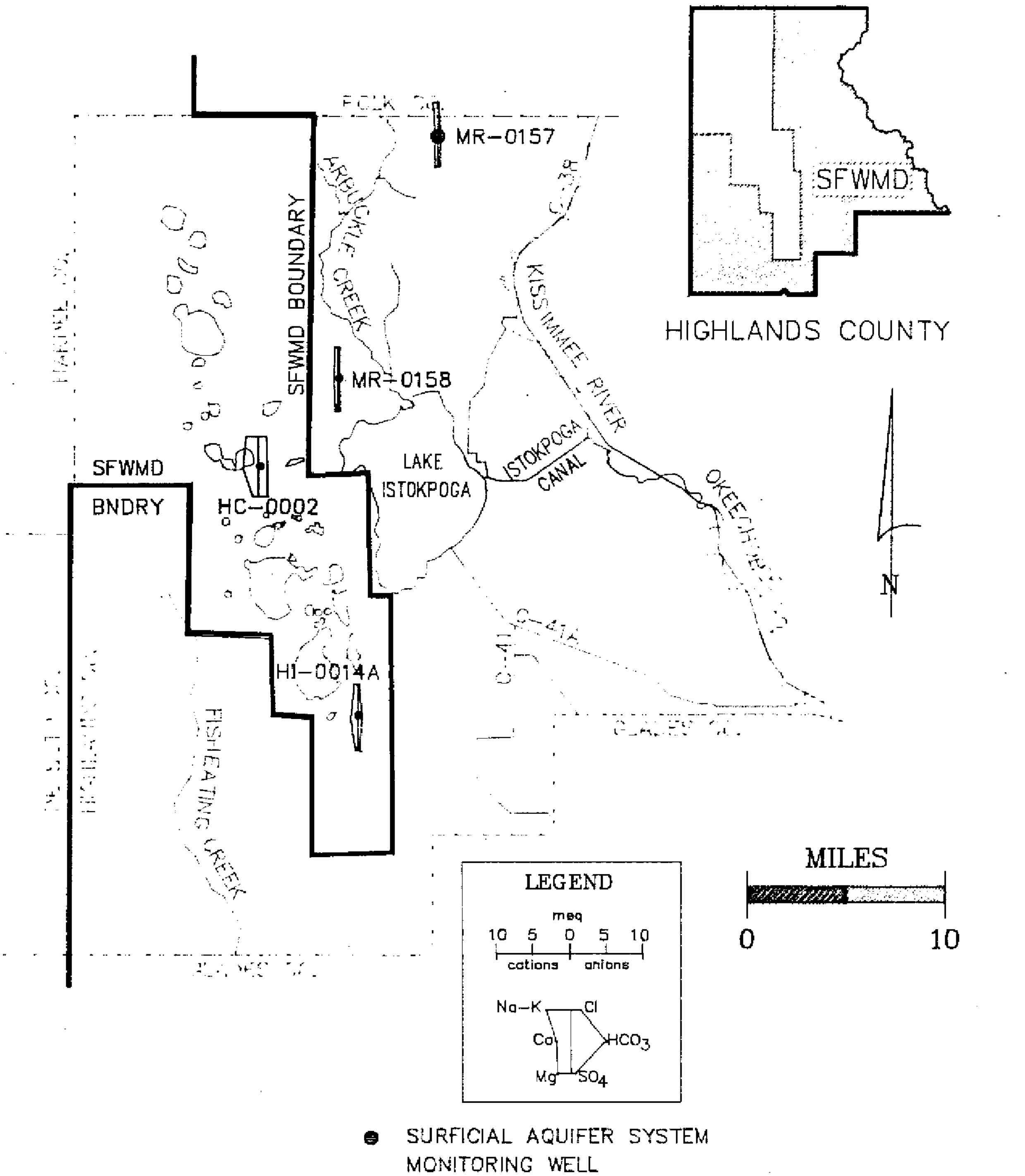


Figure 7-9 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

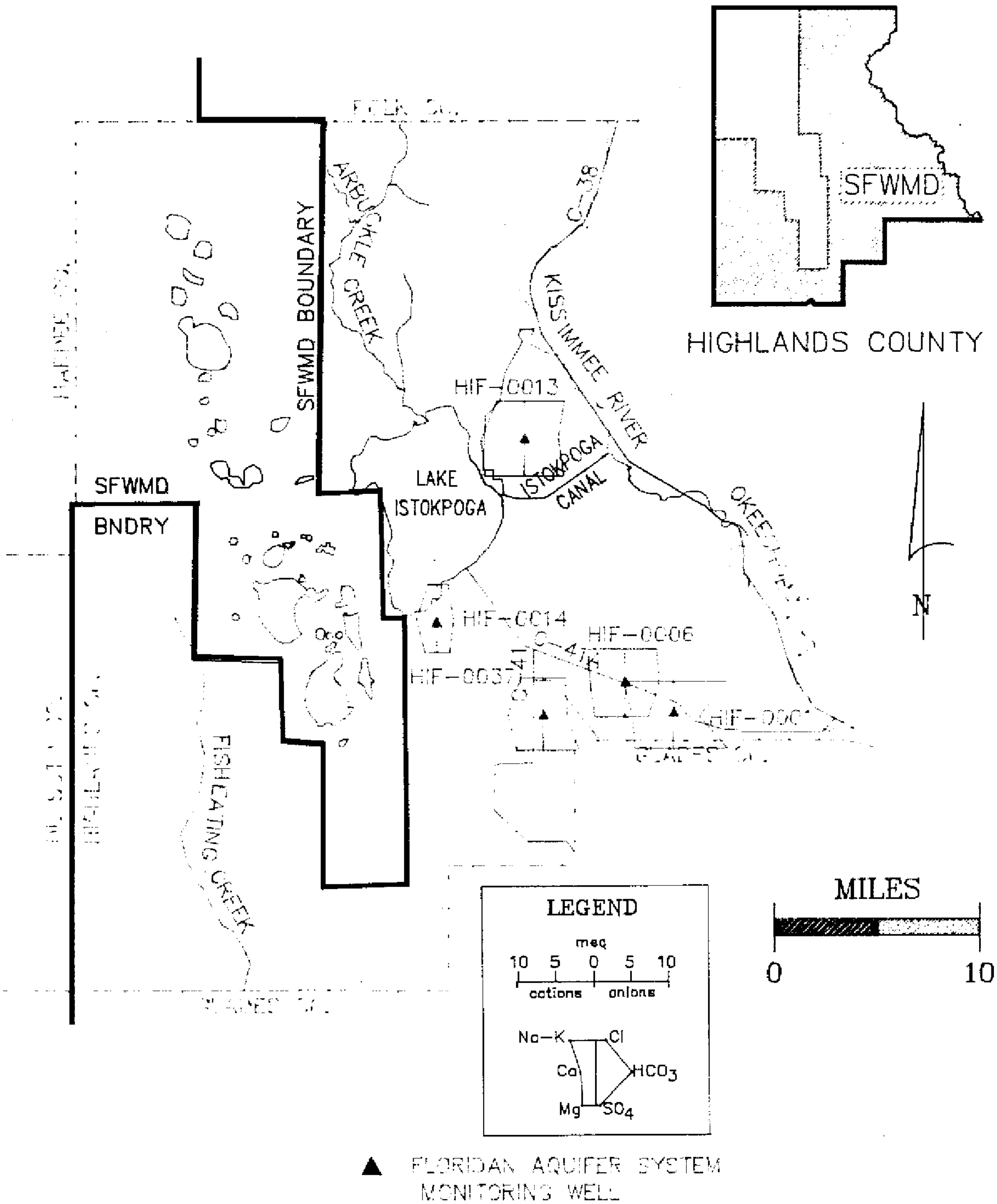


Figure 7-10 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

SUMMARY AND CONCLUSIONS

Two aquifer systems are present within Highlands County that supply drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System.

The South Florida Water Management District collects water quality samples annually from six Surficial Aquifer System and five Floridan Aquifer System, AGWQMN wells.

Data from these AGWQMN wells indicates that the water quality of the Surficial Aquifer System meets or exceeds the State of Florida Primary and Secondary Drinking Water Standards throughout Highlands County. The Floridan Aquifer System meets these standards throughout most of the county but may exceed the drinking water standards for total dissolved solids in the southeastern and southern portions of the county. Chloride concentrations in the Floridan Aquifer System may exceed standards in the extreme southern portion of the County.

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SECTION 8

LEE COUNTY

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LOCATION AND EXTENT OF AREA

Lee County is located on the southwest coast of Florida and comprises an area of approximately 786 square miles measuring 44 miles from east to west and 28 miles from north to south. The county lies between 26° 47' 24" and 26° 19' 00" north latitude and 81° 33' 58" and 82° 16' 22" west longitude. It is bounded on the north by Charlotte County, to the south by Collier County, to the east by Hendry County, and to the west by the Gulf of Mexico (Figure 8-1).

HYDROGEOLOGY

Three aquifer systems are present within Lee County that supply drinking and irrigation water. These are the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. The Surficial Aquifer System is the primary source of drinking water and is composed of two aquifers, the Water Table aquifer and the Lower Tamiami aquifer. The Intermediate Aquifer System is composed of the Sandstone aquifer and the mid-Hawthorn aquifer. The Floridan Aquifer System is composed of the lower-Hawthorn/Tampa Producing Zone and the Suwannee aquifer. Table 8-1 shows a schematic representation of the generalized hydrogeology present within Lee County.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitoring Network (AGWQMN) in Lee County is composed of eleven Surficial Aquifer System, ten Intermediate Aquifer System, and ten Floridan Aquifer System monitor wells. Figure 8-2 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials and other pertinent information is summarized and presented in Appendix 8-1. The results of the inorganic laboratory analysis for the first four years of sampling (1984-1987) are shown in Appendix 8-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells within Lee County exhibit concentrations of total dissolved solids ranging from a low of 301 MG/L to a high of 1,781 MG/L, with an average concentration of 534 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L. However, it may be greater if no other standards are exceeded.

High total dissolved solids values, in excess of 500 MG/L, occur in western Lee County and in the northeastern corner of the county. Figure 8-3 (from Wedderburn et al., 1982) shows the total dissolved solids concentrations within the Surficial Aquifer System in Lee County.

Chloride concentrations within the Surficial Aquifer System AGWQMN wells in Lee County range from a low of 6 MG/L to a high of 765 MG/L, with an average concentration of 125 MG/L. The secondary drinking water standard for chloride is 250 MG/L. Chloride concentrations within the Surficial Aquifer System in Lee County are shown in Figure 8-4 (from Wedderburn et al., 1982). Chloride concentrations are highest in western Lee County near the coast and in the northeastern corner of the county.

High chloride concentrations along the coast are due to salt water intrusion. Salt water intrusion is delineated by measuring the chloride concentration at the base of the Surficial Aquifer System. Figure 8-5 shows where the chloride concentration exceeds 1,000 MG/L, indicating the landward extent of the salt water intrusion front.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells in Lee County range from a low of 134 MG/L to a high of 349 MG/L, with an average concentration of 252 MG/L. Hardness concentrations are lowest in northern Lee County and increase to the south and west (Figure 8-6). The ground water from the majority of the county would be considered hard to very hard.

Sodium concentrations within Surficial Aquifer System AGWQMN well L-01403 were above the primary drinking water standard for sodium of 160 MG/L. This well is located on Sanibel Island and has been affected by salt water intrusion.

All of the Surficial Aquifer System AGWQMN wells within Lee County exceeded the secondary drinking water standard for iron of 0.3 MG/L on at least one occasion. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Manganese was detected in one Surficial Aquifer System AGWQMN well within Lee County at a level

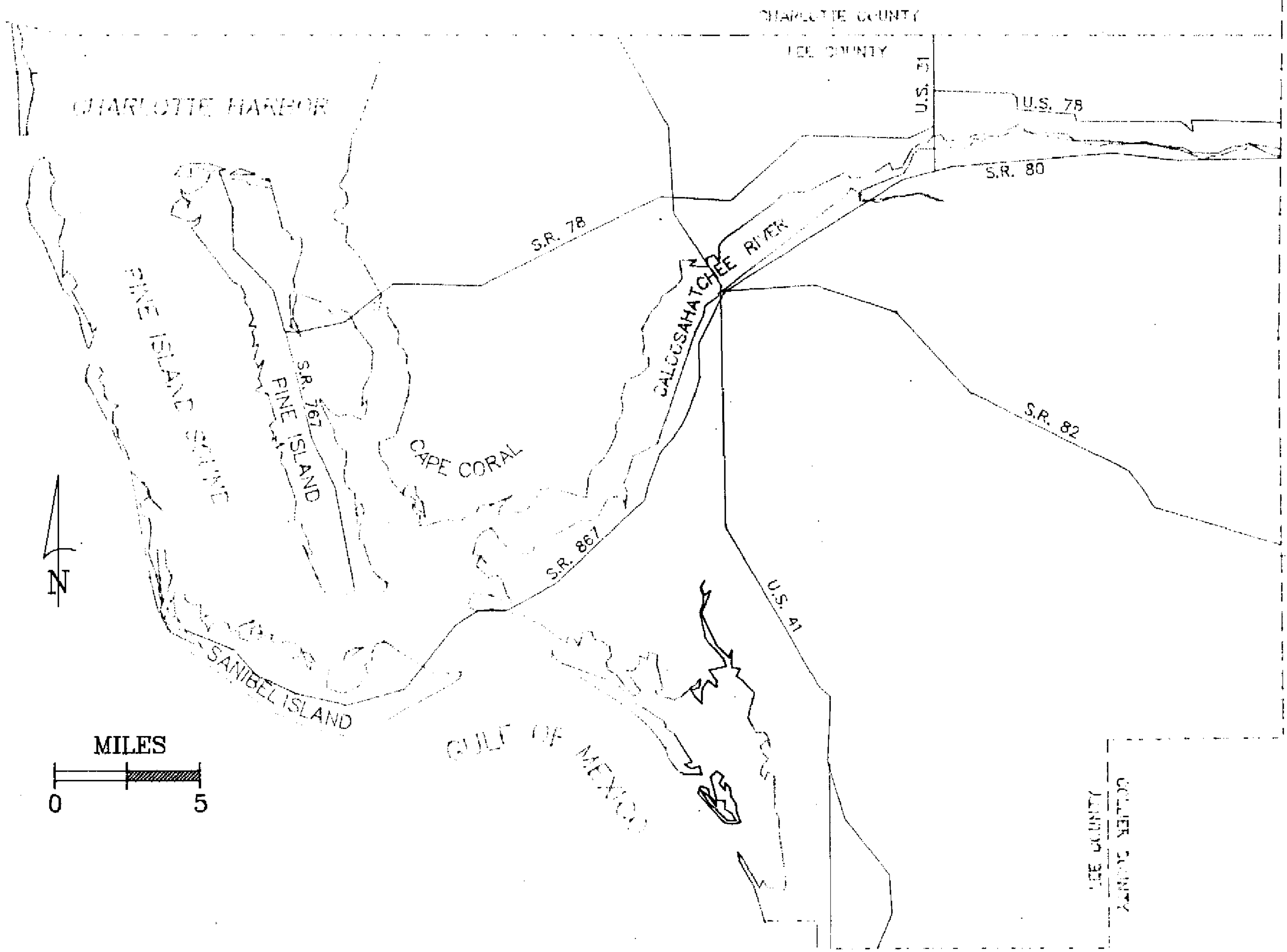

Figure 8-1 MAP OF LEE COUNTY

TABLE 8-1. GENERALIZED HYDROGEOLOGY OF LEE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	WATER TABLE AQUIFER	25-125	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	FINE TO MEDIUM GRAINED QUARTZ SAND WITH VARYING PERCENTAGES OF SHELL AND CLAY.SHELL BEDS WITH INTERBEDDED LIMESTONE
	TAMIAMI CONFINING BEDS		POOR TRANSMISSIVITY	POORLY INDURATED LIMESTONES, DOLOSILTS, AND CALCAREOUS SANDY CLAYS
	LOWER TAMIAMI AQUIFER		MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	LIMESTONE QUARTZ SAND, SOME SILT AND MICRITE
INTERMEDIATE AQUIFER SYSTEM	UPPER HAWTHORN CONFINING ZONE	25-100	LOW PERMEABILITY	PHOSPHATIC CLAYEY DOLOSILTS AND SAND
	SANDSTONE AQUIFER	0-200	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	LIMESTONES, SANDSTONES, SANDY DOLOMITES, AND CALCAREOUS SANDS
	MID-HAWTHORN CONFINING ZONE	0-175	LOW PERMEABILITY	CLAYEY DOLOSILTS WITH THIN SEAMS OF POROUS LIMESTONE, SAND, AND DOLOSILT
	MID-HAWTHORN AQUIFER	0-50	MODERATE TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	PHOSPHATIC LIMESTONES AND DOLOMITES
	LOWER HAWTHORN CONFINING ZONE	100-300	LOW PERMEABILITY	SANDY PHOSPHATIC MARL, INTERBEDDED WITH CLAY, SHELL MARL, SILT, AND SAND
FLORIDAN AQUIFER SYSTEM		2600-3400	HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	INTERBEDDED LIMESTONES AND DOLOMITES

slightly exceeding the secondary drinking water standard. High manganese concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and can impart objectionable tastes to beverages.

Lead concentrations exceeded the primary drinking water standard in four Surficial Aquifer System AGWQMN wells within Lee County. Three of these wells, L-01137, L-01403, and L-05649, are equipped with water level recorders that use lead weights. These lead weights often come in contact with the water within the well, and the lead weights are the probable source of the increased lead concentrations within these wells. The other well, L-01978, has no explainable source for the increased lead concentrations. However, only one of the three samples from this well exceeded the drinking water standard.

Zinc concentrations within one Surficial Aquifer System AGWQMN well, L-01403, exceeded the secondary drinking water standard. However, this well has a galvanized steel casing, and the increased zinc concentrations are due to zinc leaching from the well casing.

Benzene was detected at a concentration of 1.6 µG/L in a sample collected from Surficial Aquifer System AGWQMN well L-01978 in June 1985.

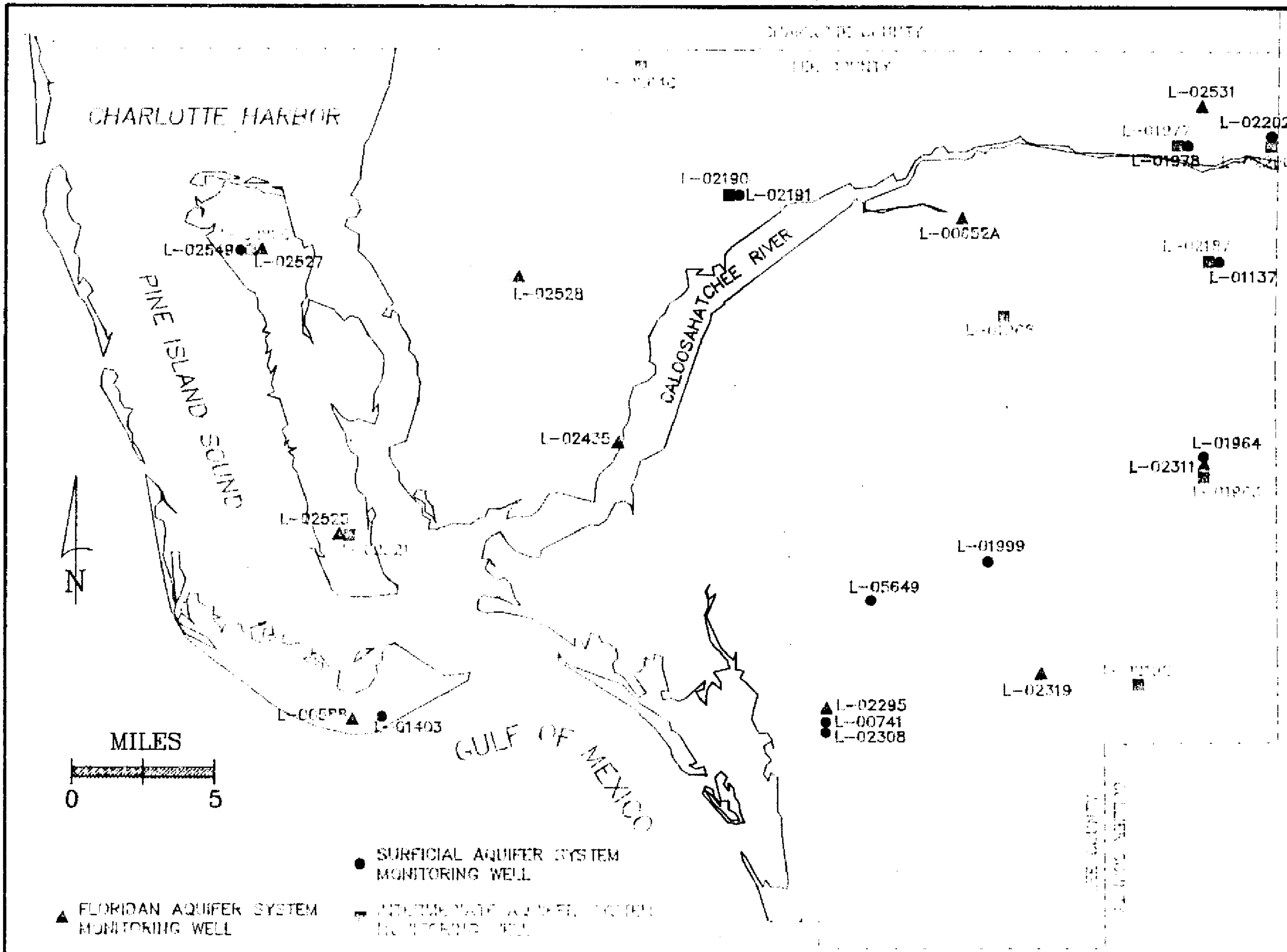

Figure 8-2 LOCATION OF AMBIENT WATER QUALITY MONITOR NETWORK WELLS

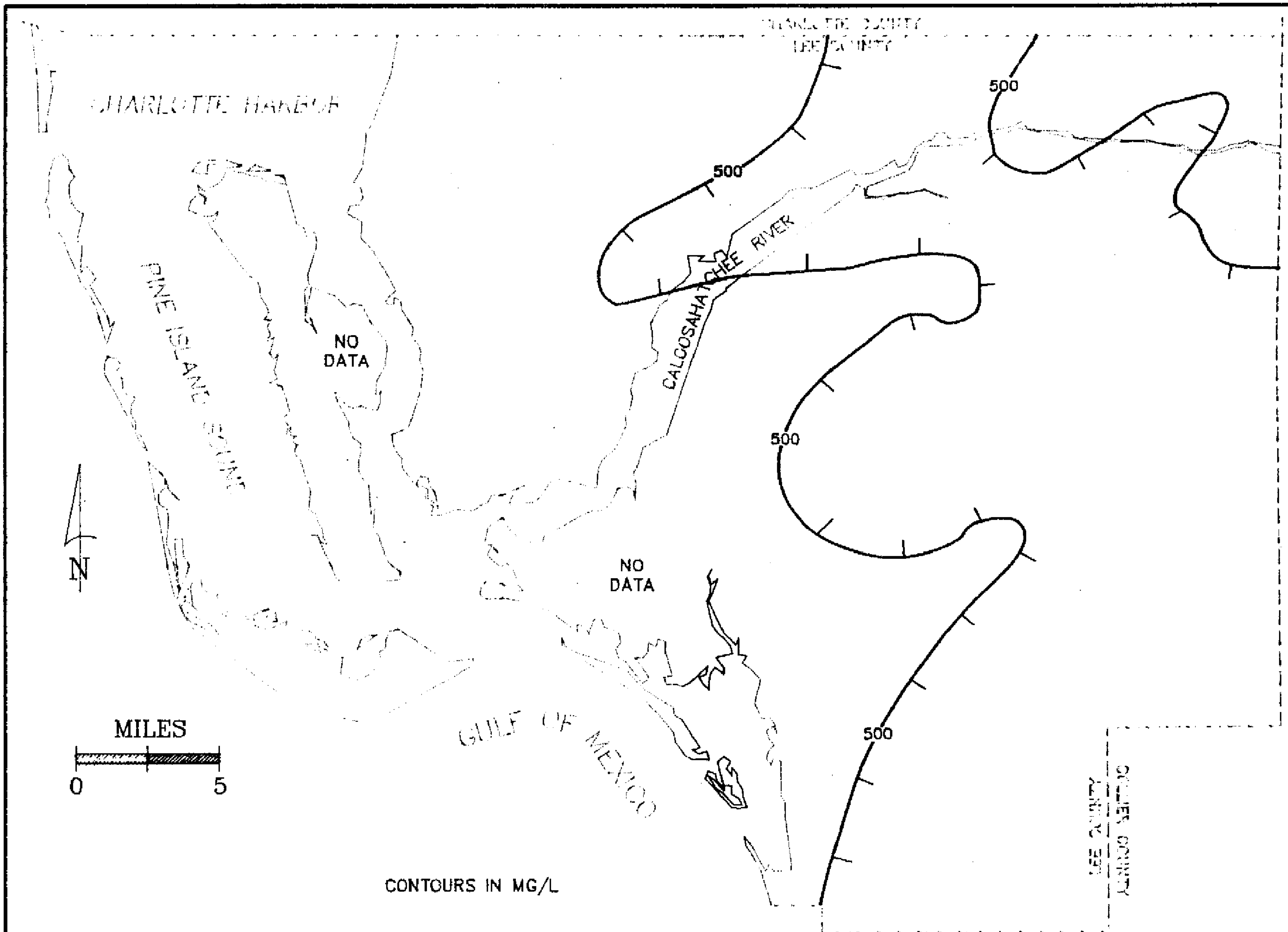

Figure 8-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (FROM WEDDERBURN AND OTHERS, 1982)

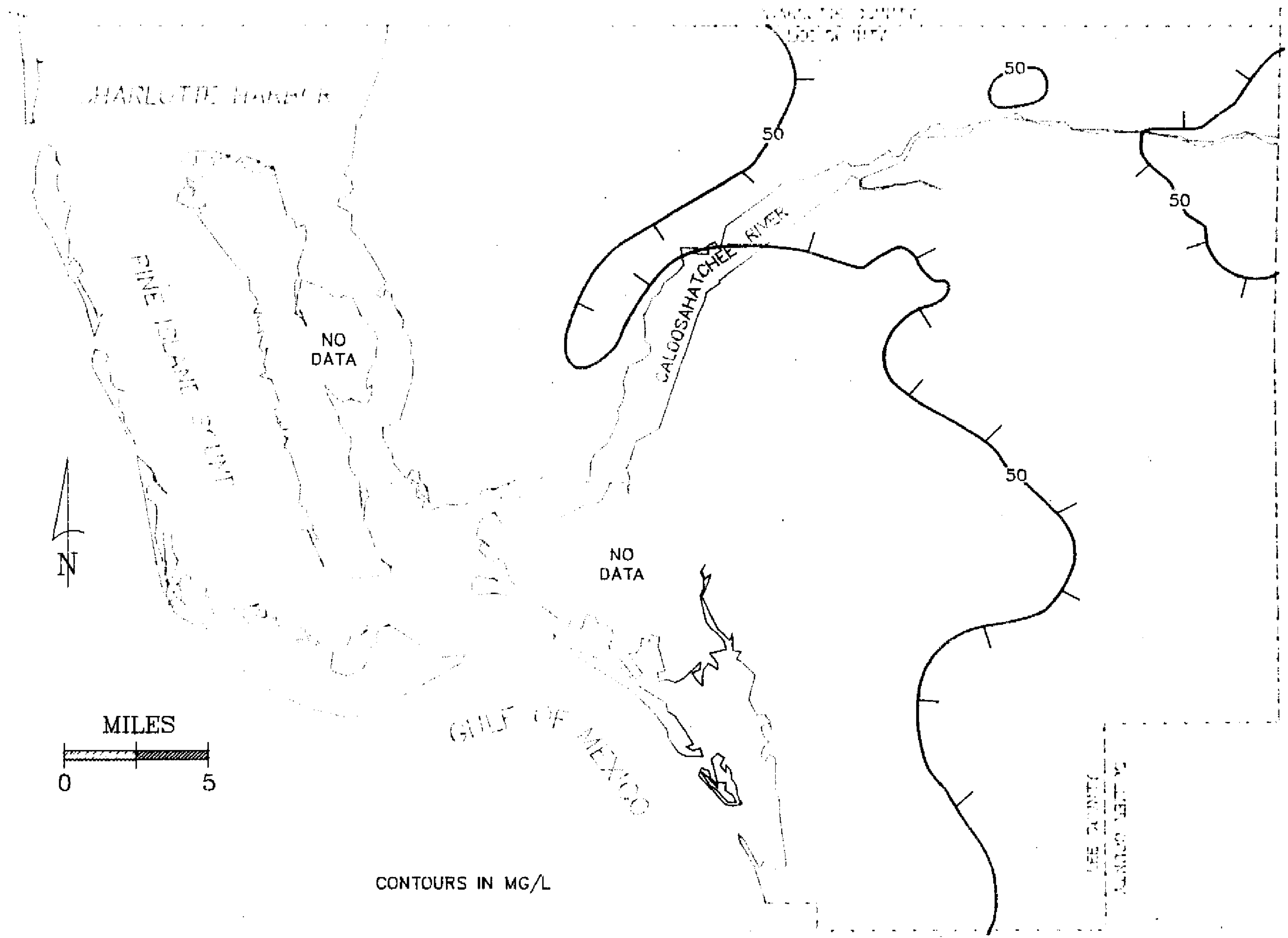

Figure 8-4 CHLORIDE CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM, (FROM WEDDERBURN AND OTHERS, 1982)

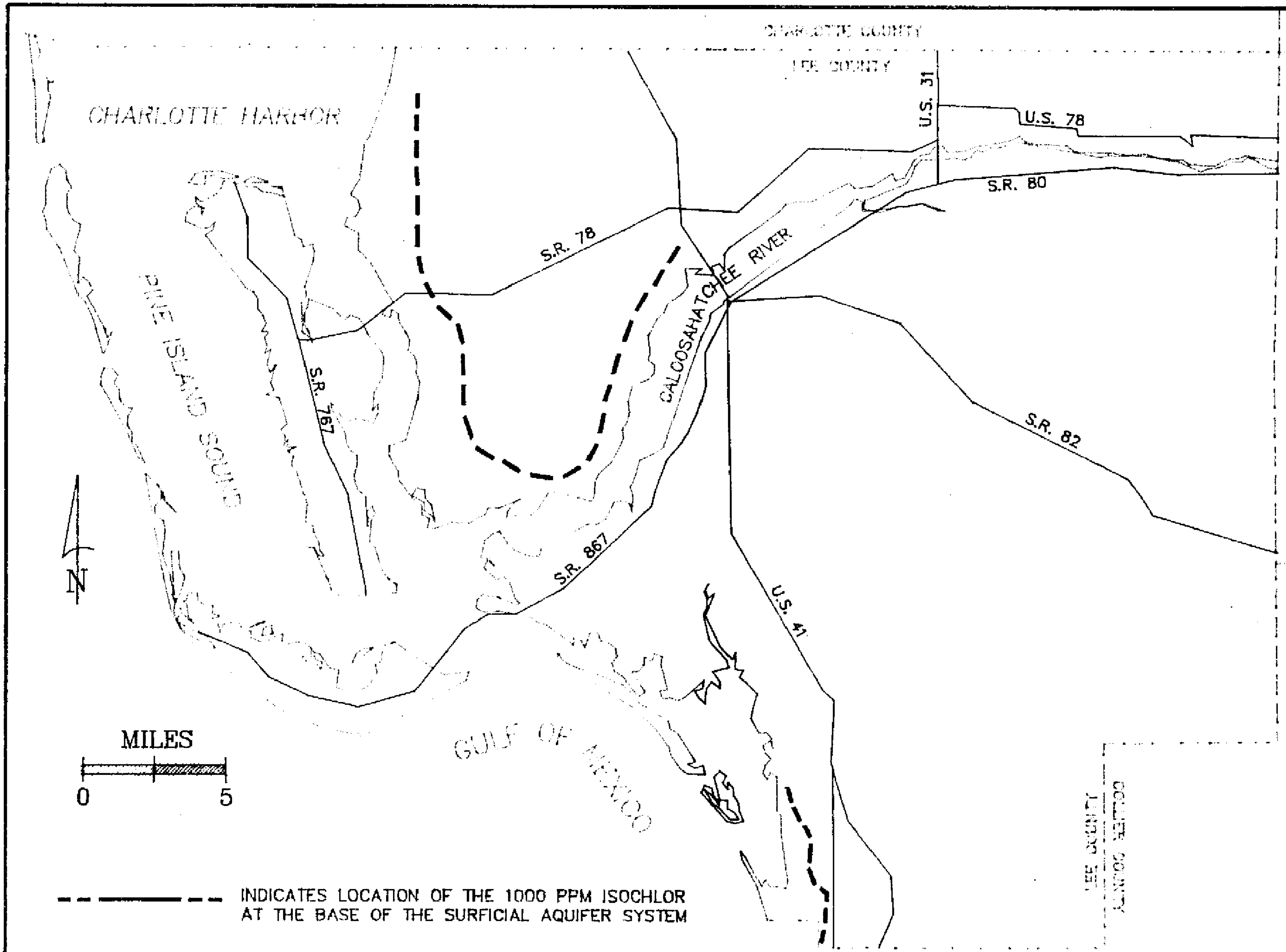

Figure 8-5 EXTENT OF SALT-WATER INTRUSION (1982)

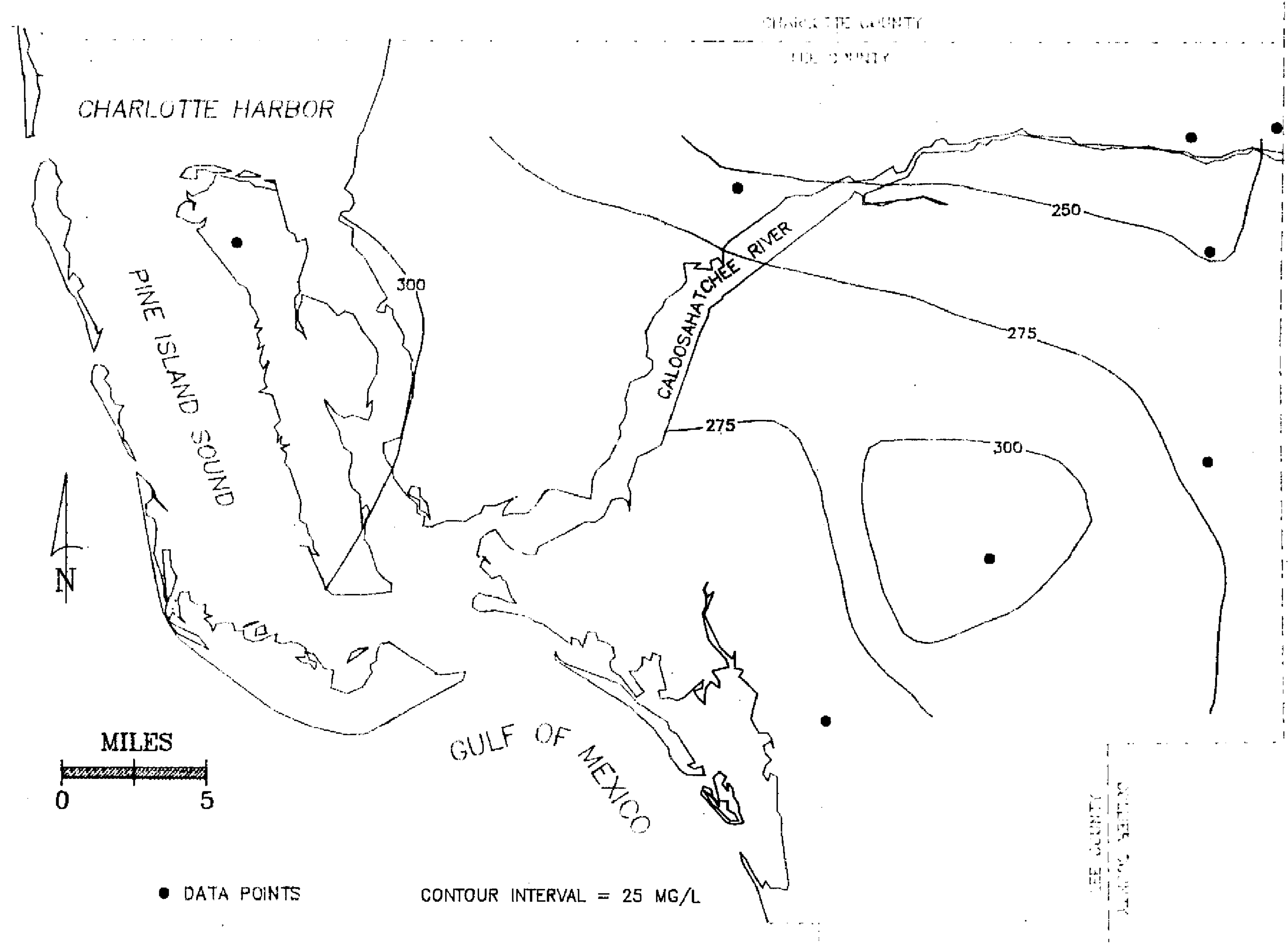

Figure 8-6 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

Benzene and other organic compounds present in gasoline were detected in samples from four AGWQMN wells collected during the same sampling trip.

Each of these AGWQMN wells is several miles from the other AGWQMN wells. It is possible that traces of gasoline may have contaminated sampling equipment and been introduced into the water samples. No purgeable organic compounds or aromatic hydrocarbons have been detected in any AGWQMN wells within Lee County during subsequent sampling.

Intermediate Aquifer System

The Intermediate Aquifer System in Lee County is composed of two regional aquifers, the Sandstone aquifer and the mid-Hawthorn aquifer. The Sandstone aquifer is present in eastern Lee County and is absent in western Lee County. The western boundary of the Sandstone aquifer is located approximately 2-4 miles west of US-41.

The mid-Hawthorn aquifer is a confined aquifer present beneath all of Lee County. The potentiometric surface of the mid-Hawthorn aquifer is above land surface in most areas of Lee County, creating flowing artesian conditions in wells that are open to this aquifer. In some areas of the county the large volume of withdrawals from this aquifer has lowered the potentiometric surface and created cones of depression.

The differences in water quality between the Sandstone aquifer and the mid-Hawthorn aquifer necessitates individual examination of the water quality within each aquifer. Seven of the ten Intermediate Aquifer System wells are Sandstone aquifer wells, and the remaining three are mid-Hawthorn aquifer wells. Wells L-02646, L-02820, and L-02821 are open to the mid-Hawthorn aquifer.

Sandstone Aquifer

Total dissolved solids concentrations within the Sandstone aquifer AGWQMN wells in Lee County range from a low of 319 MG/L to a high of 2,208 MG/L, with an average concentration of 1,074 MG/L. The drinking water standard for total dissolved solids is 500 MG/L. Figure 8-7 (from Wedderburn et al., 1982) shows total dissolved solids concentrations within the Sandstone aquifer in Lee County. The northeastern corner of the county has total dissolved solids concentrations exceeding 1,000 MG/L, in this area of the county the leakage of saline water from deep abandoned wells has adversely affected the water quality of the Sandstone aquifer (Wedderburn et al., 1982).

Chloride concentrations within the Sandstone aquifer AGWQMN wells range from a low of 55 MG/L to a high of 1,025 MG/L, with an average concentration of 408 MG/L. Chloride concentrations within the Sandstone aquifer are highest in the northeastern corner of the county due to the previously mentioned affect of deep abandoned wells, Figure 8-8 (from Wedderburn et al., 1982). Chloride concentrations are also high in the southwestern corner of the county due to the affect of salt water intrusion.

Hardness concentrations within the Sandstone aquifer AGWQMN wells range from a low of 117 MG/L to a high of 445 MG/L, with an average concentration of 231 MG/L. These values are in the hard to very hard range. Figure 8-9 shows the hardness concentrations within the Sandstone aquifer in Lee County.

The primary drinking water standard for sodium (160 MG/L) was exceeded by samples collected from three of the seven Sandstone aquifer AGWQMN wells. These three wells with high sodium concentrations are all located in the northeastern corner of the county where water from deeper saline wells has contaminated the Sandstone aquifer.

Samples from three Sandstone aquifer AGWQMN wells exceeded the secondary drinking water standard for sulfate of 250 MG/L. All of these wells are located in the northeastern corner of the county.

Two of the Sandstone aquifer AGWQMN wells exceeded the secondary drinking water standard for iron. As mentioned previously, high iron concentrations are not a health threat but may be aesthetically displeasing.

Sandstone aquifer AGWQMN well L-01977 exceeded the secondary drinking water standard for manganese in January 1986. Previous and subsequent samples collected from this well were below the secondary drinking water standard for manganese.

Mid-Hawthorn Aquifer

Total dissolved solids concentrations within the mid-Hawthorn aquifer AGWQMN wells in Lee County range from a low of 370 MG/L to a high of 1,640 MG/L, with an average concentration of 1,102 MG/L. The drinking water standard for total dissolved solids is 500 MG/L. Figure 8-10 (from Wedderburn et

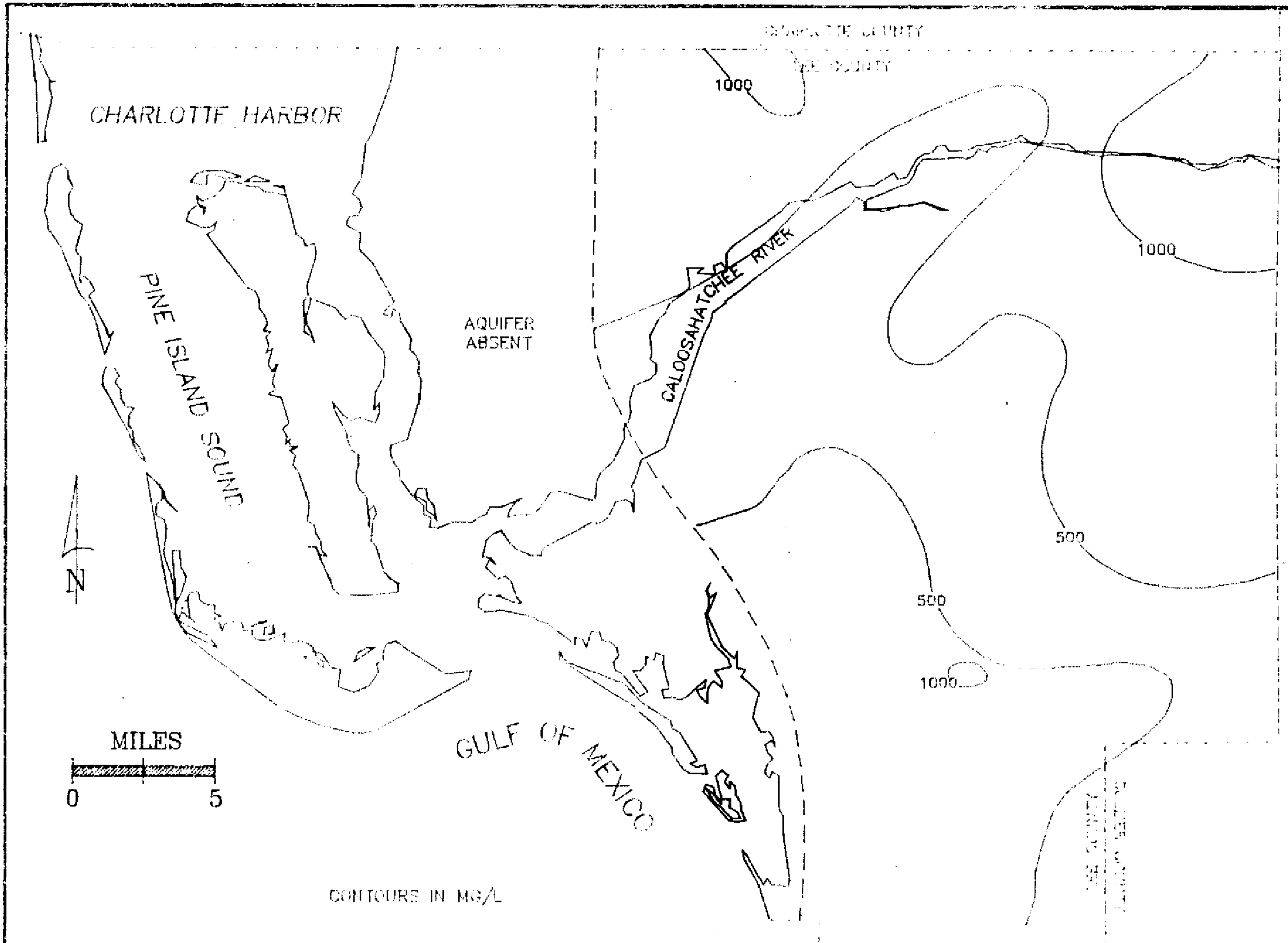

Figure 8-7 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, SANDSTONE AQUIFER (FROM WEDDERBURN AND OTHERS, 1982)

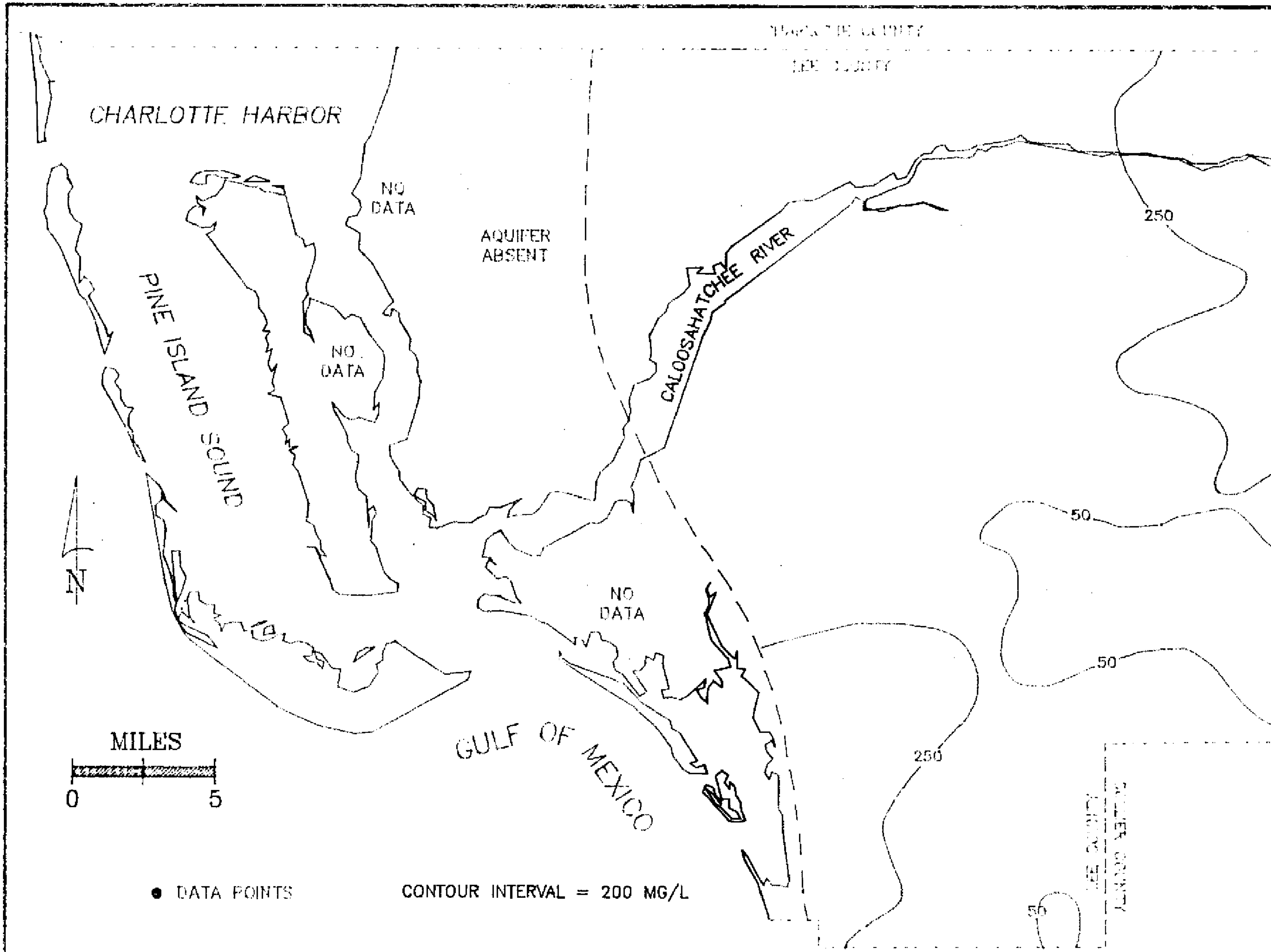

Figure 8-8 CHLORIDE CONCENTRATIONS, SANDSTONE AQUIFER (FROM WEDDERBURN AND OTHERS, 1982)

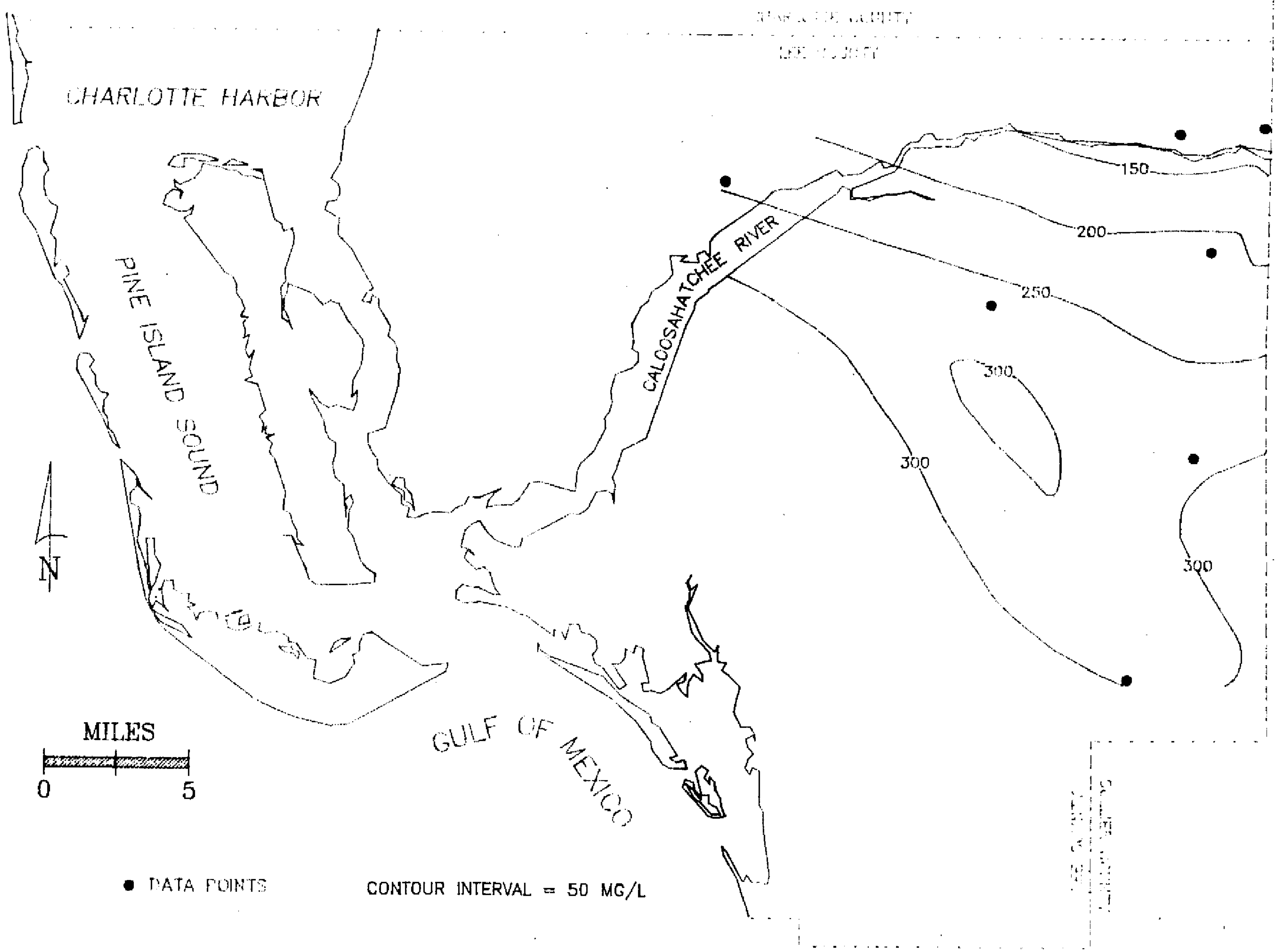

Figure 8-9 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SANDSTONE AQUIFER

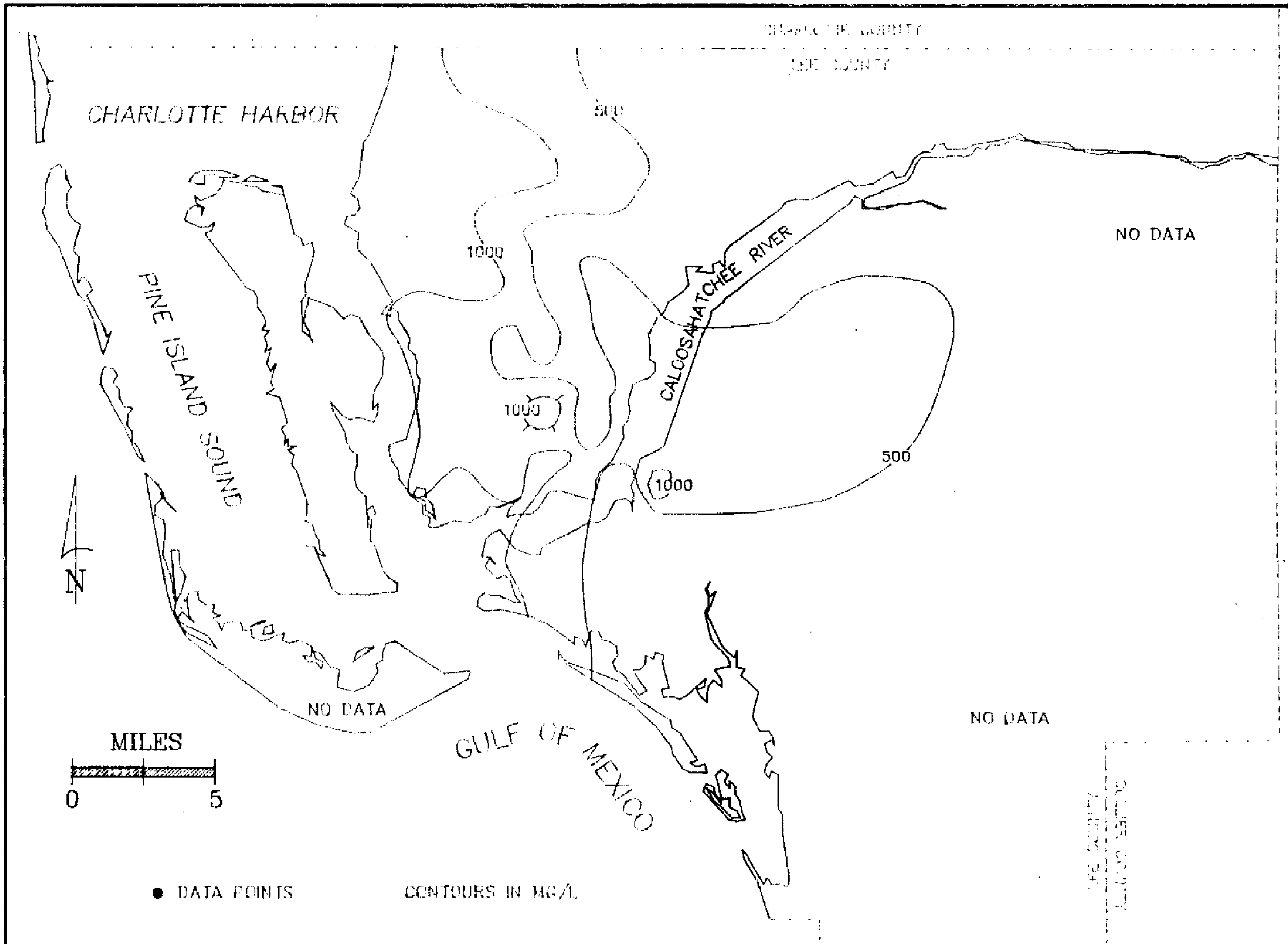

Figure 8-10 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, MID-HAWTHORN AQUIFER (FROM WEDDERBURN AND OTHERS, 1982)

al., 1984) shows the total dissolved solids concentration within the mid-Hawthorn aquifer in Lee County. Lowest concentrations are found in the eastern portion of the county, concentrations increase to the west.

Chloride concentrations within the mid-Hawthorn aquifer AGWQMN wells range from a low of 79 MG/L to a high of 875 MG/L with an average concentration of 493 MG/L. Chloride concentrations within the mid-Hawthorn aquifer are low in the eastern portions of the county and increase westward toward the gulf, Figure 8-11 (from Wedderburn et al., 1984).

Hardness concentrations in the mid-Hawthorn aquifer AGWQMN wells range from a low of 137 MG/L to a high of 213 MG/L, with an average concentration of 167 MG/L. These values are in the hard to very hard range. It was not possible to construct a hardness concentration map due to the scarcity of data.

Sodium concentrations within two of the three mid-Hawthorn AGWQMN wells exceeded the primary drinking water standard for sodium of 160 MG/L. Both wells with high sodium concentrations are located on Pine Island, an area of poor water quality for the mid-Hawthorn aquifer.

Sulfate concentrations within mid-Hawthorn aquifer AGWQMN well L-02821 exceed the secondary drinking water standard. High sulfate concentrations are not a health threat but can impart an objectionable taste and odor and have a cathartic affect on some individuals.

Floridan Aquifer System

The water quality within the Floridan Aquifer System in Lee County is poor and the water is nonpotable. Ground water within the Floridan Aquifer System tends to become more mineralized with increased distance from the primary recharge area. Lee County is located 100 miles from the principal recharge area to the Floridan Aquifer System (Wedderburn et al., 1982).

Water quality also tends to deteriorate with depth within the Floridan Aquifer System, thus water quality is affected by the depth to, and number of producing zone(s) penetrated by the well. All Floridan Aquifer System AGWQMN wells within Lee County exceed drinking water standards for total dissolved solids, sodium, and chlorides.

Despite the poor water quality, the Floridan Aquifer System is used as a source of drinking water in Lee County. The water is used by public water supply systems, after treatment by reverse osmosis (RO) filtration. This process lowers concentrations of total dissolved solids, sodium, and chlorides to within drinking water standards.

Total dissolved solids concentrations within the Floridan Aquifer System AGWQMN wells in Lee County range from a low of 1,093 MG/L to a high of 7,425 MG/L, with an average concentration of 2,615 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L. Figure 8-12 (from Wedderburn et al., 1984) shows the total dissolved solids concentration within the Floridan Aquifer System in Lee County. The majority of the county exceeds 1,000 MG/L and many areas exceed 2,000 MG/L.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 380 MG/L to a high of 3,785 MG/L, with an average concentration of 1,237 MG/L. Figure 8-13 (from Wedderburn et al., 1984) shows the chloride concentrations within the Floridan Aquifer System. **Chloride concentrations are below 1,000 MG/L in most areas of the county, except for isolated pockets with increased chloride concentrations.**

Hardness concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 102 MG/L to a high of 287 MG/L, with an average concentration of 155 MG/L. These values are in the moderately hard to very hard range. Figure 8-14 shows the hardness concentrations within the Floridan Aquifer System in Lee County. Hardness concentrations are lowest in the north and increase to the southeast.

Sodium concentrations were above the primary drinking water standard of 160 MG/L in all of the Floridan Aquifer System AGWQMN wells sampled in Lee County. Sodium concentrations range from a low of 217 MG/L to a high of 2,040 MG/L, with an average concentration of 642 MG/L.

Sulfate concentrations within nine of the ten Floridan Aquifer System AGWQMN wells in Lee County exceeded the secondary drinking water standard of 250 MG/L. Sulfate concentrations range from a low of 183 MG/L to a high of 713 MG/L, with an average concentration of 376 MG/L.

Floridan Aquifer System AGWQMN well L-00588 exceeded the secondary drinking water standard for iron in June of 1985. Subsequent samples collected from this well were below the secondary drinking water standard for iron. Well L-00588 has a

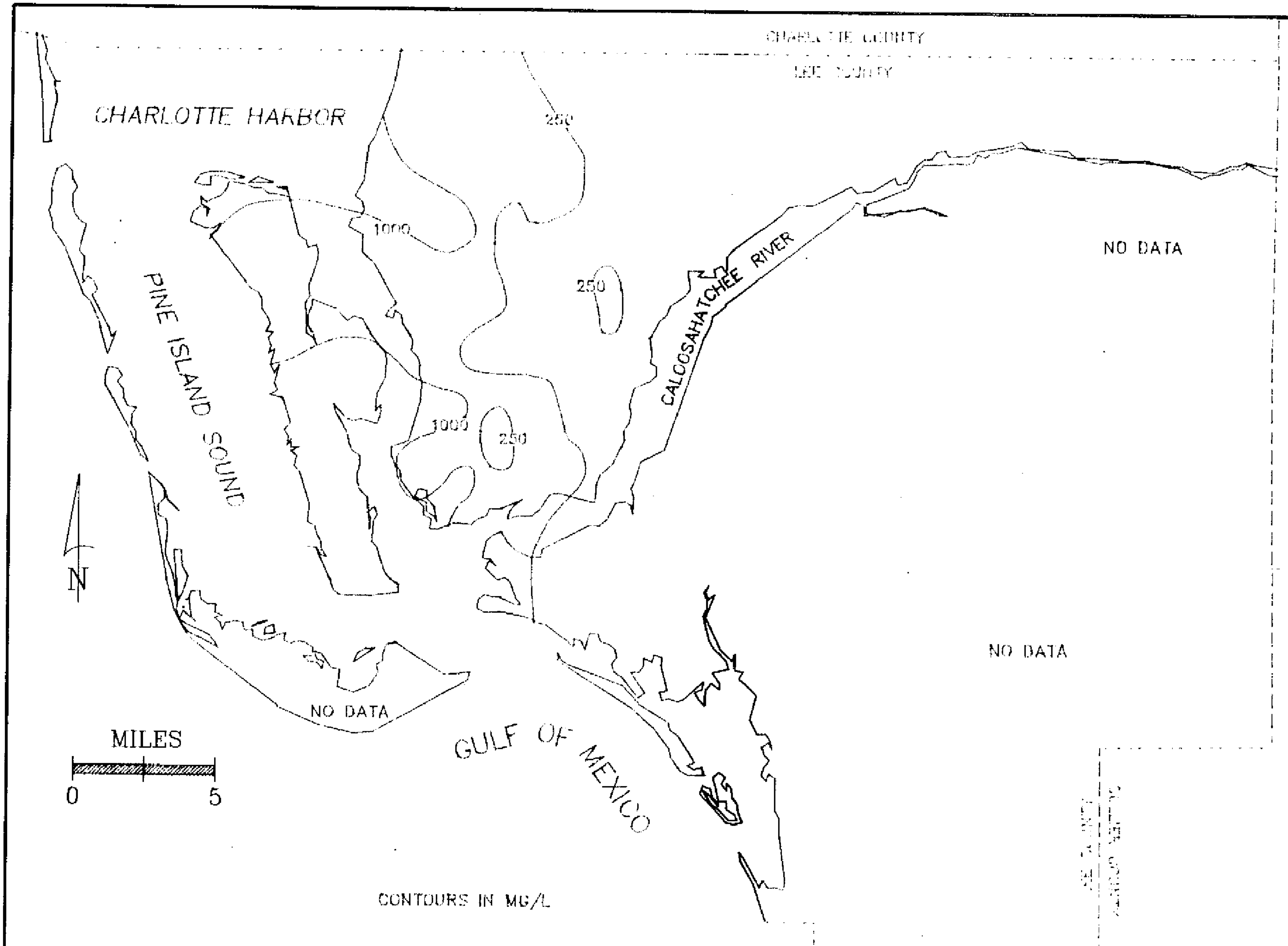

Figure 8-11 **CHLORIDE CONCENTRATIONS, MID-HAWTHORN AQUIFER (FROM WEDDERBURN AND OTHERS, 1982)**

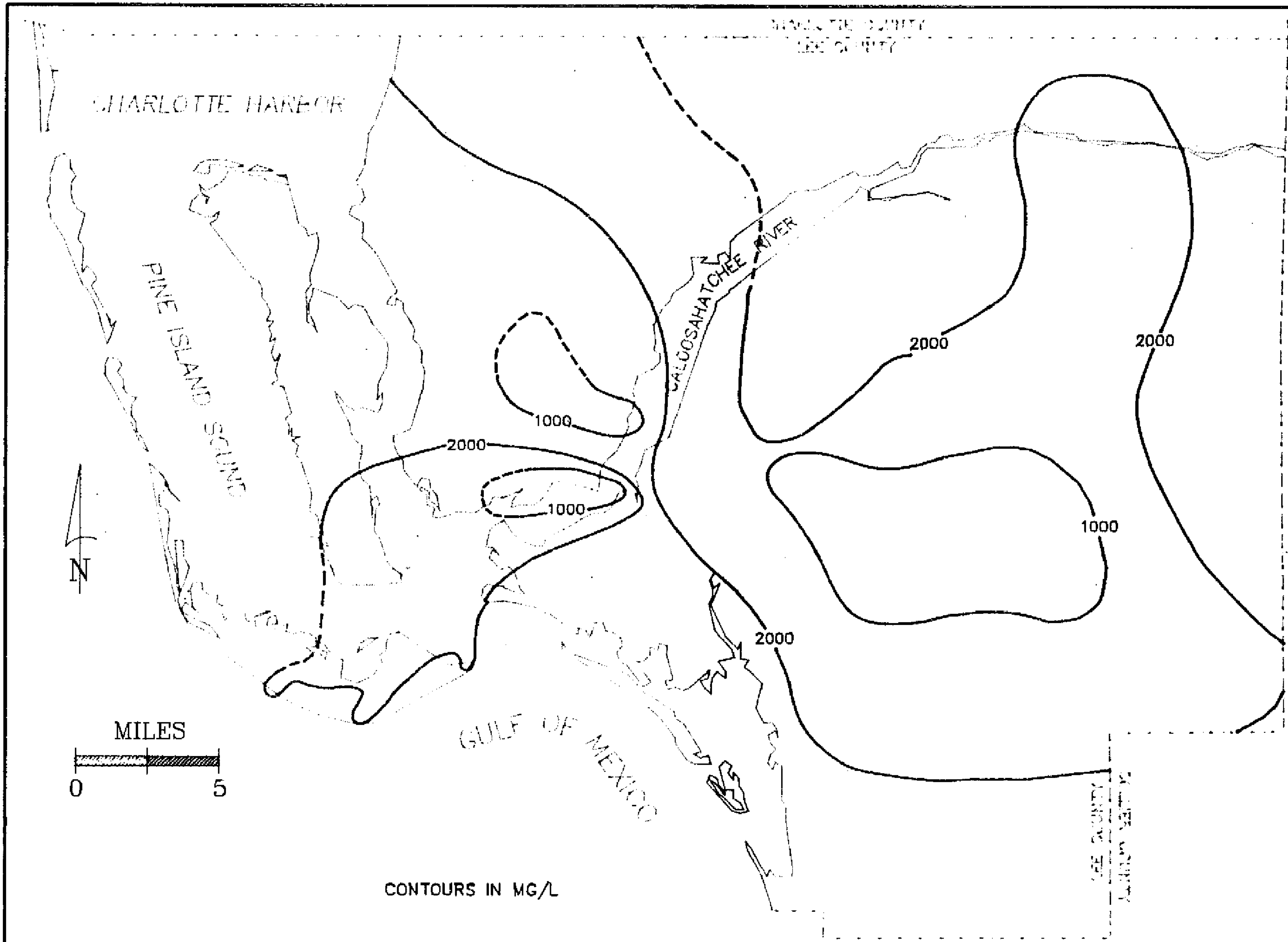

Figure 8-12 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM WEDDERBURN AND OTHERS, 1982)

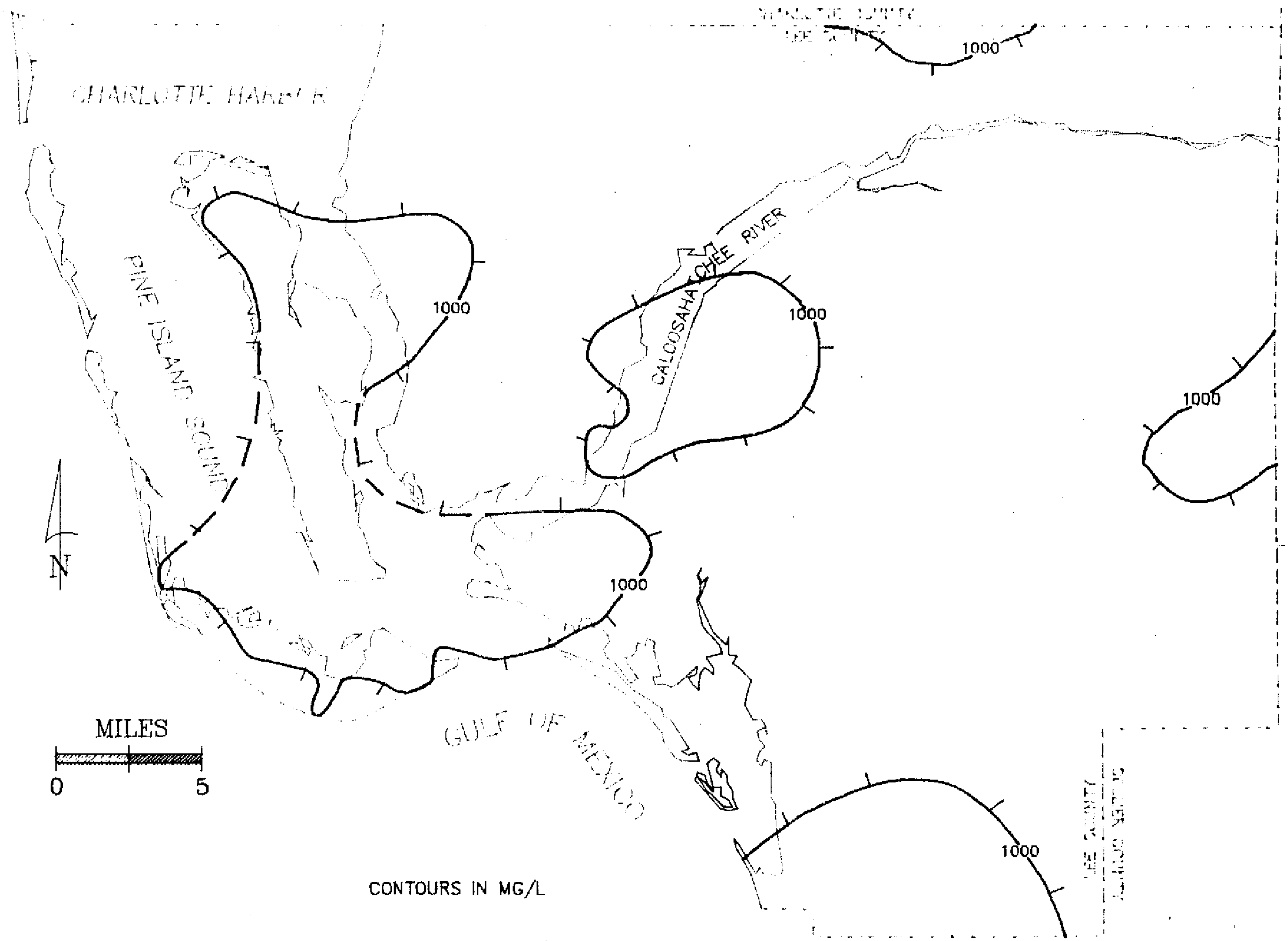

Figure 8-13 CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM WEDDERBURN AND OTHERS, 1982)

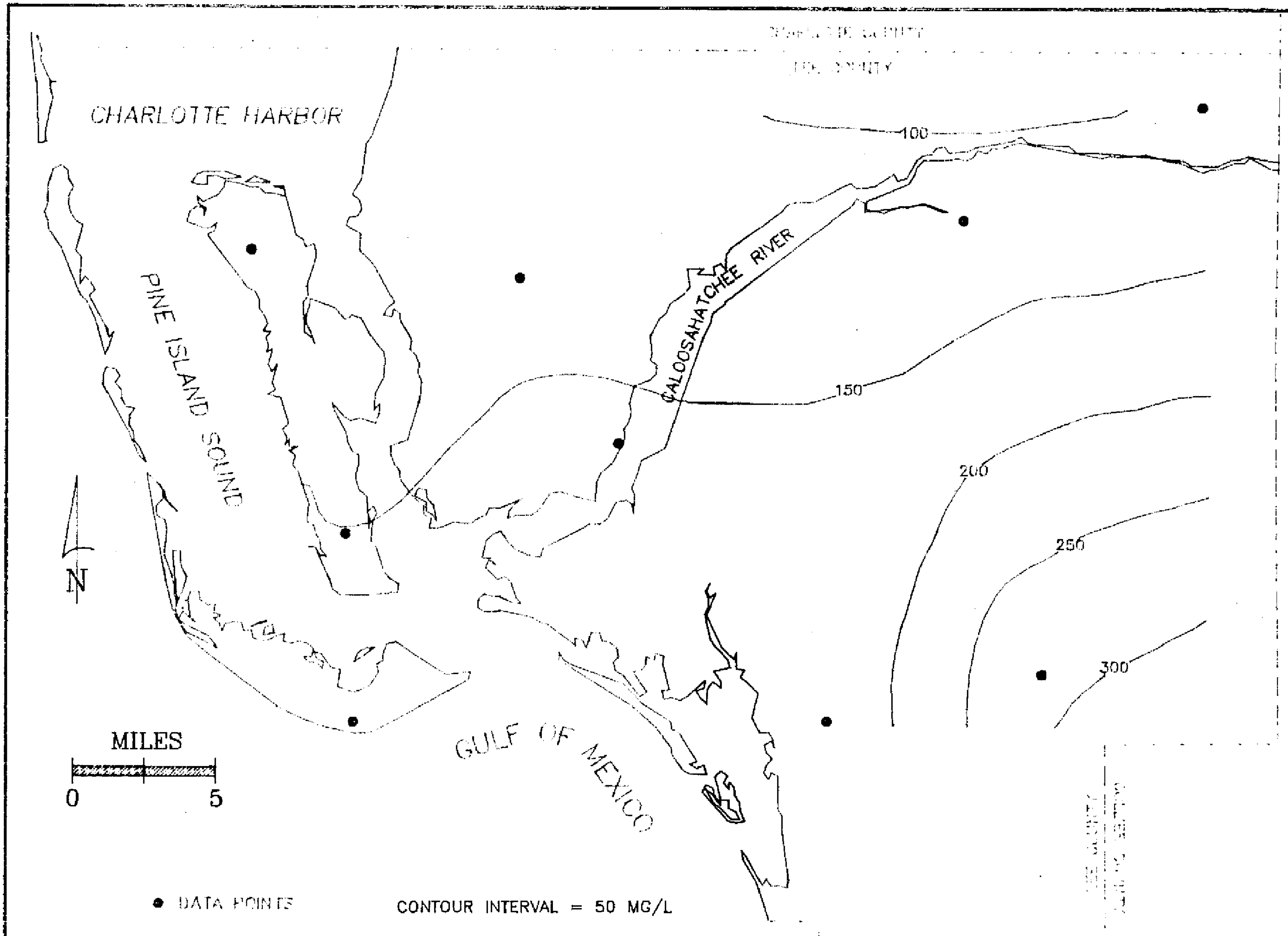

Figure 8-14 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

black iron casing that may have contributed to the iron concentration of the sample.

Organic compounds were detected at low (less than 4 μG/L) concentrations in samples collected from Floridan Aquifer System AGWQMN wells within Lee County during June 1985. Benzene, o-Dichlorobenzene, m-Dichlorobenzene, and 1,2 dichloroethane were detected at very low levels in samples from four Floridan Aquifer System AGWQMN wells. No purgeable organic compounds or aromatic hydrocarbons were detected in any Floridan Aquifer System AGWQMN wells within Lee County during subsequent sampling.

The four Floridan Aquifer System AGWQMN wells that had traces of organic compounds during the June sampling trip are deep flowing wells, and it is extremely unlikely that they could have been contaminated by anthropogenic compounds. The presence of these compounds in the samples was probably due to a sample contamination problem.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells within Lee County are shown in Figures 8-15, 8-16, and 8-17. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Stiff patterns of Surficial Aquifer System AGWQMN wells are shown in Figure 8-15. These patterns indicate that the water type from the Surficial Aquifer System is predominantly calcium-bicarbonate (increased width along the central axis). Three of the Surficial Aquifer System AGWQMN wells show unique patterns. Well L-01403, located on Sanibel Island, shows the increased ionic strength of the sodium and chloride ions (increased width of the upper axis), which is indicative of salt water intrusion. Wells L-05649 and L-00741 show the effects of recharge to the Surficial Aquifer System from underlying aquifers.

Stiff patterns of the Intermediate Aquifer System AGWQMN wells are shown in Figure 8-16, Stiff patterns from the Sandstone aquifer show two distinct water types. Water from the Sandstone aquifer is predominantly a sodium chloride-calcium bicarbonate water, with the exception of wells L-02200, L-01977, and L-02187, which show the increased strengths of sodium and chloride ions due to contamination from deeper aquifers.

Mid-Hawthorn aquifer wells L-02820 and L-01821 show the effects of salt water intrusion. These wells have high sodium and chloride concentrations. The third mid-Hawthorn aquifer AGWQMN well, L-02646, has a much lower ionic strength and is not dominated by the sodium and chloride ions.

Stiff patterns of the Floridan Aquifer System AGWQMN wells are shown in Figure 8-17. These patterns show the dominance of the sodium and chloride ions within the Floridan Aquifer System. These patterns also show the increased ionic strength (width of Stiff patterns) of water from the Floridan Aquifer System, as compared to water from the other aquifer systems.

SUMMARY AND CONCLUSIONS

The AGWQMN in Lee County is composed of eleven Surficial Aquifer System, ten Intermediate Aquifer System, and ten Floridan Aquifer System wells. These wells are sampled annually to monitor ambient ground water quality.

Water quality within Lee County generally deteriorates with the increasing depth of the aquifer system. Throughout most of Lee County there is an upward hydraulic gradient. The combination of this upward hydraulic gradient and decreasing water quality with depth provides the potential for contamination of shallow aquifers by water from underlying aquifers. This type of contamination has already occurred in the northeastern corner of Lee County where the water quality within the Surficial Aquifer System and the Intermediate Aquifer System has been degraded by water from underlying aquifers.

Water within the Surficial Aquifer System is potable throughout most of Lee County, with the exception of the northeastern corner of the county and areas where salt water intrusion has occurred.

Water within the Sandstone aquifer of the Intermediate Aquifer System is potable throughout most of Lee County, with the exception of the northeastern corner of the county. Water from the mid-Hawthorn aquifer is potable in north-central Lee County, but exceeds drinking water standards to the west.

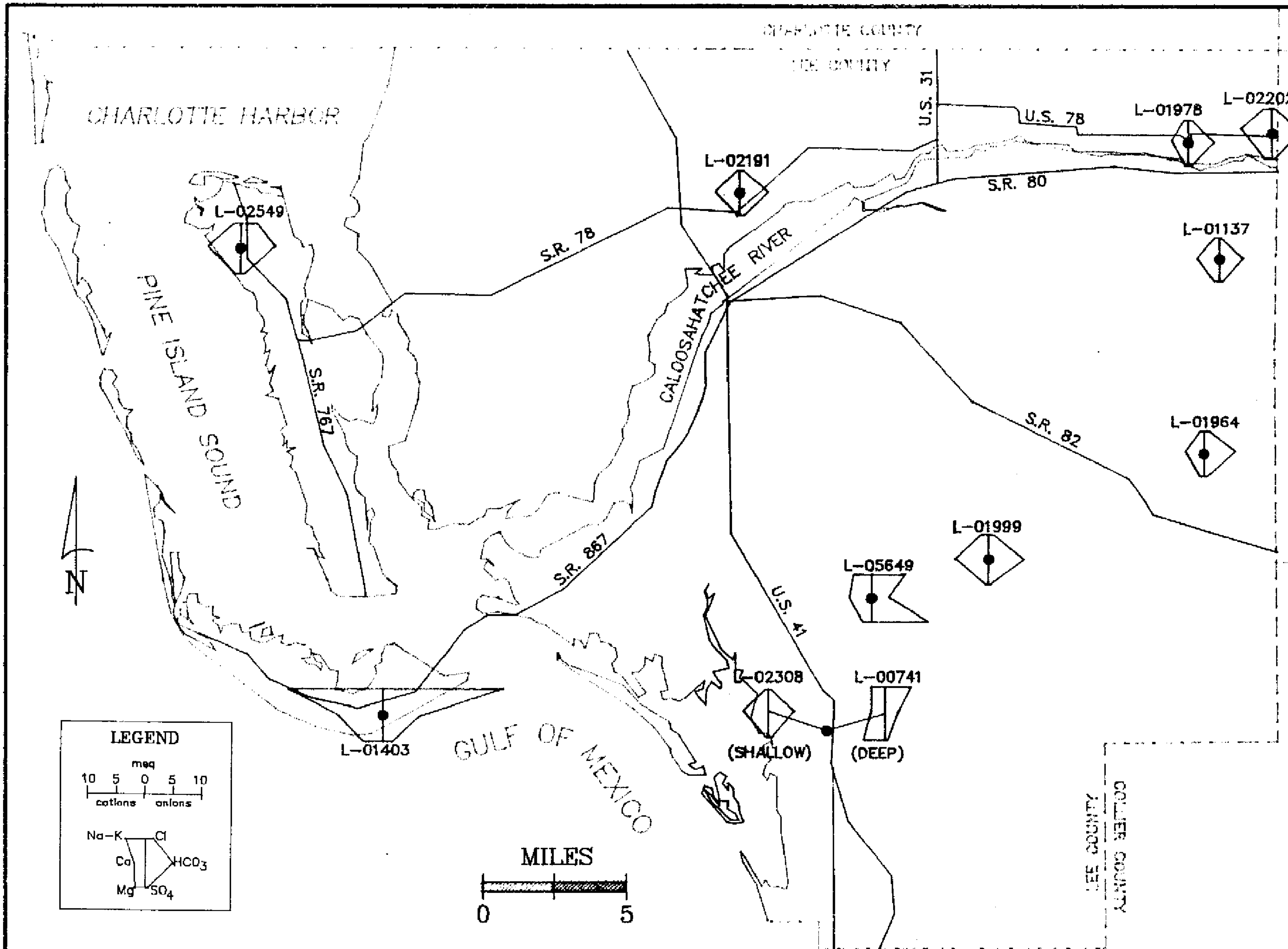

Figure 8-15 STIFF PATTERN DIAGRAMS FROM SURFICIAL AQUIFER SYSTEM AGWQMN WELL DATA

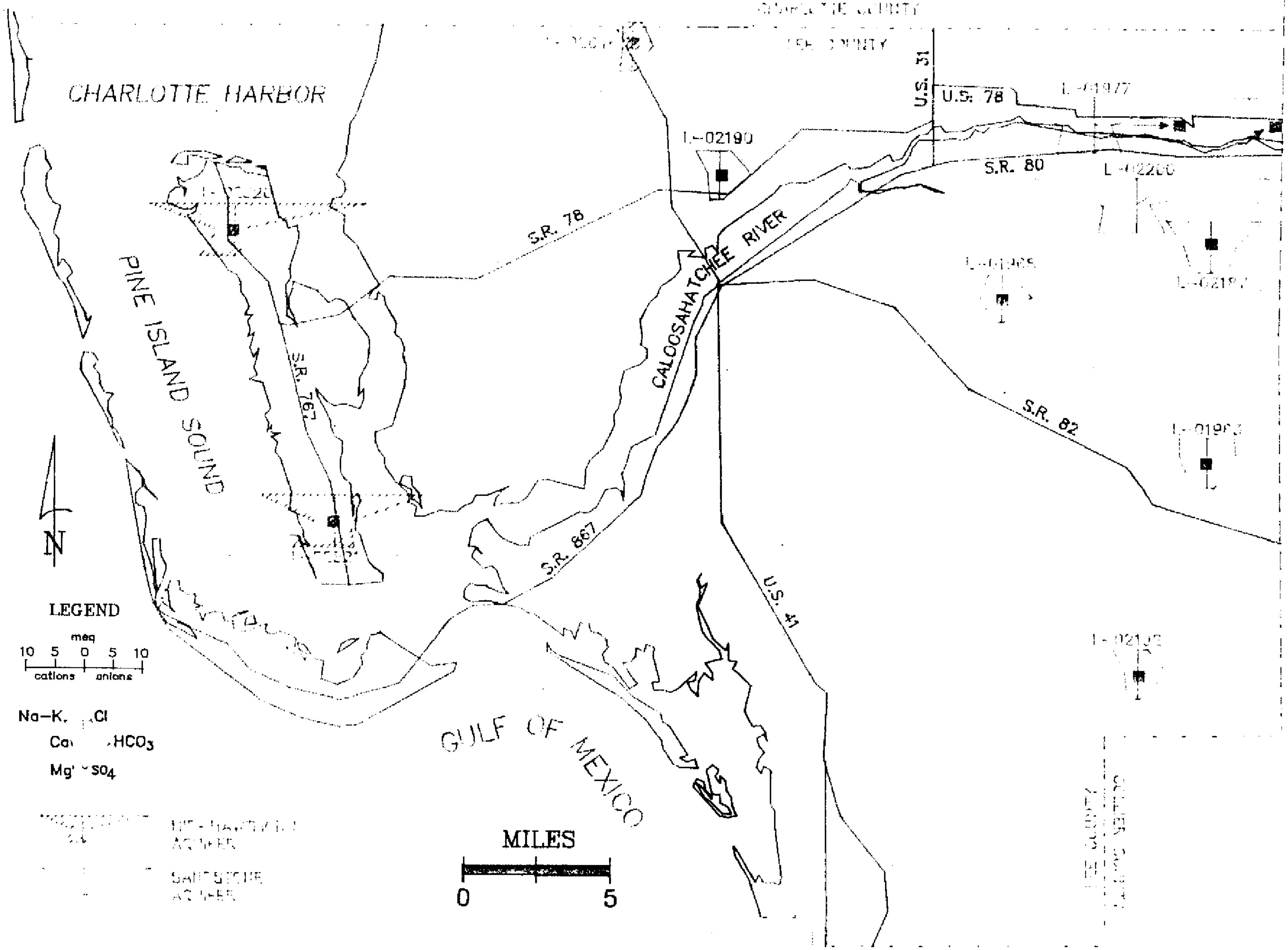

Figure 8-16 STIFF PATTERN DIAGRAMS FROM INTERMEDIATE AQUIFER SYSTEM, AGWQMN WELL DATA

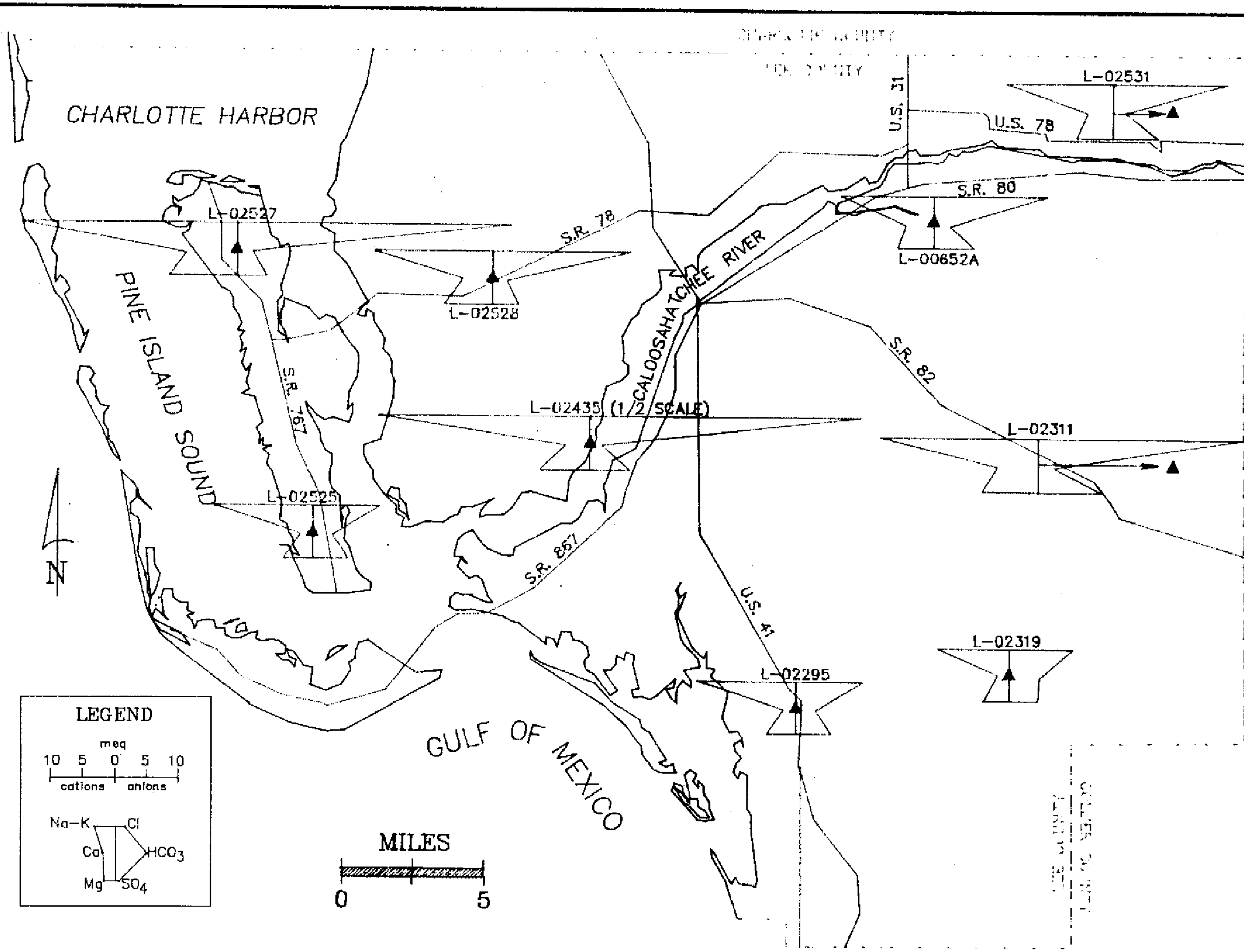

Figure 8-17 STIFF PATTERN DIAGRAMS FROM FLORIDAN AQUIFER SYSTEM, AGWQMN WELL DATA

The Floridan Aquifer System exceeds drinking water standards throughout Lee County. Water withdrawn from this aquifer system must be treated by RO filtration in order to meet drinking water standards.

REFERENCES

Upchurch, S.B. 1986. Use of Water Chemistry to Identify Interaquifer Mixing - Lee County, Florida: Department of Geology, University of South Florida, Tampa, Fla.

Wedderburn, L.A. M.S. Knapp, D.P. Waltz, and S.W. Burns, 1982. Hydrogeologic Reconnaissance of Lee County, Florida: South Florida Water Management District, Technical Publication 82-1.

SECTION 9

MARTIN COUNTY

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LOCATION AND EXTENT OF AREA

Martin County is located on the southeast coast of Florida and comprises an area of approximately 600 square miles, measuring 35 miles from east to west and 16 miles from north to south. The county lies between 26 57' 24" and 27 15' 46" north latitude and 80 04' 49" and 80 40' 40" west longitude. It is bounded on the north by St. Lucie County, to the south by Palm Beach County, to the west by Lake Okeechobee and Okeechobee County, and to the east by the Atlantic Ocean (Figure 9-1).

HYDROGEOLOGY

Two aquifer systems are present within Martin County that provide drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the thick and impermeable Hawthorn confining zone. Table 9-1 shows a schematic representation of the generalized hydrogeology of Martin County.

The Surficial Aquifer System is the primary source of drinking water throughout the county. The Floridan Aquifer System is an alternate source of drinking water supplies. However, water from the Floridan Aquifer System must first undergo treatment by reverse osmosis (RO) filtration prior to use as a drinking water supply. Both aquifer systems serve as sources for irrigation water.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of the aquifer to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and high water table all increase the susceptibility of this aquifer to contamination.

The Floridan Aquifer System in Martin County is protected from contamination by anthropogenic compounds. Two factors provide this protection. First, the aquifer is overlain by the Hawthorn formation (Table 9-1), a thick sequence of confining layers that are present beneath the Surficial Aquifer System. In addition, the entire county is a discharge area for the Floridan Aquifer System. Because it is a discharge zone, the hydraulic head of the Floridan Aquifer System is greater than that of the Surficial Aquifer System; therefore, downward flow is impossible unless the gradient is reversed (Nealon et al., 1987).

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Martin County consists of eight Surficial Aquifer System and two Floridan Aquifer System wells. Figure 9-2 shows the distribution and approximate location of these AGWQMN wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials and other pertinent information is summarized and presented in Appendix 9-1. The results of the inorganic laboratory analysis for the first four years of sampling (1984-1987) are shown in Appendix 9-2.

Surficial Aquifer System

The water quality within the Surficial Aquifer System in Martin County is potable on a regional basis. A few areas near the coast affected by salt water intrusion, and a few areas of connate water in the south central portion of the county have elevated chlorides and exceed the secondary drinking water standards.

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 80 MG/L to a high of 686 MG/L, with an average concentration of 398 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L. However, it may be greater if no other standards are exceeded. High total dissolved solids values in excess of 500 MG/L occur in the western part of the county (Figure 9-3).

Chloride concentrations within the Surficial Aquifer System range from a low of 11 MG/L to a high of 183 MG/L, with an average concentration of 46 MG/L. The secondary drinking water standard for chloride is 250 MG/L. Figure 9-4 shows the chloride concentration distribution in the Surficial Aquifer System of Martin County. Chloride data from Lichtler (1960) and Nealon et al. (1987) was used to supplement the AGWQMN data used in the construction of Figure 9-4.

A small area of increased chloride concentration appears in the south central portion of the county. This may be due to the presence of connate water or the upconing of poorer quality water from the Floridan Aquifer System. Chloride concentrations also increase along the coast in areas where salt-water

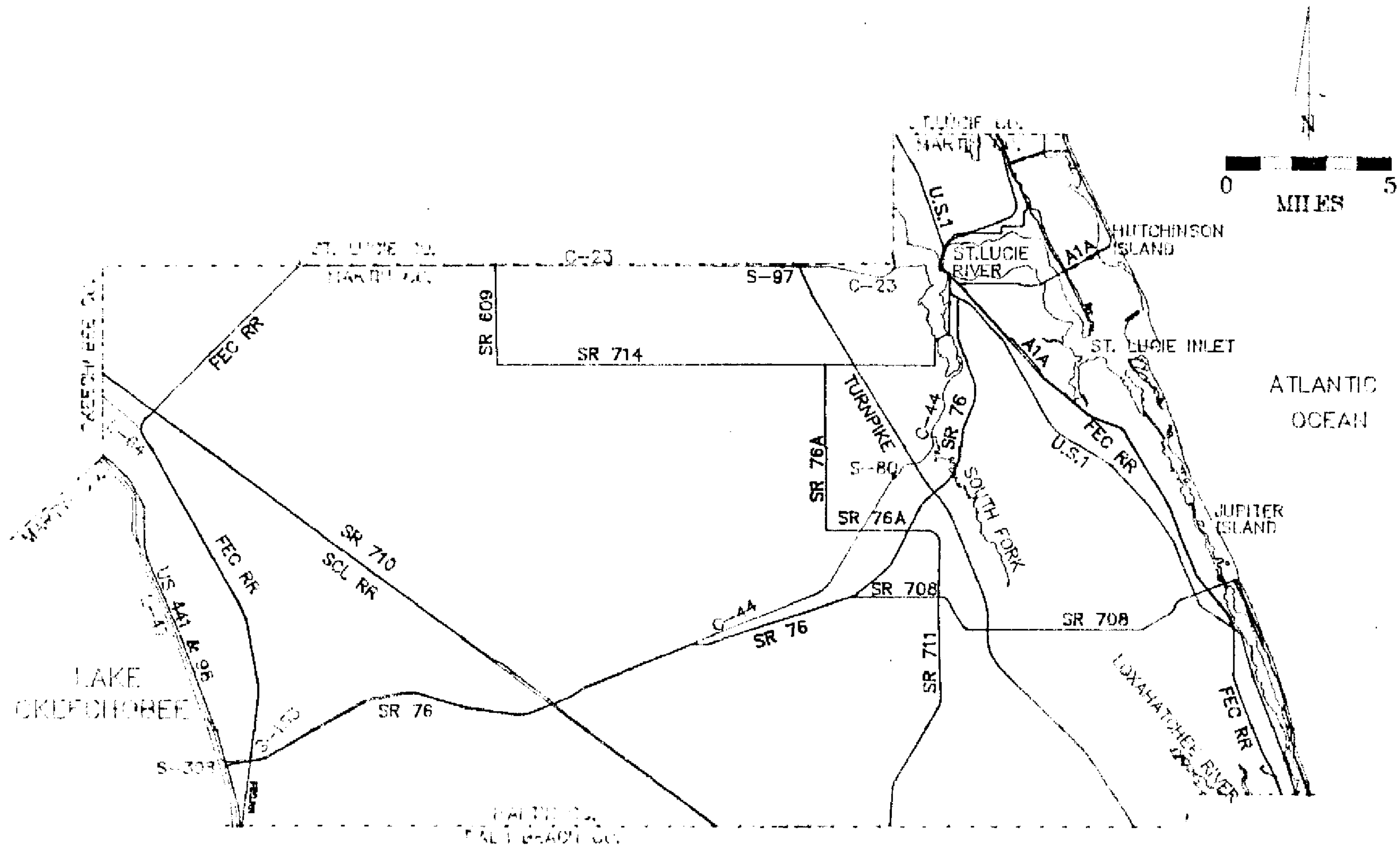

Figure 9-1 MAP OF MARTIN COUNTY

TABLE 9-1. GENERALIZED HYDROGEOLOGY OF MARTIN COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFER-ENTIATED DEPOSITS	20-40	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	MEDIUM TO FINE GRAINED QUARTZ SAND
	ANASTASIA FORMATION		MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	SANDY COQUINA
	FT. THOMPSON FORMATION	130-150	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	ALTERNATING MARINE, BRACKISH, AND FRESH WATER MARLS
	CALOOSA-HATCHEE FORMATION		LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	SANDY MARL, CLAY, SILT,SAND, AND SHELL BEDS
INTERMEDIATE CONFINING ZONE	TAMIAMI FORMATION	350-600	LOW TRANSMISSIVITY	SANDY BIOGENIC LIMESTONES WITH MINOR PERCENTAGES OF SPARRY CALCITE, AND DOLOMITE
	HAWTHORN GROUP		IMPERMEABLE	GRAY GREEN SANDY CLAY WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2800-3400	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

intrusion has occurred. Figure 9-5 delineates the extent of salt water intrusion in Martin County as of 1982.

Hardness concentrations range from a low of 5 MG/L to a high of 432 MG/L, with an average concentration of 252 MG/L. Areas of high hardness occur along the south fork of the St. Lucie River (Figure 9-6). The ground water from the majority of the county would be considered hard to very hard.

Approximately half of the samples collected exceeded the secondary drinking water standard for iron of 0.3 MG/L. Iron concentrations vary locally, and no general trends were evident from the sampling results. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

An anomalously high manganese concentration of 90 ug/l was detected in well number M-01047. It is believed that the unusually high concentration is due to manganese leached from the well casing material and, therefore, is not representative of the natural conditions in the aquifer.

No purgeable halocarbons or aromatics were detected in any of the samples collected from the Surficial Aquifer System in Martin County.

Floridan Aquifer System

Water from the Floridan Aquifer System in Martin County is high in sodium, chloride, and other dissolved constituents, and is generally nonpotable unless treated by RO filtration. In most areas of the county the concentrations of chlorides and total dissolved solids exceeded the secondary drinking water standards. Sodium values from the two wells sampled as part of the ambient network were above the primary drinking water standards. Water from the Floridan Aquifer System is, however, suitable for most irrigation uses.

Total dissolved solids concentrations within the Floridan Aquifer System in Martin County are shown in Figure 9-7 (Brown and Reece, 1979). These concentrations range from a low of 500 MG/L to a high of over 3,000 MG/L. The drinking water standard for total dissolved solids is 500 MG/L.

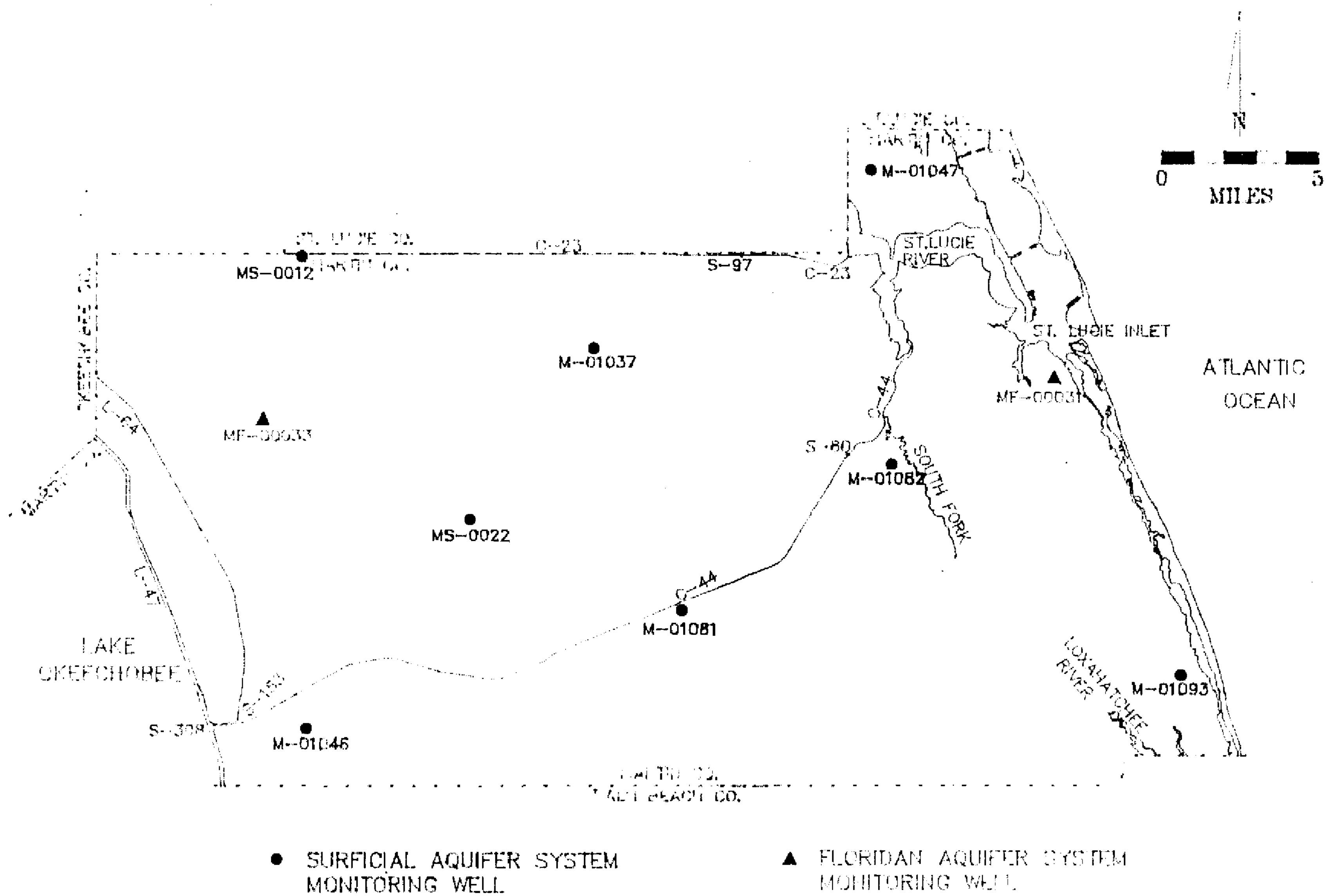

Figure 9-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

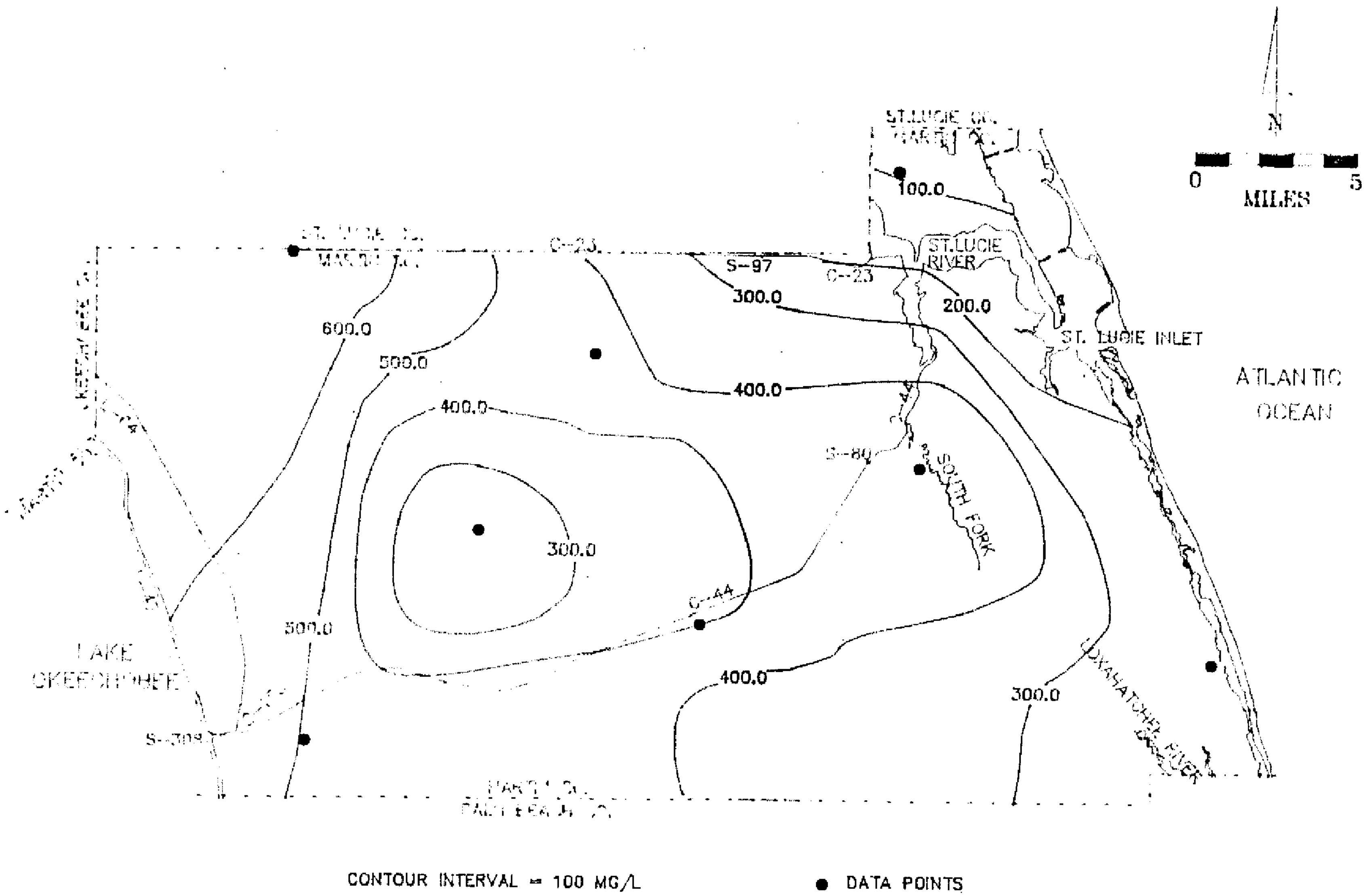

Figure 9-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

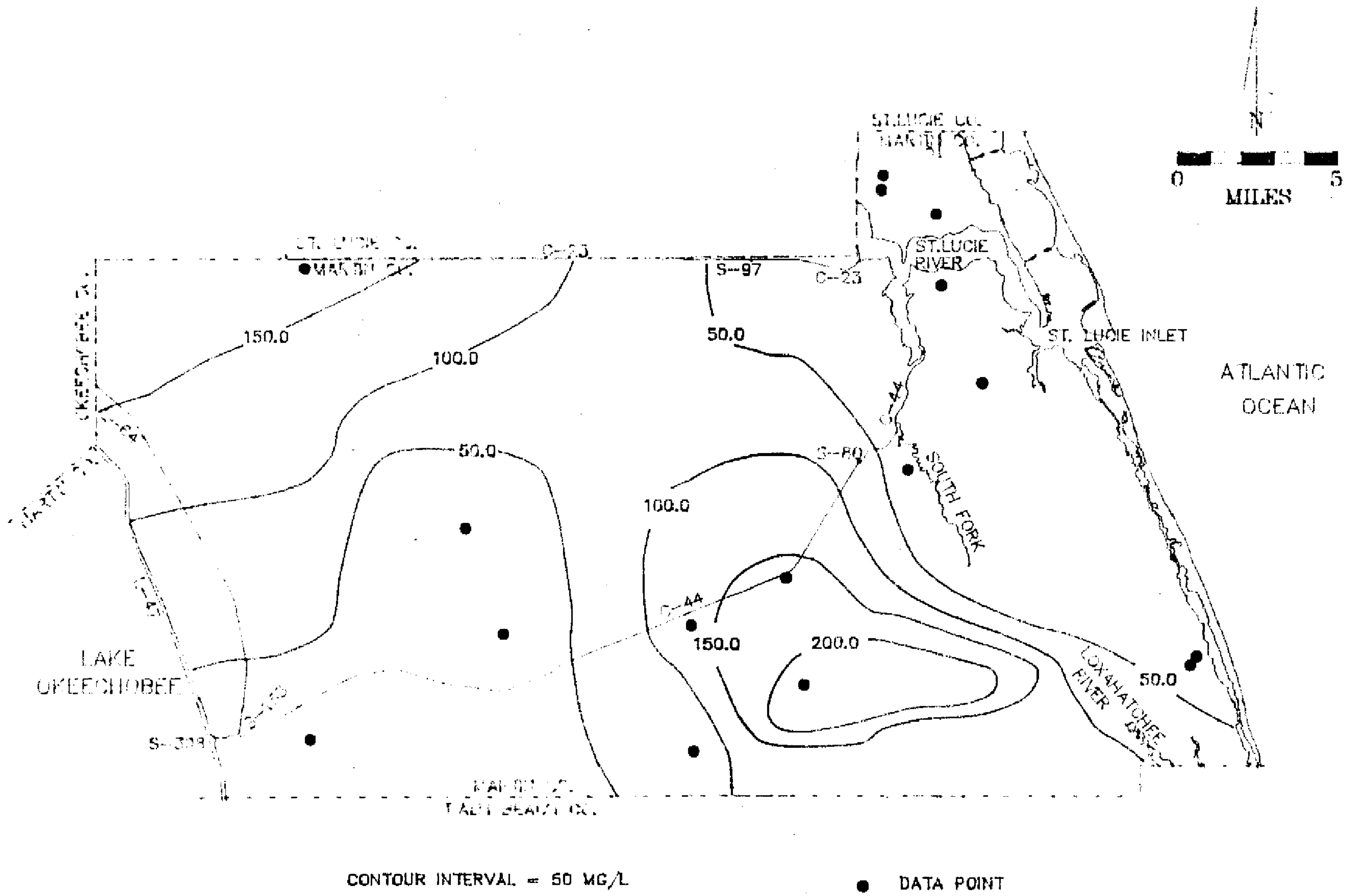

Figure 9-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

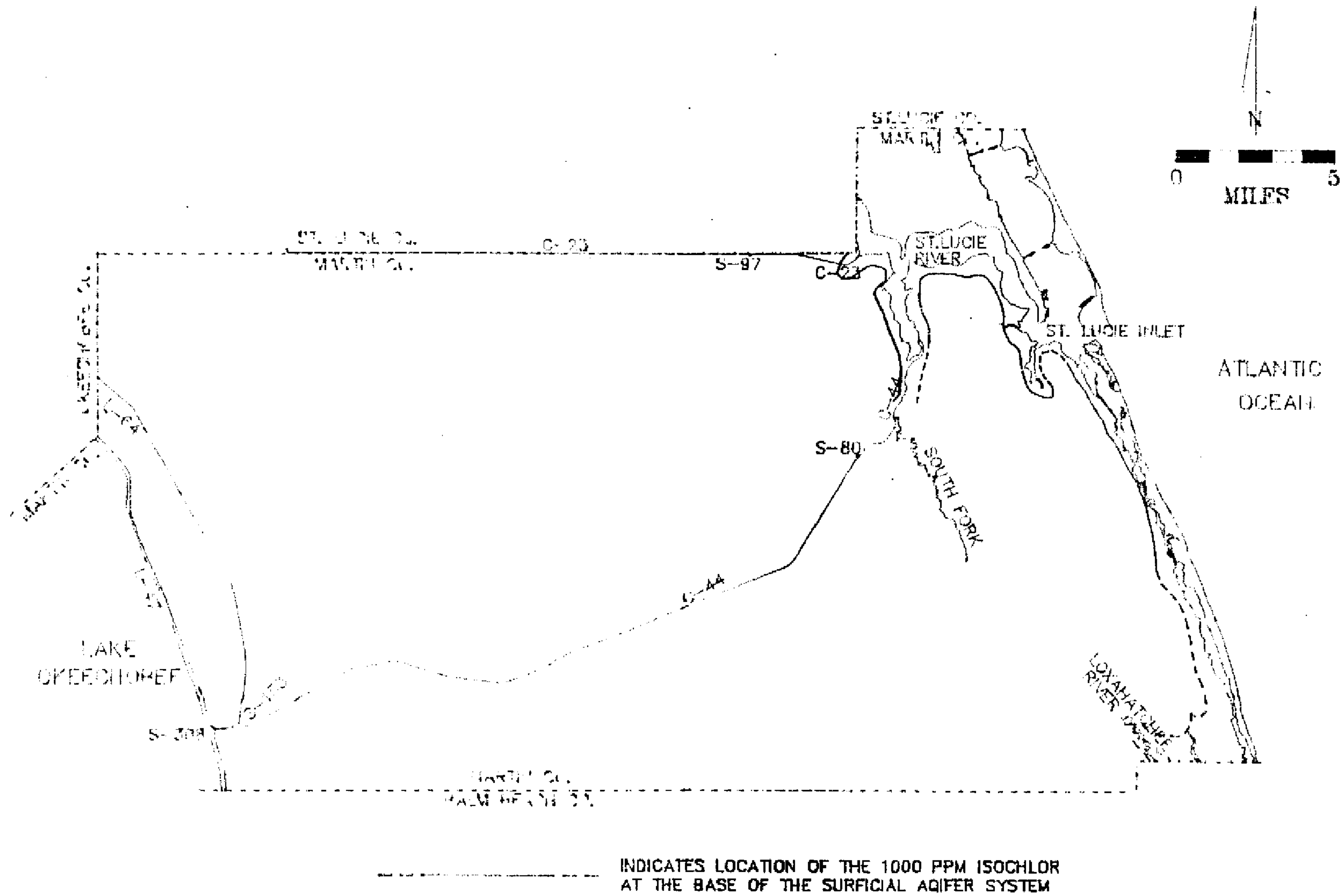

Figure 9-5 EXTENT OF SALT-WATER INTRUSION (1982)

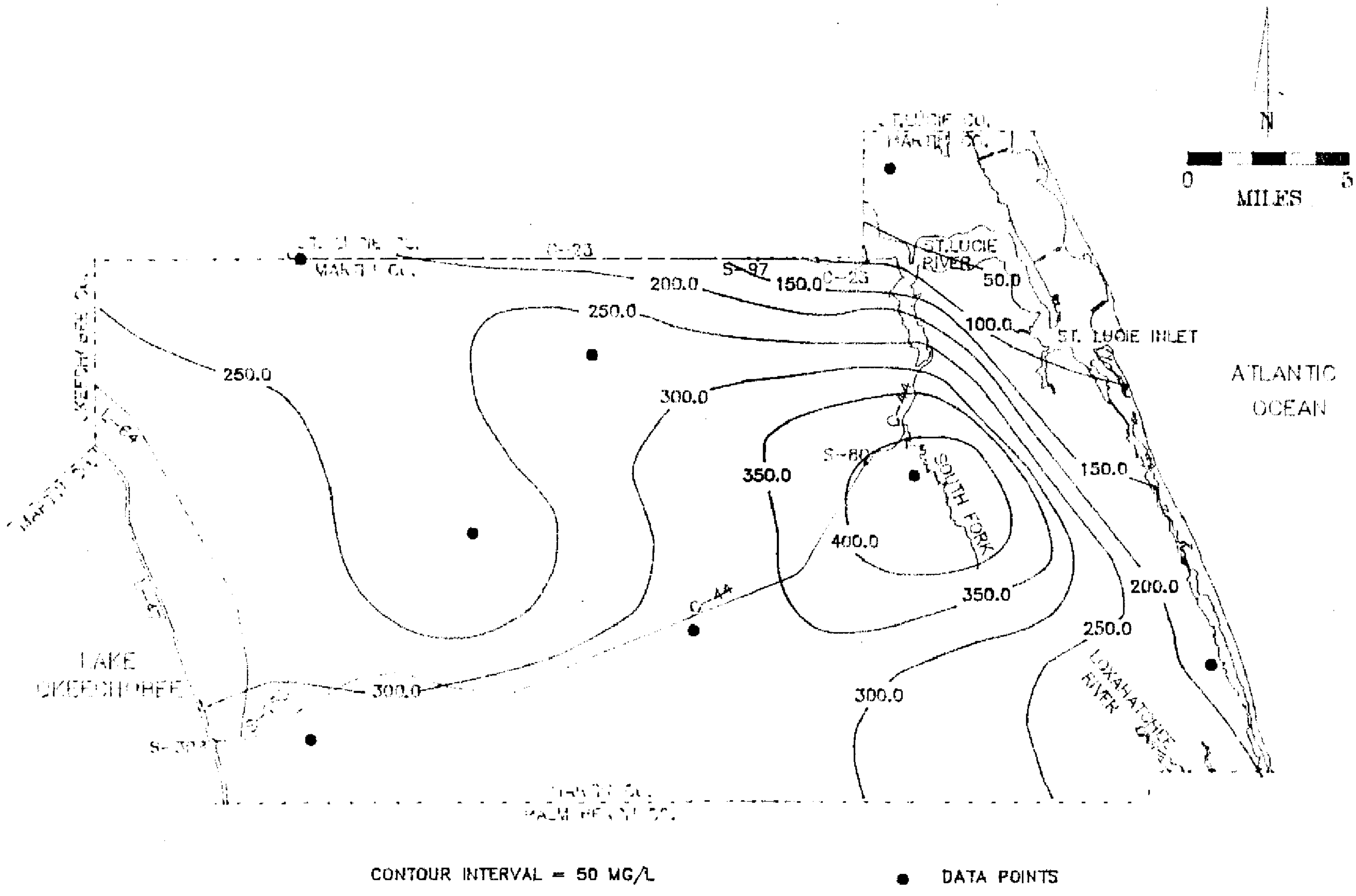

Figure 9-6 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

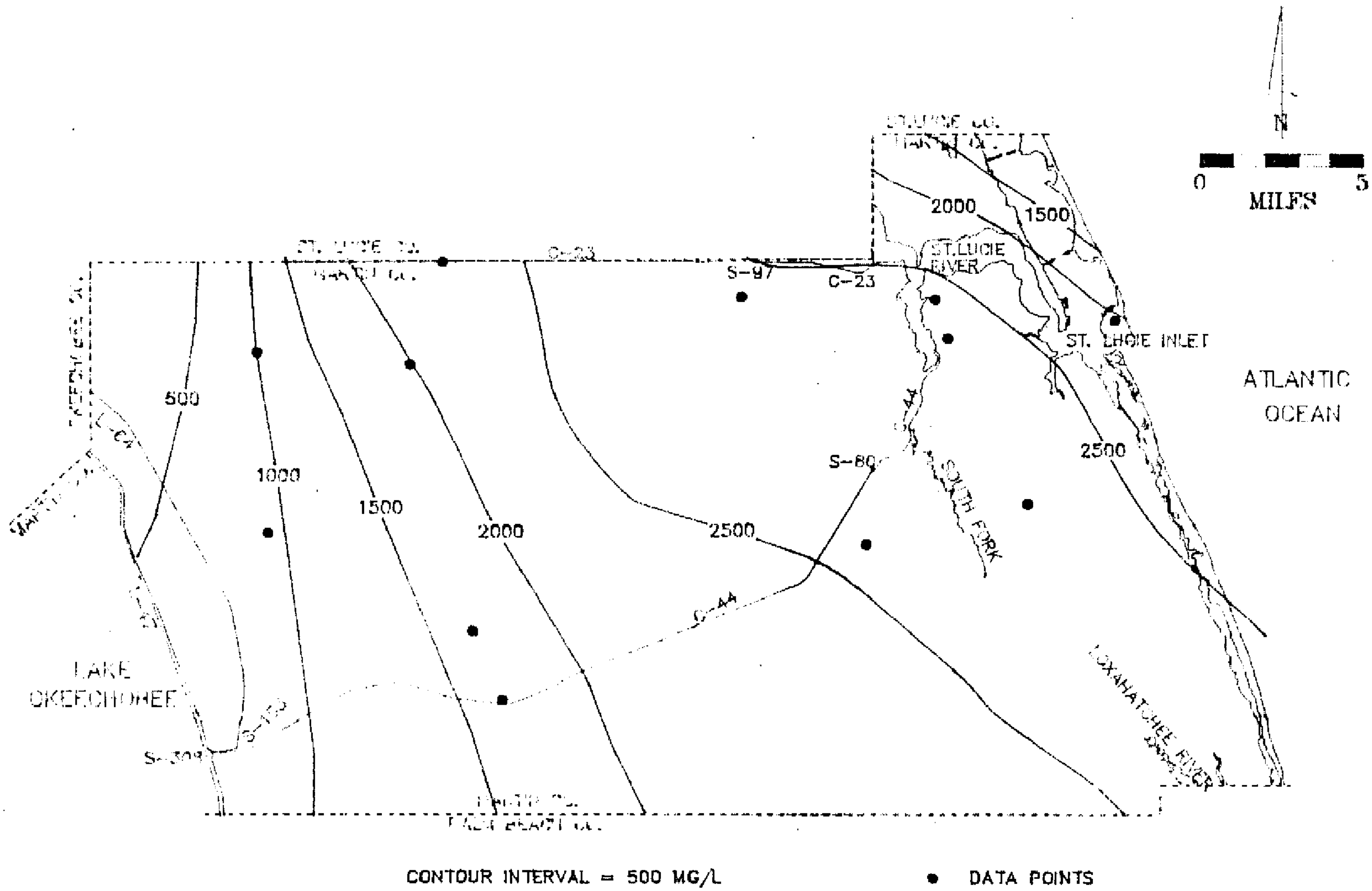

Figure 9-7 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM (FROM BROWN AND REECE, 1979)

Chloride concentrations within the Floridan Aquifer System in September of 1977 ranged from a low of approximately 200 MG/L to a high of over 1,400 MG/L, Figure 9-8 (from Brown and Reece, 1979). These concentrations exceed the drinking water standard of 250 MG/L in all areas of the county except along the western border.

Hardness concentrations within the Floridan Aquifer System AGWQMN wells in Martin county range from a low of 124 MG/L to a high of 172 MG/L, with an average concentration of 148 MG/L. These concentrations are in the hard range.

The total dissolved solids and chloride concentrations within the Floridan Aquifer System AGWQMN wells in Martin County agree with the concentrations indicated by Brown and Reece (1979). Both data sets show the best water quality to be in the western portion of the county, and the worst water quality to be in the southeastern portion of the county.

All of the samples collected from Floridan Aquifer System AGWQMN wells exceeded the 160 MG/L primary drinking water standard for sodium. Additionally, one sample had a sulfate concentration of 474 MG/L, which exceeds the secondary drinking water standard for sulfate of 250 MG/L. Although these values exceed drinking water standards, they represent natural conditions within the Floridan Aquifer System.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Floridan Aquifer System in Martin County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells within Martin County are shown in Figure 9-9. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 9-9 shows Stiff patterns for several of the monitor wells in Martin County. The increased ionic strength of water from the Floridan Aquifer System is illustrated by the increased width of the Stiff patterns for that aquifer system. The Stiff patterns for the Surficial Aquifer System are widest along the central axis, indicating a calcium bicarbonate type of water. Conversely the Stiff patterns for Floridan Aquifer System are elongated most prominently along the upper axis, indicating a dominance by the sodium and chloride ions.

SUMMARY AND CONCLUSIONS

There are two major aquifer systems present in Martin County, these are the Surficial Aquifer System and the Floridan Aquifer System. These aquifer systems are separated by the relatively impermeable Hawthorn formation.

The South Florida Water Management District collects water quality samples annually from eight Surficial Aquifer System, and two Floridan Aquifer System Ambient Ground Water Quality Monitor Network wells in Martin County.

Water quality data from these wells indicates that water from the Surficial Aquifer System is of relatively low ionic strength and is dominated by the calcium and bicarbonate ions. The water quality of the Surficial Aquifer System in most areas of Martin County is suitable for drinking water supply.

Water quality data indicates that water from the Floridan Aquifer System is of high ionic strength, and is dominated by the sodium and chloride ions. Floridan Aquifer system water must be treated by RO filtration prior to use for drinking water supply.

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Nealon, D., S. Trost, G. Shih, S. Opalat, A Fan, and B. Adams, 1987. Martin County Resource Assessment: South Florida Water Management District, Special Publication.

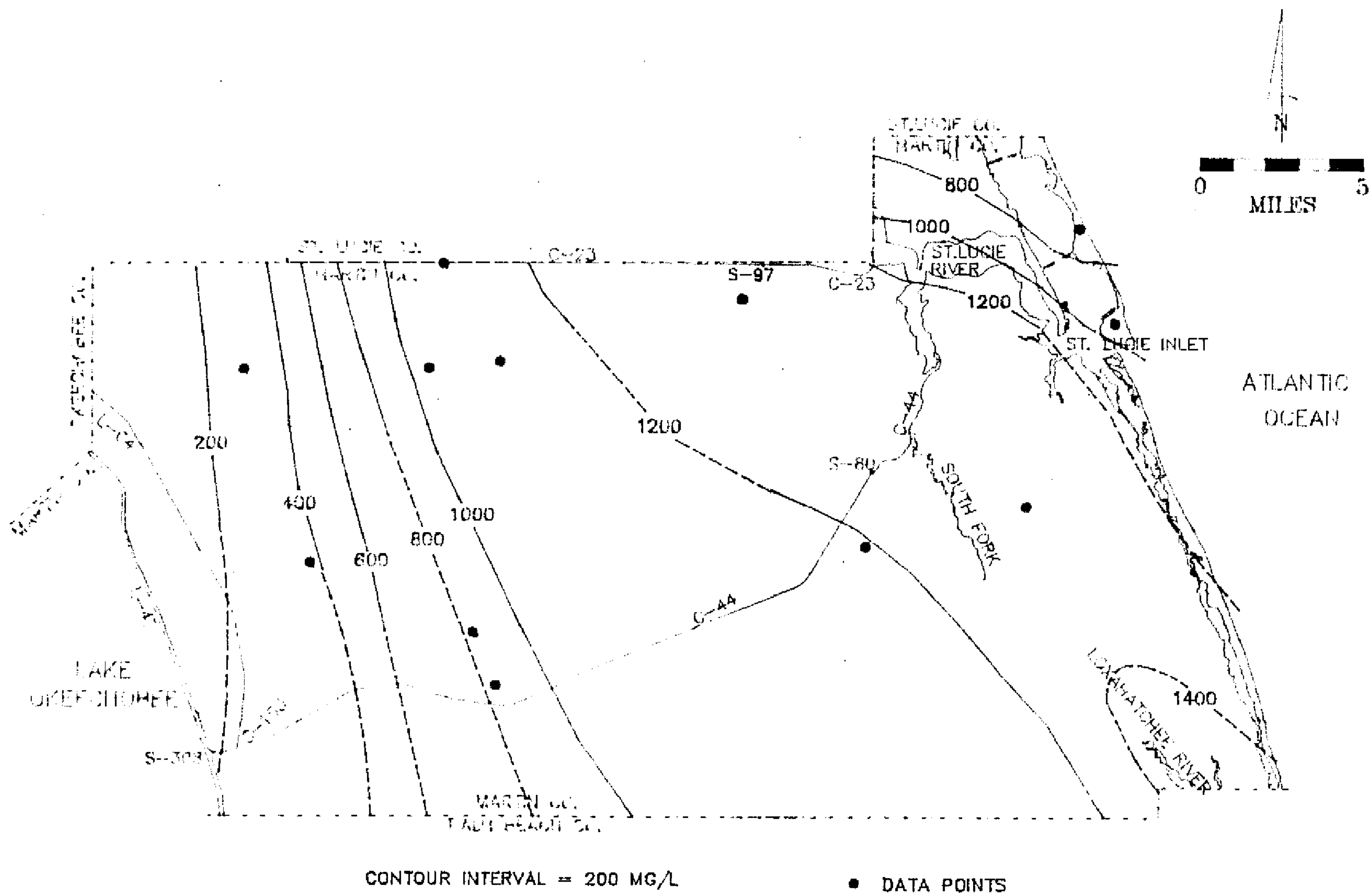

Figure 9-8 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, WELL SAMPLES, FLORIDAN AQUIFER SYSTEM (FROM BROWN AND REECE, 1979)

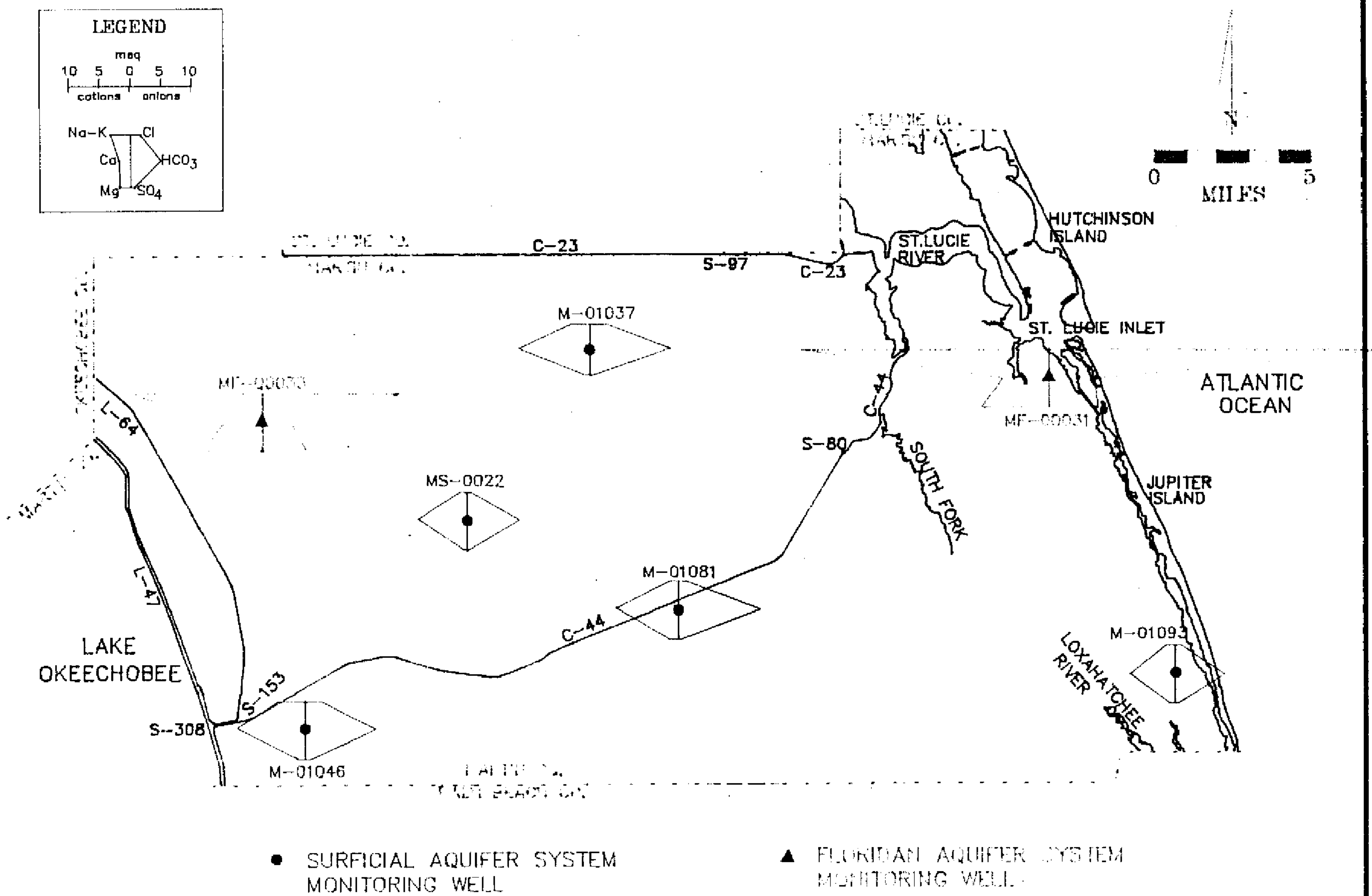

Figure 9-9 STIFF PATTERN DIAGRAMS FROM MONITOR AGWQMN WELL DATA

SECTION 10

MONROE COUNTY

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LOCATION AND EXTENT OF AREA

Monroe County is located on the southern tip of the Florida peninsula, measuring 100 miles from east to west and 90 miles from north to south. The county lies between 25° 50' and 24° 35' north latitude and 81° 50' and 80° 15' west longitude. It is bounded on the north by Dade and Collier Counties, to the west by the Gulf of Mexico, to the south by the Atlantic Ocean, and to the east by Dade County and the Atlantic Ocean (Figure 10-1).

Monroe County can be divided into two distinct zones, the portion on the mainland of Florida; and the Florida Keys which stretch from the mainland 135 miles to the southwest. The portion of Monroe County located on the mainland is predominantly wetlands and contains only a very small portion of the county's population. Everglades National Park and the Big Cypress Basin occupy virtually all of this mainland portion of the county. The Florida Keys are composed of numerous small islands (keys), 97 of which have an area greater than 10 acres. The land area of the Florida Keys totals approximately 105 square miles.

HYDROGEOLOGY

Two aquifer systems are present beneath Monroe County, these are the Surficial Aquifer System and the Floridan Aquifer System. These aquifer systems are separated from one another by the Hawthorn confining zone. Table 10-1 shows a schematic representation of the generalized hydrogeology of Monroe County.

Information on the Surficial Aquifer System beneath the mainland portion of Monroe County is scarce. This area has not been studied in detail because of dense vegetation, swampy conditions, and lack of demand for ground water resources.

The Surficial Aquifer System is present beneath all of the keys, however, on most of the keys the aquifer contains salt or brackish water. A few of the larger islands in the Florida Keys, notably Big Pine Key and Key West, do have limited resources of freshwater in shallow lenses that float on underlying seawater (Hanson, 1980).

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

There are no Ambient Ground Water Quality Monitor Network (AGWQMN) wells in Monroe County. Because of the lack of potable ground water in the Florida Keys it was felt that a monitoring network was not necessary. Ground water quality information from existing literature is briefly discussed in the following sections.

Surficial Aquifer System

The relatively small size of the islands in the Florida Keys, combined with their low elevations and the high permeability of the formations beneath the keys, allows salt water to intrude beneath all of the keys. Shallow lenses of freshwater are present beneath a few of the larger keys, however, these supplies are extremely limited and pumping at a rate of only several thousand gallons per day would quickly exhaust the supplies (Parker, 1955). The only current use of water from these lenses is for lawn watering and

TABLE 10-1. GENERALIZED HYDROGEOLOGY OF MONROE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	BISCAYNE AQUIFER	100-500	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: PREDOMINANTLY POOR	MASSIVE TO CROSS BEDDED LIMESTONE, CORALLINE REEF ROCK, AND ALTERNATING MARINE AND FRESH WATER MARLS
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	300-575	LOW TRANSMISSIVITY	SANDY PHOSPHATIC MARL, INTER-BEDDED WITH CLAY, SHELL MARL, SILT AND SAND
FLORIDAN AQUIFER SYSTEM		240-320	HIGH TRANSMISSIVITY WATER QUALITY: POOR	WHITE TO CREAM, SOFT TO HARD, POROUS AND CAVERNOUS TO DENSE, PARTIALLY RECRYSTALLIZED LIMESTONE WITH FOROMINIFERA PRESENT IN SOME ZONES

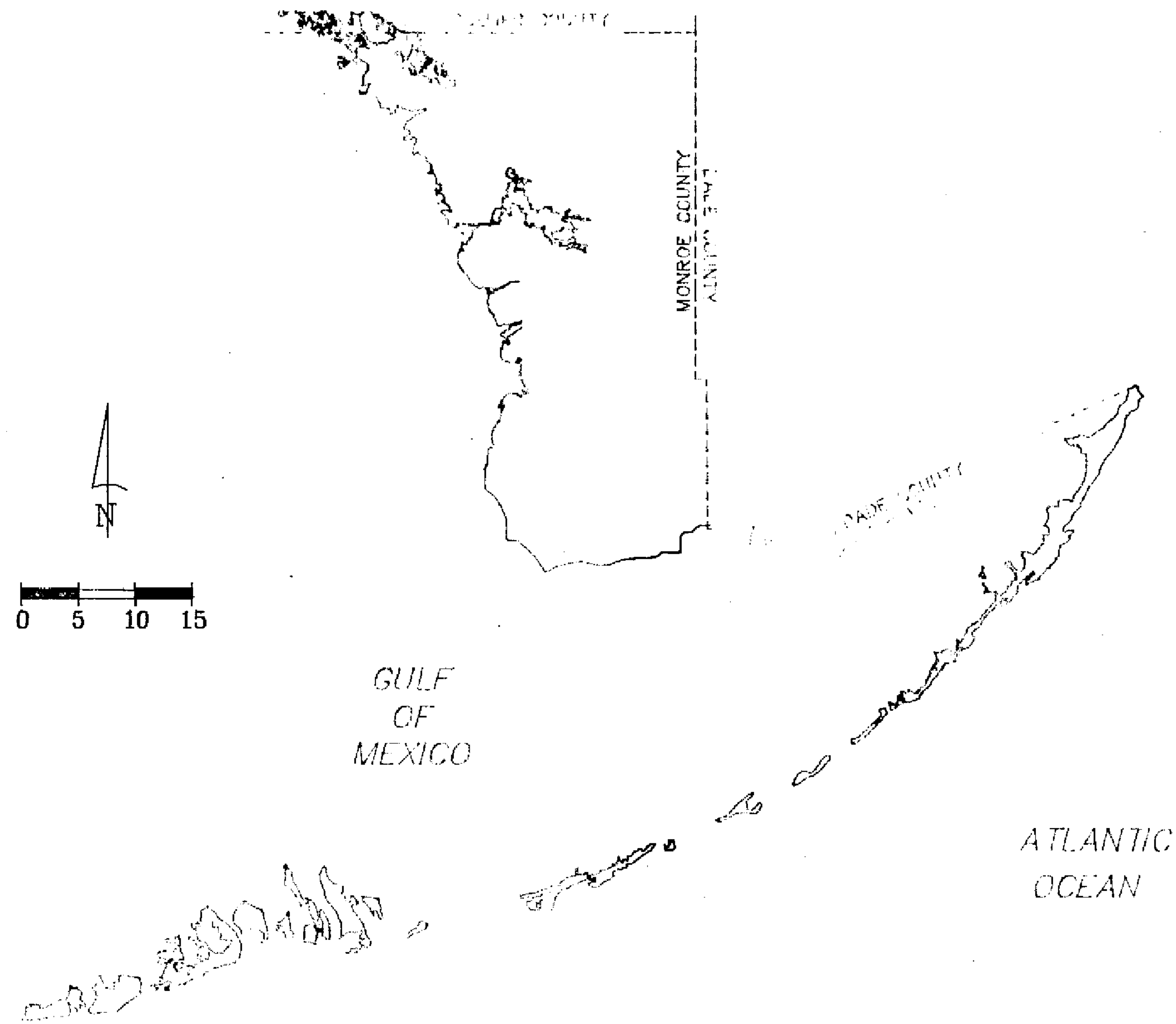

Figure 10-1   MAP OF MONROE COUNTY

for plant nurseries. The water beneath all of the keys has been affected by seawater, and in most areas, has high concentrations of sodium and chloride.

Floridan Aquifer System

The water quality of the Floridan Aquifer System is poor throughout all of Monroe County and decreases in quality to the south. Chloride concentrations within seven wells in the Florida Keys range from 1,600 to 20,000 MG/L. Total dissolved solids concentrations range from 3,430 to 37,500 MG/L (Beaven and Meyer, 1978). A Floridan Aquifer System well in Marathon produced water that was saltier than seawater.

SUMMARY AND CONCLUSIONS

There is little information available for the ground water resources beneath the mainland portion of Monroe County. This area has not been studied in detail because of the lack of demand for ground water resources and the difficult access to most areas.

There is no source of large quantities of potable ground water in the Florida Keys. Drinking water to the Florida Keys is supplied by wellfields in Dade County and is delivered by the Florida Keys Aqueduct Authority pipeline that runs from Dade County to Key West. Desalination plants that produce potable water from seawater provide backup capabilities. Small lenses of freshwater may exist beneath the larger keys, but these lenses can produce only very limited quantities of water.

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SECTION 11

OKEECHOBEE COUNTY

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LOCATION AND EXTENT OF AREA

Okeechobee County is located in the south central portion of the Florida peninsula immediately north of Lake Okeechobee. The county measures 33 miles from east to west and 47 miles from north to south, comprising an area of approximately 780 square miles (Figure 11-1). The county lies between 26° 57' and 27° 40' north latitude and 81° 13' and 80° 40' west longitude. It is bounded on the north by Osceola and Indian River Counties, to the south by Glades County and Lake Okeechobee, to the west by Highlands and Glades Counties, and to the east by Martin and St. Lucie Counties.

HYDROGEOLOGY

Two aquifer systems are present within Okeechobee County that provide drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the thick and impermeable Hawthorn formation. Table 11-1 shows a schematic representation of the generalized hydrogeology of Okeechobee County. Both aquifer systems supply drinking and irrigation water. Throughout most areas of the county the water quality of the Surficial Aquifer System is superior to that of the Floridan Aquifer System.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and high water table all increase the susceptibility of the Surficial Aquifer System to contamination.

The Floridan Aquifer System in Okeechobee County is less vulnerable to contamination from anthropogenic compounds due to a thick sequence of confining layers that are present beneath the Surficial Aquifer System, and the upward hydraulic gradient throughout the county. Because it is a discharge zone, the hydraulic head of the Floridan Aquifer System is greater than that of the Surficial Aquifer System. Therefore, downward flow is impossible unless the gradient is reversed (Nealon et al., 1987). The Floridan Aquifer System is, however, susceptible to water quality degradation from the upconing of poorer quality water from lower formations caused by excessive pumping.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Okeechobee County consists of three Surficial Aquifer System and ten Floridan Aquifer System monitor wells (Figure 11-2). A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 11-1. The results of the inorganic laboratory analysis for the first four years of sampling (1984-1987) are shown in Appendix 11-2.

Surficial Aquifer System

Total dissolved solids concentrations within the Surficial Aquifer System AGWQMN wells in Okeechobee County range from a low of 55 MG/L to a high of 570 MG/L, with an average concentration of 253 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L. However, it may be greater if no other standards are exceeded. Figure 11-3 shows the total dissolved solids concentrations within Okeechobee County. Total dissolved solids concentrations from wells OKLFW-39 and OKLFW-40 were excluded from the analysis due to their proximity to an abandoned landfill. The total dissolved solids concentrations are lowest in western Okeechobee County and increase to the east.

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 11 MG/L to a high of 62 MG/L, with an average concentration of 39 MG/L. Chloride concentrations of the Surficial Aquifer System in Okeechobee County are well below the secondary drinking water standard for chloride of 250 MG/L. Chloride concentrations appear to be lowest in the west-central portion of the county and increase slightly to the east and to the west (Figure 11-4).

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 5 MG/L to a high of 323 MG/L, with an average concentration of 181 MG/L. Figure 11-5 shows the hardness concentrations throughout Okeechobee County. Hardness concentrations are low in the western portion of Okeechobee County and increase to the southeast. These concentrations range from soft to very hard. The wells from western Okeechobee County that yielded soft water are all shallow. It is likely that deeper wells would produce harder water

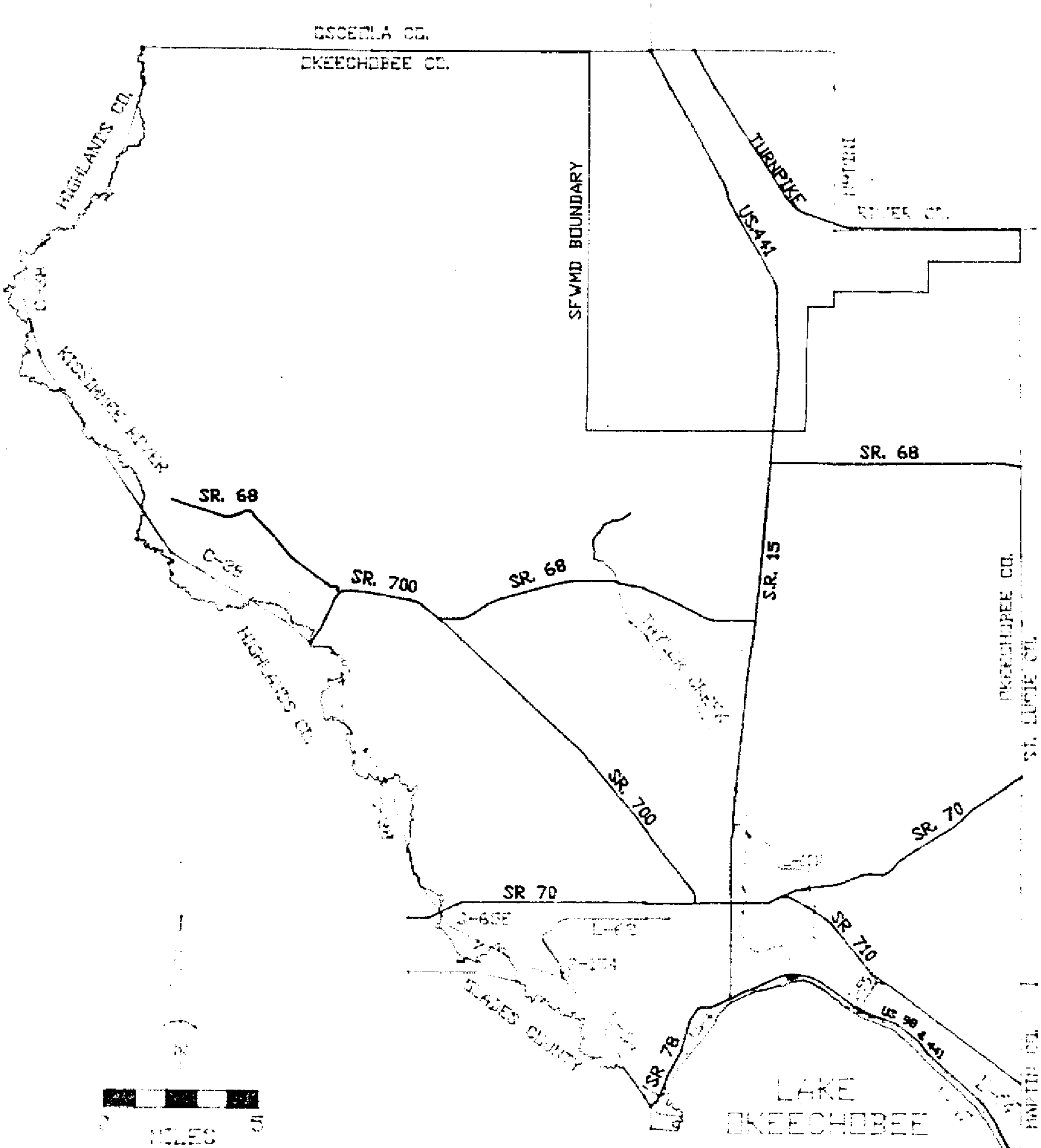

Figure 11-1 MAP OF OKEECHOBEE COUNTY

TABLE 11-1. GENERALIZED HYDROGEOLOGY OF OKEECHOBEE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	10-75	MODERATE TO LOW TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	QUARTZ SAND CONTAINING VARYING AMOUNTS OF MARL AND CLAY
	FT. THOMPSON FORMATION	0-10	LOW PERMEABILITY WATER QUALITY: MODERATE TO POOR	ALTERNATING MARINE, BRACKISH, AND FRESH WATER MARLS
	CALOOSAHATCHEE MARL	0-50	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	SANDY MARL, CLAY SILT, SAND, AND SHELL BEDS
INTERMEDIATE CONFINING ZONE	TAMIAMI FORMATION	0-90	LOW TRANSMISSIVITY	CLAYEY SANDY SHELL MARL, QUARTZ SAND, SANDUY CLAY
	HAWTHORN GROUP	250-700	IMPERMEABLE	GRAY-GREEN SANDY CLAY WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2600-3000	HIGH TRANSMISSIVITY WATER QUALITY: MODERATE TO POOR	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

due to the increasing calcium carbonate content of the aquifer material.

Lead was detected in three Surficial Aquifer System AGWQMN wells at concentrations that exceed the primary drinking water standard of 50 µG/L All of the wells that exceeded drinking water standards for lead are equipped with water level recorders. These recorders use lead weights that often come in contact with the water in the wells. The lead weights are believed to be the source of the increased lead concentrations. Lead concentrations in these wells are not representative of lead concentrations within the aquifer.

All of the Surficial Aquifer System AGWQMN wells within Okeechobee County exceeded the secondary drinking water standard for iron of 0.3 MG/L. Well MR-0189 has a metal casing. The metal casing may be the source of the extremely high iron concentrations within this well. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Benzene was detected at very low levels in two of the Okeechobee County Surficial Aquifer System monitor wells. Benzene was detected in wells OKLFW-39 and OKLFW-40 at concentrations of 7.0 and 7.2 µG/L respectively. In addition, the sample from well OKLFW-39 in which benzene was detected contained Chlorobenzene at a concentration of 4.0 µG/L.

Both of the wells in which the organic compounds were detected are located near the closed landfill and are not representative of background water quality. Both of these wells were sampled on three occasions, and purgeable organic compounds were detected on only one occasion in each well. The landfill is the suspected source of the compounds that were detected. No purgeable organic compounds or aromatic hydrocarbons were detected in any of the other samples collected from Okeechobee County..

Floridan Aquifer System

The water quality of the Floridan Aquifer System in Okeechobee County is variable with the area of best water quality located in the northwestern section of the county. The water quality decreases to the southeast due to increasing concentrations of total dissolved solids and chlorides. In order to more accurately estimate the ground water quality of the

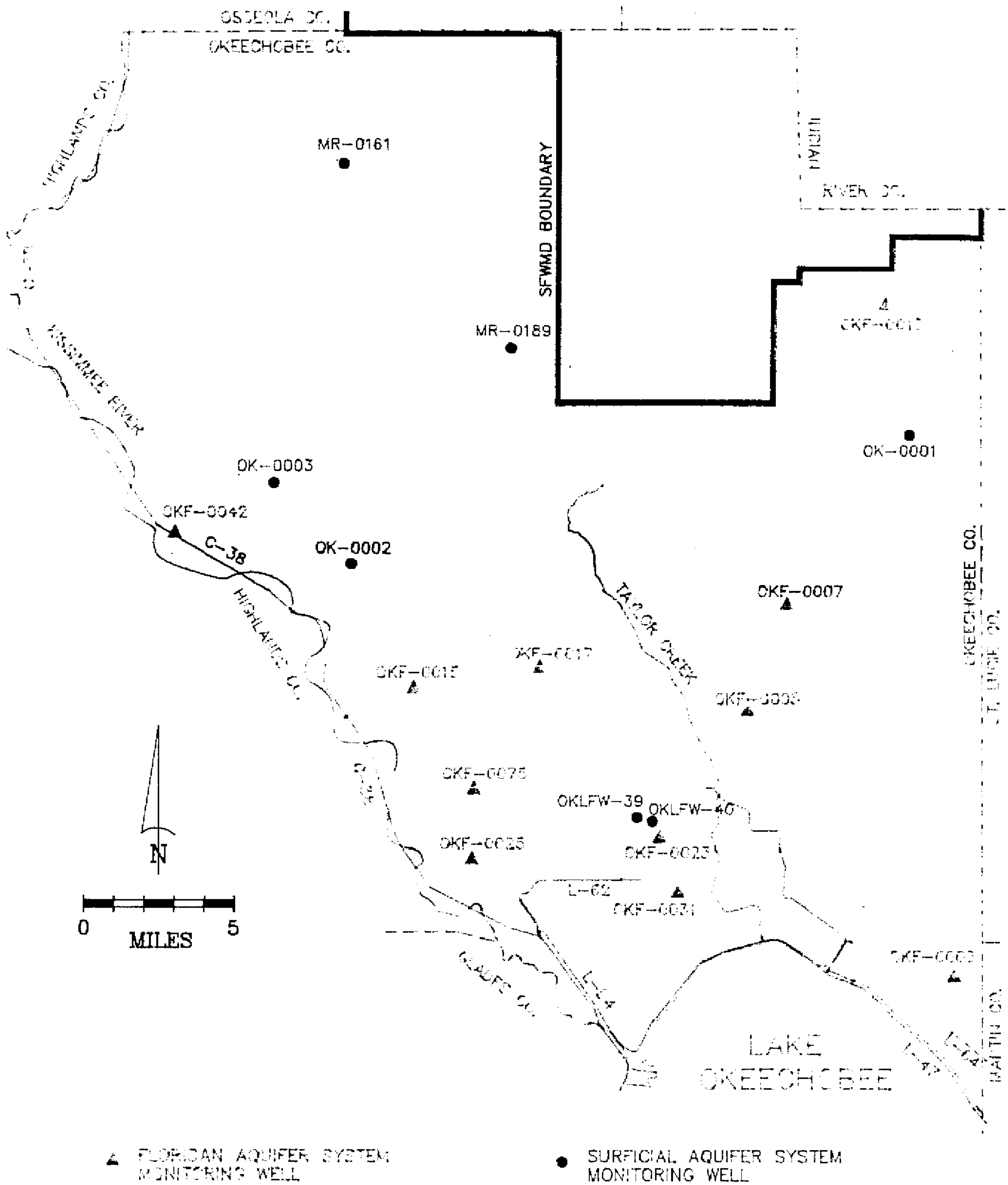

Figure 11-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

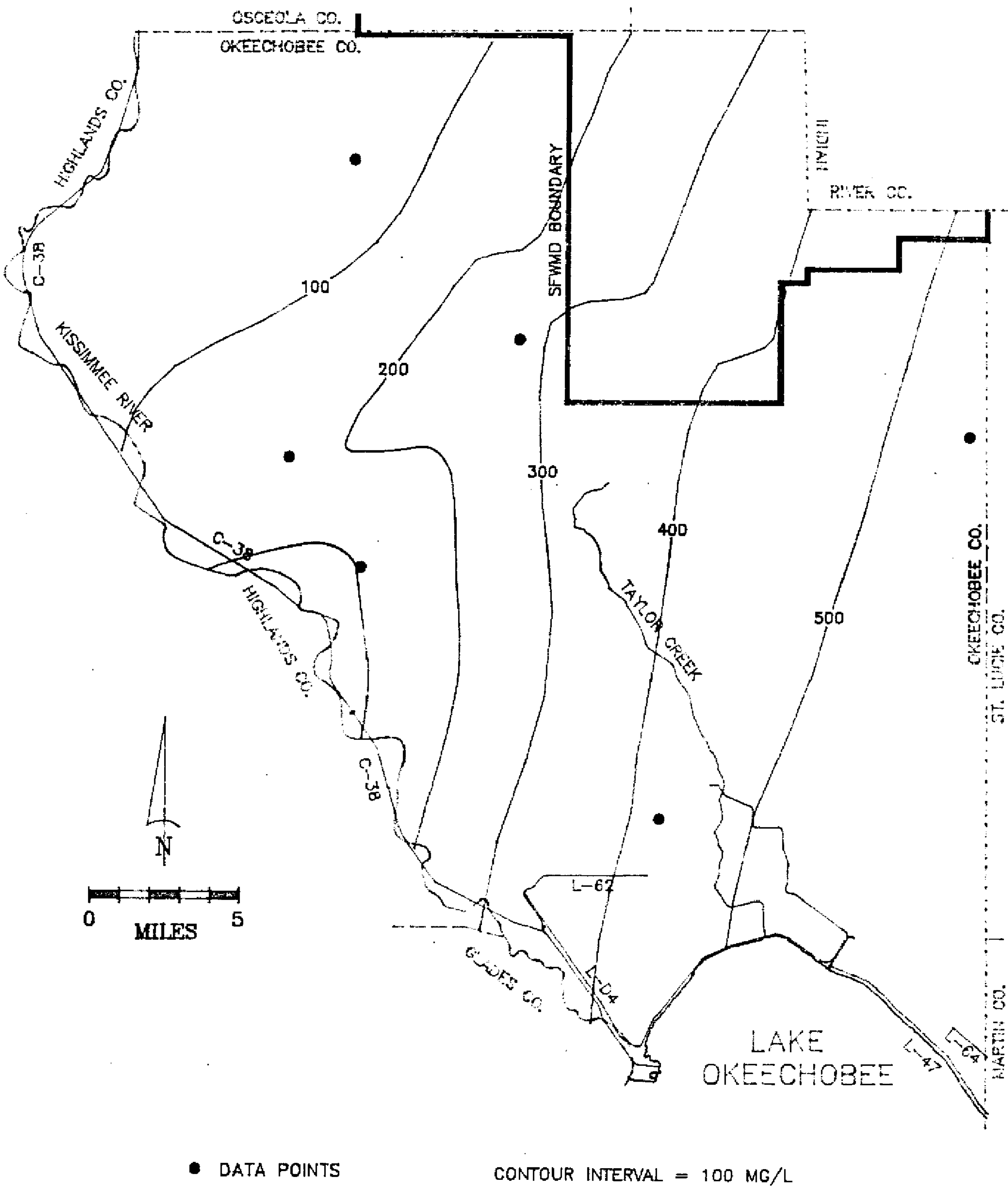

Figure 11-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

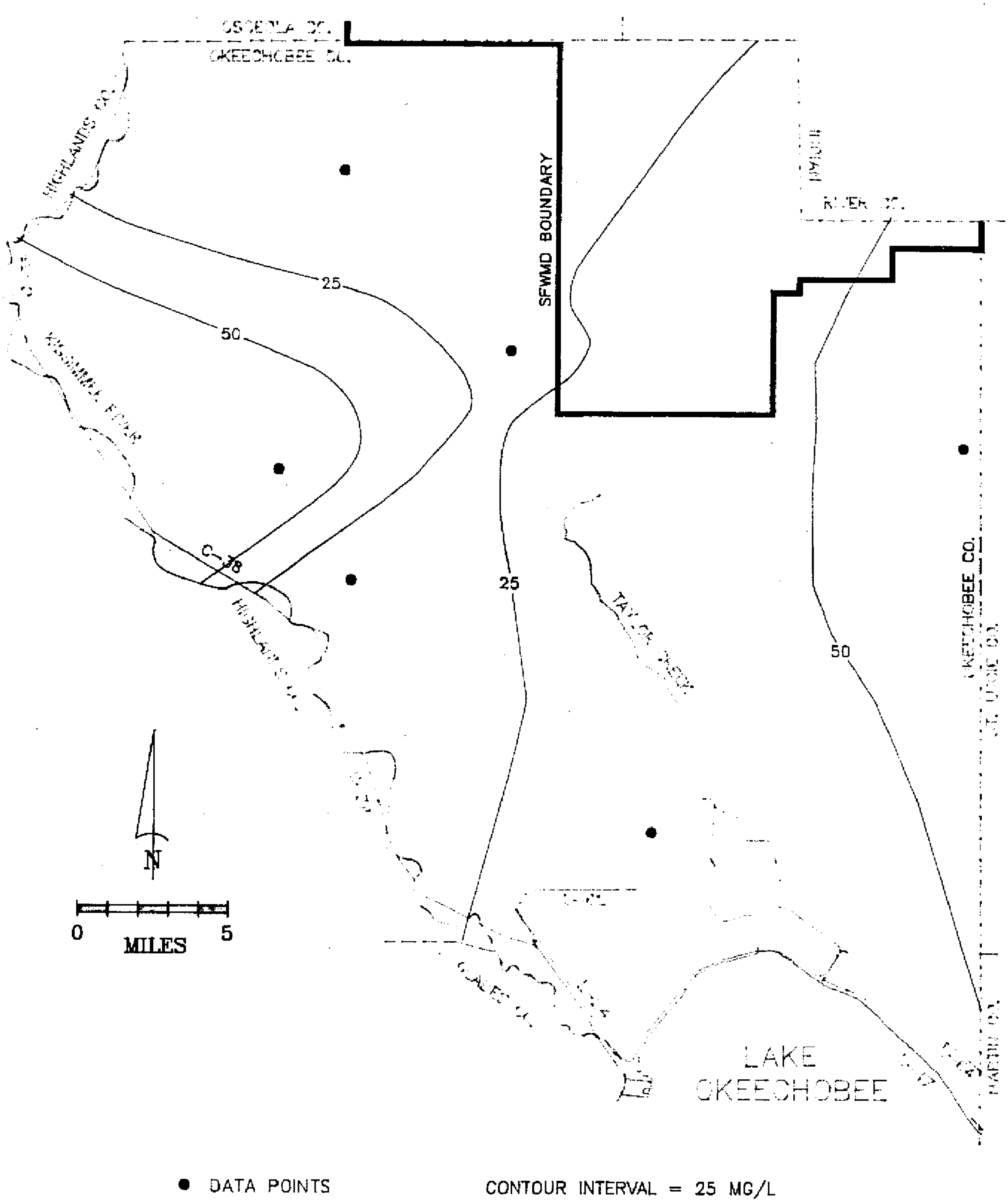

Figure 11-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

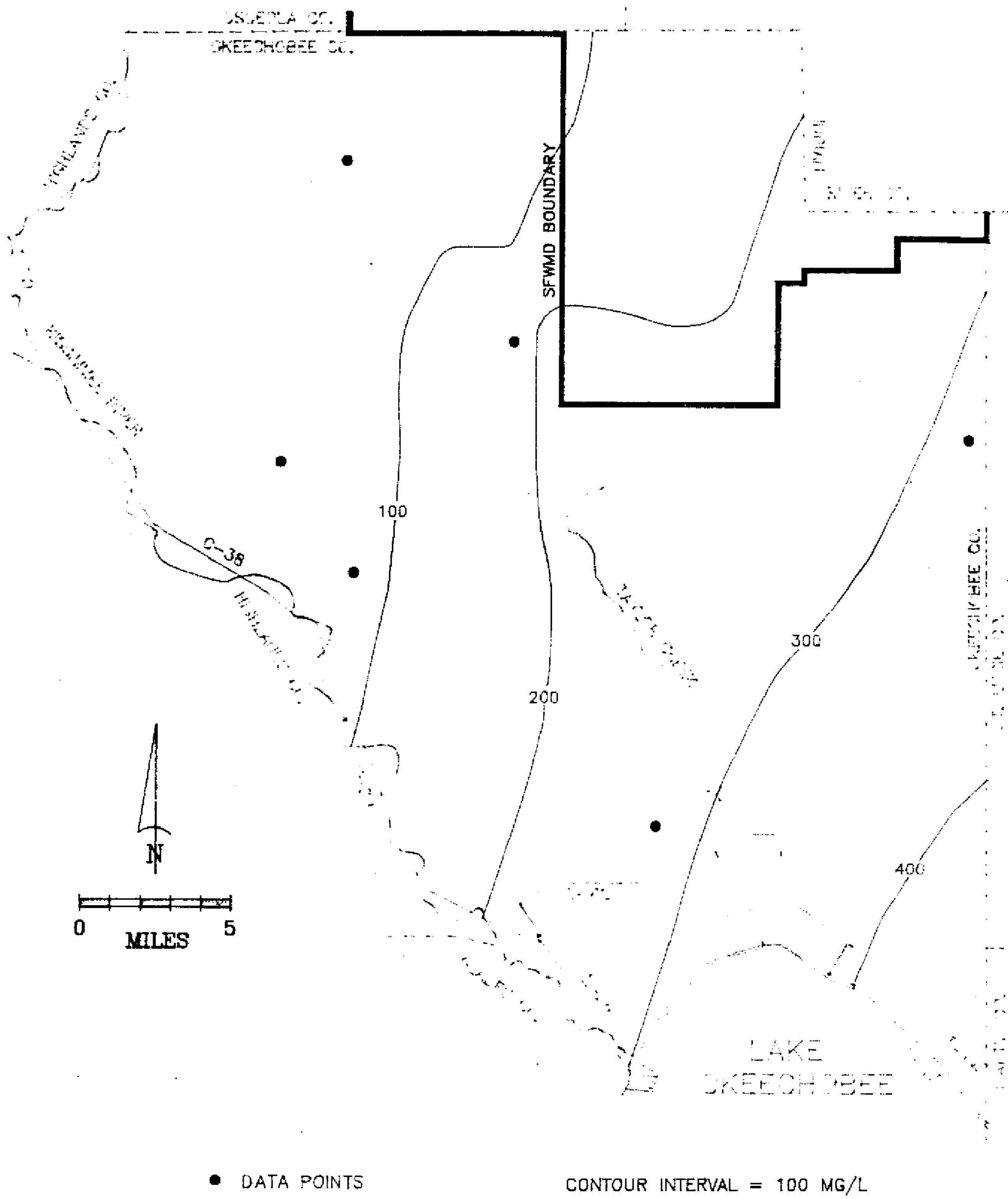

Figure 11-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

Floridan Aquifer System within Highlands County, water quality data and figures from Shaw and Trost, 1984 were used to supplement the AGWQMN Floridan Aquifer System data.

Water quality within the Floridan Aquifer System also decreases with depth. Floridan Aquifer System AGWQMN well OKF-0005 provides an excellent example of the decrease in water quality with depth. The total depth of well OKF-0005 was 1,181 feet below land surface in 1984 when the well was first sampled for the AGWQMN. By the time the second sample was collected in late August 1986, the lower portion of the well had been plugged with cement grout in an attempt to improve water quality. A comparison of the results from the sampling in 1984 with the results of later sampling shows a significant improvement in water quality. Chloride concentrations decreased from 2,150 MG/L in 1984 to approximately 100 MG/L in samples collected in 1986 and 1987. Total dissolved solids decreased from 4,600 MG/L to 560 MG/L, and sodium decreased from 1,050 MG/L to less than 100 MG/L.

The average wellhead total dissolved solids concentration within the Floridan Aquifer System in Okeechobee County is shown in Figure 11-6 (from Shaw and Trost, 1984). Total dissolved solids concentrations range from a low of less than 500 MG/L to a high of over 2,000 MG/L. These values agree with the AGWQMN sampling results listed in Appendix 11-2. The secondary drinking water standard for total dissolved solids is 500 MG/L. The highest concentrations occur in the southern portion of the county within five miles of Lake Okeechobee.

The average wellhead chloride concentration within the Floridan Aquifer System ranges from a low of less than 100 MG/L to a high of over 1,000 MG/L, Figure 11-7 (from Shaw and Trost, 1984). These concentrations exceeded the secondary drinking water standard of 250 MG/L in the southern portion of the county near Lake Okeechobee and in certain localized highs in other areas of the county. These values agree with the Floridan Aquifer System AGWQMN sampling results listed in Appendix 11-2.

Hardness concentrations range from a low of 24 MG/L to a high of 253 MG/L, with an average concentration of 127 MG/L. Hardness concentrations are highest in the northern portion of the county and decrease to the south (Figure 11-8).

One of the three samples collected from AGWQMN well OKF-0042 was slightly below the secondary drinking water standard for pH. A pH value slightly below the secondary drinking water standard is not a health threat but may accelerate the corrosion of plumbing fixtures.

Half of the samples collected from Floridan Aquifer System AGWQMN wells exceeded the primary drinking water standard for sodium of 160 MG/L. Sodium values are lowest in the northwest portion of the county and increase to the south and east. Sodium values above this standard render the water unpotable.

Ten of the thirty samples collected exceeded the secondary drinking water standard for sulfate of 250 MG/L. High sulfate concentrations impart objectionable odors and taste to water.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Floridan Aquifer System in Okeechobee County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells throughout Okeechobee County are shown in Figures 11-9 and 11-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 11-9 shows Stiff patterns for the Surficial Aquifer System AGWQMN wells in Okeechobee County. The emphasis on the middle "axis" of four of these patterns indicates a calcium-carbonate water. The narrow Stiff patterns of well MR-0161 indicates a low ionic strength water with no dominant anions or cations.

Figure 11-10 shows Stiff patterns for the Floridan Aquifer System AGWQMN wells in Okeechobee County. The emphasis on the upper axis in these wells indicates a sodium-chloride water. The increased ionic strength of water from the Floridan Aquifer System is illustrated by the increased width of the Stiff patterns for that aquifer system.

SUMMARY AND CONCLUSIONS

Two major aquifer systems are present within Okeechobee County, these are the Surficial Aquifer System and the Floridan Aquifer System. Water quality samples are collected annually from three Surficial Aquifer System, and ten Floridan Aquifer System, AGWQMN wells within Okeechobee County.

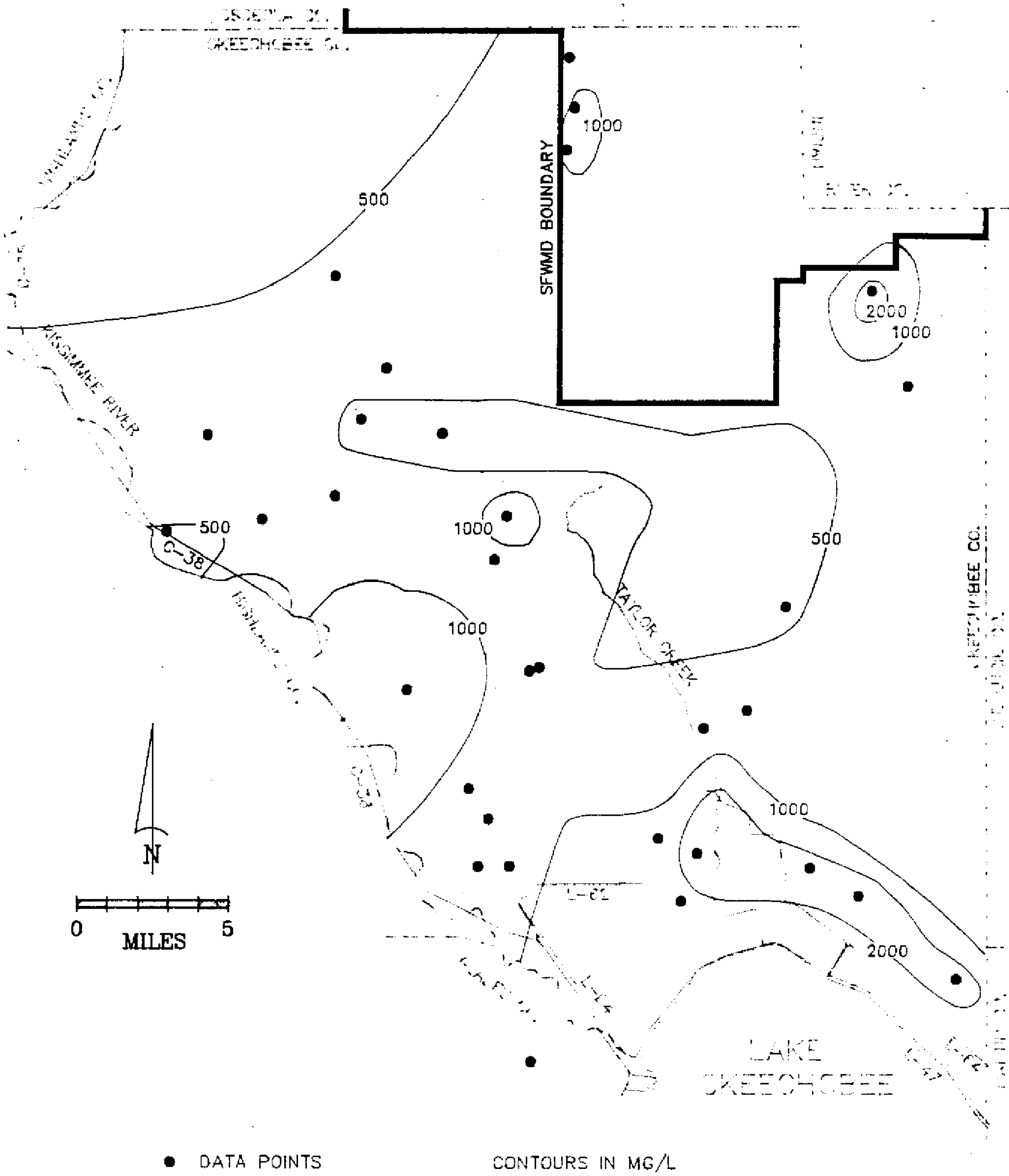

Figure 11-6 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

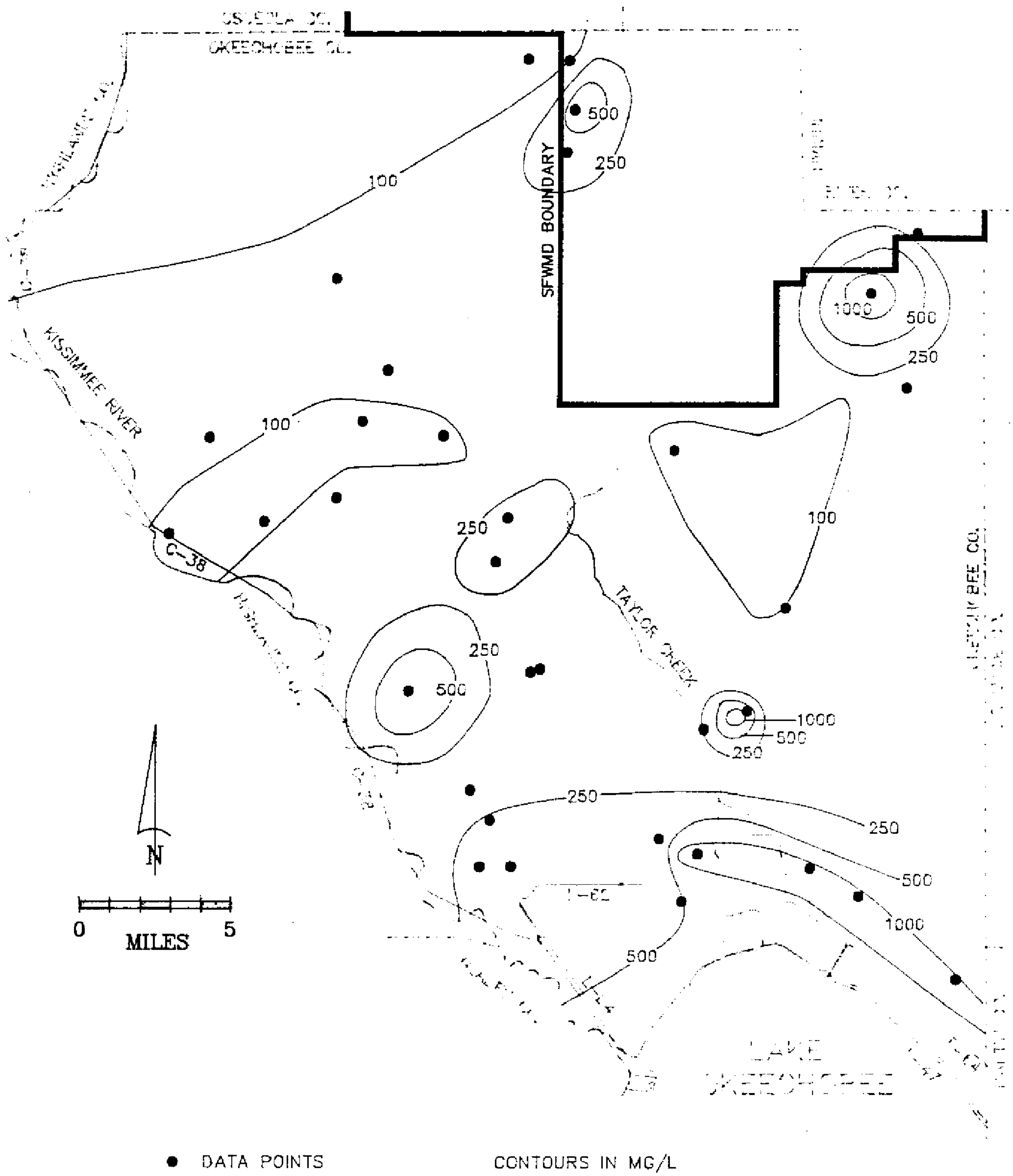

Figure 11-7 CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

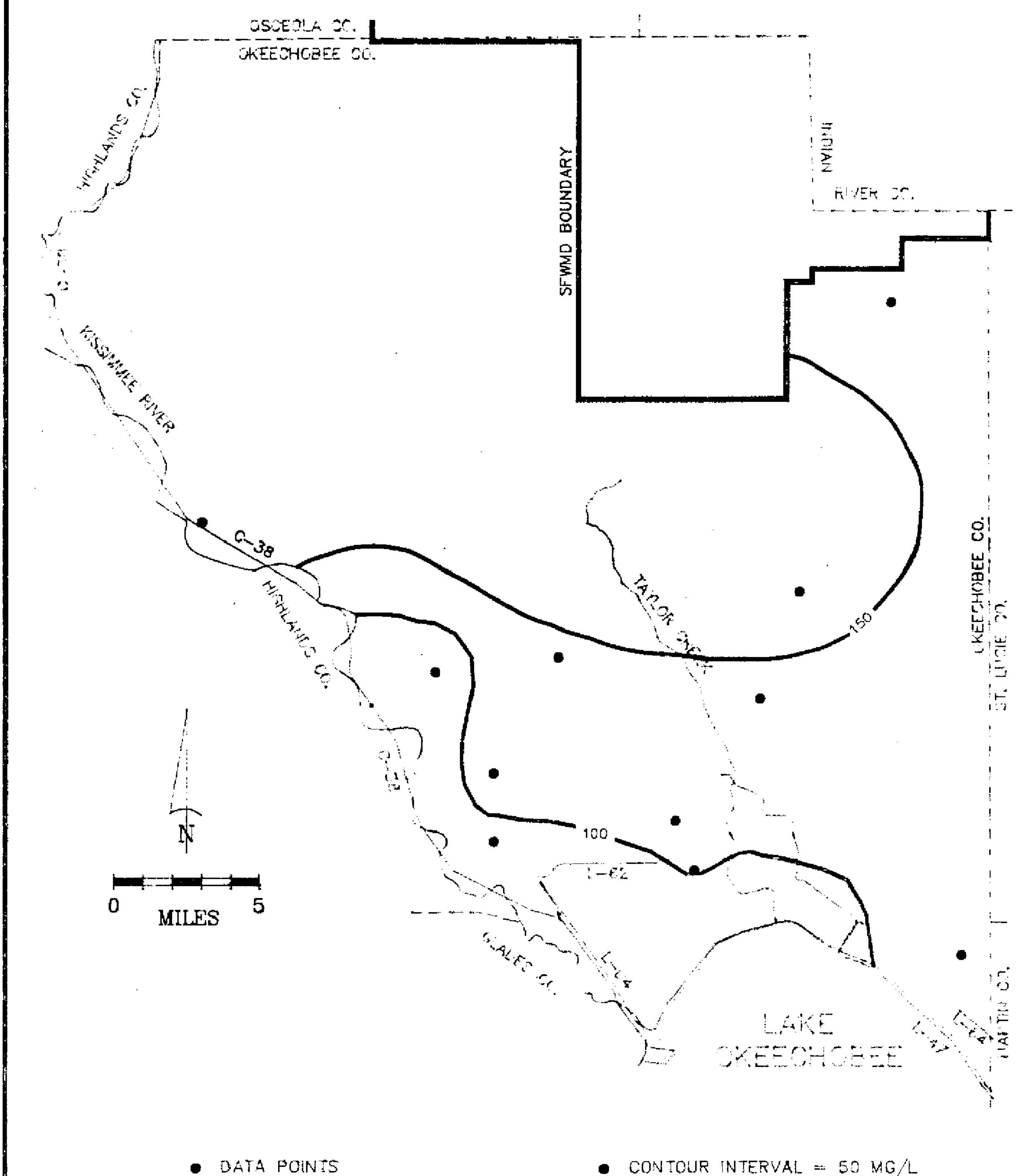

Figure 11-8 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

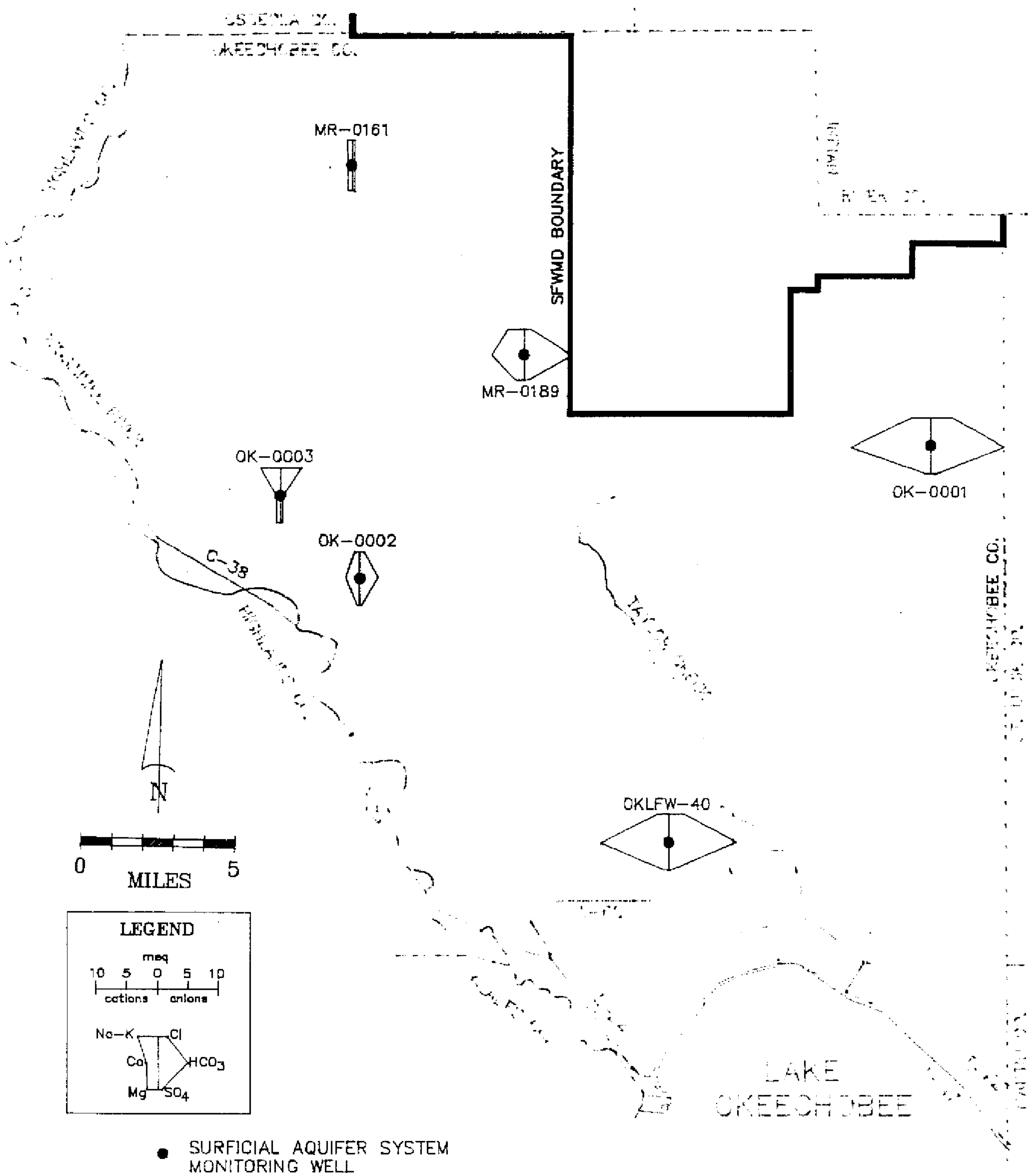

Figure 11-9 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

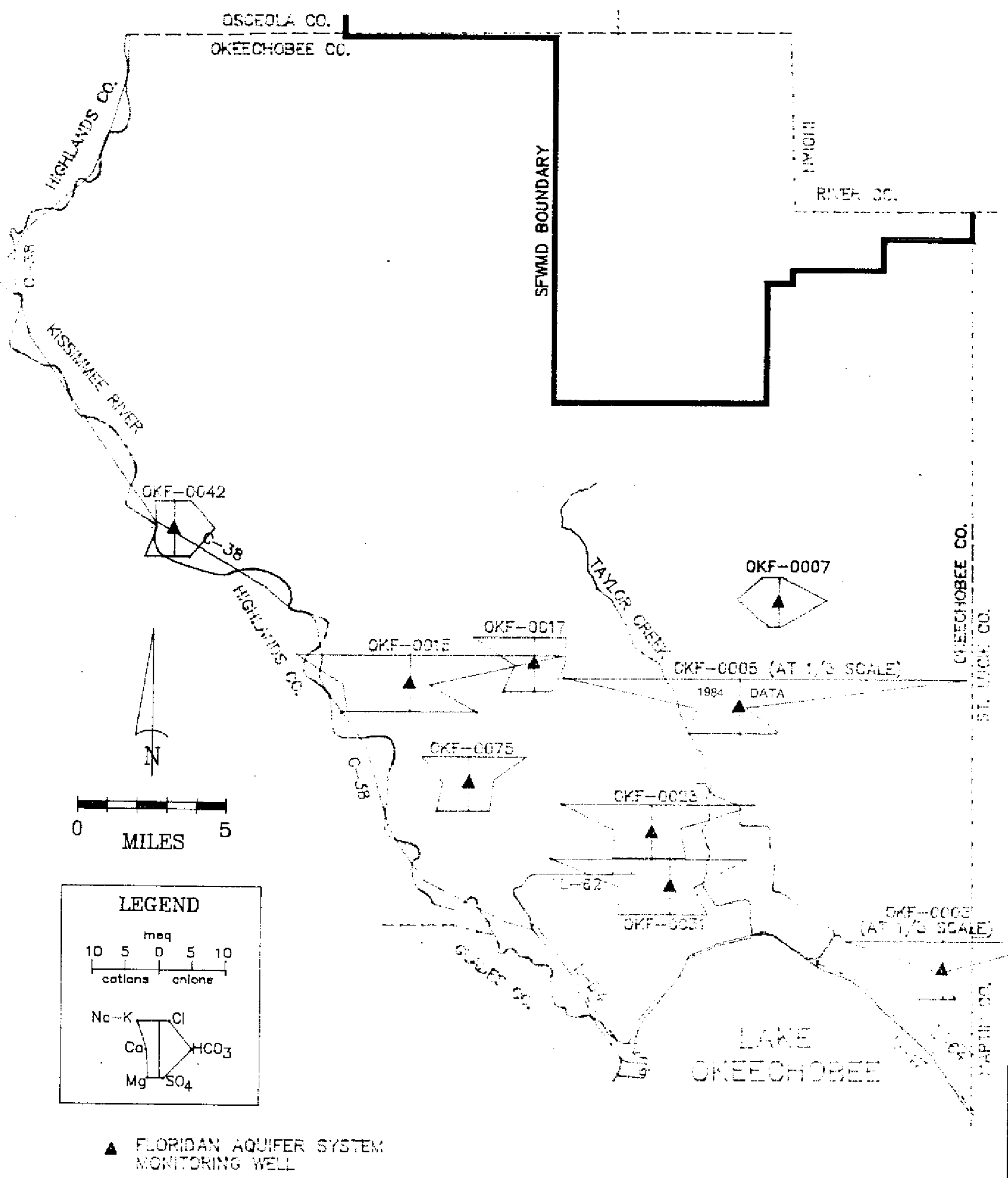

Figure 11-10 **STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM**

Water quality data from these wells indicates that water from the Surficial Aquifer System is of relatively low ionic strength and is dominated by the calcium and bicarbonate ions. The water quality of the Surficial Aquifer System in most areas of Okeechobee County is suitable for drinking water supply.

AGWQMN water quality data indicates that water from the Floridan Aquifer System is of higher ionic strength and is dominated by the sodium and chloride ions. Water quality within the Floridan Aquifer System deteriorates to the south and southeast and with depth within the aquifer.

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SECTION 12

ORANGE COUNTY

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LOCATION AND EXTENT OF AREA

Orange County is located in the south central portion of the Florida peninsula and comprises an area of approximately 1,003 square miles, measuring 48 miles from east to west and 30 miles from north to south. The county lies between 28° 20' and 28° 48' north latitude and 80° 52' and 81° 40' west longitude. It is bounded on the north by Lake and Seminole Counties, to the south by Osceola County, to the east by Brevard County, and to the west by Lake County (Figure 12-1).

The southwestern one-third of Orange County lies within the South Florida Water Management District, the remainder of the county lies in the St. Johns River Water Management District. This section pertains to only the portion of Orange County within the boundaries of the South Florida Water Management District.

HYDROGEOLOGY

Two aquifer systems are present within Orange County that provide drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another throughout most of the county by the Hawthorn formation (Table 12-1).

Throughout most of Orange County the Surficial Aquifer System has lower hardness and chloride concentrations than does the Floridan Aquifer System. However, it does not yield sufficient quantities of water for many applications. Water from the Floridan Aquifer System is generally more mineralized than water from the Surficial Aquifer System. Floridan Aquifer System wells yield much greater quantities of water and provide a reliable source of water during periods of drought.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and a high water table in many areas all increase the susceptibility of this aquifer system to contamination.

The ridge areas of western Orange County (Figure 12-2) are regions of high recharge to the Floridan Aquifer System. The Floridan Aquifer System is most susceptible to contamination by anthropogenic compounds in these areas of high recharge where the confining layer is thin or absent and there is a downward hydraulic gradient.

In areas where the Floridan Aquifer System is overlain by a thick sequence of confining layers it is protected from anthropogenic contamination except where these confining layers are breached by drainage wells or sinkholes. Sinkholes often bridge the confining layers and may offer direct connections between the Floridan Aquifer System and bodies of surface water. Drainage wells also offer this direct connection to the aquifer. These connections can allow contaminants present at land surface to infiltrate the Floridan Aquifer System without being subjected to the attenuation processes that occur within the soil and unsaturated zones.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Orange County consists of four Surficial Aquifer System wells. Figure 12-3 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 12-1. The results of the inorganic laboratory analysis for the first three years of sampling (1985-1987) are shown in Appendix 12-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 57 MG/L to a high of 299 MG/L, with an average concentration of 149 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L. The higher total dissolved solids values were located in the western part of the county (Figure 12-4).

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 2 MG/L to a high of 38 MG/L, with an average concentration of 20 MG/L. These concentrations are well below the secondary drinking water standard for chloride of 250 MG/L. Figure 12-5 shows the chloride concentrations to be highest in the east and in a small pocket in south-central Orange County. This figure was generated using data from wells in Osceola County in addition to the wells shown.

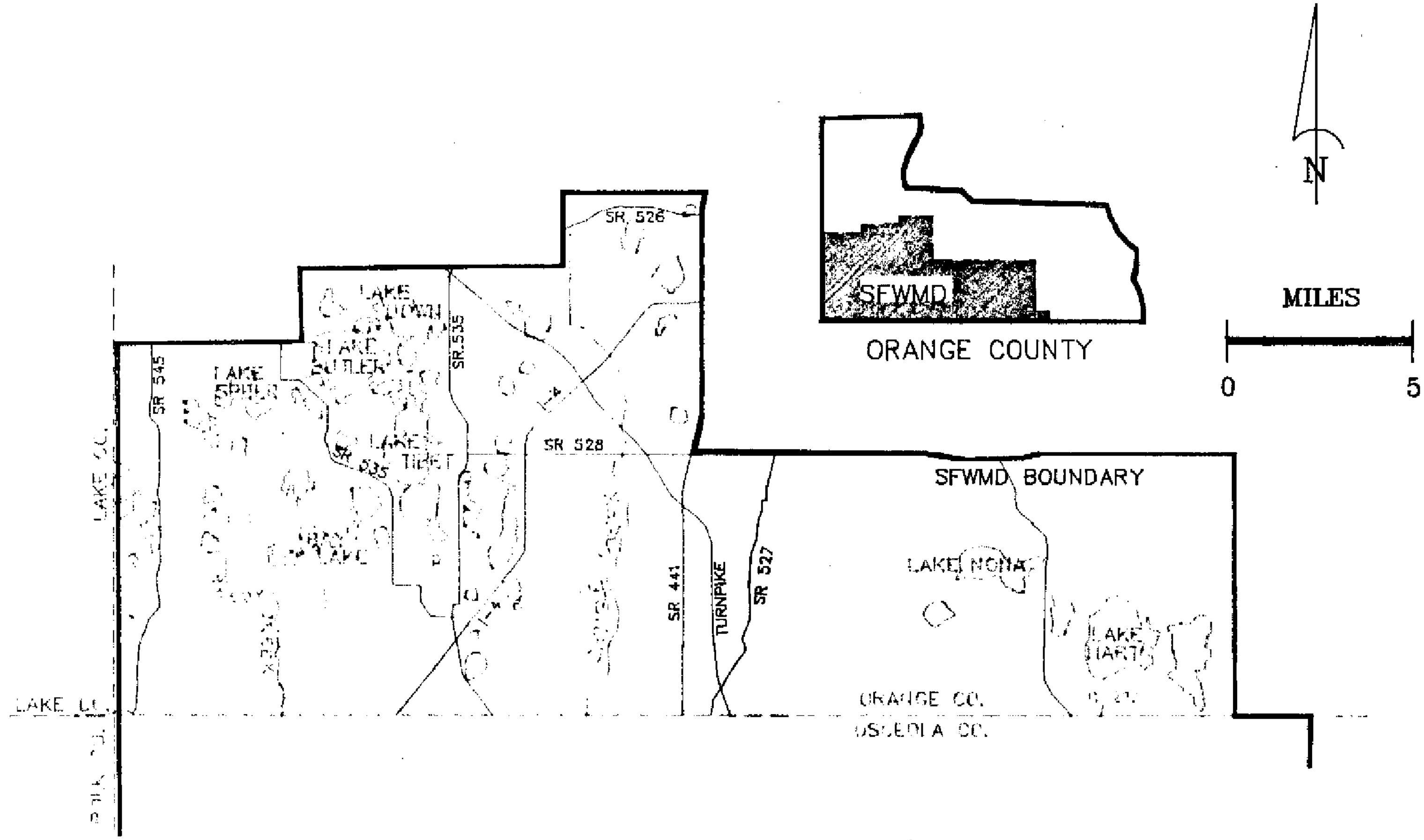

Figure 12-1 MAP OF ORANGE COUNTY

TABLE 12-1. GENERALIZED HYDROGEOLOGY OF ORANGE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	0-80	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: VARIABLE	QUARTZ SAND WITH VARYING AMOUNTS OF CLAY AND SHELL
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	0-200	LOW PERMEABILITY TO IMPERMEABLE	GRAYISH-GREEN SANDY CLAY, WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2200-2600	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 5 MG/L to a high of 142 MG/L, with an average concentration of 63 MG/L. Areas of high hardness occur in the western portion of the county and decrease to the east (Figure 12-6). The ground water in the majority of the county falls in the soft to moderately hard category.

The pH of two Surficial Aquifer System AGWQMN wells sampled in Orange County were below the minimum allowable secondary drinking water standard of 6.5.

All of the Surficial Aquifer System AGWQMN wells exceeded the secondary drinking water standard for iron of 0.3 MG/L on at least one occasion. Three of these wells, MR-0004, OR-0003, and OR-0004 have metal casings that contributed to the high iron concentrations.

Total iron concentrations in several wells are significantly higher than the dissolved iron concentrations. The wells with extremely high total iron concentrations were very turbid when sampled. The high total iron concentrations are probably due to iron that dissolves from the surface of suspended sediments when the sample is preserved with acid. The dissolved iron samples are filtered prior to acidification and the suspended sediments are removed before metals are dissolved from their surface.

Iron concentrations tend to vary locally over short distances. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

High chromium concentrations were detected in wells MR-0004 and OR-0004. Both of these wells have metal casings that are likely sources of the chromium.

High manganese concentrations were detected in wells MR-0004, OR-0003, and OR-0004. These high manganese concentrations coincide with high total iron concentrations and may be due to the same process of a metal coating on suspended sediments being dissolved into solution when the sample is preserved with acid. All three of these wells have metal casings that may be the initial source of the manganese coating on suspended sediments.

Lead was detected in three wells at concentrations exceeding the primary drinking water standard. Well MR-0004 is equipped with a recorder that uses a lead weight to balance a float that measures the water level. This lead weight often comes in contact with the water and is the probable source of the increased lead concentrations. The source of the high lead levels in the other two wells is not apparent. However, the wells do have metal casings. Concentrations in all three wells were highest when the water in the wells was turbid.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the AGWQMN wells in Orange County.

Floridan Aquifer System

No Floridan Aquifer System AGWQMN wells were sampled within Orange County, the description

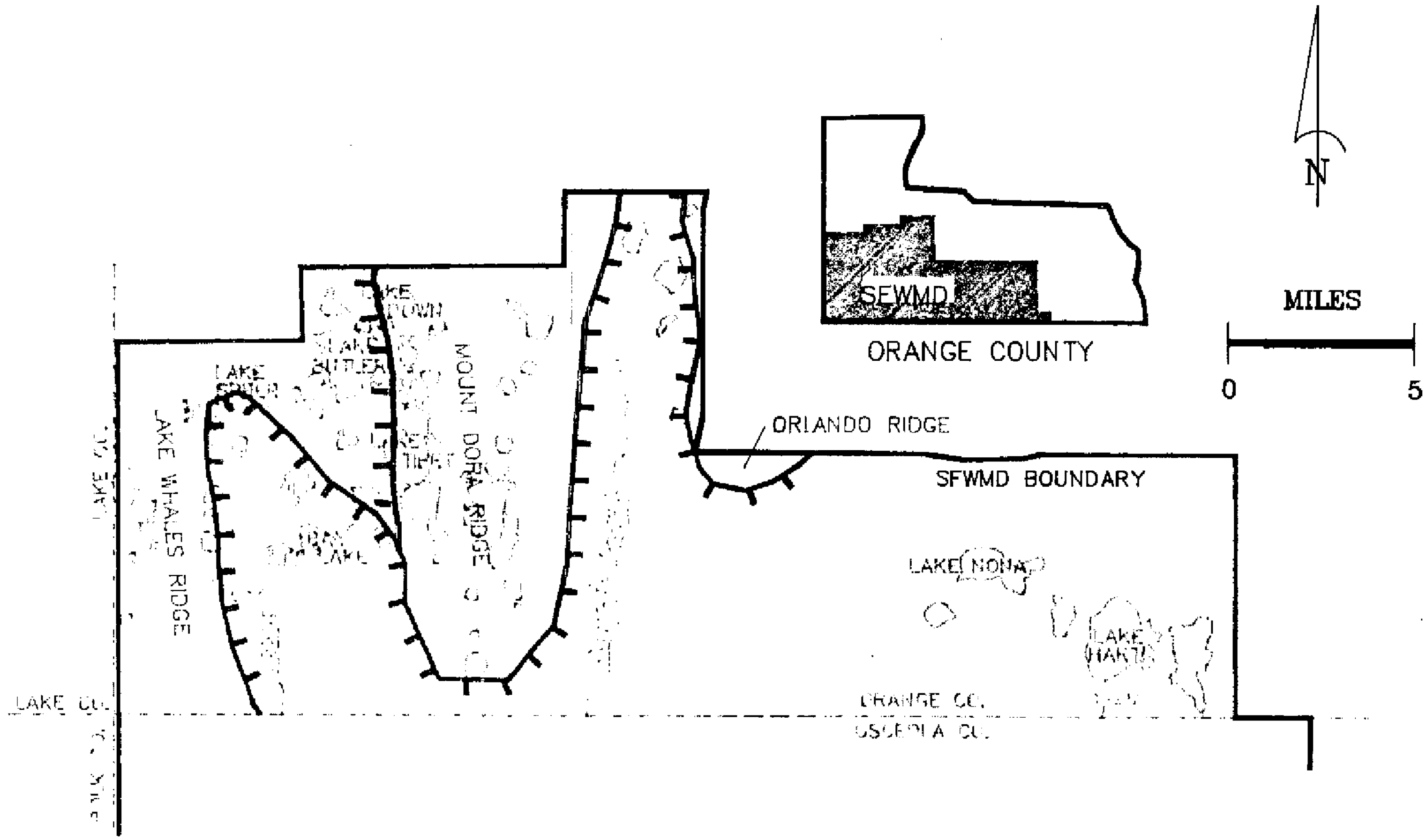

Figure 12-2 MAJOR GEOMORPHIC FEATURES OF ORANGE COUNTY (FROM WHITE, 1970)

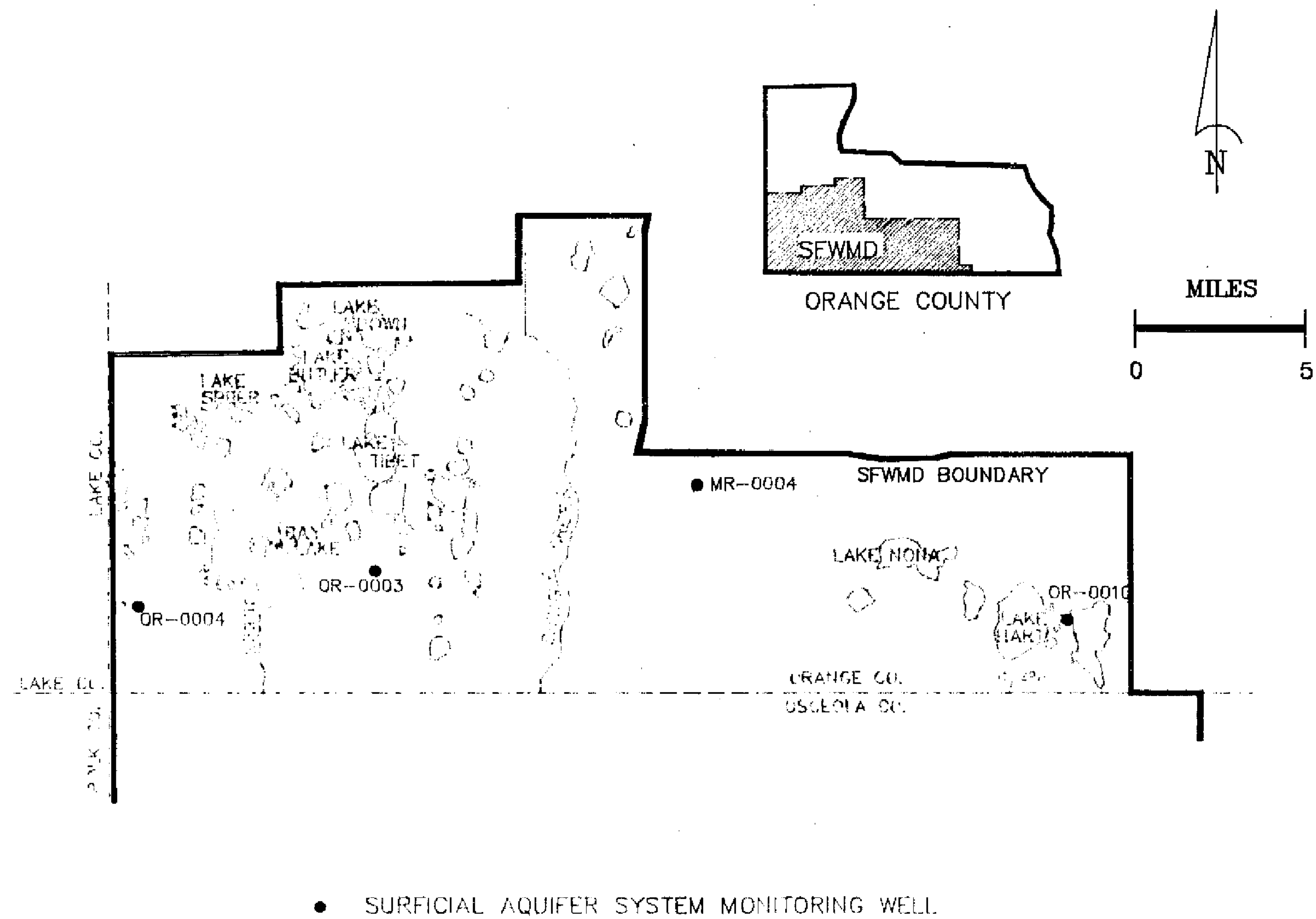

Figure 12-3 **LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS**

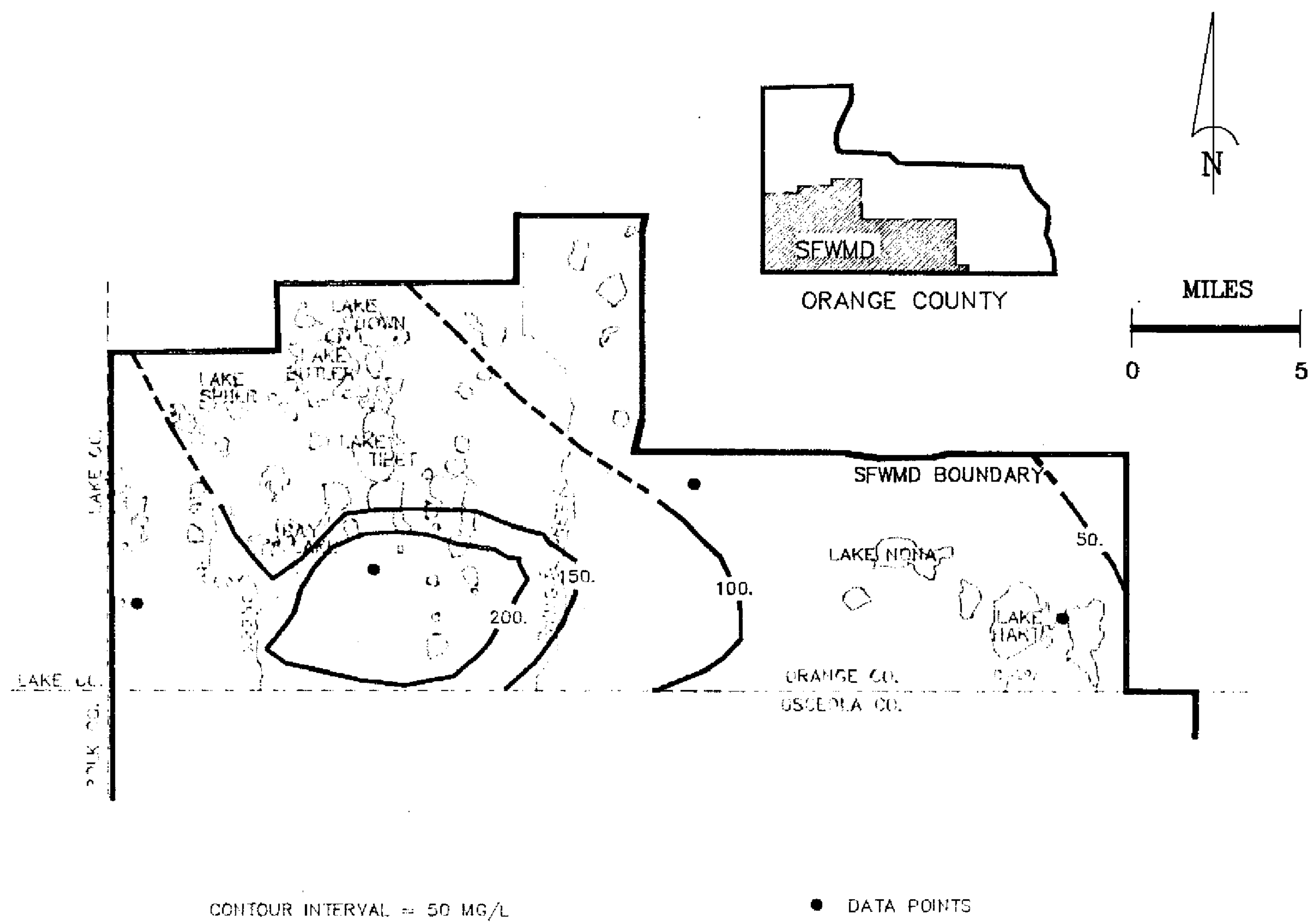

Figure 12-4 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

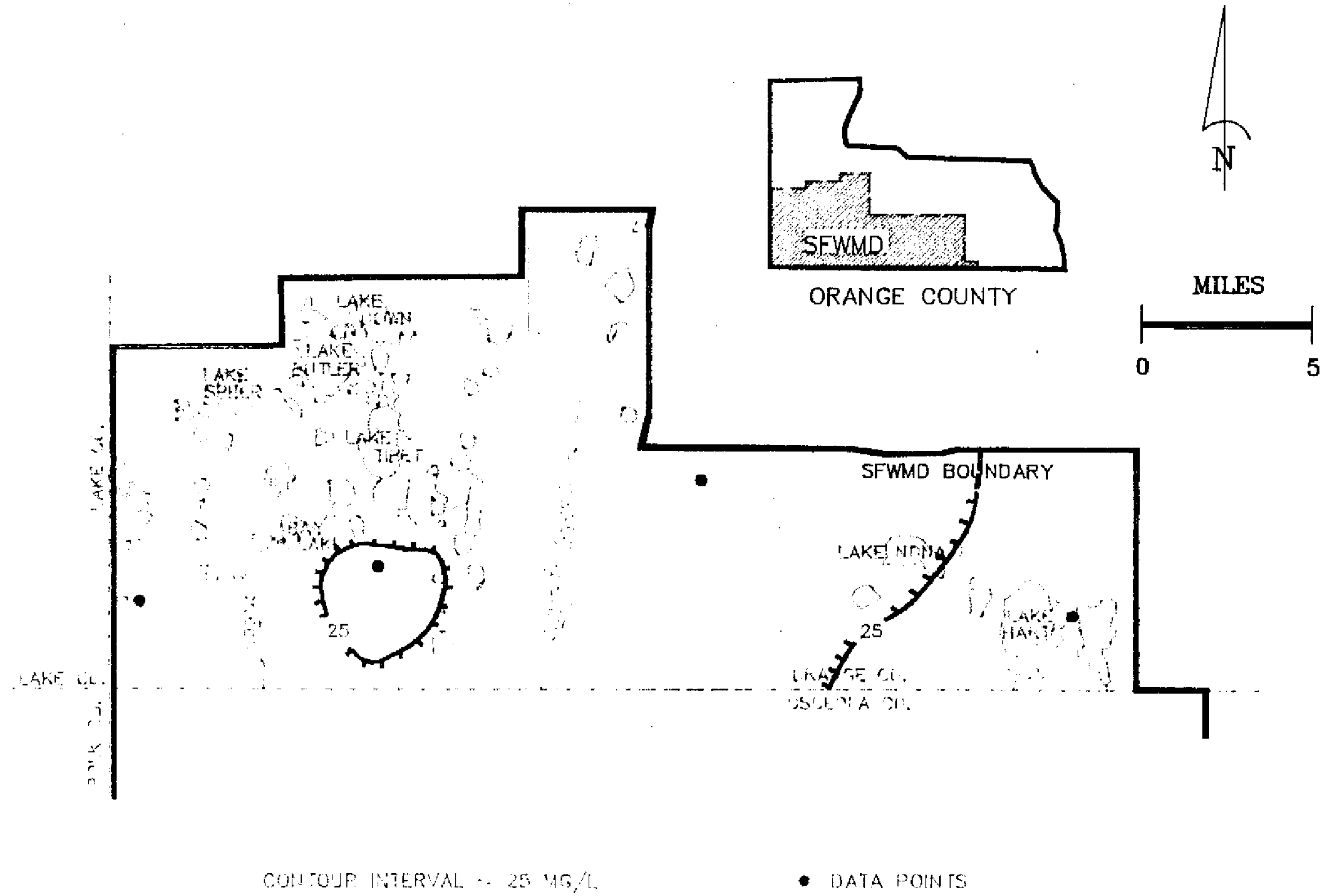

Figure 12-5 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

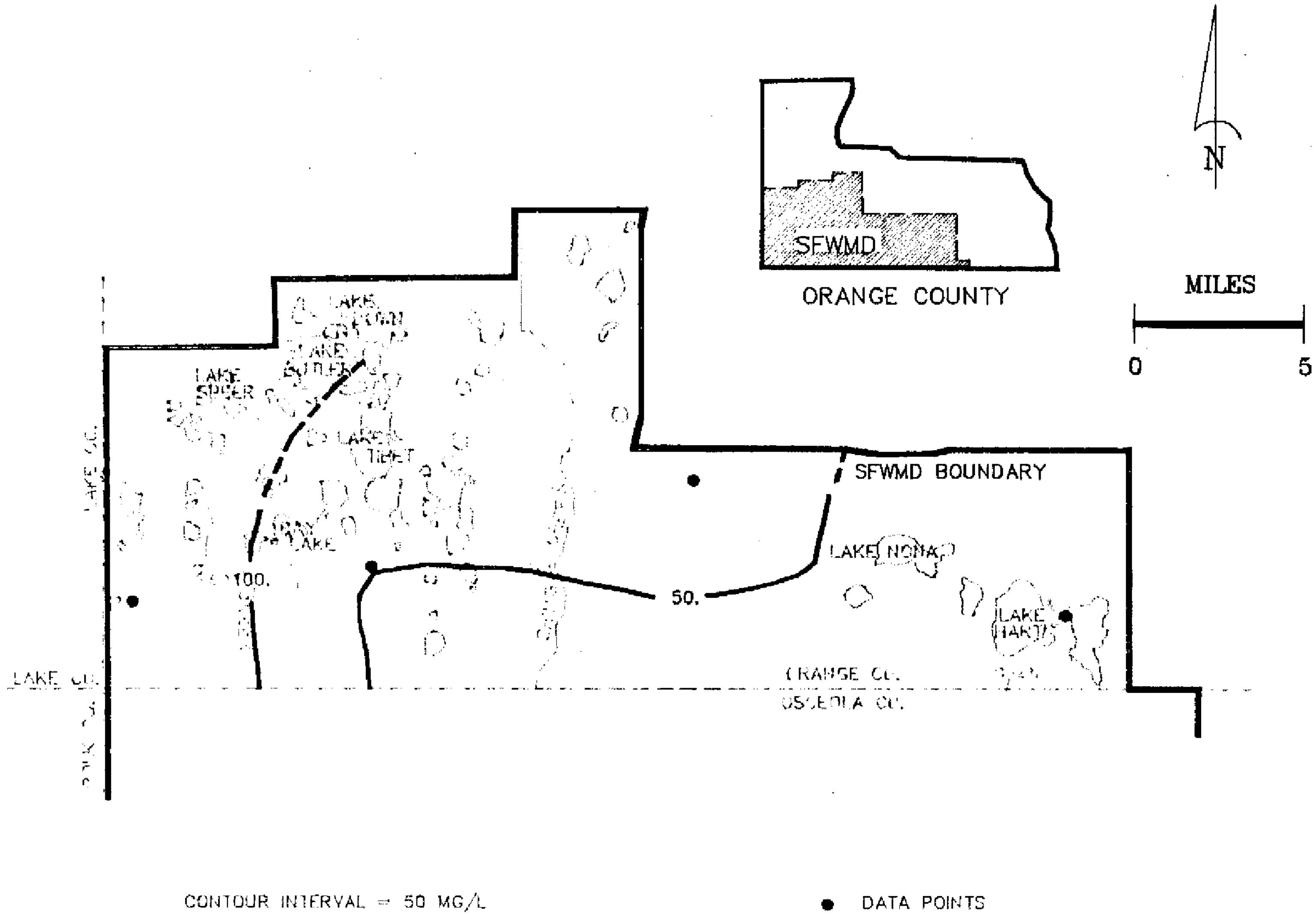

Figure 12-6 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

of the water quality will rely on data from existing literature. Floridan Aquifer System water is of good quality throughout the portion of Orange County within the South Florida Water Management District. Floridan Aquifer System water becomes more mineralized to the east, with increased distance from the recharge areas.

Lichtler and Joyner (1966) show the dissolved solids concentration within the Floridan Aquifer System in Orange County (Figure 12-7). The concentrations range from below 150 MG/L in western Orange County to greater than 300 MG/L in the eastern portion of the county within the South Florida Water Management District. These concentrations are below the secondary drinking water standard for total dissolved solids of 500 MG/L.

Chloride concentrations within the Floridan Aquifer System in Orange County range from lows of less than 10 MG/L in the western portion of the county to highs of more than 50 MG/L in the eastern area of the county within the South Florida Water Management District, Figure 12-8 (from Lichtler and Joyner, 1966).

Hardness concentrations within the Floridan Aquifer System in Orange County range from less than 150 MG/L in the western portion of the county to over 250 MG/L in the eastern portion of the county within the South Florida Water Management District, Figure 12-9 (from Lichtler and Joyner, 1966). These concentrations fall in the moderately hard to very hard range.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells within Orange County are shown in Figure 12-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

The Stiff patterns indicate that the water from the Surficial Aquifer System has a low ionic strength, which is reflected by the narrow Stiff patterns seen in Figure12-10. Well OR-0004 has a calcium-bicarbonate water. Water from the other wells is not dominated by any specific anions or cations.

SUMMARY AND CONCLUSIONS

There are two major aquifer systems present in Orange County, these are the Surficial Aquifer System and the Floridan Aquifer System. The South Florida Water Management District collects water quality samples annually from four Surficial Aquifer System Ambient Ground Water Quality Monitor Network wells within Orange County.

The water quality of both the Surficial Aquifer System and the Floridan Aquifer System meet or exceed the State of Florida Primary and Secondary Drinking Water Standards throughout the portion of Orange County that lies within the South Florida Water Management District. The Surficial Aquifer System has lower concentrations of chlorides, total dissolved solids, and hardness, as well as a lower overall ionic strength than the Floridan Aquifer System.

The Floridan Aquifer System is partially protected from anthropogenic contamination by the Hawthorn formation, except in recharge areas and areas served by drainage wells open to the Floridan Aquifer System. These recharge areas are located along the ridge areas in the western portion of the county. Areas containing drainage wells can allow contaminants present at land surface to infiltrate the Floridan Aquifer System without being subjected to the attenuation processes that occur within the soil and unsaturated zones.

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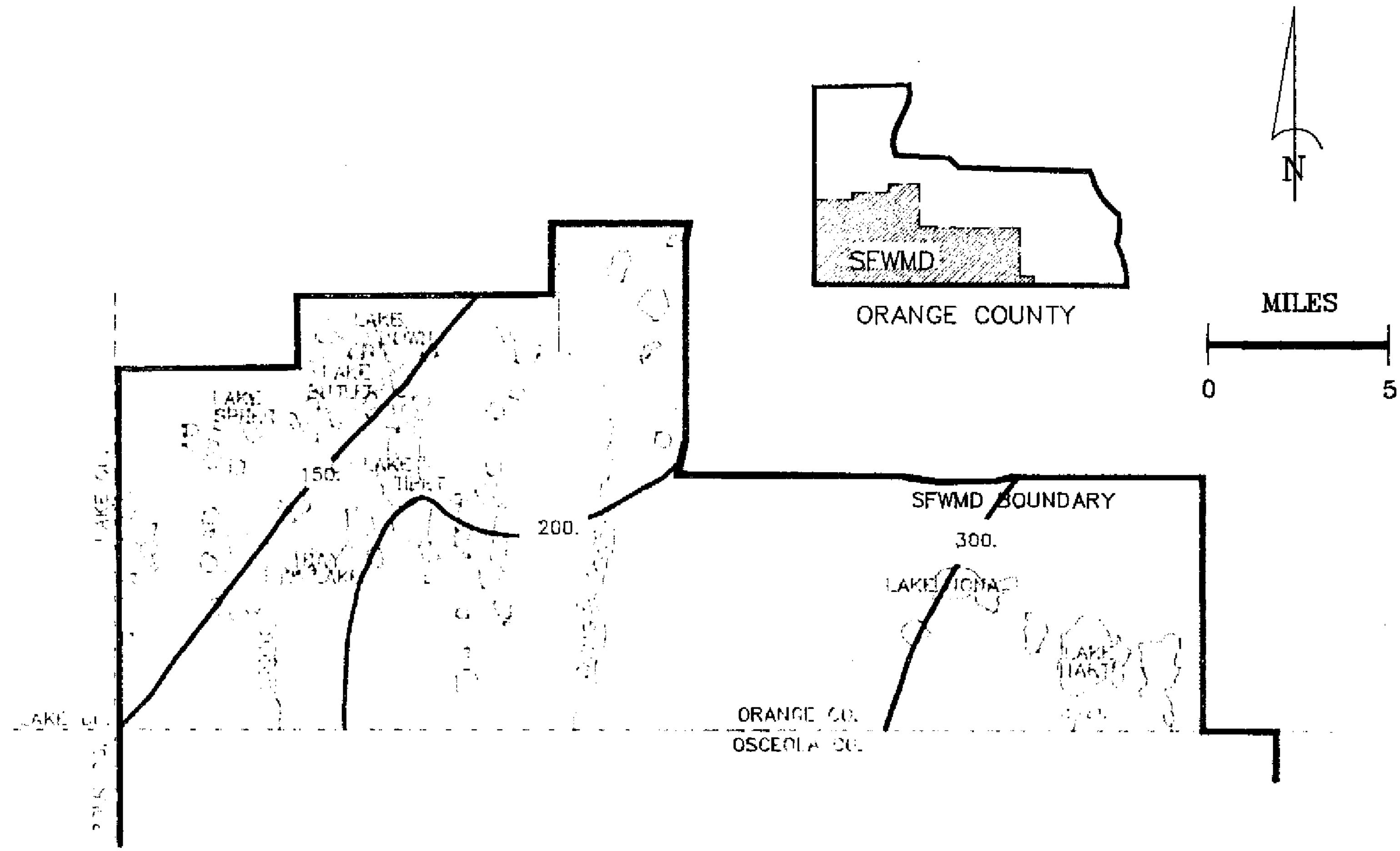

Figure 12-7 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM LICHTLER AND JOYNER, 1966)

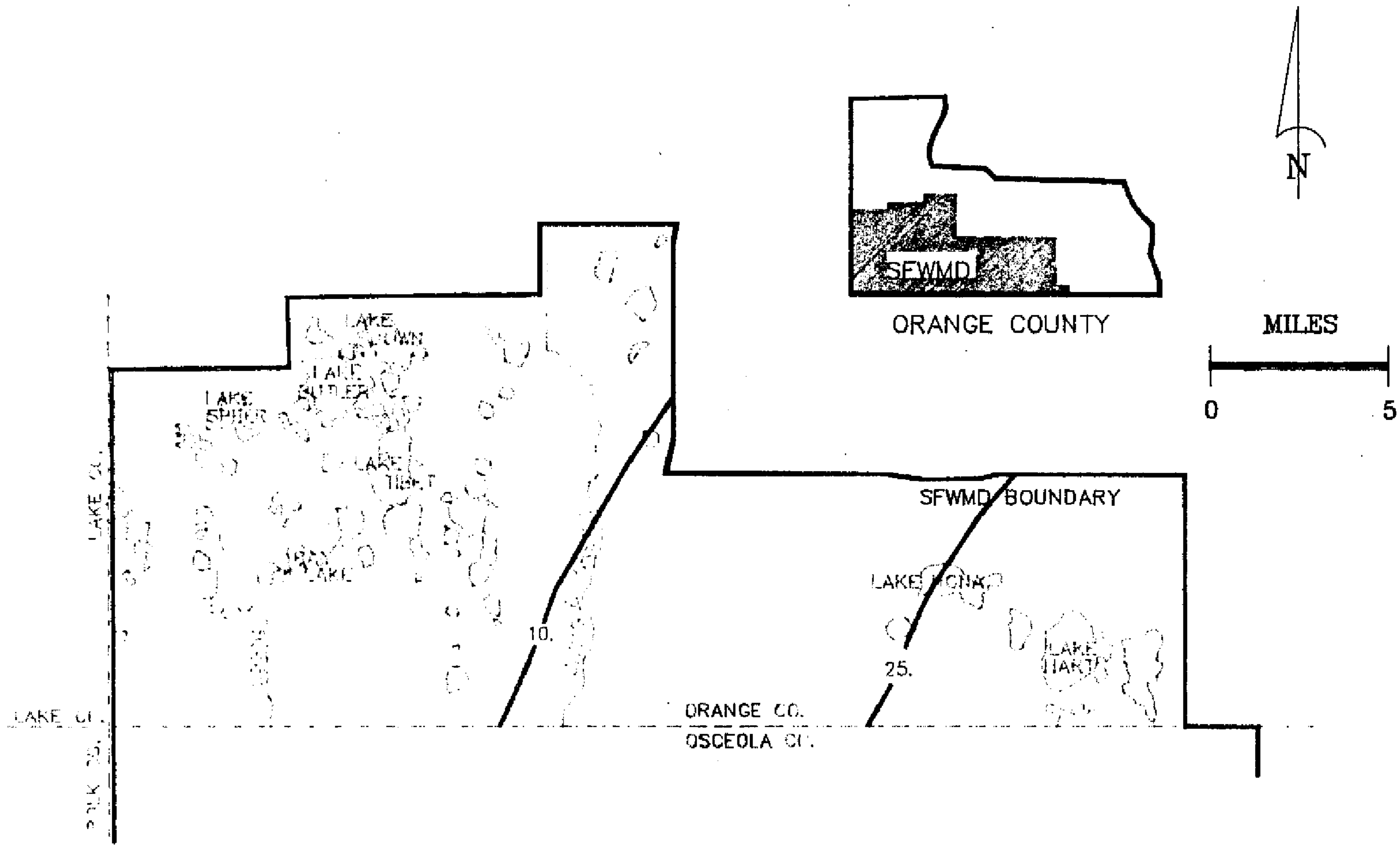

Figure 12-8 CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM LICHTLER AND JOYNER, 1966)

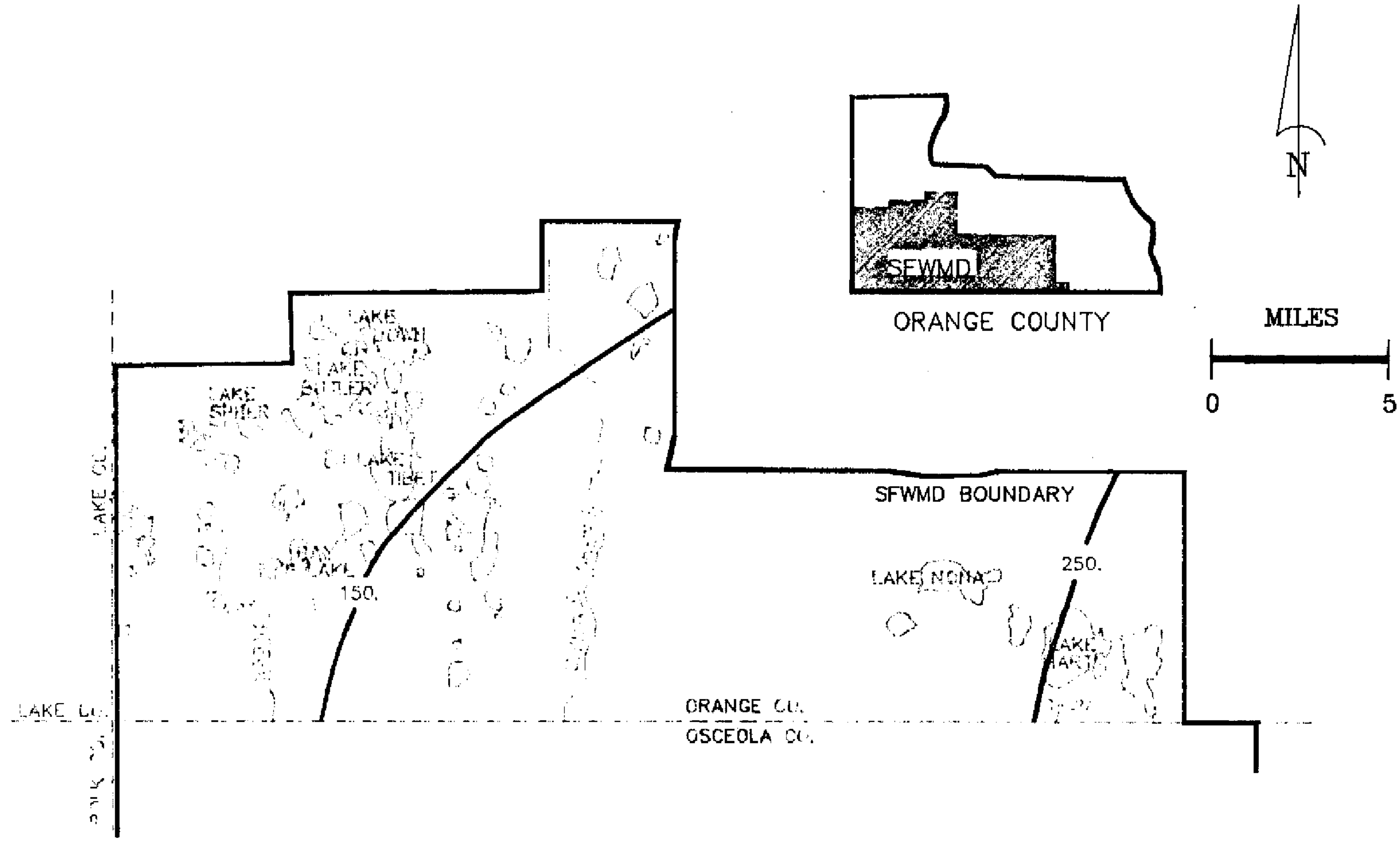

Figure 12-9 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM (FROM LICHTLER AND JOYNER, 1966)

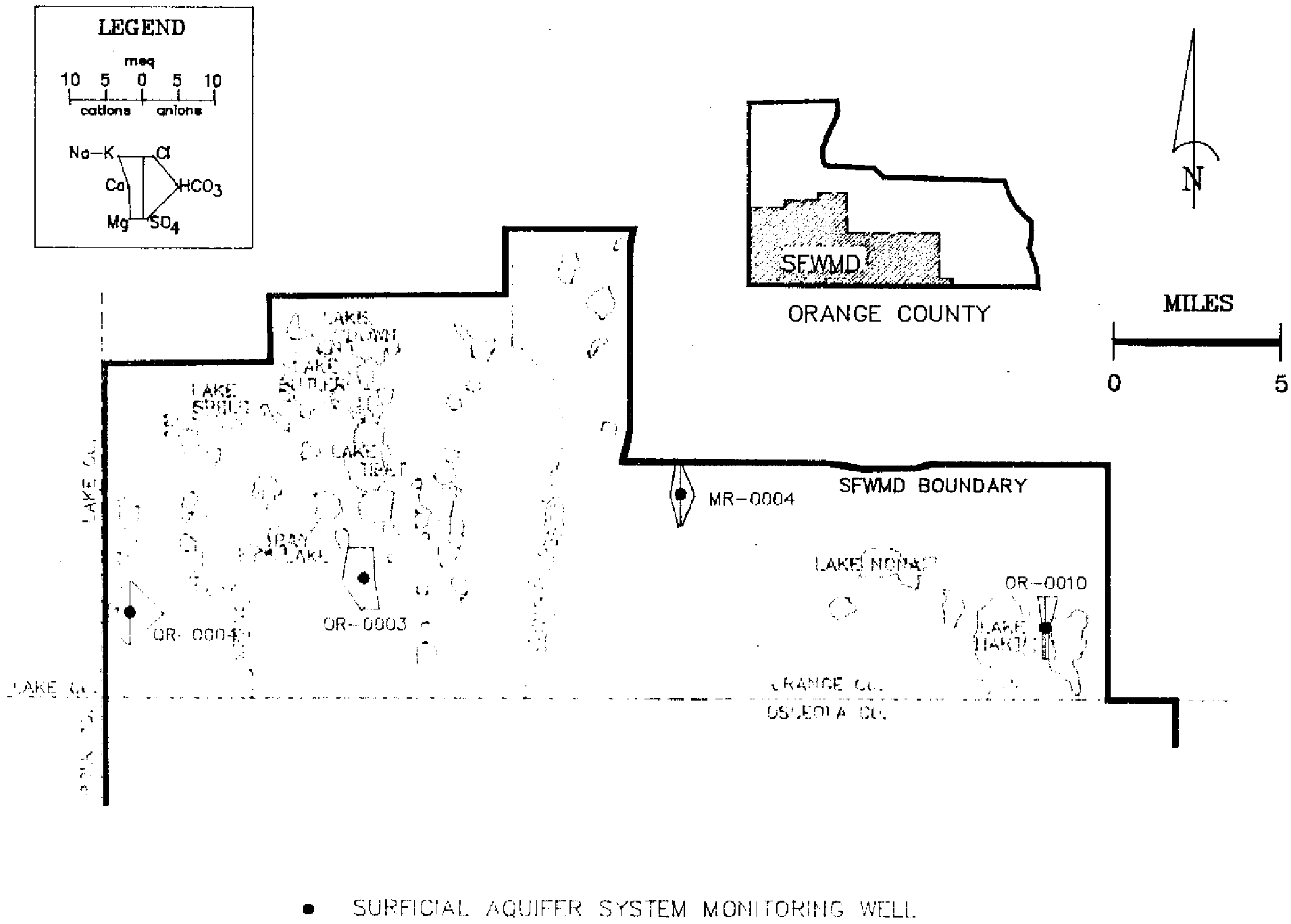

Figure 12-10 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

SECTION 13

OSCEOLA COUNTY

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LOCATION AND EXTENT OF AREA

Osceola County is located in the central portion of the Florida peninsula, comprising an area of approximately 1,325 square miles, measuring 48 miles from east to west and 49 miles from north to south. The county lies between 27° 38' 30" and 28° 20' 50" north latitude and 80° 52' and 81 40' west longitude. It is bounded to the north by Orange County, to the south by Okeechobee County, to the west by Polk County, and to the east by Brevard and Indian River Counties (Figure 13-1).

HYDROGEOLOGY

Two aquifer systems supply drinking and irrigation water within Osceola County. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the Hawthorn formation beneath most of the county (Table 13-1).

Throughout most of Osceola County the Surficial Aquifer System has lower hardness and chloride concentrations than does the Floridan Aquifer System. However, it does not yield sufficient quantities of water for many applications. Water from the Floridan Aquifer System is generally more mineralized than water from the Surficial Aquifer System. Floridan Aquifer System wells yield greater quantities of water and provide a reliable source of water during periods of drought.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and a high water table in most areas, all increase the susceptibility of this aquifer system to contamination.

In most areas of Osceola County the Floridan Aquifer System is protected from contamination due to the presence of the Hawthorn formation. However, excessive pumping can cause upconing of poorer quality water from the deeper producing zones of the Floridan Aquifer System. The Floridan Aquifer System is susceptible to contamination in recharge areas because of the thin or absent confining layer and a downward hydraulic gradient. The most effective recharge areas for the Floridan Aquifer System within Osceola County are in the extreme northwest where the surficial deposits are thin and relatively permeable and where the Hawthorn formation is absent (Frazee, 1980).

Sinkholes often bridge the Hawthorn confining zone and may offer direct connections between the Floridan Aquifer System and bodies of surface water. These connections can allow contaminants present at land surface to infiltrate the Floridan Aquifer System without being subjected to the attenuation processes that normally occur within the soil and unsaturated zones.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Osceola County consists of seven Surficial Aquifer System and six Floridan Aquifer System monitor wells. Figure 13-2 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction material,s and other pertinent information is summarized and presented in Appendix 13-1. The results of the inorganic laboratory analysis for the first three years of sampling (1985-1987) are shown in Appendix 13-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells in Osceola County exhibit concentrations of total dissolved solids ranging from a low of 26 mg/l to a high of 363 mg/l, with an average concentration of 203 mg/l. All of these values are well below the secondary drinking water standard for total dissolved solids of 500 mg/l. Figure 13-3 shows the total dissolved solids concentrations for Osceola County. The total dissolved solids concentrations are lowest in western and southern Osceola County and increase to the northeast.

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 2.4 mg/l to a high of 33 mg/l, with an average concentration of 20 mg/l. Chloride concentrations of the Surficial Aquifer System in Osceola County are well below the secondary drinking water standard of 250 mg/l. Chloride concentrations appear to be lowest in the western portion of the county and increase slightly to the northeast (Figure 13-4).

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 8 mg/l to a high of 334 mg/l, with an average

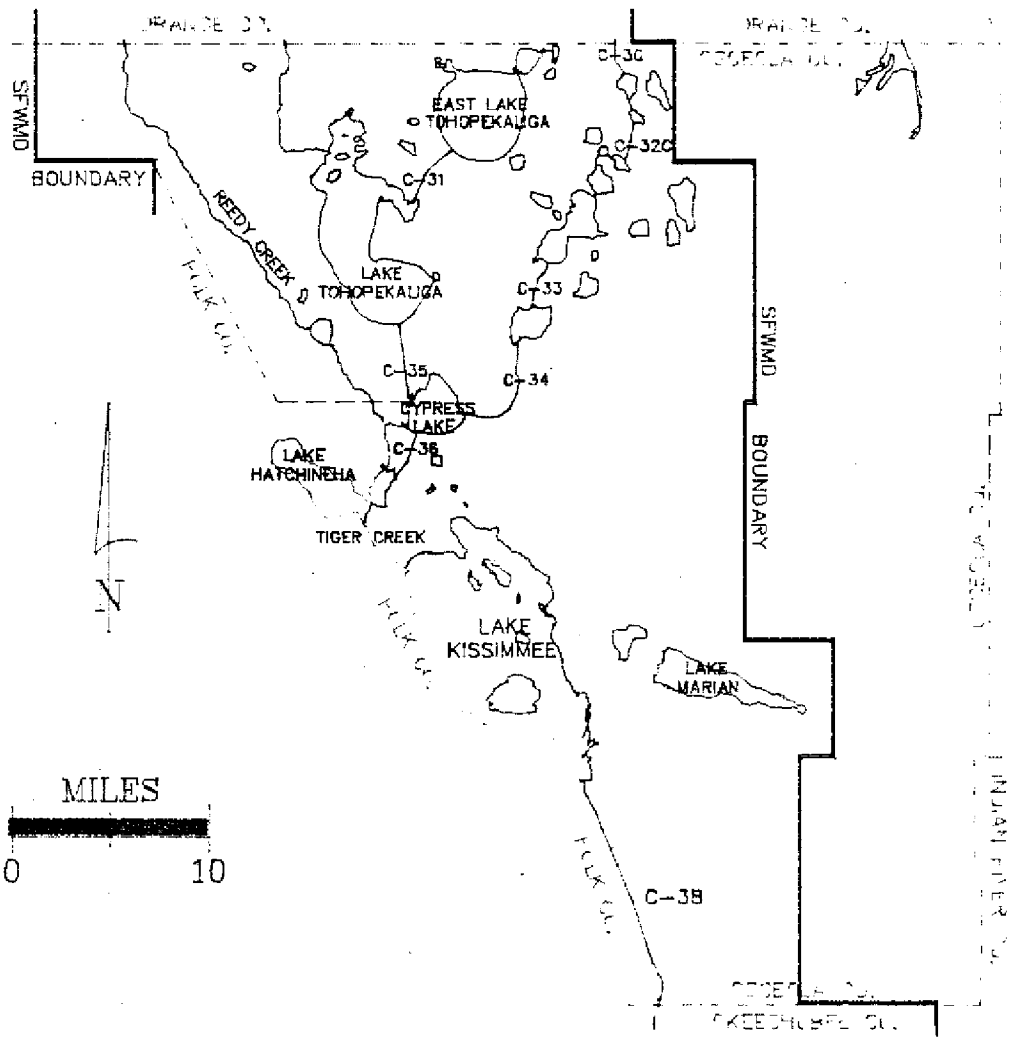

Figure 13-1 MAP OF OSCEOLA COUNTY

TABLE 13-1. GENERALIZED HYDROGEOLOGY OF OSCEOLA COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	50-300	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: GOOD TO EXCELLENT	FINE TO COARSE GRAINED QUARTZ SAND, SHELL SILT AND CLAY
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	0-250	LOW PERMEABILITY TO IMPERMEABLE	GRAYISH-GREEN SANDY CLAY, WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2400-3000	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

concentration of 154 mg/l. Figure 13-5 shows the hardness concentrations throughout Osceola County. Hardness concentrations are low in the western portion of Osceola County and increase to the northeast. These concentrations range from soft to very hard. The wells from western Osceola County that yielded the soft water are all shallow, it is likely that deeper wells would produce harder water.

The pH concentrations in two of the Surficial Aquifer System AGWQMN wells were below the minimum allowable secondary drinking water standard of 6.5. Both of these wells are extremely shallow, and it is likely that the pH of the ground water from the deeper zones of the surficial aquifer is higher and meets the drinking water standard.

Five of the Surficial Aquifer System AGWQMN wells within Osceola County exceeded the secondary drinking water standard for iron of 0.3 mg/l on at least one occasion. Three of these wells have metal casings that may have contributed to the iron concentrations. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Manganese concentrations in two of the Surficial Aquifer System AGWQMN wells exceeded the secondary drinking water standard. Both of these wells have metal casings that could have contributed to the elevated manganese concentrations.

Lead was detected in three of the Surficial Aquifer System AGWQMN wells at concentrations exceeding the primary drinking water standard of 50 µG/L. These wells are all equipped with water level recorders that use lead weights that often come in contact with the water in the wells. The lead weight is believed to be the source of the increased lead concentrations.

Toluene was detected in one of the Surficial Aquifer System AGWQMN wells in Osceola County. Well OS-0182 had toluene concentration of 2 µG/L. This well is far from any possible sources of contamination and has a water level recording instrument mounted at the wellhead. During routine maintenance this recorder is lubricated with a spray that contains toluene. This spray is the probable source of the toluene in the sample. No other purgeable compounds or aromatic hydrocarbons were detected in any other samples from the AGWQMN wells in Osceola County.

Floridan Aquifer System

The water quality of the Floridan Aquifer System in Osceola County is variable with the best water quality located in the northwestern area of the county. The water quality decreases to the southeast as concentrations of hardness, total dissolved solids, and chlorides increase. In order to more accurately estimate the ground water quality of the Floridan Aquifer System within Osceola County, water quality data and figures from Shaw and Trost, 1984 were used to supplement the AGWQMN Floridan Aquifer System.

Total dissolved solids concentrations within the Floridan Aquifer System AGWQMN wells in Osceola County range from a low of 137 mg/l to a high of

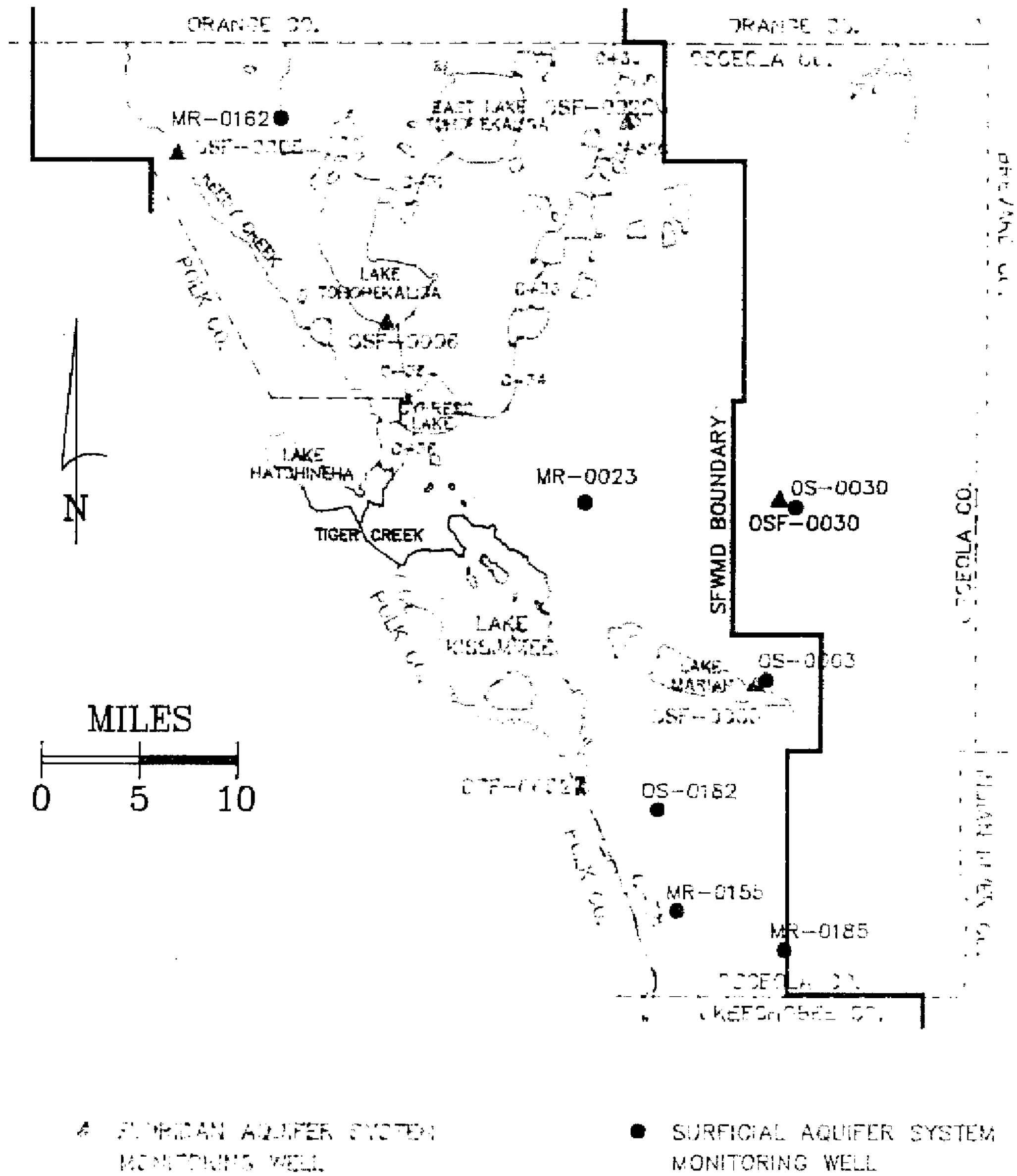

Figure 13-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

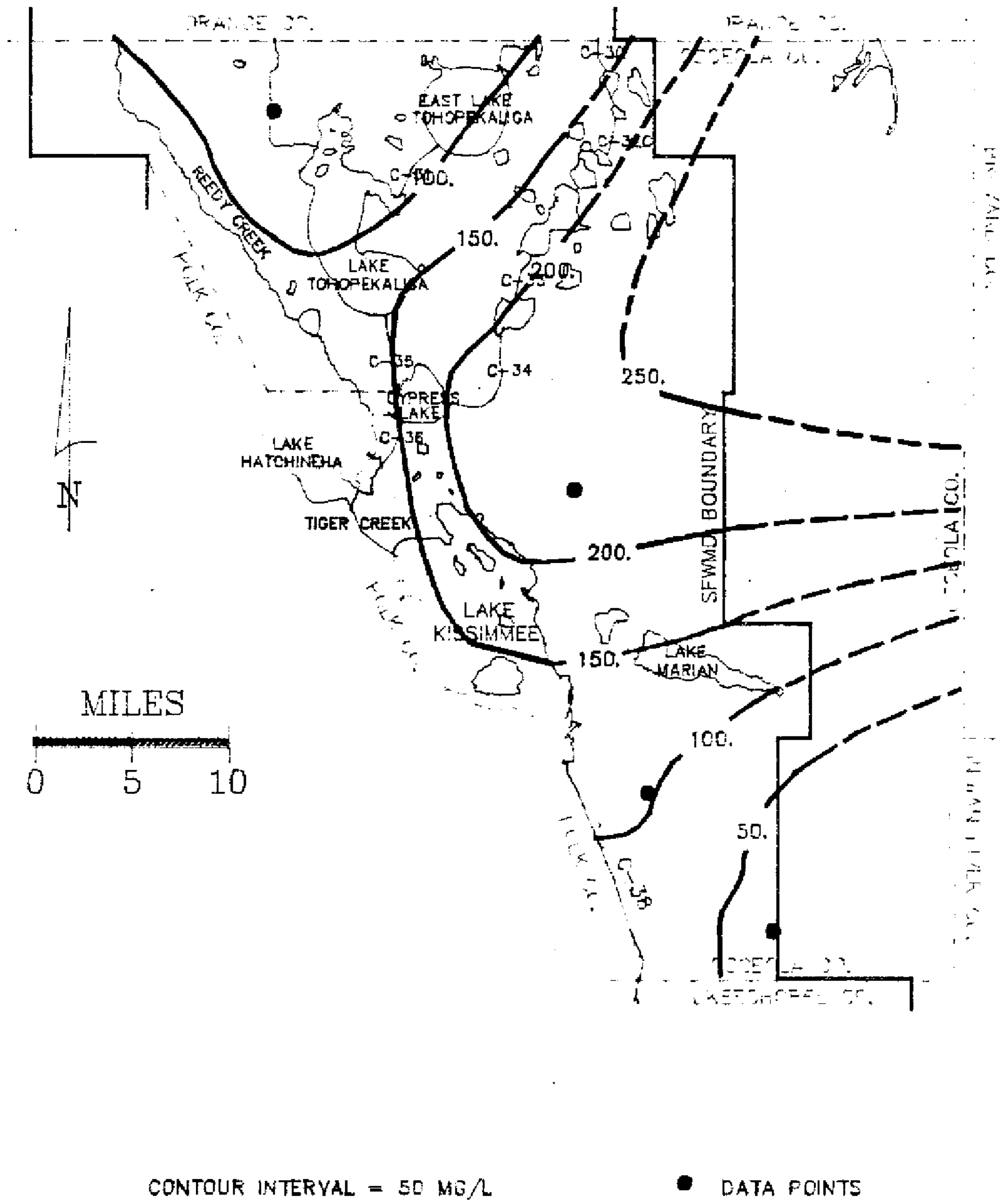

Figure 13-3 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

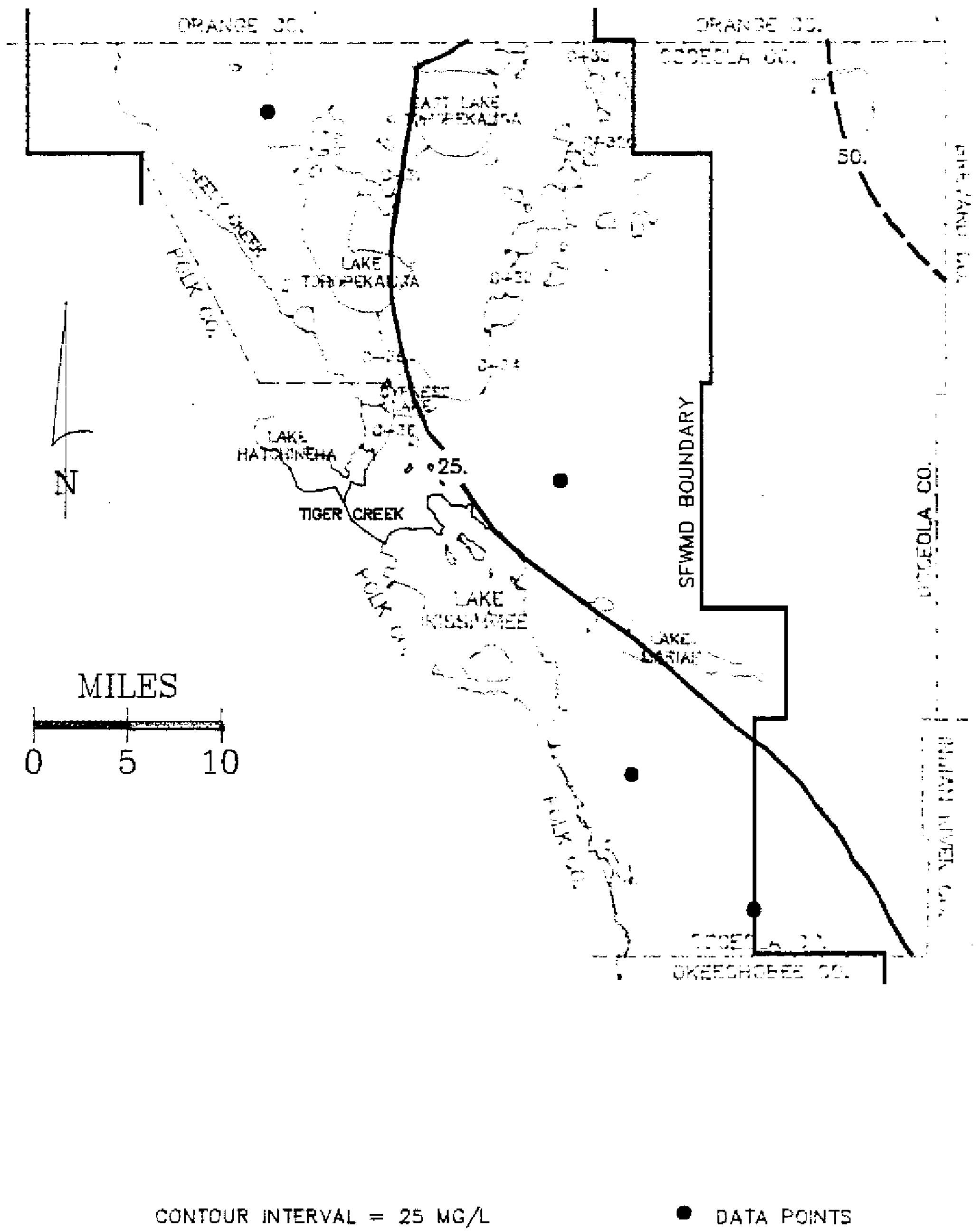

Figure 13-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

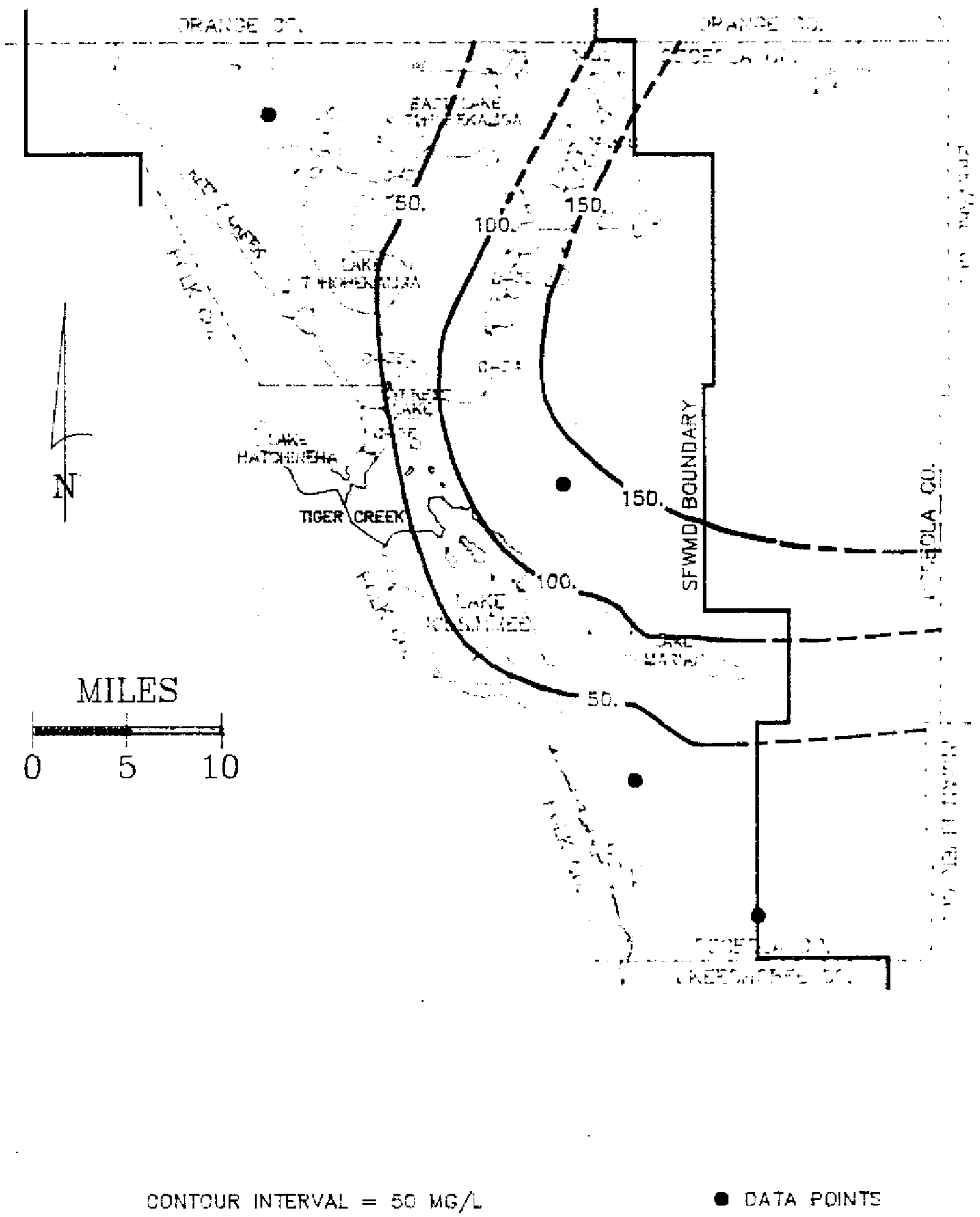

Figure 13-5 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

790 mg/l, with an average concentration of 331 mg/l. The secondary drinking water standard for total dissolved solids is 500 mg/l. However, it can be higher provided that no other standards are exceeded. Shaw and Trost (1984) show the average wellhead total dissolved solids concentration for the groundwater of the Floridan Aquifer System in Osceola County (Figure 13-6). These concentrations agree with the AGWQMN sampling results listed in Appendix 13-2.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells in Osceola County range from a low of 3.5 mg/l to a high of 368 mg/l, with an average concentration of 83 mg/l. The secondary drinking water standard for chloride is 250 mg/l. Shaw and Trost (1984) show the average wellhead chloride concentrations within the Floridan Aquifer System in Osceola County (Figure 13-7).

Hardness concentrations within the Floridan Aquifer System AGWQMN wells in Osceola County range from a low of 98 mg/l to a high of 230 mg/l, with an average concentration of 157 mg/l. Shaw and Trost (1984) show the average wellhead hardness concentrations within the Floridan Aquifer System in Osceola County (Figure 13-8). These concentrations agree with the AGWQMN network sampling results in Appendix 13-2.

Floridan Aquifer System AGWQMN well OSF-0052 slightly exceeded the primary drinking water standard for sodium. The samples collected from OSF-0052 are good quality samples, and these sodium concentrations are representative of concentrations within the aquifer.

Two Floridan Aquifer System AGWQMN wells exceeded the secondary drinking water standard for iron. Both of these wells have iron casings, and it is likely that the iron casing is the source of the iron in the samples. Well OSF-0003 had the higher iron concentrations. The casing on this well is extremely corroded and is covered with rust.

Well OSF-0003 was the only Floridan Aquifer System well to exceed the secondary drinking water standard for manganese and lead. The corroded well casing is believed to be the source of both of these metals. This casing has increased the concentrations of iron and manganese in the samples from this well, and it is probable that the iron, manganese and lead concentrations in the aquifer do not exceed the drinking water standards.

No purgeable compounds or aromatic hydrocarbons were detected in any samples collected from from Floridan Aquifer System AGWQMN wells in Osceola County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells throughout Osceola County are shown in Figures 13-9, and 13-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

The Surficial Aquifer System has a low ionic strength water, reflected by the narrow Stiff patterns shown in Figure 13-9, the water also has relatively even proportions, as milliequivalents, of sodium and calcium as well as chloride and bicarbonate. Well MR-0023 has increased ionic strength compared to the other Surficial Aquifer System wells. This is due to the infiltration of water from the Floridan Aquifer System.

Stiff patterns for the Floridan Aquifer System AGWQMN wells are shown in Figure 13-10. These patterns indicate that the water type from the Floridan Aquifer System is predominantly calcium-carbonate. Well OSF-0003 in southern Osceola County shows the effects of increased chloride concentrations, the upper axis is emphasized more than in the other Floridan Aquifer System wells.

SUMMARY AND CONCLUSIONS

There are two major aquifer systems present in Osceola County, these are the Surficial Aquifer System and the Floridan Aquifer System. The South Florida Water Management District collects water quality samples annually from seven Surficial Aquifer System, and six Floridan Aquifer System, Ambient Ground Water Quality Monitor Network wells within Osceola County.

In general the water quality of both the Surficial Aquifer System and the Floridan Aquifer System meet or exceed the State of Florida Primary and Secondary Drinking Water Standards throughout Osceola County. The Surficial Aquifer System has lower concentrations of chlorides, total dissolved solids, and hardness, as well as a lower ionic strength overall, but it has higher concentrations of iron in many areas. The well yields for the Floridan Aquifer System are much higher than for the Surficial Aquifer System.

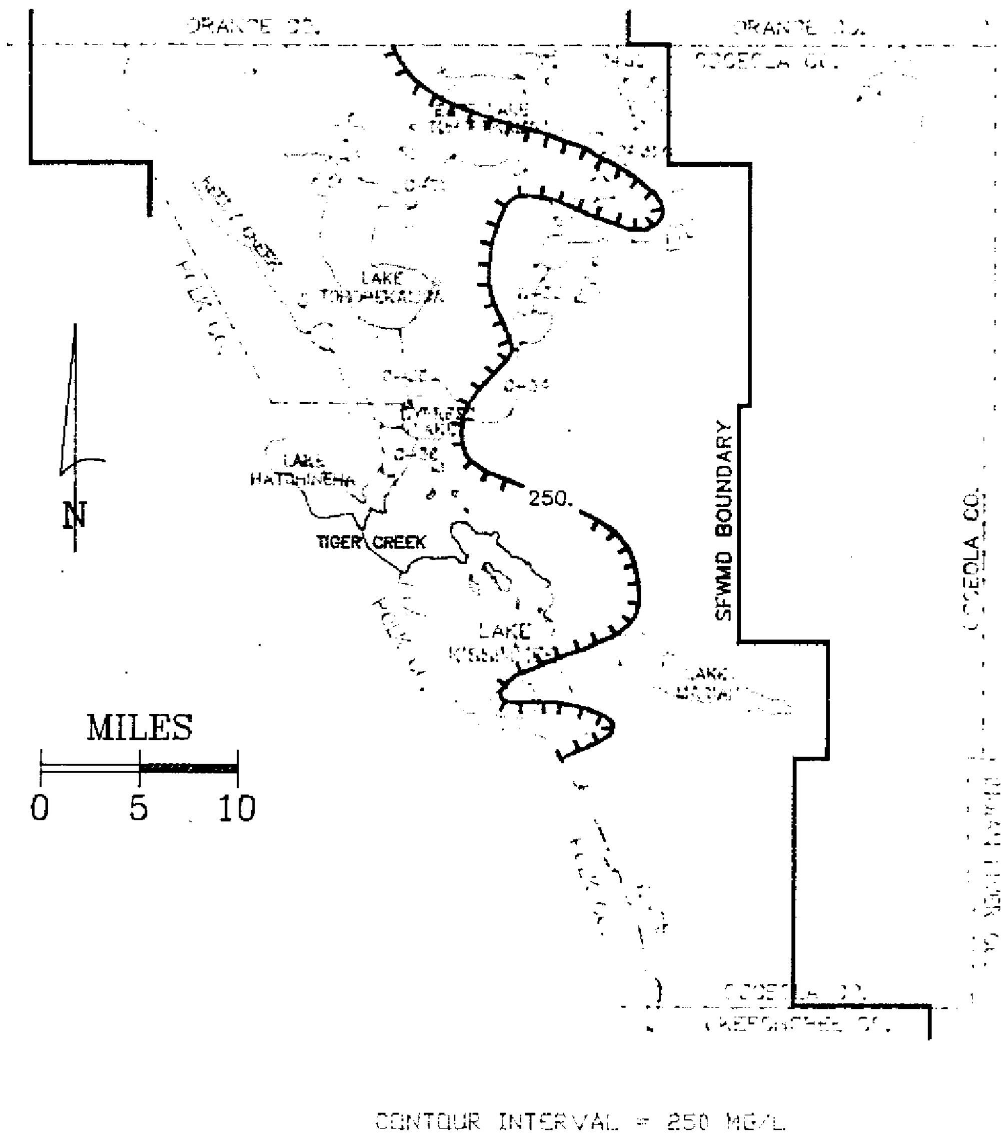

Figure 13-6 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

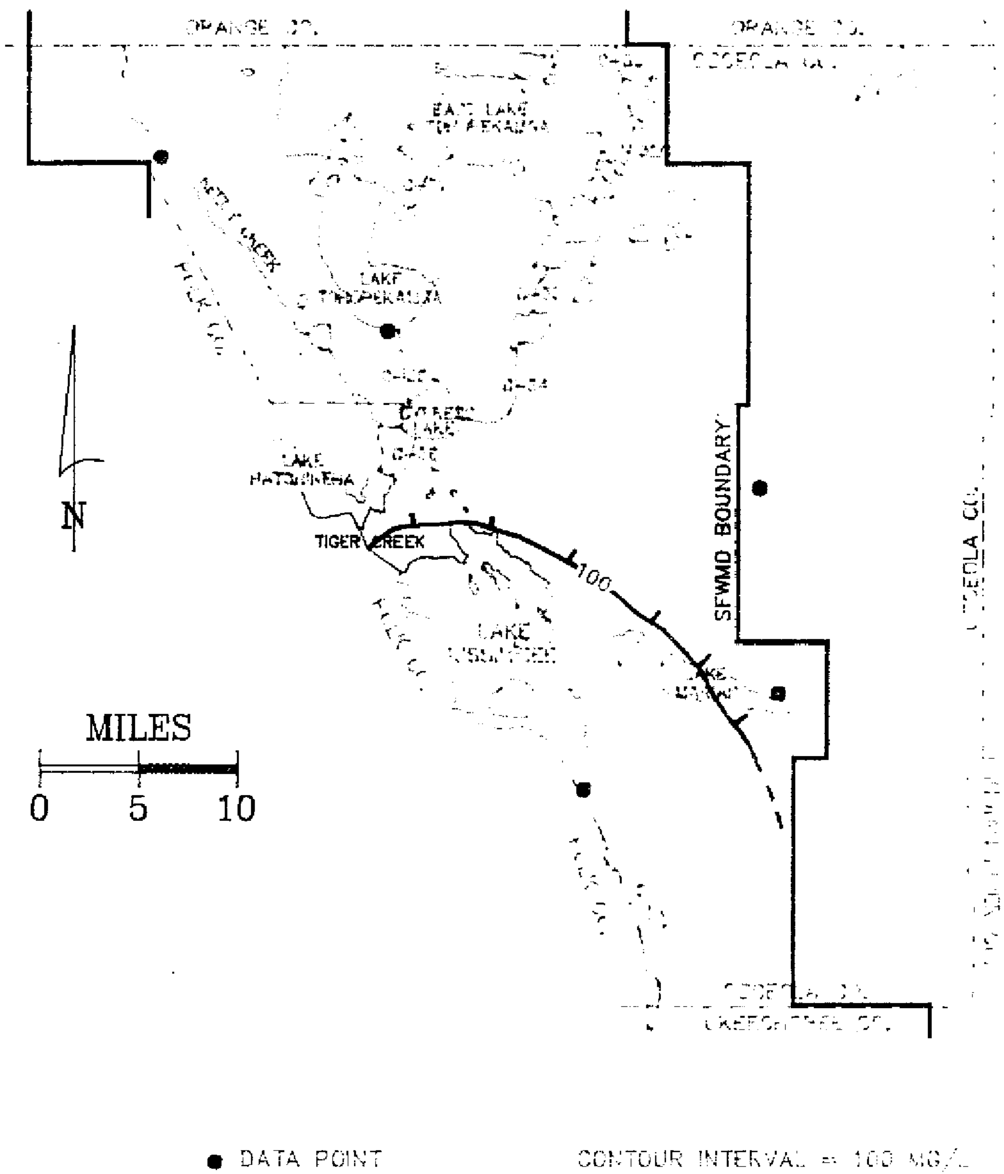

Figure 13-7 CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM

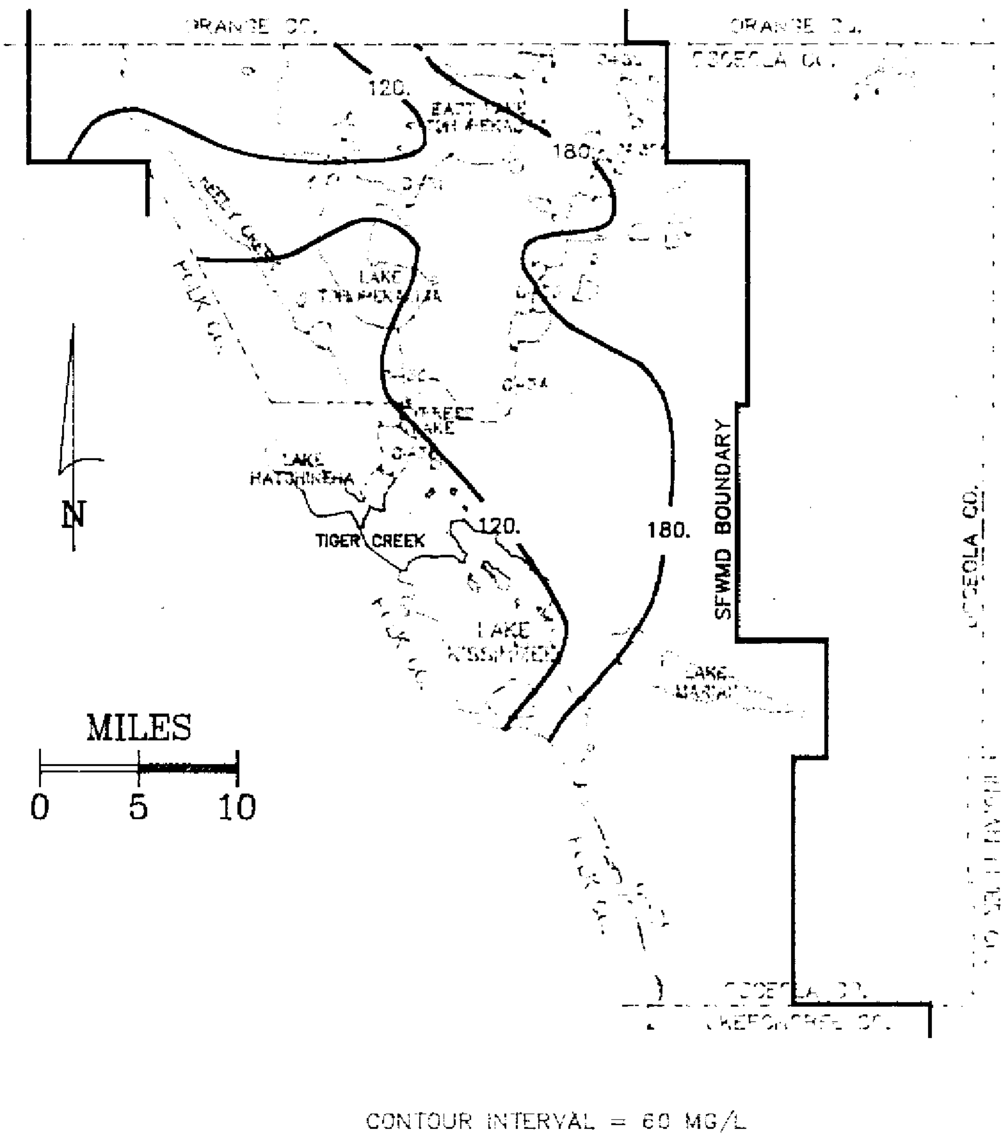

Figure 13-8 HARDNESS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

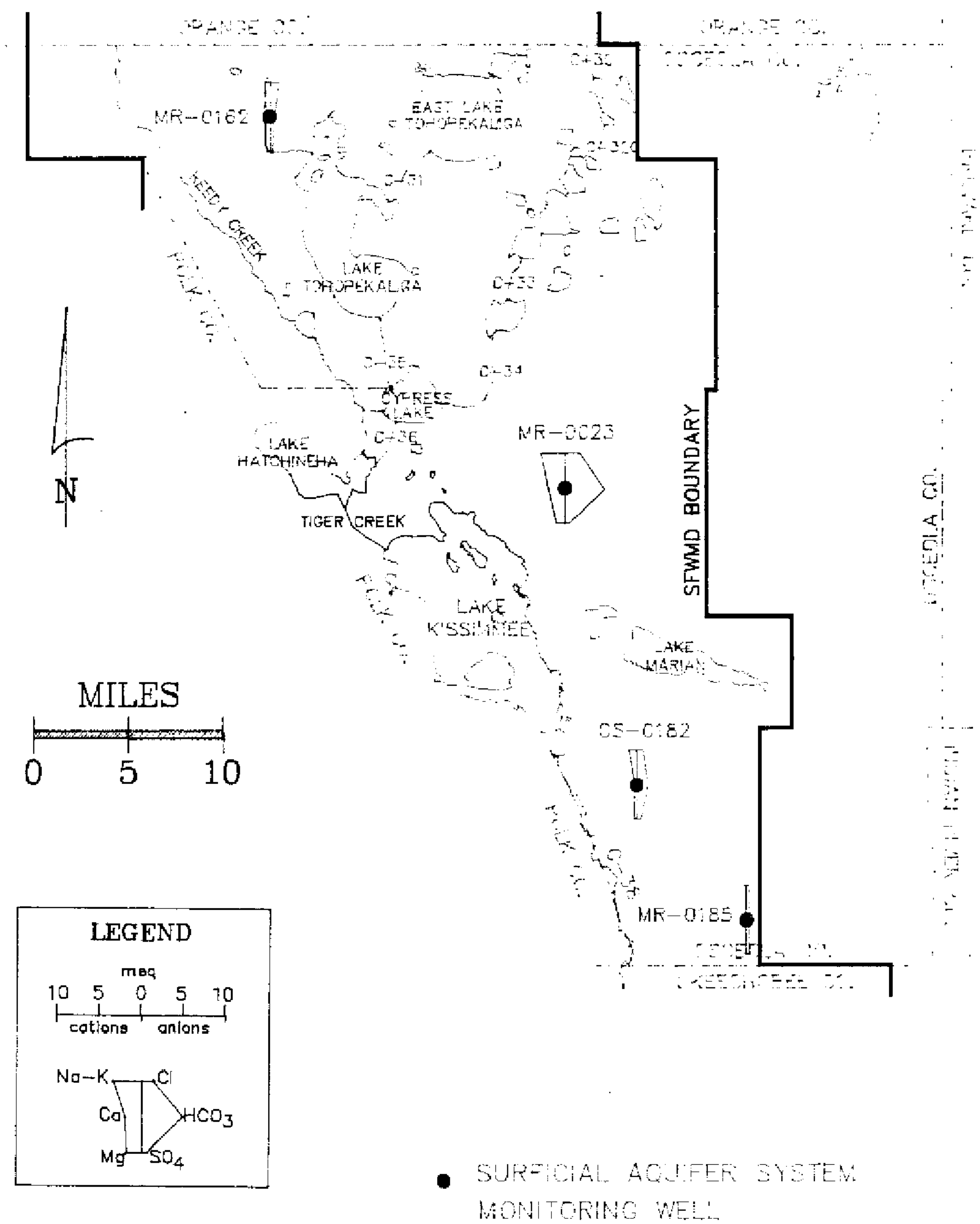

Figure 13-9 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

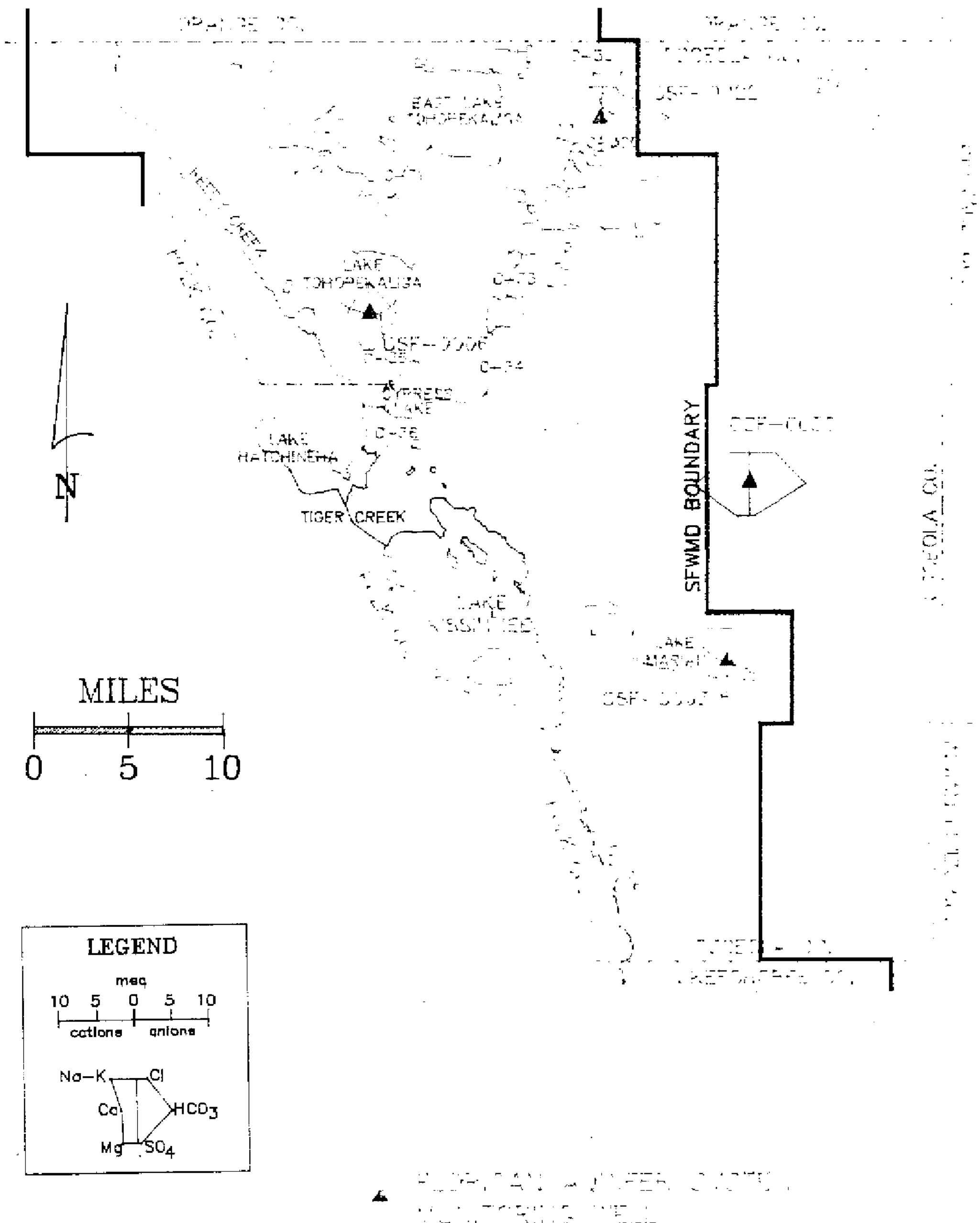

Figure 13-10 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

A recharge area to the Floridan Aquifer System is located in the extreme northwestern corner of the county. This recharge area has the best water quality (lowest ionic strength) of the aquifer in the county. Residence time, and thus mineralization increase with distance from these recharge areas.

The Floridan Aquifer System is most susceptible to contamination by anthropogenic compounds in areas of high recharge where the confining layer is thin or absent, and there is a downward hydraulic gradient. The Floridan Aquifer System is partially protected from contamination where the Hawthorn formation is thick and impermeable.

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Frazee, J.M. Jr. 1980. Groundwater in Osceola County, Florida: U. S. Geological Survey Open-File Report #79-1595

Shaw, J.E. and S.M. Trost, 1984. Hydrogeology of the Kissimmee Planning Area, South Florida Water Management District: South Florida Water Management District, Technical Publication #84-1.

SECTION 14

PALM BEACH COUNTY

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LOCATION AND EXTENT OF AREA

Palm Beach County is located on the southeast coast of Florida and comprises an area of approximately 1,978 square miles, measuring 53 miles from east to west and 46 miles from north to south. The county lies between 26° 57' 24" and 26° 19' 18" north latitude and 80° 01' 44" and 80° 52' 42" west longitude. It is bounded on the north by Martin County, to the south by Broward County, to the west by Lake Okeechobee and Hendry County, and to the east by the Atlantic Ocean (Figure 14-1).

HYDROGEOLOGY

Two aquifer systems are present in Palm Beach County, these are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the thick and impermeable Hawthorn formation. Table 14-1 shows a schematic representation of the generalized hydrogeology of Palm Beach County.

The Surficial Aquifer System is the primary source of drinking and irrigation water in the county. The remainder of the water used in the county is supplied by surface water sources. The Floridan Aquifer System is too highly mineralized for use as a water supply source.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of the aquifer to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and high water table also increase the susceptibility of this aquifer to contamination.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitoring Network (AGWQMN) within Palm Beach County consists of 23 Surficial Aquifer System wells. The Floridan Aquifer System in Palm Beach County is not monitored by the AGWQMN since it is not used as a source of drinking or irrigation water.

The AGWQMN is concentrated in eastern Palm Beach County where the majority of the population is located and the demands on ground water resources are the greatest. Figure 14-2 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 14-1. The results of the inorganic laboratory analyses for approximately the first three years of sampling (1985-1987) are presented in Appendix 14-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 148 mg/l to a high of 820 mg/l, with an average concentration of 439 mg/l. The secondary drinking water standard for total dissolved solids is 500 mg/l; however, it may be greater if no other standards are exceeded. High total dissolved solids values, in excess of 500 mg/l, occur in the western part of the county, Figure 14-3 (from Swayze and Miller, 1984).

Chloride concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 11 mg/l to a high of 218 mg/l, with an average concentration of 70 mg/l. The secondary drinking water standard for chloride is 250 mg/l. Chloride concentrations within eastern Palm Beach County are shown in Figure 14-4 (from Swayze and Miller, 1984). Chloride concentrations increase to the west due to the presence of diluted residual seawater. Chloride concentrations also increase along the coast in areas where salt-water intrusion has occurred. Figure 14-5 delineates the extent of salt water intrusion in Palm Beach County as of 1982.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 66 mg/l to a high of 420 mg/l, with an average concentration of 284 mg/l. Hardness is lowest in the eastern portion of the county and increases to the west of the Florida Turnpike, Figure 14-6 (from Swayze and Miller, 1984). The ground water from the majority of the county would be considered hard to very hard.

Approximately half of the Surficial Aquifer System AGWQMN well samples collected exceeded the secondary drinking water standard for iron of 0.3 mg/l. Iron concentrations vary locally, and no general trends were evident from the sampling results. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

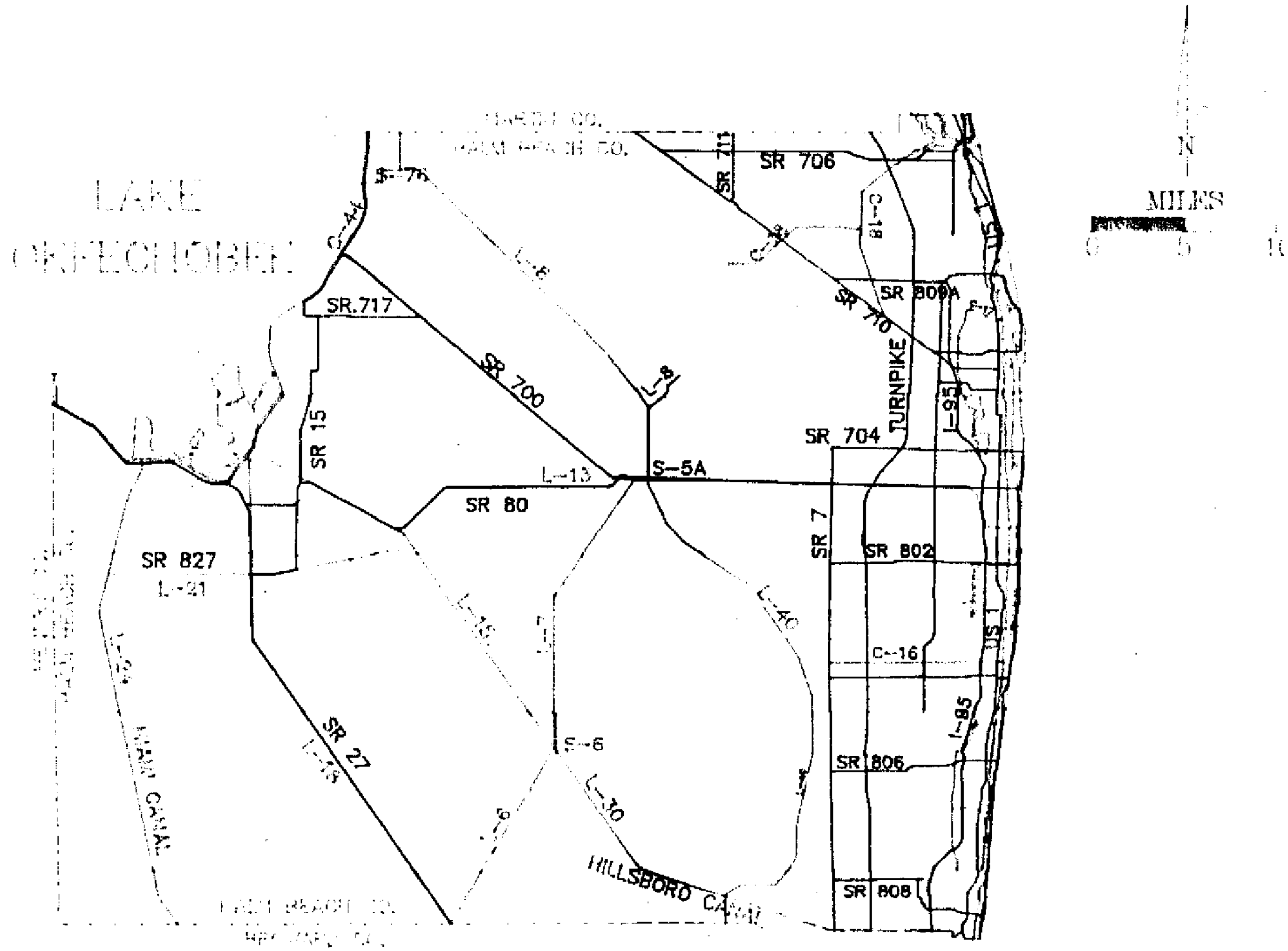


Figure 14-1 MAP OF PALM BEACH COUNTY

TABLE 14-1. GENERALIZED HYDROGEOLOGY OF PALM BEACH COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	2-20	MODERATE TRANSMISSIVITY	MEDIUM TO FINE GRAINED QUARTZ SAND WITH VARYING PERCENTAGES OF SHELL AND CLAY
	ANASTASIA FORMATION	20-180	MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO POOR	SANDY LIMESTONE, CALCAREOUS SANDSTONE, SHELLS AND COQUINA
	FT. THOMPSON FORMATION	10-30	LOW TRANSMISSIVITY	ALTERNATING MARINE, BRACKISH AND FRESH WATER MARLS
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	300-700	IMPERMEABLE	GRAY-GREEN SANDY CLAY WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2800-3400	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

Purgeable organic compounds were detected in concentrations above detection limits in only one AGWQMN well within Palm Beach County. This well, LP-12P, was part of the Seacoast Utilities Old Dixie Wellfield and is located in the middle of an industrial park that contains several businesses suspected of using organic solvents. The well was sampled as part of a study evaluating the impact of industrial land use on ground water quality. Trichloroethene (TCE) was found in concentrations of 255 µG/L, cis-1,2-dichloroethene at concentrations of 59 µG/L, and a tetrachloroethene at concentrations of 1.5 µG/L. The drinking water standard for each of these three compounds is 3 µG/L. In 1984, when the organic contaminants were detected the well was removed from service.

Floridan Aquifer System

The Floridan Aquifer System underlies all of Palm Beach County. In general, the water quality is poor (highly mineralized) and the water is nonpotable. In all areas of the county the concentrations of chlorides and total dissolved solids exceed the secondary drinking water standards (Shampine, 1975). In the future as water demand increases, the Floridan Aquifer System may be considered as a viable alternative water supply source. This alternative would necessitate expensive treatment processes in order to render the water potable.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of the AGWQMN wells throughout Palm Beach County are shown in Figure 14-7. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

Figure 14-7 shows Stiff patterns for several of the Surficial Aquifer System AGWQMN wells in Palm Beach County. Stiff patterns for wells in eastern Palm Beach County are widest along the central axis, indicating a calcium bicarbonate type of water. Stiff patterns for wells further west, near the Water Conservation Areas, are elongated along the central and upper axes. These wells contain higher concentrations of sodium and chloride. These higher concentrations result from diluted residual seawater that has not been completely flushed from the aquifer.

SUMMARY AND CONCLUSIONS

The water quality of the Surficial Aquifer System in most areas of eastern Palm Beach County meets the state of Florida drinking water standards. Generally the areas displaying the lowest concentrations of total dissolved solids, chloride, and hardness are located

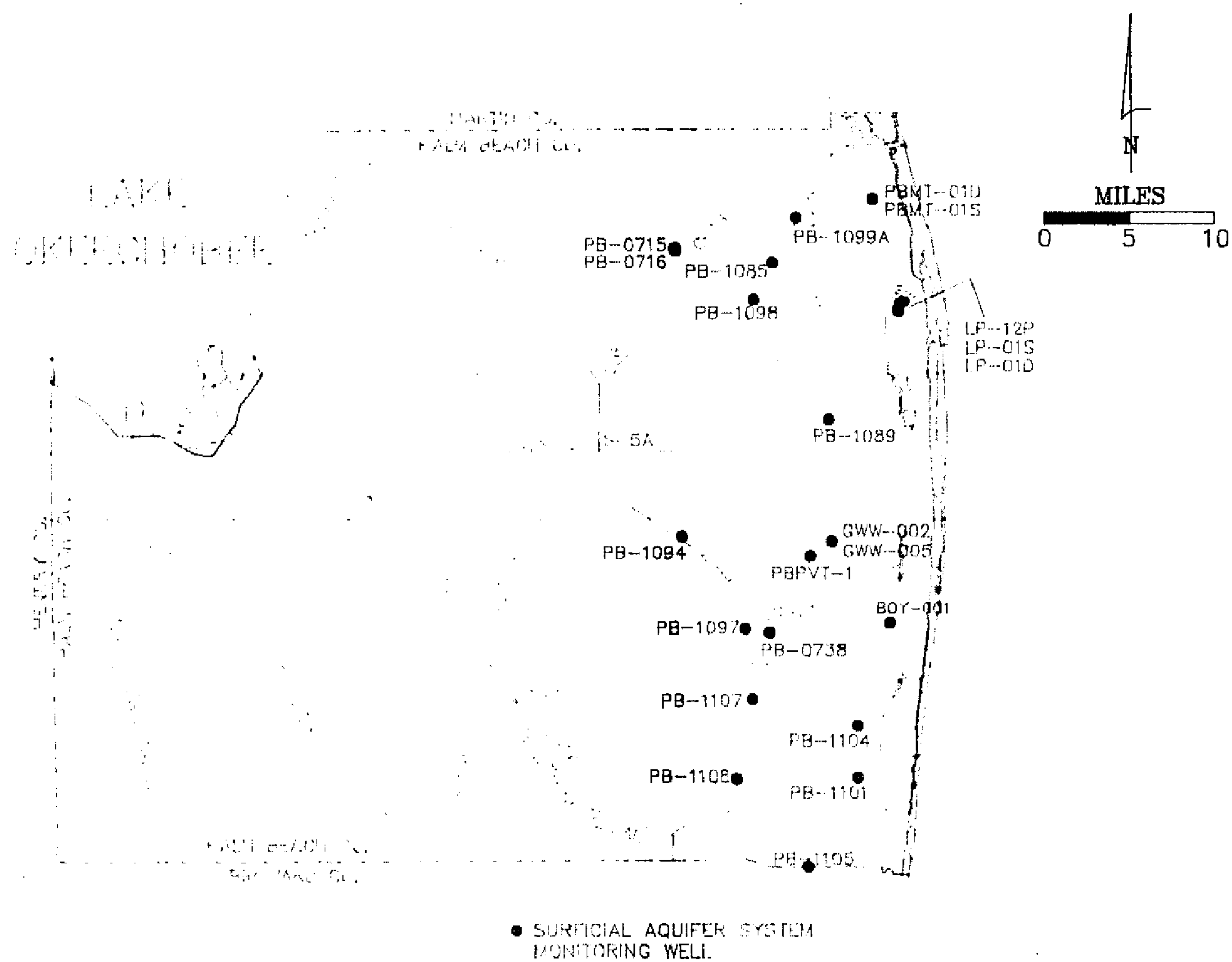


Figure 14-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

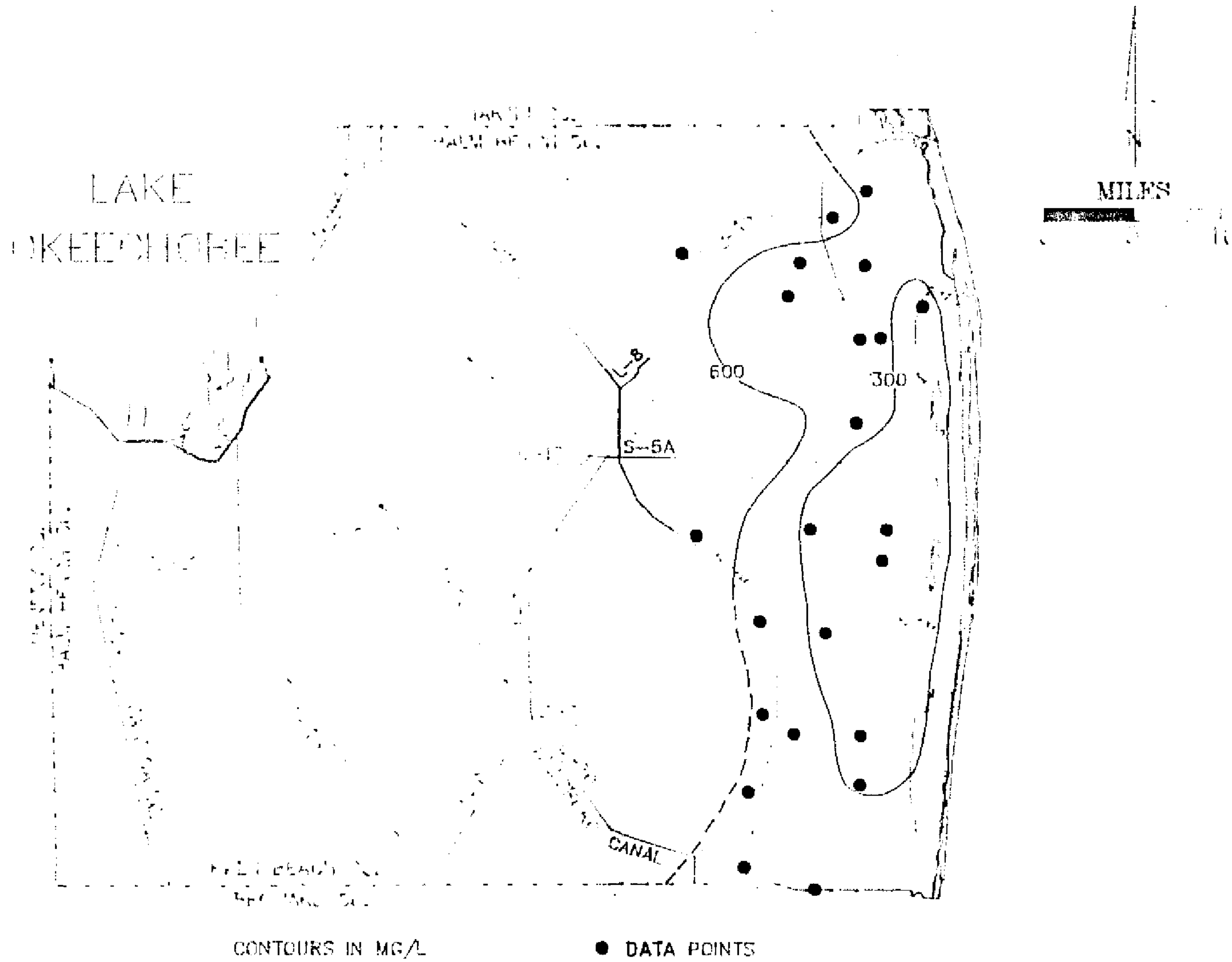


Figure 14-3 TOTAL DISSOLVEDSOLIDS CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (FROM SWAYZE AND MILLER, 1984)

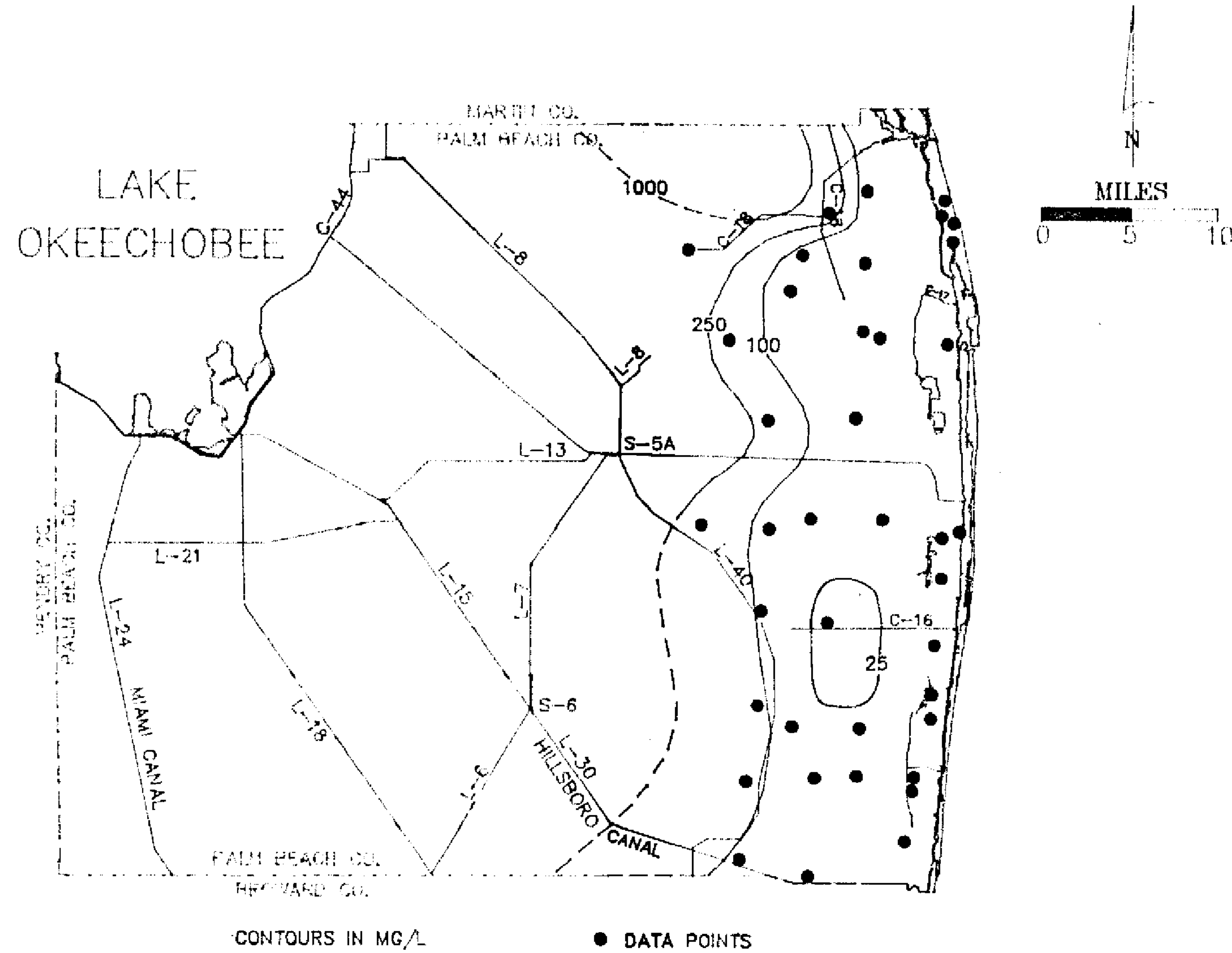
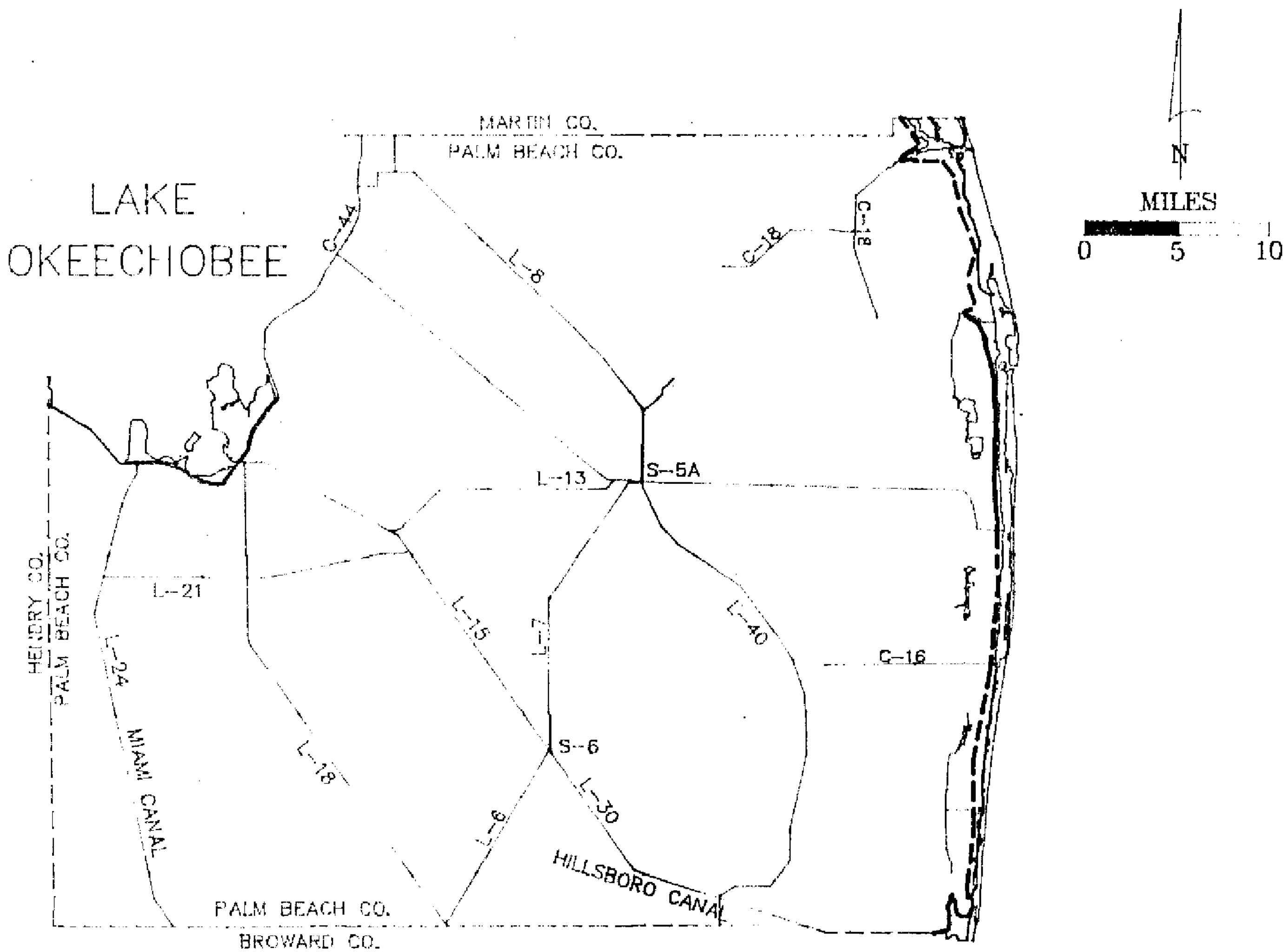


Figure 14-4 CHLORIDE CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (FROM SWAYZE AND MILLER, 1984)



INDICATES LOCATION OF THE 1000 PPM ISOCHLOR AT THE BASE OF THE SURFICIAL AQUIFER SYSTEM

Figure 14-5 EXTENT OF SALT-WATER INTRUSION (1982)

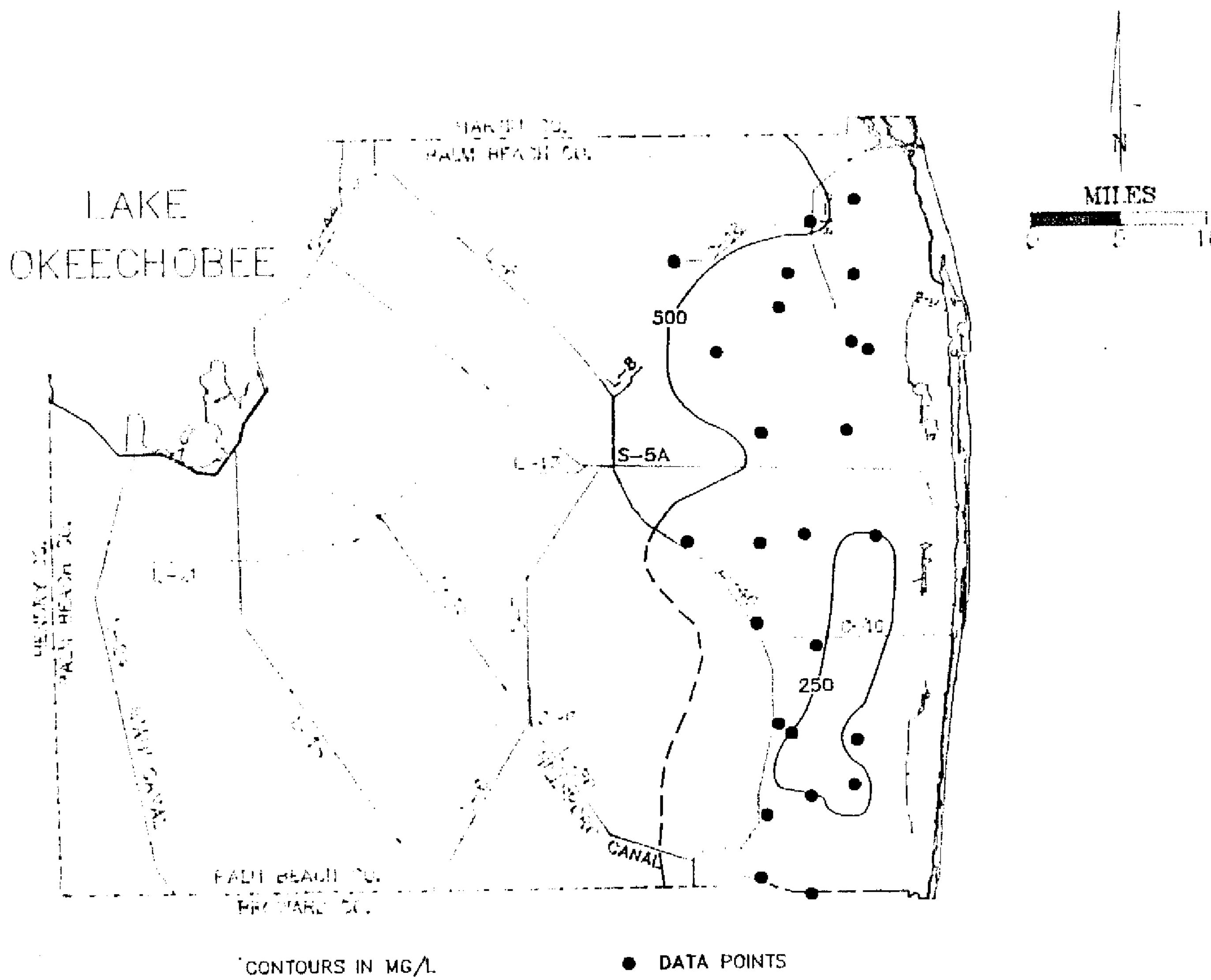


Figure 14-6 HARDNESS CONCENTRATIONS, SURFICIAL AQUIFER SYSTEM (FROM SWAYZE AND MILLER, 1984)

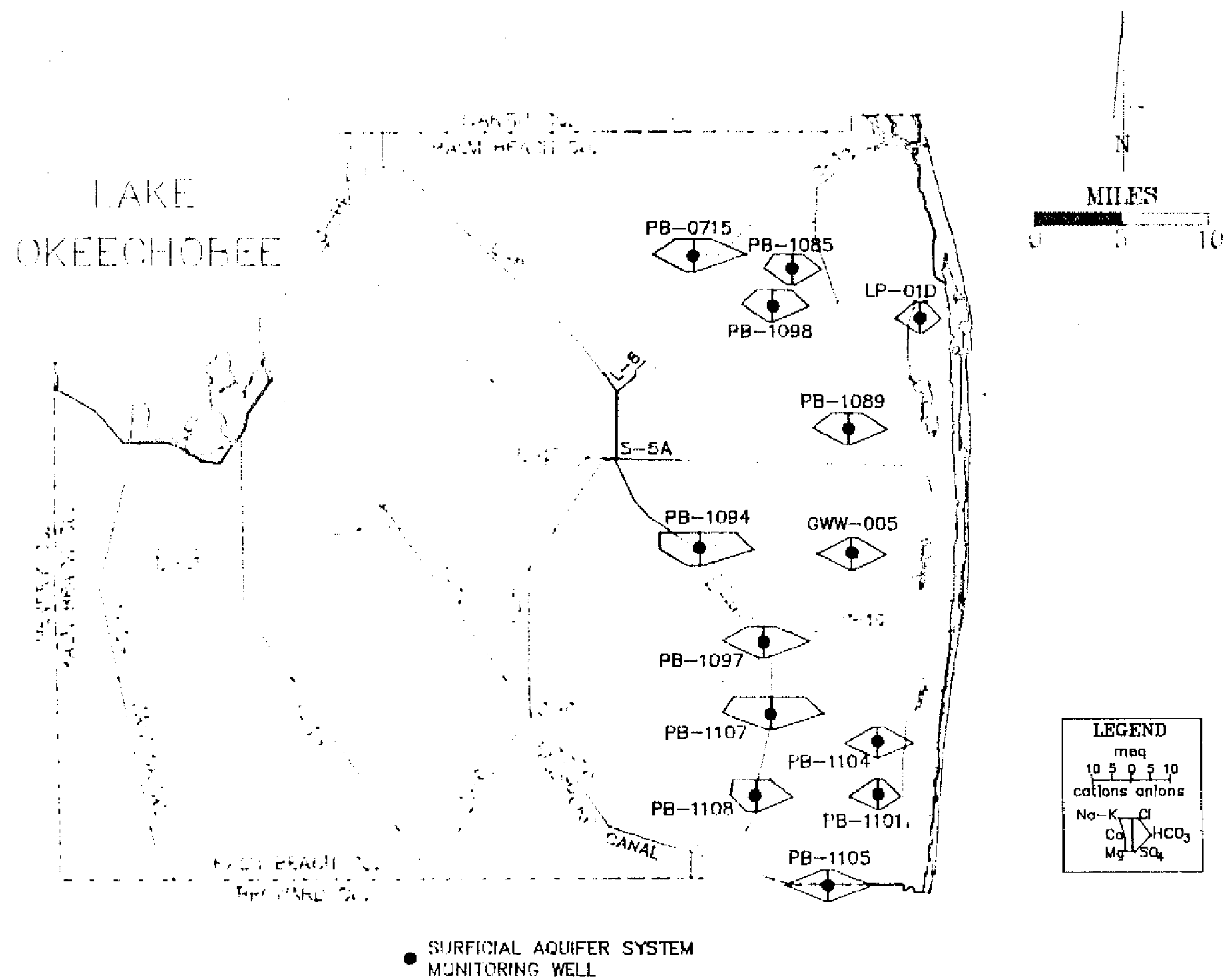


Figure 14-7 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL DATA

east of the Florida Turnpike. Concentrations of these compounds tend to increase to the west of the Florida Turnpike, due to the presence of connate water.

Water adjacent to, and west of the Florida Turnpike, will eventually be used for public drinking water supply. It may be necessary to first treat this water in order to attain potable water standards.

Assuming present technological standards, water from the Floridan Aquifer System is not considered an economically viable alternative source in order to augment water supply. High levels of sodium, chloride, and total dissolved solids, within the Floridan Aquifer System would require expensive treatment methods in order to attain potable water standards.

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

SECTION 15

POLK COUNTY

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LOCATION AND EXTENT OF AREA

Polk County is located in the south central portion of the Florida peninsula and comprises an area of approximately 1,861 square miles, measuring 57 miles from east to west and 49 miles from north to south. The county lies between 27° 40' and 28° 25' north latitude and 81° 05' and 82° 05' west longitude. It is bounded on the north by Lake and Sumter Counties, to the south by Highlands and Hardee Counties, to the east by Osceola County, and to the west by Hillsborough and Pasco Counties.

The eastern one-fourth of Polk County is within the South Florida Water Management District (Figure 15-1) while the majority of the county is within the Southwest Florida Water Management District. A small area in the northeastern corner of the county is within the St. Johns River Water Management District. This section pertains to only the portion of Polk County that is within the South Florida Water Management District boundaries.

HYDROGEOLOGY

There are two major aquifer systems within Polk County that supply drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System. Throughout most of the county the Surficial Aquifer System and the Floridan Aquifer System are separated from one another by the Hawthorn formation (Table 15-1).

Both the Surficial Aquifer System and the Floridan Aquifer System yield potable water throughout Polk County. Floridan Aquifer System wells yield much greater quantities of water and provide a more reliable source of water during periods of drought than do Surficial Aquifer System wells.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and a high water table in most areas all increase the susceptibility of this aquifer system to contamination.

The Floridan Aquifer System in Polk County is recharged primarily from infiltration of rainfall to the water table with subsequent percolation downward through the nonartesian aquifer and the underlying confining beds into the limestones of the Floridan Aquifer System (Stewart, 1966). Some recharge to the Floridan Aquifer System occurs within Polk County along the Lake Wales Ridge (Figure 15-2) where the confining beds above the Floridan Aquifer System are absent or are penetrated by openings such as sinkholes. This downward movement of water occurs only in places where the water table in the Surficial Aquifer System is higher than the potentiometric surface of the Floridan Aquifer System.

The Floridan Aquifer System is most susceptible to contamination by anthropogenic compounds in these ridge areas because of the thin or absent confining layer, and a downward hydraulic gradient. In areas where the Hawthorn formation is thick and impermeable, the Floridan Aquifer System is protected from contamination by anthropogenic compounds. However, excessive pumping can cause upconing of poorer quality water from the deeper producing zones of the Floridan Aquifer System.

Sinkholes often bridge the Hawthorn formation and may offer direct connections between the Floridan Aquifer System and bodies of surface water. These connections can allow contaminants present at land surface to infiltrate the Floridan Aquifer System without being subjected to the attenuation processes that normally occur within the soil and unsaturated zones.

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in Polk County consists of one Surficial Aquifer System and four Floridan Aquifer System wells. Figure 15-3 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 15-1. The results of the inorganic laboratory analysis for the first three years of sampling (1985-1987) are shown in Appendix 15-2.

Surficial Aquifer System

It was not possible to generate concentration maps for total dissolved solids, chloride, or hardness for the Surficial Aquifer System in Polk County due to the scarcity of data. Data from Stewart (1966) and data from surrounding counties was used to estimate the concentration of these compounds in the portion of Polk County that lies within the South Florida Water Management District. The AGWQMN sampling results and the data from Stewart (1966) indicate that

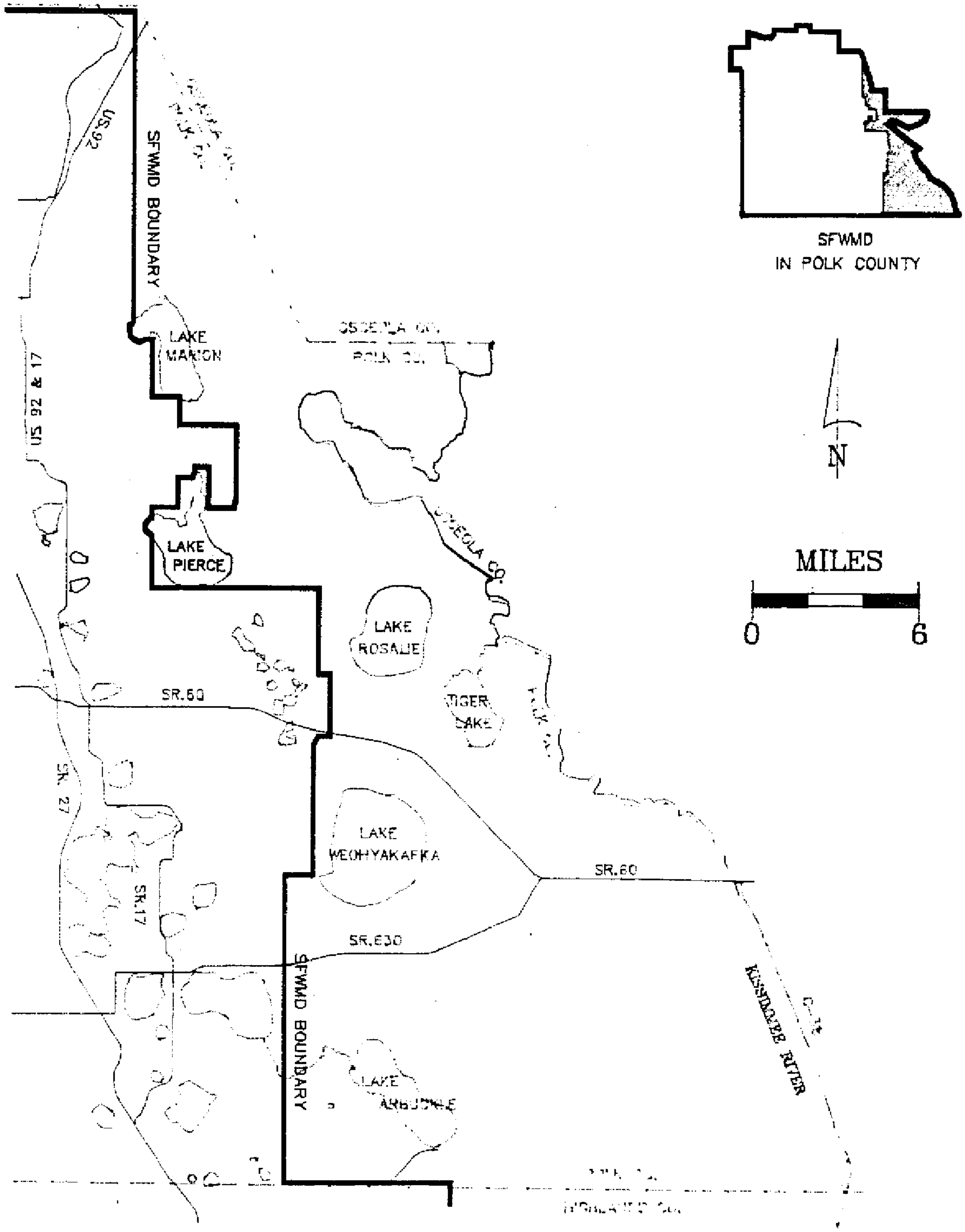

Figure 15-1 MAP OF POLK COUNTY

TABLE 15-1. GENERALIZED HYDROGEOLOGY OF POLK COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFER-ENTIATED DEPOSITS	0-250 300-600 (Ridge Areas)	LOW TO MODERATE TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	INTERBEDDED UNITS OF GRAVEL, SHELL, SANDSTONE, LIMESTONE AND CLAY
INTERMEDIATE CONFINING ZONE	HAWTHORN GROUP	0-160	LOW PERMEABILITY TO IMPERMEABLE	GRAYISH-GREEN SANDY CLAY, WITH SILT AND PHOSPHATIC SAND
FLORIDAN AQUIFER SYSTEM	OCALA GROUP AVON PARK LIMESTONE	2400-2800	HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO MODERATE	INTERBEDDED LIMESTONES AND DOLOMITES

in general, water from the Surficial Aquifer System in Polk County is potable and of good quality.

Total dissolved solids concentrations in the Surficial Aquifer System are estimated to range from 20 MG/L to 200 MG/L. These concentrations are well below the secondary drinking water standard for total dissolved solids of 500 MG/L.

Chloride concentrations in the Surficial Aquifer System are estimated to range from lows of approximately 2 MG/L to highs of approximately 20 MG/L. These chloride concentrations are well below the secondary drinking water standard for chloride of 250 MG/L.

Hardness concentrations are estimated to range from lows of approximately 10 MG/L to highs of approximately 100 MG/L in the Surficial Aquifer System. These concentrations are in the soft to moderately hard range.

The pH of the Surficial Aquifer System AGWQMN well sampled in Polk County was below the minimum allowable secondary drinking water standard of 6.5. This well is extremely shallow, and it is likely that water from deeper within the aquifer would have a higher pH.

The Surficial Aquifer System monitor well also exceeded the secondary drinking water standard for iron of 0.3 MG/L. Stewart (1966) gives a range of 0.4 to 0.51 MG/L for iron concentrations in the Surficial Aquifer System of Polk County, a range that is above the drinking water standard. High iron concentrations are not a health threat but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

Lead was detected in the Surficial Aquifer System AGWQMN well at a concentration of 2,845 ug/l, greatly exceeding the primary drinking water standard of 50 ug/l. This well has a water level recorder mounted to it. These recorders use lead weights that often come in contact with the water in the wells. This lead weight is believed to be the source of the increased lead concentrations. This particular AGWQMN well yields extremely turbid water with high suspended sediments. High suspended sediments contribute to high metals concentrations when metal coatings on the suspended sediments dissolve into solution as the sample is acidified for preservation.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Surficial Aquifer System well in Polk County.

Floridan Aquifer System

The water quality of the Floridan Aquifer System in Polk County is of good quality throughout the portion of the county that lies within the South Florida Water Management District boundaries. The water in the Floridan Aquifer System becomes more mineralized to the east with increased distance from recharge areas. In order to more accurately estimate the ground water quality of the Floridan Aquifer System within Polk County, water quality data and figures from Shaw and Trost, 1984 were used to supplement the AGWQMN Floridan Aquifer System data.

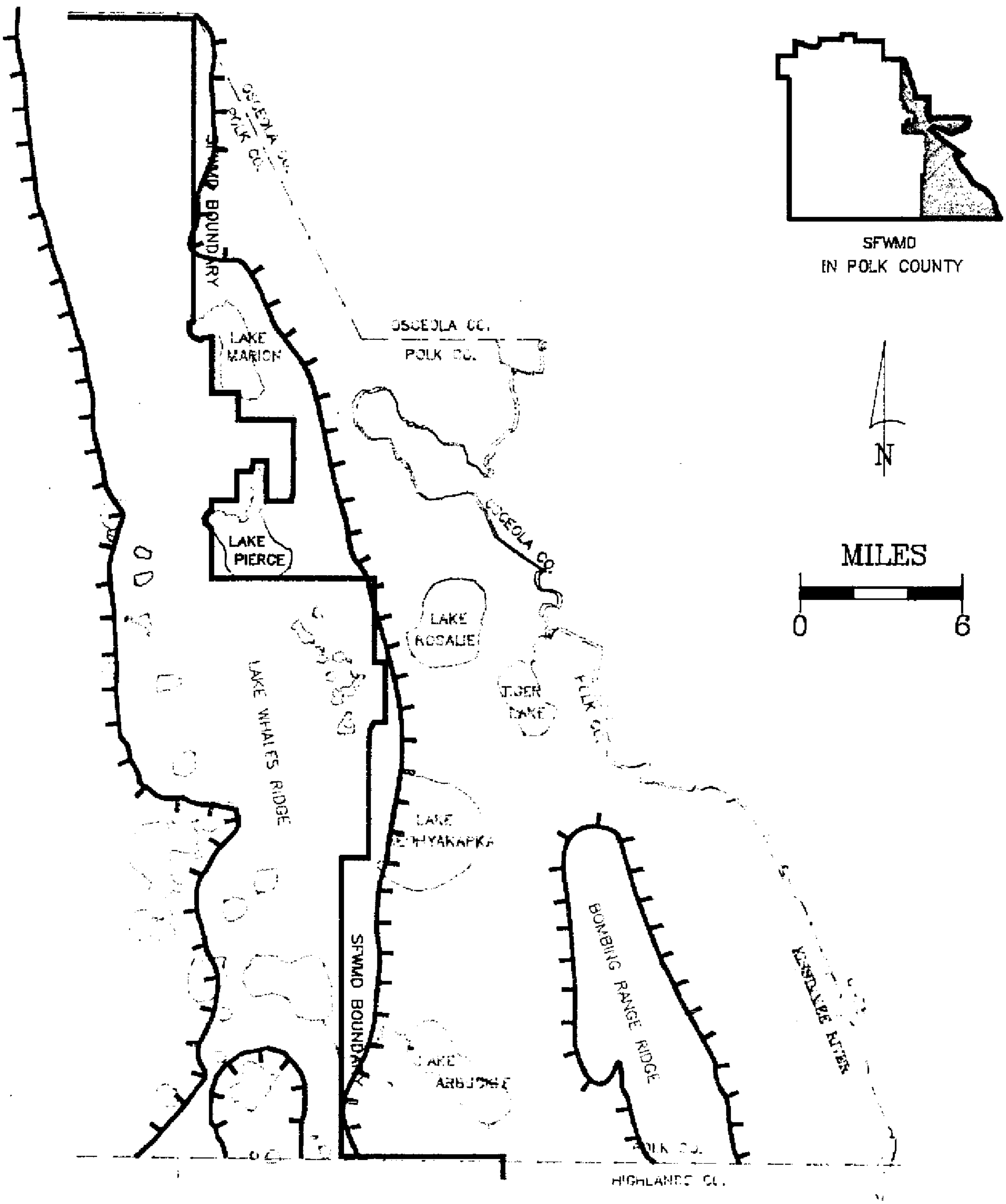

Figure 15-2 MAJOR GEOMORPHIC FEATURES OF POLK COUNTY (FROM WHITE, 1970)

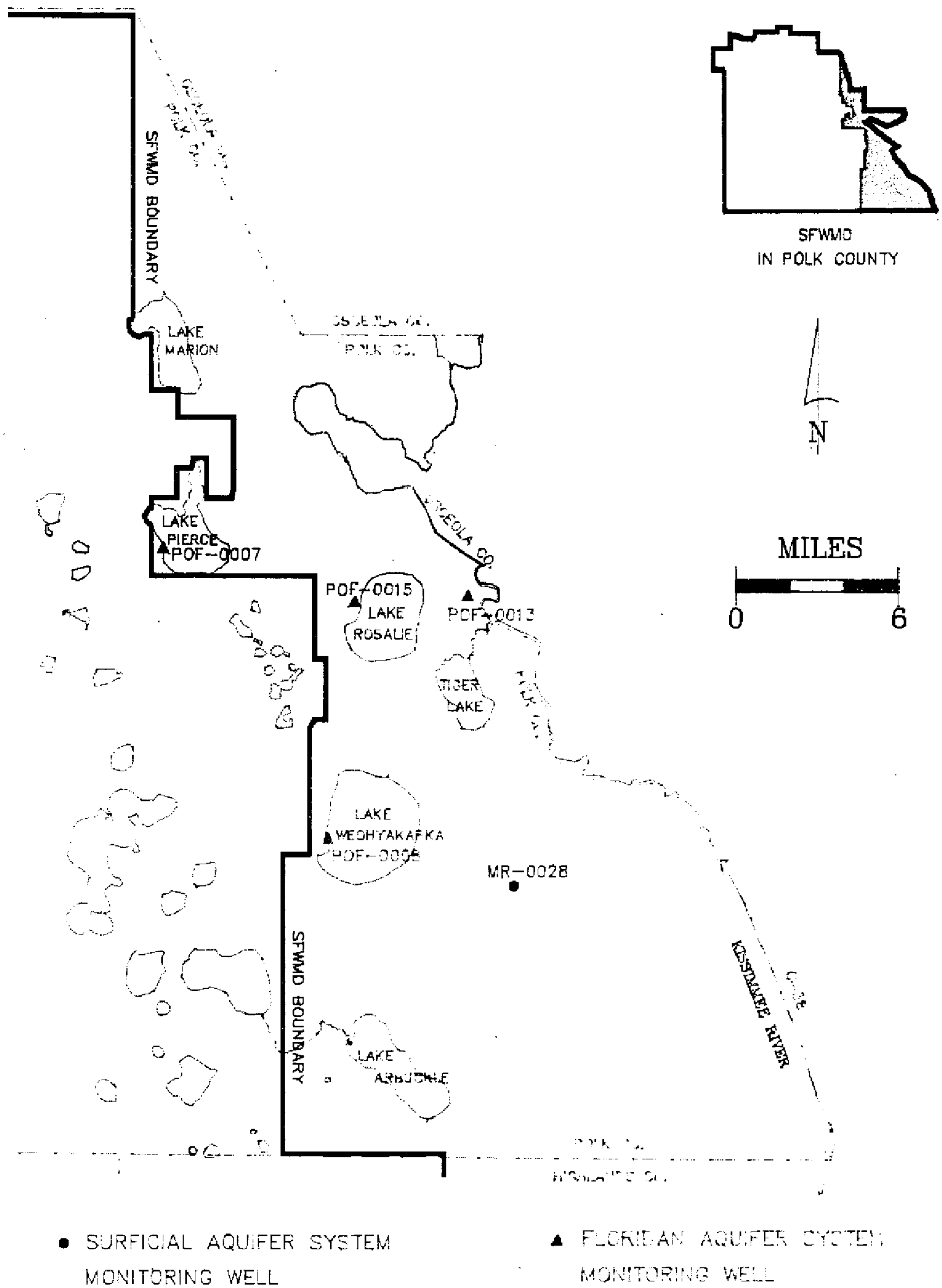

Figure 15-3 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

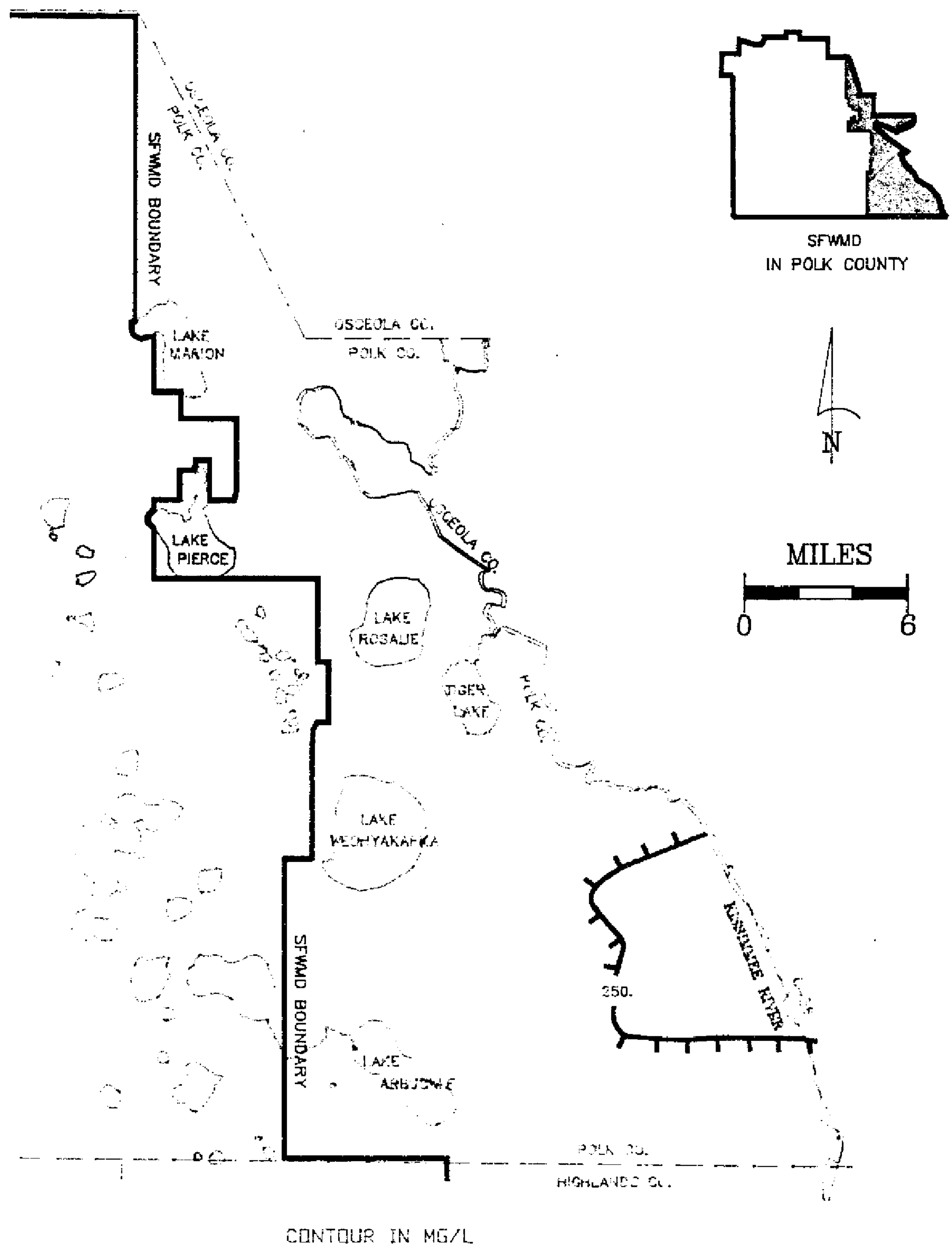

Figure 15-4 TOTAL DISSOLVED SOLIDS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

Total dissolved solids concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 58 MG/L to a high of 119 MG/L with an average concentration of 98 MG/L. Concentrations in Figure 15-4 (from Shaw and Trost 1984) show the average wellhead total dissolved solids concentration for the Floridan Aquifer System in Polk County. This figure agrees with the AGWQMN data and shows the total dissolved solids concentrations to be below 250 MG/L in all areas of the county within the South Florida Water Management District, except for a pocket in the southeastern corner of the county. Total dissolved solids concentrations are below the drinking water standard within the Floridan Aquifer System throughout Polk County.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells in Polk County are less than 10 MG/L. Figure 15-5 (from Shaw and Trost, 1984) depicts the 10 MG/L isochlor in Polk County. The highest chloride concentrations are in the eastern portion of the county, and are approximately 50 MG/L.

Hardness concentrations within the Floridan Aquifer System AGWQMN wells in Polk County range from a low of 35 MG/L to a high of 86 MG/L, with an average concentration of 71 MG/L. Shaw and Trost (1984) show the hardness concentrations within Polk County to range from less than 120 MG/L within most of the county, to a high of over 180 MG/L in a pocket along the Kissimmee River (Figure 15-6). Hardness concentrations within the county range from soft to very hard.

Two Floridan Aquifer System AGWQMN wells slightly exceeded the secondary drinking water standard for iron of 0.30 MG/L. Both of these wells have black iron casings. Only one of the total iron samples collected from each of these wells exceeded the drinking water standard, and none of the dissolved iron samples exceeded the standard. The iron concentrations that exceeded drinking water standards are likely due to metal particles from the well casing that were collected with the sample water. Iron concentrations within the aquifer are below the drinking water standard.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Floridan Aquifer System AGWQMN wells in Polk County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells within Polk County are shown in Figure 15-7. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

The Stiff patterns indicate that the water from the Floridan Aquifer System is a calcium, magnesium-bicarbonate water of low ionic strength. Surficial Aquifer System AGWQMN well MR-0028 also has a low ionic strength water, which is reflected by the narrow Stiff pattern seen in Figure 15-7.

SUMMARY AND CONCLUSIONS

There are two major aquifer systems present within Polk County, these are the Surficial Aquifer System and the Floridan Aquifer System. The South Florida Water Management District collects water quality samples annually from one Surficial Aquifer System, and four Floridan Aquifer System, Ambient Ground Water Quality Monitor Network wells within Polk County.

The water quality of both the Surficial Aquifer System and the Floridan Aquifer System meet or exceed the State of Florida Primary and Secondary Drinking Water Standards throughout the portion of Polk County that lies within the South Florida Water Management District.

The Surficial Aquifer System has lower concentrations of chlorides, total dissolved solids, and hardness, as well as a lower ionic strength overall, but it has higher concentrations of iron in many areas. The well yields for the Floridan Aquifer System are much higher than for the Surficial Aquifer System. If large quantities of water are needed, the Floridan Aquifer System is a better source.

The Floridan Aquifer System is partially protected from contamination by the confining Hawthorn formation, except in recharge areas. These recharge areas are located along the Lake Wales Ridge, in the western portion of the county that lies within the South Florida Water Management District boundaries. Residence time, and consequently mineralization, increase with distance from these recharge areas.

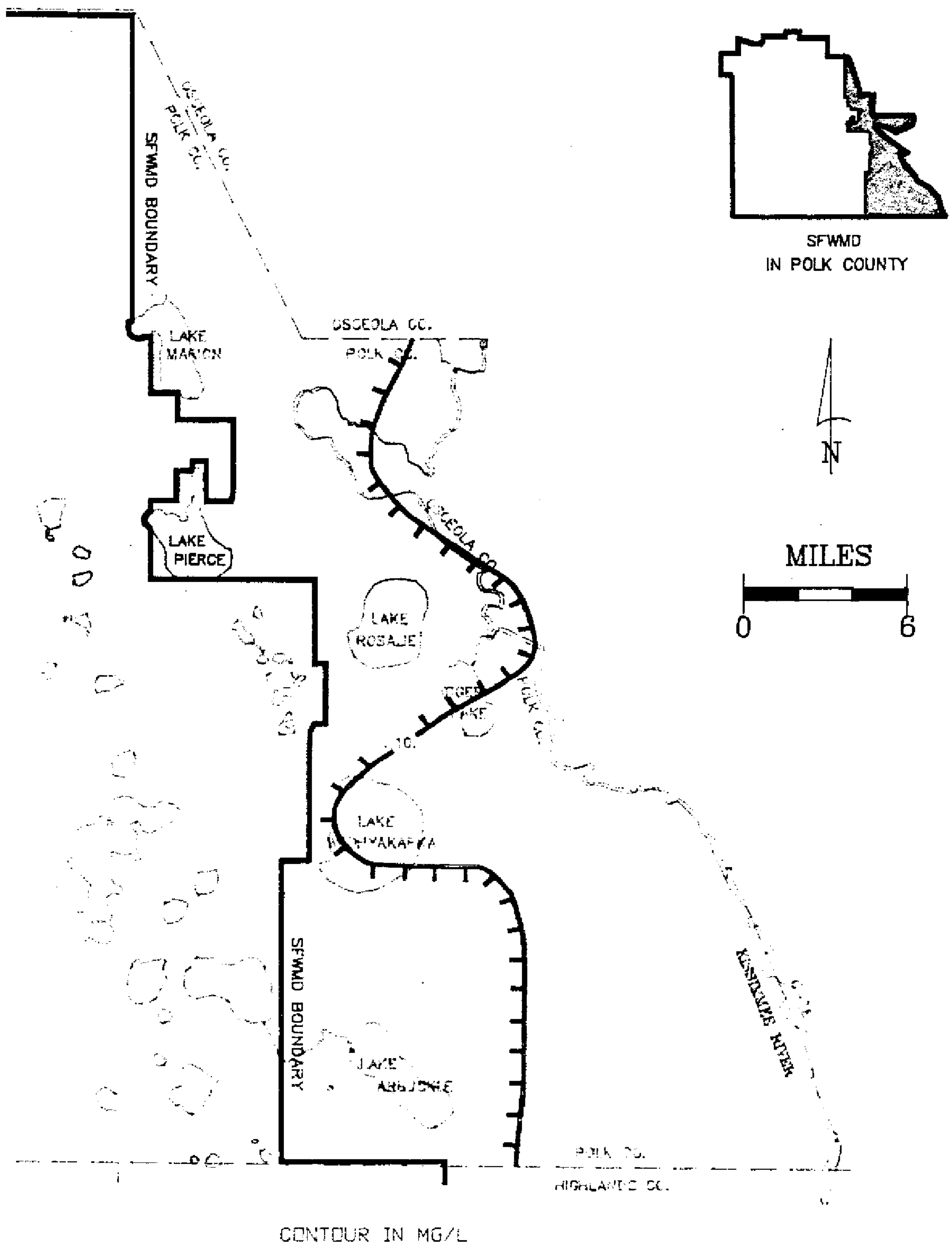

Figure 15-5 CHLORIDE CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

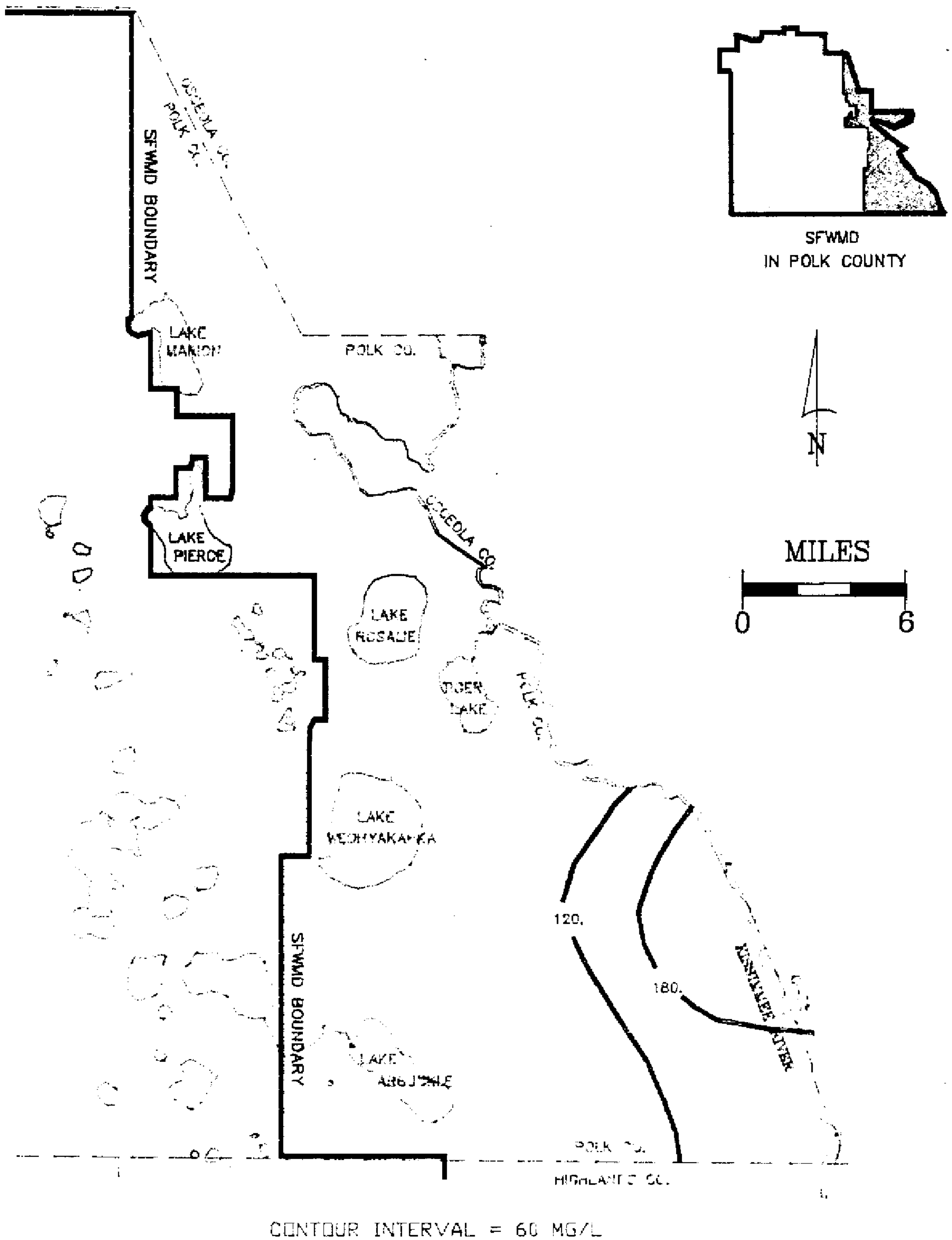

Figure 15-6 HARDNESS CONCENTRATIONS, FLORIDAN AQUIFER SYSTEM (FROM SHAW AND TROST, 1984)

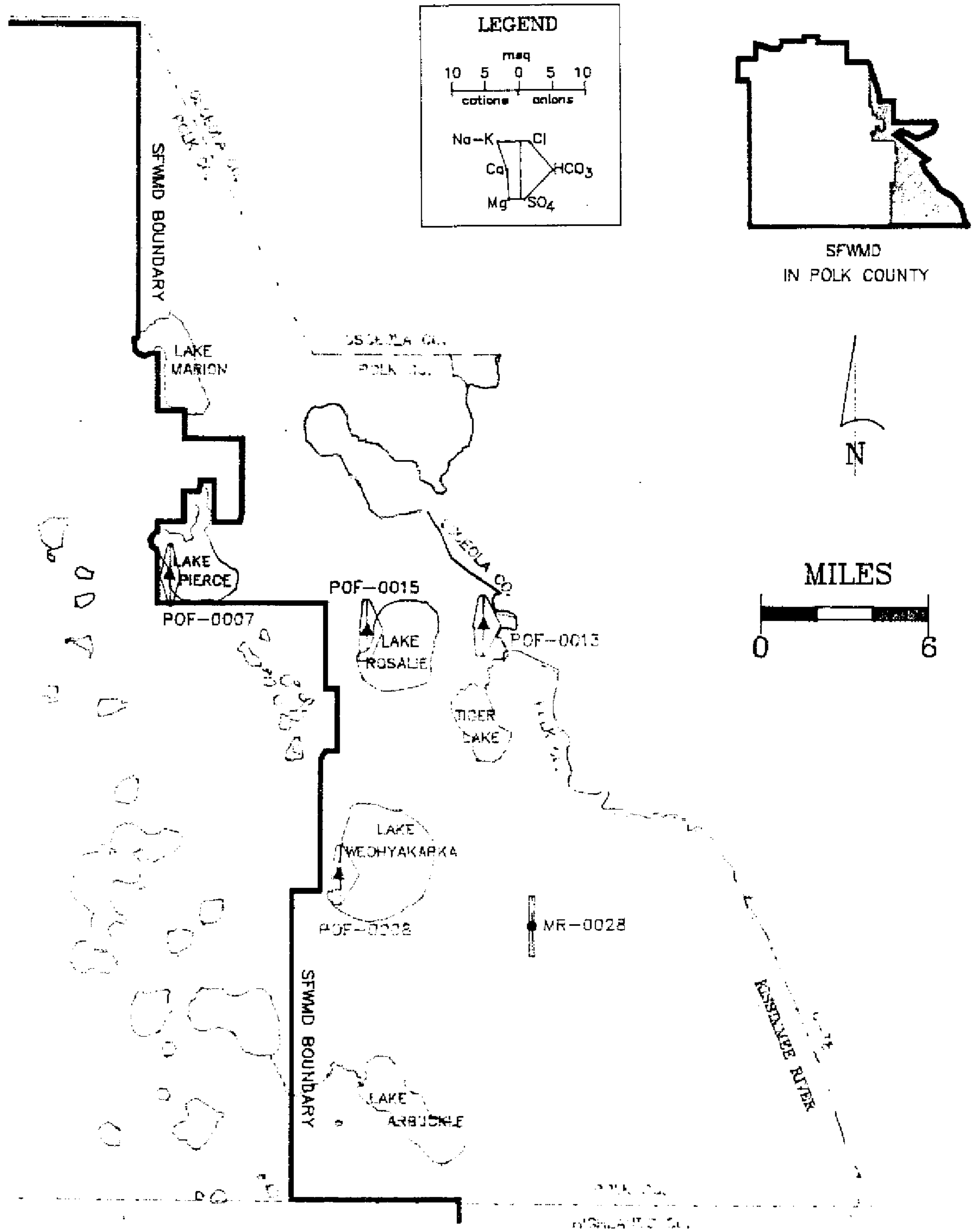

Figure 15-7 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM, AND FLORIDAN AQUIFER SYSTEM

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*Robertson, A.F. 1973. Hydrologic Conditions in the Lakeland Ridge area of Polk County, Florida. Bureau of Geology, Report of Investigation No. 64. Tallahassee, Florida.

Shaw, J.E. and S.M. Trost, 1984. Hydrogeology of the Kissimmee Planning Area, South Florida Water Management District. South Florida Water Management District, Technical Publication #84-1. West Palm Beach, Florida.

*Stewart, H.G. 1959. Interim Report on the Geology and Ground-Water Resources of Northwestern Polk County. Florida Geological Survey, Information Circular No. 23. Tallahassee, Florida.

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*Indicates text was not referenced in the supplement

SECTION 16

ST. LUCIE COUNTY

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LOCATION AND EXTENT OF AREA

St. Lucie County is located on the southeast coast of Florida and comprises an area of approximately 588 square miles, measuring 30 miles from east to west and 25 miles from north to south. The county lies between 27 12' 22" and 27 33' 26" north latitude and 80 11' 37" and 80 40' 42" west longitude. It is bounded on the north by Indian River County, to the south by Martin County, to the west by Okeechobee County and to the east by the Atlantic Ocean (Figure 16-1).

HYDROGEOLOGY

Two aquifer systems are present within St. Lucie County that provide drinking and irrigation water. These are the Surficial Aquifer System and the Floridan Aquifer System, which are separated from one another by the thick and impermeable Hawthorn formation. Table 16-1 shows a schematic representation of the generalized hydrogeology of St. Lucie County.

The Surficial Aquifer System is the primary source of drinking water throughout the county, and the Floridan Aquifer System is an alternate source of drinking water supplies. However, water from the Floridan Aquifer System must first undergo treatment by reverse osmosis (RO) filtration prior to use as a drinking water supply. Both aquifer systems serve as sources for irrigation water.

The proximity of the Surficial Aquifer System to near surface sources of contamination increases the susceptibility of this aquifer system to contamination from a variety of anthropogenic sources. Lack of confining layers, high recharge, relatively high permeability, and high water table also increase the susceptibility of this aquifer to contamination.

Throughout St. Lucie County the Floridan Aquifer System is protected from anthropogenic contamination due to the presence of the thick and impermeable Hawthorn formation (Table 16-1). In addition, the entire county is a discharge area for the Floridan Aquifer System. Because it is a discharge area, the hydraulic head of the Floridan Aquifer System is greater than that of the Surficial Aquifer System; therefore, downward flow is impossible unless the gradient is reversed (Nealon et al., 1987).

AMBIENT GROUND WATER QUALITY MONITORING NETWORK

Introduction

The Ambient Ground Water Quality Monitor Network (AGWQMN) in St. Lucie County consists of four Surficial Aquifer System and four Floridan Aquifer System wells. Figure 16-2 shows the distribution and approximate location of these monitor wells within the county. A complete listing of the AGWQMN well locations, screened intervals, construction materials, and other pertinent information is summarized and presented in Appendix 16-1. The results of the inorganic laboratory analyses for the first four years of sampling (1984-1987) are shown in Appendix 16-2.

Surficial Aquifer System

Water quality samples collected from the Surficial Aquifer System AGWQMN wells exhibit concentrations of total dissolved solids ranging from a low of 60 MG/L to a high of 1954 MG/L, with an average concentration of 799 MG/L. The secondary drinking water standard for total dissolved solids is 500 MG/L; however, it may be greater if no other standards are exceeded. High total dissolved solids values, in excess of 500 MG/L occur in the western part of the county (Figure 16-3). The 500 MG/L contour line approximately parallels the turnpike with increased values to the west. Total dissolved solids data from Miller (1980) was used to supplement the AGWQMN data used to construct Figure 16-3.

Chloride concentrations within the Surficial Aquifer System AGWQMN range from a low of 5.9 MG/L to a high of 429 MG/L with an average concentration of 125 MG/L. The secondary drinking water standard for chloride is 250 MG/L.

Figure 16-4 shows the chloride concentrations in St. Lucie County for the Surficial Aquifer System. Chloride data from Miller (1980) was used to supplement the AGWQMN data used to construct Figure 16-4. A pocket of increased chloride concentration appears in the southwest quadrant of the county. This may be due to connate water, the upconing of poorer quality water from the Floridan Aquifer System or the infiltration of Floridan Aquifer System water used for irrigation.

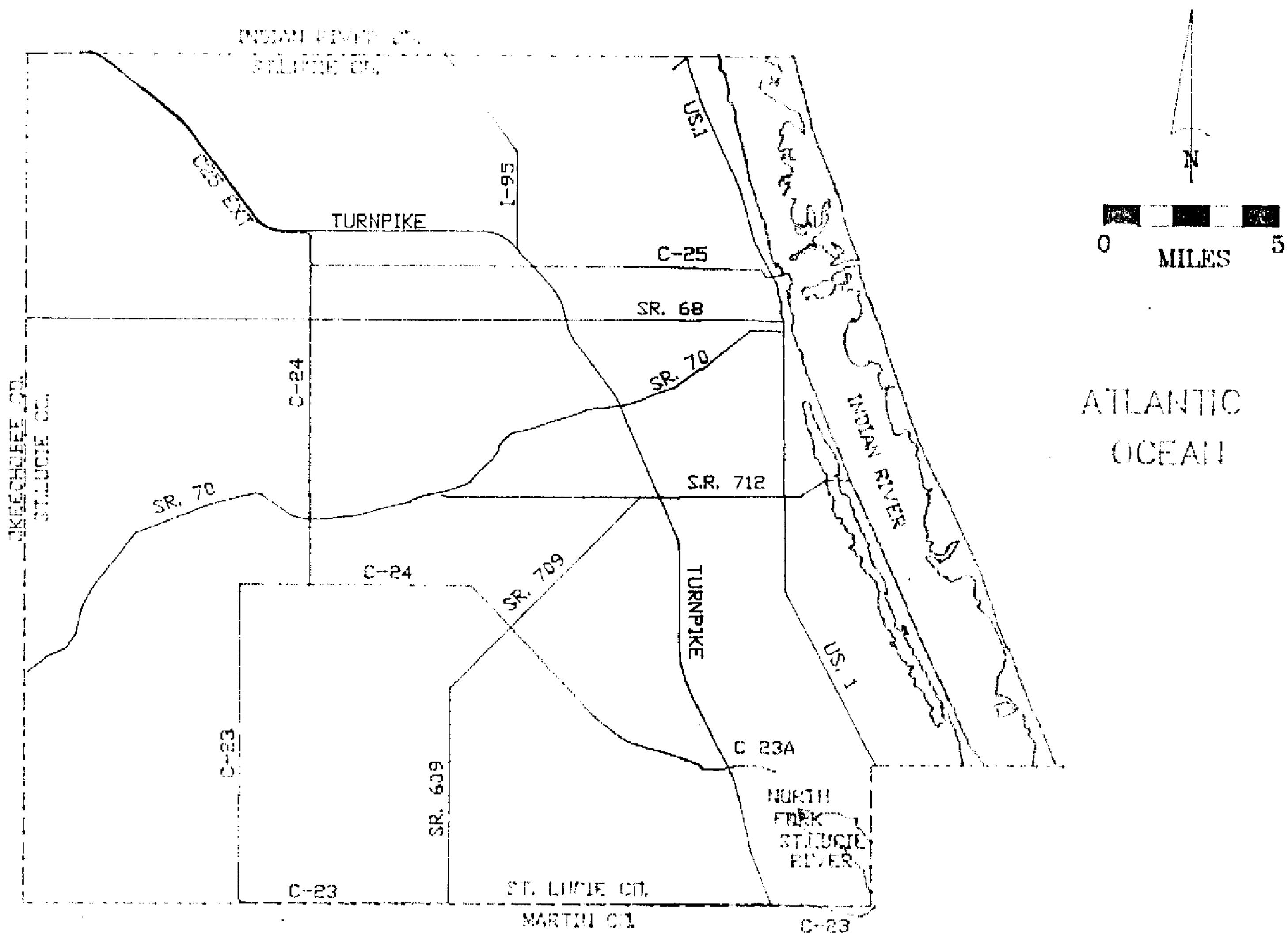

Figure 16-1 MAP OF ST. LUCIE COUNTY

TABLE 16-1. GENERALIZED HYDROGEOLOGY OF ST. LUCIE COUNTY

AQUIFER SYSTEM	FORMATION	THICKNESS (FT.)	HYDROGEOLOGIC PROPERTIES	GEOLOGIC DESCRIPTION
SURFICIAL AQUIFER SYSTEM	UNDIFFERENTIATED DEPOSITS	60-180	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR TO GOOD	FINE TO MEDIUM GRAINED QUARTZ SAND, WITH VARYING PERCENTAGES OF SHELL. OCCASIONALLY INTERBEDDED WITH SANDY LIMESTONE AND/OR SHELL BEDS
	ANASTASIA FORMATION		MODERATE TO HIGH TRANSMISSIVITY WATER QUALITY: GOOD TO FAIR	SANDY COQUINA
INTERMEDIATE CONFINING ZONE	TAMIAMI FORMATION	20-90	MODERATE TRANSMISSIVITY WATER QUALITY: FAIR	SANDY BIOGENIC LIMESTONE WITH MINOR PERCENTAGES OF SPARRY CALCITE AND DOLOMITE
	HAWTHORN GROUP	300-500	IMPERMEABLE	POORLY INDURATED CLAYEY, SILTY PHOSPHATIC SANDS
FLORIDAN AQUIFER SYSTEM	OCALA GROUP	2600-3200	HIGH TRANSMISSIVITY WATER QUALITY: POOR	INTERBEDDED LIMESTONES AND DOLOMITES
	AVON PARK LIMESTONE			

Chloride concentrations also increase along the coast in areas where salt water intrusion has occurred. Figure 16-5 delineates the extent of salt water intrusion in St. Lucie County as of 1982.

Hardness concentrations within the Surficial Aquifer System AGWQMN wells range from a low of 8.7 MG/L to a high of 440 MG/L with an average concentration of 240 MG/L. Western St. Lucie County has hard to very hard water, while the eastern portion of the county has moderately hard to soft water (Figure 16-6). Data from Miller (1980) was used to supplement the AGWQMN data used to construct Figure 16-6.

Ten of the 11 samples collected exceeded the secondary drinking water standard for iron of 0.3 MG/L. High iron concentrations are not a health threat,but may be aesthetically displeasing. They can cause the staining of clothes and plumbing fixtures. In addition, high iron concentrations can induce the growth of iron reducing bacteria, which can subsequently clog the wells or plumbing fixtures.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Surficial Aquifer System in St. Lucie County.

Floridan Aquifer System

Water quality samples collected from the Floridan Aquifer System within St. Lucie County exhibit high concentrations of sodium, chloride, and other dissolved constituents. Throughout the county the concentrations of chloride and total dissolved solids exceed the secondary drinking water standards.

Total dissolved solids concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 626 MG/L to a high of 2,998 MG/L with an average concentration of 1,591 MG/L. The highest total dissolved solids concentrations were located in the west central portion of the county, while the lowest concentrations, less than 1,000 MG/L, were located in the east central portion of the county (Figure 16-7). Data from Brown and Reece (1980) supplemented the AGWQMN data used to construct Figure 16-7.

Chloride concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 204 MG/L to a high of 1,660 MG/L, with an average concentration of 737 MG/L. Figure 16-8 shows that the chloride concentrations exceed the drinking water standard of 250 MG/L throughout the county. Data from Brown and Reece (1980) was used to supplement the AGWQMN data used to construct Figure 16-8.

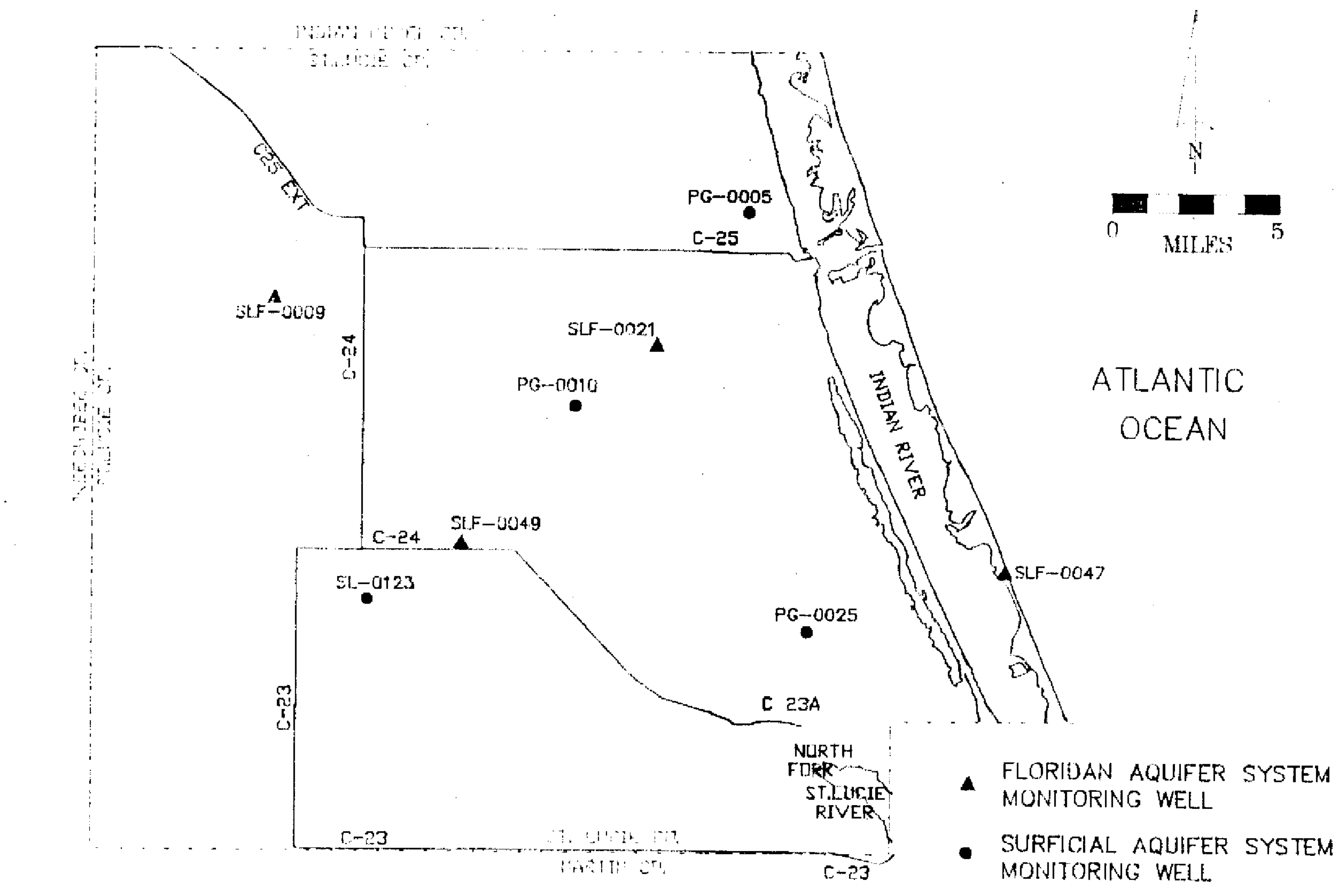

Figure 16-2 LOCATION OF AMBIENT GROUND WATER QUALITY MONITOR NETWORK WELLS

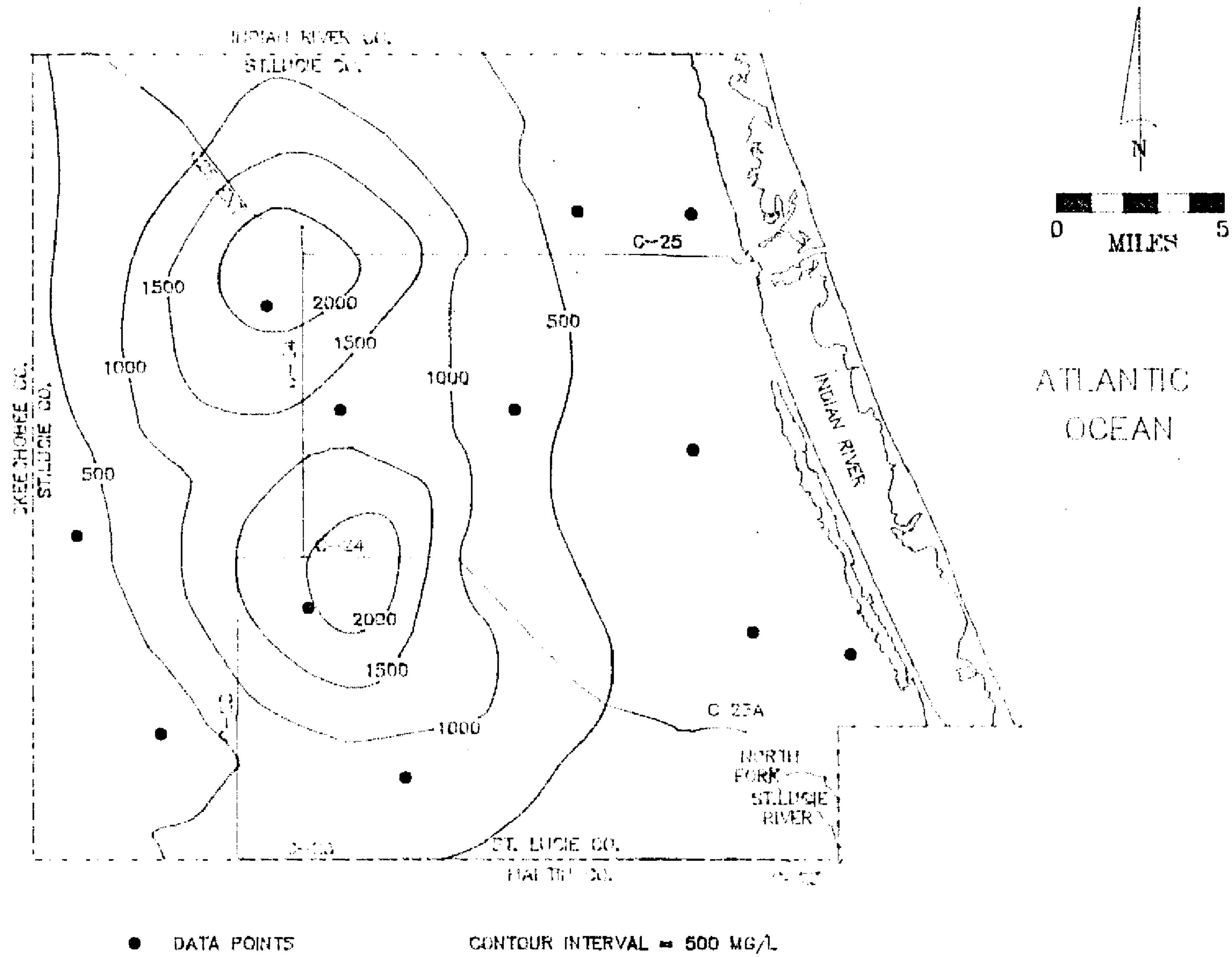

Figure 16-3 **TOTAL DISSOLVED SOLIDS CONCENTRATION FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM**

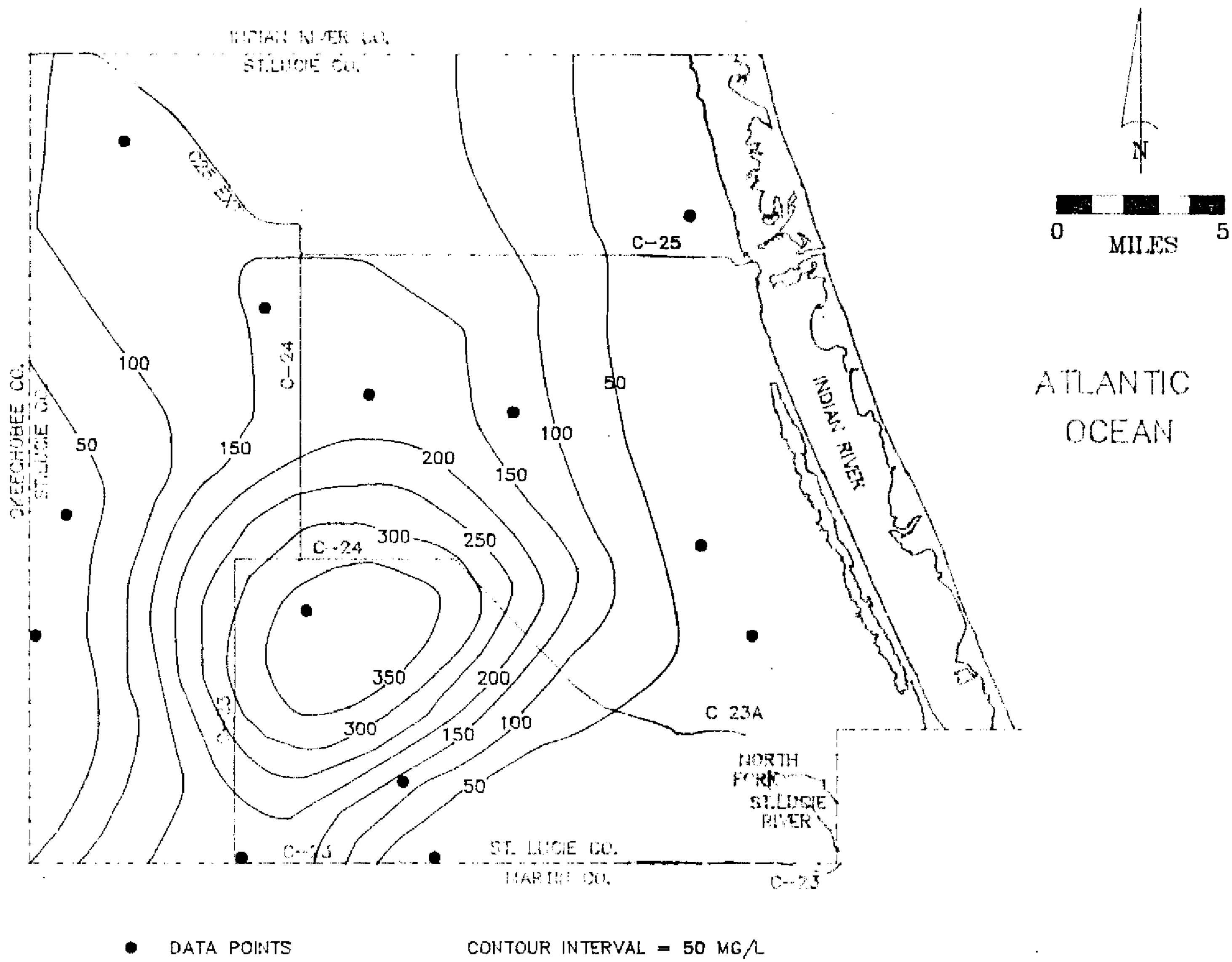

Figure 16-4 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

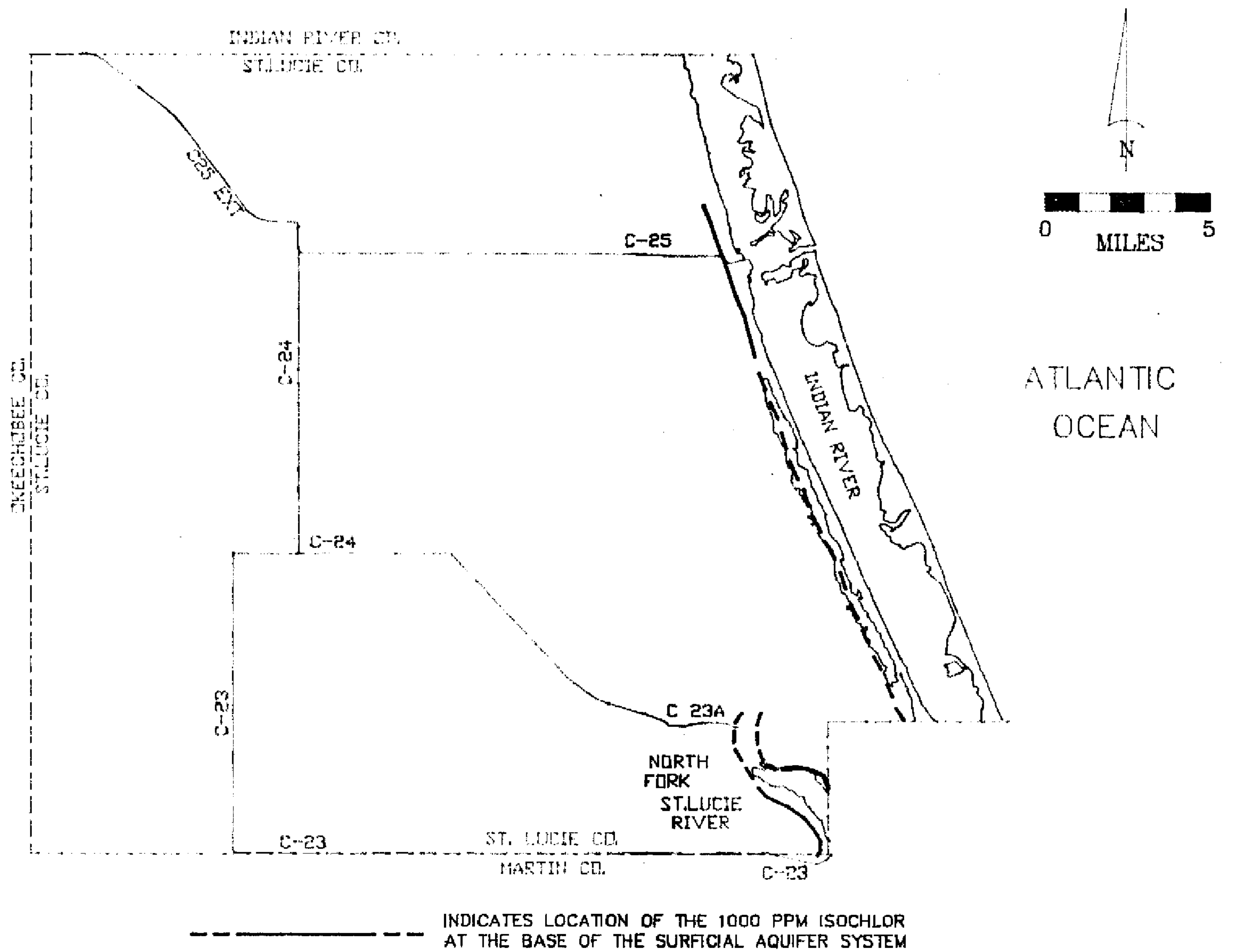

Figure 16-5 EXTENT OF SALT-WATER INTRUSION (1982)

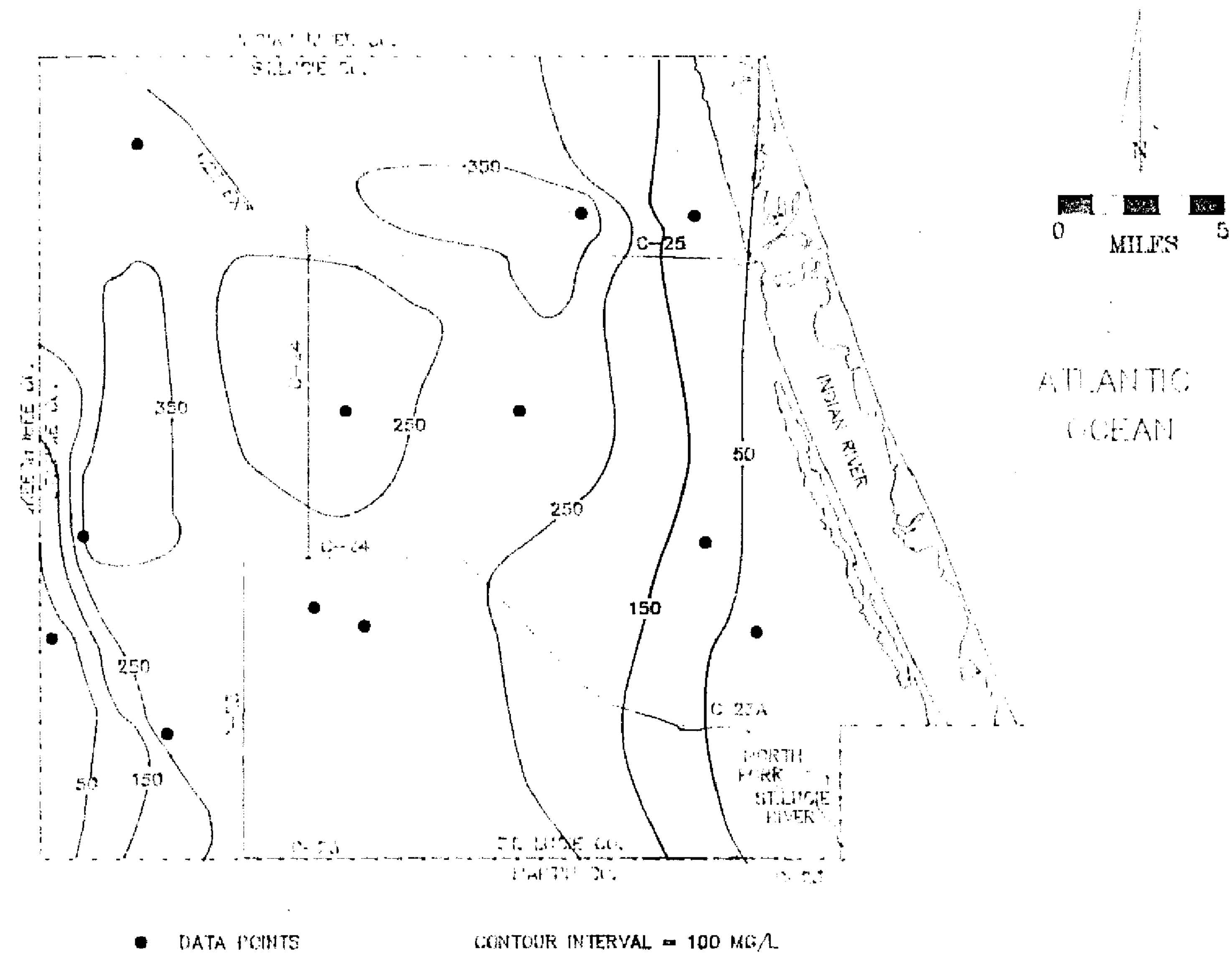

Figure 16-6 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, SURFICIAL AQUIFER SYSTEM

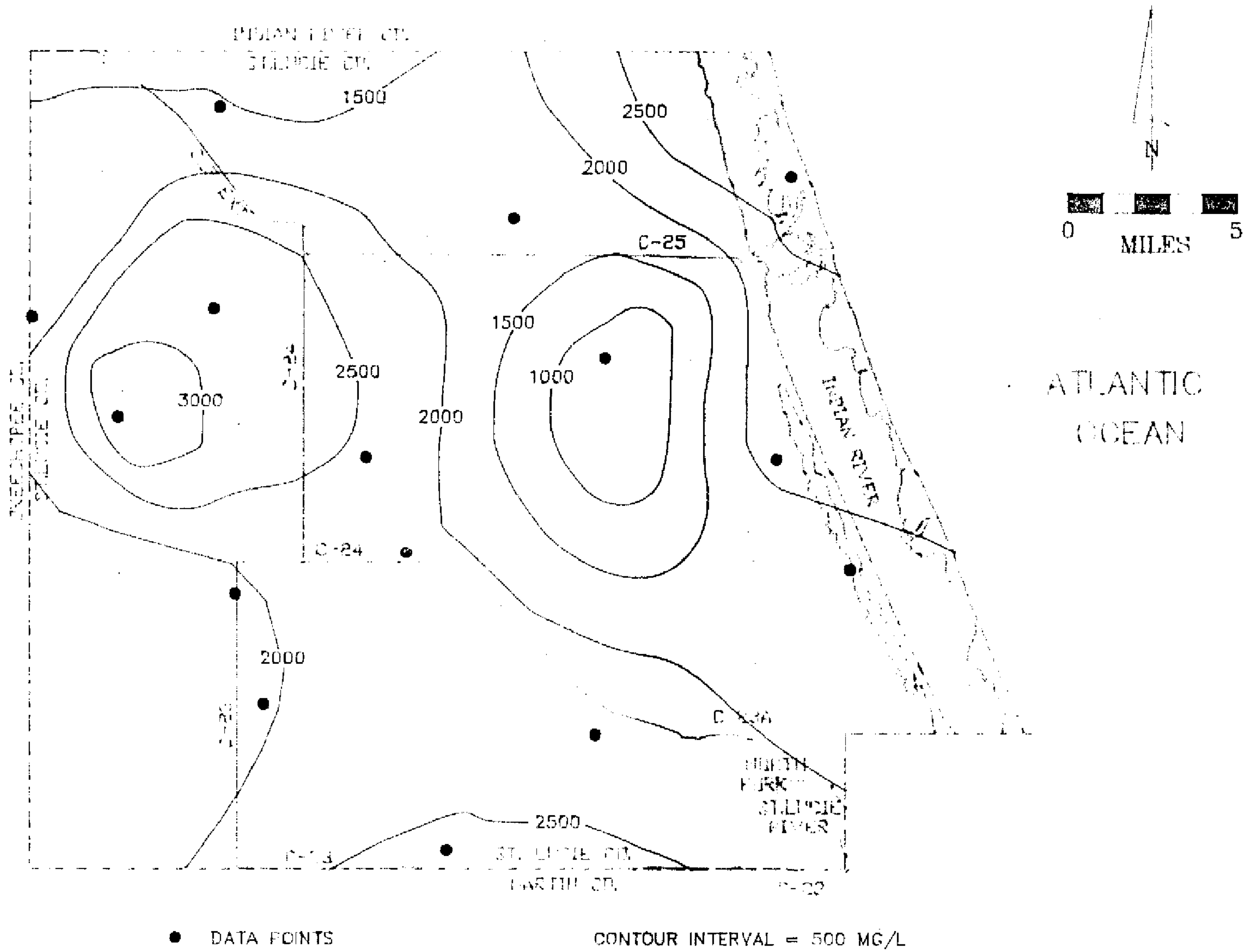

Figure 16-7 TOTAL DISSOLVED SOLIDS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

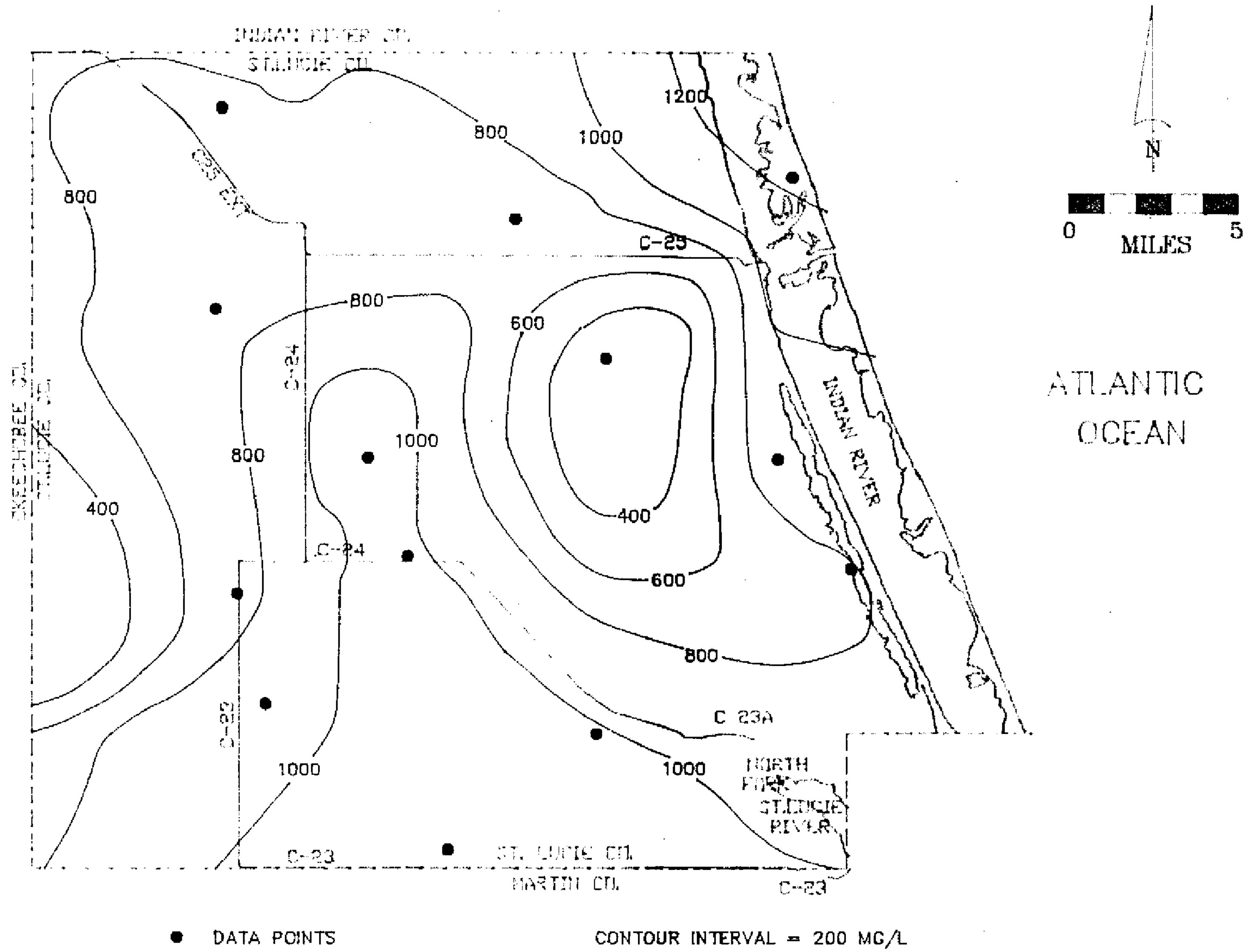

Figure 16-8 CHLORIDE CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

Hardness concentrations within the Floridan Aquifer System AGWQMN wells range from a low of 125 MG/L to a high of 170 MG/L with an average of 153 MG/L. These concentrations place the water in the moderately hard to hard range. There is not much variation in the hardness of the Floridan Aquifer System water throughout the county as shown in Figure 16-9. Data from Brown and Reece (1980) was used to supplement the AGWQMN data used to construct Figure 16-9.

The primary drinking water standard for sodium is 160 MG/L. Samples collected from the Floridan Aquifer System AGWQMN wells range in value from a minimum of 140 MG/L to a maximum of 740 MG/L with an average concentration of 364 MG/L. Sodium concentrations in three of the four Floridan Aquifer System exceeded the drinking water standard.

The sulfate concentration of well SLF-0009 exceeded the secondary drinking water standard in 1985. Prior and subsequent samples collected from this well have had sulfate concentrations below the drinking water standard.

No purgeable organic compounds or aromatic hydrocarbons were detected in any of the samples collected from the Floridan Aquifer System in St. Lucie County.

Graphical Representation of Ground Water Quality

Stiff patterns representing the water quality of AGWQMN wells throughout St. Lucie County are shown in Figure 16-10. The relative size of a Stiff pattern represents the ionic strength of the cations and anions in the ground water sample from the designated monitor well. The shape of the pattern indicates the type of water present.

The increased ionic strength of water from the Floridan Aquifer System is illustrated by the increased width of the Stiff patterns for that aquifer system (Figure 16-10). Stiff patterns for the Surficial Aquifer System are widest along the central axis, indicating a calcium bicarbonate type of water. Conversely the Stiff patterns for the Floridan Aquifer System are elongated most prominently along the upper axis, indicating a dominance by the sodium and chloride ions.

Surficial Aquifer System well SL-0123 has a high ionic strength and a Stiff pattern unique from all other AGWQMN wells within the county. The higher ionic strength and unique Stiff pattern suggests a mixing of Floridan Aquifer System water with Surficial Aquifer System water. This mixing is probably the result of contamination from Floridan Aquifer System irrigation wells.

SUMMARY AND CONCLUSIONS

There are two major aquifer systems present in St. Lucie County, these are the Surficial Aquifer System and the Floridan Aquifer System. These aquifer systems are separated from one another by the relatively impermeable Hawthorn formation.

The South Florida Water Management District collects water quality samples annually from four Surficial Aquifer System, and four Floridan Aquifer System Ambient Ground Water Quality Monitor Network wells in St. Lucie County.

Water quality data from these wells indicates that water within the Surficial Aquifer System is of relatively low ionic strength and meets the state of Florida drinking water standards in most areas, or can be easily treated to meet these standards.

Water quality data indicates that water from the Floridan Aquifer System is of high ionic strength, dominated by the sodium and chloride ions. Floridan Aquifer system water must be treated prior to use for drinking water supply.

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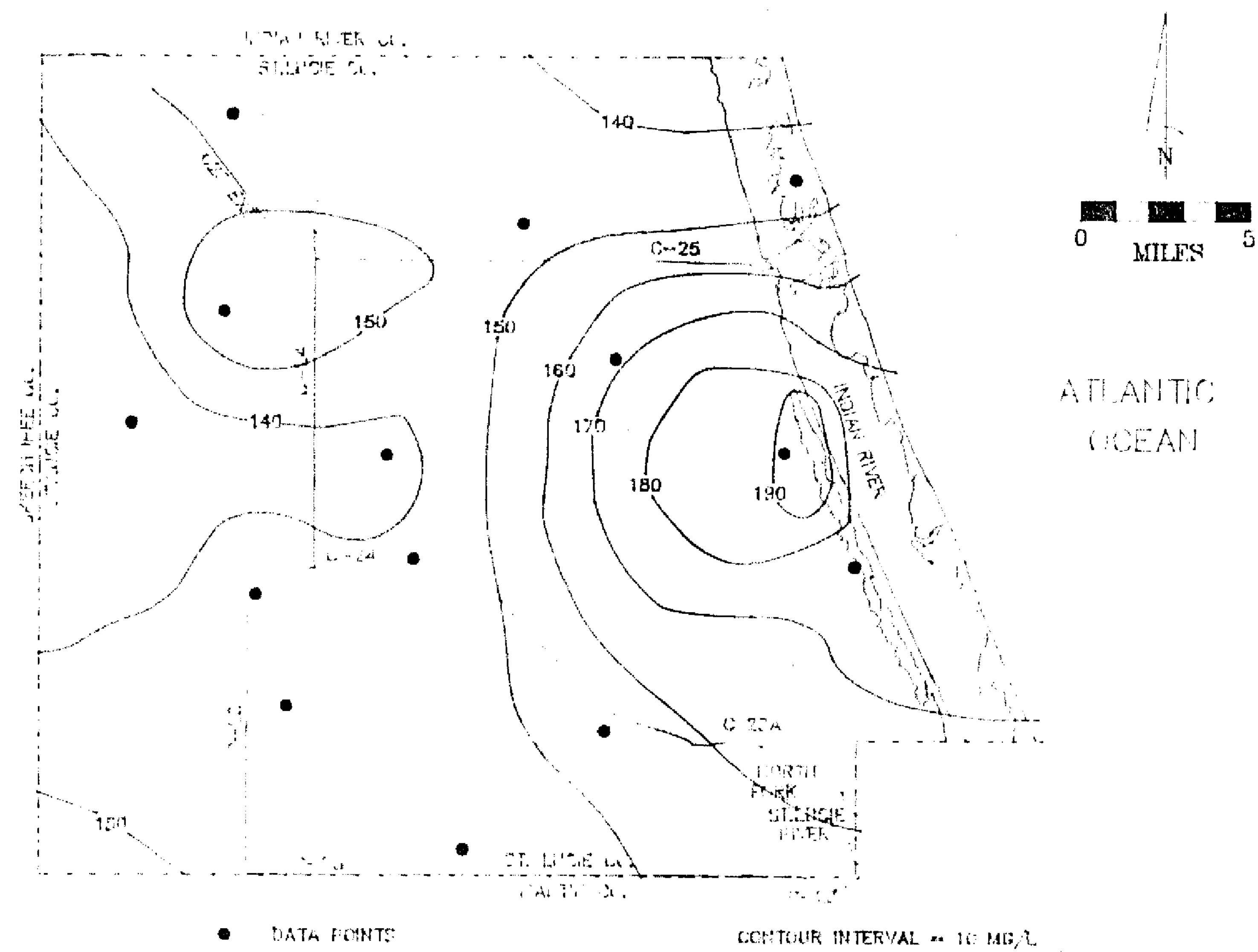

Figure 16-9 HARDNESS CONCENTRATIONS FROM AGWQMN WELL SAMPLES, FLORIDAN AQUIFER SYSTEM

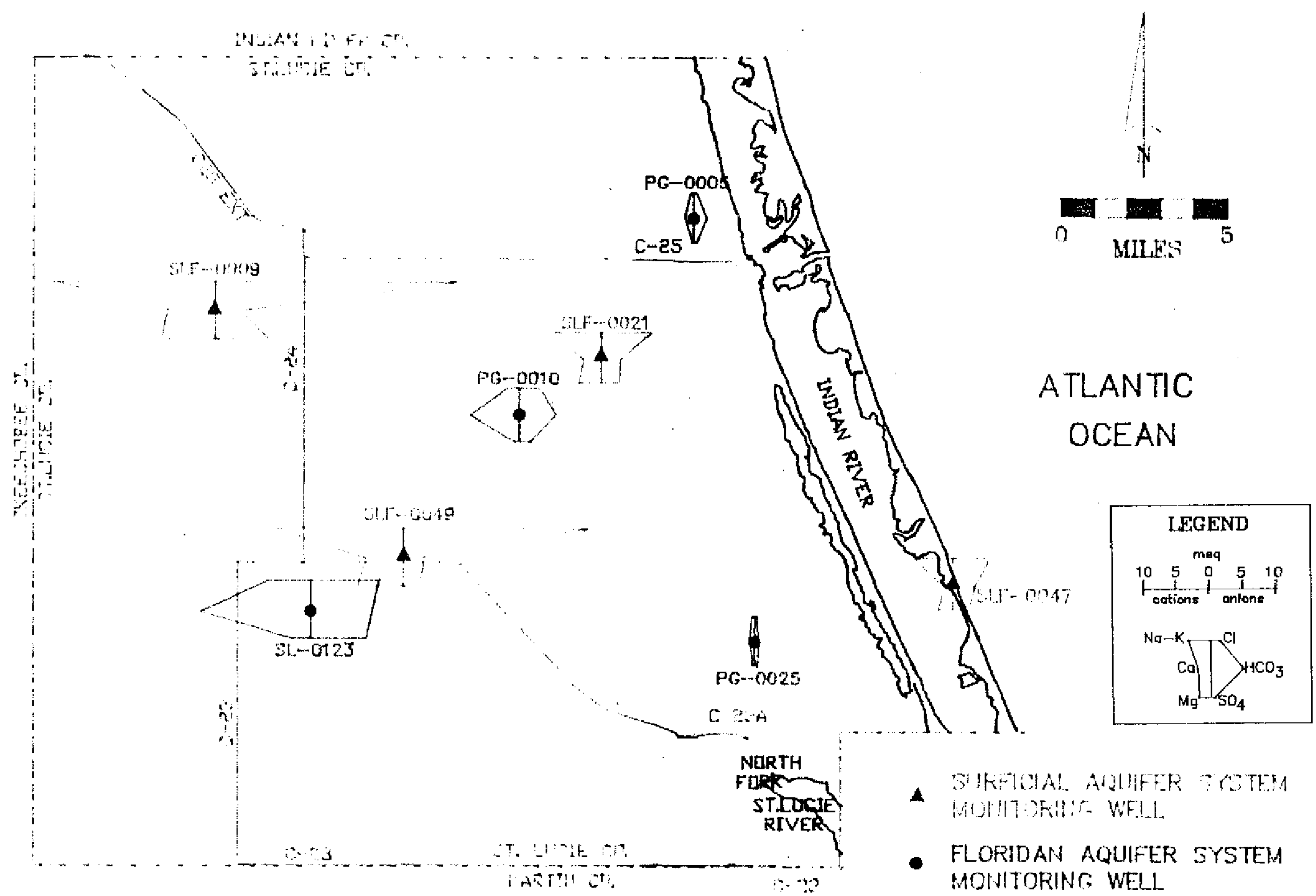

Figure 16-10 STIFF PATTERN DIAGRAMS FROM AGWQMN WELL DATA

APPENDICES

APPENDIX 1-1, BROWARD COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
G-1272A	261834	800619	BCEQCB	59	52	P	52	55	1.50	P
G-2160A	260032	801357	BCEQCB	53	49	P	49	52	1.50	P
G-2161A	260219	801411	BCEQCB	55	52	P	52	55	1.50	P
G-2274A	261450	800800	BCEQCB	57	55	P	55	57	1.25	P
G-2344A	261423	800715	BCEQCB	98	92	P	92	95	1.50	P
G-2344B	261423	800715	BCEQCB	52	38					
G-2345	260641	801235	BCEQCB	103	100	P	100	103	1.50	P
G-2355	261828	801013	BCEQCB	96	93	P	93	96	1.50	P
G-2355A	261828	801013	BCEQCB	53	50	P	50	53	1.50	P
G-2356	261627	801112	BCEQCB	96	93	P	93	96	1.50	P
G-2356A	261627	801112	BCEQCB	56	53	P	53	56	1.50	P
G-2357	261441	801110	BCEQCB	83	80	P	80	83	1.50	P
G-2357A	261441	801110	BCEQCB	56	53	P	53	56	1.50	P
G-2358	261348	801604	BCEQCB	100	96	P	96	99	1.50	P
G-2358A	261348	801604	BCEQCB	49	46	P	46	49	1.50	P
G-2359	261232	801414	BCEQCB	101	97	P	97	100	1.50	P
G-2359A	261232	801414	BCEQCB	59	52	P	52	55	1.50	P
G-2360	261707	800733	BCEQCB	100	97	P	97	100	1.50	P
G-2360A	261707	800733	BCEQCB	51	45	P	45	48	1.50	P
G-2361	261020	801317	BCEQCB	82	79	P	79	82	1.50	P
G-2361A	261020	801317	BCEQCB	45	26	P	26	29	1.50	P
G-2362	260939	801942	BCEQCB	61	58	P	58	61	1.50	P
G-2362A	260939	801942	BCEQCB	24	21	P	21	24	1.50	P
G-2363	260859	801604	BCEQCB	80	77	P	77	80	1.50	P
G-2363A	260359	801604	BCEQCB	20	17	P	17	20	1.50	P
G-2364	260325	801444	BCEQCB	80	77	P	77	80	1.50	P
G-2364A	260825	801444	BCEQCB	19		P		19	1.50	P
G-2365	260505	802017	BCEQCB	74		P		74	1.50	P
G-2365A	260505	802047	BCEQCB	35		P		35	1.50	P
G-2366	260453	801556	BCEQCB	57	54	P	54	57	1.50	P
G-2366A	260453	801556	BCEQCB	28	22	P	22	25	1.50	P
G-2367	260337	801719	BCEQCB	65	58	P	58	61	1.50	P
G-2367A	260337	801719	BCEQCB	25		P		25	1.50	P
G-2368	260202	802307	BCEQCB	60	56	P	56	59	1.50	P
G-2368A	260202	802307	BCEQCB	11		P		11	1.50	P
G-2369	260046	801907	BCEQCB	75	68	P	68	71	1.50	P
G-2370	261107	801203	BCEQCB	101	98	P	98	101	1.50	P
G-2370A	261107	801203	BCEQCB	51	45	P	45	48	1.50	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 1-1, BROWARD COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
G-1272A	SB	V				K				
G-2160A	SB	V				K				
G-2161A	SB	V				K				
G-2274A	SB	V				K				
G-2344A	SB	V				K				
G-2344B	SB	V				K				
G-2345	SB	V				K				
G-2355	SB	V				K				
G-2355A	SB	V				K				
G-2356	SB	V				K				
G-2356A	SB	V				K				
G-2357	SB	V				K				
G-2357A	SB	V				K				
G-2358	SB	V				K				
G-2358A	SB	V				K				
G-2359	SB	V				K				
G-2359A	SB	V				K				
G-2360	SB	V				K				
G-2360A	SB	V				K				
G-2361	SB	V				K				
G-2361A	SB	V				K				
G-2362	SB	V				K				
G-2362A	SB	V				K				
G-2363	SB	V				K				
G-2363A	SB	V				K				
G-2364	SB	V				K				
G-2364A	SB	V				K				
G-2365	SB	V				K				
G-2365A	SB	V				K				
G-2366	SB	V				K				
G-2366A	SB	V				K				
G-2367	SB	V				K				
G-2367A	SB	V				K				
G-2368	SB	V				K				
G-2368A	SB	V				K				
G-2369	SB	V				K				
G-2370	SB	V				K				
G-2370A	SB	V				K				

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(Z) OTHER

APPENDIX 2-1, CHARLOTTE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
CHWQ-01	265641	813633	19-42S-25E	60	50	P	50	60	2.00	P
CHWQ-02	264754	814602	34-40S-27E	33	18	S	18	28	2.00	X
CHWQ-03	264754	814602	34-40S-27E	240	175	X	175	240	6.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 2-1, CHARLOTTE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
CHWQ-01	SF	H	57.00	57.00	N	K	N	U	N	Y
CHWQ-02	SF	H	27.00	29.50	N	N	N	N	N	Y
CHWQ-03	IA	H	27.00	29.00	N	N	Y	Y	N	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 2-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
CHARLOTTE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
CHWQ-01	05/16/85	27.2		787	321.5	0.24	0.004	73.1	0.99	113.0
CHWQ-01	04/22/86	24.4	7.8	759	262.5	0.29	0.004			
CHWQ-02	05/16/85	29.0		646	237.0	0.36	0.004	36.4	0.81	87.0
CHWQ-02	01/07/86	24.0	6.3	697	244.3	0.41	0.004	28.1	0.63	105.4
CHWQ-02	01/05/87	25.7	7.3	313	212.1	0.34	0.004	21.6	0.60	96.4
	MINIMUM	24.0	6.3	313	212.1	0.24	0.004	21.6	0.60	87.0
	MAXIMUM	29.0	7.8	787	321.5	0.41	0.0	73.1	0.99	113.0
	AVERAGE	26.1	7.1	640	255.5	0.33	0.004	39.8	0.76	100.5

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
CHWQ-03	01/07/86	24.8	6.6	1773	168.1	0.44	0.004	169.5	9.64	75.8
CHWQ-03	01/05/87	25.4	7.4	1833	164.0	0.48	0.004	203.0	9.38	78.6
	MINIMUM	24.8	6.6	1773	164.0	0.44	0.004	169.5	9.38	75.8
	MAXIMUM	25.4	7.4	1833	168.1	0.48	0.004	203.0	9.64	78.6
	AVERAGE	25.1	7.0	1803	166.1	0.46	0.004	186.3	9.51	77.2

APPENDIX 2-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
CHARLOTTE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
CHWQ-01	05/16/85	14.80	43.9	34.5	51.9	550	0.89	0.05	0.07	0.004
CHWQ-01	04/22/86		46.3	33.2	66.6	513	0.74	0.07	0.12	0.004
CHWQ-02	05/16/85	6.14	38.5	24.5	5.2	360	0.72	0.05	0.67	0.004
CHWQ-02	01/07/86	5.80	31.6	54.0	5.8	422	0.71	2.51		
CHWQ-02	01/05/87	5.21	42.6	51.9	10.4	405	0.42	0.70	4.81	0.004
	MINIMUM	5.21	31.6	24.5	5.2	360	0.42	0.05	0.07	0.004
	MAXIMUM	14.80	46.3	54.0	66.6	550	0.89	2.51	4.81	0.004
	AVERAGE	7.99	40.6	39.6	28.0	450	0.70	0.68	1.42	0.004

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
CHWQ-03	01/07/86	53.15	452.0	65.7	35.2	968	5.60	0.05	0.05	0.004
CHWQ-03	01/05/87	67.60	454.7	78.6	58.2	964	5.79	0.10	2.26	0.004
	MINIMUM	53.15	452.0	65.7	35.2	964	5.60	0.05	0.05	0.004
	MAXIMUM	67.60	454.7	78.6	58.2	968	5.79	0.10	2.26	0.004
	AVERAGE	60.38	453.4	72.2	46.7	966	5.70	0.08	1.15	0.004

APPENDIX 2-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
CHARLOTTE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
CHWQ-01	05/16/85	0.004	0.40	1.50	0.40	0.10	3.92	0.60	30
CHWQ-01	04/22/86	0.004	0.68	0.90	1.12	0.50	2.84	0.53	30
CHWQ-02	05/16/85	0.004	0.10	2.77	2.60	0.80	32.92	2.92	30
CHWQ-02	01/07/86	0.016	0.19	2.00	6.31	0.69	35.15	1.87	18
CHWQ-02	01/05/87	0.004	0.13	2.57	7.86	3.89	26.92	2.09	20
	MINIMUM	0.004	0.10	0.90	0.40	0.10	2.84	0.53	18
	MAXIMUM	0.016	0.68	2.77	7.86	3.89	35.15	2.92	30
	AVERAGE	0.006	0.30	1.95	3.66	1.20	20.35	1.60	26

INTERMEDIATE AQUIFER SYSTEM

CHWQ-03	01/07/86	0.006	1.01	1.55	6.40	0.82	12.06	1.70	19
CHWQ-03	01/05/87	0.004	0.99	4.06	58.35	4.59	22.02	0.70	20
	MINIMUM	0.004	0.99	1.55	6.40	0.82	12.06	0.70	19
	MAXIMUM	0.006	1.01	4.06	58.35	4.59	22.02	1.70	20
	AVERAGE	0.005	1.00	2.80	32.38	2.71	17.04	1.20	20

APPENDIX 3-1, COLLIER COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN FROM (FT.)	OPEN TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
C-00039	254850	812147	31-53S-29E	484	436	X	436	484	5.00	L
C-00054	261018	805302	36-49S-34E	8	7	G	7	8	6.00	
C-00258	262504	812459	03-47S-29E	783		X		783	4.00	G
C-00269	255625	812812	-52S-28E	392	300	X	300	392	4.00	L
C-00296	260640	812043	18-50S-30E	45	8	X	8	45	4.00	
C-00298	262507	812352	02-47S-29E	303	254	X	254	303	3.00	P
C-00303	261620	814123	27-48S-26E	300	232	X	232	300	3.00	
C-00304	261635	813613	27-48S-27E	130	125	X	125	130	2.00	G
C-00308	260919	811600	01-50S-30E	485	312	X	312	485	4.00	G
C-00311	255437	812154	25-52S-29E	450	430	X	430	450	0.00	
C-00319	261508	814849	33-48S-25E	22	9	T	9	22	1.25	P
C-00392	261124	814730	22-49S-25E	23				23	8.00	S
C-00409A	261025	814801	28-49S-25E	73	63	X	63	73	2.00	
C-00445A	255127	812309	14-53S-29E	467	346	X	346	467	6.00	L
C-00447	260550	814115	27-50S-26E	26	8	X	8	26	9.00	M
C-00450	260913	814113	03-50S-26E	30	8	X	8	30	5.50	P
C-00490	261313	814802	10-49S-25E	71	70	X	70	71	2.00	L
C-00492	262223	815620	22-47S-27E	64	60	X	60	64	6.00	L
C-00495	255753	811843	09-52S-30E	70	8	X	8	70	6.00	L
C-00496	260111	812439	21-51S-29E	60	8	X	8	60	6.00	L
C-00503	261741	812354	23-48S-29E	24	8	X	8	24	6.00	P
C-00531	262928	812729	07-46S-29E	237	210	S	210	237	4.00	P
C-00532	262928	812729	07-46S-29E	13	3	S	3	10	4.00	P
C-00575	261318	814807	33-48S-25E	640	345	X	345	640	6.00	
C-00599	260630	814114	22-50S-263	50	40	G	40	50	4.00	P
C-00684	261740	812354	23-48S-29E	490	440	X	440	490	4.00	P
C-00687	262554	812838	36-46S-28E	560	290	X	290	560	4.00	P
C-00688	261802	813548	15-48S-27E	405	220	X	220	405	4.00	P
C-00689	261740	812354	23-48S-29E	265	230	X	230	265	4.00	
C-00972	260837	813127	-50S-28E	44	25	X	25	44	6.00	P
C-00984	261733	812855	23-48S-28E	42	30	X	30	42	6.00	P
C-00985	261733	812855	23-48S-28E	160	80	X	80	160	6.00	P
C-00989	261733	812855	23-48S-28E	270	240	X	240	270	6.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 3-1, COLLIER COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
C-00039	IA		4.00	5.50	C	F	U	U	U	Y
C-00054	SF	J	12.86	15.66	N	N	U	U	U	Y
C-00258	FA	H	35.00	39.00	N	F	U	U	U	Y
C-00269	IA		2.50	4.50	N	F	Y	U	U	Y
C-00296	SF	H	15.16	19.00	N	N	U	U	U	Y
C-00298	IA	H	34.00	37.00	N	N	U	Y	U	Y
C-00303	IA	H	15.00	18.00	N	N	Y	U	U	Y
C-00304	SF	H	16.00	19.00	N	N	U	U	U	Y
C-00308	IA	H	12.50	15.00	N	N	U	U	U	Y
C-00311	IA		4.00	7.00	N	F	U	U	U	Y
C-00319	SF	J	8.74	11.75	N	N	U	U	U	Y
C-00392	SF	H	10.38	10.38	N	N	U	U	U	Y
C-00409A	SF	J	5.00	7.00	N	N	U	U	U	Y
C-00445A	IA		5.00	8.00	N	F	U	U	U	Y
C-00447	SF		9.00	11.00	N	N	U	U	U	Y
C-00450	SF	B	13.00	15.00	N	N	U	U	U	Y
C-00490	SF	V	16.55	16.55	N	N	U	U	U	Y
C-00492	SF	V	17.50	22.00	N	N	U	U	U	Y
C-00495	SF		6.58	9.58	N	N	U	U	U	Y
C-00496	SF		10.82	14.62	N	N	U	U	U	Y
C-00503	SF	H	17.40	20.90	N	N	U	U	U	Y
C-00531	IA	H	41.84	44.50	N	N	U	U	U	Y
C-00532	SF	H	41.93	44.52	N	N	U	U	U	Y
C-00575	FA	H	16.00	15.00	N	F	Y	Y	Y	Y
C-00599	SF	H	8.81	11.63	N	N	Y	U	U	Y
C-00684	IA	H	17.48	21.04	N	F	Y	Y	U	Y
C-00687	IA	H	21.00	24.00	N	N	Y	Y	U	Y
C-00688	IA	H	19.00	21.50	N	N	U	Y	U	Y
C-00689	IA	H	16.00	20.00	N	N	U	U	U	Y
C-00972	SF	H	14.00	18.00	N	N	Y	Y	Y	Y
C-00984	SF	H	18.00	21.00	N	N	Y	Y	Y	Y
C-00985	SF	H	18.00	21.00	N	N	Y	Y	Y	Y
C-00989	IA	H	18.00	21.00	N	F	Y	Y	Y	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
C-00054	06/19/85	25.0	7.2	552	283.0	0.15	0.004	14.0	0.41	108.4
C-00054	12/06/85	25.2	6.8	648	286.5	0.16	0.004	13.7	0.44	107.2
C-00054	12/01/86	25.5	6.9	600	256.2	0.16	0.004	16.3	0.73	108.9
C-00054	10/19/87	27.0	6.5	594	253.2	0.14	0.006	15.4	0.77	99.1
C-00296	06/06/85	23.1	7.4	1610	233.5	0.20	0.004	274.5	8.63	94.0
C-00296	12/03/85	23.0	6.9	1587	296.6	0.16	0.004	179.0	7.00	105.1
C-00296	12/01/86	24.1	7.1	1390	284.8	0.21	0.004	156.8	6.89	105.5
C-00296	10/21/87	24.2	7.0	2040	296.3	0.21	0.017	256.5	9.85	110.7
C-00304	03/05/85	27.1	7.4	648	268.0	0.22	0.004	41.5	4.64	74.3
C-00304	12/04/85	24.9	7.0	666	264.4	0.15	0.004	43.0	4.16	82.2
C-00304	12/03/86	25.5	7.2	648	238.6	0.19	0.004	46.0	4.76	84.6
C-00392	06/18/85	23.3	7.0	669	326.0	1.73	0.023	27.0	2.21	120.1
C-00392	12/04/85	25.7	6.6	718	330.8	1.81	0.033	26.7	2.21	127.0
C-00392	12/02/86	25.8	6.7	707	285.1	1.66	0.039	28.0	2.35	120.8
C-00392	10/20/87	25.8	6.6	694	323.9	1.76	0.047	25.8	2.10	119.6
C-00409A	06/18/85	26.8	7.4	422	194.0	0.22	0.004	10.0	0.50	78.4
C-00409A	12/04/85	27.7	7.0	454	217.0	0.20	0.006	10.5	0.52	81.9
C-00409A	12/02/86	27.1	7.1	459	199.7	0.21	0.011	12.0	0.70	92.8
C-00409A	10/20/87	27.8	7.0	450	209.0	0.23	0.016	16.6	1.01	80.6
C-00447	03/07/85	23.3	6.8	987	288.5	0.29	0.004	53.1	0.93	171.0
C-00447	12/04/85	22.4	6.5	1031	340.0	0.24	0.006		0.76	160.0
C-00447	12/02/86	24.1	6.8	924	286.9	0.24	0.006	33.1	0.78	165.5
C-00447	10/20/87	24.4	6.6	929	323.3	0.27	0.015	49.0	0.92	158.0
C-00450	03/07/85	22.4	7.0	713	269.0	0.22	0.004	28.4	1.92	118.9
C-00450	12/04/85	23.8	6.5	1388	315.0	0.25	0.009	110.3	2.85	148.1
C-00490	03/04/85	28.2	7.6	345	169.0	0.17	0.004	19.1	0.83	64.6
C-00490	12/04/85	26.6	7.1	359	187.4	0.28	0.012	6.3	0.58	62.9
C-00490	12/02/86	26.4	7.4	327	162.6	0.15	0.062	7.0	0.75	79.5
C-00492	06/20/85	22.9	6.8	663	255.5	0.36	0.013	39.0	0.23	111.4
C-00492	12/05/85	23.3	6.7	700	263.1	0.30	0.045	26.4	0.33	125.2
C-00492	12/03/86	23.6	6.9	682	282.6	0.41	0.004	28.0	0.69	122.4

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
C-00495	06/19/85	21.8	7.2	395	189.0	0.33	0.004	16.0	0.56	78.1
C-00495	12/03/85	25.6	6.9	473	230.6	0.17	0.025	10.7	0.59	86.3
C-00495	12/01/86	26.5	7.0	440	203.0	0.30	0.009	12.0	0.80	83.1
C-00495	10/19/87	22.6	6.8	370	203.5	0.24	0.008	10.0	0.67	72.8
C-00496	06/19/85	20.5	7.2	563	229.0	0.10	0.004	21.0	0.45	97.4
C-00496	12/03/85	22.0	6.8	624	266.3	0.11	0.005	22.4	0.51	104.1
C-00496	12/01/86	22.3	7.0	590	255.2	0.11	0.012	22.3	0.70	92.9
C-00496	10/19/87	22.3	6.5	589	253.4	0.18	0.019	22.6	0.65	102.6
C-00503	03/06/85	22.8	7.1	595	247.0	0.25	0.004	20.6	1.22	107.9
C-00503	12/06/85	23.7	6.7	649	274.8	0.21	0.004	19.2	1.48	107.5
C-00503	12/03/86	24.0	6.8	683	276.4	0.28	0.004	19.8	1.84	122.8
C-00532	12/05/85	21.5	5.9	465	183.4	0.01	3.355			
C-00532	12/04/86	25.4	5.9	333	135.1	0.56	2.080	19.0	1.27	43.5
C-00599	06/19/85	23.9	7.0	968	324.0	0.22	0.004	71.0	4.15	134.6
C-00599	12/04/85	21.8	6.6	1414	358.4	0.23	0.020	102.5	4.87	145.7
C-00599	12/02/86	24.2	6.9	1586	334.1	0.26	0.013	154.0	6.02	145.8
C-00599	10/20/87	24.8	6.8	1377	338.4	0.27	0.015	121.3	4.90	141.5
C-00972	06/06/85	23.6	7.1	589	245.0	0.13	0.004	19.5	0.45	108.0
C-00972	12/06/85	23.6	6.9	613	268.3	0.05	0.004	6.2	0.33	118.3
C-00972	12/02/86	24.4	6.9	592	272.9	0.10	0.004	8.0	0.60	116.7
C-00972	10/21/87	24.8	6.8	590	289.6	0.11	0.010	11.5	0.37	122.8
C-00984	12/06/85	23.4	6.7	721	326.8	0.28	0.021	20.2	1.01	126.7
C-00984	12/03/86	23.9	7.0	718	315.9	0.53	0.033	25.0	1.71	132.4
C-00985	12/06/85	24.5	7.0	684	285.2	0.14	0.004	43.7	6.64	69.2
C-00985	12/03/86	25.1	7.2	675	270.7	0.20	0.004	48.0	7.18	68.3
C-00999	06/18/85	23.7	7.2	436	199.0	0.29	0.011	6.0	0.35	83.0
C-00999	12/04/85	25.3	6.8	463	233.4	0.22	0.032	6.3	0.37	89.6
C-00999	12/02/86	26.1	7.0	442	188.0	0.24	0.014	8.0	0.55	112.6
	MINIMUM	20.5	5.9	327	135.1	0.01	0.004	6.0	0.23	43.5
	MAXIMUM	28.2	7.6	2040	358.4	1.81	3.355	274.5	9.85	171.0
	AVERAGE	24.4	6.9	733	260.8	0.32	0.104	43.5	2.10	106.9

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
C-00054	06/19/85	4.36	22.3	5.0	7.8	346	0.46	1.82	2.24	0.004
C-00054	12/06/85	3.80	20.0	7.1	7.4	336	0.59	3.04	0.05	0.004
C-00054	12/01/86	4.20	24.2	3.9	11.3	335	0.34	3.61	0.25	0.005
C-00054	10/19/87	4.61	23.5	5.8	10.0	331	1.02	3.61	4.03	0.011
C-00296	06/06/85	29.20	293.0	94.4	6.0	949	0.82	0.29	0.25	0.022
C-00296	12/03/85	23.80	276.0	83.9	6.2	871	0.61	0.71	1.57	0.004
C-00296	12/01/86	23.03	230.5	65.6	9.4	781	0.55	0.87	0.06	0.004
C-00296	10/21/87	33.90	420.4	131.6	10.7	1169	1.19	0.70	0.75	0.004
C-00304	03/05/85	16.71	39.4		14.3	363	0.57	0.01	0.02	0.004
C-00304	12/04/85	13.70	39.7	11.3	17.3	376	0.68	0.05	0.05	0.004
C-00304	12/03/86	15.81	43.8	12.5	25.7	383	0.57		0.05	0.004
C-00319	06/18/85	2.60	11.4	7.0	5.5	272	0.43	0.25	0.24	0.009
C-00319	12/04/85	2.10	7.7	5.6	19.9	253	0.55	1.45	2.12	0.004
C-00319	12/02/86	2.64	14.8	10.6	5.8	239	0.49		1.95	0.004
C-00392	06/18/85	2.68	47.4	6.0	5.9	440	0.33	1.07	2.13	0.004
C-00392	12/04/85	2.40	42.1	6.5	5.9	420	0.36	1.17	1.31	0.004
C-00392	12/02/86	2.68	45.0	4.8	8.3	434	0.30	0.43	1.04	0.004
C-00392	10/20/87	2.61	49.2	5.0	9.0	428	0.61	1.08	1.18	0.007
C-00409A	06/18/85	3.85	22.5	4.0	7.5	260	0.27	0.12	0.31	0.009
C-00409A	12/04/85	3.40	21.4	5.1	6.7	256	0.27	0.12	0.27	0.005
C-00409A	12/02/86	4.01	23.6	5.4	11.0	276	0.21	0.10	0.08	0.004
C-00409A	10/20/87	4.08	30.5	5.0	11.1	280	0.54	0.09	0.18	0.013
C-00447	03/07/85	8.88	89.5		5.2	625	0.35	1.93	0.86	0.016
C-00447	12/04/85	7.00	71.0	100.1	5.9	631	0.44	2.29	3.57	0.004
C-00447	12/02/86	7.54	61.5	104.5	7.7	603	0.55	1.02	2.87	0.011
C-00447	10/20/87	7.31	68.8	96.1	8.4	635	0.69	2.02	2.57	0.012
C-00450	03/07/85	10.62	39.8		5.0	448	0.36	0.22	0.24	0.005
C-00450	12/04/85	15.00	208.0	91.6	6.8	814	0.74	0.28	0.45	0.004
C-00490	03/04/85	3.11	27.9		7.5	343	0.20	0.11	0.19	0.012
C-00490	12/04/85	2.50	6.4	3.4	8.3	196	0.40	0.13	0.16	0.005
C-00490	12/02/86	2.81	10.9	2.7	13.7	198	0.25		0.19	0.004

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
C-00492	06/20/85	4.31	74.7	11.0	7.0	484	0.67	6.03	11.23	0.004
C-00492	12/05/85	4.00	51.0	10.1	8.4	439	0.86	0.89	2.22	
C-00492	12/03/86	4.20	48.2	6.5	10.9	402	0.60		12.83	
C-00495	06/19/85	3.79	29.5	7.0	3.9	270	0.27	0.56	0.64	0.022
C-00495	12/03/85	3.00	16.5	4.5	4.2	254	0.13	0.31	0.32	0.025
C-00495	12/01/86	3.39	18.6	3.9	3.2	247	0.16	0.22	0.20	0.004
C-00495	10/19/87	3.33	31.8	5.0	4.9	253	0.81	0.26	0.69	0.023
C-00496	06/19/85	4.84	40.2	5.0	3.6	368	0.27	0.25	0.34	0.004
C-00496	12/03/85	4.40	36.7	5.4	3.9	354	0.20	0.29	0.31	0.004
C-00496	12/01/86	4.54	45.2	11.2	3.7	344	0.18	0.15	0.51	0.004
C-00496	10/19/87	4.94	55.4	5.0	6.2	358	0.92	0.16	1.05	0.011
C-00503	03/06/85	5.32	42.3		5.4	415	0.08	1.12	1.63	0.004
C-00503	12/06/85	3.90	41.2	5.4	11.3	382	0.39	2.02	5.52	0.004
C-00503	12/03/86	4.33	47.7	3.4	8.5	418	0.29	1.53	5.02	0.004
C-00532	12/05/85		22.4	13.8	12.4	337	0.62	0.47	0.65	
C-00532	12/04/86	8.28	34.4	20.8	17.4	316	0.17	0.37	0.54	
C-00599	06/19/85	24.54	126.0	94.0	84.2	710	1.16	0.05	0.04	0.004
C-00599	12/04/85	25.60	184.0	93.5	9.6	801	1.06	0.05	0.05	0.008
C-00599	12/02/86	31.92	241.4	98.6	14.5	950	1.67	0.05	0.06	0.004
C-00599	10/20/87	27.80	200.5	93.2	13.5	859	1.77	0.05	0.05	0.004
C-00972	06/06/85	3.82	8.4	61.4	3.9	363	0.33	0.14	0.08	0.006
C-00972	12/06/85	2.90	6.9	43.9	9.5	353	0.29	0.27	0.36	0.023
C-00972	12/02/86	3.27	11.0	39.0	4.6	354	0.22	0.05	0.06	0.121
C-00972	10/21/87	3.39	10.1	34.7	5.9	368	0.53	0.25	0.23	0.010
C-00984	12/06/85	3.10	32.8	7.1	18.1	442	0.50	4.11	5.63	0.004
C-00984	12/03/86	3.91	37.1	12.5	25.9	470	0.42	2.75	5.96	0.019
C-00985	12/06/85	17.20	37.1	15.3	57.8	386	0.49	0.13	0.71	0.004
C-00985	12/03/86	18.65	46.6	11.6	12.4	398	0.32	0.05	0.05	0.004
	MINIMUM	2.10	6.4	2.7	3.2	196	0.08	0.01	0.02	0.004
	MAXIMUM	33.90	420.4	131.6	84.2	1169	1.77	6.03	12.83	0.121
	AVERAGE	8.68	66.3	29.8	11.3	447	0.53	0.93	1.50	0.010

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
C-00054	06/19/85	0.004	0.10	2.76	1.10	4.57	85.45	4.50	79
C-00054	12/06/85	0.006	0.27	2.91	1.69	3.41	74.05	3.21	61
C-00054	12/01/86	0.004	0.26	2.77	1.01	0.81	43.06	3.18	35
C-00054	10/19/87	0.006	0.21	1.75	0.36	0.40	25.52	0.78	20
C-00296	06/06/85	0.004	0.90	1.20	0.30	1.00	5.39	0.59	111
C-00296	12/03/85	0.004	0.46	0.90	0.40	6.24	7.49	59.45	1068
C-00296	12/01/86	0.004	0.31	1.20	0.60	2.96	6.41	21.73	357
C-00296	10/21/87	0.004	0.38	1.00	1.00	5.21	7.47	4.67	130
C-00304	03/05/85	0.004	0.04		0.20	1.84	2.50	51.45	3100
C-00304	12/04/85	0.004	0.38	0.90	1.59	2.30	2.12	44.40	3875
C-00304	12/03/86	0.006	0.27	1.20	0.60	1.86	2.54	19.64	1379
C-00319	06/18/85	0.004	0.10	1.20	14.65	1.00	87.66	7.30	30
C-00319	12/04/85	0.004	0.17	0.90	7.18	2.22	29.10	4.67	25
C-00319	12/02/86	0.004	0.10	1.20	21.35	5.08	20.85	11.36	20
C-00392	06/18/85	0.004	0.10	1.20	4.76	1.00	10.73	0.80	30
C-00392	12/04/85	0.007	0.21	0.90	3.63	1.60	10.86	1.51	51
C-00392	12/02/86	0.007	0.10	1.20	3.52	0.71	12.63	1.52	20
C-00392	10/20/87	0.004	0.10	1.28	3.11	0.40	12.15	0.70	20
C-00409A	06/18/85	0.004	0.10	1.20	2.14	1.00	3.85	2.90	1148
C-00409A	12/04/85	0.004	0.10	0.90	0.52	4.15	3.19	21.75	1946
C-00409A	12/02/86	0.004	0.10	1.20	0.72	2.78	4.12	6.16	824
C-00409A	10/20/87	0.004	0.18	1.00	1.22	6.29	5.39	51.50	1830
C-00447	03/07/85	0.011	0.03		2.11	0.40	46.20	2.01	40
C-00447	12/04/85	0.004	0.39	1.36	2.01	1.01	102.60	1.82	32
C-00447	12/02/86	0.004	0.21	2.28	2.11	0.56	61.80	4.07	20
C-00447	10/20/87	0.005	0.25	1.00	1.35	0.40	42.09	0.70	39
C-00450	03/07/85	0.006	0.56		3.81	0.40	12.60	0.80	40
C-00450	12/04/85	0.004	0.41	0.90	0.87	0.58	17.28	1.05	38
C-00490	03/04/85	0.004	0.26		1.71	11.79	6.70	32.15	3415
C-00490	12/04/85	0.004	0.18	0.99	13.10	62.20	11.03	87.40	7479
C-00490	12/02/86	0.004	0.10	1.20	3.39	7.74	4.74	31.50	2121

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
C-00492	06/20/85	0.004	0.10	1.87	2.18	1.68	79.55	1.50	30
C-00492	12/05/85	0.022	0.76	5.81	4.71	2.01	81.30	9.88	69
C-00492	12/03/86	0.007	0.34	3.32	6.00	1.28	68.05	7.24	31
C-00495	06/19/85	0.004	0.10	1.20	0.87	1.00	18.45	2.70	30
C-00495	12/03/85	0.004	0.10	0.90	0.40	4.48	15.95	0.66	28
C-00495	12/01/86	0.006	0.12	1.20	0.60	0.50	11.94	1.04	20
C-00495	10/19/87	0.004	0.15	3.37	0.50	0.40	33.68	0.80	87
C-00496	06/19/85	0.004	0.10	1.20	1.13	1.00	18.44	0.90	30
C-00496	12/03/85	0.005	0.32	0.90	0.75	1.73	47.45	3.15	25
C-00496	12/01/86	0.005	0.18	1.20	0.96	1.63	61.80	12.07	20
C-00496	10/19/87	0.004	0.21	1.00	1.30	0.40	22.45	1.92	20
C-00503	03/06/85	0.004	0.26		0.55	1.25	22.90	1.79	40
C-00503	12/06/85	0.004	0.19	2.78	5.73	1.58	5.32	65.35	31
C-00503	12/03/86	0.005	0.12	1.20	3.05	0.97	93.60	5.88	20
C-00532	12/05/85	0.019	0.80	0.90	1.54	1.04	12.04	2.46	43
C-00532	12/04/86	0.015	0.48	1.20	2.94	0.21	12.62	1.87	29
C-00599	06/19/85	0.004	0.10	1.20	1.24	1.00	6.69	27.20	30
C-00599	12/04/85	0.004	0.35	0.90	0.62	1.20	11.16	18.10	44
C-00599	12/02/86	0.004	0.22	1.20	1.20	0.50	17.23	8.99	20
C-00599	10/20/87	0.004	0.47	1.00	0.80	0.40	11.66	5.98	31
C-00972	06/06/85	0.004	0.10	1.20	0.30	0.80	3.77	0.43	30
C-00972	12/06/85	0.004	0.23	0.90	0.40	0.25	14.67	4.43	25
C-00972	12/02/86	0.004	0.11	1.20	0.78	1.14	11.59	2.51	44
C-00972	10/21/87	0.004	0.12	1.00	1.00	0.48	15.05	4.70	92
C-00984	12/06/85	0.004	0.46	1.22	0.40	4.98	1.07	0.50	25
C-00984	12/03/86	0.007	0.27	1.20	8.06	4.91	26.87	2.92	30
C-00985	12/06/85	0.004	0.38	0.90	0.40	0.66	3.41	14.58	25
C-00985	12/03/86	0.004	0.30	1.20	4.31	0.50	1.49	1.03	20
	MINIMUM	0.004	0.03	0.90	0.20	0.21	1.07	0.43	20
	MAXIMUM	0.022	0.90	5.81	21.35	62.20	102.60	87.40	7479
	AVERAGE	0.005	0.25	1.44	2.62	3.05	25.39	11.79	514

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
C-00039	06/06/85	25.2	7.5	6740	159.0	0.28	0.004	1264.0	43.30	120.0
C-00039	12/03/85	25.8	6.9	6920	170.7	0.20	0.004	1179.0	42.00	138.6
C-00039	12/01/86	26.9	7.3	6830	160.3	0.23	0.004	1210.0	44.35	132.4
C-00039	10/19/87	27.1	6.8	1986	155.7	0.29	0.007	1222.0	40.85	137.8
C-00269	06/06/85	24.1	7.5	2145	216.0	0.18	0.004	406.0	17.60	59.0
C-00269	12/03/85	25.2	7.1	2340	251.8	0.12	0.025	341.5	15.50	65.7
C-00269	12/01/86	25.8	7.3	2270	252.4	0.10	0.004	341.5	15.70	64.8
C-00269	10/20/87	25.8	7.1	1903	239.7	0.16	0.010	325.5	15.80	63.0
C-00298	03/05/85	26.9	7.6	639	121.0	0.38	0.004	72.8	8.30	2.5
C-00298	12/05/85	25.2	7.6	640	235.8	0.25	0.004	66.6	6.90	27.5
C-00298	12/04/86	26.1	8.5	245	193.6	0.32	0.004	74.0	8.90	17.8
C-00303	03/05/85	27.5	7.5	3108	193.0	0.42	0.004	444.5	29.50	104.1
C-00303	12/04/85	26.1	7.1	2690	227.5	0.42	0.004	353.0	30.05	93.1
C-00303	12/03/86	25.8	7.3	2580	220.9	0.41	0.004	350.5	29.85	83.6
C-00308	06/19/85	22.3	6.8	644	336.0	0.28	0.004	20.0	0.37	123.6
C-00308	12/06/85	22.5	6.8	744	339.8	1.25	0.004	22.1	0.46	124.3
C-00308	12/01/86	22.8	6.8	715	333.0	0.26	0.006	29.0	0.59	123.5
C-00308	10/21/87	23.3	6.9	722	358.5	0.29	0.007	30.2	0.59	127.5
C-00311	06/06/85	24.4	7.8	2240	271.5	0.16	0.025	481.5	27.55	28.0
C-00311	12/03/85	25.5	7.4	2320	301.8	0.12	0.004	407.5	24.85	32.0
C-00311	12/01/86	26.8	7.8	2280	285.1	0.11	0.004	493.5	19.75	29.6
C-00311	10/19/87	25.8	7.4	1923	291.6	0.13	0.004	404.0	24.15	29.9
C-00445A	06/06/85	23.9	7.8	2730	205.0	0.16	0.004	537.5	22.25	42.0
C-00445A	12/03/85	24.7	7.3	2990	245.6	0.10	0.004	457.5	19.60	47.9
C-00445A	12/01/86	26.3	7.6	2910	243.7	0.13	0.004	497.0	41.70	44.6
C-00445A	10/19/87	27.5	7.1	1918	228.8	0.14	0.014	428.0	18.80	42.7
C-00531	06/20/85	23.9	7.6	599	265.0	0.37	0.045	79.0	9.01	47.6
C-00531	12/05/85	24.7	7.0	731	294.3	0.04	0.057	51.8	6.91	64.6
C-00684	03/06/85	26.1	7.4	3801	174.0	0.32	0.004	345.5	44.75	276.0
C-00684	12/06/85	25.6	7.2	3640	189.8	0.26	0.004	416.0	44.30	478.0
C-00687	03/06/85	24.5	7.4	809		0.12	0.038	71.7	6.78	57.0
C-00687	12/05/85	24.4	7.1	814	234.5	0.07	0.004	86.0	6.92	63.4
C-00687	12/04/86	23.9	7.3	799	238.6	0.18	0.004	86.0	7.45	55.4
C-00688	03/05/85	26.4	7.3	702	243.0	0.10	0.004	74.2	9.28	43.2
C-00688	12/04/85	25.1	7.2	711	268.9	0.14	0.004	74.1	8.14	49.2
C-00688	12/03/86	25.3	7.2	698	258.0	0.09	0.005	77.0	8.86	58.2
C-00689	03/06/85				242.0	0.03	0.004	65.2	12.30	52.6
C-00689	12/03/86	25.6	7.3	743	271.1	0.10	0.004	62.5	11.25	53.2
C-00989	12/06/85	24.4	8.3	1252	244.9	0.15	0.004	210.5	17.50	34.0
C-00989	12/03/86	24.7	7.6	1345	256.5	0.14	0.004	206.0	18.90	35.0
	MINIMUM	22.3	6.8	245	121.0	0.03	0.004	20.0	0.37	2.5
	MAXIMUM	27.5	8.5	6920	358.5	1.25	0.057	1264.0	44.75	478.0
	AVERAGE	25.2	7.3	2047	241.5	0.23	0.009	334.1	19.04	81.8

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
C-00039	06/06/85	143.40	1990.0	713.1	9.5	3662	6.76	0.05	0.05	0.004
C-00039	12/03/85	133.00	2092.5	430.0	11.5	4078	7.63	0.05	0.05	0.004
C-00039	12/01/86	145.55	1988.6	434.7	14.8	4048	8.01		0.05	0.004
C-00039	10/19/87	142.30	1640.0	437.5	13.6	4188	7.90	0.05	0.05	0.005
C-00269	06/06/85	49.80	515.0	62.6	12.3	1301	1.09	0.05	0.21	0.004
C-00269	12/03/85	45.50	537.5	95.3	14.5	1282	1.58	0.13	1.74	0.004
C-00269	12/01/86	49.80	548.2	103.2	20.1	1280	1.04		0.11	0.004
C-00269	10/20/87	47.70	578.8	112.9	17.6	1280	1.11	0.05	0.16	0.004
C-00298	03/05/85	9.96	66.2		1.1	271	0.09	0.15	0.36	0.008
C-00298	12/05/85	18.40	61.9	3.4	15.2	337	0.55	0.05	0.37	0.004
C-00298	12/04/86	19.01	61.1	3.4	5.1	288	0.15		2.79	0.004
C-00303	03/05/85	81.80	725.0		12.5	1739	1.33	0.07	0.93	0.061
C-00303	12/04/85	59.00	677.5	101.6	16.2	1466	1.43	0.26	1.76	0.004
C-00303	12/03/86	55.50	679.1	97.1	24.5	1449	1.05	0.08	0.31	0.004
C-00308	06/19/85	6.80	34.3	5.0	7.4	396	0.47	0.41	0.14	0.004
C-00308	12/06/85	6.20	38.6	18.8	6.9	424	0.47	0.05	0.05	0.004
C-00308	12/01/86	6.78	42.0	3.4	10.8	425	0.28	0.18	0.30	0.004
C-00308	10/21/87	7.13	47.5	5.0	11.0	447	0.81	0.69	0.68	0.017
C-00311	06/06/85	26.58	448.5	175.9	15.9	1338	0.61	0.05	0.08	0.004
C-00311	12/03/85	23.70	451.5	211.0	17.7	1322	0.44	0.17	0.86	0.004
C-00311	12/01/86	50.45	425.3	195.6	25.8	1306	0.51		0.24	0.004
C-00311	10/19/87	26.35	436.7	200.1	26.1	1371	0.88	0.65	0.99	0.004
C-00445A	06/06/85	68.15	720.0	227.6	11.2	1702	1.51	0.05	0.55	0.004
C-00445A	12/03/85	57.50	715.0	182.0	11.5	1616	1.29	0.31	0.92	0.004
C-00445A	12/01/86	141.05	729.1	183.8	18.4	1636	1.35	1.46	0.38	0.004
C-00445A	10/19/87	60.75	639.2	177.4	16.2	1553	1.30	0.40	0.46	0.004
C-00531	06/20/85	20.47	53.6	23.0	28.8	436	0.62	0.05	0.15	0.004
C-00531	12/05/85	17.90	41.6	9.9	25.1	411	0.68	0.05	0.05	0.004
C-00684	03/06/85	465.60	182.0		31.9	3329	2.89	0.08	0.04	0.004
C-00684	12/06/85	180.00	188.0	1754.0	46.4	3311	3.43	0.05	0.62	0.004
C-00687	03/06/85	21.18	87.8		20.8	443		0.05	0.03	
C-00687	12/05/85	17.10	102.0	15.2	33.0	450	0.84	0.05	0.05	0.004
C-00687	12/04/86	19.42	110.8	16.6	35.4	451	0.41	0.06	0.05	0.004
C-00688	03/05/85	24.79	44.6		12.4	425	0.61	0.03	0.03	0.008
C-00688	12/04/85	20.70	41.2	49.9	80.0	408	0.64	0.06	0.05	0.004
C-00688	12/03/86	24.18	41.7	43.8	24.2	423	0.73	0.05	0.05	0.004
C-00689	03/06/85	27.14	79.8		14.6	438	0.45	0.05	0.18	0.020
C-00689	12/03/86	24.98	83.4	5.1	29.1	417	0.52	0.05	0.09	0.004
C-00989	12/06/85	18.70	200.0	121.0	12.5	772	0.47	0.08	0.08	0.004
C-00989	12/03/86	22.28	210.0	163.1	18.5	802	0.32		0.05	0.004
	MINIMUM	6.20	34.3	3.4	1.1	271	0.09	0.03	0.03	0.004
	MAXIMUM	465.60	2092.5	1754.0	80.0	4188	8.01	1.46	2.79	0.061
	AVERAGE	59.67	458.9	187.7	19.5	1318	1.60	0.17	0.40	0.006

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
C-00039	06/06/85	0.004	2.60	1.20	0.30	1.60	0.30	0.40	30
C-00039	12/03/85	0.004	1.09	0.90	0.83	16.89	1.47	0.85	45
C-00039	12/01/86	0.004	0.88	1.20	0.60	29.90	1.17	4.17	26
C-00039	10/19/87	0.004	0.91	1.00	0.53	0.70	1.39	0.70	38
C-00269	06/06/85	0.004	2.20	1.20	4.00	1.50	6.52	0.73	80
C-00269	12/03/85	0.004	1.02	0.90	2.26	13.62	2.04	1.40	63
C-00269	12/01/86	0.004	0.84	1.20	0.60	0.50	3.52	2.46	20
C-00269	10/20/87	0.004	0.84	1.00	0.50	12.87	1.64	0.70	22
C-00298	03/05/85	0.004	0.10		1.12	0.95	11.60	2.04	40
C-00298	12/05/85	0.004	0.65	0.90	0.98	5.42	41.00	16.20	56
C-00298	12/04/86	0.004	0.49	1.20	0.40	5.48	37.02	10.37	25
C-00303	03/05/85	0.004	0.65		2.52	0.94	21.10	1.72	40
C-00303	12/04/85	0.004	0.84	0.90	3.54	0.86	37.20	1.23	46
C-00303	12/03/86	0.004	0.64	1.24	0.60	0.72	67.15	4.19	45
C-00308	06/19/85	0.004	0.22	1.20	0.78	1.00	18.38	0.30	30
C-00308	12/06/85	0.004	0.65	0.90	2.15	0.40	26.95	0.57	191
C-00308	12/01/86	0.004	0.45	1.43	0.60	0.09	13.23	0.36	30
C-00308	10/21/87	0.004	0.42	1.86	1.00	0.95	13.53	0.70	20
C-00311	06/06/85	0.004	3.60	1.20	0.30	1.00	3.50	0.40	30
C-00311	12/03/85	0.004	1.36	0.90	1.87	1.00	14.17	0.50	25
C-00311	12/01/86	0.004	1.84	1.20	0.60	0.30	23.20	0.40	20
C-00311	10/19/87	0.007	1.46	1.00	0.50	0.58	31.52	0.70	21
C-00445A	06/06/85	0.004	3.00	1.20	0.30	2.50	11.17	0.40	4885
C-00445A	12/03/85	0.004	1.28	0.90	0.40	2.16	13.33	0.50	3173
C-00445A	12/01/86	0.004	1.26	1.20	0.60	33.10	15.88	3.85	17298
C-00445A	10/19/87	0.004	1.21	1.00	0.50	0.40	11.51	0.70	20
C-00531	06/20/85	0.004	1.40	1.20	2.17	13.30	1.94	14.60	50
C-00531	12/05/85	0.004	0.87	0.90	0.58	3.70	1.06	34.70	34
C-00684	03/06/85	0.008	1.47		15.00	0.09	1.70	0.80	40
C-00684	12/06/85	0.004	1.34	0.90	2.68	0.40	2.83	0.40	25
C-00687	03/06/85	0.004							
C-00687	12/05/85	0.004	0.46	0.90	0.40	1.10	10.73	2.07	39
C-00687	12/04/86	0.004	0.33	1.20	0.27	0.92	2.42	2.97	91
C-00688	03/05/85	0.004	0.50		0.20	0.40	2.10	0.80	40
C-00688	12/04/85	0.004	0.80	0.90	1.72	1.29	3.84	0.85	25
C-00688	12/03/86	0.004	0.61	3.27	0.89	0.66	4.45	1.74	20
C-00689	03/06/85	0.052	0.21		0.64	0.40	0.90	4.65	40
C-00689	12/03/86	0.004	0.39	1.20	0.60	1.98	1.86	7.75	20
C-00989	12/06/85	0.004	0.90	0.90	0.40	7.50	3.67	14.27	25
C-00989	12/03/86	0.004	0.74	1.20	3.57	2.68	2.18	8.75	20
	MINIMUM	0.004	0.10	0.90	0.20	0.09	0.30	0.30	20
	MAXIMUM	0.052	3.60	3.27	15.00	33.10	67.15	34.70	17298
	AVERAGE	0.005	1.04	1.16	1.47	4.36	12.03	3.87	687

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
C-00258	03/05/85	25.6	6.6	4210	131.0	0.43	0.004	664.5	27.95	96.8
C-00258	12/05/85	25.0	7.6	4260	160.7	0.46	0.004	652.0	30.15	87.4
C-00258	12/04/86	24.9	7.7	4200	150.9	0.47	0.004	665.5	29.55	94.1
C-00575	03/04/85	27.5	7.6	4154	183.0	0.39	0.004	650.5	30.25	89.0
C-00575	12/02/86	26.8	7.3	4140	203.0	0.41	0.009	551.0	25.03	81.1
C-00575	10/20/87	27.4	7.1	4240	191.3	0.43	0.009	621.5	27.50	90.8
	MINIMUM	24.9	6.6	4140	131.0	0.39	0.004	551.0	25.03	81.1
	MAXIMUM	27.5	7.7	4260	203.0	0.47	0.009	665.5	30.25	96.8
	AVERAGE	26.2	7.3	4201	170.0	0.43	0.006	634.2	28.41	89.9

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
C-00258	03/05/85	233.30	855.0		8.7	2648	9.48	0.09	0.04	0.005
C-00258	12/05/85	93.00	1040.0	499.8	15.5	2590	8.18	0.11	0.35	0.004
C-00258	12/04/86	99.00	1003.1	508.3	17.5	2611	10.14		0.17	0.004
C-00575	03/04/85		1030.0		16.0	2273	7.57	0.04	0.02	0.022
C-00575	12/02/86	90.05	1000.7	427.2	29.4	2487	5.90	0.05	0.05	0.004
C-00575	10/20/87	106.45	1011.9	415.0	31.6	2536	6.61	0.05	0.05	0.004
	MINIMUM	90.05	855.0	415.0	8.7	2273	5.90	0.04	0.02	0.004
	MAXIMUM	233.30	1040.0	508.3	31.6	2648	10.14	0.11	0.35	0.022
	AVERAGE	124.36	990.1	462.6	19.8	2524	7.98	0.07	0.11	0.007

APPENDIX 3-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
COLLIER COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
C-00258	03/05/85	0.004	1.37		10.91	7.77	3.90	0.80	40
C-00258	12/05/85	0.004	1.26	0.90	0.59	0.53	4.81	0.50	26
C-00258	12/04/86	0.004	1.68	1.20	0.55	0.50	3.02	0.80	20
C-00575	03/04/85	0.004	1.50		9.14	27.90	0.90	1.63	40
C-00575	12/02/86	0.004	1.94	1.20	2.31	9.47	23.21	1.46	20
C-00575	10/20/87	0.004	1.40	1.00	1.00	0.94	0.54	0.70	20
	MINIMUM	0.004	1.26	0.90	0.55	0.50	0.54	0.50	20
	MAXIMUM	0.004	1.94	1.20	10.91	27.90	23.21	1.63	40
	AVERAGE	0.004	1.53	1.08	4.08	7.85	6.06	0.98	28

APPENDIX 4-1, DADE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	SCREEN OPEN TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
11-5	254611	801523	DERM	10	10	X	10	10		L
11-6	254750	801247	DERM	60				60		
2-2			DERM	8	8	X	8	8		L
27-3	252923	802717	DERM	20	20	X	20	20		P
2D	254833	801622	DERM	55	55	S	53	55	4.00	L
7S	254825	801752	DERM	12	12	s	10	12	4.00	L
A-1B	254834	801610	DERM	51	51	S	49	51	3.00	L
A-3B	254840	801623	DERM	51	51	S	49	51		L
A-4B	254845	801658	DERM	50	50	S	48	50	3.00	L
F-179	254444	801448	DERM	77	77	X	77	77	6.00	L
F-319	254217	801718	DERM	17	13	X	17	13	6.00	L
F-409	254900	801816	DERM	58	58	X	58	58	6.00	S
F-441	254842	801743	DERM	57	57	X	57	57	6.00	S
G-1486	253012	802614	DERM	32	32	X	32	32	6.00	P
G-1487	254054	802954	DERM	20	20	X	20	20	6.00	S
G-1488	254830	802842	DERM	20	20	X	20	20	6.00	S
G-1604	254019	801902	DERM	62	62	X	62	62	2.50	S
G-1609	254414	802032	DERM	61	60	X	60	61	2.00	S
G-1617	252930	802910	DERM	36	35	X	35	36	2.00	S
G-1633	255527	801147	DERM	45	44	X	44	45	2.00	S
G-1637	255707	802550	DERM	26	26	X	26	26		S
G-3073	254157	802140	DERM	20	20	X	20	20	6.00	P
G-3108	253300	803110	DERM	70	61	X	61	70	2.50	G
G-3177	253018	803412	DERM	20	20	X	20	20	2.00	S
G-3184	252413	803358	DERM	20	20	X	20	20		
G-3189	253907	803143	DERM	21	20	X	20	21	2.00	S
G-3202	254537	803620	DERM	10	10	X	10	10	2.00	L
G-3273	253748	803434	DERM	15	7	X	7	15	4.00	P
G-3373	253722	802850	DERM	7	0	X	0	7	2.00	P
G-3437	253400	803404	DERM	12	12	X	12	12	5.00	P
G-3439	254421	802602	DERM	12	10	X	10	12	4.00	P
G-430	255357	801142	DERM	98	97	X	97	98	2.50	L
G-553	253902	802025	DERM	91	79	X	79	91	2.00	S
G-580A	253952	803215	DERM	22	22	X	22	22	6.00	S
G-596	253815	803045	DERM	13	11	X	11	13	6.00	L
G-614	253258	802643	DERM	20	18	X	18	20	6.00	S
G-757A	253537	802844	DERM	33	12	X	12	33	6.00	S
G-855	254038	802802	DERM	20	20	X	20	20	6.00	S
G-858	253854	802428	DERM	20	11	X	11	20	6.00	S
G-864	252612	803007	DERM	20	11	X	11	20	6.00	S
G-958A	254306	802350	DERM	32	21	X	21	32	1.25	L
M-10	254950	801904	DERM	10	10	W	8	10	2.00	P
M-6A	254954	801948	DERM	10	10	W	8	10	2.00	P
M-7A	255012	801905	DERM	15	15	W	11	13	2.00	P
M-8A	255004	801948	DERM	10	10	W	8	10	1.50	L
M-9	254925	801948	DERM	10	10	W	7	10	2.00	P
N-1	255811	801841	DERM	23	23	W	21	23	1.50	L
N-2A	255752	801728	DERM	34	34	W	32	34	2.00	L
N-5A	255749	801652	DERM	25	25	W	23	25	2.00	P
N-7	255749	801726	DERM	25	25	W	23	25	2.00	P
N-8	255740	801645	DERM	25	25	W	23	25	2.00	P

APPENDIX 4-1, DADE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
11-5	SB		12.00	11.80	A	K	N		N	Y
11-6	SB				A	K	N		N	Y
2-2	SB		10.00	9.80	A	K	N		N	Y
27-3	SB		10.00	11.00	A	K	N		N	Y
2D	SB		5.00	4.80	B					Y
7S	SB		5.00	4.80	B					Y
A-1B	SB		5.00	4.80	B					Y
A-3B	SB		5.00	4.80	B					Y
A-4B	SB		5.00	4.80	B					Y
F-179	SB	V	8.77	11.26	A	N	N	N	N	Y
F-319	SB	V	11.12	13.81	A	N	N	N	N	Y
F-409	SB		5.00	7.50	L					Y
F-441	SB		5.00	7.50	L					Y
G-1486	SB	A	10.39	12.89		N	N	N	N	Y
G-1487	SB		6.51	9.51		K	N		N	Y
G-1488	SB	A			A	N	N	N	N	Y
G-1604	SB	V	10.00	10.20		N	N	N	N	Y
G-1609	SB	V	9.00	9.20	A	N	N	N	N	Y
G-1617	SB	V	10.00	10.00	A	N	N	N	N	Y
G-1633	SB	V	10.00	9.90	A	N	N	N	N	Y
G-1637	SB		5.90	8.90	A	N	N	N	N	Y
G-3073	SB	V	3.01	7.79	A	N	N	N	N	Y
G-3108	SB	C	8.00	8.40	A	N	N	N	N	Y
G-3177	SB	V	6.00	7.00	A	N	N	N	N	Y
G-3184	SB	V	5.00	5.50	A	N	N	N	N	Y
G-3189	SB	V	6.00	6.50	A	N	N	N	N	Y
G-3202	SB	V	7.00	6.80	A	N	N	N	N	Y
G-3273	SB		7.00	10.25		K	N		N	Y
G-3373	SB					K				Y
G-3437	SB					K	N		N	Y
G-3439	SB					K	N		N	Y
G-430	SB	J	5.00	5.50	A	N	N	N	N	Y
G-553	SB	V	12.11	12.76	Z	N	N	N	N	Y
G-580A	SB	A	9.20	11.90	Z	N	N	N	N	Y
G-596	SB		7.28	9.11		K	N		N	Y
G-614	SB	H	11.10	14.15	Z	N	N	N	N	Y
G-757A	SB		9.06	12.56	A	K	N		N	Y
G-855	SB		7.90	10.88		K	N		N	Y
G-858	SB	H	8.55	11.05	Z	N	N	N	N	Y
G-864	SB	A	8.49	9.79	Z	N	N	N	N	Y
G-958A	SB	V	5.00	5.00	Z	N	N	N	N	Y
M-10	SB	H	8.00	7.99	R	F	N	Y	N	Y
M-6A	SB	H	6.90	7.09	R	F	N	Y	N	Y
M-7A	SB	H	5.80	5.87	R	F	N	Y	N	Y
M-8A	SB	A	7.20	7.01	A	F	N	Y	N	Y
M-9	SB	H	6.60	6.61	R	K	N	Y	U	Y
N-1	SB		5.00	5.20		F	N	Y	N	Y
N-2A	SB	V	5.00	5.50	R	F	N	Y	N	Y
N-5A	SB	H	5.00	6.00	R	F	N	Y	N	Y
N-7	SB	H	5.00	6.00	R	F	N	Y	N	Y
N-8	SB	H	5.00	5.20	R	F	N	Y	N	Y

APPENDIX 4-1, DADE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA (CONTINUED)

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
NWW10B	255117	802148	DERM	28	28	S	25	28	1.50	L
NWW12B	255209	802240	DERM	24	24	S	21	24	1.50	L
NWW13B	255235	802415	DERM	21	21	S	18	21	1.50	L
NWW14B	254931	802239	DERM	18	18	S	15	18	1.50	L
NWW15A	254948	802121	DERM	60	57	S	57	60	1.50	L
NWW16B	254950	802213	DERM	20	20	S	18	20	3.00	L
NWW17B	255030	802603	DERM	24	24	S	21	23	1.50	L
NWW18B	255026	802138	DERM	21	21	S	18	20	1.50	L
NWW19B	255046	802231	DERM	23	23	S	20	22	1.50	L
NWW1B	254746	802307	DERM	17	17	S	14	17	1.50	L
NWW20B	254952	802024	DERM	24	24	S	21	23	1.50	L
NWW21B	254953	802024	DERM	14	14	S	11	14	1.50	L
NWW22B	255012	802144	DERM	10	10	S	8	10	2.00	Z
NWW23B	255013	802115	DERM	24	24	S	21	24	1.50	L
NWW24B	255025	802316	DERM	24	24	S	21	24	1.50	L
NWW26B	255005	802213	DERM	23	21	S	21	23	2.00	Z
NWW2B	255024	802312	DERM	22	22	S	19	21	1.50	L
NWW3B	255247	802608	DERM	26	26	S	23	25	1.50	L
NWW4B	254906	802504	DERM	24	24	S	21	23	1.50	L
NWW5B	254932	802348	DERM	13	13	S	10	13	1.50	L
NWW6B	254937	802434	DERM	13	13	S	10	13	1.50	L
NWW7B	255023	802430	DERM	20	20	S	17	20	1.50	L
NWW8B	255024	802338	DERM	23	23	S	20	23	1.50	L
NWW9B	255118	802119	DERM	23	23	S	20	23	1.50	L
RR1(10)	255025	802144	DERM	10	10	S	8	10	2.00	P
RR2(10)	255012	802144	DERM	10	10	S	8	10	2.00	Z
RR3(10)	255025	802131	DERM	10	10	S	8	10	2.00	P
RR4(10)	255006	802131	DERM	10	10	S	8	10	2.00	Z
S-1	253237	802051	DERM	20	20	W	15	20	2.00	P
S-182	253549	802141	DERM	51	51	X	0	0	6.00	G
S-2A	253236	802023	DERM	20	10	W	7	10	1.50	P
S-3	253213	802023	DERM	20	20	W	15	20	2.00	P
S-4A	253226	802007	DERM	23	13	W	11	13	2.00	P
S-5	253226	801953	DERM	20	20	W	15	20	2.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD	TYPE OF LIFT
(A) AIR ROTARY	(A) AIRLIFT
(B) BORED OR AUGERED	(B) BUCKET/BAILER
(C) CABLE TOOL	(C) CENTRIFUGAL
(D) DUG	(J) JET
(H) HYDRAULIC ROTARY	(L) PERISTALTIC
(J) JETTED	(N) NO LIFT
(U) UNKNOWN	(P) PISTON
(P) AIR PERCUSSION	(R) ROTARY
(R) REVERSE ROTARY	(S) SUBMERSIBLE
(V) DRIVEN	(T) TURBINE
(Z) OTHER	(U) UNKNOWN
	(Z) OTHER

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
NWW10B	SB	Z	3.50	6.01	B	K	N	Y	N	Y
NWW12B	SB	Z	6.10	6.32	B	K	N	Y	N	Y
NWW13B	SB	Z	5.00	7.97	B	K	N	Y	N	Y
NWW14B	SB	Z	4.90	5.04	B	K	N	Y	N	Y
NWW15A	SB	Z	5.10	5.26	B	K	Y	Y		Y
NWW16B	SB		5.50	6.32	B	K				Y
NWW17B	SB	Z	6.00	6.12	B	K	N	Y	N	Y
NWW18B	SB	Z	3.60	3.45	B	K	N	Y	N	Y
NWW19B	SB	Z	4.00	3.66	B	K	N	Y	N	Y
NWW1B	SB	Z	7.90	8.13	B	K	N	Y	N	Y
NWW20B	SB	Z	14.80	14.85	B	K	N	Y	N	Y
NWW21B	SB	Z	6.70	6.50	B	K	N	Y	N	Y
NWW22B	SB	B	5.70	10.35	B	K	N	Y	N	Y
NWW23B	SB	Z	6.30	9.98	B	K	N	Y	N	Y
NWW24B	SB	Z	4.00	6.19	B	K	N	Y	N	Y
NWW26B	SB	Z	3.50	4.31	B	K	Y	Y		Y
NWW2B	SB	Z	5.90	5.91	B	K	N	Y	N	Y
NWW3B	SB	Z	7.00	7.38	B	K	N	Y	N	Y
NWW4B	SB	Z	6.30	6.44	B	K	N	Y	N	Y
NWW5B	SB	Z	7.80	7.88	B	K	N	Y	N	Y
NWW6B	SB	Z	8.10	8.25	B	K	N	Y	N	Y
NWW7B	SB	Z	5.50	5.70	B	K	N	Y	N	Y
NWW8B	SB	Z	5.00	5.68	B	K	N	Y	N	Y
NWW9B	SB	Z	3.50	6.52	B	K	N	Y	N	Y
RR1(10)	SB	B	7.50	10.84	B	K	N	Y	N	Y
RR2(10)	SB	B	7.50	10.31	B	K	N	Y	N	Y
RR3(10)	SB	B	14.00	16.93	B	K	N	Y	N	Y
RR4(10)	SB	B	8.00	11.11	B	K	N	Y	N	Y
S-1	SB	H	3.70	7.23	R	F	N	Y	N	Y
S-182	SB	A	11.14	13.53	A	N	N	N	N	Y
S-2A	SB	A	3.60	3.50	A	F	N	Y	N	Y
S-3	SB	H	3.50	3.93	R	F	N	Y	N	Y
S-4A	SB	H	4.70	5.68	R	F	N	Y	N	Y
S-5	SB	H	6.30	9.36	R	F	N	Y	N	Y

WELL FINISH
- (F) GRAVEL WITH PERF.
- (G) GRAVEL SCREEN
- (P) PERFORATED OR SLOTTED
- (S) SCREEN
- (T) SANDPOINT
- (W) WALLED
- (X) OPEN HOLE
- (Z) OTHER

CASING MATERIAL
- (A) ABS
- (B) BRASS OR BRONZE
- (C) CONCRETE
- (D) COPPER OR COPPER ALLOY
- (G) GALV. IRON
- (I) WROUGHT IRON
- (L) BLACK IRON
- (M) OTHER METAL
- (N) STAINLESS STEEL
- (P) PVC
- (R) ROCK OR STONE
- (S) STEEL
- (T) TILE
- (U) COATED STEEL
- (W) WOOD
- (X) THREADED PVC (NO PVC CEMENT)
- (Z) OTHER

APPENDIX 5-1, GLADES COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
GLF-0001	270848	805524	34-39S-33E	824	464	X	464	824	6.00	S
GLF-0002	270218	810104	28-39S-33E	824	390	X	390	824	6.00	S
GLF-0005	265454	811510	08-41S-31E	1620	290	X	290	1620	12.00	S
GLWQ-01	265404	812029	17-41S-30E	54	39	G	39	49	2.00	X
GLWQ-02	265404	812029	17-41S-30E	460	360	X	360	460	6.00	X
GLWQ-03	265043	800820	04-42S-32E	49	34	S	34	44	2.00	X
GLWQ-04	270427	810644	22-39S-32E	75	60	P	60	70	2.00	X
GLWQ-05	271014	810532	14-38S-32E	55	40	P	40	55	2.00	X
GLWQ-06	270143	810010	03-40S-33E	46	31	S	31	41	2.00	X
GLWQ-07	264949	813314	18-42S-28E	50	35	S	35	45	2.00	X
GLWQ-08	265640	812920	02-41S-28E	85	70	S	70	80	2.00	X
GLWQ-09	270137	812035	05-40S-30E	33	18	S	18	28	2.00	X
HE-0517	264612	812229	36-42S-29E	138	128	X	128	138	8.00	S
RTA-007	264910	812804	18-42S-29E	410	395	X	395	410	6.00	P
RTA-007S	264910	812804	18-42S-29E	80	60	X	60	80	6.00	P

WELL STATUS

(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD

(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT

(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 5-1, GLADES COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
GLF-0001	FA		17.81	18.81	N	G	Y	N	N	Y
GLF-0002	FA		16.50	17.54	N	F	Y	N	N	Y
GLF-0005	FA		31.00	33.03	U	G	Y	N	N	Y
GLWQ-01	SF	H	40.00	40.50	N	H	N	N	N	Y
GLWQ-02	IA	H	40.00	44.00	N	K	Y	Y	N	Y
GLWQ-03	SF	H	20.00	25.00	N	N	N	Y	N	Y
GLWQ-04	SF	H	26.00	26.00	N	K	N	N	N	Y
GLWQ-05	SF	H	25.00	25.00	N	K	N	U	U	Y
GLWQ-06	SF	H	15.00	17.50	N	N	N	Y	N	Y
GLWQ-07	SF	H	35.00	35.00	N	N	N	Y	N	Y
GLWQ-08	SF	H	60.00	63.00	N	N	N	Y	N	Y
GLWQ-09	SF	H	58.00	60.00	N	N	N	Y	N	Y
HE-0517	IA	H	16.04	18.14	N	N	U	U	U	Y
RTA-007	IA	H	37.00	38.50	N	F	Y	Y	Y	Y
RTA-007S	SF	H	37.00	38.00	N	N	N	N	Y	Y

WELL FINISH
- (F) GRAVEL WITH PERF.
- (G) GRAVEL SCREEN
- (P) PERFORATED OR SLOTTED
- (S) SCREEN
- (T) SANDPOINT
- (W) WALLED
- (X) OPEN HOLE
- (Z) OTHER

CASING MATERIAL
- (A) ABS
- (B) BRASS OR BRONZE
- (C) CONCRETE
- (D) COPPER OR COPPER ALLOY
- (G) GALV. IRON
- (I) WROUGHT IRON
- (L) BLACK IRON
- (M) OTHER METAL
- (N) STAINLESS STEEL
- (P) PVC
- (R) ROCK OR STONE
- (S) STEEL
- (T) TILE
- (U) COATED STEEL
- (W) WOOD
- (X) THREADED PVC (NO PVC CEMENT)
- (Z) OTHER

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
GLWQ-01	05/14/85	24.9		77	3.9	0.19	0.012	6.2	0.52	1.0
GLWQ-01	04/21/86	25.1	5.5	60	10.2	0.15	0.008		1.35	2.2
GLWQ-01	05/11/87	25.1	4.6	41	7.1	0.19	0.004	11.9	1.06	1.1
GLWQ-03	05/13/85	24.2		901	321.0	1.11	0.007	38.8	1.09	145.0
GLWQ-03	04/21/86	25.0	6.8	894	300.0	1.10	0.025	43.1	1.34	166.5
GLWQ-03	05/12/87	24.8	6.8	1011	414.0	1.09	0.046	47.5	2.23	178.0
GLWQ-04	05/13/85	24.0		1130	434.0	1.80	0.029	81.5	2.66	125.0
GLWQ-04	04/22/86	25.6	6.6	1162	424.2	1.61	0.018	94.1	2.51	132.2
GLWQ-04	05/12/87	25.5	6.7	1241	502.5	1.69	0.004	111.2	3.15	144.0
GLWQ-05	05/13/85	22.9		990	481.5	1.01	0.037	31.4	1.79	145.0
GLWQ-05	04/22/86	23.9	6.5	979	429.6	1.09	0.013	32.2	1.53	149.9
GLWQ-05	05/12/87	25.4	6.9	967	504.7	1.24	0.016	40.3	2.06	149.0
GLWQ-06	05/14/85	23.0		1660	352.0	0.67	0.017	196.0	5.29	117.0
GLWQ-06	04/23/86	23.2	7.1	1716	392.5	0.61	0.016	207.5	5.27	121.3
GLWQ-06	05/14/87	25.1	7.0	1685	382.0	0.65	0.004		5.85	128.5
GLWQ-07	05/16/85	27.1		1168	186.0	0.35	0.004	75.9	0.78	150.0
GLWQ-07	04/21/86	24.0	6.8	949	216.1	0.30	0.004	74.2	0.58	107.0
GLWQ-07	05/11/87	25.1	6.9	930	211.0	0.33	0.008	78.4	0.68	98.3
GLWQ-08	05/16/85	26.7		1370	425.5	0.63	0.004	124.1	2.89	140.0
GLWQ-08	04/22/86	24.9	6.9	1340	378.0	0.88	0.017	118.3	2.87	120.6
GLWQ-08	05/12/87	25.5	6.9	1422	461.9	1.00	0.009	139.3	3.00	119.8
GLWQ-09	05/14/85									
GLWQ-09	04/22/86	23.0	9.1	111	16.8	0.23	0.456	8.8	0.71	4.6
GLWQ-09	05/12/87	23.5	5.6	98	19.0	0.28	0.484	20.7	0.83	4.0
RTA-007S	05/16/85	27.1		863	184.0	0.36	0.004	114.2	8.45	32.0
RTA-007S	04/21/86	25.6	7.5	862	179.3	0.34	0.004	113.7	8.24	27.4
RTA-007S	05/11/87	25.6	7.8	874	180.7	1.59	0.004	134.1	8.69	25.6
	MINIMUM	22.9	4.6	41	3.9	0.15	0.004	6.2	0.52	1.0
	MAXIMUM	27.1	9.1	1716	504.7	1.80	0.484	207.5	8.69	178.0
	AVERAGE	24.8	6.8	942	285.3	0.79	0.048	81.0	2.90	97.5

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
GLWQ-01	05/14/85	0.64	7.4	10.6	2.5	39	0.14	0.59	0.58	0.015
GLWQ-01	04/21/86	0.63	7.9		3.3	31		0.52	0.49	0.004
GLWQ-01	05/11/87	0.74	8.6	5.0	2.2	43	0.50	0.34	0.33	0.004
GLWQ-03	05/13/85	6.41	56.4	32.5	9.2	622	0.73	0.54	2.37	0.004
GLWQ-03	04/21/86	6.66	68.4	52.7	14.1	667	0.80	0.59	2.13	0.004
GLWQ-03	05/12/87	7.17	64.2	53.4	17.7	714	0.68	1.34	1.57	0.047
GLWQ-04	05/13/85	22.97	105.0	14.2	24.0	701	0.95	0.12	0.29	0.010
GLWQ-04	04/22/86	23.26	136.0	6.5	33.2	772	1.33	0.10	0.34	0.005
GLWQ-04	05/12/87	26.20	126.9	12.9	40.9	804	0.88	0.18	0.29	0.034
GLWQ-05	05/13/85	35.02	26.3	34.2	19.9	730	1.95	0.54	0.90	0.018
GLWQ-05	04/22/86	31.47	30.3	26.9	27.6	712	2.27	0.34	1.41	
GLWQ-05	05/12/87	34.65	27.8	29.6	33.6	714	1.81	0.90	2.21	0.047
GLWQ-06	05/14/85	31.29	263.0	107.6	18.7	981	1.51		0.34	0.004
GLWQ-06	04/23/86	31.50	334.0	91.5	28.5	1032	1.83	0.34	0.28	0.004
GLWQ-06	05/14/87	31.65	282.4	98.9	30.8	1011	1.68	0.06	0.19	0.028
GLWQ-07	05/16/85	13.79	220.0	38.1	12.5	750	0.71	4.61	6.82	0.004
GLWQ-07	04/21/86	10.26	163.0	28.6	22.5	605	0.49	3.62	8.33	
GLWQ-07	05/11/87	10.77	152.7	19.5	22.3	565	0.50	4.31	4.81	0.006
GLWQ-08	05/16/85	48.60	114.0	177.0	67.2	960	0.83	0.06	0.08	0.032
GLWQ-08	04/22/86	51.00	119.0	155.0	89.8	959	0.91	0.24	0.45	0.004
GLWQ-08	05/12/87	49.27	117.2	175.7	95.7	983	0.68	0.57	0.55	0.015
GLWQ-09	05/14/85									
GLWQ-09	04/22/86	1.91	15.2	7.0	24.9	89	0.21	2.12	3.77	0.004
GLWQ-09	05/12/87	2.28	14.1	5.0	25.3	87	0.50	2.70	2.73	0.029
RTA-007S	05/16/85	21.58	106.0	95.6	14.8	509	4.42	0.05	0.05	0.017
RTA-007S	04/21/86	21.70	113.0	91.0	28.4	512	5.02	0.09	0.12	0.005
RTA-007S	05/11/87	24.20	107.2	90.5	23.8	519	5.18	0.24	0.13	0.008
	MINIMUM	0.63	7.4	5.0	2.2	31	0.14	0.05	0.05	0.004
	MAXIMUM	51.00	334.0	177.0	95.7	1032	5.18	4.61	8.33	0.047
	AVERAGE	20.99	107.2	58.4	28.2	620	1.46	1.00	1.60	0.015

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
GLWQ-01	05/14/85	0.004	0.30	0.90	1.80	0.10	5.88	0.60	30
GLWQ-01	04/21/86	0.004	0.18	0.90	0.90	0.97	3.68	0.78	30
GLWQ-01	05/11/87	0.004	0.16	1.26	0.99	0.60	1.80	0.50	20
GLWQ-03	05/13/85	0.004	0.20	4.87	4.70	0.20	24.63	0.60	30
GLWQ-03	04/21/86	0.004	0.42	2.01	2.53	0.50	16.93	2.42	30
GLWQ-03	05/12/87	0.004	0.31	3.62	1.82	0.60	13.09	0.70	58
GLWQ-04	05/13/85	0.004	0.30	0.90	2.50	0.50	12.96	0.60	30
GLWQ-04	04/22/86	0.004	0.30	0.90	4.51	0.50	13.41	2.83	30
GLWQ-04	05/12/87	0.006	0.25	3.01	2.13	0.60	11.90	0.70	24
GLWQ-05	05/13/85	0.006	0.60	0.09	5.20	0.30	31.62	0.60	59
GLWQ-05	04/22/86	0.010	0.57	0.90	6.53	1.17	62.70	3.11	30
GLWQ-05	05/12/87	0.006	0.61	0.80	7.01	0.91	33.47	1.04	37
GLWQ-06	05/14/85	0.004	0.30	0.90	0.70	0.10	22.52	0.60	30
GLWQ-06	04/23/86	0.004	0.34	0.90	0.84	0.50	21.93	1.01	30
GLWQ-06	05/14/87	0.004	0.54	1.30	0.58	0.30	9.26	0.70	10
GLWQ-07	05/16/85	0.010	0.80	2.48	1.50	0.20	38.20	0.60	30
GLWQ-07	04/21/86	0.023	0.55	1.97	6.13	0.63	44.60	1.05	30
GLWQ-07	05/11/87	0.015	0.65	0.21	0.40	0.87	33.13	0.50	22
GLWQ-08	05/16/85	0.004	0.40	1.50	0.50	0.30	20.09	0.60	30
GLWQ-08	04/22/86	0.004	0.67	0.90	3.44	0.96	25.40	2.15	30
GLWQ-08	05/12/87	0.004	0.63	1.14	0.40	0.60	14.96	0.70	20
GLWQ-09	05/14/85								
GLWQ-09	04/22/86	0.004	0.23	0.90	4.13	4.68	8.71	2.82	30
GLWQ-09	05/12/87	0.004	0.31	0.05	5.94	1.68	8.06	0.89	20
RTA-007S	05/16/85	0.004	1.40	1.50	0.30	0.10	1.35	0.60	30
RTA-007S	04/21/86	0.004	2.91	0.90	0.93	1.38	2.18	5.81	30
RTA-007S	05/11/87	0.004	3.73	0.94	3.42	0.60	1.73	0.50	23
	MINIMUM	0.004	0.16	0.05	0.30	0.10	1.35	0.50	10
	MAXIMUM	0.023	3.73	4.87	7.01	4.68	62.70	5.81	59
	AVERAGE	0.006	0.68	1.38	2.69	0.76	18.62	1.27	30

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
GLWQ-02	05/14/85	24.7		457	175.0	0.33	0.004	41.8	6.63	16.0
GLWQ-02	04/21/86	25.1	7.6	472	192.2	0.31	0.004	41.2	6.84	16.2
GLWQ-02	05/11/87	24.7	7.6	471	185.8	0.33	0.004	48.3	6.26	16.1
HE-0517	06/24/85	23.4		561	260.5	0.41	0.005	15.0	1.25	100.0
HE-0517	02/25/86	24.2	6.1	597	299.8	0.38	0.004	17.9	1.68	106.3
HE-0517	02/23/87	24.3	7.1	587	304.8	0.40	0.006	15.4	1.39	100.1
RTA-007	05/16/85	25.7		872	177.0	0.41	0.004	113.6	8.64	27.0
RTA-007	04/21/86	26.3	7.5	834		0.36	0.004	116.4	9.13	26.2
RTA-007	05/11/87	26.7	7.7	877	177.0	0.40	0.005	136.2	7.53	24.3
	MINIMUM	23.4	6.1	457	175.0	0.31	0.004	15.0	1.25	16.0
	MAXIMUM	26.7	7.7	877	304.8	0.41	0.006	136.2	9.13	106.3
	AVERAGE	25.0	7.3	636	221.5	0.37	0.004	60.6	5.48	48.0

FLORIDAN AQUIFER SYSTEM

GLF-0001	09/17/84	25.7	6.4	1445	96.8			139.5	5.86	54.3
GLF-0001	05/14/85	26.3		1880	79.6	0.17	0.022	218.5	7.50	67.0
GLF-0001	04/24/86	25.8	7.4	1886	70.0	0.19	0.004	232.0	7.79	81.4
GLF-0001	05/14/87	27.0	7.2	1787	88.0	0.19	0.004		8.47	76.4
GLF-0002	09/17/84	24.2	6.6	2510				279.5	7.87	75.2
GLF-0002	05/14/85	26.5		2331	77.9	0.22	0.007	287.0	9.23	88.0
GLF-0002	04/24/86	24.7	7.4	1912	73.2	0.18	0.004	285.5	9.24	96.1
GLF-0005	09/17/84	28.8	5.6	6594	84.1			735.0	17.70	177.0
GLF-0005	05/14/85	29.4		5870	71.1	0.34	0.009	875.0	21.10	183.0
GLF-0005	04/21/86	29.4	7.3	5060	64.9	0.26	0.004	856.0	21.00	194.0
GLF-0005	05/11/87	29.7	6.8	1925	75.1	0.28	0.025	718.2	20.75	183.0
	MINIMUM	24.2	5.6	1445	64.9	0.17	0.004	139.5	5.86	54.3
	MAXIMUM	29.7	7.4	6594	96.8	0.34	0.025	875.0	21.10	194.0
	AVERAGE	27.0	6.8	3018	78.1	0.23	0.010	462.6	12.41	115.9

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
GLWQ-02	05/14/85	24.34	22.7	16.1	12.7	255	2.12	0.05	0.05	0.004
GLWQ-02	04/21/86	25.35	26.7	28.3	19.5	256	2.98	0.14	0.05	0.004
GLWQ-02	05/11/87	25.20	24.1	13.7	23.2	274	2.24	0.05	0.05	0.014
HE-0517	06/24/85	6.47	23.9	4.0	11.5	359	1.15	0.39	5.35	0.011
HE-0517	02/25/86	6.46	24.3	6.5	19.9	359	0.53			0.004
HE-0517	02/23/87	6.44	25.8	2.0	23.3	382	0.67	0.62	1.03	0.005
RTA-007	05/16/85	23.14	108.0	98.2	12.9	507	5.94	0.05	0.05	0.006
RTA-007	04/21/86	23.39	114.0	75.1	19.0	498	9.45	0.05	0.05	0.004
RTA-007	05/11/87	23.39	109.0	81.6	23.0	508	5.05	0.07	0.05	0.012
	MINIMUM	6.44	22.7	2.0	11.5	255	0.53	0.05	0.05	0.004
	MAXIMUM	25.35	114.0	98.2	23.3	508	9.45	0.62	5.35	0.014
	AVERAGE	18.24	53.2	36.2	18.3	378	3.35	0.18	0.84	0.007

FLORIDAN AQUIFER SYSTEM

GLF-0001	09/17/84	33.60	260.0	111.6	15.6	829		0.28		
GLF-0001	05/14/85	55.00	424.0	315.7	8.7	1073	15.09	0.05	0.05	0.004
GLF-0001	04/24/86	52.25	608.0	331.8	11.7	1212	19.95	0.81	0.07	0.004
GLF-0001	05/14/87	55.95	418.1	201.8	16.4	1113	14.89	0.05	0.05	0.005
GLF-0002	09/17/84	37.20	737.0			1730		0.48		
GLF-0002	05/14/85	75.00	505.0	437.0	8.2	1422	22.01	0.05	0.12	0.004
GLF-0002	04/24/86	68.05	586.0	279.2	13.1	1322	21.35	2.08	0.68	0.004
GLF-0005	09/17/84	117.00	1660.0	404.3	13.9	3576		0.10		
GLF-0005	05/14/85	136.10	1647.5	437.6	7.9	3432	35.34	0.09	0.18	0.004
GLF-0005	04/21/86	143.90	1720.0	478.1	10.0	3574	40.15	0.28	0.16	0.004
GLF-0005	05/11/87	121.67		469.7	13.2	3553	38.20	0.20	0.05	0.004
	MINIMUM	33.60	260.0	111.6	7.9	829	14.89	0.05	0.05	0.004
	MAXIMUM	143.90	1720.0	478.1	16.4	3576	40.15	2.08	0.68	0.005
	AVERAGE	81.43	856.6	346.7	11.9	2076	25.87	0.41	0.17	0.004

APPENDIX 5-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
GLADES COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
GLWQ-02	05/14/85	0.004	2.10	0.90	1.70	0.10	0.30	0.60	30
GLWQ-02	04/21/86	0.004	4.78	0.90	1.45		2.91	2.04	82
GLWQ-02	05/11/87	0.004	3.73	1.55	0.97	3.21	0.40	0.55	60
HE-0517	06/24/85	0.004	0.10	1.50	1.31	3.10	11.70	2.90	21
HE-0517	02/25/86	0.004	0.24	0.60	8.54	0.50	94.60	5.29	38
HE-0517	02/23/87	0.004	0.42	1.00	0.40	0.80	9.35	0.80	20
RTA-007	05/16/85	0.004	1.40	1.50	0.40	0.10	0.87	0.60	30
RTA-007	04/21/86	0.004	3.64	0.90	0.76	1.57	1.11	0.80	30
RTA-007	05/11/87	0.004	3.72	1.58	1.69	0.60	0.50	0.50	20
	MINIMUM	0.004	0.10	0.60	0.40	0.10	0.30	0.50	20
	MAXIMUM	0.004	4.78	1.58	8.54	3.21	94.60	5.29	82
	AVERAGE	0.004	2.24	1.16	1.91	1.25	13.53	1.56	37

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
GLF-0001	09/17/84		0.55						
GLF-0001	05/14/85	0.004	0.60	0.90	0.90	0.10	0.97	0.60	30
GLF-0001	04/24/86	0.004	0.64	0.90	0.40	0.50	10.43	1.19	30
GLF-0001	05/14/87	0.004	0.67	1.55	0.40	1.07	2.30	0.70	37
GLF-0002	09/17/84		1.49						
GLF-0002	05/14/85	0.004	0.70	0.90	0.30	0.10	2.14	0.60	30
GLF-0002	04/24/86	0.004	0.73	0.90	0.40	0.50	35.85	0.42	30
GLF-0005	09/17/84		0.49						
GLF-0005	05/14/85	0.004	0.80	0.90	1.20	0.10	4.45	0.60	30
GLF-0005	04/21/86	0.004	0.96	0.90	1.15	0.50	7.66	0.40	35
GLF-0005	05/11/87	0.004	0.93	4.18	3.41	3.74	6.61	0.50	20
	MINIMUM	0.004	0.49	0.90	0.30	0.10	0.97	0.40	20
	MAXIMUM	0.004	1.49	4.18	3.41	3.74	35.85	1.19	37
	AVERAGE	0.004	0.78	1.39	1.02	0.83	8.80	0.63	30

APPENDIX 6-1, HENDRY COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
HE-0003	261859	805854	12-48S-33E	10	8	G	8	10	6.00	M
HE-0529	263310	812509	21-45S-29E	155	135	S	135	155	4.00	P
HE-0554	263310	812509	21-45S-29E	15	5	S	5	15	4.00	P
HE-0556	263845	812607	21-44S-29E	175	135	S	135	175	4.00	P
HE-0557	264235	813106	28-43S-28E	100	80	S	80	100	4.00	P
HE-0558	264235	813106	28-43S-28E	14	3	S	3	14	4.00	P
HE-0630	264133	810408	06-44S-33E	75	70	S	70	75	2.00	P
HE-0851	263845	812607	21-44S-29E	13	5	S	5	13	4.00	P
HE-0852	263548	812006	04-45S-30E	14	9	S	9	14	4.00	M
HE-0854	263515	810120	10-45S-33E	14	3	S	3	14	4.00	P
HE-0855	263135	810735	34-45S-32E	77	70	X	70	77	4.00	P
HE-0856	263135	810735	34-45S-32E	11	4	S	4	11	4.00	P
HE-0861	261735	805340	24-48S-34E	44	37	X	37	44	4.00	P
HE-0862	261735	805340	24-48S-34E	11	7	S	7	11	4.00	P
RTA-005	263330	812607	20-45S-29E	200	165	X	165	200	6.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 6-1, HENDRY COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
HE-0003	SF	V	19.14	21.64	N	N	U	U	U	Y
HE-0529	IA	H	28.00	30.60	N	N	U	U	U	Y
HE-0554	SF	H	28.00	30.50	N	N	U	U	U	Y
HE-0556	IA	H	28.62	30.84	N	N	U	U	U	Y
HE-0557	IA		17.71	20.21	N	N	U	U	U	Y
HE-0558	SF		17.70	20.20	N	N	U	U	U	Y
HE-0630	SF	H	10.00	22.00	N	N	U	U	U	Y
HE-0851	SF	H	27.55	30.45	N	N	U	U	U	Y
HE-0852	SF	H	29.00	31.00	N	N	N	N	N	Y
HE-0854	SF	H	23.00	25.00	N	N	N	N	N	Y
HE-0855	SF	H	26.00	28.58	N	N	U	U	U	Y
HE-0856	SF	H	26.00	28.50	N	N	U	U	U	Y
HE-0861	SF	H	15.00	17.69	N	N	U	U	U	Y
HE-0862	SF	H	15.00	17.71	N	N	U	U	U	Y
RTA-005	IA	H	32.00	33.00	N	N	Y	Y	Y	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
HE-0003	06/25/85	23.7		591	286.5	0.75	0.004	4.0	2.77	105.4
HE-0003	02/24/86	28.6	6.8	430	296.2	1.10	0.004	5.6	4.49	104.0
HE-0003	02/24/87	24.3	7.5	599	326.0	1.04	0.004	11.4	2.31	108.6
HE-0554	06/20/85	23.4	6.0	287	120.0	0.01	0.100	18.0	1.05	39.0
HE-0554	01/09/86	21.8	5.7	442	127.9	0.07	0.087	21.7	1.23	44.9
HE-0554	02/23/87	23.2	6.7	430	135.0	0.57	0.111	45.2	1.69	54.4
HE-0558	06/24/85	24.2		3654	164.0	0.18	0.004	374.0	8.00	269.5
HE-0558	02/25/86	22.6	5.5	3240	203.1	0.01	0.016	312.5	8.80	188.0
HE-0558	02/23/87	24.0	6.8	2550	165.7	0.27	0.078	298.5	8.43	219.0
HE-0630	06/26/85	23.3		1035	295.5	0.23	0.004	138.0	5.90	63.4
HE-0630	02/25/86	23.1	6.0	1065	302.1	0.16	0.004	155.7	8.30	64.6
HE-0630	02/24/87	23.0	7.4	1079	267.7	0.33	0.009	143.5	5.85	60.7
HE-0851	06/20/85	23.0	7.2	763	401.5	0.68	0.004	29.0	2.52	129.7
HE-0851	02/25/86	21.9	6.6	744	382.8	0.05	0.250	24.0	4.71	136.9
HE-0851	02/23/87	22.2	7.3	894	399.4	0.60	0.016	29.6	3.13	149.8
HE-0852	06/25/85	25.8		653	263.5	0.42	0.200	30.0	0.49	97.8
HE-0852	02/24/86	23.5	5.2	644	263.6	0.01	0.275	30.9	0.56	103.2
HE-0852	02/24/87	23.2	6.8	621	228.6	0.47	0.364	29.7	0.41	96.3
HE-0854	06/26/85	24.1		542	222.0	0.09	0.004	8.0	0.70	105.4
HE-0854	02/24/86	21.3	6.0	599	204.0	0.16	0.004	10.2	1.34	117.9
HE-0854	02/24/87	22.0	7.5	512	221.6	0.24	0.010	34.0	0.83	94.0
HE-0855	06/25/85	24.8		827	317.5	0.33	0.004	58.0	2.25	92.2
HE-0855	02/24/86	24.2	5.8	865	323.7	0.16	0.004	67.5	2.87	100.9
HE-0855	02/24/87	24.1	7.1	884	313.0	0.37	0.008	66.8	2.21	92.3
HE-0856	06/25/85	26.8		332	167.0	0.01	0.016	2.0	0.52	68.4
HE-0856	02/24/86	21.8	5.4	389	201.9	0.01	0.006	6.4	0.70	75.1
HE-0856	02/24/87	21.1	6.8	368	198.4	0.10	0.036	3.0	0.41	70.9
HE-0861	06/25/85	23.8		801	357.0	0.51	0.004	57.0	2.82	105.1
HE-0861	02/24/86	24.4	5.7	834	391.2	0.30	0.004	60.0	3.97	113.3
HE-0861	02/24/87	24.2	7.3	831	335.2	0.64	0.014	64.6	2.80	105.1
HE-0862	06/25/85	23.9		560	280.5	1.18	0.005	48.0	1.18	105.9
HE-0862	02/24/86	22.7	5.9	476	247.5	0.01	0.009	10.6	1.48	93.2
HE-0862	02/24/87	22.3	7.6	462	224.4	0.24	0.010	8.5	1.22	84.4
	MINIMUM	21.1	5.2	287	120.0	0.01	0.004	2.0	0.41	39.0
	MAXIMUM	28.6	7.6	3654	401.5	1.18	0.364	374.0	8.80	269.5
	AVERAGE	23.5	6.5	879	261.6	0.34	0.051	66.8	2.91	104.8

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
HE-0003	06/25/85	9.08	3.8	3.0	4.0	352	0.58	2.87	0.44	0.004
HE-0003	02/24/86	8.35	5.9	6.9	1.3	347	0.48			0.057
HE-0003	02/24/87	6.63	8.4	3.2	7.2	354	0.58	0.06	13.62	0.024
HE-0554	06/20/85	6.47	20.8	10.0	7.1	226	0.70	1.76	1.80	0.005
HE-0554	01/09/86	6.89	43.7	13.4	6.4	266	0.75	1.00	1.40	0.004
HE-0554	02/23/87	7.16	51.3	17.7	14.4	310	0.91	1.85	2.81	0.056
HE-0558	06/24/85	81.30	559.0	212.0	6.3	2305	17.15	3.11	0.41	0.009
HE-0558	02/25/86	72.20	1100.0	193.1	7.0	1825	14.38			0.004
HE-0558	02/23/87	69.30	789.2	226.0	15.4	1859	14.10	5.54	7.35	0.004
HE-0630	06/26/85	16.64	150.0	37.0	13.5	647	0.68	0.05	0.09	0.004
HE-0630	02/25/86	16.61	160.0	38.8	22.8	628	0.54	0.05	0.05	0.004
HE-0630	02/24/87	15.86	158.0	46.4	26.8	628	0.67	0.08	0.09	0.006
HE-0851	06/20/85	10.60	25.3	6.0	13.3	479	1.20	2.50	0.13	0.004
HE-0851	02/25/86	9.41	33.3	10.4	9.5	483	0.79			0.150
HE-0851	02/23/87	12.71	44.8	13.6	17.2	601	1.25	7.78	9.35	0.004
HE-0852	06/25/85	3.75	41.4	27.0	6.1	478	0.70	14.10	41.50	0.055
HE-0852	02/24/86	3.86	48.6	73.4	6.3	468	0.12			0.004
HE-0852	02/24/87	3.67	40.0	45.4	14.7	472	0.42	17.70	24.13	0.020
HE-0854	06/26/85	3.06	21.3	27.0	3.5	379	0.56	0.20	0.88	0.008
HE-0854	02/24/86	4.05	14.2	7.5	8.0	385	0.16			0.088
HE-0854	02/24/87	4.45	16.4	5.2	10.7	335	0.47	1.14	2.18	0.017
HE-0855	06/25/85	17.15	92.0	5.0	14.9	514	0.43	0.05	0.06	0.015
HE-0855	02/24/86	17.40	95.0	8.4	17.4	527	0.20	0.05	0.05	0.004
HE-0855	02/24/87	17.38	103.5	5.9	28.7	534	0.65	0.21	0.24	0.055
HE-0856	06/25/85	1.14	4.1	7.0	3.1	200	0.27	0.09	0.53	
HE-0856	02/24/86	1.60	9.7	9.5	3.9	244	0.41	0.22	0.20	0.004
HE-0856	02/24/87	1.89	2.1	8.1	6.0	231	0.39	0.40	0.43	0.048
HE-0861	06/25/85	11.29	62.6	3.0	11.3	518	0.73	0.05	0.34	0.005
HE-0861	02/24/86	11.31	61.6	5.6	13.1	506	0.61	0.05	0.05	0.262
HE-0861	02/24/87	11.17	94.3	4.5	24.0	504	0.64	0.06	0.14	0.042
HE-0862	06/25/85	2.37	18.1	3.0	3.8	347	0.58	0.71	3.09	0.009
HE-0862	02/24/86	2.07	14.1	5.9	1.9	298	0.19			0.004
HE-0862	02/24/87	2.27	17.2	5.6	7.2	298	0.36	0.84	2.20	0.008
	MINIMUM	1.14	2.1	3.0	1.3	200	0.12	0.05	0.05	0.004
	MAXIMUM	81.30	1100.0	226.0	28.7	2305	17.15	17.70	41.50	0.262
	AVERAGE	14.21	118.5	33.2	10.8	562	1.90	2.32	4.21	0.031

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
HE-0003	06/25/85	0.006	0.20	1.50	2.96	1.00	4.71	0.40	20
HE-0003	02/24/86	0.004	1.00	2.35	10.60	21.70	241.00	33.05	71
HE-0003	02/24/87	0.004	0.23	2.06	9.89	17.74	104.70	13.92	22
HE-0554	06/20/85	0.009	0.10	1.42	3.30	1.13	11.10	1.70	60
HE-0554	01/09/86	0.016	0.40	0.70	2.48	3.47	10.74	3.04	31
HE-0554	02/23/87	0.023	0.29	2.96	2.83	0.80	13.78	1.07	20
HE-0558	06/24/85	0.009	0.09	5.85	4.13	1.00	12.47	2.80	18
HE-0558	02/25/86	0.004	0.54	3.50	0.30	0.50	22.90	3.32	34
HE-0558	02/23/87	0.004	0.43	6.00	0.51	2.10	28.92	0.80	30
HE-0630	06/26/85	0.009	0.10	1.50	0.61	1.60	3.37	2.20	22
HE-0630	02/25/86	0.004	0.27	0.60	0.30	0.50	6.59	2.53	17
HE-0630	02/24/87	0.004	0.30	1.00	0.40	0.80	3.32	0.80	20
HE-0851	06/20/85	0.004	0.10	15.84	10.51	2.70	15.40	24.10	116
HE-0851	02/25/86	0.008	1.08	37.68	0.30	0.50	93.65	23.00	78
HE-0851	02/23/87	0.004	0.71	25.68	4.81	0.80	95.80	2.34	20
HE-0852	06/25/85	0.029	0.19	5.08	11.26	1.00	15.68	1.70	20
HE-0852	02/24/86	0.004	0.79	2.38	7.55	4.64	18.75	0.89	55
HE-0852	02/24/87	0.023	0.47	4.18	11.55	0.80	26.05	0.80	20
HE-0854	06/26/85	0.004	0.26	8.02	3.38	1.00	5.56	4.60	78
HE-0854	02/24/86	0.004	0.69	7.90	1.64	0.50	18.20	5.65	67
HE-0854	02/24/87	0.004	0.62	4.68	0.40	0.80	6.45	0.80	20
HE-0855	06/25/85	0.004	0.61	1.50	2.84	1.00	2.66	3.40	20
HE-0855	02/24/86	0.004	0.50	0.60	0.30	0.50	11.08	3.50	27
HE-0855	02/24/87	0.004	0.42	1.00	0.40	0.80	4.13	0.80	20
HE-0856	06/25/85	0.044	0.10	1.50	2.18	1.64	2.35	17.40	20
HE-0856	02/24/86	0.004	0.24	0.67	0.30	1.62	16.97	16.41	46
HE-0856	02/24/87	0.004	0.21	2.22	0.77	0.80	7.87	0.80	20
HE-0861	06/25/85	0.005	0.10	4.33	14.00	80.70	83.40	79.60	231
HE-0861	02/24/86	0.007	0.26	0.60	1.75	0.72	8.86	3.25	55
HE-0861	02/24/87	0.004	0.25	1.00	3.12	0.80	8.86	0.80	20
HE-0862	06/25/85	0.005	0.24	1.50	0.93	7.39	46.45	7.50	29
HE-0862	02/24/86	0.004	0.35	1.34	3.63	2.88	30.75	42.95	80
HE-0862	02/24/87	0.004	0.33	1.49	7.61	0.96	29.11	9.49	20
	MINIMUM	0.004	0.09	0.60	0.30	0.50	2.35	0.40	17
	MAXIMUM	0.044	1.08	37.68	14.00	80.70	241.00	79.60	231
	AVERAGE	0.008	0.38	4.81	3.86	5.00	30.66	9.56	43

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
HE-0529	06/20/85	23.5	7.2	651	302.5	0.43	0.004	37.0	1.51	85.5
HE-0529	01/09/86	24.2	6.7	704	302.0	0.14	0.005	40.7	1.59	85.8
HE-0529	02/23/87	24.5	7.3	667	268.5	0.39	0.024	40.4	1.79	85.3
HE-0556	06/20/85	23.8	7.7	1017	233.0	0.01	0.034	103.0	9.57	54.3
HE-0556	02/25/86	24.4	6.3	1062	249.0	0.01	0.028	108.5	10.20	55.2
HE-0556	02/23/87				253.8	0.33	0.079	105.1	10.40	52.1
HE-0557	06/24/85	24.6		3942	125.0	0.58	0.015	579.0	18.60	180.5
HE-0557	02/25/86	24.6	6.7	4390	125.1	0.01	0.004	582.0	19.20	104.5
HE-0557	02/23/87	25.1	7.1	4370	110.5	0.38	0.015	608.0	19.45	172.5
RTA-005	06/20/85	24.0	7.4	703	284.0	0.07	0.004	41.0	2.06	97.1
RTA-005	01/09/86	24.7	6.6	793	312.0	0.50	0.004	50.2	1.88	98.1
RTA-005	02/23/87	24.5	7.2	751	254.0	0.50	0.007	43.2	2.15	95.8
	MINIMUM	23.5	6.3	651	110.5	0.01	0.004	37.0	1.51	52.1
	MAXIMUM	25.1	7.7	4390	312.0	0.58	0.079	608.0	19.45	180.5
	AVERAGE	24.4	7.0	1732	235.0	0.28	0.019	194.8	8.20	97.2

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
HE-0529	06/20/85	14.06	60.7	5.0	25.4	439	0.54	0.85	0.09	0.004
HE-0529	01/09/86	13.84	35.6	18.0	20.6	390	0.44	0.05	0.05	
HE-0529	02/23/87	14.10	42.0	5.4	33.8	438	0.65	0.25	0.42	0.007
HE-0556	06/20/85	38.87	172.0	42.0	31.5	620	1.29	0.05	0.06	0.004
HE-0556	02/25/86	38.99	181.0	42.3	38.0	616	1.16	0.05	0.05	0.004
HE-0556	02/23/87	39.38	174.4	52.3	43.0	616	1.54	0.05	0.24	0.007
HE-0557	06/24/85	109.75	1175.0	320.0	21.0	2563	12.92	0.05	0.06	0.004
HE-0557	02/25/86	110.20	1225.0	362.3	24.0	2558	11.17	0.05	0.05	0.004
HE-0557	02/23/87	113.70	1157.5	456.9	36.4	2589	12.99	0.05	0.14	0.004
RTA-005	06/20/85	14.92	37.9	11.0	23.9	445	0.79	0.05	0.04	0.004
RTA-005	01/09/86	14.95	61.4	18.6	21.7	452	0.44	0.67	0.05	0.004
RTA-005	02/23/87	14.96	62.0	3.8	34.4	460	0.66	0.05	0.20	0.004
	MINIMUM	13.84	35.6	3.8	20.6	390	0.44	0.05	0.04	0.004
	MAXIMUM	113.70	1225.0	456.9	43.0	2589	12.99	0.85	0.42	0.007
	AVERAGE	44.81	365.4	111.5	29.5	1016	3.72	0.19	0.12	0.005

APPENDIX 6-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
HENDRY COUNTY

INTERMEDIATE AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
HE-0529	06/20/85	0.004	0.10	1.20	0.30	2.55	0.46	0.30	30
HE-0529	01/09/86	0.006	0.41	0.70	4.19	37.55	1.82	51.30	38
HE-0529	02/23/87	0.004	0.43	1.00	0.40	0.80	1.38	0.80	20
HE-0556	06/20/85	0.004	0.57	1.20	0.49	1.00	0.30	15.40	30
HE-0556	02/25/86	0.005	1.18	0.60	5.74	52.50	3.31	30.00	117
HE-0556	02/23/87	0.012	0.93	1.00	0.40	4.59	6.43	70.68	37
HE-0557	06/24/85	0.004	1.20	1.50	0.95	1.51	4.05	1.40	24
HE-0557	02/25/86	0.004	1.16	0.60	0.30	0.50	12.85	0.60	45
HE-0557	02/23/87	0.004	0.99	1.00	0.40	1.69	5.55	0.80	20
RTA-005	06/20/85	0.004	0.10	1.20	0.30	17.30	1.07	5.10	30
RTA-005	01/09/86	0.004	0.28	2.08	0.30	7.67	0.76	1.55	20
RTA-005	02/23/87	0.004	0.33	1.00	0.40	0.80	1.00	0.80	20
	MINIMUM	0.004	0.10	0.60	0.30	0.50	0.30	0.30	20
	MAXIMUM	0.012	1.20	2.08	5.74	52.50	12.85	70.68	117
	AVERAGE	0.005	0.64	1.09	1.18	10.71	3.25	14.89	36

APPENDIX 7-1, HIGHLANDS COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	HIGHLAND CASING DIAMETER (IN.)	COUNTY CASING MATERIAL
HC-0002	272341	812449	34-35S-29E	92	82		82	92	2.00	P
HI-0004	271750	812505	33-36S-29E	13		P		13	2.00	P
HI-0014A	271226	811943	04-38S-30E	35	28	G	28	35	6.00	
HI-0440A	271559	812425	21-37S-29E	23	13	S	13	23	6.00	S
HIF-0001	271335	810520	26-37S-32E	640		X		640	6.00	S
HIF-0006	271454	810741	21-37S-32E	520	310	X	310	520	4.00	S
HIF-0013	272512	811229	22-35S-31E			X			6.00	S
HIF-0014	271726	811639	01-37S-30E	1500		X		1500	8.00	S
HIF-0037	271330	811134	33-37S-31E	1450	619	X	619	1450	12.00	S
MR-0157	273751	811558	07-33S-31E	21				21	6.00	L
MR-0158	272713	812045	08-35S-30E	10	10	X	10	10	3.00	M

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 7-1, HIGHLANDS COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
HC-0002	SF		92.00	95.00	Z	N	U	U	U	Y
HI-0004	SF	B	76.00	78.00	N	N	U	U	U	Y
HI-0014A	SF	H	136.01	139.31	N	N	U	U	U	Y
HI-0440A	SF	H	117.86	115.56	N	N	U	U	U	Y
HIF-0001	FA		33.00	39.77	U	F	N	N	Y	Y
HIF-0006	FA		25.00	29.08	U	G	Y	N	Y	Y
HIF-0013	FA		52.78	53.78	T	K	N	N	N	Y
HIF-0014	FA		36.00	36.81	T	F	N	N	N	Y
HIF-0037	FA		30.00	31.10		F	N	N	N	Y
MR-0157	SF	J	130.00	132.75	N	N	N	N	N	Y
MR-0158	SF	J	60.00	62.00	N	N	N	N	N	Y

WELL FINISH

(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL

(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 7-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
HIGHLANDS COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
HC-0002	01/06/86	24.1	6.4	259	43.0	0.12	0.038	15.8	1.94	22.1
HI-0004	07/29/85	22.6	4.6	50	10.0	0.13	0.004	4.3	0.32	1.8
HI-0014A	07/29/85	23.8	6.3	80	14.6	0.02	0.008	3.6	0.54	9.8
HI-0014A	04/22/86	25.7	6.4	170		0.01	0.018	2.2	1.12	27.5
HI-0014A	05/13/87	26.0	6.6	138	39.7	0.01	0.018	3.2	1.43	22.2
HI-0440A	07/29/85	24.8	6.2	110	5.8	0.16	0.020	4.6	0.99	1.8
HI-0440A	04/23/86	23.9	6.1	137	8.9	0.20	0.007	4.2	1.47	2.2
HI-0440A	05/13/87	25.2	5.8	86	5.0	0.19	0.025	3.0	1.38	1.7
MR-0157	07/11/85	22.1	6.4	133	9.9	4.61	0.015	8.5	2.78	1.8
MR-0157	04/23/86	22.8	6.3	129	10.2	0.55	0.004	4.5	0.60	2.2
MR-0157	05/13/87	25.5	5.8	110	5.0	0.57	0.019	4.0	0.41	1.7
MR-0158	07/30/85	24.1	5.4	60	14.0	0.10	0.018	3.6	0.23	5.2
MR-0158	04/23/86	22.5	5.6	65	9.6	0.09	0.011	3.4	0.09	6.6
MR-0158	05/13/87	24.4	5.1	57	5.0	0.10	0.004	6.4	0.16	6.6
	MINIMUM	22.1	4.6	50	5.0	0.01	0.004	2.2	0.09	1.7
	MAXIMUM	26.0	6.6	259	43.0	4.61	0.038	15.8	2.78	27.5
	AVERAGE	24.1	5.9	113	13.9	0.49	0.015	5.1	0.96	8.1

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
HIF-0001	09/18/84	24.4		945	94.8			67.3	3.75	59.6
HIF-0001	04/22/86	25.4	7.5	912	77.7	0.18	0.005	74.1	4.00	54.5
HIF-0001	05/12/87				93.3	0.19	0.004	91.4	3.98	52.6
HIF-0006	09/18/84	25.1	7.2	671	140.0			49.3	4.02	43.4
HIF-0006	04/22/86	24.3	7.5	646	117.2	0.31	0.004	52.7	4.19	42.3
HIF-0006	05/12/87	25.2	7.0	662	133.7	0.33	0.004	57.1	5.02	44.7
HIF-0013	09/18/84	26.4	6.7	815	118.0			40.3	1.93	62.6
HIF-0013	04/23/86	26.9	7.4	767	105.1	0.28	0.007	42.1	2.25	59.5
HIF-0013	05/13/87	27.0	7.5	768	120.5	0.30	0.006	41.6	2.47	59.6
HIF-0014	09/17/84	24.4		295	66.9			55.7	2.05	35.4
HIF-0014	04/23/86	25.1	7.8	312	55.1	0.18	0.006	13.1	1.12	25.7
HIF-0014	05/13/87	26.1	7.9	314	65.7	0.19	0.009		1.23	
HIF-0037	09/18/84	28.0	6.9	581	82.6			30.9	1.86	41.7
HIF-0037	04/22/86	26.9	7.7	601	57.7	0.21	0.007	36.3	1.69	44.8
HIF-0037	05/13/87	27.2	7.9	547	76.7	0.18	0.004	31.8	1.78	42.1
	MINIMUM	24.3	6.7	295	55.1	0.18	0.004	13.1	1.12	25.7
	MAXIMUM	28.0	7.9	945	140.0	0.33	0.009	91.4	5.02	62.6
	AVERAGE	25.9	7.4	631	93.7	0.24	0.006	48.8	2.76	47.8

APPENDIX 7-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
HIGHLANDS COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
HC-0002	01/06/86	4.84	19.9	37.1	10.5	142	0.27			
HI-0004	07/29/85	0.32	5.8	4.6	4.0	42	0.40	0.05	0.26	0.012
HI-0014A	07/29/85	0.22	3.0	5.6	1.6	62	0.40	0.56	15.30	1.766
HI-0014A	04/22/86	0.63	3.1	5.8	1.8	105	0.14	0.54	16.40	1.046
HI-0014A	05/13/87	0.55	4.3	13.6	4.2	91	0.50	0.61	2.96	0.943
HI-0440A	07/29/85	0.29	15.2	20.2	6.5	90	0.40	19.00	29.00	0.004
HI-0440A	04/23/86	0.63	16.1	23.3	8.9	94		9.54	35.00	0.031
HI-0440A	05/13/87	0.38	6.1	5.0	9.0	73	0.50	14.72	21.15	0.030
MR-0157	07/11/85	0.66	4.5	10.6	4.6	66	0.09	8.00	63.38	0.016
MR-0157	04/23/86	0.63	6.2	5.4	6.5	80		19.58	46.50	0.004
MR-0157	05/13/87	0.47	6.3	5.0	5.6	80	0.50	21.64	32.94	
MR-0158	07/30/85	0.10	4.1	5.2	3.7	78	0.40	0.13	0.10	0.004
MR-0158	04/23/86	0.63	5.6	7.9	4.0	64	0.41	0.35	0.18	0.005
MR-0158	05/13/87	0.07	5.9	6.2	3.4	56	0.50	0.31	0.29	0.029
	MINIMUM	0.07	3.0	4.6	1.6	42	0.09	0.05	0.10	0.004
	MAXIMUM	4.84	19.9	37.1	10.5	142	0.50	21.64	63.38	1.766
	AVERAGE	0.74	7.6	11.1	5.3	80	0.38	7.31	20.27	0.324

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
HIF-0001	09/18/84	30.70	115.0	110.5	15.5	598		0.03		
HIF-0001	04/22/86	30.26	126.0	184.5	13.2	574	15.55	0.05	0.05	0.004
HIF-0001	05/12/87	30.49	119.3	188.4	14.1	567	15.75	0.09	0.05	0.013
HIF-0006	09/18/84	23.00	68.0	107.4	25.6	432		0.01		
HIF-0006	04/22/86	22.75	72.1	74.9	26.1	418	11.75	0.07	0.06	0.004
HIF-0006	05/12/87	25.50	73.4	100.0	25.6	416	13.65	0.05	0.05	0.088
HIF-0013	09/18/84	30.60	85.1	87.0	19.1	518		0.01		
HIF-0013	04/23/86	32.18	91.5	117.7	17.4	493	18.90	0.06	0.05	0.004
HIF-0013	05/13/87	34.25	83.8	143.7	20.6	475	19.89	0.08	0.06	0.020
HIF-0014	09/17/84	16.30	32.4	31.9	10.8	186		0.01		
HIF-0014	04/23/86	10.25	27.9	36.2	9.7	178	8.96	0.25	0.11	0.004
HIF-0014	05/13/87		29.0	40.1	10.1	183	7.80	0.08	0.05	0.007
HIF-0037	09/18/84	20.30	52.8	106.3	12.6	360		0.01		
HIF-0037	04/22/86	20.95	71.0	100.5	10.6	384	14.89	0.09	0.07	0.010
HIF-0037	05/13/87	20.68	54.1	112.9	11.3	340	14.89	0.06	0.06	0.017
	MINIMUM	10.25	27.9	31.9	9.7	178	7.80	0.01	0.05	0.004
	MAXIMUM	34.25	126.0	188.4	26.1	598	19.89	0.25	0.11	0.088
	AVERAGE	24.87	73.4	102.8	16.2	408	14.20	0.06	0.06	0.017

APPENDIX 7-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
HIGHLANDS COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
HC-0002	01/06/86	0.192	0.10	1.71	0.42	0.40	122.40	0.40	26
HI-0004	07/29/85	0.005	0.10	0.80	1.11	13.90	3.21	10.77	177
HI-0014A	07/29/85	0.004	0.10	0.80	2.49	83.20	178.00	65.30	10
HI-0014A	04/22/86	0.004	0.10	0.90	1.44	16.82	90.50	19.49	673
HI-0014A	05/13/87	0.004	0.10	1.30	1.58	2.16	19.86	9.22	782
HI-0440A	07/29/85	0.022	0.28	0.80	0.48	3.20	274.35	12.69	27
HI-0440A	04/23/86	0.059	0.10	0.90	0.40	1.27	383.00	42.35	50
HI-0440A	05/13/87	0.013	0.10	1.30	2.30	2.06	289.40	4.02	60
MR-0157	07/11/85	0.080	0.33	0.80	0.20	59.60	219.00	673.00	120
MR-0157	04/23/86	0.008	0.10	0.90	0.48	24.70	268.20	710.00	30
MR-0157	05/13/87	0.066	0.10	1.30	0.40	12.60	228.00	294.25	53
MR-0158	07/30/85	0.004	0.10	0.80	3.40	11.40	2.13	58.60	32
MR-0158	04/23/86	0.004	0.10	0.90	5.45	54.75	3.86	63.25	30
MR-0158	05/13/87	0.004	0.10	1.30	11.18	27.60	4.00	0.70	109
	MINIMUM	0.004	0.10	0.80	0.20	0.40	2.13	0.40	10
	MAXIMUM	0.192	0.33	1.71	11.18	83.20	383.00	710.00	782
	AVERAGE	0.034	0.13	1.04	2.24	22.40	148.99	140.29	156

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
HIF-0001	09/18/84		0.35						
HIF-0001	04/22/86	0.004	0.64	0.90	0.40	0.50	0.83	0.40	30
HIF-0001	05/12/87	0.004	0.69	1.27	0.78	0.60	0.74	0.70	20
HIF-0006	09/18/84		0.60						
HIF-0006	04/22/86	0.004	0.62	0.90	1.14	0.50	1.28	0.40	30
HIF-0006	05/12/87	0.004	0.64	1.10	0.40	0.60	0.40	0.70	20
HIF-0013	09/18/84		0.27						
HIF-0013	04/23/86	0.004	0.33	0.90	0.40	0.50	6.00	0.40	30
HIF-0013	05/13/87	0.004	0.39	1.65	2.77	0.60	1.45	0.70	24
HIF-0014	09/17/84		0.20						
HIF-0014	04/23/86	0.004	0.17	0.90	0.40	0.50	3.50	0.40	30
HIF-0014	05/13/87	0.004	0.23	0.78	1.05	0.81	0.94	0.70	26
HIF-0037	09/18/84		0.26						
HIF-0037	04/22/86	0.004	0.38	0.90	1.15	1.08	2.23	0.40	30
HIF-0037	05/13/87	0.004	0.36	1.30	0.44	0.77	1.67	0.70	20
	MINIMUM	0.004	0.17	0.78	0.40	0.50	0.40	0.40	20
	MAXIMUM	0.004	0.69	1.65	2.77	1.08	6.00	0.70	30
	AVERAGE	0.004	0.41	1.06	0.89	0.65	1.90	0.55	26

APPENDIX 8-1, LEE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
L-00588	262539	820455	35-45S-22E	557	403	X	403	557	4.00	L
L-00652A	264101	814430	05-44S-26E	598	188	X	188	598	6.65	L
L-00741	262552	814857	33-46S-25E	119	102	X	102	119	4.00	G
L-01137	263950	813554	11-44S-27E	20	15	S	15	20	4.00	P
L-01403	262549	820353	25-46S-22E	11	2	S	2	11	4.00	
L-01963	263344	813617	22-45S-27E	74	65	S	65	74	4.00	P
L-01964	263344	813617	15-45S-27E	24	14	X	14	24	4.00	P
L-01968	263807	814303	21-44S-26E	165	70	X	70	165	4.00	P
L-01977	264320	813657	21-43S-27E	185	65	X	65	185	4.00	P
L-01978	264320	813657	21-43S-27E	17	7	S	7	17	4.00	
L-01999	263041	814331	33-45S-26E	26	16	X	16	26	4.00	P
L-02187	263950	813554	11-44S-27E	154	136	S	136	154	4.00	P
L-02190	264144	815203	36-42S-24E	109	71	S	71	109	4.00	P
L-02191	264144	815203	36-43S-24E	25	15	S	15	20	4.00	P
L-02192	262659	813825	29-46S-27E	180	155	S	155	180	4.00	P
L-02200	264329	813404	24-43S-27E	163	122		122	163	4.00	P
L-02202	264329	813404	24-43S-27E	19	7		7	19	4.00	P
L-02295	262552	814857	33-46S-25E	610	300	X	300	610	4.00	P
L-02308	262552	814857	33-46S-25E	13	12	X	12	13	4.00	P
L-02311	263340	813617	15-45S-27E	625	300	X	300	625	4.00	P
L-02319	262713	814144	22-46S-26E	750	492	X	492	750	4.00	P
L-02435	263407	815559	08-45S-24E	704	352	X	352	704	4.00	P
L-02525	263117	820510	26-45S-22E	645	405	X	405	645	4.00	P
L-02527	263955	820831	06-44S-22E	605	360	X	360	605	4.00	P
L-02528	263907	815927	11-44S-23E	625	420	X	420	625	4.00	P
L-02531	264427	813626	10-43S-27E	605	345	X	345	605	4.00	P
L-02549	263955	820831	06-44S-22E	80	58	X	58	80	4.00	P
L-02646	264537	815522	04-43S-24E	220	170	X	170	220	4.00	P
L-02820	263955	820831	06-44S-22E	250	192	X	192	250	4.00	P
L-02821	263117	820510	26-45S-22E	340	290	X	290	340	4.00	P
L-05649	262934	814727	03-46S-25E	135	118	S	118	135	4.00	

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 8-1, LEE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
L-00588	FA	H	3.00	4.30	N	F	U	U	U	Y
L-00652A	FA	H	11.00	13.00	N	F	U	U	U	Y
L-00741	SF	H	13.00	18.15	N	N	Y	U	U	Y
L-01137	SF	H	21.72	74.13	N	N	U	U	U	Y
L-01403	SF	H	6.08	8.50	N	N	U	U	U	Y
L-01963	IA	H	30.00	33.41	N	N	Y	Y	Y	Y
L-01964	SF	H	30.00	33.39	N	N	U	U	U	Y
L-01968	IA	H	23.93	25.92	N	N	U	U	U	Y
L-01977	IA	H	17.39	19.89	N	N	Y	U	U	Y
L-01978	SF	H	14.00	19.90	N	N	U	U	U	Y
L-01999	SF	H	26.43	29.93	N	N	U	U	U	Y
L-02187	IA	H	21.90	24.50	N	N	Y	U	U	Y
L-02190	IA	H	13.87	15.96	N	N	Y	U	U	Y
L-02191	SF	H	11.00	15.70	N	N	Y	U	U	Y
L-02192	IA.	H	27.26	5.00	N	N	Y	U	U	Y
L-02200	IA	H	17.40	20.00	N	N	U	U	U	Y
L-02202	SF	H	17.43	20.03	N	N	U	U	U	Y
L-02295	FA	H	15.71	18.01	B	N	U	Y	U	Y
L-02308	SF	H	15.49	17.99	N	N	U	Y	U	Y
L-02311	FA	H	30.00	33.00	N	F	Y	Y	Y	Y
L-02319	FA	H	20.00	22.40	N	F	Y	Y	U	Y
L-02435	FA	H	5.00	6.00	N	F	Y	Y	U	Y
L-02525	FA	H	6.00	8.30	N	F	Y	Y	U	Y
L-02527	FA	H	6.00	10.74	N	F	U	U	U	Y
L-02528	FA	H	11.42	14.19	N	F	Y	Y	U	Y
L-02531	FA	H	20.00	21.00	N	F	U	Y	U	Y
L-02549	SF	H	6.00	8.70	N	N	U	U	U	Y
L-02646	IA	H	21.00	23.60	N	N	U	Y	U	Y
L-02820	IA	H	6.00	10.56	N	F	U	U	U	Y
L-02821	IA	H	6.00	8.60	N	F	U	U	U	Y
L-05649	SF	H	19.00	21.50	N	N	N	N	N	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
L-00741	06/04/85	23.2	7.6	816	134.0	0.23	0.004	46.8	9.00	54.0
L-00741	01/08/86	24.7	7.0	768	161.5	0.23	0.004	36.0	9.33	54.5
L-00741	01/07/87	25.0	7.8	707	139.7	0.20	0.006	31.4	8.52	49.8
L-01137	06/17/85	22.8	7.2	550	236.0	0.27	0.004	93.0	0.49	10.0
L-01137	01/09/86	23.9	6.5	550	249.0	0.25	0.004	7.5	0.47	90.9
L-01137	01/08/87	24.9	7.2	530	241.8	0.29	0.010	8.1	0.49	91.4
L-01403	06/18/85	25.0	7.2	2865	328.5	0.37	0.021	404.0	10.64	175.0
L-01403	01/08/86	25.3	6.7	2100	309.0	0.31	0.004	283.5	8.22	121.6
L-01403	01/06/87	24.9	7.3	2700	299.7	0.57	0.019	129.8	4.02	109.4
L-01964	06/04/85	23.6	7.0	557	272.5	0.51	0.139	23.7	0.79	83.0
L-01964	01/09/86	23.9		580	292.5	0.27	0.044	16.7	1.02	91.1
L-01964	01/08/87	24.4	7.0	550	300.2	0.44	0.080	14.4	1.03	91.6
L-01978	06/03/85	23.9	6.6	508	212.0	0.33	0.012	15.3	0.46	89.0
L-01978	01/06/86	23.6		504	216.5	0.27	0.010	21.0	0.55	79.5
L-01978	01/05/87	24.9	6.8	494	231.1	0.27	0.020	11.3	0.44	86.2
L-01999	06/18/85	24.9	6.9	675	324.5	0.48	0.011	27.0	0.99	118.6
L-01999	01/08/86	24.6		742	348.5	0.19	0.004	20.3	0.87	123.2
L-01999	01/07/87	24.5	7.1		244.1	0.04	0.009	14.3	1.28	106.7
L-02191	05/15/85	24.8		642	258.5	0.26	2.740	11.5	4.56	125.0
L-02191	01/07/86	25.9		543	265.5	0.47	1.664	14.0	4.98	101.2
L-02191	01/05/87	26.4	6.8	316	237.8	0.34	0.050		3.61	117.0
L-02202	06/24/85	25.1		683	282.5	0.24	0.025	22.0	1.67	107.3
L-02202	01/05/87	24.5	7.5	727	272.4	0.29	0.054	26.8	1.60	108.6
L-02308	06/04/85	21.6	7.0	497	219.0	0.26	0.012	21.3	0.29	86.0
L-02308	01/08/86	22.9		520	268.3	0.24	0.014	9.4	0.23	91.9
L-02308	01/07/87	23.7	6.9	520	239.7	0.25	0.009	8.0	0.40	96.2
L-02549	05/15/85	23.9		853	270.5	0.18	0.004	35.8	1.48	127.0
L-02549	01/07/86	25.0		822	310.5	0.13	0.004	38.5	1.58	123.0
L-02549	01/06/87	24.3	7.1	872	332.8	0.29	0.017	33.9	1.66	126.4
L-05649	06/18/85	23.7	7.4	1210	162.0	0.92	0.008	80.0	6.86	101.9
L-05649	01/08/86	25.7	6.9	1194	208.0	0.55	0.004	74.9	5.03	104.5
L-05649	01/07/87	25.6	7.4	1142	206.8	0.97	0.017	70.3	5.18	108.4
	MINIMUM	21.6	6.5	316	134.0	0.04	0.004	7.5	0.23	10.0
	MAXIMUM	26.4	7.8	2865	348.5	0.97	2.740	404.0	10.64	175.0
	AVERAGE	24.4	7.1	862	252.4	0.34	0.157		3.05	98.4

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
L-00741	06/04/85	39.96	180.0	6.1	45.8	580	1.19	0.05	0.80	0.009
L-00741	01/08/86	35.48	156.0	14.9	52.4	472	0.86	0.14	0.19	0.004
L-00741	01/07/87	30.92	185.6	4.7	73.9	441	1.28	0.06	4.31	0.004
L-01137	06/17/85	9.99	6.0	30.0	6.0	340	0.45	0.33	5.38	0.008
L-01137	01/09/86	9.17	7.8	26.9	6.4	310	0.43	1.00	2.02	0.023
L-01137	01/08/87	9.29	35.1	29.5	9.4	408	0.39	0.81	1.36	0.004
L-01403	06/18/85	47.85	765.0	82.0	13.4	1781	1.45	0.05	0.17	0.006
L-01403	01/08/86	32.86	650.0	68.4	10.1	1259	1.28	0.05	0.08	0.022
L-01403	01/06/87	15.46	240.0	29.1	13.5	715	1.03	0.28	0.52	0.014
L-01964	06/04/85	11.39	17.1	8.3	5.6	364	0.32	1.21	1.72	0.005
L-01964	01/09/86	10.35	13.8	26.6	6.3	358	0.27	0.99	2.19	0.007
L-01964	01/08/87	10.46	57.0	12.4	11.2	391	0.28	1.50	2.04	0.004
L-01978	06/03/85	4.62	22.4	7.6	5.7	333	0.36	0.71	2.96	0.038
L-01978	01/06/86	6.44	29.9	20.9	4.6	333	0.35			
L-01978	01/05/87	4.52	13.7	16.0	8.5	335	0.10	0.15	1.62	0.004
L-01999	06/18/85	5.11	29.2	8.0	8.7	427	0.49	0.98	0.25	0.052
L-01999	01/08/86	6.26	16.1	23.3	10.5	430	0.72	0.05	0.28	0.169
L-01999	01/07/87	4.91	14.7	12.9	14.0	372	0.62	0.29	3.44	0.243
L-02191	05/15/85	2.82	25.5	15.3	6.1	401	0.49	0.14	2.28	0.004
L-02191	01/07/86	2.21	26.0	12.3	5.8	350	0.44			0.010
L-02191	01/05/87	37.68		86.1	37.3		1.22	0.12	0.68	0.004
L-02202	06/24/85	12.02	39.1	12.0	6.6	459	1.70	0.90	4.96	0.004
L-02202	01/05/87	11.33	78.9	11.7	19.8	470	1.16	1.27	4.02	0.004
L-02308	06/04/85	3.69	16.8	7.7	6.1	319	0.45	1.54	0.93	0.055
L-02308	01/08/86	3.27	11.0	19.6	5.8	301	0.36	1.91		0.013
L-02308	01/07/87	3.19	64.5	5.7	11.9	361	0.36	0.84	22.62	0.004
L-02549	05/15/85	10.57	94.3	4.4	8.3	541	1.11	0.05	0.13	0.011
L-02549	01/07/86	11.11	103.0	15.7	9.9	533	1.21		0.14	0.004
L-02549	01/06/87	11.15	112.1	4.5	17.6	538	0.90	0.07	0.37	0.011
L-05649	06/18/85	32.52	217.0	5.0	19.0	874	1.97	0.05	0.21	0.010
L-05649	01/08/86	25.51	226.0	20.7	16.5	699	1.32	0.37	0.47	0.004
L-05649	01/07/87	25.26	248.7	10.6	30.2	707	1.42	0.05	0.21	0.004
	MINIMUM	2.21	6.0	4.4	4.6	301	0.10	0.05	0.08	0.004
	MAXIMUM	47.85	765.0	86.1	73.9	1781	1.97	1.91	22.62	0.243
	AVERAGE	15.23		20.6	15.8		0.81	0.55	2.29	0.024

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
L-00741	06/04/85	0.004	1.70	4.60	19.30	3.30	39.85	2.51	30
L-00741	01/08/86	0.004	0.28	3.29	23.90	5.04	42.60	7.54	31
L-00741	01/07/87	0.004	0.70	1.70	4.53	1.23	14.79	4.02	20
L-01137	06/17/85	0.004		1.81	0.33	5.35	56.10	21.30	30
L-01137	01/09/86	0.006	0.40	2.67	1.00	7.88	58.15	99.10	41
L-01137	01/08/87	0.007	0.28	1.70	0.90	2.69	39.17	21.88	20
L-01403	06/18/85	0.004	0.10	1.20	0.30	9.20	3.28	1.30	7290
L-01403	01/08/86	0.009	0.36	0.70	1.04	3.70	3.45	72.50	6620
L-01403	01/06/87	0.004	0.21	1.60	0.30	0.60	3.89	18.97	4262
L-01964	06/04/85	0.004	0.10	1.50	5.80	0.40	5.75	0.96	30
L-01964	01/09/86	0.011	0.46	0.90	5.64	1.10	7.25	2.33	18
L-01964	01/08/87	0.007	0.25	1.70	5.08	0.30	3.89	0.50	20
L-01978	06/03/85	0.004	1.10	1.50	8.10	2.20	22.20	75.65	30
L-01978	01/06/86	0.007	0.36	1.08	4.37	0.61	13.19	20.42	15
L-01978	01/05/87	0.004	0.30	1.60	0.95	0.60	11.21	4.57	20
L-01999	06/18/85	0.004	0.10	3.69	0.70	1.00	14.10	0.80	30
L-01999	01/08/86	0.004	0.38	9.22	5.39	3.03	21.15	8.70	22
L-01999	01/07/87	0.010	0.29	5.43	2.05	2.34	11.53	4.38	20
L-02191	05/15/85	0.004	0.90	0.90	4.10	2.00	29.32	2.80	33
L-02191	01/07/86	0.005	1.03	0.79	4.70	0.80	38.80	7.39	40
L-02191	01/05/87	0.004	0.58	1.60	6.22	6.29	20.05	0.83	20
L-02202	06/24/85	0.033	0.10	1.50	7.66	1.62	7.86	3.40	20
L-02202	01/05/87	0.007	0.46	1.60	2.50	1.25	6.94	2.56	20
L-02308	06/04/85	0.004	0.20	1.50	2.00	0.40	13.27	1.07	30
L-02308	01/08/86	0.004	0.14	1.91	6.65	1.49	31.20	1.89	26
L-02308	01/07/87	0.004	0.10	13.51	29.32	11.66	27.58	15.66	20
L-02549	05/15/85	0.009	0.10	1.50	4.50	1.20	3.31	1.62	30
L-02549	01/07/86	0.004	0.13	0.70	2.39	1.98	8.32	8.09	21
L-02549	01/06/87	0.004	0.23	1.60	0.40	0.60	4.02	5.34	20
L-05649	06/18/85	0.004	0.92	1.20	1.51	1.50	6.20	23.90	30
L-05649	01/08/86	0.010	0.69	0.70	0.92	0.93	11.00	152.90	31
L-05649	01/07/87	0.004	0.55	1.60	0.30	1.64	8.30	69.95	20
	MINIMUM	0.004	0.10	0.70	0.30	0.30	3.28	0.50	15
	MAXIMUM	0.033	1.70	13.51	29.32	11.66	58.15	152.90	7290
	AVERAGE	0.006	0.44	2.39	5.09	2.62	18.37	20.78	591

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

INTERMEDIATE AQUIFER SYSTEM
SANDSTONE AQUIFER

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
L-01963	01/09/86	24.5	6.7	1182	284.5	0.31	0.009	108.6	4.05	93.5
L-01963	01/08/87	24.8	7.2	1155	310.2	0.47	0.022	107.2	4.23	95.2
L-01968	06/04/85	25.1	7.4	767	271.5	0.30	0.057	51.1	2.50	80.0
L-01968	01/09/86	24.1	6.6	788	301.0	0.33	0.004	44.9	2.59	89.0
L-01968	01/08/87	24.5	7.3	783		0.40	0.004	44.0	2.51	88.4
L-01977	06/03/85	23.8	6.6	3654	117.0	0.51	0.004	518.5	18.00	126.0
L-01977	01/06/86	23.9	6.8	379	132.4	0.59	0.004	465.0	14.40	139.5
L-01977	01/05/87	23.4	7.7	1991	128.9	0.54	0.004	606.0	21.30	136.3
L-02187	06/17/85	24.2	7.6	1612	210.0	0.24	0.005	184.0	9.71	99.8
L-02187	01/09/86	25.0	6.7	1554	239.8	0.28	0.004	183.0	8.90	96.2
L-02187	01/08/87	25.6	7.3		226.8	0.40	0.013	201.0	10.55	98.8
L-02190	05/15/85	24.5		1441	216.0	0.01	0.007	133.2	3.66	127.0
L-02190	01/07/86	25.2	6.5	1555	245.0	0.01	0.004	135.1	3.64	116.9
L-02190	01/05/87	25.1	7.3		230.2	0.50	2.282		5.29	96.8
L-02192	06/04/85	24.3	7.5	662	253.5	0.45	0.425	92.3	7.31	45.0
L-02192	01/08/86	25.6	6.8	852	299.5	0.32	0.411	94.1	8.33	47.4
L-02192	01/07/87	26.1	7.2	824	322.9	0.53	0.381	89.6	8.20	49.4
L-02200	06/24/85	24.7		3148	124.0	0.42	0.200	425.0	14.50	127.6
L-02200	01/06/86	25.2	6.5	3220	136.9	0.21	0.094	407.5	13.15	128.5
L-02200	01/05/87	24.6	7.4	3360	123.4	0.45	0.220	403.0	13.86	119.9
	MINIMUM	23.4	6.5	379	117.0	0.01	0.004		2.50	45.0
	MAXIMUM	26.1	7.7	3654	322.9	0.59	2.282	606.0	21.30	139.5
	AVERAGE	24.7	7.1	1607	219.7	0.3635	0.208		8.83	100.1

MID-HAWTHORN AQUIFER

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
L-02646	06/03/85	25.5	7.6	630	178.0	0.18	0.004	42.0	8.61	36.0
L-02646	01/07/86	26.0	6.8	661	213.1	0.20	0.005	36.7	9.34	37.0
L-02646	01/06/87	25.9	7.5	663	184.9	0.18	0.004	37.1	9.41	37.5
L-02820	05/15/85	24.6		2980	137.0	0.60	0.004	369.0	20.60	99.0
L-02820	01/07/86	25.3	7.1	2990	160.8	0.63	0.004	342.0	20.05	100.4
L-02820	01/06/87	25.0	7.4	2500	138.0	0.59	0.004	397.0	25.40	99.2
L-02821	05/15/85	24.9		2328	157.0	0.24	0.004	306.0	19.00	73.0
L-02821	01/07/86	25.5	7.0	2290	178.8	0.26	0.004	287.5	17.80	65.3
L-02821	01/06/87	25.3	7.5	2550	158.7	0.25	0.004	329.5	20.90	72.7
	MINIMUM	24.6	6.8	630	137.0	0.2	0.004	36.7	8.61	36.0
	MAXIMUM	26.0	7.6	2990	213.1	0.6	0.005	397.0	25.40	100.4
	AVERAGE	25.3	7.3	1955	167.4	0.3	0.004	238.5	16.79	68.9

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

INTERMEDIATE AQUIFER SYSTEM
SANDSTONE AQUIFER

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
L-01963	01/09/86	27.55	178.0	65.5	18.4	652	2.42			
L-01963	01/08/87	27.71	199.8	65.0	30.4	710	0.20	0.14	0.27	0.004
L-01968	06/04/85	20.73	70.1	14.4	20.0	454	0.68	0.05	0.31	0.011
L-01968	01/09/86	19.69	65.3	24.2	22.1	449	0.54	0.05	0.07	
L-01968	01/08/87	19.37	98.1	18.7	37.9	507	0.51	0.05	0.11	0.004
L-01977	06/03/85	92.90	1020.0	226.5	18.0	2208	18.87	0.05	0.05	0.004
L-01977	01/06/86	86.65	1025.0	324.7	20.3	2060	17.98	0.05		0.004
L-01977	01/05/87	107.00	978.4	311.6	33.3	2115	19.00	0.05	0.12	0.004
L-02187	06/17/85	42.95	334.5	120.0	22.2	1035	2.16		0.10	0.004
L-02187	01/09/86	41.25	337.5	188.6	19.4	948	2.14	0.05	0.14	0.004
L-02187	01/08/87	43.25	372.5	156.6	34.4	1059	2.15	0.05	0.22	0.004
L-02190	05/15/85	37.75	296.0	85.4	19.3	871	1.40	0.05	0.22	0.004
L-02190	01/07/86	39.24	303.0	60.3	21.8	865	1.40	0.05		0.187
L-02190	01/05/87	2.21		16.0	10.4		0.22	1.02	2.81	0.031
L-02192	06/04/85	23.13	72.3	30.0	41.3	503	0.69	0.05	0.79	0.006
L-02192	01/08/86	22.66	80.4	28.8	45.6	510	0.53	0.05	0.19	0.027
L-02192	01/07/87	21.98	98.3	25.5	69.6	538	0.56	0.05	0.54	0.034
L-02200	06/24/85	85.45	855.0	236.0	20.0	1937	16.14	0.05	0.05	0.004
L-02200	01/06/86	80.40	880.0	394.2	23.8	1846	13.21	0.05	0.05	0.004
L-02200	01/05/87	77.30	837.2	313.6	38.8	1892	14.89	0.05	0.05	0.011
	MINIMUM	2.21		14.4	10.4		0.20	0.05	0.05	0.004
	MAXIMUM	107.00	1025.0	394.2	69.6	2208	19.00	1.02	2.81	0.187
	AVERAGE	45.96		135.3	28.3		5.78	0.11	0.36	0.020

MID-HAWTHORN AQUIFER

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
L-02646	06/03/85	31.89	79.1	15.4	25.6	380	2.97	0.05	0.05	0.004
L-02646	01/07/86	32.19	79.8	13.9	27.9	370	2.86	0.05		0.004
L-02646	01/06/87	31.96	88.7	12.3	46.7	370	2.76	0.05	0.09	0.004
L-02820	05/15/85	92.10	825.0	61.1	12.0	1640	9.64	0.05	0.05	0.004
L-02820	01/07/86	75.20	875.0	35.1	13.4	1513	10.56	0.05	0.05	0.004
L-02820	01/06/87	91.80	741.5	38.8	24.3	1490	10.14	0.05	0.05	0.005
L-02821	05/15/85	88.45	580.0	183.8	19.5	1383	8.55	0.05	0.05	0.004
L-02821	01/07/86	73.75	610.0	242.2	20.5	1347	8.05	0.05	0.05	0.004
L-02821	01/06/87	81.95	559.5	212.7	32.5	1427	9.98	0.05	0.10	0.004
	MINIMUM	31.89	79.1	12.3	12.0	370	2.76	0.05	0.05	0.004
	MAXIMUM	92.10	875.0	242.2	46.7	1640	10.56	0.05	0.10	0.005
	AVERAGE	66.59	493.2	90.6	24.7	1102	7.28	0.05	0.06	0.004

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

INTERMEDIATE AQUIFER SYSTEM
SANDSTONE AQUIFER

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
L-01963	01/09/86	0.012	0.81	0.70	3.29	0.20	24.45	5.40	18
L-01963	01/08/87	0.004	0.57	1.70	1.80	2.17	14.46	2.24	20
L-01968	06/04/85	0.004	0.10	1.50	0.30	0.50	1.65	5.76	30
L-01968	01/09/86	0.011	0.73	0.70	0.54	0.30	4.25	22.23	120
L-01968	01/08/87	0.004	0.51	1.70	0.90	0.44	1.26	6.05	33
L-01977	06/03/85	0.004	1.80	1.50	0.80	0.90	42.80	3.09	30
L-01977	01/06/86	0.004	1.04	0.70	1.72	1.93	60.30	3.78	25
L-01977	01/05/87	0.004	0.88	1.60	0.30	0.60	28.70	0.30	20
L-02187	06/17/85	0.004	0.28	1.21	0.62	1.00	0.43	0.30	30
L-02187	01/09/86	0.005	0.97	0.70	1.19	2.18	2.77	5.75	11
L-02187	01/08/87	0.004	0.77	1.70	0.90	0.45	1.30	2.14	20
L-02190	05/15/85	0.005	0.40	1.50	1.50	0.10	32.98	0.60	30
L-02190	01/07/86	0.004	0.66	0.70	2.15	0.80	37.70	9.83	15
L-02190	01/05/87	0.004	0.84	1.60	4.04	0.76	26.28	4.21	20
L-02192	06/04/85	0.004	0.10	1.50	0.60	3.10	5.45	6.80	54
L-02192	01/08/86	0.005	0.75	0.70	0.67	21.82	8.29	16.19	213
L-02192	01/07/87	0.004	0.61	1.70	0.30	19.71	6.35	17.17	153
L-02200	06/24/85	0.006	0.79	1.50	1.72	1.56	8.62	1.30	730
L-02200	01/06/86	0.013	0.97	0.70	1.22	1.25	4.23	1.87	48
L-02200	01/05/87	0.004	0.71	1.60	0.30	0.66	2.65	0.38	20
	MINIMUM	0.004	0.10	0.70	0.30	0.10	0.43	0.30	11
	MAXIMUM	0.013	1.80	1.70	4.04	21.82	60.30	22.23	730
	AVERAGE	0.005	0.71	1.26	1.24	3.02	15.75	5.77	82

MID-HAWTHORN AQUIFER

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
L-02646	06/03/85	0.004	1.70	1.50	0.30	0.40	1.14	0.53	30
L-02646	01/07/86	0.004	1.34	0.70	0.65	0.40	4.76	4.34	53
L-02646	01/06/87	0.004	1.44	1.60	0.30	0.60	1.00	0.30	20
L-02820	05/15/85	0.004	1.30	1.50	1.20	1.00	2.46	0.60	545
L-02820	01/07/86	0.004	1.30	0.70	5.28	0.40	1.75	0.40	72
L-02820	01/06/87	0.004	1.29	1.60	0.30	0.74	0.71	0.30	20
L-02821	05/15/85	0.004	1.40	1.50	0.50	0.10	0.30	0.60	30
L-02821	01/07/86	0.004	1.31	0.70	1.02	0.40	0.30	0.40	15
L-02821	01/06/87	0.004	1.52	1.60	0.30	1.77	0.70	0.30	20
	MINIMUM	0.004	1.29	0.70	0.30	0.10	0.30	0.30	15
	MAXIMUM	0.004	1.70	1.60	5.28	1.77	4.76	4.34	545
	AVERAGE	0.004	1.40	1.27	1.09	0.65	1.46	0.86	89

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
L-00588	06/05/85	24.4	7.8	12204	149.0	0.21	0.004		99.00	203.0
L-00588	01/08/86	24.3	7.6	3420	179.9	0.11	0.004	469.0	27.10	74.9
L-00588	01/06/87	24.4	7.1	3780	158.1	0.15	0.004	608.0	43.15	73.3
L-00652A	06/17/85	28.8	7.5	2950	124.0	0.25	0.004	397.0	16.95	103.0
L-00652A	01/09/86	28.4	6.9	3130	145.0	0.27	0.004	388.5	15.30	96.7
L-00652A	01/08/87	28.3	7.6	3110	127.3	0.29	0.004	400.0	18.75	100.9
L-02295	06/04/85	26.0	7.6	2280	184.0	0.56	0.004	393.0	25.60	43.0
L-02295	01/08/86	26.8	6.9	2400	216.9	0.52	0.004	323.5	20.50	46.1
L-02295	01/07/87	27.1	7.8	2390	194.0	0.62	0.011	374.0	26.60	47.4
L-02311	01/09/86	27.2	6.9	4920	129.0	0.31	0.004	672.5	19.00	150.5
L-02311	01/08/87	27.9	7.4	4840	116.8	0.40	0.009	569.5	31.95	153.7
L-02319	06/04/85	27.5	7.8	2030	232.0	0.49	0.004		23.05	28.0
L-02319	01/08/86	27.9	7.1	2110	287.0	0.46	0.004	304.0	19.20	28.5
L-02435	06/03/85	27.0	7.4	10560	132.0	0.44	0.004	2040.0	63.20	204.0
L-02435	01/08/86	27.2	6.7	10970	158.3	0.49	0.004	1770.0	35.00	200.0
L-02435	01/06/87	27.3	7.6	10630	143.4	0.46	0.012	1840.0	64.50	194.0
L-02525	05/15/85	26.4		1908	150.0	0.17	0.004	218.5	18.00	70.0
L-02525	01/07/86	26.6	7.0	2020	177.1	0.22	0.004	217.0	16.35	67.6
L-02525	01/06/87	26.2	7.5	1630	155.3	0.20	0.004	248.0	22.45	70.3
L-02527	05/15/85	26.7		6005	122.0	0.41	0.004	899.0	28.35	189.0
L-02527	01/07/86	26.9		6110	140.5	0.42	0.004	880.0	16.50	185.0
L-02527	01/06/87	26.3	7.4	6380	133.5	0.41	0.018	961.0	34.45	201.5
L-02528	06/03/85	26.5	7.6	3401	143.0	0.38	0.013	485.5	23.25	94.0
L-02528	01/07/86	27.1	6.7	3510	169.8	0.39	0.004	435.0	21.25	93.7
L-02528	01/06/87	27.3	7.4	2440	148.0	0.40	0.004	490.0	24.15	103.9
L-02531	06/03/85	26.8	7.4	2890	102.0	0.34	0.004	446.5	19.75	92.0
L-02531	01/06/86	27.4	6.7	3050	119.1	0.36	0.006	405.5	16.15	93.9
L-02531	01/05/87	26.7	7.8	3150	106.7	0.35	0.004	461.5	21.35	94.4
	MINIMUM	24.3	6.7	1630	102.0	0.11	0.004	217.0	15.30	28.0
	MAXIMUM	28.8	7.8	12204	287.0	0.62	0.018	2040.0	99.00	204.0
	AVERAGE	26.8	7.3	4436	155.1	0.36	0.006	642.2	28.96	110.8

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
LEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
L-00588	06/05/85	264.20	3785.0	713.1	20.1	7425	15.11	0.12	0.39	0.004
L-00588	01/08/86	87.30	860.0	382.3	16.0	1942	7.86		0.05	0.004
L-00588	01/06/87	93.60	901.7	303.8	28.5	2197	7.38		0.10	0.043
L-00652A	06/17/85	82.50	715.0	368.0	11.1	1809	19.80	0.06	0.06	0.004
L-00652A	01/09/86	76.30	750.0	398.9	11.5	1813	19.43	0.05	0.18	0.004
L-00652A	01/08/87	79.50	694.5	373.3	20.3	1847	22.05	0.05	0.13	0.004
L-02295	06/04/85	67.70	454.0	304.2	18.5	1397	4.41	0.05	0.05	0.004
L-02295	01/08/86	62.95	488.4	371.6	18.6	1332	4.59	0.05	0.29	0.012
L-02295	01/07/87	70.90	495.5	306.8	31.2	1431	4.47		0.16	0.004
L-02311	01/09/86	126.50	1335.0	545.3	10.8	2828	21.55	0.05	0.05	0.004
L-02311	01/08/87	115.75	1179.6	610.6	22.2	2990	24.10	0.06	0.03	0.013
L-02319	06/04/85	59.65	379.5	200.7	11.5	1208	3.76	0.05	0.05	0.004
L-02319	01/08/86	56.05	412.5	261.3	11.2	1175	3.78	0.05	0.05	0.004
L-02435	06/03/85	244.20	3300.0	486.6	10.2	6118	28.84	0.11	0.05	0.004
L-02435	01/08/86	243.00	3550.0	711.4	10.2	6107	29.02		0.05	0.004
L-02435	01/06/87	244.40	3372.9	476.7	18.7	6080	32.60	0.05	0.05	0.029
L-02525	05/15/85	72.50	410.0	212.9	20.6	1093	7.40	0.05	0.05	0.006
L-02525	01/07/86	64.15	459.5	218.4	21.0	1120	9.30	0.05	0.07	0.004
L-02525	01/06/87	70.20	531.1	182.7	40.2	1171	8.87	0.05	0.06	0.004
L-02527	05/15/85	154.40	1785.0	265.2	11.2	3535	24.11		0.05	0.004
L-02527	01/07/86	157.00	1970.0	325.8	12.9	3680	26.19	0.05	0.20	0.004
L-02527	01/06/87	173.70	1849.2	310.0	22.6	3523	28.20	0.05	0.05	0.004
L-02528	06/03/85	106.75	915.0	216.9	12.1	1989	18.71	0.05	0.05	0.004
L-02528	01/07/86	103.75	940.0	511.1	11.9	1887	18.43	0.05	0.05	0.004
L-02528	01/06/87	112.55	887.3	235.0	20.6	1970	20.75	0.05	0.05	0.004
L-02531	06/03/85	84.65	725.0	385.9	10.6	1871	19.21	0.05	0.05	0.004
L-02531	01/06/86	80.20	755.0	446.6	9.7	1829	18.19	0.05	0.05	0.004
L-02531	01/05/87	90.80	732.8	405.3	17.1	1842	19.10	1.14	0.02	0.004
	MINIMUM	56.05	379.5	182.7	9.7	1093	3.76	0.05	0.02	0.004
	MAXIMUM	264.20	3785.0	713.1	40.2	7425	32.60	1.14	0.39	0.043
	AVERAGE	115.90	1236.9	376.1	17.2	2615	16.69	0.10	0.09	0.007

APPENDIX 8-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS

LEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
L-00588	06/05/85	0.008		1.20	2.00	1.70	22.60	0.70	30
L-00588	01/08/86	0.008	1.32	0.70	2.12	0.20	19.85	0.50	10
L-00588	01/06/87	0.004	1.46	1.60	0.30	0.60	22.47	0.30	20
L-00652A	06/17/85	0.004	1.98	1.56	0.30	1.00	0.30	0.30	73
L-00652A	01/09/86	0.008	1.16	0.70	2.30	0.20	1.21	0.50	11
L-00652A	01/08/87	0.004	1.12	1.70	1.31	6.62	3.98	1.77	59
L-02295	06/04/85	0.004		1.20	5.90	3.90	1.04	1.79	41
L-02295	01/08/86	0.004	1.36	0.70	4.29	0.43	0.70	2.13	12
L-02295	01/07/87	0.004	2.49	1.70	0.30	4.32	0.70	0.30	20
L-02311	01/09/86	0.016	1.25	0.70	0.42	0.20	3.65	0.50	18
L-02311	01/08/87	0.004	1.16	1.70	0.90	0.30	0.80	0.50	20
L-02319	06/04/85	0.004		1.50	0.30	1.40	0.30	1.54	30
L-02319	01/08/86	0.012	1.39	0.70	0.83	0.20	0.30	0.50	10
L-02435	06/03/85	0.006		1.50	0.30	0.40	1.95	0.40	30
L-02435	01/08/86	0.004	1.28	0.70	8.09	0.20	2.67	0.50	24
L-02435	01/06/87	0.004	1.40	1.60	0.30	0.60	0.70	0.49	54
L-02525	05/15/85	0.004		0.90	0.90	0.10	0.30	0.60	30
L-02525	01/07/86	0.004	1.36	0.70	0.35	4.97	0.97	1.38	19
L-02525	01/06/87	0.004	1.96	1.60	0.30	2.59	0.70	0.30	20
L-02527	05/15/85	0.004	1.30	1.50	0.80	0.10	1.24	0.60	30
L-02527	01/07/86	0.004	1.26	0.70	1.21	0.40	1.41	0.40	15
L-02527	01/06/87	0.004	1.26	1.60	0.30	0.60	0.70	0.30	20
L-02528	06/03/85	0.004		1.50	0.30	0.40	0.47	0.40	30
L-02528	01/07/86	0.004	1.31	0.70	2.87	2.95	1.31	2.17	22
L-02528	01/06/87	0.004	1.31	1.60	0.30	0.60	0.70	0.30	20
L-02531	06/03/85	0.004		1.50	0.30	0.40	0.95	0.40	30
L-02531	01/06/86	0.004	1.29	0.70	1.00	0.40	0.60	0.40	15
L-02531	01/05/87	0.004	1.37	1.60	0.30	0.60	0.70	0.30	20
	MINIMUM	0.004	1.12	0.70	0.30	0.10	0.30	0.30	10
	MAXIMUM	0.016	2.49	1.70	8.09	6.62	22.60	2.17	73
	AVERAGE	0.005	1.42	1.22	1.39	1.30	3.33	0.72	26

APPENDIX 9-1, MARTIN COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
M-01037	270942	802504	22-38S-39E	27	24	S	24	27	2.00	L
M-01046	265903	803408	19-40S-38E	15	15	S	15	15	2.00	G
M-01047	271441	801621	19-37S-41E	30	26	S	26	30	2.00	L
M-01081	270220	802220	31-39S-40E	24	24	S	24	24	2.00	S
M-01082	270622	801548	05-38S-41E	32	32			32	2.00	S
M-01093	270028	800643	12-40S-42E	90	70	S	70	90	4.00	P
MF-00031	270847	801038	19-38S-41E	1091	844	X	844	1091	6.00	P
MF-00033	270742	803528	36-39S-37E	1200	420	X	420	1200	8.00	S
MS-0012	271218	803414	06-38S-38E	180	140	S	140	180	2.00	P
MS-0022	270454	802858	13-39S-38E	160	40	S	40	160	2.00	P

WELL STATUS

- (D) FLOWING-ABANDONED-OPERABLE VALVE
- (E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
- (F) FLOWING-ACTIVE-OPERABLE VALVE
- (G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
- (H) NON FLOWING-ABANDONED
- (K) NON FLOWING-ACTIVE-PUMPED
- (N) NON FLOWING-ACTIVE-NO PUMP
- (P) PLUGGED
- (X) DESTROYED

CONSTRUCTION METHOD

- (A) AIR ROTARY
- (B) BORED OR AUGERED
- (C) CABLE TOOL
- (D) DUG
- (H) HYDRAULIC ROTARY
- (J) JETTED
- (U) UNKNOWN
- (P) AIR PERCUSSION
- (R) REVERSE ROTARY
- (V) DRIVEN
- (Z) OTHER

TYPE OF LIFT

- (A) AIRLIFT
- (B) BUCKET/BAILER
- (C) CENTRIFUGAL
- (J) JET
- (L) PERISTALTIC
- (N) NO LIFT
- (P) PISTON
- (R) ROTARY
- (S) SUBMERSIBLE
- (T) TURBINE
- (U) UNKNOWN
- (Z) OTHER

APPENDIX 9-1, MARTIN COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

LONGITUDE	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
802504	SF		30.00	32.40	N	N	U	U	U	Y
803408	SF		25.00	25.91	N	N	N	N	N	Y
801621	SF	H	14.00	14.20	N	N	U	U	U	Y
802220	SF	V	27.00	29.23	N	N	U	U	U	Y
801548	SF	V	11.00	11.13	N	N	U	U	U	Y
800643	SF	H	7.00	7.37	N	N	U	U	U	Y
801038	FA	H	1.00	3.00	N	F	Y	Y	Y	Y
803528	FA	H	34.20	35.26	N	F	Y	U	Y	Y
803414	SF	H	26.00	27.00	N	N	N	Y	Y	Y
802858	SF	H	28.00	29.00	N	N	N	Y	Y	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESULTS
MARTIN COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
M-01037	12/05/84	25.3	6.0	785	332.5	0.30		43.0	0.35	120.6
M-01037	11/19/85	24.8	6.7	734	348.7	0.26	0.004	41.0	0.45	106.9
M-01037	11/13/86				304.1	0.25	0.012	42.0	0.37	118.1
M-01037	09/01/87	24.0	6.6	761	324.1	0.32	0.009	40.7	0.49	124.2
M-01046	12/05/84	24.3	6.7	767	326.0	0.55		50.0	0.64	116.3
M-01046	11/20/85	27.0	6.9	805	322.7	0.57	0.004	45.0	0.76	117.8
M-01046	11/13/86				279.1	0.57	0.004	47.0	0.70	121.6
M-01046	09/01/87	29.0	7.0	871	310.7	0.57	0.036	43.1	0.78	124.5
M-01047	11/29/84	23.0	5.2	121	8.2	0.27		15.4	0.39	1.8
M-01047	11/19/85	25.2	5.4	137	5.0	0.26	0.004	20.0	0.44	3.3
M-01047	11/12/86				14.5	0.25	0.008	14.0	0.47	1.2
M-01081	11/29/84	23.6	6.7	675	301.5	0.53		18.1	1.12	108.0
M-01081	11/20/85	25.6	6.8	687	307.3	0.47	0.004	16.0	1.12	120.9
M-01081	09/01/87	24.9	7.0	741	343.8	0.55	0.027	21.1	1.08	142.9
M-01082	11/20/85	26.3	6.4	749	432.1	0.33	0.004	13.0	0.90	164.5
M-01082	11/13/86				382.5	0.39	0.449	13.0	0.89	151.3
M-01093	11/29/84	23.7	6.8	928	188.0	0.26		10.6	1.10	73.7
M-01093	11/19/85	24.3	7.1	422	204.1	0.24	0.098	17.0	1.15	73.3
M-01093	11/13/86				143.0	0.25	0.087	11.0	1.09	78.7
M-01093	09/01/87	24.4	7.1	450	192.3	0.28	0.108	14.8	1.23	79.9
MS-0012	12/05/84	23.8	6.6	1110	262.0	0.64		161.0	8.93	69.2
MS-0012	11/19/85	23.4	7.2	1142	282.3	0.54	0.061	152.0	8.81	65.3
MS-0012	11/13/86				273.1	0.62	0.064	165.0	8.96	66.8
MS-0012	09/01/87	23.0	7.4	1179	283.4	0.61	0.073	165.5	9.25	65.7
MS-0022	12/05/84	22.6		434	216.0	0.29		15.0	1.47	85.6
MS-0022	11/19/85	24.6	6.5	463	241.0	0.23	1.200	11.0	1.54	82.0
MS-0022	11/13/86				213.5	0.25	1.458	8.0	1.30	84.6
MS-0022	09/01/87	23.3	6.6	451	219.1	0.29	1.389	9.0	1.38	87.3
	MINIMUM	22.6	5.2	121	5.0	0.23	0.004	8.0	0.35	1.2
	MAXIMUM	29.0	7.4	1179	432.1	0.64	1.458	165.5	9.25	164.5
	AVERAGE	24.6	6.6	686	252.2	0.39	0.243	43.7	2.04	91.3

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESULTS
MARTIN COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
M-01037	12/05/84	4.25	54.2	5.0	17.9	472	0.40	7.52	9.34	
M-01037	11/19/85	4.06		7.9	13.6	422	0.16	0.05	0.13	0.004
M-01037	11/13/86	4.48	48.8	13.3	23.7	455	0.41	7.08	7.25	0.004
M-01037	09/01/87	5.42	49.9	5.0	24.9	441	1.44	7.53	14.65	0.023
M-01046	12/05/84	7.38	44.9	25.0	11.3	529	0.50	5.68	8.53	0.004
M-01046	11/20/85	7.21	41.8	59.0	9.3	496	0.50	1.18	0.33	0.004
M-01046	11/13/86	7.15	70.3	58.3	15.6	519	0.59	0.52	8.49	0.004
M-01046	09/01/87	8.23	57.4	60.3	16.3	574	1.49	6.47	8.10	0.036
M-01047	11/29/84	1.10	15.5	18.9	8.4	81	0.10	8.22	9.00	0.004
M-01047	11/19/85	0.74	19.4	18.8	8.8	98	0.08	4.00	15.49	0.004
M-01047	11/12/86	0.78	12.1	22.7	12.8	80	1.00	0.42	10.14	0.004
M-01081	11/29/84	8.70	22.8	16.8	9.2	408	0.60	0.06	1.77	0.014
M-01081	11/20/85	7.78	48.3	19.0	11.9	402	0.70			0.004
M-01081	09/01/87	8.80	37.4	12.2	17.0	449	1.47	1.67	4.53	0.030
M-01082	11/20/85	2.80	24.5	9.5	16.1	490	1.11	0.06	0.70	0.004
M-01082	11/13/86	2.79	16.0	16.7	25.6	486	0.93	5.84	6.49	0.004
M-01093	11/29/84	1.90	17.8	10.3	3.6	238	0.30	0.25	0.26	0.037
M-01093	11/19/85	1.78	20.7	23.0	4.8	242	0.31	0.17	0.24	0.004
M-01093	11/13/86	1.81	22.3	13.9	6.1	243	0.23	0.17	0.24	0.004
M-01093	09/01/87	1.97	25.9	5.0	6.3	259	0.87	0.17	0.27	0.025
MS-0012	12/05/84	14.25	183.0	92.0	21.6	673	0.40	0.01	0.28	0.004
MS-0012	11/19/85	13.56		67.0	18.3	680	0.40	0.05	0.08	0.090
MS-0012	11/13/86	13.19	175.8	64.7	29.1	686	0.40	0.16	0.15	0.004
MS-0012	09/01/87	13.56	167.5	57.4	30.6	678	1.63	0.07	0.17	0.034
MS-0022	12/05/84	2.74	11.3	4.0	18.6	276	0.50	0.01	0.21	0.004
MS-0022	11/19/85	2.72	20.3	8.0	15.1	246	0.60	0.05	0.06	0.004
MS-0022	11/13/86	1.91	11.2	15.7	23.5	258	0.55	0.05	0.25	0.004
MS-0022	09/01/87	2.11	11.1	5.0	24.3	265	1.48	0.07	0.21	0.007
	MINIMUM	0.74	11.1	4.0	3.6	80	0.08	0.01	0.06	0.004
	MAXIMUM	14.25	183.0	92.0	30.6	686	1.63	8.22	15.49	0.090
	AVERAGE	5.47	47.3	26.2	15.9	398	0.68	2.13	3.98	0.014

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESUL
MARTIN COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
M-01037	12/05/84	0.025							
M-01037	11/19/85	0.006	0.35	1.30	1.88	1.68		14.18	
M-01037	11/13/86	0.004	0.29	0.80	0.60	0.30	40.31	0.95	964
M-01037	09/01/87	0.004	0.43	2.69	9.30	1.37	1.57	11.78	1778
M-01046	12/05/84	0.004							
M-01046	11/20/85	0.004	0.49	3.32	1.82	3.56		34.00	
M-01046	11/13/86	0.004	0.33	2.62	7.79	2.96	13.75	20.81	3613
M-01046	09/01/87	0.004	0.29	3.51	3.36	0.88	7.51	5.00	1026
M-01047	11/29/84	0.005							
M-01047	11/19/85	0.011	0.10	1.30	7.85	1.14		2.31	
M-01047	11/12/86	0.007	0.12	1.20	5.09	2.37	90.15	1.56	20
M-01081	11/29/84	0.004							
M-01081	11/20/85	0.004	0.23	1.71	0.91	9.82		27.90	
M-01081	09/01/87	0.004	0.27	3.77	4.30	2.79	4.94	120.00	3556
M-01082	11/20/85	0.004	0.45	1.30	4.78	0.72		34.40	
M-01082	11/13/86	0.004	0.21	0.80	3.36	0.75	31.93	1.92	425
M-01093	11/29/84	0.004							
M-01093	11/19/85	0.004	0.16	1.30	0.40	0.50	7.55	4.28	20
M-01093	11/13/86	0.004	0.10	0.97	0.80	3.77	6.10	0.78	59
M-01093	09/01/87	0.004	0.11	1.30	0.75	53.20	3.97	2.58	20
MS-0012	12/05/84	0.004							
MS-0012	11/19/85	0.090	0.40	1.30	8.00	1.99	6.79	2.10	30
MS-0012	11/13/86	0.004	0.30	0.80	0.60	0.59	2.39	0.40	20
MS-0012	09/01/87	0.004	0.37	1.30	1.67	0.81	0.50	0.72	20
MS-0022	12/05/84	0.004							
MS-0022	11/19/85	0.004	0.10	4.46	22.60	1.90	17.26	8.50	31
MS-0022	11/13/86	0.004	0.10	0.80	8.42	1.03	7.41	2.78	138
MS-0022	09/01/87	0.004	0.36	1.30	6.84	1.08	3.64	3.72	20
	MINIMUM	0.004	0.10	0.80	0.40	0.30	0.50	0.40	20
	MAXIMUM	0.090	0.49	4.46	22.60	53.20	90.15	120.00	3613
	AVERAGE	0.008	0.26	1.80	4.82	4.44	15.36	14.32	734

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESULTS
MARTIN COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
MF-00031	11/29/84	23.1	7.5	3305	163.0	0.90		474.0	23.20	77.6
MF-00031	11/19/85	24.0	7.3	3510	167.3	0.78	0.005	521.0	13.05	82.3
MF-00031	11/13/86				172.2	0.88	0.009	540.0	22.15	80.4
MF-00031	09/01/87	24.5	7.1	3740	162.2	0.90	0.004	584.5	25.25	75.2
MF-00033	12/05/84	27.3	6.5	1920	137.0	0.33		251.0	11.15	60.9
MF-00033	11/19/85	27.4	7.4	2010	130.5	0.33	0.004	233.0	11.20	63.4
MF-00033	11/13/86				123.8	0.37	0.004	260.0	11.70	59.1
MF-00033	09/02/87	27.8	7.3	1850	124.2	0.41	0.005	277.0	13.80	50.3
	MINIMUM	23.1	6.5	1850	123.8	0.33	0.004	233.0	11.15	50.3
	MAXIMUM	27.8	7.5	3740	172.2	0.90	0.009	584.5	25.25	82.3
	AVERAGE	25.7	7.2	2723	147.5	0.61	0.005	392.6	16.44	68.7

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESULTS
MARTIN COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
MF-00031	11/29/84	69.00	979.0	193.0	16.5	2045	6.10	0.04	0.03	0.004
MF-00031	11/19/85	76.00	930.0	182.2	11.5	2010	6.57	0.05	0.05	0.004
MF-00031	11/13/86	70.00	896.3	194.8	20.0	2051	6.42	0.05	0.15	0.004
MF-00031	09/01/87	76.10	968.0	210.0	19.8	2090	5.91	0.05	0.05	0.004
MF-00033	12/05/84	60.28	421.0	180.0	14.0	1224	22.10	0.05	0.07	0.004
MF-00033	11/19/85	60.00	423.0	424.7	11.3	1130	25.25	0.05	0.04	0.004
MF-00033	11/13/86	56.95	461.3	232.1	18.9	1212	20.05	0.30		0.004
MF-00033	09/02/87	60.15	467.9	229.0	19.3	1204	17.60	0.08	0.05	0.004
	MINIMUM	56.95	421.0	180.0	11.3	1130	5.91	0.04	0.03	0.004
	MAXIMUM	76.10	979.0	424.7	20.0	2090	25.25	0.30	0.15	0.004
	AVERAGE	66.06	693.3	230.7	16.4	1621	13.75	0.08	0.06	0.004

APPENDIX 9-2, AMBIENT GROUNDWATER QUALITY MONITOR NETWORK SAMPLING RESUL
MARTIN COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
MF-00031	11/29/84	0.004							
MF-00031	11/19/85	0.004	1.18	1.30	0.51	0.59	0.70	0.84	20
MF-00031	11/13/86	0.004	0.93	0.80	0.60	0.30	0.25	0.20	20
MF-00031	09/01/87	0.004	1.04	1.30	0.74	1.31	0.50	0.40	10
MF-00033	12/05/84	0.004							
MF-00033	11/19/85	0.009	1.15	1.30	0.33	0.50		0.40	
MF-00033	11/13/86	0.004	1.02	0.80	0.60	0.30	1.91	0.40	20
MF-00033	09/02/87	0.004	1.12	1.30	0.22	0.30	0.50	0.40	20
	MINIMUM	0.004	0.93	0.80	0.22	0.30	0.25	0.20	10
	MAXIMUM	0.009	1.18	1.30	0.74	1.31	1.91	0.84	20
	AVERAGE	0.005	1.07	1.13	0.50	0.55	0.77	0.44	18

APPENDIX 11-1, OKEECHOBEE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
MR-0161	273448	810125	28-33S-33E	9	9	X	9	9	3.00	M
MR-0189	272929	805559	21-34S-34E	6	6	X	6	6	3.00	M
OK-0001	272658	804307	21-34S-36E	34				34	2.00	L
OK-0002	272315	810109	34-35S-33E	21	18	X	18	21	6.00	L
OK-0003	272535	810340	18-35S-33E	8	8	X	8	8	4.00	P
OKF-0003	271114	804145	02-38S-36E	433	430	X	430	433	8.00	S
OKF-0005	271855	804825	26-36S-35E	* 1181	440	X	440	1181	8.00	S
OKF-0007	272158	804709	01-36S-35E	963	412	X	412	963	8.00	S
OKF-0013	273043	804400	21-34S-36E	1200		X		1200	12.00	S
OKF-0015	271934	805913	24-36S-33E	1600		X		1600	8.00	S
OKF-0017	272010	805508	15-36S-34E	986	538	X	538	986	6.00	S
OKF-0023	271514	805116	17-37S-35E	925	496	X	496	925	6.00	S
OKF-0025	271438	805719	17-37S-34E			X			6.00	S
OKF-0031	271340	805040	28-37S-35E	1079		X		1079	6.00	S
OKF-0042	272403	810658	07-35S-28E	1152	370	X	370	1152	6.00	S
OKF-0075	271640	805715	05-37S-34E	1100		X		1100	8.00	
OKLFW-39	271554	805154	08-37S-35E	30	25	S	25	30	2.00	X
OKLFW-40	271545	805125	07-37S-35E	29	19	S	19	29	2.00	X

* TOTAL DEPTH FOR WELL OKF-0005 IS FROM 1984, THE LOWER PRODUCING ZONES FOR THIS WELL WERE PLUGGED IN 1985. NO FURTHER INFORMATION IS AVAILABLE.

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN

APPENDIX 11-1, OKEECHOBEE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
MR-0161	SF	J	67.00	69.00	N	N	N	N	N	Y
MR-0189	SF	J	69.00	71.00	N	N	N	N	N	Y
OK-0001	SF	U	30.00	29.50	N	N	N	N	N	Y
OK-0002	SF	C	47.44	49.94	N	N		Y		Y
OK-0003	SF	B	50.00	52.37	N	N	N	N	N	Y
OKF-0003	FA	U	34.67	36.07	N	F	Y	N	N	Y
OKF-0005	FA	U	30.00	32.72	N	F	Y	N	Y	Y
OKF-0007	FA	U	61.00	61.98	N	N	Y	N	Y	Y
OKF-0013	FA	U	33.17	33.17	N	F			Y	Y
OKF-0015	FA	U	35.22	35.22	N	G	N	N	Y	Y
OKF-0017	FA	U	41.54	41.54	N	G	Y	N	Y	Y
OKF-0023	FA	U	34.44	34.44	N	F	N	Y	N	Y
OKF-0025	FA	U	32.89	32.89	N	F	N	N	N	Y
OKF-0031	FA	U	25.72	25.72	N	F	N	N	N	Y
OKF-0042	FA	R	38.00	40.57	N	F	Y	Y	Y	Y
OKF-0075	FA	U	34.00	36.00	C		N	N	N	Y
OKLFW-39	SF	B	30.00	32.62	N	N	N	N	N	Y
OKLFW-40	SF	B	31.50	34.02	N	N	N	Y	N	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
MR-0161	07/08/85	21.9	5.0	89	5.2	0.11	0.004	9.3	0.23	1.8
MR-0189	07/08/85	23.0	7.0	462	192.0	0.70	0.004	33.0	0.68	51.9
MR-0189	08/27/86	27.1	6.7	513	185.0	0.92	0.004	53.7	3.46	46.8
MR-0189	07/14/87	29.5	6.6	554	183.0	0.97	0.005	44.9	1.14	52.7
OK-0001	11/28/84	22.3	6.5	867	323.0	0.50		41.7	1.25	138.8
OK-0002	06/27/85	22.7		200	79.2	0.25	0.004	9.0	3.07	26.7
OK-0003	06/27/85	25.0		273	5.4	0.04	0.013	35.0	3.54	3.7
OKLFW-39	02/13/85	22.3	6.5	1426	478.5	1.10	0.004	75.1	2.62	216.5
OKLFW-39	04/17/85	23.0	5.8	1445	462.0	0.87	0.004	74.9	0.92	215.0
OKLFW-39	08/26/86	23.7	6.5	1640	482.5	2.73	0.006	100.2	0.87	114.1
OKLFW-39	07/14/87	23.6	6.3	1685	547.4	4.51	0.037	100.5	2.82	244.5
OKLFW-40	02/13/85	22.0	7.0	674	279.0	1.40	0.004	22.6	1.51	111.4
OKLFW-40	04/18/85	21.4	6.2	650	289.0	0.77	0.004	17.8	0.93	113.0
OKLFW-40	08/26/86	23.4	6.9	676	266.0	0.82	0.027	59.2	4.57	43.3
	MINIMUM	21.4	5.0	89	5.2	0.04	0.004	9.0	0.23	1.8
	MAXIMUM	29.5	7.0	1685	547.4	4.51	0.037	100.5	4.57	244.5
	AVERAGE	23.6	6.4	797	269.8	1.12	0.009230	48.4	1.97	98.6

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
MR-0161	07/08/85	1.00	11.0	4.1	3.1	55	0.06	0.53	0.51	0.004
MR-0189	07/08/85	8.21	23.0	6.0	9.2	280	0.45	4.08	8.26	0.004
MR-0189	08/27/86	27.02	40.6	7.0	17.7	285	0.42	5.00	8.49	
MR-0189	07/14/87	8.29	61.2	5.0	18.4	302	0.30	1.55	101.50	
OK-0001	11/28/84	5.30	62.4	14.1	15.4	570	1.11	0.73	1.63	
OK-0002	06/27/85	0.66	12.0	2.0	1.2	104	0.32	0.05	26.10	0.006
OK-0003	06/27/85	2.84	65.3	12.0	2.9	178	0.33	3.26	2.82	1.016
OKLFW-39	02/13/85	6.16	188.0	7.6	14.5	1008	1.10	0.28	13.00	
OKLFW-39	04/17/85	6.35	187.0	7.9	15.3	950	0.96	9.28	9.27	0.020
OKLFW-39	08/26/86	3.34		6.9		1044	1.10	1.66	21.90	0.013
OKLFW-39	07/14/87	9.05	190.9	5.0	28.5	1049	0.97	10.96	37.05	
OKLFW-40	02/13/85	4.76	36.1	9.4	7.9	434	0.38	0.95	4.55	0.017
OKLFW-40	04/18/85	4.02	36.7	11.3	9.6	1016	0.59	2.03	1.16	0.004
OKLFW-40	08/26/86	31.95	41.4	7.7	16.0	416	0.52	4.90	4.80	0.004
	MINIMUM	0.66	11.0	2.0	1.2	55	0.06	0.05	0.51	0.004
	MAXIMUM	31.95	190.9	14.1	28.5	1049	1.11	10.96	101.50	1.016
	AVERAGE	8.50	73.5	7.6	12.3	549	0.62	3.23	17.22	0.121

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
MR-0161	07/08/85	0.004	0.16	1.20	4.09	16.21	9.51	4325.00	23
MR-0189	07/08/85	0.021	0.10	4.94	4.28	63.80	46.00	33.50	20
MR-0189	08/27/86	0.015	0.10	4.75	7.99	29.75	23.66	77.50	44
MR-0189	07/14/87	0.020	0.10	5.38	106.75	444.00	174.50	800.00	196
OK-0001	11/28/84	0.009							
OK-0002	06/27/85	0.008	0.10	1.50	0.43	14.06	86.85	72.40	182
OK-0003	06/27/85	0.004	0.10	1.50	2.66	8.38	150.90	42.20	303
OKLFW-39	02/13/85	0.062	0.62	29.18	0.58	0.72	130.30	0.80	40
OKLFW-39	04/17/85	0.014	0.20	26.51	11.40	0.20	154.00	1.40	30
OKLFW-39	08/26/86	0.012	0.16	25.74	5.28	1.69	166.80	3.34	29
OKLFW-39	07/14/87	0.165	0.24	5.74	4.78	4.85	191.20	2.11	20
OKLFW-40	02/13/85	0.004	0.80	2.50	13.30	3.74	36.70	6.89	45
OKLFW-40	04/18/85	0.004	0.10	1.41	11.60	0.20	18.32	1.40	30
OKLFW-40	08/26/86	0.005	0.10	1.59	3.05	0.30	20.43	0.81	19
	MINIMUM	0.004	0.10	1.20	0.43	0.20	9.51	0.80	19
	MAXIMUM	0.165	0.80	29.18	106.75	444.00	191.20	4325.00	303
	AVERAGE	0.025	0.22	8.61	13.55	45.22	93.01	412.87	75

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
OKF-0003	09/19/84	24.9	6.6	3895	26.8			578.0	22.60	42.3
OKF-0003	08/26/86	24.2	8.9	3950	23.7	0.70	0.004	663.0	24.50	36.5
OKF-0003	07/14/87	24.3	7.6	1945	131.1	0.70	0.005		24.20	67.2
OKF-0005	09/19/84	27.1	6.7	7804	95.0			1050.0	27.00	227.0
OKF-0005	08/27/86	26.8	7.6	799	102.0	0.14	0.004	55.4	4.81	73.1
OKF-0005	07/15/87	27.2	7.3	904	114.6	0.17	0.005	89.8	5.77	39.2
OKF-0007	07/08/85	22.8	7.5	500	253.0	0.52	0.004	23.0	4.95	72.6
OKF-0007	08/27/86	24.9	7.2	536	242.0	0.51	0.004	42.9	0.81	51.9
OKF-0007	07/15/87	24.9	7.1	532	251.1	0.54	0.009	28.2	5.33	69.5
OKF-0013	08/27/86	26.8	7.5	2900	109.0	0.39	0.004	340.5	1.49	73.1
OKF-0013	07/15/87	25.9	7.1	1792	132.2	0.41	0.006	288.0	8.56	95.1
OKF-0015	09/19/84	28.3	6.9	2478	92.6			222.5	8.83	113.8
OKF-0015	08/26/86	29.1	7.4	2360	87.3	0.19	0.004	234.5	5.37	108.9
OKF-0015	07/14/87	28.8	7.1	1724	93.7	0.19	0.004	277.5	9.14	93.7
OKF-0017	09/19/84	26.0		936	150.0			116.8	9.09	26.9
OKF-0017	08/26/86	27.0	7.7	944	137.0	0.40	0.004	123.6	9.43	22.2
OKF-0017	07/14/87	26.7	7.6	941	153.9	0.38	0.005	121.2	9.55	21.4
OKF-0023	09/18/84	26.5	7.0	1745	117.0			181.0	7.79	62.5
OKF-0023	08/26/86	27.0	7.4	1648	111.0	0.33	0.004	203.0	9.17	106.8
OKF-0023	07/15/87	26.2	7.1	1647	114.0	0.37	0.006	216.0	8.83	58.1
OKF-0025	09/18/84	27.0	7.4	1418	97.7			145.8	6.50	60.6
OKF-0025	08/26/86	26.6	7.6	1550	89.1	0.22	0.004	177.5	7.75	61.9
OKF-0031	09/19/84	26.4	7.2	1841	111.0			259.5	8.86	89.4
OKF-0031	08/26/86	26.7	7.5	2150	99.8	0.38	0.004	318.5	11.05	64.0
OKF-0031	07/14/87	29.1	6.8	1780	95.5	0.44	0.006	953.0	26.60	194.5
OKF-0031	08/04/87				110.3			294.5	13.00	53.4
OKF-0042	09/18/84	24.7	6.4	647	191.0			38.7	5.34	31.6
OKF-0042	08/26/86	25.3	7.5	692	195.0	0.46	0.004	101.8	1.41	33.7
OKF-0042	05/14/87	25.0	7.6	624	194.4	0.46	0.006	48.2	6.54	30.8
OKF-0075	09/18/84	27.4	7.3	1148	105.0			90.7	4.45	48.8
	MINIMUM	22.8	6.4	500	23.7	0.14	0.0	23.0	0.81	21.4
	MAXIMUM	29.1	8.9	7804	253.0	0.70	0.0	1050.0	27.00	227.0
	AVERAGE	26.3	7.3	1787	127.5	0.40	0.0	251.1	9.96	71.0

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
OKF-0003	09/19/84	80.00	1130.0	162.4	3.2	2279		0.07		
OKF-0003	08/26/86	66.30	1100.0	202.3	3.3	2160	10.30	0.05	0.08	0.004
OKF-0003	07/14/87	97.05	1074.3	274.0	21.3	2345	12.00	0.12	0.25	0.004
OKF-0005	09/19/84	161.00	2150.0	496.2	17.0	4609		0.13		
OKF-0005	08/27/86	8.70	66.7	206.4	20.3	500	19.86	0.05	0.05	0.004
OKF-0005	07/15/87	32.93	101.8	186.9	20.2	560	24.55	0.11	0.07	0.004
OKF-0007	07/08/85	9.20	16.2	11.0	24.4	326	0.68	0.05	0.07	0.004
OKF-0007	08/27/86	7.56	21.3	7.8	42.4	311	0.80	0.42	3.36	0.004
OKF-0007	07/15/87	9.47	20.0	5.0	38.8	332	0.54	0.36	0.62	0.004
OKF-0013	08/27/86	9.55	715.0	262.7	20.4	1622	29.16	0.11	0.05	0.004
OKF-0013	07/15/87	68.60	548.5	205.6	20.2	1294	20.20	0.10	0.10	0.237
OKF-0015	09/19/84	65.00	485.5	306.6	17.7	1495		0.05		
OKF-0015	08/26/86	38.97	441.5	399.6	18.0	1416	31.65	0.05	0.05	0.004
OKF-0015	07/14/87	68.80	535.7	354.0	18.1	1421	30.75	0.44	0.05	0.004
OKF-0017	09/19/84	30.00	111.0	86.5	17.0	557		0.01		
OKF-0017	08/26/86	28.13	103.0	157.0	17.4	544	16.20	0.05	0.05	0.004
OKF-0017	07/14/87	30.22	103.9	157.1	17.4	546	17.20	0.05	0.05	0.004
OKF-0023	09/18/84	42.00	339.5	134.0	19.1	1043		0.01		
OKF-0023	08/26/86	42.20	327.0	217.2	20.0	958	16.40	0.05	0.75	0.004
OKF-0023	07/15/87	46.00	338.5	203.8	18.3	991	25.05	0.05	0.05	0.004
OKF-0025	09/18/84	41.10		128.2	17.2	874		0.03		
OKF-0025	08/26/86	45.70	292.0	254.2	17.6	925	23.40	0.05	0.15	0.004
OKF-0031	09/19/84	54.50	415.5	156.5	17.7	1146		0.03		
OKF-0031	08/26/86	46.40	500.0	253.5	19.3	1231	14.95	0.05	0.05	0.004
OKF-0031	07/14/87	131.40	2374.0	500.9	16.7	3691	38.85	0.31	0.05	0.004
OKF-0031	08/04/87	45.95	469.7	246.5	18.5	1255	12.68	0.39		
OKF-0042	09/18/84	34.20	54.9	71.5	28.9	414		0.02		
OKF-0042	08/26/86	7.76	56.9	89.1	32.9	407	17.60	0.05	0.05	0.004
OKF-0042	05/14/87	38.40	55.6	58.4	28.7	379	16.22	0.05	0.10	0.014
OKF-0075	09/18/84	32.00	192.0	84.9	17.4	684		0.02		
	MINIMUM	7.56	16.2	5.0	3.2	311	0.54	0.01	0.05	0.004
	MAXIMUM	161.00	2374.0	500.9	42.4	4609	38.85	0.44	3.36	0.237
	AVERAGE	47.30	487.6	196.0	20.3	1210	18.05	0.11	0.30	0.016

APPENDIX 11-2, AMBIENT GROUND WATER QUALITY MONITORING NETWORK SAMPLING RESULTS
OKEECHOBEE COUNTY

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
OKF-0003	09/19/84		0.76						
OKF-0003	08/26/86	0.004	0.78	1.40	0.77	54.20	6.24	5.39	94
OKF-0003	07/14/87	0.004	0.97	1.60	0.70	0.76	21.99	0.40	20
OKF-0005	09/19/84		0.91						
OKF-0005	08/27/86	0.004	1.03	1.40	0.60	0.30	0.90	0.30	10
OKF-0005	07/15/87	0.004	1.03	1.60	2.55	1.60	15.16	1.20	29
OKF-0007	07/08/85	0.004	0.60	1.20	1.28	0.60	17.16	0.60	20
OKF-0007	08/27/86	0.004	0.53	1.40	1.04	1.71	13.22	0.31	11
OKF-0007	07/15/87	0.004	0.60	1.60	0.98		8.13	0.40	20
OKF-0013	08/27/86	0.004	0.77	1.40	0.60	0.30	1.04	0.30	21
OKF-0013	07/15/87	0.004	0.84	1.60	0.85	0.40	1.35	0.40	20
OKF-0015	09/19/84		0.81						
OKF-0015	08/26/86	0.004	0.82	1.40	0.60	0.30	0.90	0.30	11
OKF-0015	07/14/87	0.004	0.78	1.60	0.70	1.59	2.11	0.40	25
OKF-0017	09/19/84		2.18						
OKF-0017	08/26/86	0.004	1.83	1.40	0.60	0.30	0.90	0.30	10
OKF-0017	07/14/87	0.004	1.94	1.60	0.70	1.47	4.55	0.40	20
OKF-0023	09/18/84		0.76						
OKF-0023	08/26/86	0.004	0.93	1.40	0.60	1.97	1.51	0.30	17
OKF-0023	07/15/87	0.004	0.91	1.60	0.70	0.17	1.51	0.40	20
OKF-0025	09/18/84		0.47						
OKF-0025	08/26/86	0.004	0.76	1.40	1.63	8.72	1.31	0.31	24
OKF-0031	09/19/84		0.90						
OKF-0031	08/26/86	0.004	0.89	1.40	0.68	0.30	0.90	0.30	10
OKF-0031	07/14/87	0.004	0.83	1.60	0.70	0.28	4.88	0.40	20
OKF-0031	08/04/87								
OKF-0042	09/18/84		0.60						
OKF-0042	08/26/86	0.004	0.72	1.40	0.60	0.30	0.90	0.30	10
OKF-0042	05/14/87	0.004	0.73	3.53	0.40	0.60	0.70	0.70	41
OKF-0075	09/18/84		0.66						
	MINIMUM	0.004	0.47	1.20	0.40	0.17	0.70	0.30	10
	MAXIMUM	0.004	2.18	3.53	2.55	54.20	21.99	5.39	94
	AVERAGE	0.004	0.91	1.58	0.86	3.99	5.27	0.67	23

APPENDIX 12-1, ORANGE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
MR-0004	282608	812216	01-29S-24E	7	7	X	7	7	3.00	M
OR-0003	282353	813137	17-24S-28E	18	18	X	18	18	6.00	I
OR-0004	282257	813832	19-24S-27E	83				83	2.00	S
OR-0010	282241	811128	23-24S-31E	29	26		26	29	2.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 12-1, ORANGE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
MR-0004	SF	J	98.00	100.03	N	N	N	N	N	Y
OR-0003	SF	V	112.00	115.00	N	N	N	N	N	Y
OR-0004	SF		118.00	118.50	N	H	N	N	N	Y
OR-0010	SF	C	69.05	72.05	N	N	U	U	U	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 12-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
ORANGE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
MR-0004	07/10/85	24.6	6.8	145	60.3	0.41	0.008	9.0	1.88	17.5
MR-0004	06/24/86	23.2	7.2	190	43.0	0.20	0.007	4.9	0.61	9.4
OR-0003	07/10/85	22.3	5.7	391	45.4	3.28	0.038	21.1	16.60	38.2
OR-0003	06/24/86	24.2	5.3	328	69.4	0.01	0.009	27.2	4.95	30.3
OR-0003	06/23/87	27.3	6.0	268	35.8	0.01	0.007	28.0	3.94	25.6
OR-0004	07/10/85	21.7	7.6	263	139.0	0.33	0.065	2.1	0.93	47.5
OR-0004	06/24/86	24.3	7.0	280	137.0	0.32	0.059	4.0	0.96	47.1
OR-0004	06/23/87	25.2	7.2	280	142.3	0.36	0.028	5.5	0.91	46.5
OR-0010	07/10/85	21.2	4.2	180	13.0	0.33	0.128	11.8	0.61	4.9
OR-0010	06/24/86	22.8	4.2	185	5.0	0.35	0.250	16.9	0.90	5.5
OR-0010	06/24/87	22.9	4.1	171	5.0	0.40	0.311	19.6	1.37	3.6
	MINIMUM	21.2	4.1	145	5.0	0.01	0.007	2.1	0.61	3.6
	MAXIMUM	27.3	7.6	391	142.3	3.28	0.311	28.0	16.60	47.5
	AVERAGE	23.6	5.9	244	63.2	0.55	0.083	13.6	3.06	25.1

APPENDIX 12-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
ORANGE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
MR-0004	07/10/85	3.41	1.9	4.0	3.9	90	0.07	0.65	0.89	0.464
MR-0004	06/24/86	3.08	8.2	10.7	5.2	73	0.09	0.05	34.30	0.004
OR-0003	07/10/85	3.14	29.2	54.3	8.8	299	2.93	0.05	0.18	5.667
OR-0003	06/24/86	2.07	20.1	38.5	5.9	176	2.47	0.08	1.43	2.734
OR-0003	06/23/87	1.44	30.0	26.1	2.1	158	1.43	0.05	0.55	5.239
OR-0004	07/10/85	3.05	2.8	3.7	8.5	161	0.14	0.05	0.06	0.004
OR-0004	06/24/86	3.88	5.5	3.3	13.5	166	0.13	0.05	18.55	0.033
OR-0004	06/23/87	2.93	6.7	5.0	9.4	161	0.26	0.05	298.50	0.025
OR-0010	07/10/85	3.46	35.3	6.8	8.6	57	0.08	0.88	0.21	0.004
OR-0010	06/24/86	3.57	36.5	8.2	17.0	178	0.20	0.52	0.87	0.004
OR-0010	06/24/87	2.33	38.0	5.0	13.6	120	0.25	0.66	2.24	0.013
	MINIMUM	1.44	1.9	3.3	2.1	57	0.07	0.05	0.06	0.004
	MAXIMUM	3.88	38.0	54.3	17.0	299	2.93	0.88	298.50	5.667
	AVERAGE	2.94	19.5	15.1	8.8	149	0.73	0.28	32.53	1.290

APPENDIX 12-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
ORANGE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
MR-0004	07/10/85	0.058	0.10	1.20	2.68	345.60	450.40	1146.50	273
MR-0004	06/24/86	0.024	0.02	1.60	110.00	41.25	272.00	6565.00	1285
OR-0003	07/10/85	0.373	0.16	1.40	1.73	4.04	126.80	0.30	20
OR-0003	06/24/86	0.110	0.02	1.60		14.68	98.00	177.50	74
OR-0003	06/23/87	0.178	0.15	1.60	6.29	5.20	17.10	5.38	26
OR-0004	07/10/85	0.004	0.10	1.20	1.49	0.53	15.68	12.67	601
OR-0004	06/24/86	0.004	1.28	1.60	214.25	37.85	217.10	93.00	819
OR-0004	06/23/87	0.004	0.77	4.30	3035.00	14.78	3815.00	1107.50	
OR-0010	07/10/85	0.004	0.12	1.20	2.30	0.20	1.73	0.30	20
OR-0010	06/24/86	0.004	0.18	1.60	2.16	0.70	2.47	3.91	15
OR-0010	06/24/87	0.005	0.29	1.60	2.12	0.45	1.38	1.23	20
	MINIMUM	0.004	0.02	1.20	1.49	0.20	1.38	0.30	15
	MAXIMUM	0.373	1.28	4.30	3035.00	345.60	3815.00	6565.00	1285
	AVERAGE	0.070	0.29	1.72	337.80	42.30	456.15	828.48	315

APPENDIX 13-1, OSCEOLA COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN FROM (FT.)	OPEN TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
MR-0023	280029	811133	35-28S-31E	8	8	X	8	8	3.00	M
MR-0155	274509	810429	25-31S-32E	7	7	X	7	7	3.00	M
MR-0162	281724	812653	19-25S-29E	8	8	X	8	8	3.00	P
MR-0185	274032	810127	21-32S-33E	9	9	X	9	9	3.00	M
OS-0003	275222	810307	18-30S-33E	28		S			2.00	P
OS-0030	280033	812158	33-28S-33E	130					2.00	P
OS-0182	274646	810748	16-31S-32E	23	16	Z	16	23	6.00	L
OSF-0003	275222	810307	18-30S-33E	310	243		243	310	4.00	
OSF-0005	281536	813248	31-25S-28E	261	63	X	63	261	6.00	G
OSF-0006	280820	812139	13-27S-29E	318	176	X	176	318	4.00	S
OSF-0022	281714	810930	30-25S-32E	750	394	X	394	750	8.00	
OSF-0030	280033	810158	33-28S-33E	800		X		80	10.00	L
OSF-0052	274806	811155	11-31S-31E	880	172	X	172	880	6.00	P

WELL STATUS
- (D) FLOWING-ABANDONED-OPERABLE VALVE
- (E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
- (F) FLOWING-ACTIVE-OPERABLE VALVE
- (G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
- (H) NON FLOWING-ABANDONED
- (K) NON FLOWING-ACTIVE-PUMPED
- (N) NON FLOWING-ACTIVE-NO PUMP
- (P) PLUGGED
- (X) DESTROYED

CONSTRUCTION METHOD
- (A) AIR ROTARY
- (B) BORED OR AUGERED
- (C) CABLE TOOL
- (D) DUG
- (H) HYDRAULIC ROTARY
- (J) JETTED
- (U) UNKNOWN
- (P) AIR PERCUSSION
- (R) REVERSE ROTARY
- (V) DRIVEN
- (Z) OTHER

TYPE OF LIFT
- (A) AIRLIFT
- (B) BUCKET/BAILER
- (C) CENTRIFUGAL
- (J) JET
- (L) PERISTALTIC
- (N) NO LIFT
- (P) PISTON
- (R) ROTARY
- (S) SUBMERSIBLE
- (T) TURBINE
- (U) UNKNOWN
- (Z) OTHER

APPENDIX 13-1, OSCEOLA COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
MR-0023	SF	J	69.00	71.08	N	N	N	N	N	Y
MR-0155	SF	J	68.00	70.00	N	N	N	N	N	Y
MR-0162	SF	J	72.00	73.51	N	N	N	N	N	Y
MR-0185	SF	J	69.00	67.00	N	N	N	N	N	Y
OS-0003	SF		59.00	61.50	C	K	N	N	N	Y
OS-0030	SF		70.00	71.50	C	K	N	N	N	Y
OS-0182	SF	C	61.92	64.72	N	N	N	N	N	Y
OSF-0003	FA		59.00	60.00	N	N	Y	Y	N	Y
OSF-0005	FA		73.00	75.26	N	N	Y	Y	N	Y
OSF-0006	FA		60.00	60.89	S	K	N	N	N	Y
OSF-0022	FA	C	65.00	65.78	N	N	Y	Y	Y	Y
OSF-0030	FA		70.00	71.50	T	K	U	U	U	Y
OSF-0052	FA	H	48.00	48.00	N	N	Y	Y	Y	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 13-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
OSCEOLA COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
MR-0023	07/09/85		8.5	392	137	0.50	0.007	40.0	3.15	27.2
MR-0155	07/09/85	23.5	6.5	588	206		0.095	28.0	9.17	9.3
MR-0162	07/10/85	25.9	5.6	123	8	0.04	0.004	6.0	1.44	8.3
MR-0162	06/24/86	25.3	5.0	174	18	0.05	0.004	15.3	1.62	10.6
MR-0162	06/23/87	26.1	5.0	157	30	0.07	0.004		1.10	7.6
MR-0185	07/09/85	23.0	5.1	64	9	0.01	0.004	1.6	0.06	1.8
OS-0003	06/25/86	24.3	7.0	645	329	0.49	4.000	26.1	1.50	98.2
OS-0003	06/24/87	25.6	6.8	623	334	0.43	2.032	32.1	1.60	101.4
OS-0030	06/25/86	24.8	6.9	563	275	0.22	0.113	8.4	0.93	102.8
OS-0030	06/24/87	26.6	7.0	531	312	0.23	0.082	11.9	0.91	105.4
OS-0182	07/09/85	23.3	6.8	237	34	0.96	0.004	12.2	2.35	3.6
	MINIMUM	23.0	5.0	64	8	0.01	0.004	1.6	0.06	1.8
	MAXIMUM	26.6	8.5	645	334	0.96	4.000	40.0	9.17	105.4
	AVERAGE	24.8	6.4	372	154	0.30	0.577	18.2	2.17	43.3

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
OSF-0003	07/31/85	23.0	6.6	368	116	3.57	0.004	34.2	2.00	25.5
OSF-0003	06/25/86	24.2	7.8	561	205	0.88	0.008	35.4	1.35	70.9
OSF-0003	06/24/87	25.2	7.5	543	205	0.97	0.004	41.8	1.56	67.2
OSF-0005	06/24/86	23.8	7.2	286	146	0.18	0.061	2.7	0.67	46.5
OSF-0005	06/23/87	25.4	7.2	265	143	0.19	0.065	2.8	0.54	43.3
OSF-0006	07/11/85	22.2	7.8	231	98	0.33	0.027	3.4	0.76	33.3
OSF-0006	06/24/86	23.0	7.4	241	108	0.27	0.021	5.1	0.77	35.2
OSF-0006	06/23/87	24.8	7.4	233	109	0.27	0.019	5.0	1.08	37.4
OSF-0022	07/31/85	26.0	7.6	477	230	0.42	0.148	16.7	1.00	72.0
OSF-0030	07/31/85	24.0	7.6	537	199	0.37	0.020	33.6	1.00	79.9
OSF-0030	08/27/86	24.4	7.5	595	218	0.34	0.004	37.2	1.52	72.9
OSF-0030	06/24/87	25.4	7.1	919	180	0.30	0.005		5.26	67.7
OSF-0052	06/23/86	26.4	7.4	1440	110	0.25	0.012	175.0	6.91	48.9
OSF-0052	06/22/87	26.6	7.4	1254	124	0.31	0.004	166.5	6.33	46.6
	MINIMUM	22.2	6.6	231	98	0.18	0.004	2.7	0.54	25.5
	MAXIMUM	26.6	7.8	1440	230	3.57	0.148	175.0	6.91	79.9
	AVERAGE	24.6	7.4	568	157	0.62	0.029	43.0	2.20	53.4

APPENDIX 13-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
OSCEOLA COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
MR-0023	07/09/85	7.68	32.6	4.0	1.0	217	0.16	0.05	0.12	0.200
MR-0155	07/09/85	7.59	30.5	14.0	7.3	250	0.49	2.85	6.80	0.023
MR-0162	07/10/85	2.55	18.2	6.0	3.8	88	0.09	0.17	0.15	0.006
MR-0162	06/24/86	3.56	26.6	5.3	5.1	96	0.11	0.14	0.22	0.004
MR-0162	06/23/87	2.86	29.3	11.3	3.2	88	1.32	0.27	0.38	0.006
MR-0185	07/09/85	1.74	2.4	4.1	1.0	26	0.06	0.39	0.72	0.007
OS-0003	06/25/86	12.44	21.6	4.2	15.6	360	0.49	0.77	1.02	0.004
OS-0003	06/24/87	7.65	28.6	5.0	20.0	363	0.57	0.51	0.65	0.008
OS-0030	06/25/86	5.20	5.7	3.7	25.4	310	0.66	0.07	0.12	0.004
OS-0030	06/24/87	4.00	7.1	5.0	27.6	326	0.64	0.06	0.10	0.004
OS-0182	07/09/85	3.86	15.0	5.2	3.5	99	0.11	9.00	25.30	0.054
	MINIMUM	1.74	2.4	3.7	1.0	26	0.06	0.05	0.10	0.004
	MAXIMUM	12.44	32.6	14.0	27.6	363	1.32	9.00	25.30	0.200
	AVERAGE	5.38	19.8	6.2	10.3	202	0.43	1.30	3.23	0.029

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
OSF-0003	07/31/85	5.58	51.1	3.6	1.0	205	0.80	0.05	1.10	0.004
OSF-0003	06/25/86	7.41	47.7	3.5	22.8	311	0.61	0.28	6.00	0.004
OSF-0003	06/24/87	4.98	53.1	5.0	21.7	314	4.76	0.20	6.85	0.014
OSF-0005	06/24/86	8.94	4.4	3.3	12.0	154	0.12	0.05	0.05	0.004
OSF-0005	06/23/87	6.37	3.6	5.0	10.1	153	0.20	0.05	0.05	0.004
OSF-0006	07/11/85	5.82	3.5	6.9	9.2	154	0.37	0.05	0.11	0.004
OSF-0006	06/24/86	7.53	6.2	6.0	14.4	137	0.48	0.10	0.19	
OSF-0006	06/23/87	5.61	7.6	10.7	12.8	159	1.92	0.05	0.08	0.004
OSF-0022	07/31/85	5.86	21.2	6.0	15.0	314	0.84	0.05	0.04	0.004
OSF-0030	07/31/85	10.12	60.1	12.5	14.5	345	2.28	0.05	0.02	0.004
OSF-0030	08/27/86	9.59	57.1	11.2	24.0	336	1.85	0.05	0.21	0.004
OSF-0030	06/24/87	16.56	183.5	30.3	22.2	549	2.96	0.95	1.34	0.004
OSF-0052	06/23/86	31.77	367.9	77.8	20.9	790	14.75	0.05	0.05	0.004
OSF-0052	06/22/87	29.78	300.9	68.2	22.6	709	8.23	0.05	0.05	0.004
	MINIMUM	4.98	3.5	3.3	1.0	137	0.12	0.05	0.02	0.004
	MAXIMUM	31.77	367.9	77.8	24.0	790	14.75	0.95	6.85	0.014
	AVERAGE	11.14	83.4	17.9	15.9	331	2.87	0.15	1.15	0.005

APPENDIX 13-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
OSCEOLA COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
MR-0023	07/09/85	0.012	0.27	1.20	2.16	32.30	36.10	18.90	20
MR-0155	07/09/85	0.053	0.48	43.10	13.25	18.31	66.58	50.90	158
MR-0162	07/10/85	0.004	0.10	1.20	1.38	22.15	5.34	29.00	20
MR-0162	06/24/86	0.004	0.05	1.60	0.40	42.10	2.62	122.75	26
MR-0162	06/23/87	0.004	0.10	1.00	1.78	10.44	2.16	4.82	20
MR-0185	07/09/85	0.004	0.19	1.20	1.65	68.65	0.60	165.10	20
OS-0003	06/25/86	0.004	0.47	1.60	0.40	0.70	11.89	1.30	15
OS-0003	06/24/87	0.004	0.52	1.60	0.68	1.07	8.78	0.40	20
OS-0030	06/25/86	0.004	0.10	1.60	0.40	6.63	7.08	0.67	15
OS-0030	06/24/87	0.004	0.15	1.60	0.70	0.52	5.53	0.40	20
OS-0182	07/09/85	0.033	0.10	3.20	2.32	13.51	180.20	19.25	23
	MINIMUM	0.004	0.05	1.00	0.40	0.52	0.60	0.40	15
	MAXIMUM	0.053	0.52	43.10	13.25	68.65	180.20	165.10	158
	AVERAGE	0.012	0.23	5.35	2.28	19.67	29.72	37.59	32

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
OSF-0003	07/31/85	0.004	0.53	0.80	0.35	15.00	129.90	7.71	36
OSF-0003	06/25/86	0.004	0.40	1.60	0.40	13.02	83.30	18.61	50
OSF-0003	06/24/87	0.004	0.55	1.60	1.42	22.33	94.45	81.45	87
OSF-0005	06/24/86	0.008	0.08	1.60	0.83	1.46	4.30	1.42	15
OSF-0005	06/23/87	0.004	0.10	1.00	1.91	1.05	3.48	0.20	20
OSF-0006	07/11/85	0.004	0.36	0.80	0.91	41.60	3.47	1.29	92
OSF-0006	06/24/86	0.006	0.13	1.60	0.40	0.70	5.70	0.60	602
OSF-0006	06/23/87	0.004	0.20	1.00	0.70	4.08	2.88	0.20	20
OSF-0022	07/31/85	0.004	0.18	0.94	0.20	0.90	11.22	5.48	20
OSF-0030	07/31/85	0.004	0.36	0.80	0.59	0.90	4.74	0.30	20
OSF-0030	08/27/86	0.004	0.34	1.40	0.70	0.30	4.46	0.30	19
OSF-0030	06/24/87	0.004	0.34	1.60	0.97	35.35	2.97	1.98	58
OSF-0052	06/23/86	0.004	0.33	1.60	4.89	5.05	29.86	0.60	20
OSF-0052	06/22/87	0.004	0.65	3.83	1.87	11.51	0.77	8.92	20
	MINIMUM	0.004	0.08	0.80	0.20	0.30	0.77	0.20	15
	MAXIMUM	0.008	0.65	3.83	4.89	41.60	129.90	81.45	602
	AVERAGE	0.004	0.32	1.44	1.15	10.95	27.25	9.22	77

APPENDIX 14-1, PALM BEACH COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
BOY-001	263202	800539	19-45S-43E	18	8	S	8	18	2.00	P
GWW-002	263612	800841	34-44S-42E	10	5	S	5	10	2.00	P
GWW-005	263605	800846	34-44S-42E	11	6	S	6	11	2.00	P
LP-01D	264815	800444	20-42S-43E	80	75	S	75	80	2.00	N
LP-01S	264815	800444	20-42S-43E	30	25	S	25	30	2.00	N
LP-12P	264819	800442	20-42S-43E	100				100	8.00	S
PB-0715	205114	801731	06-42S-41E	81	72	S	72	81	2.00	L
PB-0716	265114	801731	06-42S-41E	15	10	S	10	15	2.00	L
PB-1085	265027	801157	01-42S-41E	200	2	S	80	87	2.00	P
PB-1089	264225	800847	27-43S-42E	240	130	S	130	135	2.00	P
PB-1094	263629	801714	31-44S-41E	180	90	S	90	100	2.00	P
PB-1097	263144	801340	23-45S-41E	160	80	S	80	90	2.00	P
PB-1098	264835	801302	23-42S-41E	180	70	S	70	80	2.00	P
PB-1099A	265250	801036	32-41S-42E	90				90	4.00	
PB-1101	262405	800718	02-46S-42E	220	0	S	0	220	2.00	P
PB-1104	262645	800718	23-26S-42E	340	20	S	95	105	2.00	P
PB-1105	261938	801010	33-47S-42E	220	130	S	130	140	2.00	P
PB-1107	262808	801317	11-46S-41E	200	15	S	95	105	2.00	P
PB-1108	262403	801413	03-47S-41E	200	80	S	80	90	2.00	P
PBMT-01D	265346	800613	24-41S-42E	183	173	S	173	183	2.00	P
PBMT-01S	265346	800613	24-41S-42E	45	40	S	40	45	2.00	P
PBPVT-1	263531	800955	33-44S-42E	94				94	2.00	P

WELL STATUS
(D) FLOWING-ABANDONED-OPERABLE VALVE
(E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
(F) FLOWING-ACTIVE-OPERABLE VALVE
(G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
(H) NON FLOWING-ABANDONED
(K) NON FLOWING-ACTIVE-PUMPED
(N) NON FLOWING-ACTIVE-NO PUMP
(P) PLUGGED
(X) DESTROYED

CONSTRUCTION METHOD
(A) AIR ROTARY
(B) BORED OR AUGERED
(C) CABLE TOOL
(D) DUG
(H) HYDRAULIC ROTARY
(J) JETTED
(U) UNKNOWN
(P) AIR PERCUSSION
(R) REVERSE ROTARY
(V) DRIVEN
(Z) OTHER

TYPE OF LIFT
(A) AIRLIFT
(B) BUCKET/BAILER
(C) CENTRIFUGAL
(J) JET
(L) PERISTALTIC
(N) NO LIFT
(P) PISTON
(R) ROTARY
(S) SUBMERSIBLE
(T) TURBINE
(U) UNKNOWN
(Z) OTHER

APPENDIX 14-1, PALM BEACH COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
BOY-001	SF	B	14.00	15.70	N	N	N	N	N	Y
GWW-002	SF	J	18.00	18.00	N	N	N	N	N	Y
GWW-005	SF	J	18.00	18.00	N	N	N	N	N	Y
LP-01D	SF	B	31.00	30.49	N	N	Y	Y	N	Y
LP-01S	SF	B	30.00	30.00	N	N	N	N	N	Y
LP-12P	SF		23.00	26.51	T	K	N	N	N	Y
PB-0715	SF	V	24.00	24.90	N	N	N	N	U	Y
PB-0716	SF	V	24.00	24.80	N	N	N	N	U	Y
PB-1085	SF	H	18.00		N	K	Y	Y	U	Y
PB-1089	SF	H	17.00		N	K	Y	Y	U	Y
PB-1094	SF	H	18.00		N	K	Y	Y	U	Y
PB-1097	SF	H	16.00		N	K	Y	Y	U	Y
PB-1098	SF	H	20.00		N	K	Y	Y	U	Y
PB-1099A	SF	H	18.00	20.00	N	N	N	N	U	Y
PB-1101	SF	H	19.00		N	K	Y	Y	U	Y
PB-1104	SF	H			N	K	Y	Y	U	Y
PB-1105	SF	H	16.00		N	K	Y	Y	U	Y
PB-1107	SF	H	15.00		N	K	U	Y	Y	Y
PB-1108	SF	H	14.00		N	K	Y	Y	U	Y
PBMT-01D	SF	R	11.80	11.97	N	N	Y	Y	Y	Y
PBMT-01S	SF	R	11.80	12.15	N	N	Y	Y	Y	Y
PBPVT-1	SF	U	19.00	20.00	C	K	N	N	N	Y

WELL FINISH

(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL

(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
BOY-001	02/24/87	23.2	7.3	493	238.5	0.23	0.036	6.1	3.89	96.4
GWW-002	08/19/85									
GWW-002	09/03/85	27.7	7.0	231						
GWW-002	02/24/86	27.0	6.6	285	65.8	0.02	0.053	13.1	3.01	37.4
GWW-002	02/24/87	22.9	6.5	214	66.1	0.1	0.101	6.2	3.50	33.1
GWW-005	08/19/85									
GWW-005	09/03/85	28.0	6.3	542						
GWW-005	02/24/86	23.4	6.1	543	248.4	0.99	0.004	11.8	11.13	101.4
GWW-005	02/24/87	24.2	7.0	616	299.6	0.96	0.017	14.0	9.95	109.3
LP-01D	11/08/84	27.0	6.4	452	165.0	0.01		17.9	1.93	72.5
LP-01S	11/08/84	25.3	7.2	359	91.5	0.01		16.3	2.59	34.3
LP-12P	11/08/84	26.9	7.4	485	184.0	0.15		11.6	2.15	75.9
LP-12P	11/12/86	26.0	7.3	420	150.1	0.1	0.083	66.8	1.98	64.3
PB-0715	01/15/85	22.6	7.0	1003	397.5	0.67	0.004	65.9	2.93	127.3
PB-0715	11/20/85	25.9	7.0	599	285.5	0.55	0.004	17.0	1.26	100.7
PB-0715	09/02/87	26.3	7.1	975	375.9	0.71	0.018	66.6	3.30	135.3
PB-0716	01/15/85	22.4	7.2	608	292.0	0.46	0.004	22.0	1.03	111.4
PB-0716	11/20/85	24.3	8.5	986	388.9	0.64	0.004	63.0	2.82	128.7
PB-0716	11/12/86	25.0	6.9	618	263.1	0.59	0.022		1.15	102.8
PB-0716	09/02/87	26.9	7.3	538	253.5	0.53	0.026	14.5	1.11	95.5
PB-0738	01/16/85	25.4	7.0	619	220.0	0.61	0.004	44.6	1.61	80.2
PB-1085	01/15/85	21.9	7.3	689	240.0	0.81	0.004	60.1	2.04	85.3
PB-1089	01/15/85	24.0	7.1	805	311.5	0.79	0.004	52.1	1.88	104.8
PB-1089	11/20/85	24.3	6.7	813	291.6	0.81	0.022	58.0	2.42	107.1
PB-1089	11/12/86	24.7	6.9	809	257.0	0.85	0.023	109.4	2.15	106.9
PB-1094	01/16/85	24.6	7.2	1330	404.0	2.75	0.008	137.0	7.17	124.4
PB-1094	02/24/86	23.7	6.4	1360	414.0	3.13	0.023	139.6	9.54	135.9
PB-1097	01/16/85	24.0	7.0	800	356.5	0.61	0.026	50.8	3.55	113.3
PB-1097	02/24/86	23.4	6.4	854	356.2	0.63	0.043	52.3	5.03	124.5
PB-1097	02/24/87	22.9	7.1	84	347.7	0.69	0.057	50.1	3.56	120.7
PB-1098	01/15/85	24.0	7.2	709	292.0	0.6	0.004	44.2	2.21	92.6
PB-1098	11/20/85	24.7	6.8	753	272.8	0.58	0.011	50.0	2.75	96.8

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
PB-1098	11/12/86	24.8	7.0	565	252.8	0.71	0.014	98.1	1.55	96.1
PB-1098	09/02/87	25.0	7.2	726	276.6	0.67	0.020	45.5	2.79	103.6
PB-1099A	11/12/86	23.6	6.8	1047	406.3	0.7	0.058	138.4	2.45	131.4
PB-1099A	09/02/87	23.4	6.6	1100	419.8	0.71	0.064	82.4	2.69	145.7
PB-1101	01/17/85	24.1		501	198.0	0.59	0.351	17.9	1.03	86.0
PB-1104	01/17/85	24.9	7.0	602	265.5	0.46	0.013	21.1	0.83	108.0
PB-1105	01/17/85	25.1		588	335.5	0.41	0.029	25.4	1.07	124.7
PB-1105	02/24/86	24.0	6.5	703	338.9	0.13	0.004	22.3	1.48	128.4
PB-1105	02/24/87	24.0	7.2	691	287.2	0.43	0.054	20.4	0.81	122.7
PB-1107	01/16/85	23.6	7.0	1208	415.0	1.68	0.039	118.6	2.27	145.0
PB-1107	02/24/86	23.8	6.3	1259	410.7	1.09	0.025	128.1	3.14	149.2
PB-1107	02/24/87	23.3	7.1	1242	361.5	1.79	0.062	116.8	2.11	142.8
PB-1108	01/16/85	24.1	7.2	747	291.5	1.09	0.007	77.7	3.71	76.0
PB-1108	02/24/86	23.4	6.4	931	330.3	1.20	0.036	81.2	4.23	112.0
PB-1108	02/24/87	23.0	7.2	958	254.4	1.25	0.048	79.7	3.46	105.9
PBMT-01D	11/12/86	25.0	7.0	632	275.7	0.59	0.006		0.77	106.2
PBMT-01D	09/02/87	24.3	6.9	625	288.2	0.69	0.012	27.2	1.22	110.0
PBMT-01S	11/12/86	24.6	7.0	560	240.0	0.28	0.097		0.35	95.4
PBMT-01S	09/02/87	23.8	6.9	553	243.5	0.31	0.115	20.6	0.41	100.5
PBPVT-1	09/03/87	25.1	7.1	528	218.9	0.51	0.029	25.5	0.98	86.3
	MINIMUM	21.9	6.1	84	65.8	0.01	0.004	6.1	0.35	33.1
	MAXIMUM	28.0	8.5	1360	419.8	3.13	0.351	139.6	11.13	149.2
	AVERAGE	24.5	7.0	707	284.1	0.73	0.038	53.5	2.81	104.1

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
BOY-001	02/24/87	1.63	11.1	18.5	4.6	320	1.01	1.35	4.69	0.004
GWW-002	08/19/85									
GWW-002	09/03/85				3.0	190	1.09	0.63	0.94	
GWW-002	02/24/86	2.58	30.3	13.5	3.1	175	0.57	0.44	0.85	
GWW-002	02/24/87	2.04	12.6	9.1	1.8	148	0.46	0.30	1.91	0.004
GWW-005	08/19/85									
GWW-005	09/03/85				5.4	446	1.82	0.18	2.66	
GWW-005	02/24/86	6.00	24.6	15.9	3.5	398	0.98	0.23	0.28	
GWW-005	02/24/87	6.16	35.7	13.8	5.3	451	1.41	0.14	1.48	0.004
LP-01D	11/08/84	5.20	29.5	19.3	3.1	267	0.64	0.01	0.10	0.083
LP-01S	11/08/84	5.00	29.7	13.0	2.5	206	0.46	0.02	0.88	2.691
LP-12P	11/08/84	0.70	28.1	12.7	5.7	252	0.55	0.30	0.66	0.140
LP-12P	11/12/86	3.47	23.2	30.8	8.3	227	0.40	0.66	0.83	0.004
PB-0715	01/15/85	15.40	93.6	7.2	19.8	606	1.06	0.37	0.48	0.004
PB-0715	11/20/85	7.65	76.6	6.7	13.7	338	0.90	0.34	0.41	0.004
PB-0715	09/02/87	13.72	87.5	5.0	29.0	582	2.30	0.80	1.49	0.004
PB-0716	01/15/85	9.54	25.5	8.6	16.3	419	0.87	0.47	3.55	0.004
PB-0716	11/20/85	13.96	27.5	6.0	16.5	291	1.00			0.004
PB-0716	11/12/86	7.54	26.5	15.2	23.9	364	0.74	1.83	1.84	0.004
PB-0716	09/02/87	6.39	17.2	5.0	22.6	322	2.29	1.62	4.00	0.021
PB-0738	01/16/85	3.25	54.4	7.2	10.2	374	1.07	0.15	15.62	0.007
PB-1085	01/15/85	7.20	69.8	6.2	20.6	406	0.73	0.04	0.21	0.077
PB-1089	01/15/85	6.33	87.1	6.3	18.1	478	1.78		0.02	0.011
PB-1089	11/20/85	6.90	166.0	9.3	13.2	496	1.83	0.05	0.12	0.004
PB-1089	11/12/86	6.15	89.7	14.0	19.3	470	1.70	0.05	0.56	0.004
PB-1094	01/16/85	20.92	196.0	20.1	12.6	815	1.05	0.04	0.10	0.004
PB-1094	02/24/86	19.92	218.0	21.3	16.8	820	1.34	0.07	0.14	0.010
PB-1097	01/16/85	7.90	62.0	8.8	15.9	494	1.74	0.03	0.11	0.007
PB-1097	02/24/86	8.03	70.2	8.0	15.9	514	1.79		0.32	0.004
PB-1097	02/24/87	7.84	73.1	6.7	19.4	520	2.14	0.05	0.45	0.004
PB-1098	01/15/85	8.56	70.0	6.2	15.7	415	0.90		0.09	0.028
PB-1098	11/20/85	9.06	98.6	6.6	12.8	446	0.96	0.15	0.83	

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
PB-1098	11/12/86	7.38	58.5	16.3	21.0	391	0.83	0.05	0.26	0.004
PB-1098	09/02/87	8.65	79.8	5.0	22.6	423	2.34	0.12	0.30	0.023
PB-1099A	11/12/86	18.60	101.0	23.7	30.7	654	1.82	0.05	0.33	0.004
PB-1099A	09/02/87	19.74	109.0	17.4	32.8	672	3.55	0.05	0.19	0.004
PB-1101	01/17/85	1.77	27.7	21.9	21.4	343	0.20	0.12	0.61	0.008
PB-1104	01/17/85	2.51	35.2	7.3	12.1	381	1.04	0.27	0.66	0.016
PB-1105	01/17/85	3.77	34.8	6.9	18.1	413	2.11	0.04		0.004
PB-1105	02/24/86	3.52	33.7	5.3	17.7	422	2.01	0.05	0.07	
PB-1105	02/24/87	3.41	36.2	4.3	21.3	427	2.41	0.05	0.21	0.004
PB-1107	01/16/85	5.87	169.0	10.9	15.4	713	1.74	0.13	0.20	0.034
PB-1107	02/24/86	5.59	191.0	8.5	17.3	758	1.76	0.08	0.13	
PB-1107	02/24/87	5.32	165.3	12.1	21.3	765	1.99	0.18	7.53	0.023
PB-1108	01/16/85	14.80	86.5	9.9	15.3	480	1.05	0.07	0.20	0.048
PB-1108	02/24/86	11.80	114.0	13.8	16.1	574	1.94	0.05	0.08	0.004
PB-1108	02/24/87	14.30	123.9	10.5	19.2	588	1.95	0.05	0.25	0.004
PBMT-01D	11/12/86	4.17	33.1	13.3	23.1	361	1.01	0.09	0.15	0.004
PBMT-01D	09/02/87	4.05	38.7	5.0	22.8	374	1.61	0.07	0.10	0.019
PBMT-01S	11/12/86	2.52	28.2	15.0	8.7	314	0.67	1.04	2.35	0.004
PBMT-01S	09/02/87	2.86	31.6	5.0	8.1	333	1.61	0.91	1.50	0.004
PBPVT-1	09/03/87	3.16	38.0	5.0	14.5	308	2.18	0.44	0.54	0.004
	MINIMUM	0.70	11.1	4.3	1.8	148	0.20	0.01	0.02	0.004
	MAXIMUM	20.92	218.0	30.8	32.8	820	3.55	1.83	15.62	2.691
	AVERAGE	7.56	70.2	11.2	15.2	439	1.39	0.31	1.28	0.078

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
BOY-001	02/24/87	0.004	0.12	1.06	9.96	1.77	121.10	2.41	20
GWW-002	08/19/85								
GWW-002	09/03/85		0.26	4.00	6.77	1.18	61.50	1.24	32
GWW-002	02/24/86	0.013	0.29	5.37	6.41	0.50	50.95	1.02	11
GWW-002	02/24/87	0.009	0.10	5.19	13.71	18.67	32.25	14.60	20
GWW-005	08/19/85								
GWW-005	09/03/85		0.99	6.30	29.55	2.26	21.17	4.93	14
GWW-005	02/24/86	0.016	0.56	0.98	3.05	0.50	37.30	1.21	10
GWW-005	02/24/87	0.011	0.21	6.87	13.56	1.44	22.48	1.67	26
LP-01D	11/08/84	0.022							
LP-01S	11/08/84	0.004							
LP-12P	11/08/84	0.004							
LP-12P	11/12/86	0.004	0.10	5.67	0.60	1.44	26.16	6.07	20
PB-0715	01/15/85	0.004		1.50	1.61	0.40	10.84	0.80	40
PB-0715	11/20/85	0.004	0.23	1.30	1.30	1.55	38.55	9.83	20
PB-0715	09/02/87	0.004	0.25	1.30	2.07	0.32	1.28	0.57	36
PB-0716	01/15/85	0.004		1.50	0.75	0.40	18.45	0.80	40
PB-0716	11/20/85	0.004	0.25	1.30	1.85	1.60	27.85	12.30	82
PB-0716	11/12/86	0.005	0.25	0.80	3.46	6.66	26.36	7.12	52
PB-0716	09/02/87	0.004	0.34	1.30	4.07	2.63	0.50	4.96	52
PB-0738	01/16/85	0.004		1.50	5.71	6.85	94.10	30.36	1685
PB-1085	01/15/85	0.004		1.50	4.80	2.06	4.79	1.45	40
PB-1089	01/15/85	0.004		1.50	1.72	0.64	4.97	0.80	40
PB-1089	11/20/85	0.004	0.32	1.30	3.79	0.50	3.05	0.51	20
PB-1089	11/12/86	0.004	0.27	0.80	23.60	2.73	7.91	2.60	42
PB-1094	01/16/85	0.004		1.50	1.67	0.40	19.88	0.80	40
PB-1094	02/24/86	0.004	0.44	0.60	7.00	0.50	12.63	7.48	264
PB-1097	01/16/85	0.004		1.50	1.78	2.26	3.12	0.80	40
PB-1097	02/24/86	0.004	0.51	0.93	5.70	0.50	6.61	0.76	16
PB-1097	02/24/87	0.004	0.30	1.10	4.58	0.80	4.10	0.94	20
PB-1098	01/15/85	0.007		1.50	2.47	0.54	2.73	0.80	40
PB-1098	11/20/85	0.008	0.31	1.30	4.65	1.17	4.76	0.40	20

APPENDIX 14-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
PALM BEACH COUNTY

SURFICIAL AQUIFER SYSTEM (CONTINUED)

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
PB-1098	11/12/86	0.004	0.24	0.80	4.12	1.33	4.33	0.90	44
PB-1098	09/02/87	0.012	0.24	1.30	6.77	0.92	0.50	0.40	20
PB-1099A	11/12/86	0.004	0.44	0.80	3.98	0.99	13.54	2.14	26
PB-1099A	09/02/87	0.004	0.49	1.30	2.46	0.30	0.50	0.40	20
PB-1101	01/17/85	0.004		1.50	2.33	0.80	11.62	0.80	40
PB-1104	01/17/85	0.004		1.50	1.06	0.63	10.61	0.80	40
PB-1105	01/17/85	0.004		1.50	5.40	0.61	19.96	0.80	40
PB-1105	02/24/86	0.006	0.53	0.60	4.63	0.50	18.03	3.06	10
PB-1105	02/24/87	0.004	0.35	1.00	0.79	1.49	20.90	0.80	20
PB-1107	01/16/85	0.004		1.50	3.25	0.82	6.48	0.80	40
PB-1107	02/24/86	0.014	1.00	0.60		0.50	29.20	4.88	35
PB-1107	02/24/87	0.004	0.38	1.00	20.62	0.80	10.05	2.46	20
PB-1108	01/16/85	0.004		1.50	3.26	0.71	4.69	7.73	40
PB-1108	02/24/86	0.005	0.59	0.60	6.49	0.50	16.65	1.28	10
PB-1108	02/24/87	0.004	0.47	1.00	0.91	0.80	6.94	0.80	20
PBMT-01D	11/12/86	0.004	0.10	0.80	0.60	1.06	17.54	1.23	31
PBMT-01D	09/02/87	0.004	0.30	1.30	7.72	2.33	7.20	0.69	20
PBMT-01S	11/12/86	0.004	0.10	2.79	7.96	2.18	61.20	6.64	26
PBMT-01S	09/02/87	0.004	0.13	1.30	3.18	0.50	0.50	0.93	20
PBPVT-1	09/03/87	0.004	0.39	1.37	3.86	15.98	2.73	5.63	25
	MINIMUM	0.004	0.10	0.60	0.60	0.32	0.50	0.40	10
	MAXIMUM	0.022	1.00	6.87	29.55	18.67	121.10	30.36	1685
	AVERAGE	0.006	0.35	1.78	5.56	2.00	19.76	3.41	70

APPENDIX 15-1, POLK COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	CASING DIAMETER (IN.)	CASING MATERIAL
MR-0028	274719	811934	16-31S-30E	8	8	X	8	8	3.00	P
POF-0007	275805	813219	17-29S-28E			X			3.00	
POF-0008	274846	812620	05-31S-29E	194	149	X	149	194	3.00	S
POF-0013	275634	812118	19-29S-28E	560	226	X	226	560	6.00	S
POF-0015	275622	812523	28-29S-29E	575		X		575	6.00	

WELL STATUS
- (D) FLOWING-ABANDONED-OPERABLE VALVE
- (E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
- (F) FLOWING-ACTIVE-OPERABLE VALVE
- (G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
- (H) NON FLOWING-ABANDONED
- (K) NON FLOWING-ACTIVE-PUMPED
- (N) NON FLOWING-ACTIVE-NO PUMP
- (P) PLUGGED
- (X) DESTROYED

CONSTRUCTION METHOD
- (A) AIR ROTARY
- (B) BORED OR AUGERED
- (C) CABLE TOOL
- (D) DUG
- (H) HYDRAULIC ROTARY
- (J) JETTED
- (U) UNKNOWN
- (P) AIR PERCUSSION
- (R) REVERSE ROTARY
- (V) DRIVEN
- (Z) OTHER

TYPE OF LIFT
- (A) AIRLIFT
- (B) BUCKET/BAILER
- (C) CENTRIFUGAL
- (J) JET
- (L) PERISTALTIC
- (N) NO LIFT
- (P) PISTON
- (R) ROTARY
- (S) SUBMERSIBLE
- (T) TURBINE
- (U) UNKNOWN
- (Z) OTHER

APPENDIX 15-1, POLK COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
MR-0028	SF	J	70.00	71.08	N	N	N	N	N	Y
POF-0007	FA		79.08	80.48	N	D	U	U	U	Y
POF-0008	FA		65.00	68.56	N	F	N	N	N	Y
POF-0013	FA		55.40	56.40	S	K	U	Y	U	Y
POF-0015	FA		60.00	61.00	S	K	N	N	N	Y

WELL FINISH
(F) GRAVEL WITH PERF.
(G) GRAVEL SCREEN
(P) PERFORATED OR SLOTTED
(S) SCREEN
(T) SANDPOINT
(W) WALLED
(X) OPEN HOLE
(Z) OTHER

CASING MATERIAL
(A) ABS
(B) BRASS OR BRONZE
(C) CONCRETE
(D) COPPER OR COPPER ALLOY
(G) GALV. IRON
(I) WROUGHT IRON
(L) BLACK IRON
(M) OTHER METAL
(N) STAINLESS STEEL
(P) PVC
(R) ROCK OR STONE
(S) STEEL
(T) TILE
(U) COATED STEEL
(W) WOOD
(X) THREADED PVC (NO PVC CEMENT)
(Z) OTHER

APPENDIX 15-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
POLK COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
MR-0028	07/09/85	25.1	4.5	107	13.4	0.06	0.134	5.0	3.70	1.8
MR-0028	06/23/86	27.6	4.4	84	3.3	0.17	0.537	5.9	1.35	2.7
MR-0028	06/22/87	28.4	3.9	155	5.0	0.03	0.286	13.4	1.35	8.5
	MINIMUM	25.1	3.9	84	3.3	0.03	0.134	5.0	1.35	1.8
	MAXIMUM	28.4	4.5	155	13.4	0.17	0.537	13.4	3.70	8.5
	AVERAGE	27.0	4.3	115	7.2	0.09	0.319	8.1	2.13	4.3

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
POF-0007	07/30/85	23.5	8.2	163	46.0	0.01	0.008	4.1	0.65	18.9
POF-0007	06/23/86	23.5	8.0	162	54.3	0.01	0.004	3.9	0.64	19.3
POF-0007	06/22/87	23.4	8.7	120	35.3	1.95	0.008	5.2	0.64	8.6
POF-0008	07/30/85	23.2	8.0	162	80.2	0.15	0.011	4.6	0.64	16.0
POF-0008	06/23/86	24.9	7.7	170	79.0	0.16	0.011	7.8	0.84	18.1
POF-0008	06/22/87	25.3	7.8	160	77.9	0.16	0.005	12.7	0.75	17.5
POF-0013	07/30/85	24.0	8.2	185	79.1	0.10	0.006	9.2	1.00	17.6
POF-0013	06/23/86	24.8	7.6	186	85.9	0.25	0.004	3.8	1.10	19.6
POF-0013	06/22/87	25.8	7.7	279	82.2	0.11	0.004	4.7	0.88	20.9
POF-0015	07/30/85	23.1	8.4	155	70.8	0.04	0.004		0.93	13.0
POF-0015	06/23/86	24.8	7.8	162	81.7	0.06	0.008	5.0	1.06	14.6
POF-0015	06/22/87	25.5	7.5	162	80.9	0.04	0.004	4.0	0.75	14.1
	MINIMUM	23.1	7.5	120	35.3	0.01	0.004	3.8	0.64	8.6
	MAXIMUM	25.8	8.7	279	85.9	1.95	0.011	12.7	1.10	20.9
	AVERAGE	24.3	8.0	172	71.1	0.25	0.006	5.9	0.82	16.5

APPENDIX 15-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
POLK COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
MR-0028	07/09/85	2.21	5.1	18.8	2.7	120	0.10	0.75	0.97	0.005
MR-0028	06/23/86	2.37	9.6	16.8	3.3	125	0.20	5.45	2.58	0.740
MR-0028	06/22/87	3.29	16.1	23.7	1.0	153	0.78	0.73	2.72	0.029
	MINIMUM	2.21	5.1	16.8	1.0	120	0.10	0.73	0.97	0.005
	MAXIMUM	3.29	16.1	23.7	3.3	153	0.78	5.45	2.72	0.740
	AVERAGE	2.62	10.3	19.8	2.3	133	0.36	2.31	2.09	0.258

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
POF-0007	07/30/85		8.8	8.1	8.1	109	0.64	0.05	0.39	1.969
POF-0007	06/23/86	4.75	5.9	4.8	12.4	83	0.31	0.05	0.08	0.005
POF-0007	06/22/87	4.05	7.5	8.6	1.0	58	1.55	0.05	0.27	0.004
POF-0008	07/30/85	6.87	8.1	3.6	9.3	109	1.14	0.05	0.16	0.004
POF-0008	06/23/86	8.98	6.0	4.7	13.8	101	0.78	0.05	0.07	0.004
POF-0008	06/22/87	6.64	7.4	5.0	12.3	97	1.74	0.05	0.06	0.004
POF-0013	07/30/85	8.07	8.8	6.5	9.8	119	2.27	0.05	0.01	0.004
POF-0013	06/23/86	7.53	5.2	3.8	14.2	93	2.41	0.05	0.06	0.029
POF-0013	06/22/87	7.83	7.6	5.4	13.1	114	2.18	0.05	0.05	0.013
POF-0015	07/30/85	8.06	5.4	4.7	7.8	99	4.74	0.05	0.05	0.004
POF-0015	06/23/86	10.64	4.8	3.8	12.3	101	5.46	0.05	0.32	0.004
POF-0015	06/22/87	7.85	5.0	5.0	10.8	95	5.50	0.05	0.05	0.004
	MINIMUM	4.05	4.8	3.6	1.0	58	0.31	0.05	0.01	0.004
	MAXIMUM	10.64	8.8	8.6	14.2	119	5.50	0.05	0.39	1.969
	AVERAGE	7.39	6.7	5.3	10.4	98	2.39	0.05	0.13	0.171

APPENDIX 15-2, AMBIENT GROUND WATER QUALITY MONITOR NETWORK SAMPLING RESULTS
POLK COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
MR-0028	07/09/85	0.021	0.53	1.20	2.27	145.50	4.20	2845.00	71
MR-0028	06/23/86	0.055	0.90	1.60	0.50	1614.00	15.95	3040.00	420
MR-0028	06/22/87	0.019	0.19	5.68	1.03	5.05	2.83	1811.00	299
	MINIMUM	0.019	0.19	1.20	0.50	5.05	2.83	1811.00	71
	MAXIMUM	0.055	0.90	5.68	2.27	1614.00	15.95	3040.00	420
	AVERAGE	0.032	0.54	2.83	1.27	588.18	7.66	2565.33	263

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	NO2 MG N/L	F MG/L	TOTAS UG/L	TOTCR UG/L	TOTCU UG/L	TOTMN UG/L	TOTPB UG/L	TOTZN UG/L
POF-0007	07/30/85	0.004	0.10	0.80	1.55	1.10	8.02	0.30	20
POF-0007	06/23/86	0.004	0.07	1.60	0.40	0.70	2.25	1.69	20
POF-0007	06/22/87	0.004	0.10	1.00	0.70	1.61	3.37	0.53	20
POF-0008	07/30/85	0.004	0.12	0.80	0.20	1.10	2.81	0.05	48
POF-0008	06/23/86	0.004	0.05	1.60	0.40	0.70	1.44	0.60	15
POF-0008	06/22/87	0.004	0.19	1.00	0.27	1.47	4.17	3.26	20
POF-0013	07/30/85	0.004	0.40	0.80	0.20	2.30	1.70	2.00	51
POF-0013	06/23/86	0.008	0.27	1.60	0.40	3.32	2.34	1.11	15
POF-0013	06/22/87	0.004	0.41	1.00	0.56	11.69	1.05	2.56	251
POF-0015	07/30/85	0.004	0.10	0.80	0.48	15.90	1.30	1.19	28
POF-0015	06/23/86	0.004	0.13	1.60	0.40	4.14	1.03	0.69	15
POF-0015	06/22/87	0.004	0.14	1.00	0.72	4.43	0.70	0.20	20
	MINIMUM	0.004	0.05	0.80	0.20	0.70	0.70	0.05	15
	MAXIMUM	0.008	0.41	1.60	1.55	15.90	8.02	3.26	251
	AVERAGE	0.004	0.17	1.13	0.52	4.04	2.52	1.18	44

APPENDIX 16-1, ST. LUCIE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

SITE ID	LATITUDE	LONGITUDE	SECTION-TOWNSHIP-RANGE-	TOTAL DEPTH (FT.)	CASE DEPTH (FT.)	WELL FINISH	SCREEN OPEN FROM (FT.)	TO (FT.)	ST. LUCIE COUNTY CASING DIAMETER (IN.)	CASING MATERIAL
PG-0005	272907	802123	29-34S-40E	30	25	S	25	30	2.00	P
PG-0010	272400	802629	28-35S-39E	30	26		26	30	2.00	P
PG-0025	271802	801939	34-36S-39E	30	22	S	22	30	2.00	P
SL-0123	271853	803237	28-36S-38E	14	14	X	14	14	4.00	L
SLF-0009	272650	803528	12-35S-37E	1058	263	X	263	1058	10.00	S
SLF-0021	272536	802409	14-35S-39E	707	156	X	156	707	4.00	S
SLF-0047	271938	801352	22-36S-41E	1230	850	X	850	1230	6.00	P
SLF-0049	272019	802955	14-36S-38E	893	560	X	560	893	6.00	S

WELL STATUS
- (D) FLOWING-ABANDONED-OPERABLE VALVE
- (E) FLOWING-ABANDONED-INOPERABLE VALVE (FREE FLOWING)
- (F) FLOWING-ACTIVE-OPERABLE VALVE
- (G) FLOWING-ACTIVE-INOPERABLE VALVE (FREE FLOWING)
- (H) NON FLOWING-ABANDONED
- (K) NON FLOWING-ACTIVE-PUMPED
- (N) NON FLOWING-ACTIVE-NO PUMP
- (P) PLUGGED
- (X) DESTROYED

CONSTRUCTION METHOD
- (A) AIR ROTARY
- (B) BORED OR AUGERED
- (C) CABLE TOOL
- (D) DUG
- (H) HYDRAULIC ROTARY
- (J) JETTED
- (U) UNKNOWN
- (P) AIR PERCUSSION
- (R) REVERSE ROTARY
- (V) DRIVEN
- (Z) OTHER

TYPE OF LIFT
- (A) AIRLIFT
- (B) BUCKET/BAILER
- (C) CENTRIFUGAL
- (J) JET
- (L) PERISTALTIC
- (N) NO LIFT
- (P) PISTON
- (R) ROTARY
- (S) SUBMERSIBLE
- (T) TURBINE
- (U) UNKNOWN
- (Z) OTHER

APPENDIX 16-1, ST. LUCIE COUNTY AMBIENT MONITOR WELL CONSTRUCTION DATA

AQUIFER	CONSTRUCT METH	LSE (NGVD)	MPE (NGVD)	LIFT TYPE	WELL STATUS	G-LOG	D-LOG	H-DATA	SAMPLES COLLECTED
SF		21.43	22.93	N	N	N	N	N	Y
SF		19.86	19.86	N	N	U	U	U	Y
SF		12.50	12.50	N	N	U	U	U	Y
SF	J	24.50	27.74	N	N	U	U	U	Y
FA		26.56	25.56	N	F	Y	U	Y	Y
FA		20.00	21.65	N	F	Y	U	Y	Y
FA	H	3.00	6.00	N	F	Y	Y	N	Y
FA		22.00	24.00	N	F	N	N	N	Y

WELL FINISH
- (F) GRAVEL WITH PERF.
- (G) GRAVEL SCREEN
- (P) PERFORATED OR SLOTTED
- (S) SCREEN
- (T) SANDPOINT
- (W) WALLED
- (X) OPEN HOLE
- (Z) OTHER

CASING MATERIAL
- (A) ABS
- (B) BRASS OR BRONZE
- (C) CONCRETE
- (D) COPPER OR COPPER ALLOY
- (G) GALV. IRON
- (I) WROUGHT IRON
- (L) BLACK IRON
- (M) OTHER METAL
- (N) STAINLESS STEEL
- (P) PVC
- (R) ROCK OR STONE
- (S) STEEL
- (T) TILE
- (U) COATED STEEL
- (W) WOOD
- (X) THREADED PVC (NO PVC CEMENT)
- (Z) OTHER

APPENDIX 16-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
ST. LUCIE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
PG-0005	11/28/84	24.1	6.6	215	108.0	0.13		5.7	0.29	30.5
PG-0005	11/18/85	25.4	6.1	251		0.10	0.039	6.4	0.33	40.5
PG-0005	11/12/86				113.5	0.13	0.081	6.0	0.43	40.7
PG-0005	08/31/87	25.6	6.3	212	79.4	0.13	0.076	9.1	0.37	29.2
PG-0010	11/28/84	27.2	6.7	1000	332.5	0.15		45.9	0.54	150.4
PG-0010	11/18/85	24.2	6.6	1023	242.5	0.14	0.004	44.4	0.68	178.0
PG-0010	11/12/86				262.1	0.16	0.012	50.0	0.60	159.0
PG-0010	08/31/87	24.4	6.8	1061	300.9	0.17	0.027	54.2	0.68	153.0
PG-0025	11/29/84	25.1	5.5	83	8.7	0.05		7.4	0.22	8.9
SL-0123	11/28/84	25.8	6.4	2475	318.0	0.83		163.0	1.72	349.5
SL-0123	11/18/85				439.1	0.79	0.004	168.0	2.09	399.0
SL-0123	08/31/87	24.8	6.4	2580	426.1	0.83	0.022	186.0	2.21	370.0
	MINIMUM	24.1	5.5	83	8.7	0.05	0.004	5.7	0.22	8.9
	MAXIMUM	27.2	6.8	2580	439.1	0.83	0.081	186.0	2.21	399.0
	AVERAGE	25.2	6.4	989	239.2	0.30	0.033	62.2	0.85	159.1

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	TEMP CENT	PH UNITS	SP COND UMHOS/CM	ALCACO3 MG/L	NH4 MG/L	OPO4 MG/L	NA MG/L	K MG/L	CA MG/L
SLF-0009	11/28/84	26.4	7.2	5705	153.0	0.68		579.0	16.80	132.4
SLF-0009	11/18/85	27.1	6.9	4650		0.60	0.004	577.5	16.40	155.5
SLF-0009	11/12/86				135.7	0.66	0.004	680.0	17.00	155.6
SLF-0009	08/31/87	27.8	7.0	1996	125.8	0.66	0.006	740.0	18.60	165.5
SLF-0021	11/28/84	24.3	7.3	1398	170.0	0.42		240.0	9.24	49.3
SLF-0021	11/18/85	25.3	7.3	1520		0.39	0.004	178.0	9.83	52.9
SLF-0021	11/12/86				163.5	0.38	0.004	175.0	9.30	52.4
SLF-0021	08/31/87	26.3	7.3	1603	166.1	0.42	0.004	203.0	10.20	50.8
SLF-0047	11/29/84	26.0	7.5	1149	165.0	0.23		142.6	13.00	33.6
SLF-0047	11/19/85	24.0	7.6	1149	168.4	0.20	0.009	139.4	20.30	34.1
SLF-0047	11/12/86				163.7	0.24	0.004	143.0	13.35	34.6
SLF-0047	09/01/87	24.2	7.4	1194	162.6	0.24	0.004	150.5	13.95	32.9
SLF-0049	11/28/84	30.5	6.7	3540	144.0	0.63		494.0	14.90	122.2
SLF-0049	11/18/85	29.1	7.0	3460	149.5	0.55	0.004	408.5	12.70	125.3
SLF-0049	11/12/86				134.4	0.59	0.004	490.0	13.95	125.7
SLF-0049	08/31/87	29.5	7.1	1915	133.4	0.61	0.005	489.0	13.30	132.0
	MINIMUM	24.0	6.7	1149	125.8	0.20	0.004	139.4	9.24	32.9
	MAXIMUM	30.5	7.6	5705	170.0	0.68	0.009	740.0	20.30	165.5
	AVERAGE	26.7	7.2	2440	152.5	0.47	0.005	364.3	13.93	90.9

APPENDIX 16-2, AMBIENT GROUNDWATER QUALITY MONITORING NETWORK SAMPLING RESULTS
ST. LUCIE COUNTY

SURFICIAL AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
PG-0005	11/28/84	4.40	5.9	11.9	4.0	123	0.19	0.62	0.75	0.004
PG-0005	11/18/85	4.70			4.9					
PG-0005	11/12/86	4.86	7.5	6.2	6.2	155	0.09	0.55	0.62	0.014
PG-0005	08/31/87	3.76	10.6	9.4	7.2	123	1.19	0.47	0.81	0.006
PG-0010	11/28/84	7.90	123.0	51.0	11.7	661	1.39	3.44	2.85	0.023
PG-0010	11/18/85	8.34	106.0	81.8	12.1	642	1.22	0.05	0.14	0.011
PG-0010	11/12/86	7.55	118.5	72.5	20.4	650	1.00	2.69	3.94	0.004
PG-0010	08/31/87	7.82	137.2	54.2	21.2	641	1.45	2.52	7.25	0.004
PG-0025	11/29/84	0.70	10.7	13.7	4.4	60	0.05	0.69	1.90	0.012
SL-0123	11/28/84	38.20	371.0	396.1	16.9	1954	2.79	0.81	8.78	0.022
SL-0123	11/18/85	40.27		391.7	19.4	1918	2.22	0.12	1.08	0.009
SL-0123	08/31/87	43.05	429.0	431.0	28.6	1864	3.21	4.57	12.38	0.109
	MINIMUM	0.70	5.9	6.2	4.0	60	0.05	0.05	0.14	0.004
	MAXIMUM	43.05	429.0	431.0	28.6	1954	3.21	4.57	12.38	0.109
	AVERAGE	14.30	131.9	138.1	13.1	799	1.35	1.50	3.68	0.020

FLORIDAN AQUIFER SYSTEM

SITE ID	SAMPLE DATE	MG MG/L	CL MG/L	SO4 MG/L	SIO2 MG/L	TDS MG/L	SR MG/L	FE MG/L	TOTFE MG/L	NO3 MG/L
SLF-0009	11/28/84	93.00	732.0	193.0	14.0	2872	29.30	0.10	0.04	0.004
SLF-0009	11/18/85	101.00	1345.0	392.8	12.9				0.05	
SLF-0009	11/12/86	100.35	1458.6	210.8	22.0	2916	28.35	0.24	0.13	0.004
SLF-0009	08/31/87	119.75	1660.0	226.0	21.8	2998	30.75	0.05	0.05	0.004
SLF-0021	11/28/84	43.00	285.5	91.5	14.1	840	8.54	0.17	0.54	0.005
SLF-0021	11/18/85	44.00	302.5	127.1	15.4					
SLF-0021	11/12/86	41.80	293.6	137.8	23.6	890	9.03	0.11	0.30	0.004
SLF-0021	08/31/87	45.90	350.6	148.0	24.3	916	8.60	0.69	0.05	0.004
SLF-0047	11/29/84	34.50	211.0	104.3	16.4	653	5.52	0.01	0.06	0.004
SLF-0047	11/19/85	34.27		110.2	14.7	626	5.73	0.05	0.05	0.004
SLF-0047	11/12/86	35.62	204.5	107.8	24.4	655	5.42	0.18	0.24	0.004
SLF-0047	09/01/87	35.90	203.7	108.4	25.6	666	5.66	0.05	0.05	0.004
SLF-0049	11/28/84	90.00	1020.0	119.3	11.2	2122	14.11	0.12	0.18	0.004
SLF-0049	11/18/85	77.00	945.0	157.7	12.6	1962	13.72	0.05	0.06	0.004
SLF-0049	11/12/86	84.40	1085.1	170.6	19.7	2144	16.65	0.06	0.14	0.004
SLF-0049	08/31/87	86.60	963.7	172.7	20.0	2008	16.30	0.07	0.05	0.004
	MINIMUM	34.27	203.7	91.5	11.2	626	5.42	0.01	0.04	0.004
	MAXIMUM	119.75	1660.0	392.8	25.6	2998	30.75	0.69	0.54	0.005
	AVERAGE	66.69	737.4	161.1	18.3	1591	14.12	0.14	0.13	0.004