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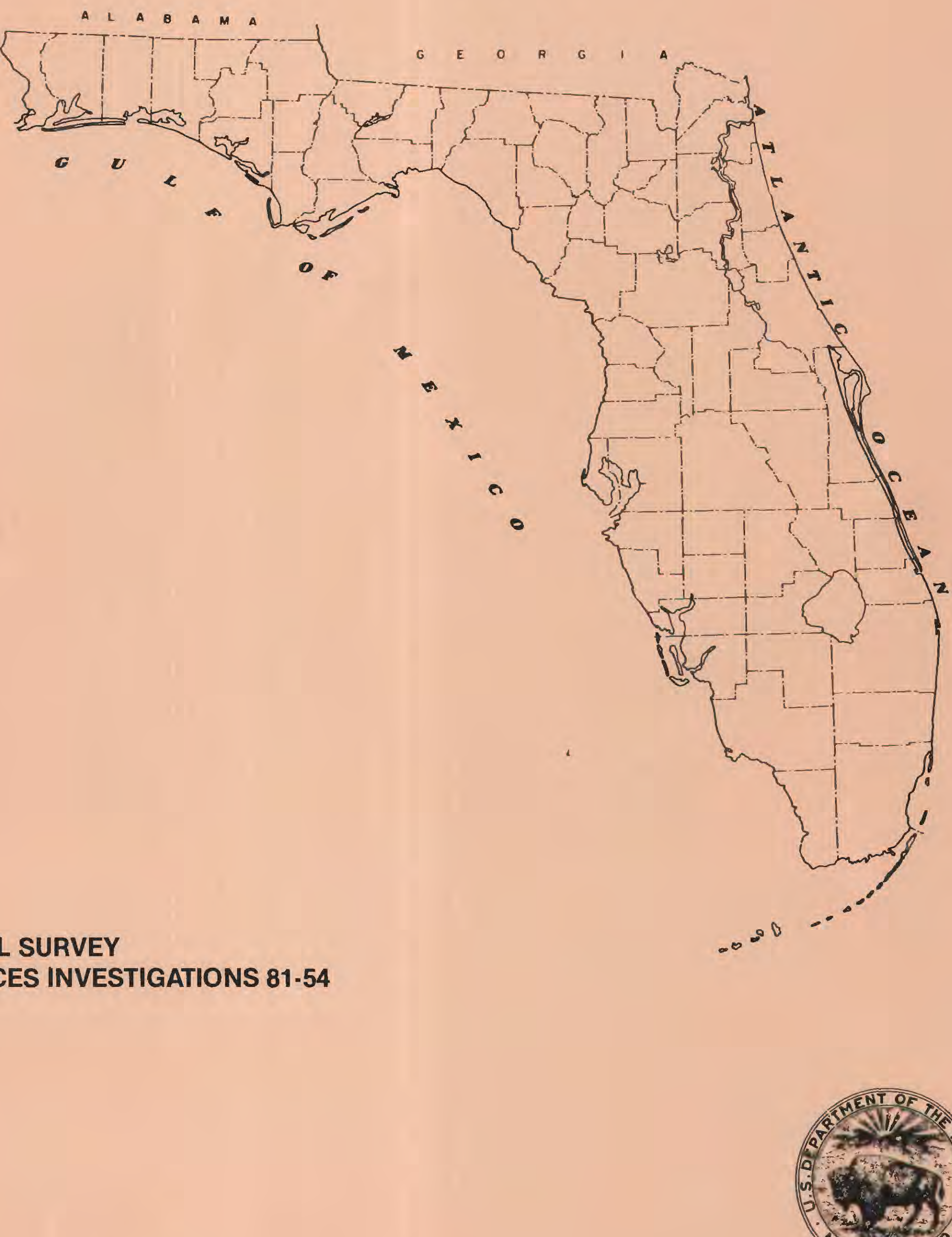
DIGITAL MODEL OF PREDEVELOPMENT FLOW IN THE TERTIARY LIMESTONE (FLORIDAN) AQUIFER SYSTEM IN WEST-CENTRAL FLORIDA



U.S. GEOLOGICAL SURVEY
WATER-RESOURCES INVESTIGATIONS 81-54

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A computer model was calibrated to approximate predevelopment flow conditions in a multilayered aquifer system in 10,600 square miles in west-central Florida. The lowermost aquifer, called the Floridan aquifer, is confined in most of the study area and consists of carbonate rocks ranging up to 1,300 feet thick. The Floridan aquifer is the chief source of large withdrawals and natural springflow in the study area. Daily springflows within the study area have averaged about 2.4 billion gallons.

The secondary artesian and the surficial aquifers are much less permeable than the Floridan aquifer. Where they are present and have heads higher than those in the Floridan aquifer, they provide recharge to the Floridan. Initial estimates of recharge to the Floridan aquifer were from water-balance calculations for surface-water basins; initial estimates of transmissivity were from aquifer tests and flow-net analyses.

The model was calibrated for the predevelopment era, wherein steady-state flow conditions were assumed. Calibrated transmissivities for the Floridan aquifer range from less than 15,000 to several million feet squared per day. Recharge to the system was about 3,700 cubic feet per second. About 90 percent was discharged as springflow, and 10 percent was upward leakage.

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*Floridan aquifer, West-central Florida, Southwest Florida Water Management District

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By Paul D. Ryder

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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

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ABBREVIATIONS AND CONVERSION FACTORS

Factors for converting inch-pound units to International System (SI) of metric units and abbreviation of units

Multiply	By	To obtain
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
inch per year (in/yr)	25.4	millimeter per year (mm/yr)
foot squared per day (ft^2/d)	0.0929	meter squared per day (m^2/d)

* * * * * * * * * * * * * *

National Geodetic Vertical Datum of 1929 (NGVD of 1929).--A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "mean sea level." NGVD of 1929 is referred to as sea level in this report.

DIGITAL MODEL OF PREDEVELOPMENT FLOW IN THE TERTIARY LIMESTONE (FLORIDAN) AQUIFER SYSTEM IN WEST-CENTRAL FLORIDA

By Paul D. Ryder

ABSTRACT

A digital computer model was calibrated to approximate predevelopment flow conditions in a multilayered aquifer system in west-central Florida. The lowermost aquifer, called the Floridan aquifer, is confined in most of the study area and consists of carbonate rocks ranging in thickness from about 400 feet in the north to more than 1,300 feet in the south. The Floridan aquifer is the chief source for large withdrawals and natural springflow in the study area--a 10,600-square-mile land area that approximately coincides with the Southwest Florida Water Management District. Springflows within the study area have averaged about 2.4 billion gallons per day. By 1979, water-well development accounted for an additional average outflow of about 940 million gallons per day.

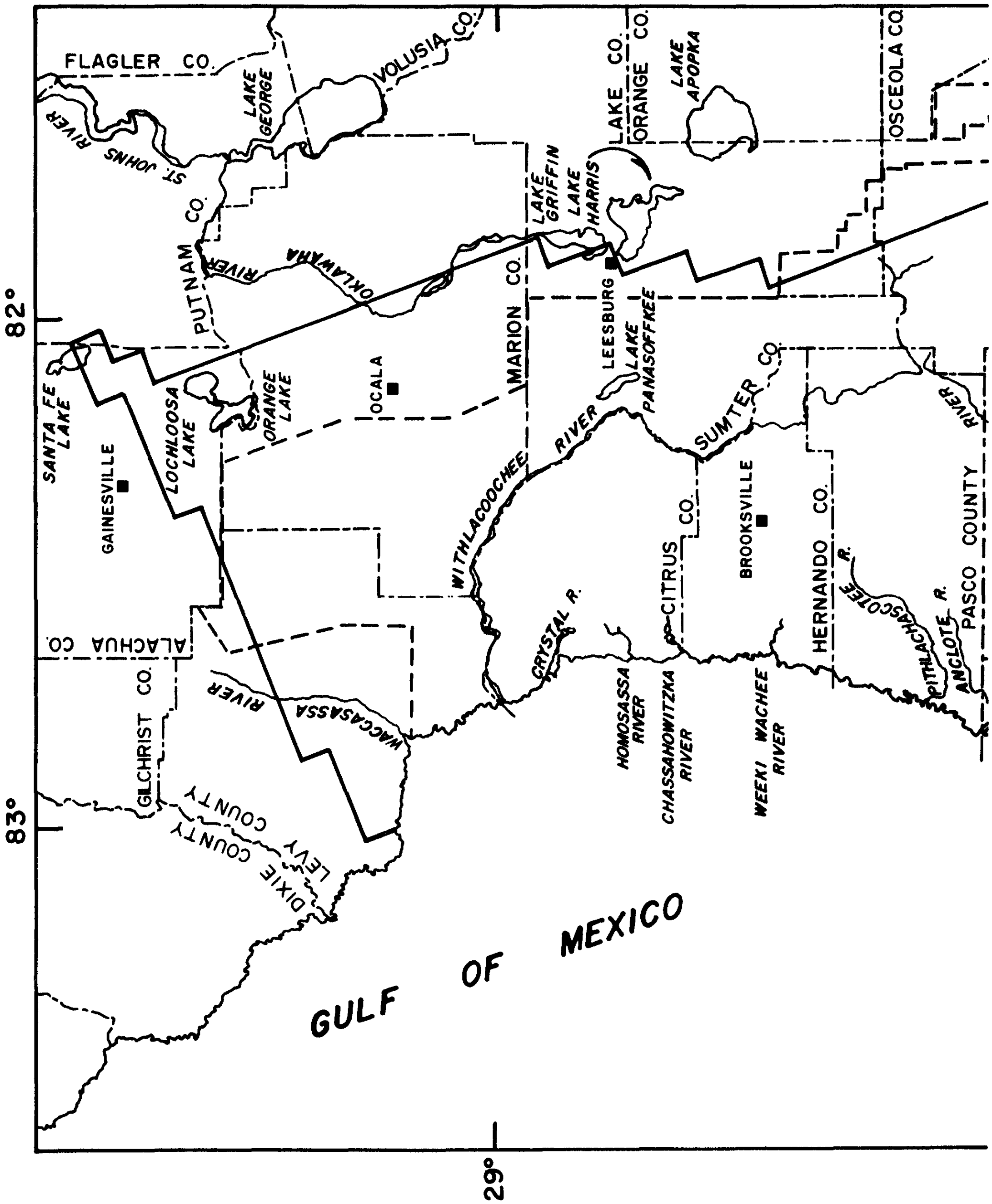
The shallow aquifers, including the secondary artesian aquifer and the surficial aquifer, are much less permeable than the Floridan aquifer and are not present everywhere in the study area. Where they are present and have heads higher than those in the Floridan aquifer, they provide recharge to the Floridan. Initial estimates of recharge to the Floridan aquifer were based on water-balance calculations for surface-water basins; initial estimates of transmissivity were based on aquifer tests and flow-net analyses.

The model was calibrated for the predevelopment era, for which steady-state flow conditions were assumed. Transmissivities and recharge rates were adjusted during calibration to make simulated values of heads and springflows approximate observed values. Recharge rates and transmissivities thus derived are similar to initial estimates. Calibrated transmissivities for the Floridan aquifer range from less than 15,000 (offshore, where the aquifer thins) to nearly 13,000,000 feet squared per day (near large springs). Under prepumping conditions, recharge to the system was about 3,700 cubic feet per second. Of this amount, about 90 percent was discharged as springflow and about 10 percent was upward leakage--primarily along the coast. The steady-state model provides a hydraulic description of the original flow system before development.

INTRODUCTION

Purpose and Scope

This study is part of a regional study of the Tertiary limestone aquifer system in the southeastern United States. The regional study encompasses all of Florida and extends into Georgia, Alabama, and South Carolina--a total area of about 82,000 mi^2. A complete discussion of the regional study and a map showing the several subproject areas comprising the study are given in Johnston (1978).


FLAGLER CO.
VOLUSIA CO.
LAKE GEORGE
ST. JOHNS RIVER
PUTNAM CO.
OKLAWAHA RIVER
LAKE GRIFFIN
LAKE HARRIS
LAKE CO.
ORANGE CO.
LAKE APOPKA
OSCEOLA CO.
MARION CO.
OCALA
LEESBURG
LAKE PANASOFFKEE
SANTA FE LAKE
LOCHLOOSA LAKE
ORANGE LAKE
GAINESVILLE
ALACHUA CO.
SUMTER CO.
WITHLACOOCHEE RIVER
CITRUS CO.
BROOKSVILLE
HERNANDO CO.
PASCO COUNTY
RIVER
CRYSTAL R.
PITHLACHASCOTEE R.
ANCLOTE R.
GILCHRIST CO.
WACCASASSA RIVER
HOMOSASSA RIVER
CHASSAHOWITZKA RIVER
WEEKI WACHEE RIVER
LEVY COUNTY
DIXIE COUNTY
GULF OF MEXICO
82°
83°
29°

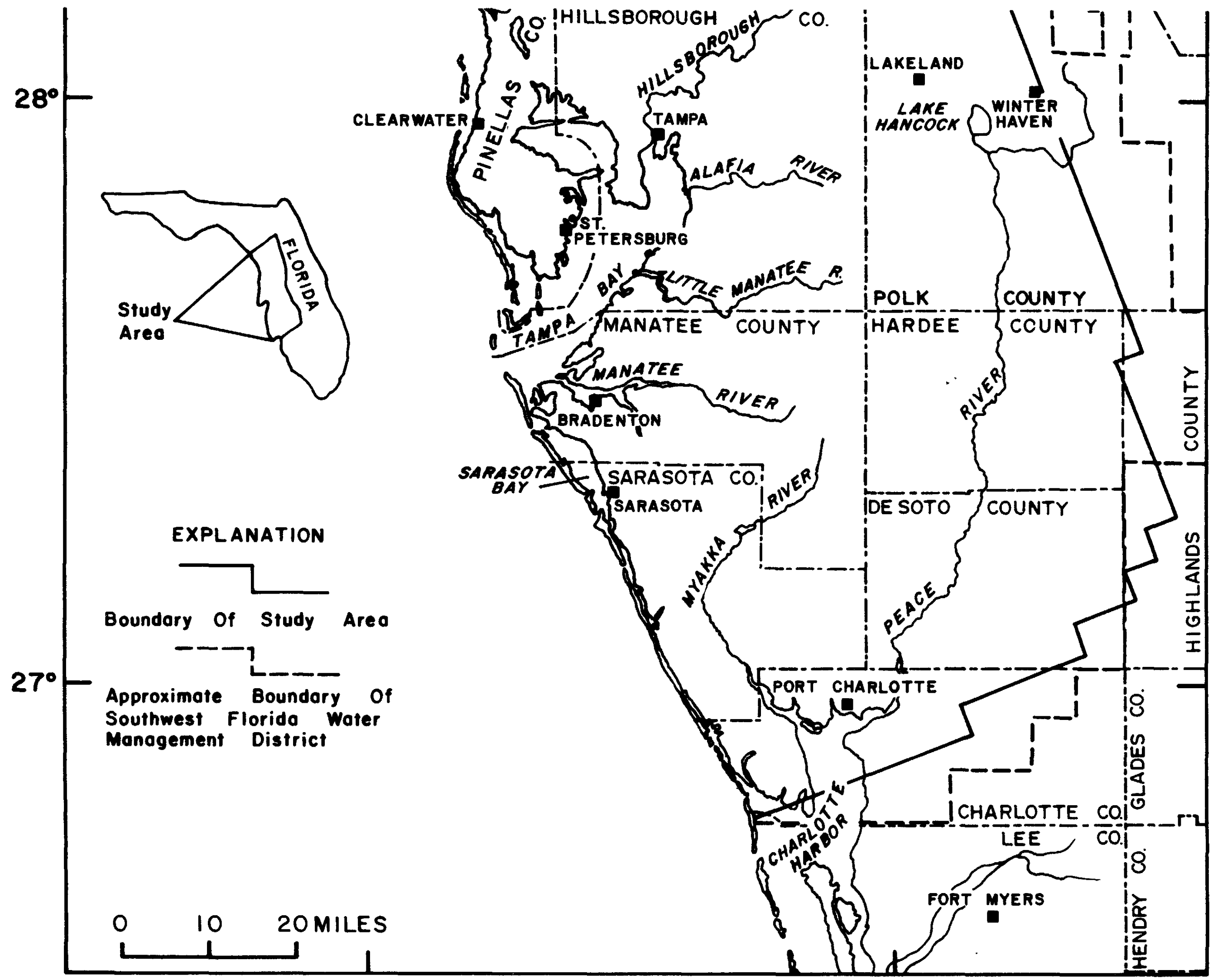


Figure 1.--Location of study area.

In Florida, the limestone aquifer is referred to as the Floridan aquifer (Parker and others, 1955), and this terminology will be used throughout the report. The Floridan aquifer is the major source of freshwater supplies for all of west-central Florida. A rapidly expanding population and industrial and agricultural development has led to increased demands on the ground-water resource. This increase in water use has resulted in problems, principally declining water levels and water-quality degradation.

Vast amounts of water are available from the aquifer. The problems of declining water levels and water-quality degradation in west-central Florida can be dealt with by employing effective water-management alternatives. Results of this study will aid water managers and others by providing (1) a description of the hydrogeologic framework and the associated ground-water flow system and (2) a digital computer model that assesses effects of large withdrawals of ground water.

This report describes the hydrogeologic framework and the predevelopment flow system based on the calibration of a three-layer, steady-state digital model. A second report documenting the calibration of a stressed, transient model that can be used for assessing water-management alternatives is planned.

Description of the Area

The study area includes all or part of 18 counties in west-central Florida. The nearly 10,600-mi^2 study area approximately coincides with the Southwest Florida Water Management District (fig. 1). The irregularly-shaped boundary is necessitated by boundaries of the digital model, as discussed later in the report.

Topography in the southern half of the study area is characterized by a low-lying coastal plain that gradually rises toward the east where thick, sandy ridges are at more than 200 feet above sea level. There are numerous lakes in the ridge areas. Surface-water drainage is relatively well developed; major streams include the Peace, Myakka, Manatee, Little Manatee, and Alafia Rivers.

High ridges continue in a north-northwesterly direction through northwestern Polk, eastern Pasco, east-central Hernando, and central Citrus Counties. Sand and clay beds are relatively thin and discontinuous in the more northern areas. Locally, they may support a perched water table or small lake, but generally the limestone lies at or near land surface. The irregular topography in northern areas, with numerous sinkholes and poorly developed surface drainage, is typical of karst areas. The coastal plain narrows toward the north, reaching its narrowest point in Citrus County. Eastward of the ridge, the topography becomes more subdued with numerous swamps, lakes, and shallow sinkholes. Major streams draining the northern part of the study area include the Hillsborough, Anclote, Pithlachascotee, Withlacoochee, Oklawaha, Waccasassa, Crystal, Homosassa, Chassahowitzka, and Weeki Wachee Rivers. Springflow from the Floridan aquifer accounts for a significant part of the mean annual discharge of many of these streams; for some streams, the discharges are virtually all springflow.

Records from 23 weather stations within and near the study area show that average rainfall for the period 1915 to 1976 ranged from 48 in/yr at Tampa to nearly 57 in/yr at Brooksville (Palmer and Bone, 1977, p. 6). More than one-half of total rainfall occurs in summer months June through September.

Previous Investigations

Numerous geological and hydrogeological investigations within or including the study area have led to published reports by the U.S. Geological Survey, the Florida Bureau of Geology (formerly the Florida Geological Survey), other State and Federal agencies, and consulting firms.

A regional report on the Tertiary limestone aquifer by Stringfield (1966) includes a review of the literature and a comprehensive summary of the hydrogeology and geochemistry of the Floridan aquifer system. Wilson and Gerhart (1980) studied an area of about 3,500 mi^2 in Manatee, Sarasota, De Soto, Hardee, and parts of Hillsborough and Polk Counties. They presented the results of a two-dimensional, single-layer digital flow model. Grubb and Rutledge (1979) also used a two-dimensional, single-layer flow model to evaluate the water-supply potential in an 870-mi^2 area known as the Green Swamp--including parts of Polk, Pasco, Hernando, Sumter, and Lake Counties. Faulkner (1973) discusses the hydrology of large springs associated with one of the world's most highly developed subsurface drainage systems in Marion County.

GROUND-WATER HYDROLOGY

Hydrogeologic Units and Hydraulic Properties

Floridan aquifer

The Floridan aquifer consists of a thick sequence of carbonate rocks of Tertiary age (table 1). Figure 2 shows locations of geologic sections depicted in figures 3 and 4. The sections, with some modifications, were provided by J. A. Miller of the U.S. Geological Survey (written commun., 1980). Section C-C' shows a thinning of the aquifer system from south to north as progressively younger rocks pinch out.

The base of the Floridan aquifer system in the study area is considered to be the first occurrence of vertically persistent, intergranular evaporites in either the Avon Park, Lake City, or Oldsmar Limestones (Wolansky, Barr, and Spechler, 1979). Hydraulic tests of rocks with intergranular evaporites indicate that they have an extremely low permeability.

In the southern half of the study area, a sequence of limestone and dolomite, in places more than 1,300 feet thick, lies between the aquifer system's base and the top of the Suwannee Limestone. These carbonate rocks comprise the Floridan aquifer (fig. 4). In some areas, the Floridan aquifer may include all or part of the Tampa Limestone. The Floridan aquifer has pronounced vertical anisotropy. Permeabilities are relatively low in the Ocala Limestone and very high in fractured dolomitic zones within the Avon Park Limestone, as substantiated by flow-meter and specific-capacity tests. Wolansky and others (1980) have mapped the top of the highly permeable Avon Park dolomite zone in the study area. Despite the large permeability contrasts, aquifer-test results indicate that there is enough vertical interconnection between each formation to consider the Floridan aquifer a single hydrologic unit.

Table 1.--Hydrogeologic framework

[Modified from Wilson and Gerhart, 1980, table 1.]

System	Series	Stratigraphic unit	General lithology	Major lithologic unit	Hydrogeologic unit
Quaternary	Holocene, Pleistocene, Pliocene	Surficial sand, terrace sand, phosphorite	Predominantly fine sand; interbedded clay, marl, shell, limestone, phosphorite	Sand	Surficial aquifer
		Undifferentiated deposits 1/	Clayey and pebbly sand; clay, marl, shell, phosphatic	Clastic	Confining bed
Tertiary	Miocene	Hawthorn Formation	Dolomite, sand, clay, and limestone; silty, phosphatic	Carbonate and clastic	Secondary artesian aquifer
		Tampa Limestone	Limestone, sandy, phosphatic, fossiliferous; sand and clay in lower part in some areas		Confining bed
	Oligocene	Suwannee Limestone	Limestone, sandy limestone, fossiliferous	Carbonate	Floridan aquifer
	Eocene	Ocala Limestone	Limestone, chalky, foraminiferal, dolomitic near bottom		
		Avon Park Limestone	Limestone and hard brown dolomite; intergranular evaporite in lower part in some areas		
		Lake City and Oldsmar Limestones	Dolomite and chalky limestone, with intergranular gypsum and anhydrite in most areas	Carbonate with intergranular evaporites	Confining bed (base of Floridan aquifer)

1/ Includes all or parts of Caloosahatchee Marl, Bone Valley Formation, Alachua Formation, and Tamiami Formation.

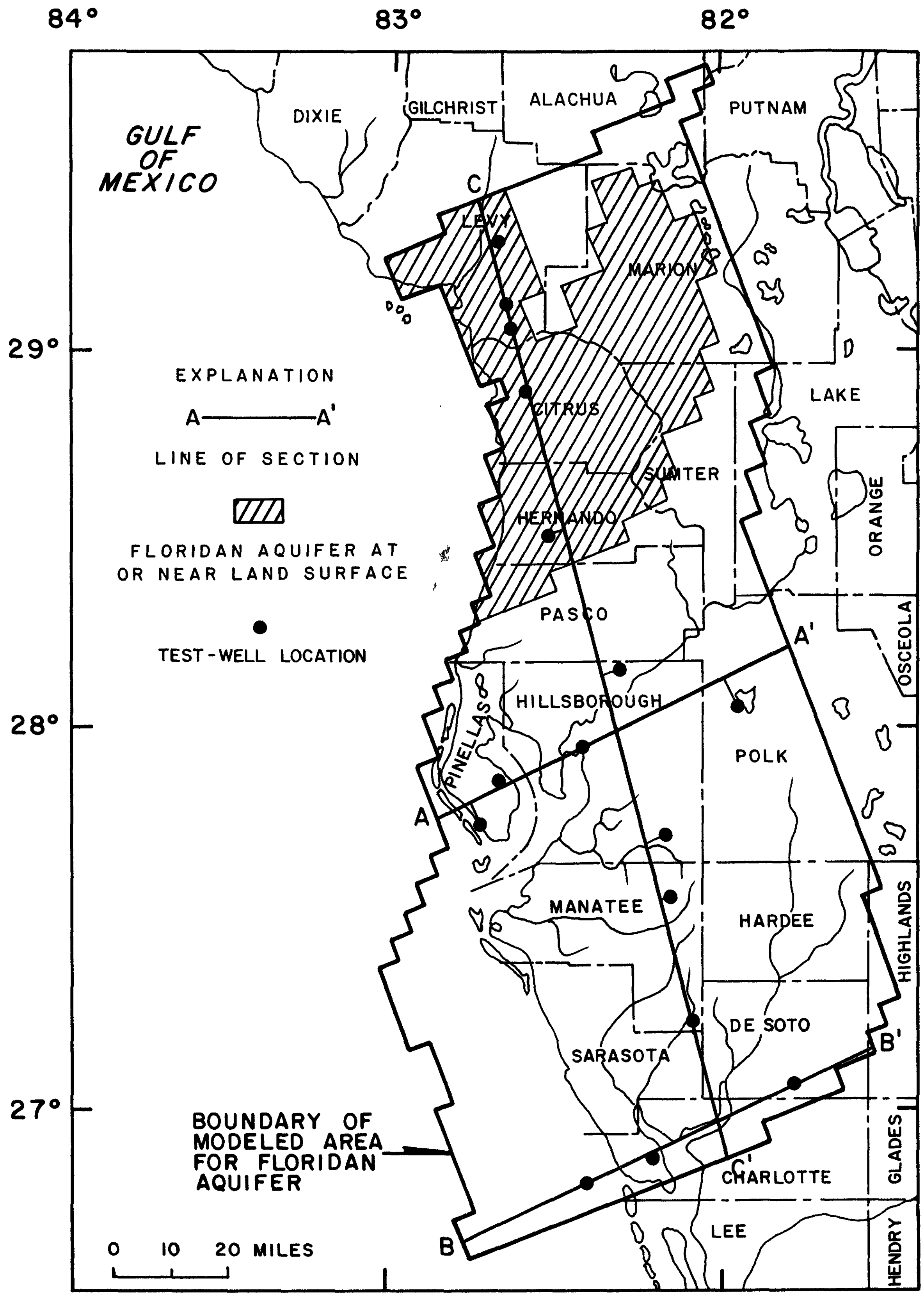


Figure 2.--Location of geologic sections and area where the Floridan aquifer is at or near land surface.

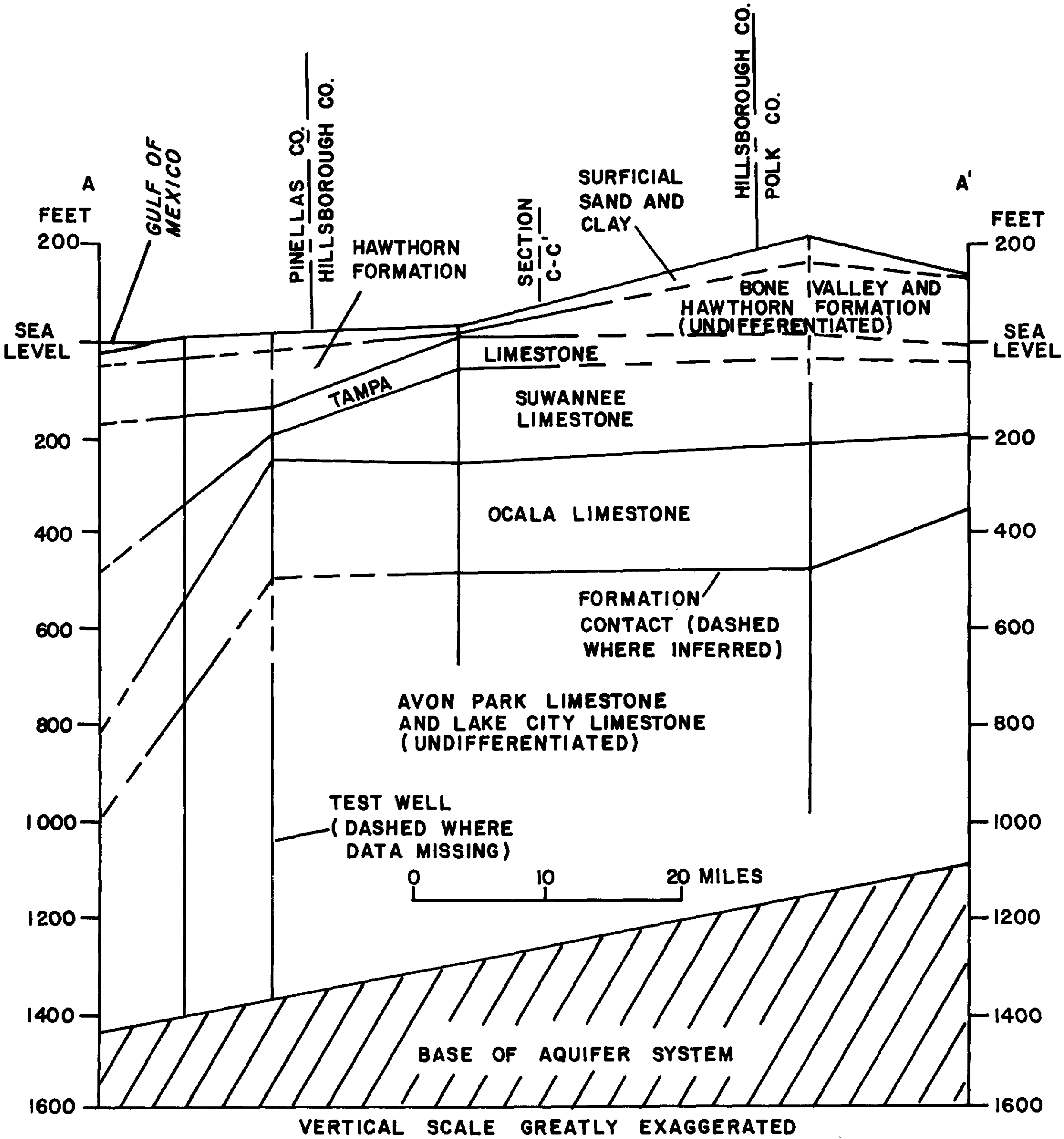
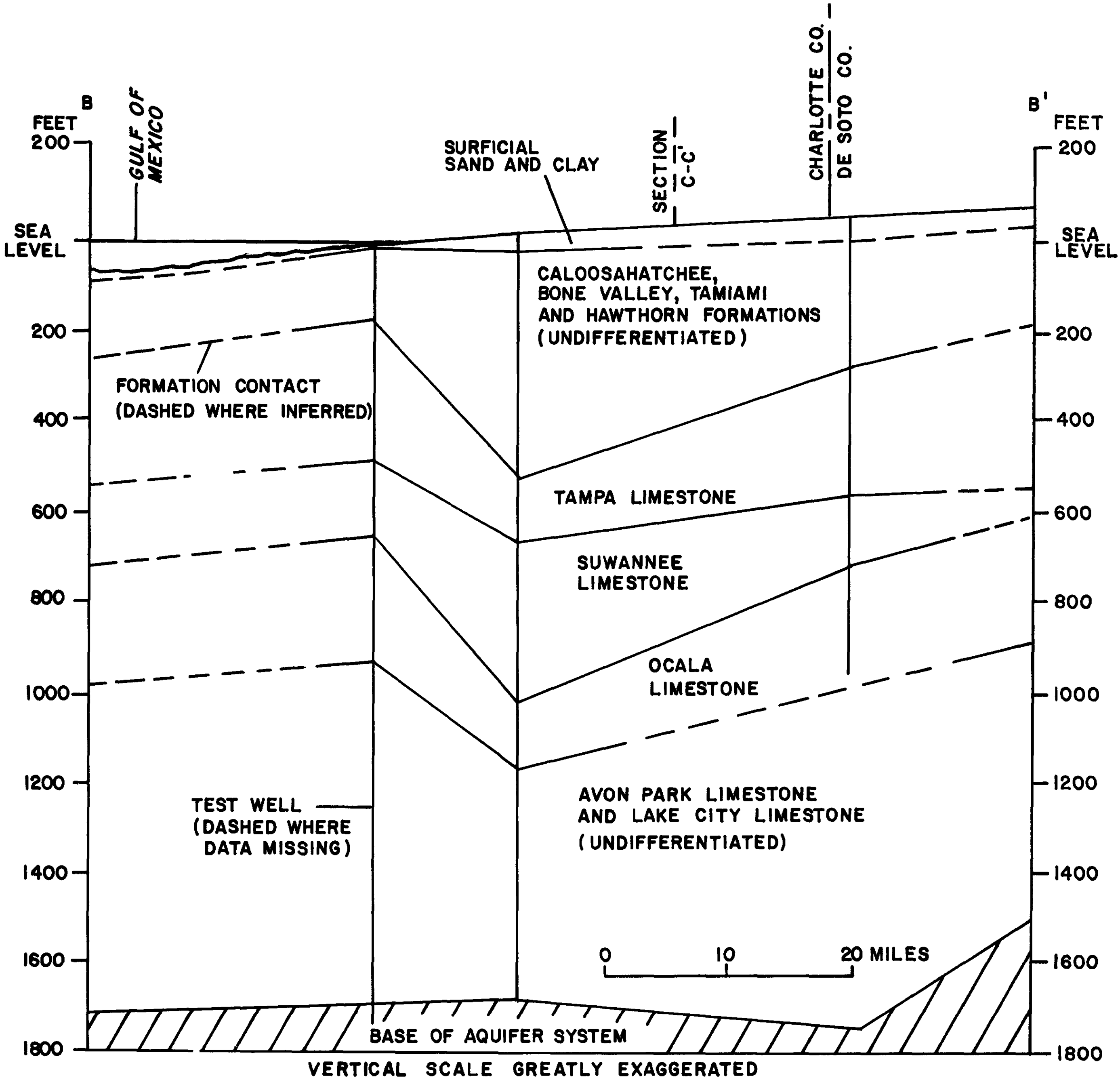


Figure 3.--Geologic sections


B
B'
FEET
200
GULF OF MEXICO
SURFICIAL SAND AND CLAY
SECTION C-C'
CHARLOTTE CO.
DE SOTO CO.
SEA LEVEL
CALOOSAHATCHEE, BONE VALLEY, TAMIAMI AND HAWTHORN FORMATIONS (UNDIFFERENTIATED)
200
FORMATION CONTACT (DASHED WHERE INFERRED)
400
TAMPA LIMESTONE
600
SUWANNEE LIMESTONE
800
OCALA LIMESTONE
1000
1200
TEST WELL (DASHED WHERE DATA MISSING)
AVON PARK LIMESTONE AND LAKE CITY LIMESTONE (UNDIFFERENTIATED)
1400
0
10
20 MILES
1600
BASE OF AQUIFER SYSTEM
1800
VERTICAL SCALE GREATLY EXAGGERATED

A-A' and B-B'.

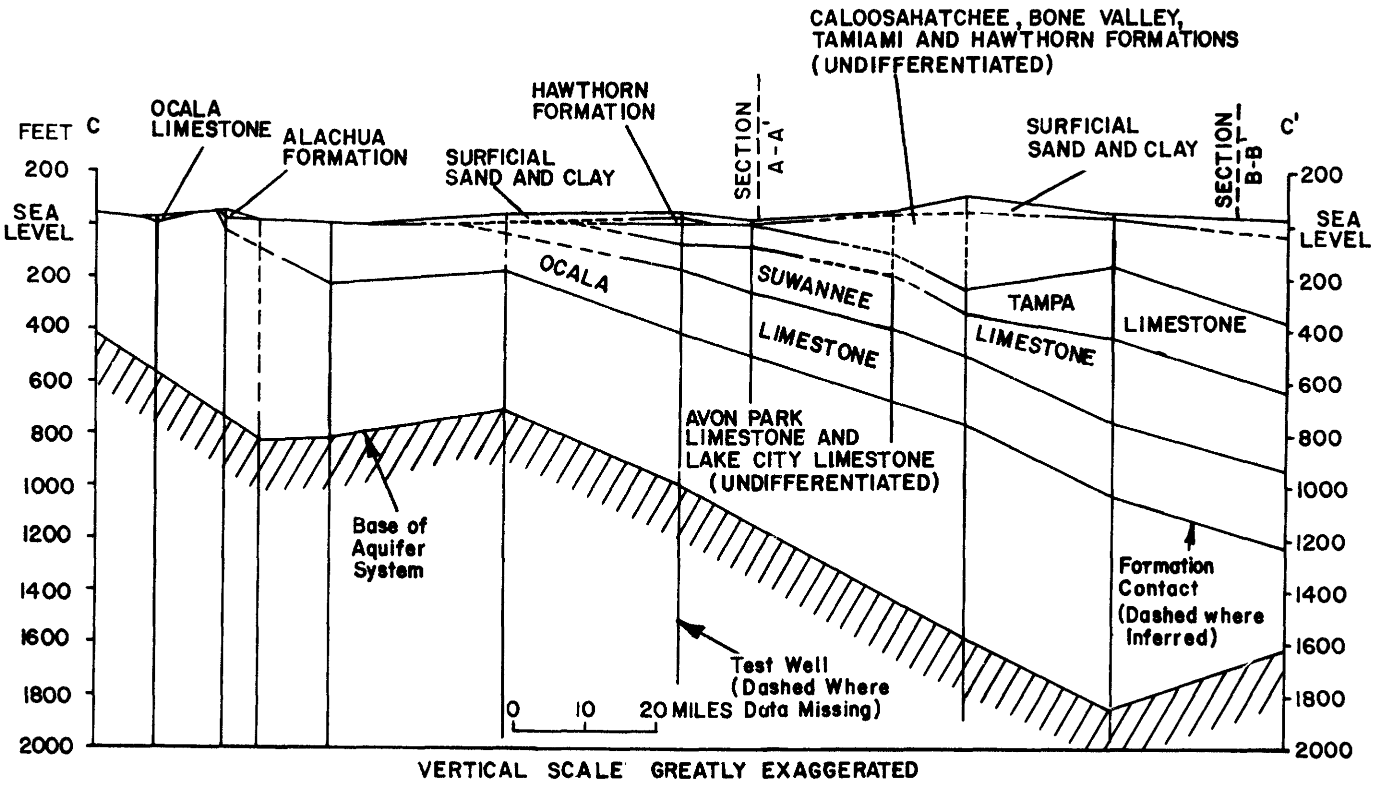


Figure 4.--Geologic section C-C'.

Northward of Pasco County, where the Ocala Limestone is at or near land surface, the permeability of the formation increases substantially, as indicated by its cavernous nature, high recharge rates, and numerous large springs. The Avon Park Limestone crops out in the Levy County area (fig. 4). In the general area of Levy and Marion Counties, Faulkner (1973, p. 72-77) suggests that the Avon Park Limestone may be considerably less permeable than the Ocala Limestone. As evidence, he cites the following: (1) pronounced highs in the potentiometric surface in southeast Levy County and southwest Marion County, where the Avon Park is at or near land surface, are the result of relatively low permeability in the Avon Park; (2) recrystallization during dolomitization of the Avon Park may not only have reduced effective intergranular porosity and permeability, but, because dolomite is much less soluble than limestone, development of solution channels from circulating ground water must also have been reduced; and (3) dissolved solids concentrations, sulfate concentrations, and temperature of water from Rainbow Springs in southwest Marion County and Silver Springs in central Marion County suggest that the water has traveled relatively short distances through a well-developed solution-channel system in the shallower part of the aquifer, as opposed to flow through the less permeable, underlying Avon Park where water is known to be more mineralized. Total thickness of the Floridan aquifer in the north is as little as 400 feet.

Figure 5 shows transmissivity values for the Floridan aquifer based on aquifer tests, estimates from specific-capacity tests, and flow-net analyses in the vicinity of large springs. (References for aquifer tests shown in figure 5 are listed in table 2.) Nearly all of the wells associated with the tests penetrated the more permeable zones of the aquifer. However, zones containing saline water (greater than 10,000 mg/L chloride concentration) are not considered to be part of the flow system in this report. Thus, transmissivities shown in Pinellas and Sarasota Counties (where the upper, and predominantly freshwater, part of the aquifer is thin) are considerably lower than would be the case if the entire aquifer, particularly the Avon Park dolomite zones, contained freshwater.

Figure 5 shows that in about the southern two-thirds of the study area transmissivity is relatively uniform over large areas, and the range of transmissivities is not much greater than one order of magnitude. Development of large solution channels is relatively rare in this part of the study area, and transmissivity appears to correlate better with total aquifer thickness than with any other hydrogeologic characteristic.

Conditions in the northern part of the study area, particularly in the vicinity of large springs in Marion, Citrus, and Hernando Counties, are considerably different. In these areas, solution channels in the Ocala Limestone are apparently highly developed. As discussed by Faulkner (1973, p. 69-70), flow paths converging into troughs in the potentiometric surface may indicate solution-channel systems that become increasingly well developed as larger springs such as Silver and Rainbow Springs are approached. Since there is no increase in hydraulic gradient, a progressive increase in permeability is essential in order to accommodate the increasing volume of flow converging on the area of discharge. Thus, in areas having large springs and low head gradients, one should expect transmissivity to (1) be lowest at the divides of groundwater basins in which the springs are located and (2) be much lower in the interchannel zones as opposed to the solution-channel zones. It should be stressed that transmissivities derived from the digital model in a later section of this report are averages, representative of solution channels, interchannel zones, and the underlying, less permeable dolomite.

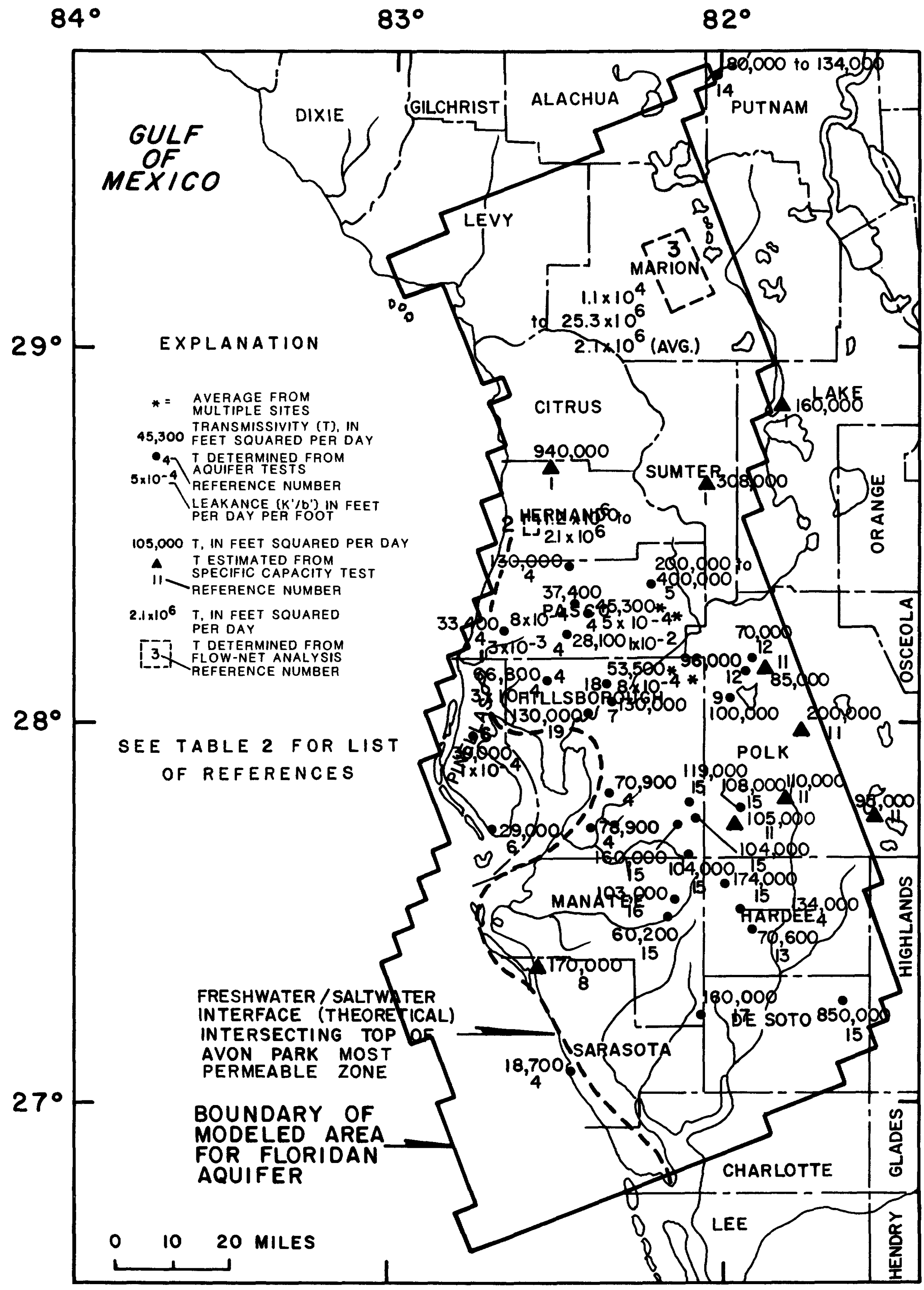


Figure 5.--Locations of aquifer-test sites showing aquifer characteristics data for freshwater part of the Floridan aquifer.

Table 2.--References for aquifer tests shown in figure 5

Reference number	Reference
1	Estimated from unpublished data
2	Sinclair (1978, p. 17)
3	Faulkner (1973, p. 97)
4	R. M. Wolansky, U.S. Geological Survey (written commun., 1980)
5	Tibbals and others (1980)
6	Hickey (1981, p. 15)
7	Stewart (1977, p. 205)
8	Estimated from data in Sutcliffe (1979, p. 6)
9	Robertson (1973, p. 14)
10	Stewart (1966, p. 114)
11	Estimated from data in Stewart (1966, table 10)
12	Pride and others (1966, p. 83)
13	LaMoreaux and Associates (1979)
14	Yobbi and Chappell (1979, p. 53)
15	Wilson and Gerhart (1980, p. 19)
16	William F. Guyton and Associates (1976, p. 59)
17	Geraghty and Miller, Inc. (1978, p. 10)
18	Ryder and others (1980)
19	Stewart and others (1978, p. 21)

Highest transmissivities occur around major springs where they exceed one million ft^2/d. Leakance values shown in figure 5 probably reflect vertical leakage from the overlying confining bed, with no significant leakage from the underlying evaporite section.

Secondary Artesian Aquifer

The secondary artesian aquifer consists primarily of carbonate rocks within the Hawthorn Formation (Stewart, 1966, p. 83). It is confined below by clay beds in the Tampa Limestone or, where the Tampa is part of the Floridan aquifer, by less permeable material in the lower part of the Hawthorn. Geologic section A-A' (fig. 2) very nearly coincides with the northernmost extent of the secondary artesian aquifer. Toward the south, the aquifer consists of permeable carbonates of the Tampa Limestone, as well as those within the Hawthorn, and the aquifer thickens to over 400 feet in Charlotte County. The aquifer is confined above by less permeable material in the overlying formations or by clay beds in the upper part of the Hawthorn. Discontinuous clay beds occur within the carbonate section of the secondary artesian aquifer.

Transmissivities for the secondary artesian aquifer are shown in figure 6. (References for aquifer tests shown in figure 6 are listed in table 3.) The distribution of transmissivity indicates that the carbonate rocks are relatively impermeable in some areas and, other than confining water within deeper rocks, have little influence on the regional flow system. In areas of higher transmissivities, the aquifer may have a significant effect on the regional flow system, particularly under conditions of pumping stress.

Surficial Aquifer

The thickness of the permeable surficial deposits, generally consisting of sand, clayey sand, shell, and shelly marl, were mapped for most of the study area by Wolansky, Spechler, and Buono (1979). Thicknesses range from nearly zero in the northern part of the study area (figs. 3 and 4) to greater than 100 feet in southeastern Levy, eastern Sumter, eastern Hardee, and northeastern De Soto Counties.

The deposits are generally saturated to within a few feet of land surface in the southern part of the study area. Northward from about Hillsborough and Polk Counties, the water table lies progressively deeper within the surficial deposits. Here, the surficial deposits are thin and discontinuous over large areas. In these areas, the Floridan aquifer is generally unconfined, and only isolated, perched water-table conditions exist within the surficial deposits.

Transmissivities of the surficial aquifer vary according to saturated thickness and lithology. R. M. Wolansky (U.S. Geological Survey, written commun., 1980) reports five values of transmissivity for the surficial aquifer--two sites in northwest Hillsborough County averaging 205 ft^2/d; 1,800 ft^2/d in southeast Hillsborough County; 270 ft^2/d in northeast Sarasota County; and 880 ft^2/d in southwest De Soto County. Hutchinson (1978, p. 22) reports 2,200 ft^2/d for a site in southern Polk County. Wilson (1977, p. 28) estimated an average transmissivity of about 1,100 ft^2/d for De Soto and Hardee Counties.

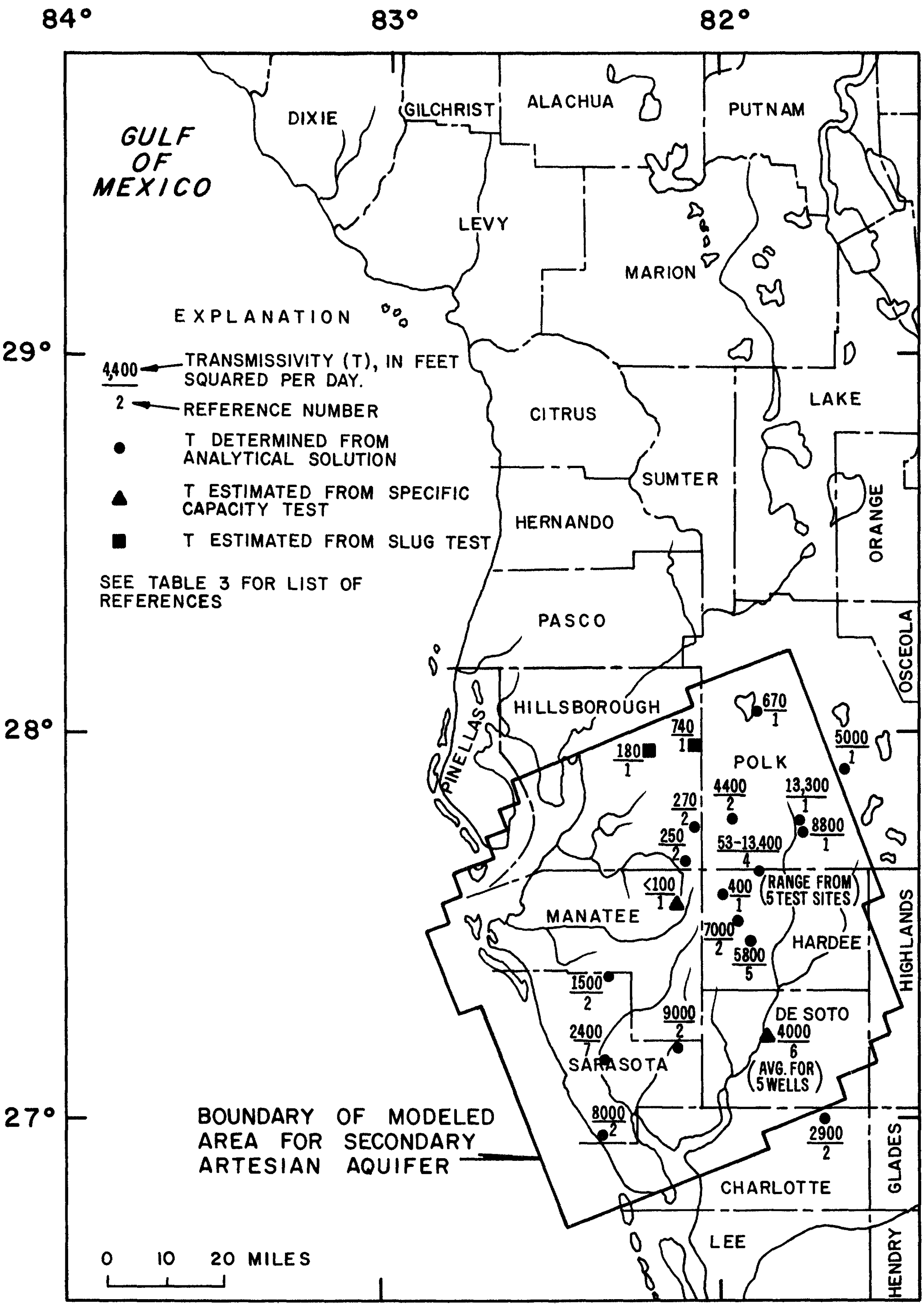


Figure 6.--Locations of aquifer-test sites showing transmissivity determinations for the secondary artesian aquifer.

Table 3.--References for aquifer tests shown in figure 6

Reference number	Reference
1	Hutchinson (1976, p. 22)
2	R. M. Wolansky (U.S. Geological Survey, written commun., 1980)
3	William F. Guyton and Associates (1976, p. 17)
4	Dames and Moore (1979)
5	LaMoreaux and Associates (1979)
6	Wilson (1977, p. 31)
7	Geraghty and Miller, Inc. (1978)

Regional Flow System of the Floridan Aquifer

Predevelopment Conditions

Water in the limestone aquifer system generally originates as rainfall within the study-area boundary. Essentially no ground water enters or leaves the area laterally through the aquifers (by design, the study-area boundary is along divides on the potentiometric surface). The exception is a minor amount of flow into and out of the secondary artesian aquifer along the southeastern and southern boundaries.

To estimate ground-water recharge rates to the limestone aquifer system, a series of steady-state, water-balance calculations for surface-water basins (or groups of basins) was made by P. W. Bush of the U.S. Geological Survey (written commun., 1980). For a given surface-water basin or group of basins, the residual from rainfall, runoff, and evapotranspiration is equal to the net interbasin transfer of water in the limestone aquifer. Net interbasin transfer is basin boundary outflow in the limestone aquifer minus basin boundary inflow. Net lateral flow in the basin limestone system must be balanced by net vertical flow; that is, net interbasin transfer equals limestone recharge minus limestone discharge. Therefore, limestone recharge equals net interbasin transfer plus any upward discharge from the limestone (primarily to rivers or springs). Basin recharge figures thus obtained are based on long-term estimates of the hydrologic components noted above.

Recharge rates estimated from the water-balance calculations have the following general characteristics: northward from about northern Pasco County, rates are generally high--from about 8 to 20 in/yr; southward the rates generally decrease, ranging from about 1 to 8 in/yr. Discharge through upward leakage occurs off-coast and along coastal areas, including bays, and generally along the downstream reaches of major stream valleys.

Figure 7 shows the estimated average potentiometric surface of the Floridan aquifer as it probably existed prior to development. The map is a composite of older maps and published water-level records in areas now affected by pumpage and recent maps in areas where pumping has been minimal. Contour lines drawn in off-coast areas are not based on observed data, but are simply extrapolations of landward head gradients. This estimated potentiometric surface is subsequently referred to as the observed surface; it is to be distinguished from a model-generated or simulated surface. Average potentiometric-surface maps were also estimated for the secondary artesian aquifer and for the surficial aquifer.

By comparing potentials, or heads, in the Floridan aquifer with those of the overlying aquifer, areas of recharge (unshaded areas, fig. 7) can be distinguished from discharge areas (shaded areas, fig. 7). To define recharge and discharge areas in northern areas where an overlying aquifer is generally absent, heads in the Floridan aquifer were compared with altitudes of land surface. Floridan heads are at or above land surface in swampy areas along the coastal margin, including a relatively large swampy area in Levy County, thus indicating upward leakage or discharge. The direction of ground-water flow (based on flow lines drawn perpendicular to the potentiometric contours in figure 7) is generally westward or coastward from recharge areas to discharge areas.

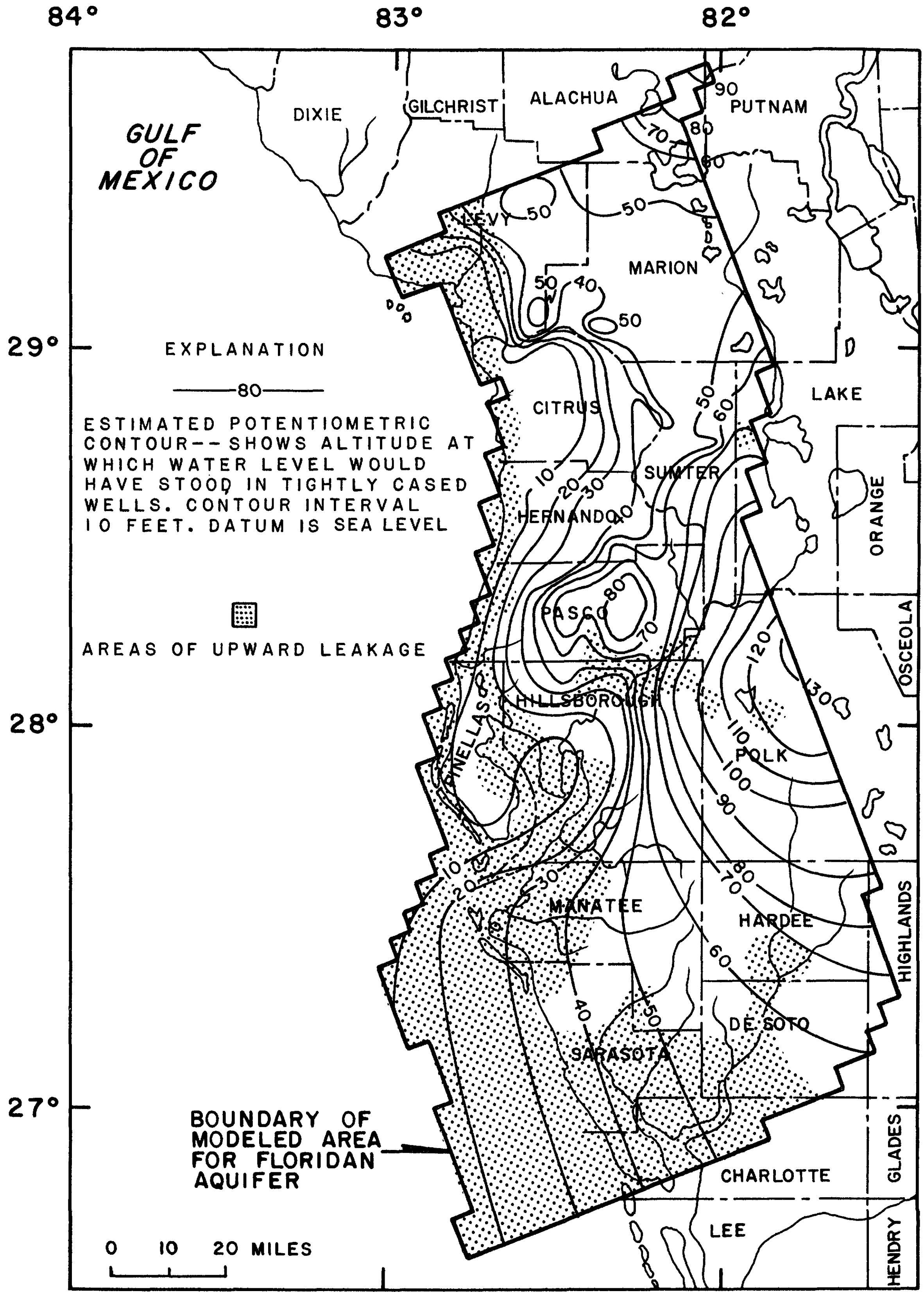


Figure 7.--Estimated average potentiometric surface of the Floridan aquifer prior to development (from Johnston and others, 1980).

A more important component of ground-water discharge than upward leakage through confining beds is springflow. Thirty-four spring sites, having a combined average annual freshwater discharge of more than 2.3 billion gallons per day, are shown in figure 8. (Names and discharge rates for springs are listed in table 4.) This discharge probably accounts for about 90 percent of all water discharging from the Floridan aquifer under predevelopment conditions. Many of the springs are located along the coast, and submarine springs are known to exist off the coastal areas of Pinellas and Lee Counties. Two large spring systems located inland in Marion County--Rainbow and Silver--have a combined average discharge exceeding 1 billion gallons per day.

Present-Day (1979) Conditions

The average rate of ground-water pumpage within the Southwest Florida Water Management District for 1979 (Duerr and Trommer, 1981) was about 940 Mgal/d. About 41 percent of this pumpage was for irrigation and the remainder for public, industrial, and rural-domestic supply. Comparison of the predevelopment potentiometric surface with an estimated mean 1979 potentiometric surface shows that northward from about the Hillsborough-Pasco County line, differences of only a few feet are observed; these are around localized centers of heavy pumpage. Southward from about the Hillsborough-Pasco County line, the average 1979 heads may differ greatly from predevelopment heads, reaching a maximum decline of over 40 feet in southwestern Polk County. These large declines are generally caused by large ground-water withdrawals by the phosphate-mining industry and for crop irrigation in areas where confining beds are relatively thick and recharge rates relatively low.

Generalized Conceptual Model of Predevelopment Flow System

Figures 9, 10, and 11 are hydrogeologic sections made from known and generalized data along column 13, column 40, and row 20, respectively (fig. 12). The sections illustrate the generalized conceptual model of steady-state flow within the hydrogeologic framework. It is emphasized that the vertical scale in the hydrogeologic sections is greatly exaggerated, and the vertical component of flow within the aquifers (flow paths are represented by arrows) is likewise greatly exaggerated. Note that figures 9, 10, and 11 do not have identical scales.

Figure 11 shows water flowing into or out of an aquifer depending on relative altitudes of potentiometric heads. In general, in about the eastern half of the section, water flows downward from the surficial aquifer through a confining layer and into the secondary artesian aquifer. A relatively small amount of this water returns to the surface in topographically low areas such as the Peace River valley or flows eastward out of the study area. The remainder of the water eventually continues downward through a confining bed and into the Floridan aquifer, where the flow is westward toward the Gulf. Along the coastal margin and in the Gulf, there is a reversal in relative potentiometric heads and water flows upward through the confining beds. There is no flow across a freshwater-saltwater interface.

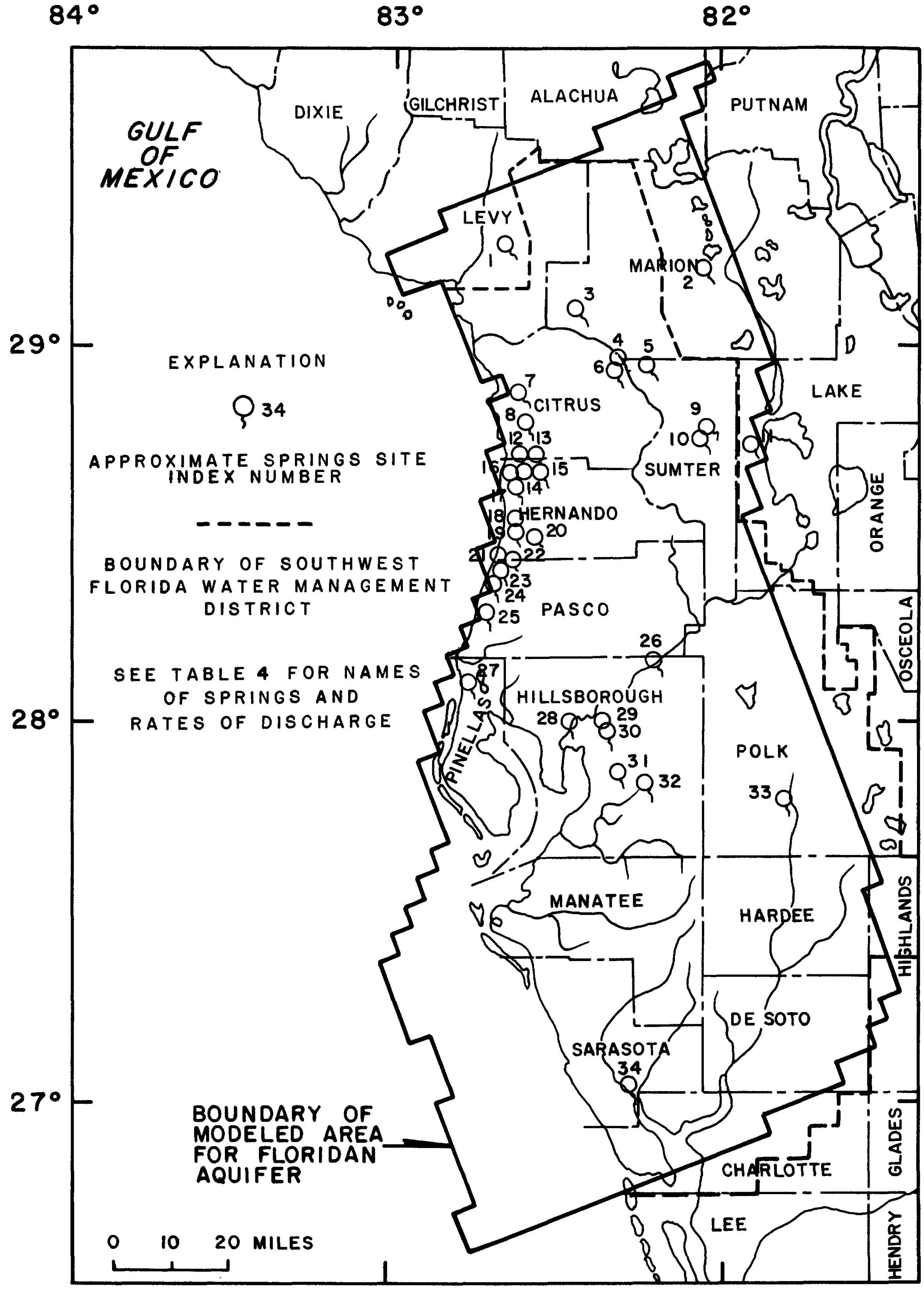
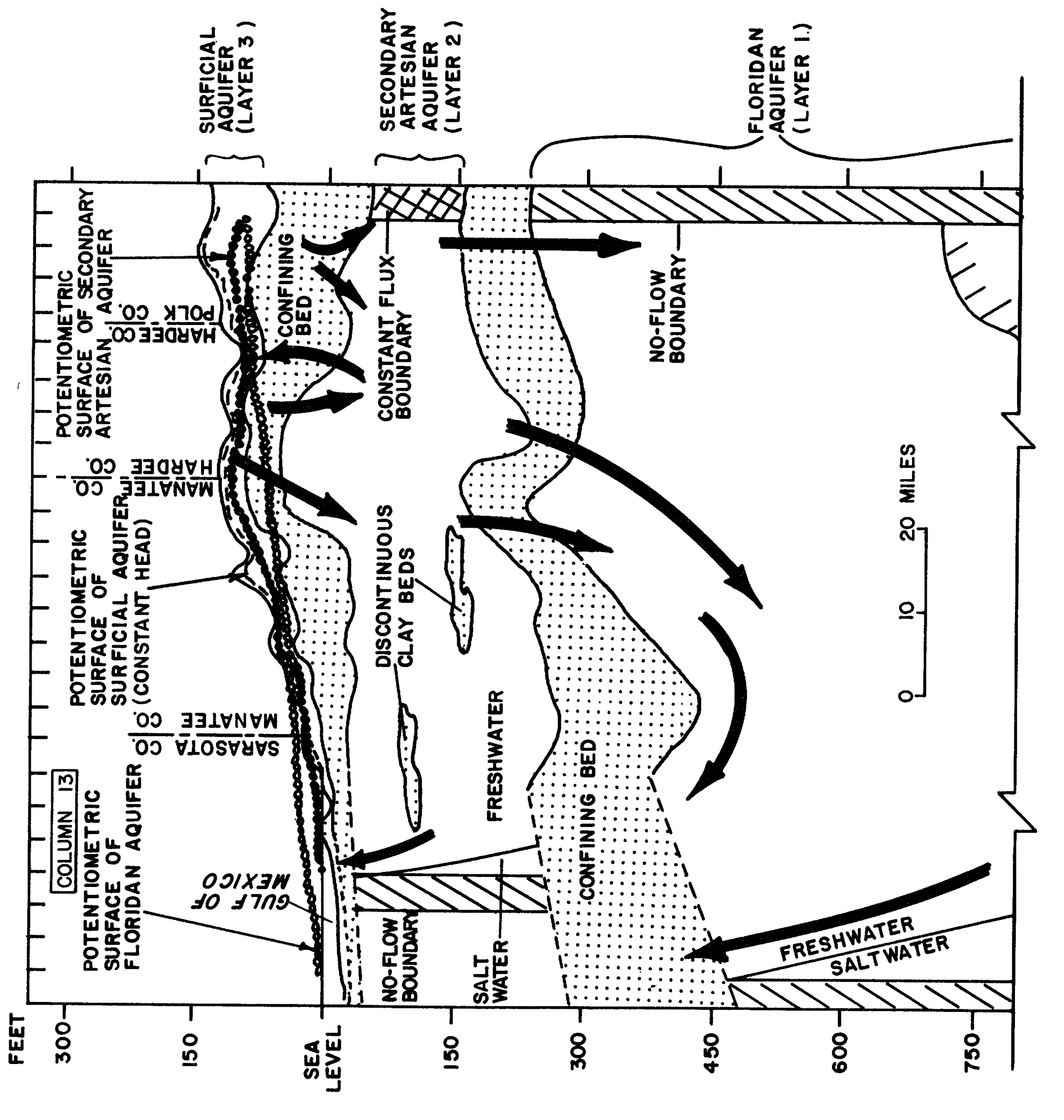


Figure 8.--Locations of springs discharging from the Floridan aquifer.

Table 4.--Names and discharge rates for springs shown in figure 8

Index number	Spring(s)	Flow (Mgal/d)
1	Wekiva	36
2	Silver	530
3	Rainbow	493
4	Wilson Head	2
5	Gum	32
6	Blue	10
7	Crystal River Group	592
8	Homosassa	113
9	Fenny	10
10	Miscellaneous	19
11	Bugg	10
12	Potter and Ruth	19
13	Chassahowitzka	89
14	Nos. 10, 11, 12	6
15	No. 9	13
16	Blind	26
17	No. 7	16
18	Salt	19
19	Mud	32
20	Weeki Wachee	114
21	Boat	3
22	Bobhill	2
23	Magnolia	6
24	Horseshoe	4
25	Salt	3
26	Crystal	39
27	Health	3
28	Sulphur	28
29	Lettuce Lake	6
30	Eureka	1
31	Buckhorn	8
32	Lithia	33
33	Kissengen	10
34	Warm Mineral	19
	Total flow	2,346


FEET
300
150
SEA LEVEL
150
300
450
600
750
COLUMN 13
POTENTIOMETRIC SURFACE OF FLORIDAN AQUIFER
GULF OF MEXICO
SARASOTA CO. | MANATEE CO.
POTENTIOMETRIC SURFACE OF SURFICIAL AQUIFER (CONSTANT HEAD)
MANATEE CO. | HARDEE CO.
POTENTIOMETRIC SURFACE OF SECONDARY ARTESIAN AQUIFER
HARDEE CO. | POLK CO.
CONFINING BED
CONSTANT FLUX BOUNDARY
DISCONTINUOUS CLAY BEDS
FRESHWATER
NO-FLOW BOUNDARY
SALT WATER
CONFINING BED
FRESHWATER
SALTWATER
0 10 20 MILES
NO-FLOW BOUNDARY
SURFICIAL AQUIFER (LAYER 3)
SECONDARY ARTESIAN AQUIFER (LAYER 2)
FLORIDAN AQUIFER (LAYER 1.)

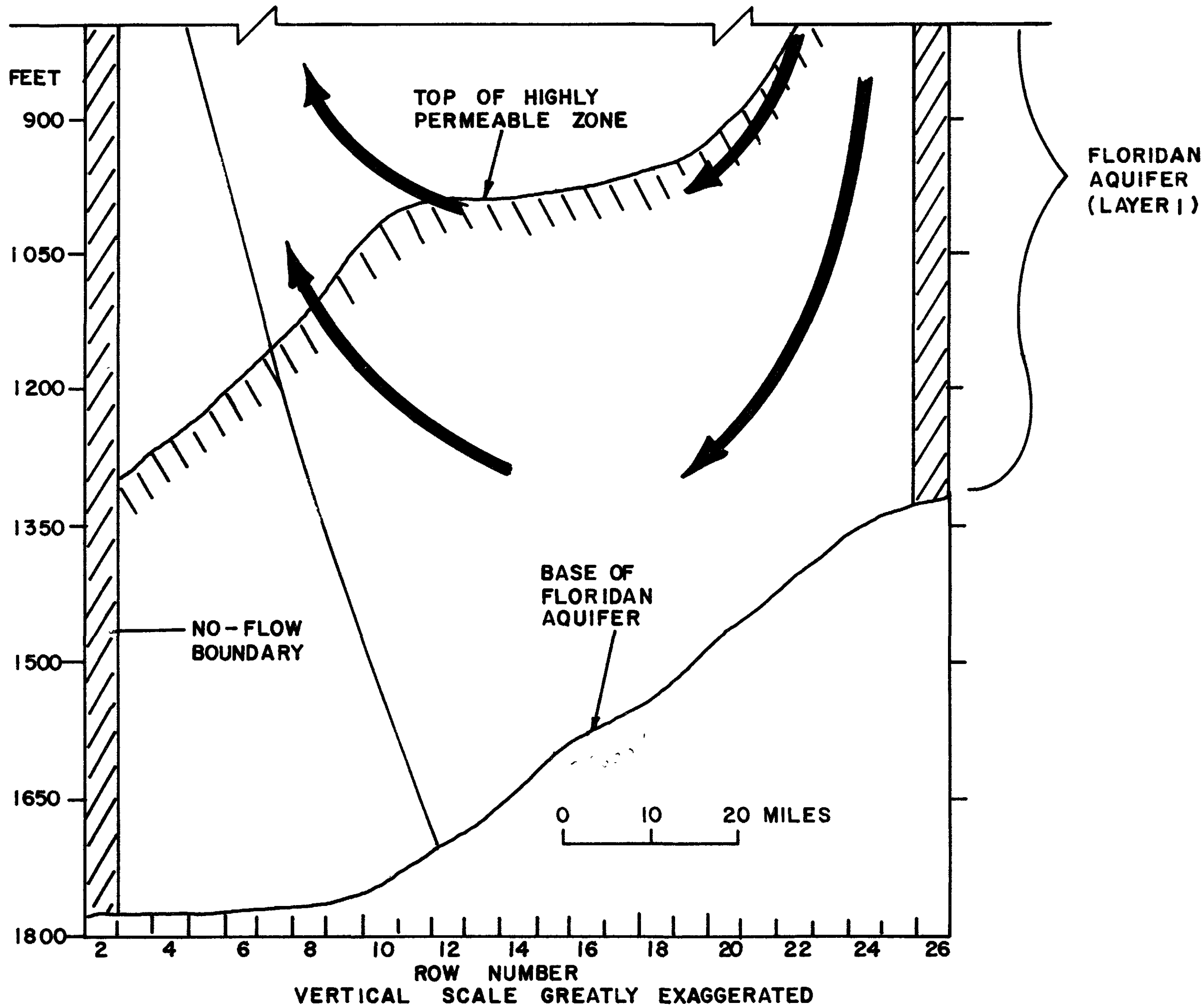


Figure 9.--Generalized hydrogeologic section along column 13 showing steady-state flow.

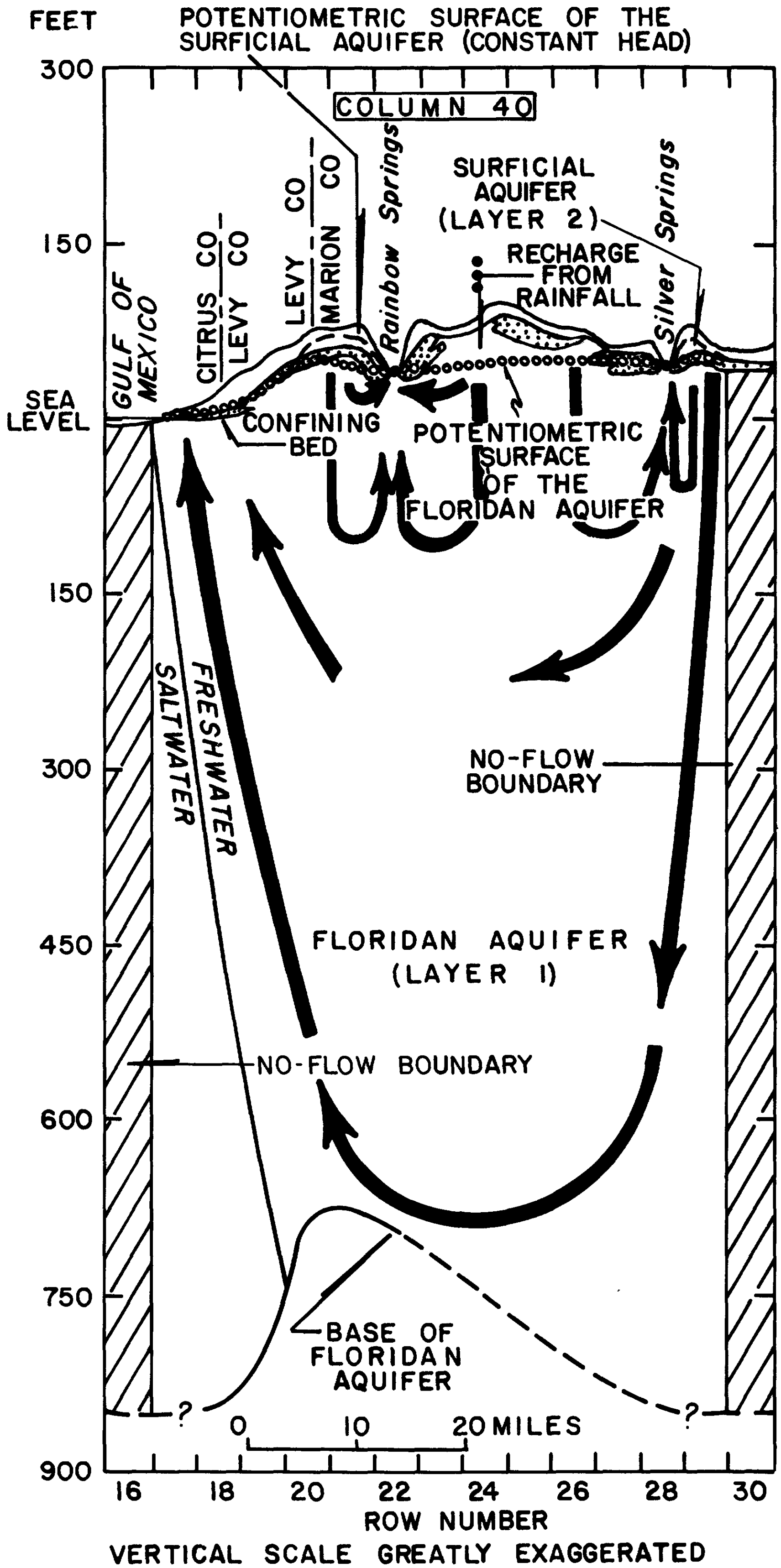


Figure 10.--Generalized hydrogeologic section along column 40 showing steady-state flow.

Freshwater-saltwater interface positions in figures 9 and 10 were estimated by applying the Hubbert (1940) interface relation, which states that under conditions of hydrostatic equilibrium the depth below sea level to the base of freshwater is about 40 times the altitude of the freshwater head on the interface. Heads from the predevelopment potentiometric surface map or its offshore extension were used to establish the position of the interface. Since these heads were obtained from zones above the interface, a necessary assumption is that they are the same as those on the interface. The maximum seaward extent of the interface thus obtained was determined by extrapolating the top-of-the-aquifer surface offshore to the point where the interface crossed the estimated top of the aquifer. In the southern half of the study area (fig. 9), a sharp decrease in aquifer transmissivity occurs where water in the highly permeable zone in the Avon Park Limestone goes from fresh to saline (assuming that the saltwater zone is not part of the flow system). An areal trace of the freshwater-saltwater interface intersecting the top of the highly permeable zone is shown in figure 5.

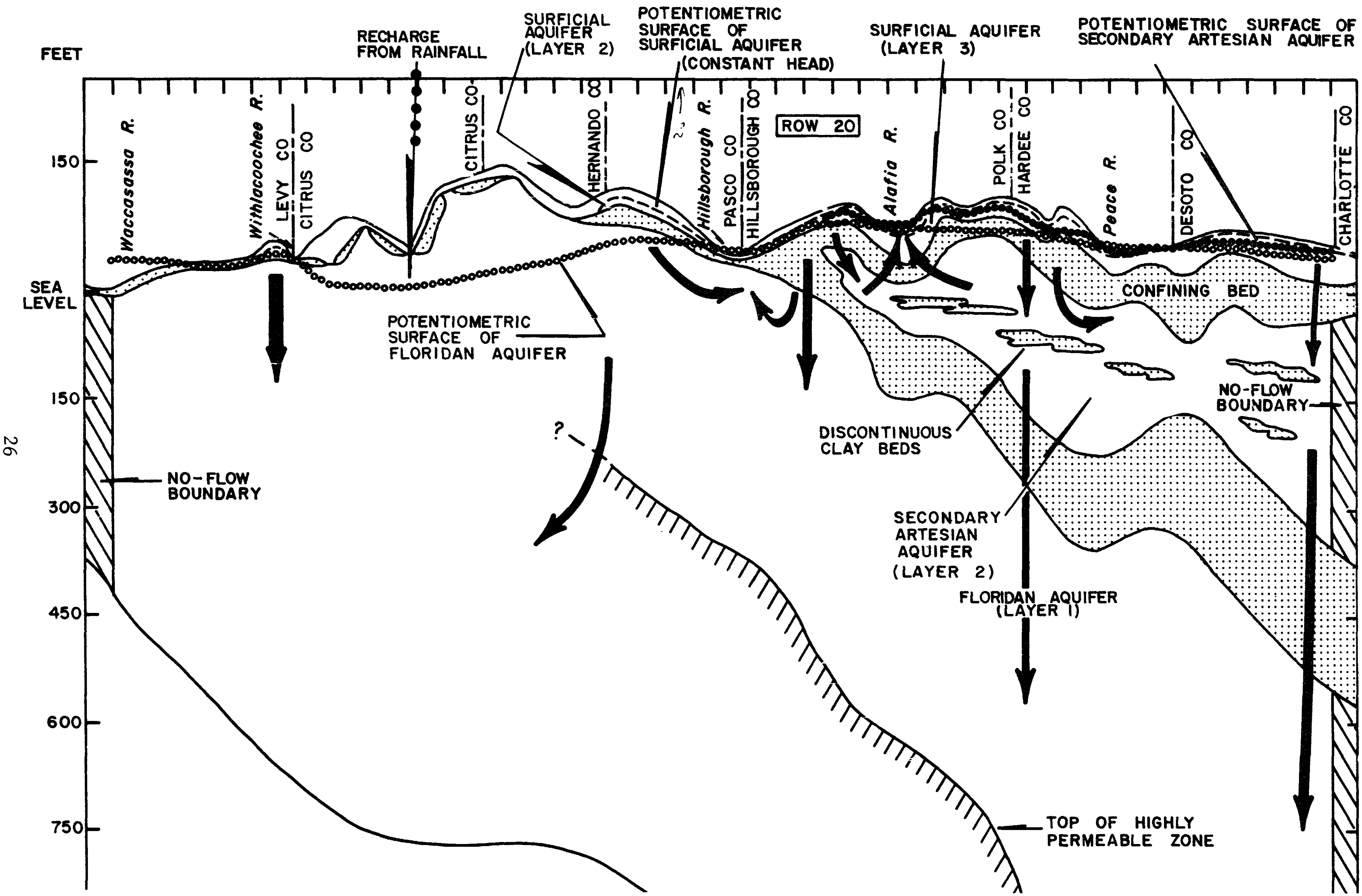
The hydrogeologic section in figure 10 contrasts sharply with that in figure 9. The secondary artesian aquifer is absent and the Floridan aquifer is generally unconfined. The unconfined or poorly confined conditions allow a relatively high rate of recharge to occur. Water enters the Floridan aquifer, travels relatively short distances through well-developed solution channels, and discharges as large springs. Total thickness of the Floridan aquifer in figure 10 is far less than that shown in figure 9; however, a lack of adequate geologic control precludes an accurate determination of the aquifer base in some areas.

The north-south hydrogeologic section in figure 11 is generally perpendicular to the flow paths within the aquifers in contrast to the sections in figures 9 and 10. The flow is generally westward (out of the plane of the cross section), except for some local discharge areas near the top of the secondary artesian and Floridan aquifers. Figure 11 shows from south to north: (1) thinning of the confining beds and a transition from confined to generally unconfined conditions in the Floridan aquifer; (2) pinching out of the secondary artesian aquifer; (3) a decline in importance of the highly permeable zone in the Avon Park (solution channels in Ocala Limestone attain greater significance); and (4) thinning of the Floridan aquifer.

DIGITAL MODEL OF PREDEVELOPMENT FLOW SYSTEM

Theory

A digital flow model computes changes in hydraulic head and ground-water inflow and outflow in an aquifer system in response to hydrologic stresses. To simulate the ground-water flow system in the study area, a finite-difference model developed by Trescott (1975) and modified by Trescott and Larson (1976) was used. The model uses the strongly implicit numerical procedure (Stone, 1968) to give an approximate solution to the partial differential equation of ground-water flow in a multilayer aquifer system. The model uses a quasi-three-dimensional option for calculating steady leakage across confining beds. This option assumes that all flow is vertical within confining layers and horizontal


FEET
150
SEA LEVEL
150
300
450
600
750
RECHARGE FROM RAINFALL
SURFICIAL AQUIFER (LAYER 2)
POTENTIOMETRIC SURFACE OF SURFICIAL AQUIFER (CONSTANT HEAD)
SURFICIAL AQUIFER (LAYER 3)
POTENTIOMETRIC SURFACE OF SECONDARY ARTESIAN AQUIFER
Waccasassa R.
Withlacoochee R.
LEVY CO
CITRUS CO
CITRUS CO
HERNANDO CO
Hillsborough R.
PASCO CO
HILLSBOROUGH CO
ROW 20
Alafia R.
POLK CO
HARDEE CO
Peace R.
DESOTO CO
CHARLOTTE CO
CONFINING BED
POTENTIOMETRIC SURFACE OF FLORIDAN AQUIFER
NO-FLOW BOUNDARY
DISCONTINUOUS CLAY BEDS
NO-FLOW BOUNDARY
SECONDARY ARTESIAN AQUIFER (LAYER 2)
FLORIDAN AQUIFER (LAYER 1)
TOP OF HIGHLY PERMEABLE ZONE

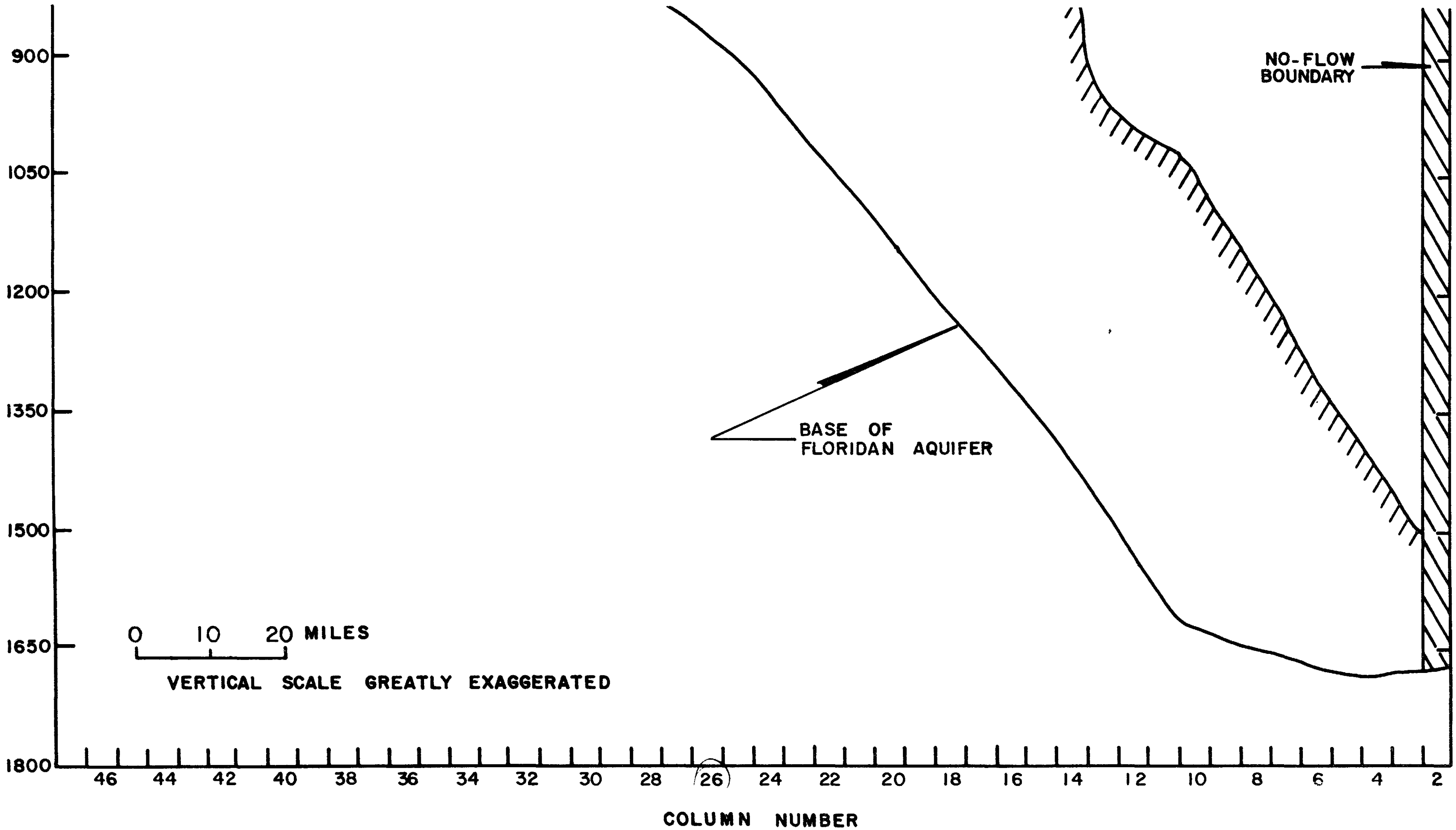


Figure 11.--Generalized hydrogeologic section along row 20 showing steady-state flow.

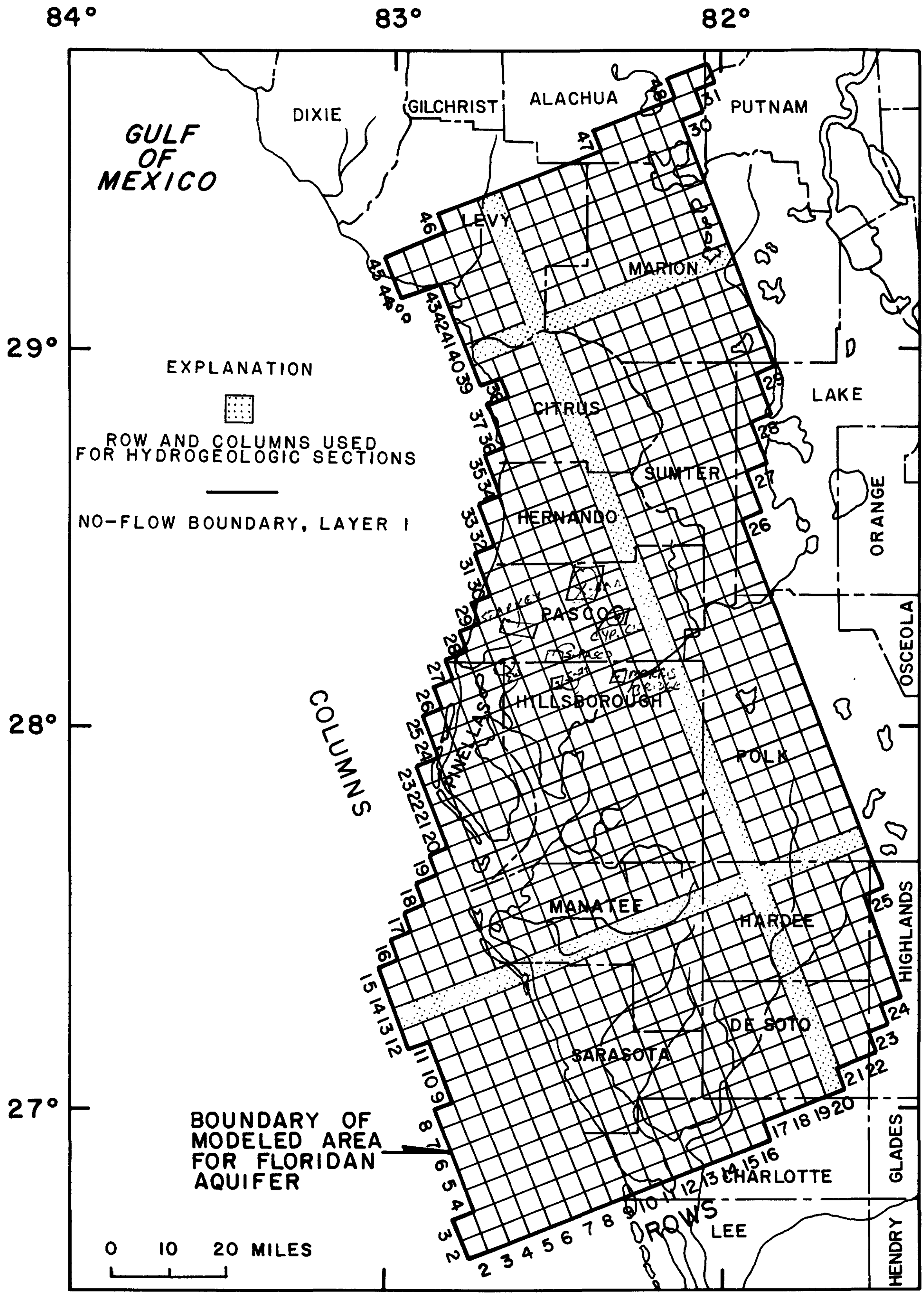


Figure 12.--Model area of the Floridan aquifer with finite-difference grid and boundaries.

within aquifers. With this option, a layer of nodes is not needed to represent a confining bed, and the effects of vertical leakage through a confining bed are achieved by reading a matrix of confining-bed leakance values for each confining bed. Further explanation is given in Trescott and Larson (1976, p. XIII).

Assumptions and Limitations

The model analysis and results are subject to the following assumptions and limitations:

1. Only the freshwater flow system is being modeled. Highly saline water (chloride greater than 10,000 mg/L) is assumed static and, therefore, not a part of the flow system.
2. The Floridan aquifer and secondary artesian aquifer are single-layer, isotropic media, with water moving in a horizontal plane.
3. Water moves vertically through confining layers.
4. The rocks with intergranular evaporites that form the base of the Floridan aquifer are impermeable.
5. The estimated saltwater-freshwater interface is in equilibrium; thus, its position is fixed and, as the limiting flow line, it represents the seaward extent of the freshwater flow system.
6. No flow crosses the ground-water divides (derived from an estimated predevelopment potentiometric surface) that form the model boundaries.

Boundary Conditions and Finite-Difference Grid

The anhydritic and gypsiferous carbonate rock at the base of the Floridan aquifer is almost impermeable and is considered a no-flow boundary. Seaward, the estimated positions of the freshwater-saltwater interface in the Floridan aquifer (layer 1) and secondary artesian aquifer (layer 2) define a no-flow boundary. The remainder of the lateral boundaries of the Floridan aquifer are treated as no-flow boundaries. They are oriented along the axes of natural ground-water divides and perpendicular to equipotential lines. The lateral boundaries of the secondary artesian aquifer are no-flow in most nodes; however, slight gradients into and out of the modeled area necessitate a few constant-flux boundary nodes. Constant-flux rates were calculated by estimating transmissivity and multiplying the head gradient across the boundary times the transmissivity times the length of the grid block (4 miles). Constant-flux rates for each grid block are listed in Supplement I.

The surficial aquifer, layer 3 in the south, becomes layer 2 where the secondary artesian aquifer pinches out. Heads in the surficial aquifer are held constant during calibration runs. The surficial aquifer is not modeled as an aquifer in the same sense as is the Floridan aquifer and secondary artesian aquifer. Rather, the constant heads in the surficial aquifer serve the sole function of providing recharge to (or receiving discharge from) the underlying aquifer.

In the area where both the surficial aquifer and the secondary artesian aquifer are absent, a recharge (or discharge) rate (QRE) is applied directly to the Floridan aquifer. The diagram in figure 13 shows how the digital model simulates the flow system as depicted by the hydrogeologic section along row 20 (fig. 11). The arrows represent flow paths of water at selected nodes. Note the absence of horizontal flow within the surficial aquifer where the constant heads provide recharge-discharge through an underlying confining bed. A constant recharge-discharge rate (QRE) is applied directly to layer 1 where the surficial aquifer is absent.

The finite-difference grid chosen for this study consists of 32 rows by 49 columns (fig. 12). The rows and columns are uniformly spaced, forming a network of square blocks with each side of a block being 4 miles in length. A node is located at the center of each block; it is inactive if the transmissivity at that node is equal to zero, and active where the transmissivity is greater than zero. The area of active nodes for layer one (Floridan aquifer) is shown in figure 12. Each of the other two layers (not shown) has fewer active nodes; the total for all layers is 1,748.

Model Calibration and Application

Procedure

During calibration, the model is run with initially estimated input data. Computed hydraulic heads are compared with observed heads. Input data are then adjusted until the differences between computed and observed heads are minimized; that is, the differences fall within acceptable limits. Computed and observed discharge rates of springs are also compared. Input data that may be adjusted include aquifer transmissivities, recharge rates, or leakance values, depending upon the degree of confidence placed on the initial estimated values. Because springflow is directly proportional to the head difference between spring pool and the aquifer, it is important to minimize errors in those nodes containing springs. This becomes especially critical where the springflow is large and the head difference is small; for example, several hundred cubic feet per second and 1 or 2 feet, respectively.

Hydrologic Input Data

The finite-difference grid was superimposed on estimated steady-state predevelopment potentiometric surfaces of the Floridan, secondary artesian, and surficial aquifers. Average heads were determined for each node within the active grid area (fig. 12); one layer of nodes was required for each aquifer.

Transmissivities were estimated for the Floridan and secondary artesian aquifers from the data in figures 5 and 6. Constant heads were imposed on the surficial aquifer, representing a steady-state water table.

In the northern part of the study area, where the Floridan aquifer is at or near land surface and is not generally overlain by a surficial aquifer, initial input values of recharge were estimated from water-balance calculations.

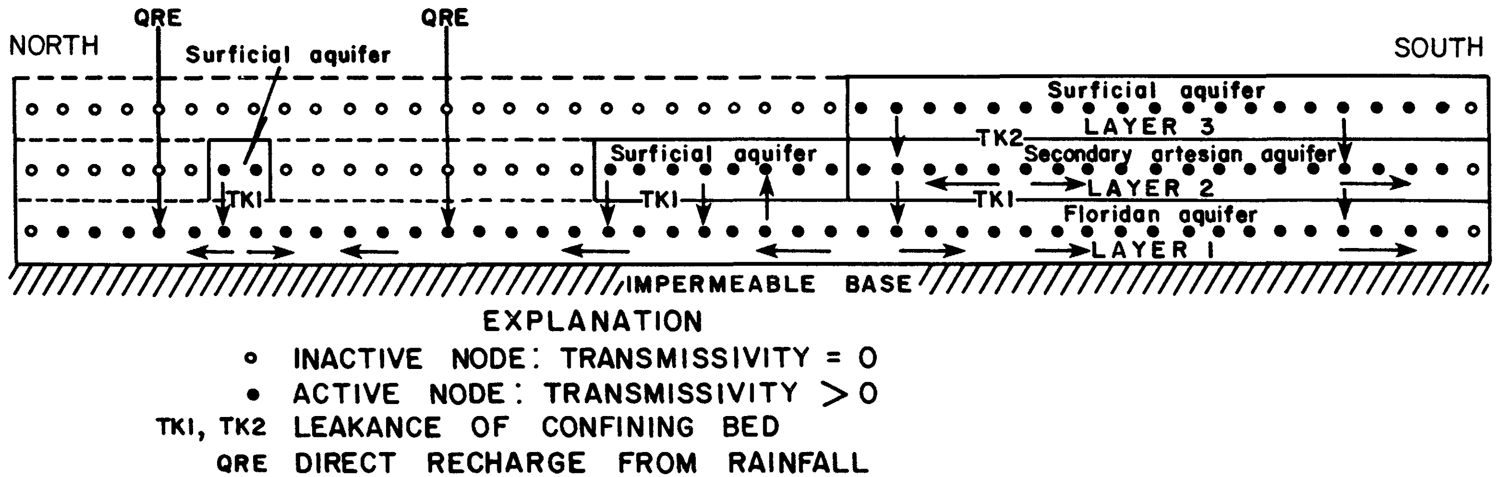


Figure 13.--Digital model simulation of steady-state flow system shown in figure 11.

In areas having a surficial aquifer, initial input values of leakance for the uppermost confining layer were chosen so that resulting recharge rates were the same as those estimated from water-balance calculations.

The Floridan aquifer discharges at springs in some areas. The springs, with a total average daily flow of nearly 2.4 billion gallons, are concentrated in the north-central part of the study area (fig. 8). To properly simulate spring discharges, the model was modified to include a head-dependent sink function (S. P. Larson and J. V. Tracy, U.S. Geological Survey, written commun., 1979). The function has the mathematical form:

$$\frac{Q_{ss}}{A} = C_{ss}(H_{ss}-h)$$

where: Q_{ss} is rate of spring discharge, in cubic feet per second (ft^3/s);

C_{ss} is a constant that describes the linear relation between head difference and flow rate (sec^{-1});

H_{ss} is spring pool elevation, in feet (ft) above sea level;

h is aquifer head computed by model, in feet (ft) above sea level;

A is area of node, in square feet (ft^2).

The terms in the equation can be rearranged so that the only unknown term, C_{ss}, can be determined from the known discharge of a spring and the presumed predevelopment head difference. Subsequently, C_{ss} and H_{ss} are entered as input data, and the model uses the calculated aquifer head (h) to compute springflow (Q_{ss}) at designated nodes.

Results

A comparison between the observed and the simulated potentiometric surfaces of the Floridan aquifer is shown in figure 14. The differences (observed minus simulated heads) for each node are called residuals. Thus, a negative residual occurs where the simulated head is greater than the observed head, and a positive residual occurs where the simulated head is less than the observed head. The residuals were analyzed for all 777 active nodes of the Floridan aquifer. The residuals were also analyzed for the 352 active nodes of the secondary artesian aquifer. Results of the statistical analyses are as follows:

Aquifer	Mean of residuals	Mean of absolute values of residuals	Standard deviation of residuals	Maximum negative residual	Maximum positive residual
Floridan	-1.3 ft	2.9 ft	3.5 ft	-11.1 ft	11.9 ft
Secondary artesian	-2.8 ft	6.9 ft	6.2 ft	-19.3 ft	18.1 ft

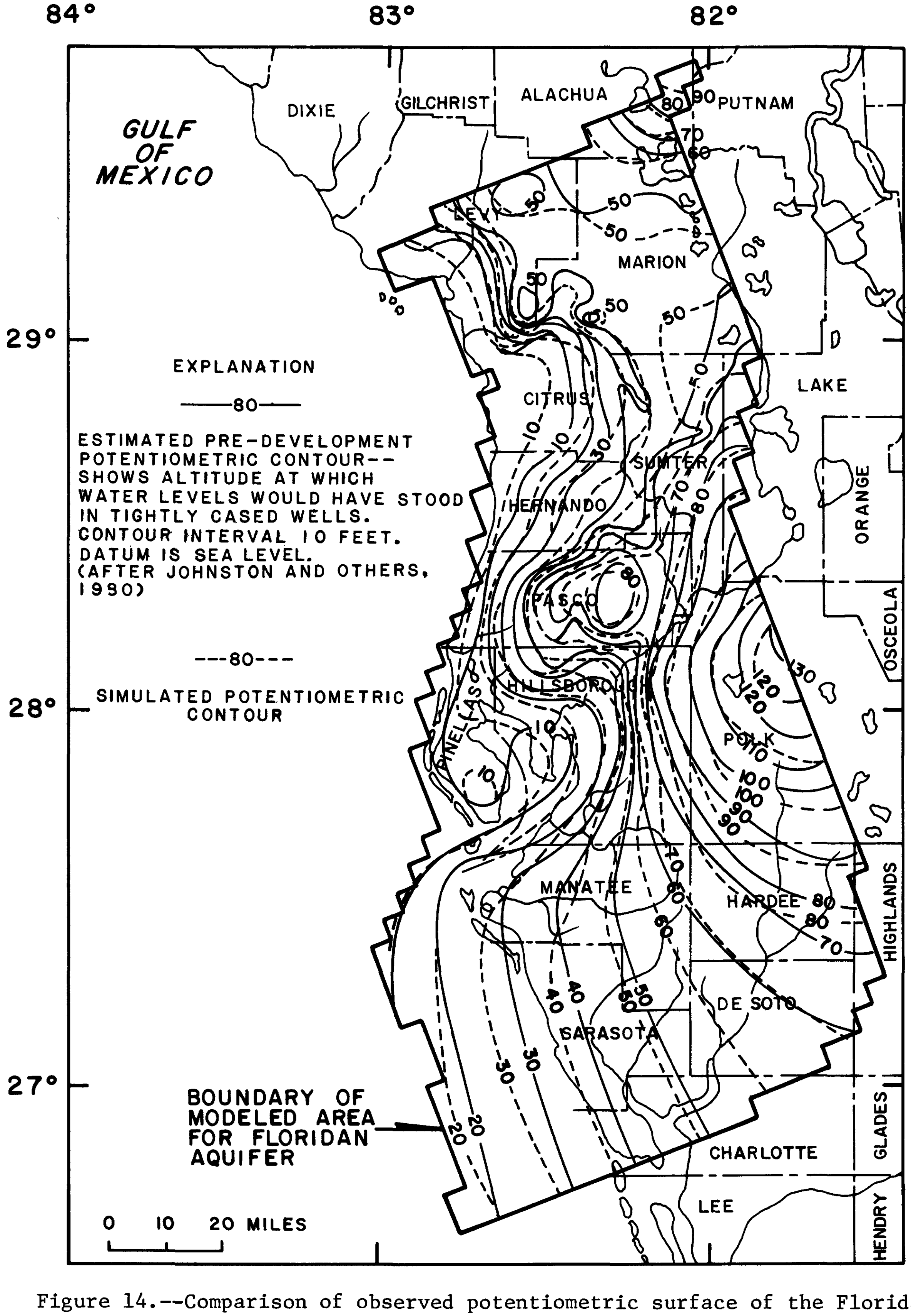


Figure 14.--Comparison of observed potentiometric surface of the Floridan aquifer to that simulated by the model.

Calibration runs with initial estimates of input parameters resulted in substantial buildup in nearly all areas of the model. Two significant changes in the input data were made during the course of the calibration to obtain a calibrated model with reasonable residuals and a reasonably accurate simulation of springflows. Changes made were: (1) transmissivities in the general area of high-yield springs (Hernando, Citrus, and Marion Counties) were increased substantially; and (2) along the coast from Tampa Bay northward to Levy County, calibrated values of ground-water discharge were increased substantially over initial estimates.

Observed discharge from springs shown in figure 8 totaled 2,346 Mgal/d (3,630 ft^3/s) and were distributed among 27 nodes. Table 5 lists nodal location of springflows and compares observed and simulated discharges by the model. Simulated springflows compare reasonably well; total simulated springflow is 90 percent of total observed springflow.

The Floridan aquifer transmissivity distribution derived from the calibrated model is shown in figure 15. Values range from less than 15,000 ft^2/d in the southwestern part of the model, where the freshwater section of the aquifer becomes progressively thinner seaward, to nearly 13,000,000 ft^2/d for the nodes containing the Crystal River group of springs. However, most transmissivities are in the range of 50,000 to 500,000 ft^2/d. The calibrated transmissivities agree reasonably well with field aquifer-test data shown in figure 5.

Floridan aquifer recharge and discharge rates (excluding spring discharge) from the calibrated model are shown in figure 16. The recharge rates compare well with initial estimates from water-balance calculations for surface-water basins. Confining-bed leakance values (TK1) between the lower two layers of the calibrated model range from $1.3x10^{-7}$ to $1.1x10^{-3}$ (ft/d)/ft and agree reasonably well with aquifer-test results shown in figure 5. Leakance values (TK2) between the upper two layers range from $1.3x10^{-7}$ to $4.0x10^{-4}$ (ft/d)/ft.

An analysis of the calibrated steady-state model shows that the total recharge rate for the modeled area is about 3,700 ft^3/s; of this, about 3,300 ft^3/s (89 percent) is discharged as springflow, and about 400 ft^3/s (11 percent) is discharged as upward leakage. The upward leakage is mainly along the coastal margin; some occurs as seepage into coastal swamps or as unmeasured spring dicharge, including that from submarine springs. Supplement I of this report lists by node and by layer most of the hydrologic input data used in the calibrated model.

Sensitivity Analysis

Although the model was calibrated by using discrete values of aquifer recharge, transmissivity, and confining-bed leakance, these parameter values are not precisely known. Ranges of values, or feasibility limits, were subjectively chosen for each parameter. Each parameter was changed uniformly over the modeled area by the factors of plus or minus 50 percent or 30 percent as listed in the table below. One steady-state run was made for each parameter change while other parameters remained unchanged.

Table 5.--Observed and simulated springflows in the Floridan aquifer[1/]

County	Spring(s)	Node row, column	Discharge, observed (Mgal/d)	Discharge, simulated (Mgal/d)
Sarasota	Warm Mineral	11,6	19	17
Polk	Kissengen	23,16	10	8
Hills-borough	Lithia	17,19	33	27
	Buckhorn	16,20	8	10
	Eureka, Lettuce Lake	16,22	7	17
	Sulphur	15,23	28	25
Pinellas	Health	11,26	3	5
Pasco	Crystal	19,24	39	31
	Salt	13,29	3	5
	Horseshoe, Magnolia	14,30	10	13
Hernando	Bobhill	15,31	2	4
	Boat	14,31	3	6
	Weeki Wachee	16,31	114	104
	Mud, Salt	16,32	51	61
	#7, Blind	16,34	42	35
	#9, 10, 11, 12	17,34	19	21
Lake	Bugg	27,32	10	4
Sumter	Fenney and others	25,33	29	24
	Gum	24,37	32	16
Citrus	Chassahowitzka, Ruth, Potter	17,35	108	77
	Homosassa	18,36	113	107
	Crystal River Group	18,38	296	266
	Crystal River Group	18,37	296	281
	Blue, Wilson Head	23,37	12	0
Levy	Wekiva	20,44	36	25
Marion	Rainbow	22,40	493	444
	Silver	28,40	530	480
		Totals	2,346	2,113

[1/] Springflow data from Rosenau and others (1977).

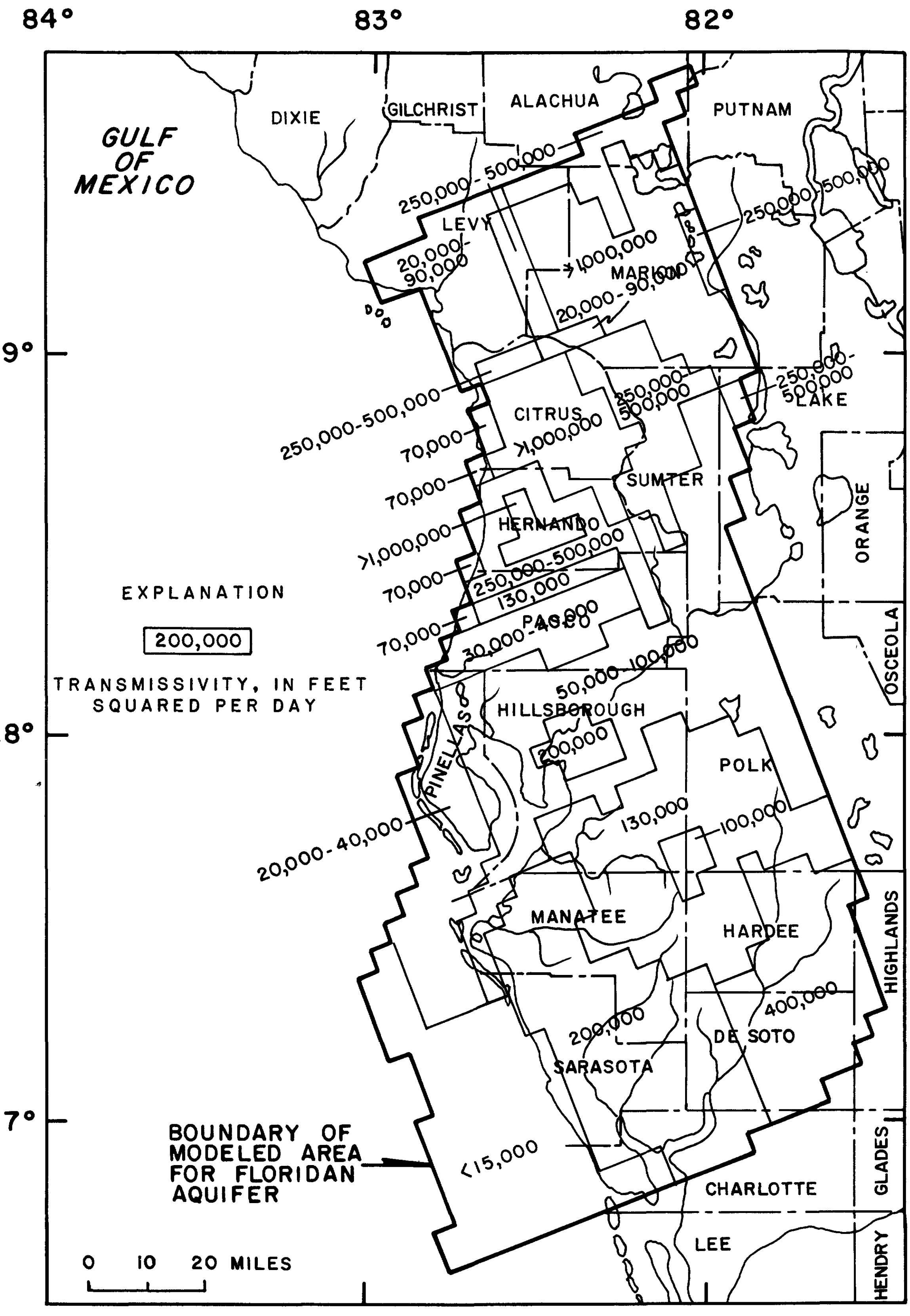


Figure 15.--Distribution of Floridan aquifer transmissivity in the calibrated model.

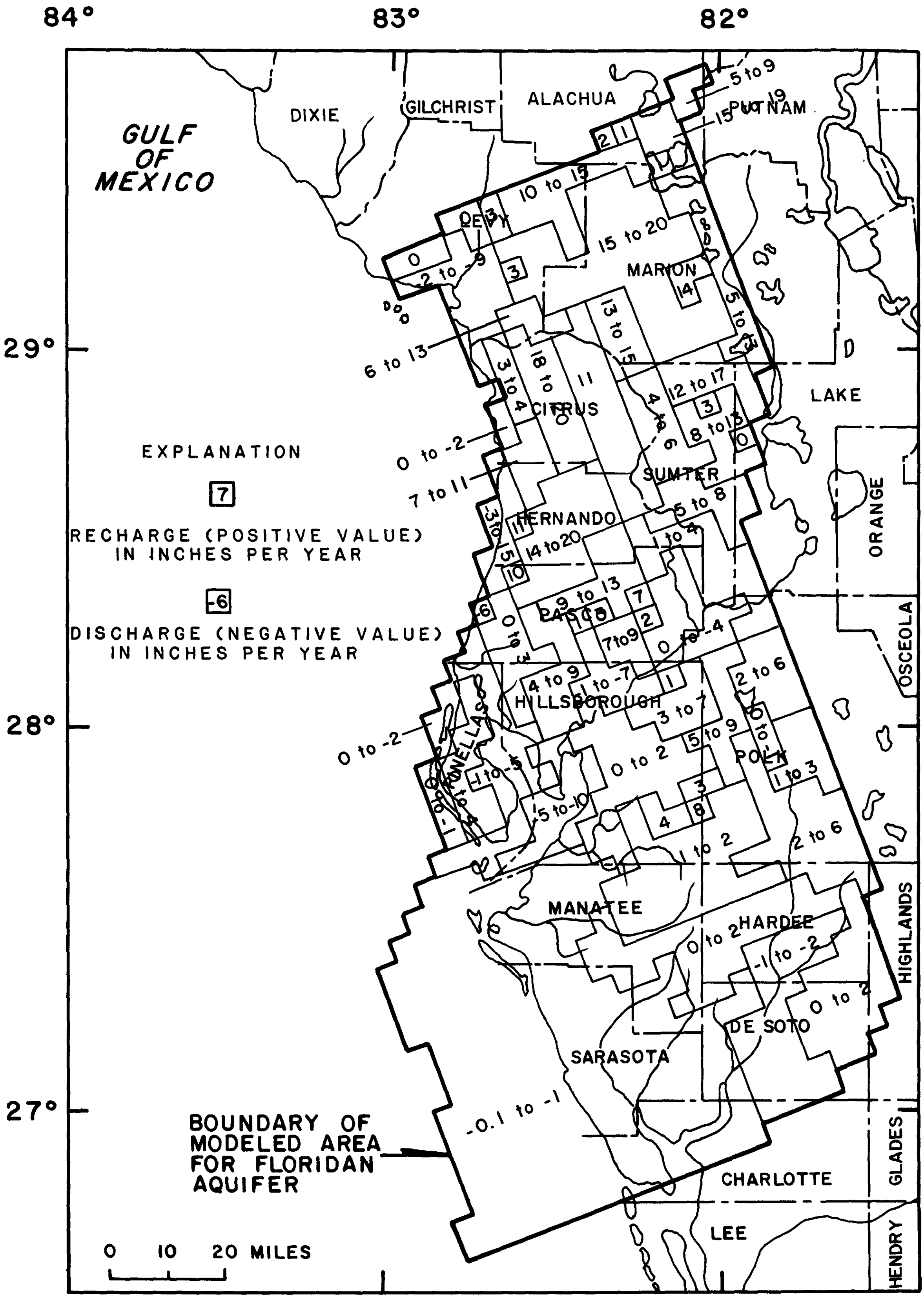


Figure 16.--Distribution of Floridan aquifer recharge and discharge in the calibrated model, excluding springflow.

Cross sections along row 20 and along column 40 (fig. 17) were constructed to show the effects of the parameter changes. The following table summarizes the change in residuals and simulated springflow due to a change in Floridan aquifer transmissivities and recharge rates (maximum negative and maximum positive residuals are as explained on p. 32):

Parameter	Percent change in parameter(s)	Mean of absolute value of residuals (ft)	Maximum negative residual (ft)	Maximum positive residual (ft)	Simulated springflow (ft^3/s)	Percent of observed springflow
Calibration run	0	2.9	11.1	11.9	3,275	90
T1	+50	4.2	12.8	14.6	3,733	103
T1	-50	5.6	24.7	30.1	2,613	72
QRE, TK1(H-h)	+30	3.3	12.2	9.1	3,827	105
QRE, TK1(H-h)	-30	3.5	10.7	14.8	2,650	73

T1 = transmissivity of Floridan aquifer.
QRE = rate of recharge to Floridan aquifer from direct precipitation.
TK1(H-h) = rate of recharge to Floridan aquifer from overlying aquifer.
TK1 = leakance of confining bed overlying Floridan aquifer.
H = head in aquifer overlying Floridan aquifer.
h = head in Floridan aquifer.

Examination of the table (and the computer printouts of the model runs) shows the following:

1. The model is relatively insensitive to a uniform 50 percent increase in transmissivity or to a uniform 30 percent increase in recharge; spring discharges (at all 27 nodes) for these runs are simulated about as well as for the calibration run, and residuals are not substantially larger than those in the calibrated model.

2. Residuals resulting from the model run with a uniform 30 percent reduction in recharge are not greatly different from those in the calibration run; however, simulation of spring discharges is relatively poor, with only 73 percent of total observed springflow being simulated.

3. The model is most sensitive to a uniform 50 percent reduction in transmissivity. Residuals are substantially larger than those in the calibration run, and simulation of spring discharges is relatively poor. The cross sections in figure 17 show that the departure of computed heads from observed heads is greatest for the run with reduced transmissivity. None of the runs with the changed parameters in the Floridan aquifer produced residuals in the secondary artesian aquifer that were significantly different from the calibration run.

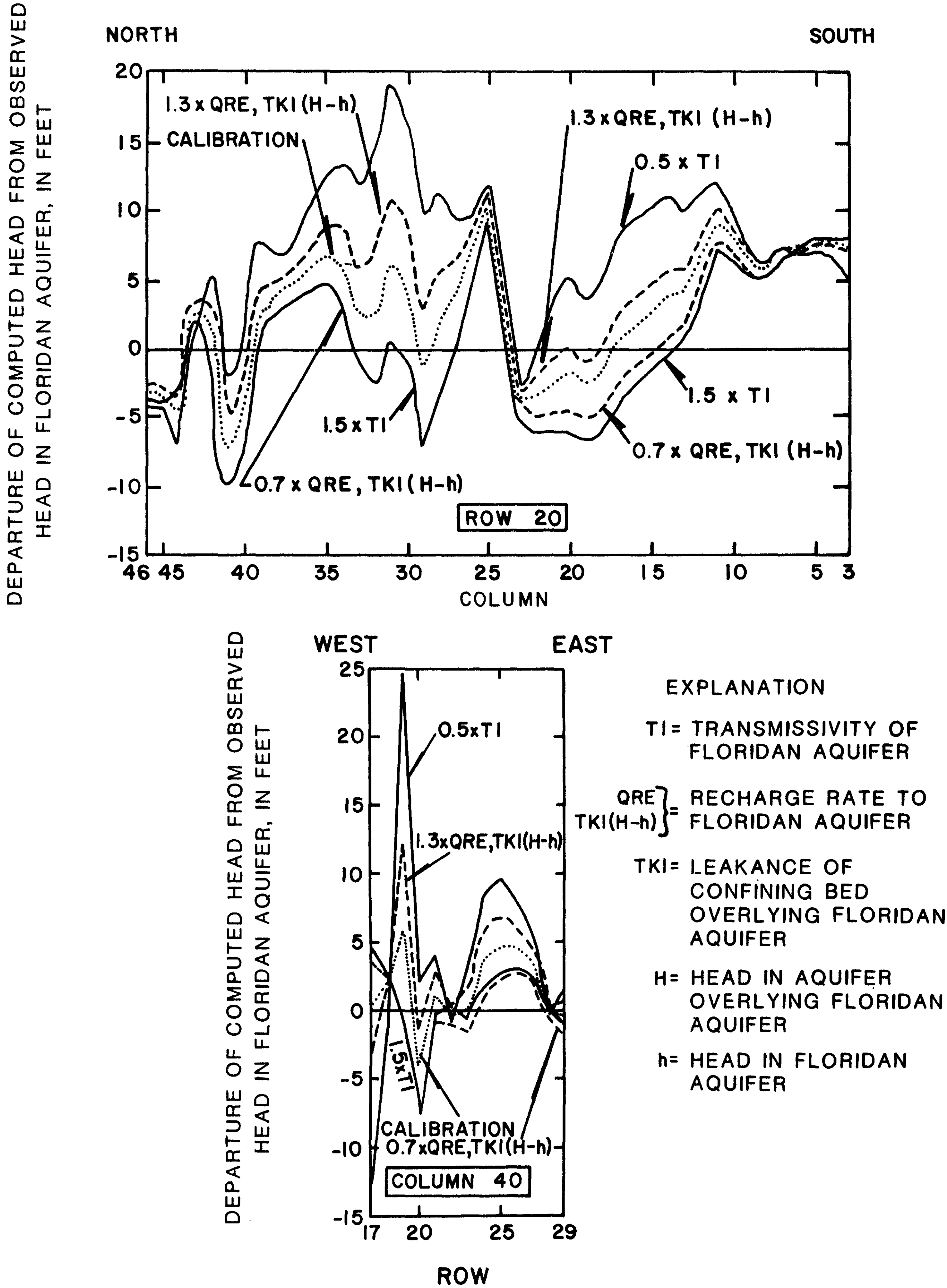


Figure 17.--Sensitivity of model to changes in recharge and transmissivity.

Parameter changes were then made in the secondary artesian aquifer: (1) transmissivity was uniformly increased by 80 percent and decreased by 80 percent; and (2) recharge rates from the overlying aquifer were uniformly increased by 30 percent and decreased by 30 percent. The transmissivity changes produced changes in the calibrated Floridan aquifer heads of less than a foot for any node. Changes in the recharge rates to the secondary artesian aquifer produced changes in the calibrated Floridan aquifer heads of almost 3 feet in a few nodes, but the changes were generally a foot or less. For all of the runs, spring discharges were essentially the same as for the calibration run. The residuals in the secondary artesian aquifer produced by the changes in transmissivity and recharge were not greatly different from those in the calibration run.

To summarize, the calibrated model is relatively insensitive to significantly higher values of transmissivity or recharge rates for the Floridan aquifer, or to significantly higher or lower values of transmissivity or recharge rates for the secondary artesian aquifer. The model resulting from any one of these changes could still be considered a reasonably accurate calibration.

The calibrated model is sensitive to significantly lower values of transmissivity or recharge rates for the Floridan aquifer, and the model resulting from either of these changes has substantially larger residuals or poorer simulation of spring discharges than does the calibrated model.

Model Application

The steady-state model provides a basis for describing predevelopment flow in the limestone aquifer system. The model will also serve as the basis for a transient simulation. The transient simulation will require: (1) a redefinition of the steady-state boundaries; (2) the addition of storage coefficients to the steady-state model; and (3) the introduction of known pumping stresses over appropriate time periods. The transient model is calibrated when an observed potentiometric surface, reflecting the effects of pumping stresses, is correctly simulated by the model (within acceptable error limits). The calibration process requires adjustments to initial estimates of storage coefficients. Transmissivity should not change, but if changes of transmissivity are required, recalibration of the steady-state model will be needed. Recharge rates obtained from the steady-state model are not necessarily applicable to the transient model because formerly rejected recharge may be induced by pumping. Once calibrated, the transient model can be used to assess the effects of proposed withdrawals on the regional flow system.

SUMMARY AND CONCLUSIONS

A digital model was used to simulate the natural (prepumping) flow system of the Floridan aquifer in west-central Florida. The hydrogeologic framework and, therefore, the hydraulics of the flow system in the northern half of the study area are quite different from the hydraulics of the southern half. Important features of the aquifer framework and predevelopment flow system can be summarized as follows:

1. In the northern half of the area, the Floridan aquifer is at or near land surface, or it is overlain by the surficial aquifer, separated by a relatively thin confining layer. Transmissivity of the aquifer is very high, ranging upwards to nearly 13,000,000 ft^2/d (in the vicinity of high-yield springs). Recharge rates are relatively large in the vicinity of large springs, averaging 20 in/yr in some areas. Most of the recharge enters highly developed solution channels in the upper part of the aquifer and flows relatively short distances before emerging as spring discharge.

2. In the southern half of the area, the Floridan aquifer is overlain by less permeable confining-bed material in the Tampa Limestone or in the lower part of the Hawthorn Formation. Overlying the confining layer is the secondary artesian aquifer, generally consisting of rocks within the Hawthorn Formation, and ranging from a few feet to over 400 feet in thickness. Permeability of the aquifer is much less than that of the Floridan aquifer. The secondary artesian aquifer is overlain by a confining layer that is overlain, in turn, by the surficial aquifer.

   Recharge to the Floridan aquifer in the southern half of the area occurs as: (1) leakage from the surficial aquifer through a confining layer; and (2) leakage from the secondary artesian aquifer through a confining layer. Discharge, prior to development, occurred principally as diffuse upward leakage through confining layers primarily along the coast.

The predevelopment flow system in west-central Florida consists of a highly transmissive, unconfined aquifer system with localized sources of recharge and discharge (springs) in the north contrasting with a confined, less transmissive system in the south with less recharge occurring as areal downward leakage across confining beds and lower discharge rates via diffuse upward leakage. The total recharge rate for the area is about 3,700 ft^3/s; of this, about 3,300 ft^3/s (89 percent) is discharged as springflow, and about 400 ft^3/s (11 percent) is discharged as upward leakage, mostly along the coast.

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SUPPLEMENT I--MODEL INPUT DATA

The following table lists by node most of the input data used in the calibrated model. An "A" indicates a constant-head node for the specified layer; any positive value for transmissivity can be coded here. All blank data are equivalent to zeros. Other symbols are defined as follows:

T = transmissivity;

POT. HEAD = altitude of potentiometric surface;

HSS = altitude of spring pool;

CSS = a constant in spring-discharge equation;

QRE = recharge/discharge rate to/from layer 1;

Q = constant-flux rate at boundary of layer 2;

TK2 = leakance of confining bed overlying secondary artesian aquifer;

TK1 = leakance of confining bed overlying Floridan aquifer.

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
ROW	COL	T (SQ.FT /SEC)	POT. HEAD (FT)	SPRING DATA HSS(FT)	SPRING DATA CSS(/SEC)	QRE (FT/SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	Q (CU.FT /SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
2	2	0.07	16	0.0	0.000E+00		A	0					1.550E-11
2	3	0.07	16	0.0	0.000E+00		A	0					1.550E-11
3	2	0.07	19	0.0	0.000E+00		A	0					1.550E-11
3	3	0.07	19	0.0	0.000E+00		A	0					1.550E-11
3	4	0.07	18	0.0	0.000E+00		A	0					1.550E-11
3	5	0.07	17	0.0	0.000E+00		A	0					1.550E-11
3	6	0.07	17	0.0	0.000E+00		A	0					1.550E-11
3	7	0.07	16	0.0	0.000E+00		A	0					1.550E-11
3	8	0.07	15	0.0	0.000E+00		A	0					1.550E-11
3	12	0.05	13	0.0	0.000E+00		A	0					7.750E-11
3	13	0.05	12	0.0	0.000E+00		A	0					7.750E-11
3	14	0.05	11	0.0	0.000E+00		A	0					7.750E-11
3	15	0.05	8	0.0	0.000E+00		A	0					7.750E-11
4	2	0.09	22	0.0	0.000E+00		A	0					1.550E-11
4	3	0.09	21	0.0	0.000E+00		A	0					1.550E-11
4	4	0.09	21	0.0	0.000E+00		A	0					1.550E-11
4	5	0.09	20	0.0	0.000E+00		A	0					1.550E-11
4	6	0.09	20	0.0	0.000E+00		A	0					1.550E-11
4	7	0.09	19	0.0	0.000E+00		A	0					1.550E-11
4	8	0.09	18	0.0	0.000E+00		A	0					1.550E-11
4	9	0.09	18	0.0	0.000E+00		A	0					1.550E-11
4	10	0.09	17	0.0	0.000E+00		A	0					1.550E-11
4	11	0.09	17	0.0	0.000E+00		A	0					1.550E-11
4	12	0.10	16	0.0	0.000E+00		A	0					1.550E-11
4	13	0.10	15	0.0	0.000E+00		A	0					7.750E-11
4	14	0.10	14	0.0	0.000E+00		A	0					7.750E-11
4	15	0.10	13	0.0	0.000E+00		A	0					7.750E-11
4	16	0.10	9	0.0	0.000E+00		A	0					7.750E-11
5	2	0.11	25	0.0	0.000E+00		A	0					7.750E-12
5	3	0.11	24	0.0	0.000E+00		A	0					7.750E-12
5	4	0.11	24	0.0	0.000E+00		A	0					7.750E-12
5	5	0.11	24	0.0	0.000E+00		A	0					7.750E-12
5	6	0.11	23	0.0	0.000E+00		A	0					7.750E-12
5	7	0.11	22	0.0	0.000E+00		A	0					7.750E-12
5	8	0.11	22	0.0	0.000E+00		A	0					7.750E-12
5	9	0.11	21	0.0	0.000E+00		A	0					7.750E-12
5	10	0.11	21	0.0	0.000E+00		A	0					7.750E-12
5	11	0.11	20	0.0	0.000E+00		A	0					7.750E-12
5	12	0.11	19	0.0	0.000E+00		A	0					7.750E-12
5	13	0.20	19	0.0	0.000E+00		A	0					7.750E-12
5	14	0.20	18	0.0	0.000E+00		A	0					7.750E-11
5	15	0.20	18	0.0	0.000E+00		A	0					7.750E-11
5	16	0.20	14	0.0	0.000E+00		A	0					7.750E-11
5	17	0.20	10	0.0	0.000E+00		A	0					7.750E-11
6	2	0.11	28	0.0	0.000E+00		A	0					7.750E-12
6	3	0.13	28	0.0	0.000E+00		A	0					7.750E-12
6	4	0.13	27	0.0	0.000E+00		A	0					7.750E-12
6	5	0.13	27	0.0	0.000E+00		A	0					7.750E-12
6	6	0.13	26	0.0	0.000E+00		A	0					7.750E-12

NODE ROW	NODE COL	LAYER ONE T (SQ.FT /SEC)	LAYER ONE POT. HEAD (FT)	LAYER ONE SPRING DATA HSS(FT)	LAYER ONE SPRING DATA CSS(/SEC)	LAYER ONE QRE (FT/SEC)	LAYER TWO T (SQ.FT /SEC)	LAYER TWO POT. HEAD (FT)	LAYER TWO Q (CU.FT /SEC)	LAYER THREE T (SQ.FT /SEC)	LAYER THREE POT. HEAD (FT)	CONFINING BEDS TK2 (/SEC)	CONFINING BEDS TK1 (/SEC)
6	7	0.13	26	0.0	0.000E+00		A	0					7.750E-12
6	8	0.13	25	0.0	0.000E+00		A	0					7.750E-12
6	9	0.13	25	0.0	0.000E+00		A	0					7.750E-12
6	10	0.13	24	0.0	0.000E+00		A	0					7.750E-12
6	11	0.13	24	0.0	0.000E+00		A	0					7.750E-12
6	12	0.13	23	0.0	0.000E+00		A	0					7.750E-12
6	13	0.35	22	0.0	0.000E+00		0.00001	4	0.0	A	4	7.750E-11	7.750E-11
6	14	0.35	22	0.0	0.000E+00		0.00001	3	0.0	A	3	7.750E-11	7.750E-12
6	15	0.35	21	0.0	0.000E+00		0.00001	3	0.0	A	3	7.750E-11	7.750E-12
6	16	0.35	19	0.0	0.000E+00		0.00001	3	0.0	A	3	7.750E-11	7.750E-12
6	17	0.20	16	0.0	0.000E+00		A	0					1.550E-10
6	18	0.20	9	0.0	0.000E+00		A	0					1.550E-10
7	2	0.13	30	0.0	0.000E+00		0.00001	3	0.0	A	0	7.750E-12	1.550E-12
7	3	0.13	30	0.0	0.000E+00		0.00001	3	0.0	A	0	7.750E-12	1.550E-12
7	4	0.15	30	0.0	0.000E+00		0.00001	4	0.0	A	0	7.750E-12	1.550E-12
7	5	0.15	29	0.0	0.000E+00		0.00001	4	0.0	A	0	7.750E-12	1.550E-12
7	6	0.15	29	0.0	0.000E+00		0.00001	4	0.0	A	0	7.750E-12	1.550E-12
7	7	0.15	29	0.0	0.000E+00		0.00001	4	0.0	A	0	7.750E-12	1.550E-12
7	8	0.15	29	0.0	0.000E+00		0.00001	3	0.0	A	0	7.750E-12	1.550E-12
7	9	0.15	28	0.0	0.000E+00		0.00001	3	0.0	A	0	7.750E-12	1.550E-12
7	10	0.15	28	0.0	0.000E+00		0.00001	3	0.0	A	0	7.750E-12	1.550E-12
7	11	0.15	28	0.0	0.000E+00		0.00001	2	0.0	A	0	7.750E-12	1.550E-12
7	12	0.15	27	0.0	0.000E+00		0.00001	4	0.0	A	0	7.750E-11	7.750E-11
7	13	0.50	26	0.0	0.000E+00		0.03000	11	0.0	A	0	7.750E-11	7.750E-11
7	14	0.50	25	0.0	0.000E+00		0.03000	8	0.0	A	0	7.750E-11	7.750E-12
7	15	0.50	25	0.0	0.000E+00		0.03000	9	0.0	A	0	7.750E-11	7.750E-12
7	16	0.35	23	0.0	0.000E+00		0.03000	10	0.0	A	0	7.750E-11	7.750E-12
7	17	0.35	20	0.0	0.000E+00		0.00001	2	0.0	A	0	7.750E-11	7.750E-12
7	18	0.20	13	0.0	0.000E+00		A	0					1.550E-10
7	19	0.20	6	0.0	0.000E+00		A	0					1.550E-09
8	2	0.15	34	0.0	0.000E+00		0.06000	5	0.0	A	0	7.750E-12	1.550E-12
8	3	0.15	33	0.0	0.000E+00		0.06000	7	0.0	A	0	7.750E-12	1.550E-12
8	4	0.15	33	0.0	0.000E+00		0.06000	9	0.0	A	0	7.750E-12	1.550E-12
8	5	0.15	33	0.0	0.000E+00		0.06000	10	0.0	A	0	7.750E-12	1.550E-12
8	6	0.15	33	0.0	0.000E+00		0.06000	10	0.0	A	0	7.750E-12	1.550E-12
8	7	0.15	33	0.0	0.000E+00		0.06000	9	0.0	A	0	7.750E-12	1.550E-12
8	8	0.15	32	0.0	0.000E+00		0.06000	7	0.0	A	0	4.650E-10	1.550E-12
8	9	0.15	32	0.0	0.000E+00		0.04000	7	0.0	A	0	4.650E-10	1.550E-12
8	10	0.17	31	0.0	0.000E+00		0.04000	7	0.0	A	0	4.650E-10	1.550E-12
8	11	0.17	31	0.0	0.000E+00		0.04000	5	0.0	A	0	4.650E-10	7.750E-11
8	12	0.17	30	0.0	0.000E+00		0.04000	7	0.0	A	1	4.650E-10	7.750E-11
8	13	1.00	30	0.0	0.000E+00		0.03000	11	0.0	A	0	7.750E-11	7.750E-11
8	14	1.00	29	0.0	0.000E+00		0.03000	14	0.0	A	1	7.750E-11	7.750E-12
8	15	1.00	28	0.0	0.000E+00		0.03000	14	0.0	A	3	7.750E-11	7.750E-12
8	16	1.00	26	0.0	0.000E+00		0.03000	8	0.0	A	0	7.750E-11	7.750E-12
8	17	0.35	22	0.0	0.000E+00		0.01000	2	0.0	A	0	7.750E-11	7.750E-12
8	18	0.35	15	0.0	0.000E+00		0.00001	1	0.0	A	0	7.750E-11	7.750E-12
8	19	0.20	7	0.0	0.000E+00		A	0					1.550E-09
8	20	0.20	7	0.0	0.000E+00		A	0					1.550E-09

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
8	21	0.20	7	0.0	0.000E+00		A	0					1.550E-09
8	22	0.20	5	0.0	0.000E+00		A	5					1.550E-09
8	23	0.20	3	0.0	0.000E+00		A	2					1.550E-09
9	2	0.15	36	0.0	0.000E+00		0.06000	10	-0.4	A	0	1.550E-12	1.550E-12
9	3	0.17	36	0.0	0.000E+00		0.12000	14	0.0	A	1	1.550E-12	1.550E-12
9	4	0.17	36	0.0	0.000E+00		0.12000	17	0.0	A	1	1.550E-12	1.550E-12
9	5	0.17	36	0.0	0.000E+00		0.12000	19	0.0	A	3	1.550E-12	1.550E-12
9	6	0.17	36	0.0	0.000E+00		0.12000	19	0.0	A	7	1.550E-12	1.550E-12
9	7	0.17	36	0.0	0.000E+00		0.12000	17	0.0	A	10	7.750E-12	1.550E-12
9	8	0.17	36	0.0	0.000E+00		0.12000	15	0.0	A	7	4.650E-10	1.550E-12
9	9	0.17	35	0.0	0.000E+00		0.08000	17	0.0	A	11	4.650E-10	7.750E-11
9	10	0.17	35	0.0	0.000E+00		0.08000	17	0.0	A	11	4.650E-10	7.750E-11
9	11	2.30	34	0.0	0.000E+00		0.08000	15	0.0	A	19	4.650E-10	7.750E-11
9	12	2.30	34	0.0	0.000E+00		0.08000	15	0.0	A	11	4.650E-10	7.750E-11
9	13	2.30	33	0.0	0.000E+00		0.03000	18	0.0	A	10	7.750E-11	7.750E-11
9	14	2.30	33	0.0	0.000E+00		0.03000	21	0.0	A	12	7.750E-11	7.750E-12
9	15	2.30	31	0.0	0.000E+00		0.03000	16	0.0	A	12	7.750E-11	7.750E-12
9	16	1.00	28	0.0	0.000E+00		0.03000	8	0.0	A	1	7.750E-11	7.750E-12
9	17	1.00	23	0.0	0.000E+00		0.01000	7	0.0	A	0	7.750E-11	7.750E-12
9	18	0.35	15	0.0	0.000E+00		0.00001	2	0.0	A	0	1.550E-09	1.550E-09
9	19	0.35	8	0.0	0.000E+00		A	1					1.550E-09
9	20	0.20	9	0.0	0.000E+00		A	6					1.550E-09
9	21	0.20	10	0.0	0.000E+00		A	6					1.550E-09
9	22	0.20	10	0.0	0.000E+00		A	10					1.550E-09
9	23	0.20	9	0.0	0.000E+00		A	19					1.550E-10
9	24	0.20	5	0.0	0.000E+00		A	3					1.550E-09
9	25	0.20	1	0.0	0.000E+00		A	0					1.550E-09
10	2	0.15	39	0.0	0.000E+00		0.12000	13	-0.6	A	1	1.550E-12	1.550E-12
10	3	0.17	39	0.0	0.000E+00		0.12000	19	0.0	A	5	1.550E-12	1.550E-12
10	4	2.30	39	0.0	0.000E+00		0.12000	22	0.0	A	7	1.550E-12	1.550E-12
10	5	2.30	39	0.0	0.000E+00		0.12000	22	0.0	A	10	1.550E-12	1.550E-12
10	6	2.30	39	0.0	0.000E+00		0.12000	22	0.0	A	9	1.550E-12	1.550E-12
10	7	2.30	39	0.0	0.000E+00		0.12000	23	0.0	A	9	7.750E-12	7.750E-11
10	8	2.30	39	0.0	0.000E+00		0.12000	23	0.0	A	11	4.650E-10	7.750E-11
10	9	2.30	39	0.0	0.000E+00		0.08000	23	0.0	A	15	4.650E-10	7.750E-11
10	10	2.30	38	0.0	0.000E+00		0.08000	23	0.0	A	26	4.650E-10	7.750E-11
10	11	2.30	38	0.0	0.000E+00		0.08000	23	0.0	A	25	4.650E-10	7.750E-11
10	12	2.30	38	0.0	0.000E+00		0.08000	24	0.0	A	23	4.650E-10	7.750E-11
10	13	2.30	37	0.0	0.000E+00		0.03000	24	0.0	A	17	1.550E-10	7.750E-11
10	14	2.30	36	0.0	0.000E+00		0.03000	23	0.0	A	14	1.550E-10	7.750E-12
10	15	2.30	34	0.0	0.000E+00		0.03000	12	0.0	A	8	1.550E-10	7.750E-12
10	16	2.30	30	0.0	0.000E+00		0.03000	16	0.0	A	7	1.550E-10	7.750E-12
10	17	1.00	23	0.0	0.000E+00		0.01000	7	0.0	A	0	1.550E-10	1.550E-10
10	18	1.00	15	0.0	0.000E+00		0.01000	4	0.0	A	0	1.550E-09	1.550E-09
10	19	0.35	8	0.0	0.000E+00		0.00001	2	0.0	A	3	1.550E-09	1.550E-09
10	20	0.35	11	0.0	0.000E+00		A	19					1.550E-09
10	21	0.35	11	0.0	0.000E+00		A	15					1.550E-09
10	22	0.35	12	0.0	0.000E+00		A	6					1.550E-09
10	23	0.35	12	0.0	0.000E+00		A	15					1.550E-10

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
10	24	0.35	10	0.0	0.000E+00		A	36					1.550E-10
10	25	0.35	6	0.0	0.000E+00		A	6					1.550E-10
10	26	0.35	2	0.0	0.000E+00		A	0					1.550E-09
11	2	0.17	42	0.0	0.000E+00		0.12000	11	-0.4	A	2	1.550E-12	1.550E-12
11	3	0.17	43	0.0	0.000E+00		0.12000	14	0.0	A	5	1.550E-12	1.550E-12
11	4	2.30	43	0.0	0.000E+00		0.12000	15	0.0	A	6	1.550E-12	1.550E-12
11	5	2.30	43	0.0	0.000E+00		0.12000	17	0.0	A	4	1.550E-10	1.550E-12
11	6	2.30	43	6.0	1.820E-09		0.12000	21	0.0	A	8	1.550E-10	1.550E-12
11	7	2.30	43	0.0	0.000E+00		0.12000	26	0.0	A	16	7.750E-12	7.750E-11
11	8	2.30	42	0.0	0.000E+00		0.12000	27	0.0	A	24	4.650E-10	7.750E-11
11	9	2.30	42	0.0	0.000E+00		0.08000	26	0.0	A	19	4.650E-10	7.750E-11
11	10	2.30	42	0.0	0.000E+00		0.08000	27	0.0	A	28	4.650E-10	7.750E-11
11	11	2.30	42	0.0	0.000E+00		0.08000	29	0.0	A	30	4.650E-10	7.750E-11
11	12	2.30	41	0.0	0.000E+00		0.08000	31	0.0	A	35	4.650E-10	7.750E-11
11	13	2.30	40	0.0	0.000E+00		0.03000	30	0.0	A	23	1.550E-10	7.750E-11
11	14	2.30	40	0.0	0.000E+00		0.03000	26	0.0	A	21	1.550E-10	7.750E-12
11	15	2.30	38	0.0	0.000E+00		0.01000	21	0.0	A	11	1.550E-10	7.750E-12
11	16	2.30	32	0.0	0.000E+00		0.01000	22	0.0	A	21	1.550E-10	7.750E-12
11	17	2.30	23	0.0	0.000E+00		0.01000	15	0.0	A	12	1.550E-09	1.550E-10
11	18	1.00	15	0.0	0.000E+00		0.01000	6	0.0	A	0	1.550E-09	1.550E-09
11	19	0.81	9	0.0	0.000E+00		0.01000	2	0.0	A	0	1.550E-09	1.550E-09
11	20	0.81	9	0.0	0.000E+00		0.00001	1	0.0	A	3	1.550E-09	1.550E-09
11	21	0.81	11	0.0	0.000E+00		A	4					1.550E-09
11	22	0.81	12	0.0	0.000E+00		A	1					1.550E-09
11	23	0.81	11	0.0	0.000E+00		A	3					1.550E-09
11	24	0.81	12	0.0	0.000E+00		A	35					1.550E-10
11	25	0.81	12	0.0	0.000E+00		A	29					1.550E-10
11	26	0.81	7	5.0	5.600E-09		A	9					1.550E-09
11	27	0.35	2	0.0	0.000E+00		A	2					7.750E-09
12	2	0.17	45	0.0	0.000E+00		0.12000	7	-0.1	A	0	1.550E-10	7.750E-11
12	3	0.17	45	0.0	0.000E+00		0.12000	8	0.0	A	0	1.550E-10	7.750E-11
12	4	2.30	45	0.0	0.000E+00		0.12000	10	0.0	A	3	1.550E-10	7.750E-11
12	5	2.30	46	0.0	0.000E+00		0.12000	18	0.0	A	9	1.550E-10	7.750E-11
12	6	2.30	46	0.0	0.000E+00		0.12000	24	0.0	A	17	1.550E-10	7.750E-11
12	7	2.30	46	0.0	0.000E+00		0.12000	28	0.0	A	22	4.650E-10	7.750E-11
12	8	2.30	45	0.0	0.000E+00		0.12000	29	0.0	A	27	4.650E-10	7.750E-11
12	9	2.30	45	0.0	0.000E+00		0.08000	29	0.0	A	25	4.650E-10	7.750E-11
12	10	2.30	45	0.0	0.000E+00		0.08000	29	0.0	A	30	4.650E-10	7.750E-11
12	11	2.30	45	0.0	0.000E+00		0.08000	37	0.0	A	45	4.650E-10	7.750E-11
12	12	2.30	44	0.0	0.000E+00		0.03000	45	0.0	A	54	4.650E-10	3.100E-10
12	13	2.30	44	0.0	0.000E+00		0.03000	44	0.0	A	45	7.750E-10	3.100E-10
12	14	2.30	43	0.0	0.000E+00		0.03000	34	0.0	A	17	1.550E-10	7.750E-12
12	15	2.30	40	0.0	0.000E+00		0.01000	26	0.0	A	24	1.550E-10	7.750E-12
12	16	2.30	35	0.0	0.000E+00		0.01000	25	0.0	A	27	1.550E-10	7.750E-12
12	17	2.30	24	0.0	0.000E+00		0.01000	19	0.0	A	13	1.550E-09	1.550E-10
12	18	1.00	15	0.0	0.000E+00		0.01000	10	0.0	A	1	1.550E-09	1.550E-09
12	19	0.81	9	0.0	0.000E+00		0.01000	3	0.0	A	0	4.650E-09	4.650E-09
12	20	0.81	8	0.0	0.000E+00		0.01000	1	0.0	A	0	4.650E-09	4.650E-09
12	21	0.81	8	0.0	0.000E+00		0.00001	2	0.0	A	2	4.650E-09	4.650E-09

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
12	22	0.81	10	0.0	0.000E+00		A	0					1.550E-09
12	23	0.81	13	0.0	0.000E+00		A	1					1.550E-09
12	24	0.81	17	0.0	0.000E+00		A	4					1.550E-09
12	25	0.81	18	0.0	0.000E+00		A	11					1.550E-09
12	26	0.81	16	0.0	0.000E+00		A	15					1.550E-09
12	27	0.35	10	0.0	0.000E+00		A	11					7.750E-09
12	28	0.35	3	0.0	0.000E+00		A	4					7.750E-09
13	2	2.30	48	0.0	0.000E+00		0.12000	12	0.0	A	4	1.550E-10	7.750E-11
13	3	2.30	48	0.0	0.000E+00		0.12000	8	0.0	A	3	1.550E-10	7.750E-11
13	4	2.30	48	0.0	0.000E+00		0.12000	14	0.0	A	8	1.550E-10	7.750E-11
13	5	2.30	49	0.0	0.000E+00		0.12000	23	0.0	A	18	1.550E-10	7.750E-11
13	6	2.30	49	0.0	0.000E+00		0.12000	28	0.0	A	24	1.550E-10	7.750E-11
13	7	2.30	49	0.0	0.000E+00		0.12000	31	0.0	A	26	4.650E-10	7.750E-11
13	8	2.30	49	0.0	0.000E+00		0.12000	34	0.0	A	31	4.650E-10	7.750E-11
13	9	2.30	49	0.0	0.000E+00		0.08000	35	0.0	A	35	4.650E-10	7.750E-11
13	10	2.30	49	0.0	0.000E+00		0.08000	35	0.0	A	24	4.650E-10	7.750E-11
13	11	2.30	49	0.0	0.000E+00		0.03000	50	0.0	A	67	3.100E-10	3.100E-10
13	12	2.30	48	0.0	0.000E+00		0.03000	62	0.0	A	84	3.100E-10	3.100E-10
13	13	1.50	48	0.0	0.000E+00		0.03000	58	0.0	A	59	7.750E-10	3.100E-10
13	14	1.50	47	0.0	0.000E+00		0.01000	47	0.0	A	52	4.650E-10	3.100E-10
13	15	2.30	44	0.0	0.000E+00		0.01000	34	0.0	A	29	1.550E-10	7.750E-12
13	16	2.30	39	0.0	0.000E+00		0.01000	28	0.0	A	24	1.550E-10	7.750E-12
13	17	2.30	28	0.0	0.000E+00		0.01000	20	0.0	A	15	1.550E-09	1.550E-10
13	18	1.50	17	0.0	0.000E+00		0.01000	14	0.0	A	5	1.550E-09	4.650E-09
13	19	1.50	11	0.0	0.000E+00		0.01000	6	0.0	A	0	1.550E-09	4.650E-09
13	20	0.81	8	0.0	0.000E+00		0.01000	2	0.0	A	0	4.650E-09	4.650E-09
13	21	1.20	7	0.0	0.000E+00		0.00001	4	0.0	A	4	4.650E-09	4.650E-09
13	22	1.20	9	0.0	0.000E+00		A	3					4.650E-09
13	23	0.81	16	0.0	0.000E+00		A	9					1.550E-09
13	24	0.81	22	0.0	0.000E+00		A	20					1.550E-09
13	25	0.81	28	0.0	0.000E+00		A	32					1.550E-09
13	26	0.81	28	0.0	0.000E+00		A	31					1.550E-09
13	27	0.35	25	0.0	0.000E+00		A	25					7.750E-09
13	28	0.35	16	0.0	0.000E+00		A	17					7.750E-09
13	29	0.81	7	2.0	2.240E-09	-1.585E-08							
14	2	2.30	50	0.0	0.000E+00		0.12000	27	0.0	A	17	1.550E-10	7.750E-11
14	3	2.30	51	0.0	0.000E+00		0.12000	18	0.0	A	7	1.550E-10	7.750E-11
14	4	2.30	51	0.0	0.000E+00		0.12000	18	0.0	A	17	1.550E-10	7.750E-11
14	5	2.30	51	0.0	0.000E+00		0.12000	27	0.0	A	26	1.550E-10	7.750E-11
14	6	2.30	51	0.0	0.000E+00		0.12000	33	0.0	A	29	1.550E-10	7.750E-11
14	7	2.30	52	0.0	0.000E+00		0.12000	37	0.0	A	33	1.550E-10	7.750E-11
14	8	2.30	52	0.0	0.000E+00		0.12000	40	0.0	A	37	4.650E-10	7.750E-11
14	9	2.30	52	0.0	0.000E+00		0.08000	45	0.0	A	53	4.650E-10	7.750E-11
14	10	2.30	52	0.0	0.000E+00		0.08000	43	0.0	A	39	4.650E-10	7.750E-11
14	11	2.30	52	0.0	0.000E+00		0.03000	49	0.0	A	57	4.650E-10	3.100E-10
14	12	2.30	52	0.0	0.000E+00		0.03000	63	0.0	A	74	4.650E-10	3.100E-10
14	13	1.50	51	0.0	0.000E+00		0.03000	63	0.0	A	67	7.750E-10	3.100E-10
14	14	1.50	50	0.0	0.000E+00		0.01000	63	0.0	A	79	4.650E-10	3.100E-10
14	15	1.50	48	0.0	0.000E+00		0.01000	55	0.0	A	63	4.650E-10	3.100E-10

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
14	16	1.50	43	0.0	0.000E+00		0.01000	38	0.0	A	30	1.550E-10	7.750E-12
14	17	1.50	34	0.0	0.000E+00		0.01000	38	0.0	A	41	4.650E-09	1.550E-10
14	18	1.50	21	0.0	0.000E+00		0.01000	25	0.0	A	25	4.650E-09	1.550E-10
14	19	1.50	14	0.0	0.000E+00		0.01000	12	0.0	A	4	1.550E-09	4.650E-09
14	20	0.81	9	0.0	0.000E+00		0.01000	6	0.0	A	0	1.550E-09	4.650E-09
14	21	1.20	8	0.0	0.000E+00		0.00001	6	0.0	A	6	4.650E-09	4.650E-09
14	22	2.30	11	0.0	0.000E+00		A	12					4.650E-09
14	23	1.20	19	0.0	0.000E+00		A	27					1.550E-09
14	24	0.81	33	0.0	0.000E+00		A	39					1.550E-09
14	25	0.81	41	0.0	0.000E+00		A	51					1.550E-09
14	26	0.81	42	0.0	0.000E+00		A	43					1.550E-09
14	27	0.46	40	0.0	0.000E+00		A	39					1.550E-09
14	28	0.46	34	0.0	0.000E+00		A	32					1.550E-09
14	29	1.50	22	0.0	0.000E+00	0.000E+00							
14	30	2.90	10	1.5	3.960E-09	-2.642E-08							
14	31	0.81	2	1.5	1.790E-08	-3.964E-08							
15	2	2.30	52	0.0	0.000E+00		0.04000	34	0.0	A	24	1.550E-10	7.750E-11
15	3	2.30	52	0.0	0.000E+00		0.04000	28	0.0	A	11	1.550E-10	7.750E-11
15	4	2.30	52	0.0	0.000E+00		0.04000	25	0.0	A	14	1.550E-10	7.750E-11
15	5	2.30	53	0.0	0.000E+00		0.04000	31	0.0	A	21	1.550E-10	7.750E-11
15	6	2.30	53	0.0	0.000E+00		0.04000	37	0.0	A	33	1.550E-10	7.750E-11
15	7	2.30	53	0.0	0.000E+00		0.04000	42	0.0	A	40	1.550E-10	7.750E-11
15	8	2.30	54	0.0	0.000E+00		0.04000	46	0.0	A	50	4.650E-10	7.750E-11
15	9	2.30	54	0.0	0.000E+00		0.08000	52	0.0	A	66	3.100E-10	7.750E-11
15	10	2.30	55	0.0	0.000E+00		0.08000	48	0.0	A	51	4.650E-10	7.750E-11
15	11	2.30	55	0.0	0.000E+00		0.03000	51	0.0	A	53	7.750E-10	7.750E-11
15	12	1.50	54	0.0	0.000E+00		0.03000	64	0.0	A	80	4.650E-10	3.100E-10
15	13	1.50	54	0.0	0.000E+00		0.01000	69	0.0	A	84	4.650E-10	3.100E-10
15	14	1.50	53	0.0	0.000E+00		0.01000	83	0.0	A	116	3.100E-10	1.550E-10
15	15	1.50	52	0.0	0.000E+00		0.01000	63	0.0	A	87	3.100E-10	3.100E-10
15	16	1.50	49	0.0	0.000E+00		0.01000	51	0.0	A	51	7.750E-10	6.200E-10
15	17	1.50	43	0.0	0.000E+00		0.01000	66	0.0	A	76	7.750E-10	1.550E-10
15	18	1.50	30	0.0	0.000E+00		0.01000	55	0.0	A	64	7.750E-10	1.550E-10
15	19	1.50	19	0.0	0.000E+00		0.01000	30	0.0	A	30	4.650E-09	1.550E-10
15	20	1.00	14	0.0	0.000E+00		0.01000	15	0.0	A	11	4.650E-09	4.650E-09
15	21	2.30	12	0.0	0.000E+00		0.00001	12	0.0	A	12	4.650E-09	4.650E-09
15	22	2.30	15	0.0	0.000E+00		A	21					1.550E-09
15	23	2.30	23	7.0	6.160E-09		A	27					1.550E-09
15	24	0.81	40	0.0	0.000E+00		A	49					1.550E-09
15	25	0.81	52	0.0	0.000E+00		A	61					1.550E-09
15	26	0.81	56	0.0	0.000E+00		A	58					1.550E-09
15	27	0.46	56	0.0	0.000E+00		A	56					7.750E-09
15	28	0.46	52	0.0	0.000E+00		A	51					4.650E-09
15	29	1.50	37	0.0	0.000E+00	4.492E-08							
15	30	5.80	21	0.0	0.000E+00	2.642E-08							
15	31	2.90	11	8.0	2.240E-09	-1.321E-08							
15	32	2.90	3	0.0	0.000E+00	-3.964E-08							
15	33	2.90	1	0.0	0.000E+00	-3.964E-08							
15	44	0.81	2	0.0	0.000E+00	-5.285E-09							

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
15	45	1.00	7	0.0	0.000E+00	0.000E+00							
16	2	2.30	53	0.0	0.000E+00		0.04000	38	0.0	A	28	1.550E-10	7.750E-11
16	3	2.30	53	0.0	0.000E+00		0.04000	36	0.0	A	19	1.550E-10	7.750E-11
16	4	2.30	54	0.0	0.000E+00		0.04000	43	0.0	A	33	1.550E-10	7.750E-11
16	5	2.30	54	0.0	0.000E+00		0.04000	45	0.0	A	29	1.550E-10	7.750E-11
16	6	2.30	55	0.0	0.000E+00		0.04000	39	0.0	A	25	1.550E-10	7.750E-11
16	7	2.30	55	0.0	0.000E+00		0.04000	44	0.0	A	36	1.550E-10	7.750E-11
16	8	2.30	56	0.0	0.000E+00		0.04000	49	0.0	A	54	4.650E-10	7.750E-11
16	9	2.30	56	0.0	0.000E+00		0.08000	58	0.0	A	72	3.100E-10	3.100E-10
16	10	2.30	57	0.0	0.000E+00		0.08000	59	0.0	A	72	3.100E-10	3.100E-10
16	11	1.50	57	0.0	0.000E+00		0.03000	61	0.0	A	75	3.100E-10	3.100E-10
16	12	1.50	58	0.0	0.000E+00		0.03000	69	0.0	A	88	3.100E-10	3.100E-10
16	13	1.50	58	0.0	0.000E+00		0.01000	91	0.0	A	94	7.750E-10	1.550E-10
16	14	1.50	57	0.0	0.000E+00		0.01000	97	0.0	A	107	4.650E-10	1.550E-10
16	15	1.50	57	0.0	0.000E+00		0.01000	75	0.0	A	93	3.100E-10	3.100E-10
16	16	1.50	56	0.0	0.000E+00		0.01000	59	0.0	A	60	7.750E-10	6.200E-10
16	17	1.50	51	0.0	0.000E+00		0.01000	85	0.0	A	98	7.750E-10	1.550E-10
16	18	1.50	44	0.0	0.000E+00		0.01000	67	0.0	A	79	7.750E-10	1.550E-10
16	19	1.00	31	0.0	0.000E+00		0.01000	37	0.0	A	41	7.750E-10	3.100E-10
16	20	1.00	22	5.0	1.580E-09		0.01000	28	0.0	A	24	4.650E-09	3.100E-10
16	21	2.30	18	0.0	0.000E+00		0.00001	27	0.0	A	27	1.550E-10	1.550E-10
16	22	2.30	19	14.0	5.380E-09		A	27					7.750E-10
16	23	2.30	26	0.0	0.000E+00		A	32					7.750E-10
16	24	0.58	41	0.0	0.000E+00		A	37					7.750E-10
16	25	0.58	54	0.0	0.000E+00		A	62					4.650E-09
16	26	0.46	64	0.0	0.000E+00		A	70					4.650E-09
16	27	0.46	70	0.0	0.000E+00		A	72					7.750E-09
16	28	0.46	68	0.0	0.000E+00		A	72					3.100E-09
16	29	1.50	44	0.0	0.000E+00	5.285E-08							
16	30	5.80	26	0.0	0.000E+00	5.285E-08							
16	31	23.20	17	11.0	6.580E-08	5.285E-08							
16	32	5.80	10	1.5	2.110E-08	2.907E-08							
16	33	5.80	7	0.0	0.000E+00	-2.642E-08							
16	34	5.80	3	2.0	1.460E-07	-1.321E-08							
16	35	0.81	1	0.0	0.000E+00	-7.927E-09							
16	44	0.81	4	0.0	0.000E+00	-5.285E-09							
16	45	1.00	9	0.0	0.000E+00	0.000E+00							
17	3	2.30	55	0.0	0.000E+00		0.04000	42	0.0	A	34	1.550E-10	4.650E-10
17	4	2.30	55	0.0	0.000E+00		0.04000	49	0.0	A	40	1.550E-10	4.650E-10
17	5	2.30	56	0.0	0.000E+00		0.04000	51	0.0	A	37	1.550E-10	4.650E-10
17	6	2.30	56	0.0	0.000E+00		0.04000	43	0.0	A	28	1.550E-10	4.650E-10
17	7	2.30	57	0.0	0.000E+00		0.04000	49	0.0	A	51	1.550E-10	4.650E-10
17	8	2.30	57	0.0	0.000E+00		0.04000	50	0.0	A	55	1.550E-10	4.650E-10
17	9	2.30	58	0.0	0.000E+00		0.08000	57	0.0	A	66	4.650E-10	4.650E-10
17	10	2.30	59	0.0	0.000E+00		0.08000	61	0.0	A	69	7.750E-10	4.650E-10
17	11	1.50	59	0.0	0.000E+00		0.03000	66	0.0	A	71	7.750E-10	3.100E-10
17	12	1.50	60	0.0	0.000E+00		0.03000	76	0.0	A	101	3.100E-10	3.100E-10
17	13	1.50	61	0.0	0.000E+00		0.01000	97	0.0	A	115	7.750E-10	7.750E-11
17	14	1.50	62	0.0	0.000E+00		0.01000	106	0.0	A	125	7.750E-10	7.750E-11

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
17	15	1.50	64	0.0	0.000E+00		0.01000	97	0.0	A	119	4.650E-10	1.550E-10
17	16	1.50	64	0.0	0.000E+00		0.01000	76	0.0	A	89	4.650E-10	1.550E-10
17	17	1.50	63	0.0	0.000E+00		0.01000	84	0.0	A	93	7.750E-10	7.750E-10
17	18	1.50	60	0.0	0.000E+00		0.01000	68	0.0	A	75	1.550E-09	7.750E-10
17	19	2.30	52	10.0	2.720E-09		0.01000	39	0.0	A	38	3.100E-10	1.550E-10
17	20	0.58	40	0.0	0.000E+00		0.01000	44	0.0	A	53	3.100F-10	3.100E-10
17	21	2.30	30	0.0	0.000E+00		0.00001	43	0.0	A	43	3.100E-09	3.100E-10
17	22	2.30	27	0.0	0.000E+00		A	44					7.750E-10
17	23	1.20	30	0.0	0.000E+00		A	31					3.100E-09
17	24	0.58	42	0.0	0.000E+00		A	44					7.750E-09
17	25	0.58	58	0.0	0.000E+00		A	50					1.550E-09
17	26	0.46	65	0.0	0.000E+00		A	59					3.100E-09
17	27	0.46	71	0.0	0.000E+00		A	71					7.750E-09
17	28	0.46	72	0.0	0.000E+00		A	73					7.750E-09
17	29	1.50	46	0.0	0.000E+00		A	58					4.650E-09
17	30	5.80	31	0.0	0.000E+00	5.285E-08							
17	31	11.60	23	0.0	0.000E+00	4.492E-08							
17	32	11.60	17	0.0	0.000E+00	3.964E-08							
17	33	11.60	12	0.0	0.000E+00	1.850E-08							
17	34	5.80	7	2.0	1.340E-08	1.850E-08							
17	35	11.60	3	2.0	3.770E-07	2.907E-08							
17	36	0.81	2	0.0	0.000E+00	-5.285E-09							
17	37	0.81	1	0.0	0.000E+00	0.000E+00							
17	39	0.81	2	0.0	0.000E+00	-1.321E-08							
17	40	0.81	2	0.0	0.000E+00	-1.585E-08							
17	41	0.81	2	0.0	0.000E+00	-1.321E-08							
17	42	0.81	2	0.0	0.000E+00	-1.321E-08							
17	43	0.81	2	0.0	0.000E+00	-1.321E-08							
17	44	1.00	5	0.0	0.000E+00	-1.057E-08							
17	45	1.00	12	0.0	0.000E+00	0.000E+00							
18	3	4.60	56	0.0	0.000E+00		0.04000	49	0.0	A	39	3.100E-10	4.650E-10
18	4	4.60	56	0.0	0.000E+00		0.04000	52	0.0	A	47	3.100E-10	4.650E-10
18	5	4.60	57	0.0	0.000E+00		0.04000	51	0.0	A	44	3.100E-10	4.650E-10
18	6	4.60	58	0.0	0.000E+00		0.04000	51	0.0	A	51	3.100E-10	4.650E-10
18	7	4.60	58	0.0	0.000E+00		0.04000	51	0.0	A	40	3.100E-10	4.650E-10
18	8	4.60	59	0.0	0.000E+00		0.04000	52	0.0	A	63	3.100E-10	4.650E-10
18	9	4.60	61	0.0	0.000E+00		0.08000	56	0.0	A	63	4.650E-10	4.650E-10
18	10	1.50	62	0.0	0.000E+00		0.08000	62	0.0	A	79	3.100E-10	4.650E-10
18	11	1.50	63	0.0	0.000E+00		0.08000	68	0.0	A	78	7.750E-10	3.100E-10
18	12	1.50	64	0.0	0.000E+00		0.03000	78	0.0	A	92	7.750E-10	7.750E-11
18	13	1.50	66	0.0	0.000E+00		0.03000	92	0.0	A	114	7.750E-10	7.750E-11
18	14	1.16	67	0.0	0.000E+00		0.01000	108	0.0	A	128	7.750E-10	7.750E-11
18	15	1.16	69	0.0	0.000E+00		0.01000	119	0.0	A	131	4.650E-10	7.750E-11
18	16	1.16	71	0.0	0.000E+00		0.01000	91	0.0	A	92	7.750E-10	7.750E-11
18	17	1.50	73	0.0	0.000E+00		0.01000	97	0.0	A	96	1.550E-09	7.750E-10
18	18	1.50	72	0.0	0.000E+00		0.01000	68	0.0	A	70	1.550E-09	7.750E-10
18	19	1.50	70	0.0	0.000E+00		0.01000	50	0.0	A	54	3.100E-10	1.550E-10
18	20	0.58	66	0.0	0.000E+00		0.01000	54	0.0	A	63	3.100E-10	3.100E-10
18	21	0.58	61	0.0	0.000E+00		0.00001	75	0.0	A	75	3.100E-09	4.650E-10

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
				SPRING DATA									
ROW	COL	T (SQ.FT /SEC)	POT. HEAD (FT)	HSS(FT)	CSS(/SEC)	QRE (FT/SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	Q (CU.FT /SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
18	22	0.58	53	0.0	0.000E+00		A	59					1.550E-09
18	23	1.20	46	0.0	0.000E+00		A	39					1.550E-09
18	24	0.58	51	0.0	0.000E+00		A	52					3.100E-09
18	25	0.58	72	0.0	0.000E+00		A	77					4.650E-09
18	26	0.46	80	0.0	0.000E+00		A	86					4.650E-09
18	27	0.46	78	0.0	0.000E+00		A	82					3.100E-09
18	28	0.46	73	0.0	0.000E+00		A	83					2.325E-09
18	29	1.50	48	0.0	0.000E+00		A	66					3.100E-09
18	30	5.80	36	0.0	0.000E+00	3.964E-08							
18	31	11.60	30	0.0	0.000E+00	3.964E-08							
18	32	2.90	25	0.0	0.000E+00	3.964E-08							
18	33	2.90	17	0.0	0.000E+00	3.699E-08							
18	34	5.80	9	0.0	0.000E+00	2.642E-08							
18	35	11.60	6	0.0	0.000E+00	2.642E-08							
18	36	11.60	4	2.0	1.960E-07	2.642E-08							
18	37	104	3	2.0	1.030E-06	1.057E-08							
18	38	150	3	2.0	1.030E-06	1.057E-08							
18	39	2.90	8	0.0	0.000E+00	7.927E-09							
18	40	1.00	8	0.0	0.000E+00	7.927E-09							
18	41	1.00	7	0.0	0.000E+00	-7.927E-09							
18	42	1.00	5	0.0	0.000E+00	-1.850E-08							
18	43	1.00	5	0.0	0.000E+00	-1.850E-08							
18	44	1.00	7	0.0	0.000E+00	-2.378E-08							
18	45	1.00	16	0.0	0.000E+00	-7.927E-09							
18	46	1.00	27	0.0	0.000E+00	0.000E+00							
19	3	4.60	57	0.0	0.000E+00		0.04000	52	0.0	A	47	7.750E-10	4.650E-10
19	4	4.60	57	0.0	0.000E+00		0.04000	54	0.0	A	55	7.750E-10	4.650E-10
19	5	4.60	58	0.0	0.000E+00		0.04000	53	0.0	A	58	7.750E-10	4.650E-10
19	6	4.60	60	0.0	0.000E+00		0.04000	55	0.0	A	62	7.750E-10	4.650E-10
19	7	4.60	61	0.0	0.000E+00		0.04000	59	0.0	A	63	7.750E-10	4.650E-10
19	8	4.60	62	0.0	0.000E+00		0.04000	51	0.0	A	43	3.100E-10	4.650E-10
19	9	4.60	64	0.0	0.000E+00		0.08000	51	0.0	A	39	3.100E-10	4.650E-10
19	10	1.50	65	0.0	0.000E+00		0.08000	60	0.0	A	59	7.750E-10	4.650E-10
19	11	1.50	67	0.0	0.000E+00		0.08000	67	0.0	A	90	7.750E-10	4.650E-10
19	12	1.50	68	0.0	0.000E+00		0.08000	78	0.0	A	100	7.750E-10	7.750E-11
19	13	1.50	70	0.0	0.000E+00		0.03000	89	0.0	A	104	7.750E-10	7.750E-11
19	14	1.50	76	0.0	0.000E+00		0.03000	105	0.0	A	122	7.750E-10	7.750E-11
19	15	1.16	80	0.0	0.000E+00		0.03000	119	0.0	A	131	3.100E-10	7.750E-11
19	16	1.16	83	0.0	0.000E+00		0.03000	105	0.0	A	114	1.550E-09	7.750E-11
19	17	1.50	84	0.0	0.000E+00		0.14000	129	0.0	A	142	7.750E-10	7.750E-10
19	18	1.50	84	0.0	0.000E+00		0.14000	93	0.0	A	96	1.550E-09	7.750E-10
19	19	1.50	84	0.0	0.000E+00		0.03000		0.0	A	83	7.750E-10	7.750E-10
19	20	1.50	82	0.0	0.000E+00		0.03000	4	0.0	A	109	3.100E-10	7.750E-10
19	21	1.50	82	0.0	0.000E+00		0.00001	105	0.0	A	105	1.550E-09	4.650E-10
19	22	0.58	78	0.0	0.000E+00		A	88					1.550E-09
19	23	1.20	68	0.0	0.000E+00		A	62					1.550E-09
19	24	1.20	60	52.0	1.680E-08		A	61					7.750E-09
19	25	0.58	73	0.0	0.000E+00		A	87					1.550E-09
19	26	0.58	82	0.0	0.000E+00		A	118					7.750E-10

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
19	27	0.46	85	0.0	0.000E+00		A	108					1.550E-09
19	28	0.46	77	0.0	0.000E+00		A	111					7.750E-10
19	29	1.50	58	0.0	0.000E+00		A	101					7.750E-10
19	30	5.80	44	0.0	0.000E+00	3.171E-08							
19	31	11.60	35	0.0	0.000E+00	4.756E-08							
19	32	2.90	32	0.0	0.000E+00	4.756E-08							
19	33	11.60	20	0.0	0.000E+00	4.228E-08							
19	34	11.60	11	0.0	0.000E+00	4.228E-08							
19	35	34.70	8	0.0	0.000E+00	4.756E-08							
19	36	57.90	6	0.0	0.000E+00	4.756E-08							
19	37	104	4	0.0	0.000E+00	5.285E-08							
19	38	104	4	0.0	0.000E+00	5.285E-08							
19	39	2.90	14	0.0	0.000E+00	4.756E-08							
19	40	0.23	31	0.0	0.000E+00	4.756E-08							
19	41	0.23	26	0.0	0.000E+00	1.585E-08							
19	42	1.00	20	0.0	0.000E+00	-1.850E-08							
19	43	1.00	18	0.0	0.000E+00	-1.850E-08							
19	44	1.00	18	0.0	0.000E+00	-1.850E-08							
19	45	1.00	30	0.0	0.000E+00	0.000E+00							
19	46	1.00	40	0.0	0.000E+00	0.000E+00							
20	3	4.60	58	0.0	0.000E+00		0.04000	55	0.0	A	60	7.750E-10	4.650E-10
20	4	4.60	59	0.0	0.000E+00		0.04000	56	0.0	A	62	7.750E-10	4.650E-10
20	5	4.60	60	0.0	0.000E+00		0.04000	57	0.0	A	64	7.750E-10	4.650E-10
20	6	4.60	62	0.0	0.000E+00		0.04000	59	0.0	A	68	1.550E-10	4.650E-10
20	7	4.60	63	0.0	0.000E+00		0.04000	65	0.0	A	81	4.650E-10	4.650E-10
20	8	4.60	66	0.0	0.000E+00		0.04000	58	0.0	A	64	7.750E-10	4.650E-10
20	9	4.60	67	0.0	0.000E+00		0.08000	55	0.0	A	54	4.650E-10	4.650E-10
20	10	4.60	68	0.0	0.000E+00		0.08000	58	0.0	A	49	4.650E-10	4.650E-10
20	11	1.50	70	0.0	0.000E+00		0.08000	63	0.0	A	90	1.550E-10	4.650E-10
20	12	1.50	76	0.0	0.000E+00		0.08000	75	0.0	A	111	1.550E-10	4.650E-10
20	13	1.50	82	0.0	0.000E+00		0.03000	88	0.0	A	102	7.750E-10	7.750E-10
20	14	1.50	85	0.0	0.000E+00		0.03000	111	0.0	A	120	1.550E-09	7.750E-10
20	15	1.50	87	0.0	0.000E+00		0.03000	120	0.0	A	133	1.550E-09	7.750E-11
20	16	1.50	89	0.0	0.000E+00		0.03000	119	0.0	A	124	2.325E-09	7.750E-11
20	17	1.50	91	0.0	0.000E+00		0.14000	130	0.0	A	133	1.550E-09	7.750E-11
20	18	1.50	94	0.0	0.000E+00		0.14000	107	0.0	A	102	1.550E-09	7.750E-10
20	19	1.50	95	0.0	0.000E+00		0.03000	88	0.0	A	89	1.550E-09	7.750E-10
20	20	1.50	96	0.0	0.000E+00		0.03000	101	0.0	A	121	1.550E-09	1.550E-09
20	21	1.50	95	0.0	0.000E+00		0.00001	111	0.0	A	111	1.550E-09	1.550E-09
20	22	1.20	93	0.0	0.000E+00		A	98					1.550E-09
20	23	1.20	85	0.0	0.000E+00		A	82					3.100E-09
20	24	1.20	72	0.0	0.000E+00		A	66					7.750E-10
20	25	1.20	67	0.0	0.000E+00		A	76					1.550E-09
20	26	1.20	73	0.0	0.000E+00		A	84					1.550E-09
20	27	0.46	78	0.0	0.000E+00		A	95					1.550E-09
20	28	0.46	74	0.0	0.000E+00		A	99					1.550E-09
20	29	1.50	61	0.0	0.000E+00		A	103					7.750E-10
20	30	5.80	45	0.0	0.000E+00	3.171E-08							
20	31	2.90	38	0.0	0.000E+00	4.756E-08							

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
ROW	COL	T (SQ.FT /SEC)	POT. HEAD (FT)	SPRING DATA HSS(FT)	SPRING DATA CSS(/SEC)	QRE (FT/SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	Q (CU.FT /SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
20	32	2.90	34	0.0	0.000E+00	4.756E-08							
20	33	11.60	24	0.0	0.000E+00	3.699E-08							
20	34	23.20	15	0.0	0.000E+00	4.228E-08							
20	35	46.30	10	0.0	0.000E+00	4.756E-08							
20	36	34.70	8	0.0	0.000E+00	4.756E-08							
20	37	57.90	6	0.0	0.000E+00	5.285E-08							
20	38	46.30	6	0.0	0.000E+00	5.285E-08							
20	39	5.80	11	0.0	0.000E+00	4.756E-08							
20	40	0.23	44	0.0	0.000E+00		A	51					2.325E-09
20	41	1.00	52	0.0	0.000E+00		A	61					1.550E-09
20	42	1.00	41	0.0	0.000E+00	3.964E-08							
20	43	1.00	36	0.0	0.000E+00	7.927E-09							
20	44	1.00	39	25.0	8.970E-09	3.964E-08							
20	45	1.00	45	0.0	0.000E+00	7.927E-09							
20	46	1.00	47	0.0	0.000E+00	7.927E-09							
21	4	4.60	61	0.0	0.000E+00		0.04000	59	0.0	A	73	4.650E-10	4.650E-10
21	5	4.60	63	0.0	0.000E+00		0.04000	62	0.0	A	77	4.650E-10	4.650E-10
21	6	4.60	65	0.0	0.000E+00		0.04000	69	0.0	A	82	4.650E-10	4.650E-10
21	7	4.60	67	0.0	0.000E+00		0.04000	70	0.0	A	84	4.650E-10	4.650E-10
21	8	4.60	68	0.0	0.000E+00		0.04000	62	0.0	A	74	4.650E-10	4.650E-10
21	9	4.60	69	0.0	0.000E+00		0.08000	59	0.0	A	56	4.650E-10	4.650E-10
21	10	4.60	73	0.0	0.000E+00		0.08000	63	0.0	A	68	7.750E-10	4.650E-10
21	11	4.60	80	0.0	0.000E+00		0.08000	63	0.0	A	73	1.550E-10	4.650E-10
21	12	4.60	84	0.0	0.000E+00		0.08000	68	0.0	A	79	1.550E-10	4.650E-10
21	13	4.60	87	0.0	0.000E+00		0.14000	81	0.0	A	88	1.550E-10	7.750E-10
21	14	4.60	90	0.0	0.000E+00		0.14000	110	0.0	A	112	1.550E-09	7.750E-10
21	15	1.50	92	0.0	0.000E+00		0.14000	127	0.0	A	133	1.550E-09	7.750E-11
21	16	1.50	95	0.0	0.000E+00		0.14000	135	0.0	A	146	1.550E-09	7.750E-11
21	17	1.50	98	0.0	0.000E+00		0.14000	138	0.0	A	157	1.550E-09	7.750E-11
21	18	1.50	103	0.0	0.000E+00		0.14000	133	0.0	A	146	7.750E-10	7.750E-10
21	19	1.50	105	0.0	0.000E+00		0.03000	127	0.0	A	139	7.750E-10	1.550E-09
21	20	1.50	105	0.0	0.000E+00		0.03000	123	0.0	A	138	7.750E-10	1.550E-09
21	21	1.20	105	0.0	0.000E+00		0.03000	117	0.0	A	117	7.750E-10	1.550E-09
21	22	1.20	101	0.0	0.000E+00		0.00001	109	0.0	A	109	1.550E-09	1.550E-09
21	23	1.20	94	0.0	0.000E+00		A	100					1.550E-09
21	24	1.20	86	0.0	0.000E+00		A	83					1.550E-10
21	25	1.20	74	0.0	0.000E+00		A	81					3.100E-09
21	26	5.80	68	0.0	0.000E+00		A	76					1.550E-09
21	27	5.80	66	0.0	0.000E+00		A	70					3.100E-09
21	28	5.80	62	0.0	0.000E+00		A	70					1.550E-09
21	29	5.80	52	0.0	0.000E+00		A	73					7.750E-10
21	30	5.80	46	0.0	0.000E+00		A	53					1.550E-09
21	31	11.60	41	0.0	0.000E+00	2.907E-08							
21	32	11.60	38	0.0	0.000E+00	2.907E-08							
21	33	11.60	31	0.0	0.000E+00	2.907E-08							
21	34	23.20	24	0.0	0.000E+00	2.907E-08							
21	35	34.70	20	0.0	0.000E+00	2.907E-08							
21	36	46.30	18	0.0	0.000E+00	2.907E-08							
21	37	34.70	15	0.0	0.000E+00	2.907E-08							

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
ROW	COL	T (SQ.FT /SEC)	POT. HEAD (FT)	SPRING DATA HSS(FT)	SPRING DATA CSS(/SEC)	QRE (FT/SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	Q (CU.FT /SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
21	38	34.70	12	0.0	0.000E+00	2.907E-08							
21	39	1.00	19	0.0	0.000E+00	2.907E-08							
21	40	2.90	37	0.0	0.000E+00		A	61					1.550E-09
21	41	5.80	44	0.0	0.000E+00		A	76					1.550E-09
21	42	5.80	43	0.0	0.000E+00		A	73					1.550E-09
21	43	5.80	43	0.0	0.000E+00		A	65					2.325E-09
21	44	5.80	45	0.0	0.000E+00		A	63					3.100E-09
21	45	5.80	50	0.0	0.000E+00		A	58					4.650E-09
21	46	1.00	53	0.0	0.000E+00		A	60					5.425E-09
22	4	4.60	63	0.0	0.000E+00		0.04000	68	0.0	A	80	6.200E-10	4.650E-10
22	5	4.60	66	0.0	0.000E+00		0.04000	73	0.0	A	86	6.200E-10	4.650E-10
22	6	4.60	68	0.0	0.000E+00		0.04000	76	0.0	A	87	6.200E-10	4.650E-10
22	7	4.60	69	0.0	0.000E+00		0.04000	75	0.0	A	86	6.200E-10	4.650E-10
22	8	4.60	72	0.0	0.000E+00		0.04000	71	0.0	A	78	6.200E-10	4.650E-10
22	9	4.60	75	0.0	0.000E+00		0.08000	63	0.0	A	70	7.750E-10	4.650E-10
22	10	4.60	80	0.0	0.000E+00		0.08000	65	0.0	A	74	7.750E-10	4.650E-10
22	11	4.60	84	0.0	0.000E+00		0.08000	73	0.0	A	106	4.650E-10	4.650E-10
22	12	4.60	88	0.0	0.000E+00		0.08000	80	0.0	A	100	4.650E-10	4.650E-10
22	13	4.60	91	0.0	0.000E+00		0.14000	88	0.0	A	109	7.750E-10	7.750E-10
22	14	1.50	94	0.0	0.000E+00		0.14000	91	0.0	A	83	3.100E-10	7.750E-10
22	15	1.50	96	0.0	0.000E+00		0.14000	105	0.0	A	124	7.750E-10	7.750E-10
22	16	1.50	100	0.0	0.000E+00		0.14000	106	0.0	A	129	7.750E-10	7.750E-10
22	17	1.50	106	0.0	0.000E+00		0.14000	104	0.0	A	121	7.750E-10	1.550E-09
22	18	1.50	109	0.0	0.000E+00		0.14000	122	0.0	A	155	1.550E-10	1.550E-09
22	19	1.50	112	0.0	0.000E+00		0.03000	120	0.0	A	143	1.550E-10	1.550E-09
22	20	1.50	113	0.0	0.000E+00		0.03000	132	0.0	A	145	7.750E-10	1.550E-09
22	21	1.20	112	0.0	0.000E+00		0.03000	138	0.0	A	138	1.550E-09	1.550E-09
22	22	1.20	109	0.0	0.000E+00		0.00001	127	0.0	A	127	1.550E-09	1.550E-09
22	23	1.20	102	0.0	0.000E+00		A	116					1.550E-09
22	24	1.20	94	0.0	0.000E+00		A	95					1.550E-09
22	25	1.20	87	0.0	0.000E+00		A	87					3.100E-09
22	26	1.20	79	0.0	0.000E+00		A	82					6.200E-09
22	27	1.20	72	0.0	0.000E+00		A	77					3.100E-09
22	28	1.20	66	0.0	0.000E+00		A	69					4.650E-09
22	29	1.20	62	0.0	0.000E+00		A	67					3.875E-09
22	30	1.20	55	0.0	0.000E+00		A	61					3.100E-09
22	31	5.80	49	0.0	0.000E+00	2.907E-08							
22	32	5.80	44	0.0	0.000E+00	2.907E-08							
22	33	11.60	41	0.0	0.000E+00	2.907E-08							
22	34	11.60	38	0.0	0.000E+00	2.907E-08							
22	35	11.60	36	0.0	0.000E+00	2.907E-08							
22	36	23.20	32	0.0	0.000E+00	2.907E-08							
22	37	5.80	30	0.0	0.000E+00	2.907E-08							
22	38	5.80	27	0.0	0.000E+00	2.907E-08							
22	39	0.23	40	0.0	0.000E+00	2.907E-08							
22	40	104	36	32.0	4.280E-07	2.907E-08							
22	41	104	38	0.0	0.000E+00	4.756E-08							
22	42	81.00	42	0.0	0.000E+00		A	63					2.325E-09
22	43	46.30	44	0.0	0.000E+00		A	65					2.325E-09

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
22	44	23.20	46	0.0	0.000E+00		A	66					2.325E-09
22	45	11.60	51	0.0	0.000E+00		A	73					1.550E-09
22	46	5.80	53	0.0	0.000E+00		A	75					1.550E-09
23	5	4.60	69	0.0	0.000E+00		0.04000	77	0.0	A	86	7.750E-10	4.650E-10
23	6	4.60	71	0.0	0.000E+00		0.04000	81	0.0	A	91	7.750E-10	4.650E-10
23	7	4.60	73	0.0	0.000E+00		0.04000	80	0.0	A	90	7.750E-10	4.650E-10
23	8	4.60	76	0.0	0.000E+00		0.04000	78	0.0	A	85	7.750E-10	4.650E-10
23	9	4.60	79	0.0	0.000E+00		0.08000	72	0.0	A	79	4.650E-10	4.650E-10
23	10	4.60	83	0.0	0.000E+00		0.08000	67	0.0	A	65	3.100E-10	4.650E-10
23	11	4.60	87	0.0	0.000E+00		0.08000	71	0.0	A	81	4.650E-10	4.650E-10
23	12	4.60	90	0.0	0.000E+00		0.08000	95	0.0	A	107	7.750E-10	7.750E-10
23	13	4.60	93	0.0	0.000E+00		0.14000	111	0.0	A	124	1.550E-09	7.750E-10
23	14	1.50	97	0.0	0.000E+00		0.14000	113	0.0	A	120	1.550E-09	7.750E-10
23	15	1.50	100	0.0	0.000E+00		0.14000	110	0.0	A	130	7.750E-10	7.750E-10
23	16	1.50	105	88.0	1.980E-09		0.14000	107	0.0	A	125	7.750E-10	7.750E-10
23	17	1.50	112	0.0	0.000E+00		0.14000	92	0.0	A	105	7.750E-10	7.750E-10
23	18	1.50	116	0.0	0.000E+00		0.14000	89	0.0	A	101	7.750E-10	7.750E-10
23	19	1.50	118	0.0	0.000E+00		0.03000	94	0.0	A	104	7.750E-10	7.750E-10
23	20	1.20	119	0.0	0.000E+00		0.03000	115	0.0	A	114	1.550E-09	1.550E-09
23	21	1.20	118	0.0	0.000E+00		0.03000	125	0.0	A	125	1.550E-09	1.550E-09
23	22	1.20	116	0.0	0.000E+00		0.00001	121	0.0	A	121	3.100E-09	1.550E-09
23	23	1.20	109	0.0	0.000E+00		A	119					3.100E-09
23	24	1.20	101	0.0	0.000E+00		A	103					3.100E-09
23	25	0.70	95	0.0	0.000E+00		A	96					3.100E-09
23	26	0.70	90	0.0	0.000E+00		A	91					3.100E-09
23	27	0.70	85	0.0	0.000E+00		A	87					7.750E-09
23	28	0.70	77	0.0	0.000E+00		A	82					2.325E-09
23	29	2.90	71	0.0	0.000E+00		A	77					1.550E-09
23	30	2.90	66	0.0	0.000E+00		A	72					1.550E-09
23	31	2.90	59	0.0	0.000E+00		A	67					1.550E-09
23	32	5.80	50	0.0	0.000E+00	1.057E-08							
23	33	5.80	43	0.0	0.000E+00	1.057E-08							
23	34	11.60	41	0.0	0.000E+00	1.057E-08							
23	35	5.80	40	0.0	0.000E+00	1.321E-08							
23	36	5.80	38	0.0	0.000E+00	1.321E-08							
23	37	2.90	38	35.0	1.420E-08	3.435E-08							
23	38	2.90	40	0.0	0.000E+00	3.435E-08							
23	39	0.23	49	0.0	0.000E+00	3.964E-08							
23	40	11.60	41	0.0	0.000E+00	3.699E-08							
23	41	104	41	0.0	0.000E+00	4.756E-08							
23	42	81.00	43	0.0	0.000E+00		A	61					3.100E-09
23	43	46.30	44	0.0	0.000E+00		A	56					3.875E-09
23	44	34.70	47	0.0	0.000E+00		A	56					5.425E-09
23	45	23.20	49	0.0	0.000E+00		A	61					3.875E-09
23	46	5.80	49	0.0	0.000E+00		A	60					4.650E-09
24	6	4.60	73	0.0	0.000E+00		0.04000	84	0.0	A	79	7.750E-10	4.650E-10
24	7	4.60	76	0.0	0.000E+00		0.04000	83	0.2	A	97	7.750E-10	4.650E-10
24	8	4.60	78	0.0	0.000E+00		0.04000	82	0.3	A	91	1.550E-09	4.650E-10
24	9	4.60	80	0.0	0.000E+00		0.08000	78	1.0	A	84	7.750E-10	4.650E-10

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT. HEAD	SPRING DATA		QRE	T	POT. HEAD	Q	T	POT. HEAD		
ROW	COL	(SQ.FT /SEC)	(FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	(FT)	(CU.FT /SEC)	(SQ.FT /SEC)	(FT)	TK2 (/SEC)	TK1 (/SEC)
24	10	4.60	84	0.0	0.000E+00		0.08000	76	1.3	A	86	7.750E-10	4.650E-10
24	11	4.60	89	0.0	0.000E+00		0.08000	79	0.0	A	89	7.750E-10	4.650E-10
24	12	4.60	92	0.0	0.000E+00		0.08000	94	0.0	A	105	1.550E-09	7.750E-10
24	13	1.50	95	0.0	0.000E+00		0.14000	129	0.0	A	139	7.750E-10	7.750E-10
24	14	1.50	98	0.0	0.000E+00		0.14000	123	0.0	A	132	1.550E-09	7.750E-10
24	15	1.50	102	0.0	0.000E+00		0.14000	126	0.0	A	146	7.750E-10	7.750E-10
24	16	1.20	110	0.0	0.000E+00		0.14000	117	0.0	A	134	7.750E-10	7.750E-10
24	17	1.20	116	0.0	0.000E+00		0.14000	108	0.0	A	111	7.750E-10	7.750E-10
24	18	1.20	120	0.0	0.000E+00		0.14000	114	0.0	A	123	1.550E-09	7.750E-10
24	19	1.20	123	0.0	0.000E+00		0.03000	117	0.0	A	130	3.100E-09	7.750E-10
24	20	1.20	123	0.0	0.000E+00		0.03000	130	0.0	A	139	1.550E-09	1.550E-09
24	21	1.20	123	0.0	0.000E+00		0.03000	131	0.0	A	131	1.550E-09	1.550E-09
24	22	0.70	123	0.0	0.000E+00		0.00001	125	0.0	A	125	3.100E-09	1.550E-09
24	23	0.70	116	0.0	0.000E+00		A	122					3.100E-09
24	24	0.70	108	0.0	0.000E+00		A	109					3.100E-09
24	25	0.70	102	0.0	0.000E+00		A	102					3.100E-09
24	26	0.70	97	0.0	0.000E+00		A	98					3.100E-09
24	27	1.20	93	0.0	0.000E+00		A	94					3.100E-09
24	28	1.20	87	0.0	0.000E+00		A	90					3.875E-09
24	29	1.20	80	0.0	0.000E+00		A	87					1.550E-09
24	30	1.20	74	0.0	0.000E+00		A	81					1.550E-09
24	31	1.20	68	0.0	0.000E+00		A	77					1.550E-09
24	32	2.90	53	0.0	0.000E+00		A	78					4.650E-10
24	33	2.90	45	0.0	0.000E+00		A	49					3.100E-09
24	34	2.90	41	0.0	0.000E+00	1.057E-08							
24	35	5.80	42	0.0	0.000E+00	1.321E-08							
24	36	2.90	43	0.0	0.000E+00	1.321E-08							
24	37	2.90	43	40.0	3.740E-08	3.435E-08							
24	38	2.90	44	0.0	0.000E+00	3.435E-08							
24	39	11.60	44	0.0	0.000E+00	3.699E-08							
24	40	11.60	42	0.0	0.000E+00	3.699E-08							
24	41	46.30	43	0.0	0.000E+00	4.756E-08							
24	42	46.30	44	0.0	0.000E+00	4.756E-08							
24	43	34.70	47	0.0	0.000E+00	4.756E-08							
24	44	23.20	50	0.0	0.000E+00		A	70					2.325E-09
24	45	11.60	51	0.0	0.000E+00		A	68					3.100E-09
24	46	5.80	52	0.0	0.000E+00		A	66					3.100E-09
25	11	4.60	89	0.0	0.000E+00		0.08000	84	0.0	A	107	1.550E-09	7.750E-10
25	12	4.60	92	0.0	0.000E+00		0.08000	81	-2.0	A	105	1.550E-09	7.750E-10
25	13	1.50	95	0.0	0.000E+00		0.14000	55	-5.0	A	144	3.100E-10	7.750E-10
25	14	1.50	98	0.0	0.000E+00		0.14000	46	-1.6	A	130	1.550E-09	7.750E-10
25	15	1.50	104	0.0	0.000E+00		0.14000	46	-1.6	A	130	1.550E-09	7.750E-10
25	16	1.20	112	0.0	0.000E+00		0.14000	46	0.0	A	112	7.750E-10	7.750E-10
25	17	1.20	118	0.0	0.000E+00		0.14000	46	0.0	A	120	3.100E-09	7.750E-10
25	18	1.20	122	0.0	0.000E+00		0.14000	45	0.0	A	131	1.550E-09	7.750E-10
25	19	1.20	125	0.0	0.000E+00		0.03000	44	0.0	A	133	3.100E-09	7.750E-10
25	20	1.20	127	0.0	0.000E+00		0.03000	43	0.0	A	136	3.100E-09	1.550E-09
25	21	1.20	128	0.0	0.000E+00		0.03000	0	0.0	A	134	1.550E-09	1.550E-09
25	22	0.70	129	0.0	0.000E+00		0.00001	0	0.0	A	129	3.100E-09	1.550E-09

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
				SPRING DATA		QRE							
ROW	COL	T (SQ.FT /SEC)	POT. HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	Q (CU.FT /SEC)	T (SQ.FT /SEC)	POT. HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
25	23	0.70	124	0.0	0.000E+00		A	0					1.550E-09
25	24	0.70	114	0.0	0.000E+00		A	0					3.100E-09
25	25	0.70	108	0.0	0.000E+00		A	0					3.100E-09
25	26	0.70	104	0.0	0.000E+00		A	21					1.550E-09
25	27	1.20	98	0.0	0.000E+00		A	64					3.100E-09
25	28	1.20	93	0.0	0.000E+00		A	85					1.085E-08
25	29	1.20	87	0.0	0.000E+00		A	87					3.875E-09
25	30	1.20	81	0.0	0.000E+00		A	88					3.100E-09
25	31	1.20	74	0.0	0.000E+00		A	90					3.100E-09
25	32	2.90	54	0.0	0.000E+00		A	94					7.750E-10
25	33	2.90	51	50.0	1.010E-07		A	123					6.200E-09
25	34	2.90	46	0.0	0.000E+00	2.642E-08							
25	35	2.90	46	0.0	0.000E+00	3.435E-08							
25	36	5.80	46	0.0	0.000E+00	3.435E-08							
25	37	5.80	46	0.0	0.000E+00	3.964E-08							
25	38	5.80	45	0.0	0.000E+00	3.964E-08							
25	39	11.60	44	0.0	0.000E+00	4.228E-08							
25	40	11.60	43	0.0	0.000E+00	4.228E-08							
25	41	11.60	43	0.0	0.000E+00	4.228E-08							
25	42	11.60	46	0.0	0.000E+00	4.228E-08							
25	43	11.60	48	0.0	0.000E+00	4.228E-08							
25	44	11.60	52	0.0	0.000E+00	4.228E-08							
25	45	5.80	54	0.0	0.000E+00	4.228E-08							
25	46	5.80	54	0.0	0.000E+00		A	66					3.875E-09
26	29	1.20	90	0.0	0.000E+00		A	96					3.875E-09
26	30	1.20	84	0.0	0.000E+00		A	91					3.100E-09
26	31	1.20	78	0.0	0.000E+00		A	91					2.325E-09
26	32	1.20	66	0.0	0.000E+00		A	79					2.325E-09
26	33	1.20	59	0.0	0.000E+00		A	69					3.100E-09
26	34	1.20	52	0.0	0.000E+00		A	58					4.650E-09
26	35	5.80	49	0.0	0.000E+00	3.171E-08							
26	36	5.80	48	0.0	0.000E+00	3.699E-08							
26	37	11.60	47	0.0	0.000E+00	4.492E-08							
26	38	11.60	46	0.0	0.000E+00	4.492E-08							
26	39	23.20	44	0.0	0.000E+00	4.228E-08							
26	40	34.70	43	0.0	0.000E+00	4.228E-08							
26	41	5.80	44	0.0	0.000E+00	4.228E-08							
26	42	11.60	45	0.0	0.000E+00	4.228E-08							
26	43	5.80	48	0.0	0.000E+00	4.228E-08							
26	44	5.80	52	0.0	0.000E+00	4.228E-08							
26	45	2.90	55	0.0	0.000E+00	4.228E-08							
26	46	2.90	57	0.0	0.000E+00		A	76					2.325E-09
26	47	2.90	58	0.0	0.000E+00		A	61					6.975E-09
27	31	1.20	78	0.0	0.000E+00		A	90					3.100E-09
27	32	1.20	71	70.0	3.360E-08		A	65					1.550E-10
27	33	1.20	65	0.0	0.000E+00		A	79					2.325E-09
27	34	1.20	58	0.0	0.000E+00		A	70					3.100E-09
27	35	5.80	53	0.0	0.000E+00		A	68					3.100E-09
27	36	11.60	50	0.0	0.000E+00		A	71					2.325E-09

NODE		LAYER ONE					LAYER TWO			LAYER THREE		CONFINING BEDS	
		T	POT.	SPRING DATA		QRE	T	POT.	Q	T	POT.		
ROW	COL	(SQ.FT /SEC)	HEAD (FT)	HSS(FT)	CSS(/SEC)	(FT/SEC)	(SQ.FT /SEC)	HEAD (FT)	(CU.FT /SEC)	(SQ.FT /SEC)	HEAD (FT)	TK2 (/SEC)	TK1 (/SEC)
27	37	23.20	48	0.0	0.000E+00	4.228E-08							
27	38	34.70	45	0.0	0.000E+00	4.228E-08							
27	39	46.30	44	0.0	0.000E+00	3.699E-08							
27	40	104	43	0.0	0.000E+00	3.699E-08							
27	41	104	44	0.0	0.000E+00	4.756E-08							
27	42	104	46	0.0	0.000E+00	4.756E-08							
27	43	57.90	49	0.0	0.000E+00	4.228E-08							
27	44	34.70	53	0.0	0.000E+00	4.228E-08							
27	45	23.20	57	0.0	0.000E+00		A	80					1.550E-09
27	46	11.60	60	0.0	0.000E+00		A	66					4.650E-09
27	47	2.90	63	0.0	0.000E+00		A	64					7.750E-09
28	33	2.90	66	0.0	0.000E+00		A	72					6.200E-09
28	34	5.80	62	0.0	0.000E+00		A	73					3.100E-09
28	35	11.60	58	0.0	0.000E+00		A	76					2.325E-09
28	36	23.20	54	0.0	0.000E+00		A	56					1.240E-08
28	37	34.70	51	0.0	0.000E+00		A	70					2.325E-09
28	38	46.30	47	0.0	0.000E+00		A	64					3.100E-09
28	39	46.30	44	0.0	0.000E+00		A	76					1.550E-09
28	40	104	43	41.0	9.190E-07	3.699E-08							
28	41	11.60	45	0.0	0.000E+00	4.756E-08							
28	42	34.70	48	0.0	0.000E+00	4.756E-08							
28	43	81.00	51	0.0	0.000E+00		A	68					2.325E-09
28	44	34.70	55	0.0	0.000E+00		A	58					9.300E-09
28	45	11.60	60	0.0	0.000E+00		A	59					3.100E-09
28	46	2.90	69	0.0	0.000E+00		A	73					6.200E-09
28	47	2.90	73	0.0	0.000E+00		A	76					6.200E-09
29	35	11.60	61	0.0	0.000E+00		A	65					3.100E-09
29	36	23.20	57	0.0	0.000E+00		A	71					1.550E-09
29	37	11.60	53	0.0	0.000E+00		A	56					6.975E-09
29	38	11.60	49	0.0	0.000E+00		A	59					1.550E-09
29	39	2.90	47	0.0	0.000E+00		A	64					7.750E-10
29	40	2.90	47	0.0	0.000E+00		A	53					2.325E-09
29	41	2.90	48	0.0	0.000E+00		A	65					1.550E-09
29	42	5.80	50	0.0	0.000E+00		A	64					2.325E-09
29	43	11.60	53	0.0	0.000E+00		A	60					3.875E-09
29	44	11.60	57	0.0	0.000E+00		A	61					6.975E-09
29	45	5.80	63	0.0	0.000E+00		A	66					9.300E-09
29	46	2.90	76	0.0	0.000E+00		A	81					3.875E-09
29	47	2.90	81	0.0	0.000E+00		A	88					4.650E-09
30	47	2.90	84	0.0	0.000E+00		A	96					1.550E-09
30	48	2.90	86	0.0	0.000E+00		A	109					7.750E-10
31	48	2.90	90	0.0	0.000E+00		A	124					7.750E-10

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