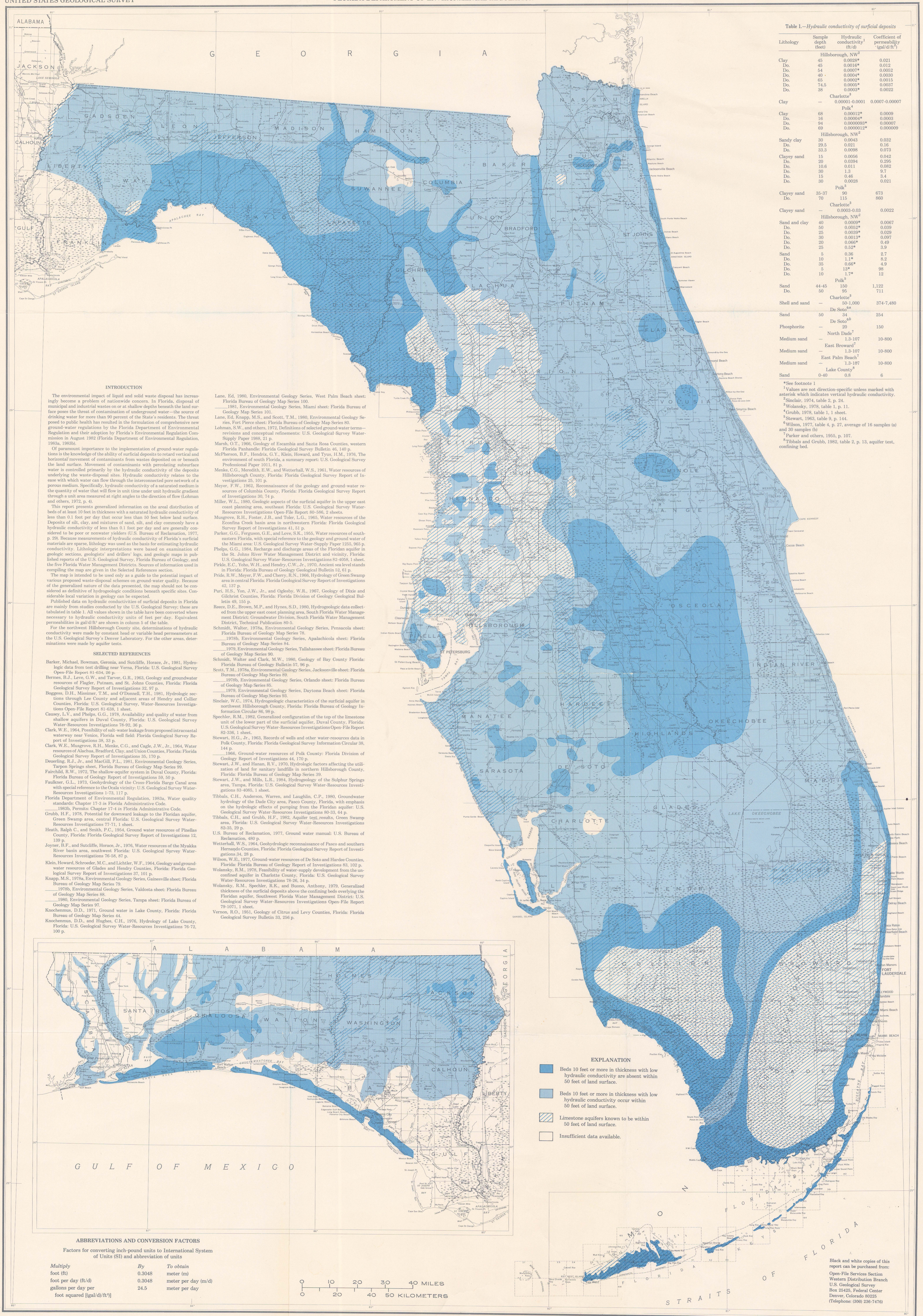
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

WATER-RESOURCES INVESTIGATIONS
REPORT 84-4210



INTRODUCTION

The environmental impact of liquid and solid waste disposal has increasingly become a problem of nationwide concern. In Florida, disposal of municipal and industrial wastes on or at shallow depths beneath the land surface poses the threat of contamination of underground water—the source of drinking water for more than 90 percent of the State's residents. The threat posed to public health has resulted in the formulation of comprehensive new ground-water regulations by the Florida Department of Environmental Regulation and their adoption by Florida's Environmental Regulation Commission in August 1982 (Florida Department of Environmental Regulation, 1983a, 1983b).

Of paramount importance to the implementation of ground-water regulations is the knowledge of the ability of surficial deposits to retard vertical and horizontal movement of contaminants from wastes deposited on or beneath the land surface. Movement of contaminants with percolating subsurface water is controlled primarily by the hydraulic conductivity of the deposits underlying the waste-disposal sites. Hydraulic conductivity relates to the ease with which water can flow through the interconnected pore network of a porous medium. Specifically, hydraulic conductivity of a saturated medium is the quantity of water that will flow in unit time under unit hydraulic gradient through a unit area measured at right angles to the direction of flow (Lohman and others, 1972, p. 4).

This report presents generalized information on the areal distribution of beds of at least 10 feet in thickness with a saturated hydraulic conductivity of less than 0.1 foot per day that occur less than 50 feet below land surface. Deposits of silt, clay, and mixtures of sand, silt, and clay commonly have a hydraulic conductivity of less than 0.1 foot per day and are generally considered to be poor or nonwater yielders (U.S. Bureau of Reclamation, 1977, p. 29). Because measurements of hydraulic conductivity of Florida's surficial materials are sparse, lithology was used as the basis for estimating hydraulic conductivity. Lithologic interpretations were based on examination of geologic sections, geologists' and drillers' logs, and geologic maps in published reports of the U.S. Geological Survey, Florida Bureau of Geology, and the five Florida Water Management Districts. Sources of information used in compiling the map are given in the Selected References section.

The map is intended to be used only as a guide to the potential impact of various proposed waste-disposal schemes on ground-water quality. Because of the generalized nature of the data presented, the map should not be considered as definitive of hydrogeologic conditions beneath specific sites. Considerable local variation in geology can be expected.

Published data on hydraulic conductivities of surficial deposits in Florida are mainly from studies conducted by the U.S. Geological Survey; these are tabulated in table 1. All values shown in the table have been converted where necessary to hydraulic conductivity units of feet per day. Equivalent permeabilities in gal/d/ft² are shown in column 5 of the table.

For the northwest Hillsborough County site, determinations of hydraulic conductivity were made by constant head or variable head permeameters at the U.S. Geological Survey's Denver Laboratory. For the other areas, determinations were made by aquifer tests.

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Table 1.—*Hydraulic conductivity of surficial deposits*

Lithology	Sample depth (feet)	Hydraulic conductivity[1] (ft/d)	Coefficient of permeability (gal/d/ft²)
		Hillsborough, NW[2]	
Clay	45	0.0028*	0.021
Do.	45	0.0016*	0.012
Do.	54	0.0007*	0.0052
Do.	40	0.0004*	0.0030
Do.	65	0.0002*	0.0015
Do.	74.5	0.0005*	0.0037
Do.	38	0.0003*	0.0022
		Charlotte[3]	
Clay	—	0.00001-0.0001	0.0007-0.00007
		Polk[4]	
Clay	68	0.00012*	0.0009
Do.	16	0.00004*	0.0003
Do.	94	0.0000093*	0.00007
Do.	69	0.0000012*	0.000009
		Hillsborough, NW[2]	
Sandy clay	30	0.0043	0.032
Do.	29.5	0.021	0.16
Do.	33.3	0.0098	0.073
Clayey sand	15	0.0056	0.042
Do.	20	0.0394	0.295
Do.	10.6	0.011	0.082
Do.	30	1.3	9.7
Do.	15	0.46	3.4
Do.	30	0.0028	0.021
		Polk[5]	
Clayey sand	35-37	90	673
Do.	70	115	860
		Charlotte[3]	
Clayey sand	—	0.0003-0.03	0.0022
		Hillsborough, NW[2]	
Sand and clay	40	0.0009*	0.0067
Do.	50	0.0052*	0.039
Do.	25	0.0039*	0.029
Do.	30	0.0013*	0.097
Do.	20	0.066*	0.49
Do.	25	0.52*	3.9
Sand	5	0.36	2.7
Do.	10	1.1*	8.2
Do.	35	0.66*	4.9
Do.	5	13*	98
Do.	10	1.7*	12
		Polk[5]	
Sand	44-45	150	1,122
Do.	50	95	711
		Charlotte[3]	
Shell and sand	—	50-1,000	374-7,480
		De Soto[6a]	
Sand	50	34	254
		De Soto[6b]	
Phosphorite	—	20	150
		North Dade[7]	
Medium sand	—	1.3-107	10-800
		East Broward[7]	
Medium sand	—	1.3-107	10-800
		East Palm Beach[7]	
Medium sand	—	1.3-107	10-800
		Lake County[8]	
Sand	0-40	0.8	6

*See footnote 1

[1] Values are not direction-specific unless marked with asterisk which indicates vertical hydraulic conductivity.

[2] Sinclair, 1974, table 2, p. 24.

[3] Wolansky, 1978, table 1, p. 11.

[4] Grubb, 1978, table 1, 1 sheet.

[5] Stewart, 1963, table 9, p. 144.

[6] Wilson, 1977, table 4, p. 27, average of 16 samples (a) and 30 samples (b)

[7] Parker and others, 1955, p. 107.

[8] Tibbals and Grubb, 1982, table 2, p. 13, aquifer test, confining bed.

ABBREVIATIONS AND CONVERSION FACTORS

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

Multiply	*By*	*To obtain*
foot (ft)	0.3048	meter (m)
foot per day (ft/d)	0.3048	meter per day (m/d)
gallons per day per foot squared [(gal/d)/ft²)]	24.5	meter per day

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