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Digital Surfaces and Hydrogeologic Data for Mesozoic through Early Tertiary Rocks in the Southeastern Coastal Plain in Parts of Mississippi, Alabama, Georgia, South Carolina, and Florida

Data Series 662

U.S. Department of the Interior
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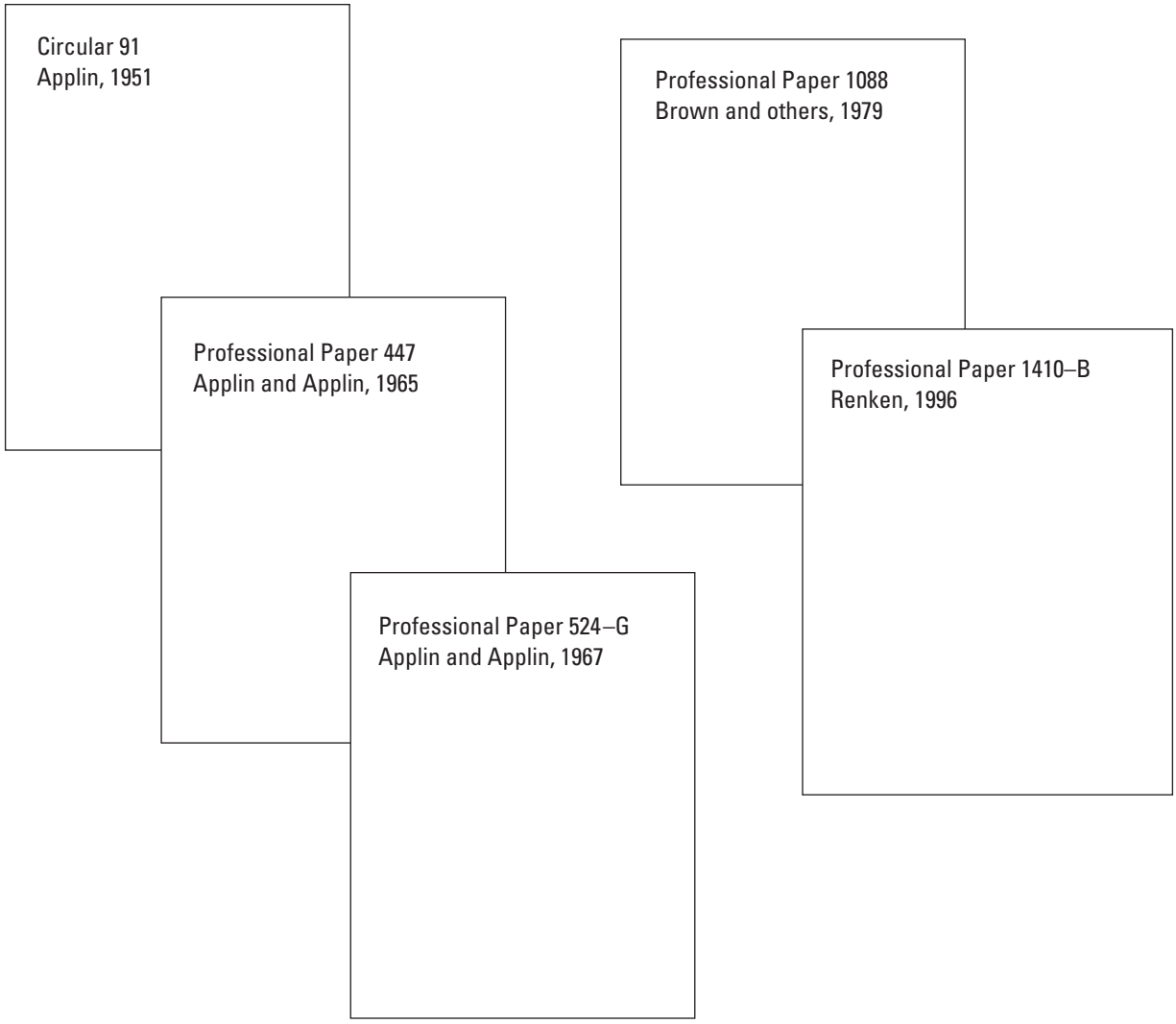
Cover. Cover images of publications used in this report.



Digital Surfaces and Hydrogeologic Data for Mesozoic through Early Tertiary Rocks in the Southeastern Coastal Plain in Parts of Mississippi, Alabama, Georgia, South Carolina, and Florida

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Conversion Factor and Datum

Multiply	By	To obtain
foot (ft)	0.3048	meter (m)

Coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Altitude, as used in this report, refers to distance above the vertical datum.

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Abstract

A digital dataset of hydrogeologic data for Mesozoic through early Tertiary rocks in the Southeastern Coastal Plain was developed using data from five U.S. Geological Survey (USGS) reports published between 1951 and 1996. These reports contain maps and data depicting the extent and elevation of the Southeast Coastal Plain stratigraphic and hydrogeologic units in Florida and parts of Mississippi, Alabama, Georgia, and South Carolina. The digital dataset provides hydrogeologic data for the USGS Energy Resources Program assessment of potential reservoirs for carbon sequestration and for the USGS Groundwater Resource Program assessment of saline aquifers in the Southeastern United States.

A Geographic Information System (ArcGIS 9.3.1) was used to construct 33 digital (raster) surfaces representing the top or base of key stratigraphic and hydrogeologic units. In addition, the Geographic Information System was used to generate 102 georeferenced maps scanned from the five reports and a geodatabase containing structural and thickness contours, faults, extent polygons, and common features. The dataset also includes point data of well construction and stratigraphic elevations, and scanned images of two geologic cross sections and a nomenclature chart.

Introduction

In 2007, the Energy Independence and Security Act (Public Law 110–140) authorized the U.S. Geological Survey (USGS) to conduct a national assessment of potential geologic storage resources for carbon dioxide in cooperation with the U.S. Environmental Protection Agency and the U.S. Department of Energy (Brennan and others, 2010). The USGS also initiated a study in 2010 to assess and map saline aquifers in the Southeastern United States as potential water sources. Information on the depth, thickness, and extent of geologic and hydrologic units is important for assessment of potential saline aquifers and potential reservoirs for carbon sequestration. This report provides a digital dataset of hydrogeologic data for Mesozoic through early Tertiary clastic sedimentary rocks, using data from five USGS reports published between 1951 and 1996. The reports are Circular 91 (Applin, 1951); Professional Paper 447 (Applin and Applin, 1965); Professional Paper 524–G (Applin and Applin, 1967); Professional Paper 1088 (Brown and others, 1979); and Professional Paper 1410–B (Renken, 1996). Prior to this compilation, maps from these older important works were not available in a digital format that would enable rapid and efficient analysis and comparison to other available digital datasets. The dataset will provide valuable hydrogeologic information for both the carbon sequestration and saline aquifer mapping projects.

Purpose and Scope

The purpose of this report is to provide digital surfaces of key stratigraphic and hydrogeologic units in the Southeastern Coastal Plain that were derived from five USGS reports published between 1951 and 1996. The study area includes Florida and parts of Mississippi, Alabama, Georgia, and South Carolina. The location of the Southeastern Coastal Plain and the extent of the five report study areas that provided data for this report are shown in figure 1.

A generalized correlation of stratigraphic and hydrogeologic units in this study and their relationship to the 33 digital surfaces presented in this report are shown in figure 2. The digital surfaces represent the top and (or) base of (1) selected major hydrogeologic units including: the Pearl River aquifer, Chattahoochee River and McNairy-Nacatoch aquifers, and the Black Warrior River aquifer, and (2) 28 time-stratigraphic units that range from the base of the Mesozoic to the top of the Claibornian.

The scope of this work involved scanning 102 report figures (including 105 georeferenced maps, two cross sections, and a naming chart); creating a geodatabase of 129 vector features representing elevation and thickness contour lines, faults, formation extents and other geologic features of interest; and generating a database containing point data of well construction and stratigraphic elevation data. Table 1 lists the files created for this report by report number, plate or figure number, and includes a brief file description. The report describes methods used to develop the digital surfaces and provides a brief description of the five selected USGS reports and resulting datasets.

Methods

Paper maps from the five previously published reports were scanned and georeferenced to the North American Datum of 1927 (NAD 27) using the Lambert Conformal Conic projection (standard parallels 33 and 45 degrees, central longitude –96 degrees, central latitude 39 degrees). Once georeferenced, tracing of pertinent line features contained in each image (for example, contours and faults) was facilitated by specialized software (NeuraMap) using algorithms that automated much of the process. Resulting digital line features were then processed using standard geographic information system (GIS) software (ArcGIS Version 9.3.1) to remove artifacts from the vectorization process and to verify and update attribute tables. The vectorization of polygonal features, such as outcrop area and unit extents, was completed by manually tracing the features from the georeferenced maps into new polygon features in the GIS.

Raster datasets depicting structural surfaces of time-stratigraphic and hydrogeologic units were generated by interpolating equidistant point features derived from the polyline features created in the vectorization process. Additionally, barriers were used in the interpolation process so that the relations represented in the original maps regarding geologic features, such as faults and unit extents, were maintained. Raster datasets were created independently of one another, and logical relations between datasets may not be maintained everywhere. Irregularities may exist, especially in areas near edges or where the units are relatively thin. Because the digital datasets are intended to be exact reproductions of the paper maps from which they were developed, no attempt was made to quantify or correct these irregularities.

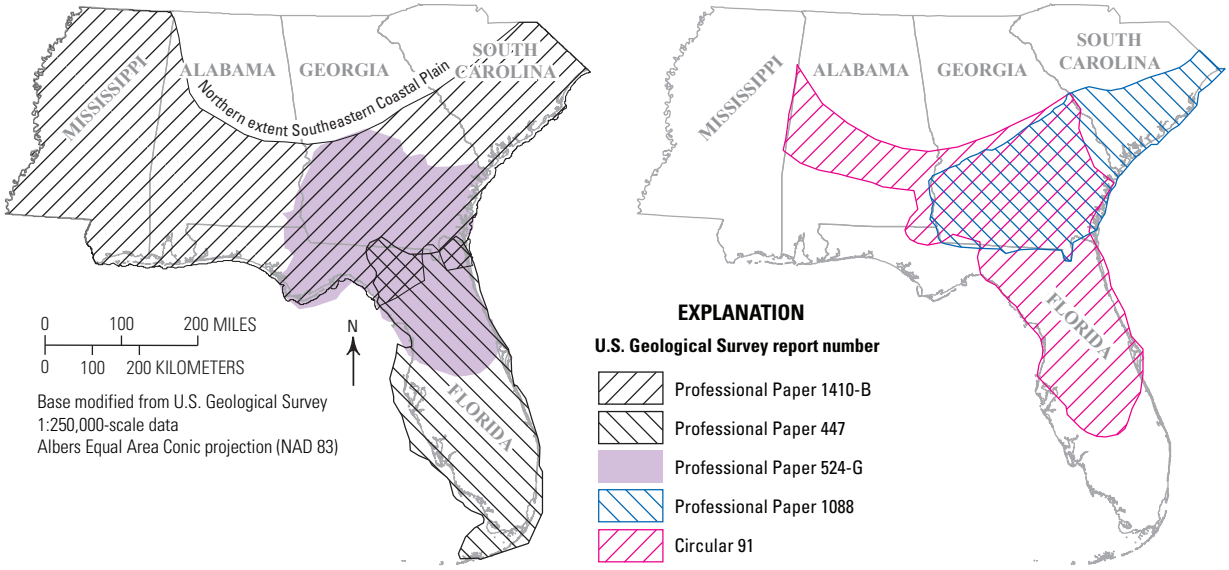

Figure 1. Areal extent for each source report used in this data series.

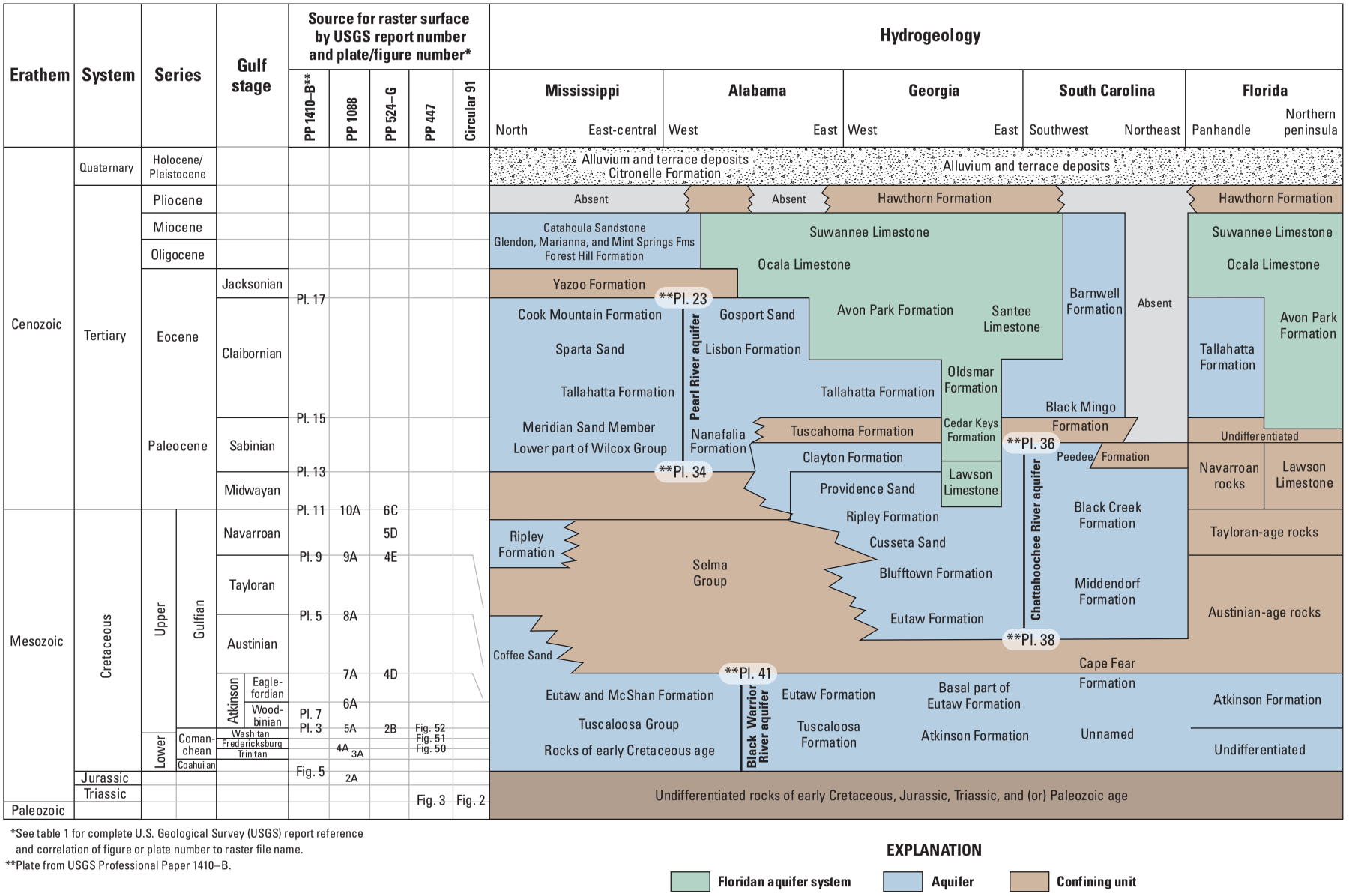

Figure 2. Generalized correlation chart showing stratigraphic units, hydrogeologic units, and sources for raster surfaces created for this report, Southeastern Coastal Plain (modified from Renken, 1996).

Three reports (Professional Papers 1088, 524–G, and 447) included tables of well construction and stratigraphic data that were used to create the structural surface maps in those reports. These well stratigraphic elevations were compiled for specific units into a database.

Dataset Description by Source

Datasets for this report originated from five USGS reports whose study areas cover the Southeastern Coastal Plain (fig. 1). A generalized correlation chart shows regional stratigraphic and hydrogeologic units and the 33 raster surfaces that were generated for this report (fig. 2). In addition to the raster surfaces created from structural contour maps, this report includes: 105 georeferenced images created from report figures and plates; a geodatabase containing structural and thickness contours, faults, extent polygon, and other features and; a database of well construction and stratigraphic elevations used as control points for the contour maps.

The report by Applin (1951) used information from 78 oil test wells drilled into pre-Mesozoic rocks that included granite, diorite, metamorphic rocks, rhyolite, pyroclastic rocks, and Paleozoic strata. This information was based largely on petrographic and petrologic studies of cores and cuttings that identified the pre-Mesozoic surface. This surface makes up the floor upon which the Mesozoic stratigraphy was deposited and the one most likely to contain reservoirs and structural features that favor oil and gas accumulation. Files created from the Applin (1951) report include: one digital surface, one scanned and georeferenced report figure, stratigraphic contours, and an extent polygon. Well construction and stratigraphic depth data were not input for this report, because extensive pre-Mesozoic stratigraphic well data are available from other sources.

The report by Applin and Applin (1965) integrated data from 70 scattered test wells (ranging in depth from 4,637 to 15,455 feet) and developed an interpretation of the regional geology in central and southern Florida for Comanche Series rocks, the older rocks of the Coastal Plain floor. The report discusses stratigraphy, structure, micropaleontology, and oil potential of these rocks. Files created from the Applin and Applin (1965) report include: four digital surfaces; 16 scanned and georeferenced images of report figures and plates; stratigraphic contours, extent polygon and faults; and well construction and stratigraphic depth data for 73 wells.

The report by Applin and Applin (1967) presented results of regional stratigraphic and paleontologic studies started in 1943 to identify oil and gas reserves. This report describes the stratigraphy, structure, micropaleontology, lithofacies, and biofacies of the Gulf Series in northern Florida, southern Georgia, and southeastern Alabama, using data from over 150 oil test wells. These data were then integrated into an interpretation of the regional geology. The Gulf Series was divided into four major stratigraphic units from oldest to youngest, the Atkinson Formation (upper and lower members), the beds of Austin age, the beds of Taylor age, and the beds of Navarro age. Files (table 1) created from the Applin and Applin (1967) report include: five digital surfaces; 24 scanned and georeferenced images of report plates; stratigraphic elevation and thickness contours, extent polygons, and faults; and well construction and stratigraphic depth data for 154 wells.

The report by Brown and others (1979) evaluated the geologic and hydrologic factors related to waste-storage potential of late-Jurassic to Cretaceous-age rocks in South Carolina and Georgia (fig. 1). This research was conducted as part of the USGS waste-storage research program to assess potential for deep-well emplacement of liquid waste into deep zones with unusable groundwater (water with a sodium chloride concentration greater than 10,000 milligrams per liter). In addition, the strata must consist of 20 feet or more of porous sand that is directly underlain and overlain by an impermeable layer that is greater than 20-feet thick. Eight Jurassic to Late Cretaceous geologic units—designated by the letters H to A and represented in the Brown and others (1979) report by surfaces shown on plates 2*A* through 10*A*—were judged to have some possible waste-storage potential, with Unit F showing the greatest waste-storage potential. Files (table 1) created from the Brown and others (1979) report include: nine digital surfaces; 36 scanned and georeferenced images of report figure and plates; stratigraphic and thickness contours, unit extent polygon, faults, and sodium chloride concentration contours (Units G and F) for pore volume calculation; and well construction and stratigraphic depth data for 88 wells.

The report by Renken (1996) was published as part of the USGS Regional Aquifer System Analysis (RASA) program and is one report in a series that discusses the hydrogeology, hydrochemistry, and hydrology of the Southeastern Coastal

Plain aquifer system. This system consists of Cretaceous and Tertiary clastic sedimentary rocks in Mississippi, Alabama, Georgia, South Carolina, and parts of northern Florida and southeastern North Carolina (fig. 1). Renken did not include the Florida Peninsula in his report study area; however, it is considered part of the Southeastern Coastal Plain. The purpose of Renken's report was to produce a regional hydrogeologic framework for use in a Southeastern Coastal Plain regional groundwater flow model. To understand the relation between time-stratigraphic units and regional aquifers and confining units, more than 1,000 oil, gas, and water wells were evaluated and used to format contour and isopach maps and cross sections. Renken found that regional aquifer boundaries do not always correspond to time-stratigraphic boundaries.

All hydrogeologic and stratigraphic contours from the Renken (1996) report were digitized from plates contained in that report, with the exception of the map showing the "Configuration and character of pre-Cretaceous rocks underlying the Southeastern Coastal Plain of the United States" where the original map (Wait and Davis, 1986) was digitized. Files (table 1) created from the Renken (1996) report include 14 digital surfaces representing 9 stratigraphic and 5 hydrogeologic surfaces; 28 scanned and georeferenced images of report figures and plates; and stratigraphic and hydrogeologic contours, fault lines, extent polygons, and other common features. Well construction and hydrogeologic and stratigraphic depth data were not provided in the Renken report.

Acknowledgments

The digital surfaces and related data for the Southeastern Coastal Plain were compiled in support of several ongoing studies by the USGS including regional assessment of carbon sequestration by the USGS Energy Resources Program (ERP) and mapping of deep saline aquifer systems by the USGS Groundwater Resources Program (GWRP). Appreciation is extended to Peter D. Warwick, with the ERP, Reston, Virginia, who provided much encouragement and support to complete digitization of the surfaces critical to that program. Additionally, a large amount of support was provided by the USGS Office of Groundwater and we especially thank Kevin F. Dennehy of the GWRP for his continued support in completion of the saline mapping project in the southeastern United States.

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Applin, P.L., 1951, Preliminary report on buried pre-Mesozoic rocks in Florida and adjacent states: U.S. Geological Survey Circular 91, 28 p., accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/CIR/circ_91.djvu*.

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Applin, P.L., and Applin, E.R., 1967, The Gulf series in the subsurface in northern Florida and southern Georgia: U.S. Geological Survey Professional Paper 524–G, 35 p., 8 pls., accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/PP/pp_524_g.djvu*.

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Wait, R.L., and Davis, M.E., 1986, Configuration and hydrology of the pre-Cretaceous rocks underlying the Southeastern Coastal Plain aquifer system: U.S. Geological Survey Water-Resources Investigations Report 86–4010, 1 sheet, accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/WRI/wrir_86_4010.djvu*.

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Database files	
All	n/a	ds662.gdb.zip	ESRI file geodatabase containing vector and raster data from all reports
PP 1088, PP 524–G, PP 447	n/a	ds662_well_data.mdb.zip	Microsoft Access database containing well construction and stratigraphic elevation data
		Raster surfaces	
Circular 91	Figure 2	cir91_fig2_pmso_tp	Top of pre-Mesozoic
PP 447	Figure 3	pp447_fig03_pmso_tp	Top of pre-Mesozoic
PP 447	Figure 50	pp447_fig50_snlnd_tp	Top of Sunniland Limestone
PP 447	Figure 51	pp447_fig51_frdbg_tp	Top of Fredericksburg
PP 447	Figure 52	pp447_fig52_wshta_tp	Top of Washita
PP 524–G	Plate 2b	pp524g_plt02b_pgulf_tp	Top pre-Gulf
PP 524–G	Plate 4d	pp524g_plt04d_astn_bs	Base of Austin
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp	Top of Taylor
PP 524–G	Plate 5b	pp524g_plt05b_lwslm_tp	Top of lower member Lawson Limestone
PP 524–G	Plate 6c	pp524g_plt06c_gulf_tp	Top of Gulf
PP 1088	Plate 2a	pp1088_plt02a_punth_tp	Top of pre-Unit H(?)
PP 1088	Plate 3a	pp1088_plt03a_unth_tp	Top of Unit H
PP 1088	Plate 4a	pp1088_plt04a_untg_tp	Top of Unit G
PP 1088	Plate 5a	pp1088_plt05a_untf_tp	Top of Unit F
PP 1088	Plate 6a	pp1088_plt06a_unte_tp	Top of Unit E
PP 1088	Plate 7a	pp1088_plt07a_untd_tp	Top of Unit D
PP 1088	Plate 8a	pp1088_plt08a_untc_tp	Top of Unit C
PP 1088	Plate 9a	pp1088_plt09a_untb_tp	Top of Unit B
PP 1088	Plate 10a	pp1088_plt10a_unta_tp	Top of Unit A
PP 1410–B	Figure 5	pp1410b_fig05_secpaq_bs	Base of Southeastern Coastal Plain aquifer system
PP 1410–B	Plate 3	pp1410b_plt03_cmnc_tp	Top of Comanchean
PP 1410–B	Plate 5	pp1410b_plt05_astn_tp	Top of Austinian
PP 1410–B	Plate 7a	pp1410b_plt07_shmkr_bs	Base of Tuscaloosa marine shale marker
PP 1410–B	Plate 9	pp1410b_plt09_tylr_tp	Top of Tayloran
PP 1410–B	Plate 11	pp1410b_plt11_nvro_tp	Top of Navarroan
PP 1410–B	Plate 13	pp1410b_plt13_mdwy_tp	Top of Midwayan
PP 1410–B	Plate 15	pp1410b_plt15_sabn_tp	Top of Sabinian
PP 1410–B	Plate 17	pp1410b_plt17_clbrn_tp	Top of Claibornian
PP 1410–B	Plate 23	pp1410b_plt23_prlrvraq_tp	Top of Pearl River aquifer
PP 1410–B	Plate 34	pp1410b_plt34_prlrvraq_bs	Base of Pearl River aquifer
PP 1410–B	Plate 36	pp1410b_plt36_cmnaq_tp	Top of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 38	pp1410b_plt38_cmnaq_bs	Base of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 41	pp1410b_plt41_blkaq_tp	Top of Black Warrior River aquifer

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Scanned images	
Circular 91	Figure 2	cir91_fig2_pmeso_struc.tif	Scanned image of top of pre-Mesozoic
PP 447	Figure 1	pp447_fig01_index_map.tif	Scanned image of study area location
PP 447	Figure 3	pp447_fig03_pmso_tp.tif	Scanned image of top of pre-Mesozoic
PP 447	Figure 4	pp447_fig04_well_loc.tif	Scanned image of well location map
PP 447	Figure 11	pp447_fig11_cmnc_thk.tif	Scanned image of thickness of Comanche
PP 447	Figure 13	pp447_fig13_cmncmf_thk.tif	Scanned image of thickness of marginal clastic facies Comanche
PP 447	Figure 27	pp447_fig27_snlnd_thk.tif	Scanned image of thickness of Sunniland Limestone
PP 447	Figure 35	pp447_fig35_frdbg_thk.tif	Scanned image of thickness of Fredericksburg
PP 447	Figure 40	pp447_fig40_wshta_thk.tif	Scanned image of thickness of Washita
PP 447	Figure 50	pp447_fig50_snlnd_tp.tif	Scanned image of top of Sunniland Limestone
PP 447	Figure 51	pp447_fig51_frdbg_tp.tif	Scanned image of top of Fredericksburg
PP 447	Figure 52	PP447_fig52_wshta_tp.tif	Scanned image of top of Washita
PP 447	Plate 7a	pp447_plt07a_trnty_thk.tif	Scanned image of thickness of Trinity
PP 447	Plate 7b	pp447_plt07b_etrnty_thk.tif	Scanned image of thickness of early Trinity
PP 447	Plate 7c	pp447_plt07c_ltrnty_thk.tif	Scanned image of thickness of late Trinity
PP 447	Plate 7d	pp447_plt07d_etrnty_tp.tif	Scanned image of top of early Trinity
PP 447	Plate 7e	pp447_plt07e_ltrnty_tp.tif	Scanned image of top of late Trinity
PP 524–G	Plate 1	pp524g_plt01_well_loc_map.tif	Scanned image of well location map
PP 524–G	Plate 2a	pp524g_plt02a_pgulf_geol.tif	Scanned image of pre-Gulf paleogeology
PP 524–G	Plate 2b	pp524g_plt02b_pgulf_tp.tif	Scanned image of top pre-Gulf
PP 524–G	Plate 3a	pp524g_plt03a_atksn_thk.tif	Scanned image of thickness of Atkinson
PP 524–G	Plate 3b	pp524g_plt03b_atksnlm_thk.tif	Scanned image of thickness of lower member Atkinson
PP 524–G	Plate 3c	pp524g_plt03c_atksnlm_lith.tif	Scanned image of lithofacies of lower member Atkinson
PP 524–G	Plate 3d	pp524g_plt03d_atksn_indx_wells.tif	Scanned image of well index for Atkinson
PP 524–G	Plate 3e	pp524g_plt03e_atksnum_thk.tif	Scanned image of thickness of upper member Atkinson
PP 524–G	Plate 3f	pp524g_plt03f_atksnum_lith.tif	Scanned image of lithofacies of upper member Atkinson
PP 524–G	Plate 4a	pp524g_plt04a_astntylr_thk.tif	Scanned image of thickness of Austin and Taylor age
PP 524–G	Plate 4b	pp524g_plt04b_astnchss_thk.tif	Scanned image of thickness of chalky sandstone facies of Austin
PP 524–G	Plate 4c	pp524g_plt04c_astntylr_index_wells.tif	Scanned image of well index for Austin and Taylor
PP 524–G	Plate 4d	pp524g_plt04d_astn_bs.tif	Scanned image of base of Austin
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp.tif	Scanned image of top of Taylor
PP 524–G	Plate 5a	pp524g_plt05a_lwslm_thk.tif	Scanned image of thickness of lower member Lawson Limestone
PP 524–G	Plate 5b	pp524g_plt05b_lwsum_thk.tif	Scanned image of thickness of upper member Lawson Limestone
PP 524–G	Plate 5c	pp524g_plt05c_nvro_thk.tif	Scanned image of thickness of Navarro
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_tp.tif	Scanned image of top of lower member Lawson Limestone
PP 524–G	Plate 5e	pp524g_plt05e_nvro_index_wells.tif	Scanned image of well index for Navarro
PP 524–G	Plate 6a	pp524g_plt06a_gulf_geol.tif	Scanned image of geology of Gulf

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
Scanned images—Continued			
PP 524–G	Plate 6b	pp524g_plt06b_gulf_thk.tif	Scanned image of thickness of Gulf
PP 524–G	Plate 6c	pp524g_plt06c_gulf_tp.tif	Scanned image of top of Gulf
PP 524–G	Plate 6d	pp524g_plt06d_gulf_index_wells.tif	Scanned image of well index for Gulf
PP 524–G	Plate 7	pp524g_plt07_xsec.tif	Scanned image of stratigraphic cross sections of Gulf wells
PP 1088	Figure 1	pp1088_fig01_loc_cross_secs.tif	Scanned image of well index map and cross section lines
PP 1088	Plate 1	pp1088_plt01_x_section.tif	Scanned image of cross sections
PP 1088	Plate 2a	pp1088_plt02a_punth_tp.tif	Scanned image of top of pre-Unit H(?)
PP 1088	Plate 2b	pp1088_plt02b_untfh_thk.tif	Scanned image of thickness of Units F to H(?)
PP 1088	Plate 2c	pp1088_plt02c_untae_thk.tif	Scanned image of thickness of Units A to E
PP 1088	Plate 3a	pp1088_plt03a_unth_tp.tif	Scanned image of top of Unit H
PP 1088	Plate 3b	pp1088_plt03b_unth_thk.tif	Scanned image of thickness and NaCl concentration of Unit H
PP 1088	Plate 3c	pp1088_plt03c_unth_sndsh.tif	Scanned image of sand-shale distribution Unit H
PP 1088	Plate 4a	pp1088_plt04a_untg_tp.tif	Scanned image of top of Unit G
PP 1088	Plate 4b	pp1088_plt04b_untg_thk.tif	Scanned image of thickness and NaCl concentration of Unit G
PP 1088	Plate 4c	pp1088_plt04c_untg_sndsh.tif	Scanned image of sand-shale distribution Unit G
PP 1088	Plate 5a	pp1088_plt05a_untf_tp.tif	Scanned image of top of Unit F
PP 1088	Plate 5b	pp1088_plt05b_untf_thk.tif	Scanned image of thickness and NaCl concentration of Unit F
PP 1088	Plate 5c	pp1088_plt05c_untf_sndsh.tif	Scanned image of sand-shale distribution Unit F
PP 1088	Plate 6a	pp1088_plt06a_unte_tp.tif	Scanned image of top of Unit E
PP 1088	Plate 6b	pp1088_plt06b_unte_thk.tif	Scanned image of thickness and NaCl concentration of Unit E
PP 1088	Plate 6c	pp1088_plt06c_unte_sndsh.tif	Scanned image of sand-shale distribution Unit E
PP 1088	Plate 7a	pp1088_plt07a_untd_tp.tif	Scanned image of top of Unit D
PP 1088	Plate 7b	pp1088_plt07b_untd_thk.tif	Scanned image of thickness and NaCl concentration of Unit D
PP 1088	Plate 7c	pp1088_plt07c_untd_sndsh.tif	Scanned image of sand-shale distribution Unit D
PP 1088	Plate 8a	pp1088_plt08a_untc_tp.tif	Scanned image of top of Unit C
PP 1088	Plate 8b	pp1088_plt08b_untc_thk.tif	Scanned image of thickness and NaCl concentration of Unit C
PP 1088	Plate 9a	pp1088_plt09a_untb_tp.tif	Scanned image of top of Unit B
PP 1088	Plate 9b	pp1088_plt09b_untb_thk.tif	Scanned image of thickness and NaCl concentration of Unit B
PP 1088	Plate 9c	pp1088_plt09c_untb_sndsh.tif	Scanned image of sand-shale distribution Unit B
PP 1088	Plate 10a	pp1088_plt10a_unta_tp.tif	Scanned image of top of Unit A
PP 1088	Plate 10b	pp1088_plt10b_unta_thk.tif	Scanned image of thickness and NaCl concentration of Unit A
PP 1088	Plate 10c	pp1088_plt10c_unta_sndsh.tif	Scanned image of sand-shale distribution Unit A
PP 1088	Plate 11a	pp1088_plt11a_unta_nacl.tif	Scanned image of NaCl concentration Unit A
PP 1088	Plate 11b	pp1088_plt11b_untb_nacl.tif	Scanned image of NaCl concentration Unit B
PP 1088	Plate 11c	pp1088_plt11c_untc_nacl.tif	Scanned image of NaCl concentration Unit C
PP 1088	Plate 11d	pp1088_plt11d_untd_nacl.tif	Scanned image of NaCl concentration Unit D

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Scanned images—Continued	
PP 1088	Plate 11e	pp1088_plt11e_unte_nacl.tif	Scanned image of NaCl concentration Unit E
PP 1088	Plate 11f	pp1088_plt11f_untf_nacl.tif	Scanned image of NaCl concentration Unit F
PP 1088	Plate 11g	pp1088_plt11g_untg_nacl.tif	Scanned image of NaCl concentration Unit G
PP 1088	Plate 11h	pp1088_plt11h_unth_nacl.tif	Scanned image of NaCl concentration Unit H(?)
PP 1410–B	Figure 5	pp1410b_fig05_secpaq_bs.tif	Scanned image of base of Southeastern Coastal Plain aquifer system
PP 1410–B	Plate 1	pp1410b_plt01_well_crss_sec_loc.tif	Scanned image of well index map and cross section lines
PP 1410–B	Plate 3	pp1410b_plt03_cmnc_tp.tif	Scanned image of top of Comanchean
PP 1410–B	Plate 4	pp1410b_plt04_gulf_thk.tif	Scanned image of thickness of Gulfian
PP 1410–B	Plate 5	pp1410b_plt05_astn_tp.tif	Scanned image of top of Austinian
PP 1410–B	Plate 6	pp1410b_plt06_astnwdbn_thk.tif	Scanned image of thickness of Austinian to Woodbinian
PP 1410–B	Plate 7	pp1410b_plt07_shmkr_bs.tif	Scanned image of base of Tuscaloosa marine shale marker
PP 1410–B	Plate 8	pp1410b_plt08_nomenclature.tif	Scanned image of nomenclature summary
PP 1410–B	Plate 9	pp1410b_plt09_tylr_tp.tif	Scanned image of top of Tayloran
PP 1410–B	Plate 10	pp1410b_plt10_tylr_thk.tif	Scanned image of thickness of Tayloran
PP 1410–B	Plate 11	pp1410b_plt11_nvro_tp.tif	Scanned image of top of Navarroan
PP 1410–B	Plate 12	pp1410b_plt12_nvro_thk.tif	Scanned image of thickness of Navarroan
PP 1410–B	Plate 13	pp1410b_plt13_mdwy_tp.tif	Scanned image of top of Midwayan
PP 1410–B	Plate 14	pp1410b_plt14_mdwy_thk.tif	Scanned image of thickness of Midwayan
PP 1410–B	Plate 15	pp1410b_plt15_sabn_tp.tif	Scanned image of
PP 1410–B	Plate 16	pp1410b_plt16_sabn_thk.tif	Scanned image of thickness of Sabinian
PP 1410–B	Plate 17	pp1410b_plt17_clbrn_tp.tif	Scanned image of top of Claibornian
PP 1410–B	Plate 18	pp1410b_plt18_clbrn_thk.tif	Scanned image of thickness of Claibornian
PP 1410–B	Plate 23	pp1410b_plt23_praq_tp.tif	Scanned image of top of Pearl River aquifer
PP 1410–B	Plate 32	pp1410b_plt32_praq_thk.tif	Scanned image of thickness of Pearl River aquifer
PP 1410–B	Plate 34	pp1410b_plt34_praq_bs.tif	Scanned image of base of Pearl River aquifer
PP 1410–B	Plate 35	pp1410b_plt35_chatrcu_thk.tif	Scanned image of thickness of Chattahoochee River confining unit
PP 1410–B	Plate 36	pp1410b_plt36_cmnaq_tp.tif	Scanned image of top of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 37	pp1410b_plt37_cmnaq_thk.tif	Scanned image of thickness of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 38	pp1410b_plt38_cmnaq_bs.tif	Scanned image of base of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 39	pp1410b_plt39_blkcu_thk.tif	Scanned image of thickness of lower part of Black Warrior River confining unit
PP 1410–B	Plate 41	pp1410b_plt41_blkaq_tp.tif	Scanned image of top of Black Warrior River aquifer
PP 1410–B	Plate 42	pp1410b_plt42_blkaq_thk.tif	Scanned image of thickness of Black Warrior River aquifer

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Shapefiles	
Circular 91	Figure 2	cir91_fig2_pmso_tp_cntr	Contours on top of pre-Mesozoic
Circular 91	Figure 2	cir91_fig2_pmso_tp_ext_poly	Extent polygon of contours on top of pre-Mesozoic
PP 447	Figure 3	pp447_fig03_pmso_flt	Fault, top of pre-Mesozoic
PP 447	Figure 3	pp447_fig03_pmso_tp_cntr	Contours on top of pre-Mesozoic
PP 447	Figure 3	pp447_fig03_pmso_tp_ext_poly	Extent polygon of contours on top of pre-Mesozoic
PP 447	Figure 50	pp447_fig50_snlnd_ext_line	Updip limit, Sunniland Limestone
PP 447	Figure 50	pp447_fig50_snlnd_tp_cntr	Contours on top of Sunniland Limestone
PP 447	Figure 50	pp447_fig50_snlnd_tp_ext_poly	Extent polygon of contours on top of Sunniland Limestone
PP 447	Figure 51	pp447_fig51_frdbg_ext_line	Updip limit, carbonate-evaporite facies, Fredericksburg
PP 447	Figure 51	pp447_fig51_frdbg_tp_cntr	Contours on top of Fredericksburg
PP 447	Figure 51	pp447_fig51_frdbg_tp_ext_poly	Extent polygon of contours on top of Fredericksburg
PP 447	Figure 52	pp447_fig52_wshta_ext_line	Updip limit, carbonate-evaporite facies, Washita
PP 447	Figure 52	pp447_fig52_wshta_tp_cntr	Contours on top of Washita
PP 447	Figure 52	pp447_fig52_wshta_tp_ext_poly	Extent polygon of contours on top of Washita
PP 524–G	Plate 2b	pp524g_plt02b_cbnfac_line	Line of facies change, clastic to carbonate-evaporite
PP 524–G	Plate 2b	pp524g_plt02b_cmnc__line	Line of inner margin of Comanche rocks
PP 524–G	Plate 2b	pp524g_plt02b_pgulf_tp_cntr	Contours on top pre-Gulf
PP 524–G	Plate 2b	pp524g_plt02b_pgulf_tp_ext_poly	Extent polygon of contours on top pre-Gulf
PP 524–G	Plate 2b	pp524g_plt02b_prek_line	Outline of pre-Cretaceous rocks Gulf Series overlies
PP 524–G	Plate 4d	pp524g_plt04d_astn_bs_cntr	Contours on base of Austin
PP 524–G	Plate 4d	pp524g_plt04d_astn_bs_ext_poly	Extent polygon of contours on base of Austin
PP 524–G	Plate 4d	pp524g_plt04d_astn_bs_ft	Fault, base of Austin
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp_cntr	Contours on top of Taylor
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp_ext_poly	Extent polygon of contours on top of Taylor
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp_ft	Fault, top of Taylor
PP 524–G	Plate 4e	pp524g_plt04e_tylr_tp_hchrs	Hachured contours on top of Taylor
PP 524–G	Plate 5a	pp524g_plt05a_lwslm_ext_line	Northern limit, lower member Lawson Limestone
PP 524–G	Plate 5a	pp524g_plt05a_lwslm_thk_cntr	Thickness contours, lower member Lawson Limestone
PP 524–G	Plate 5b	pp524g_plt05b_lwsum_ext_line	Northern limit, upper member Lawson Limestone
PP 524–G	Plate 5b	pp524g_plt05b_lwsum_thk_cntr	Thickness contours, upper member Lawson Limestone
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_axialsft_line	Axial shift of peninsular arch, top of lower member Lawson Limestone
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_ext_line	Northern limit, top of lower member Lawson Limestone
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_penarch_line	Peninsular arch, top of lower member Lawson Limestone
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_tp_cntr	Contours on top of lower member Lawson Limestone
PP 524–G	Plate 5d	pp524g_plt05d_lwslm_tp_ext_poly	Extent polygon of contours on top of lower member Lawson Limestone
PP 524–G	Plate 6c	pp524g_plt06c_gulf_axialsft_line	Axial shift of peninsular arch, top of Gulf

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Shapefiles—Continued	
PP 524–G	Plate 6c	pp524g_plt06c_gulf_flt	Fault, top of Gulf
PP 524–G	Plate 6c	pp524g_plt06c_gulf_penarch_line	Peninsular arch, top of Gulf
PP 524–G	Plate 6c	pp524g_plt06c_gulf_tp_cntr	Contours on top of Gulf
PP 524–G	Plate 6c	pp524g_plt06c_gulf_tp_ext_poly	Extent polygon of contours on top of Gulf
PP 1088	Figure 1	pp1088_fig01_cross_section_lines	Cross section lines
PP 1088	Plate 2a	pp1088_plt02a_punth_ext_poly	Extent polygon of contours on top of pre-Unit H(?)
PP 1088	Plate 2a	pp1088_plt02a_punth_tp_cntr	Contours on top of pre-Unit H(?)
PP 1088	Plate 3a	pp1088_plt03a_unth_tp_cntr	Contours on top of Unit H
PP 1088	Plate 3a	pp1088_plt03a_unth_tp_ext_line	Updip limit for top of Unit H
PP 1088	Plate 3a	pp1088_plt03a_unth_tp_ext_poly	Extent polygon of contours on top of Unit H
PP 1088	Plate 4a	pp1088_plt04a_untg_tp_cntr	Contours on top of Unit G
PP 1088	Plate 4a	pp1088_plt04a_untg_tp_ext_line	Updip limit for top of Unit G
PP 1088	Plate 4a	pp1088_plt04a_untg_tp_ext_poly	Extent polygon of contours on top of Unit G
PP 1088	Plate 4b	pp1088_plt04b_untg_nacl_cntr	Sodium chloride concentration contours (mg/L), Unit G
PP 1088	Plate 4b	pp1088_plt04b_untg_thk_cntr	Thickness contours, Unit G
PP 1088	Plate 5a	pp1088_plt05a_untf_flt	Fault, top of Unit F
PP 1088	Plate 5a	pp1088_plt05a_untf_tp_cntr	Contours on top of Unit F
PP 1088	Plate 5a	pp1088_plt05a_untf_tp_ext_poly	Extent polygon of contours on top of Unit F
PP 1088	Plate 5b	pp1088_plt05b_untf_nacl_cntr	Sodium chloride concentration contours (mg/L), Unit F
PP 1088	Plate 5b	pp1088_plt05b_untf_thk_cntr	Thickness contours, Unit F
PP 1088	Plate 6a	pp1088_plt06a_unte_flt	Fault, top of Unit E
PP 1088	Plate 6a	pp1088_plt06a_unte_tp_cntr	Contours on top of Unit E
PP 1088	Plate 6a	pp1088_plt06a_unte_tp_ext_poly	Extent polygon of contours on top of Unit E
PP 1088	Plate 7a	pp1088_plt07a_untd_flt	Fault, top of Unit D
PP 1088	Plate 7a	pp1088_plt07a_untd_tp_cntr	Contours on top of Unit D
PP 1088	Plate 7a	pp1088_plt07a_untd_tp_ext_poly	Extent polygon of contours on top of Unit D
PP 1088	Plate 8a	pp1088_plt08a_untc_flt	Fault, top of Unit C
PP 1088	Plate 8a	pp1088_plt08a_untc_tp_cntr	Contours on top of Unit C
PP 1088	Plate 8a	pp1088_plt08a_untc_tp_ext_poly	Extent polygon of contours on top of Unit C
PP 1088	Plate 9a	pp1088_plt09a_untb_flt	Fault, top of Unit B
PP 1088	Plate 9a	pp1088_plt09a_untb_tp_cntr	Contours on top of Unit B
PP 1088	Plate 9a	pp1088_plt09a_untb_tp_ext_poly	Extent polygon of contours on top of Unit B
PP 1088	Plate 10a	pp1088_plt10a_unta_abs	Unit A absent
PP 1088	Plate 10a	pp1088_plt10a_unta_flt	Fault, top of Unit A
PP 1088	Plate 10a	pp1088_plt10a_unta_tp_cntr	Contours on top of Unit A
PP 1088	Plate 10a	pp1088_plt10a_unta_tp_ext_poly	Extent polygon of contours on top of Unit A
PP 1410–B	Figure 1	pp1410b_fig01_secpaq_sys_ext_line	Inner margin of Coastal Plain (Fall Line)
PP 1410–B	Figure 1	pp1410b_fig01_secpaq_sys_ext_poly	Extent polygon of Southeastern Coastal Plain aquifer system

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Shapefiles—Continued	
PP 1410–B	Figure 5	pp1410b_fig05_secpaq_bs_cntr	Contours on base of Southeastern Coastal Plain aquifer system
PP 1410–B	Figure 5	pp1410b_fig05_secpaq_bs_ext_poly	Extent polygon of contours on base of Southeastern Coastal Plain aquifer system
PP 1410–B	Plate 3	pp1410b_plt03_cmnc_ext_line	Extent line for top of Comanchean
PP 1410–B	Plate 3	pp1410b_plt03_cmnc_ext_poly	Extent polygon of contours on top of Comanchean
PP 1410–B	Plate 3	pp1410b_plt03_cmnc_tp_cntr	Contours on top of Comanchean
PP 1410–B	Plate 5	pp1410b_plt05_astn_ext_line	Extent line for top of Austinian
PP 1410–B	Plate 5	pp1410b_plt05_astn_ext_poly	Extent polygon of contours on top of Austinian
PP 1410–B	Plate 5	pp1410b_plt05_astn_tp_cntr	Contours on top of Austinian
PP 1410–B	Plate 7	pp1410b_plt07_shmkr_bs_cntr	Contours on base of Tuscaloosa marine shale marker
PP 1410–B	Plate 7	pp1410b_plt07_shmkr_bs_ext_line	Extent line for base of Tuscaloosa marine shale marker
PP 1410–B	Plate 7	pp1410b_plt07_shmkr_bs_ext_poly	Extent polygon of contours on base of Tuscaloosa marine shale marker
PP 1410–B	Plate 9	pp1410b_plt09_tylr_ext_line	Extent line for top of Tayloran
PP 1410–B	Plate 9	pp1410b_plt09_tylr_ext_poly	Extent polygon of contours on top of Tayloran
PP 1410–B	Plate 9	pp1410b_plt09_tylr_tp_cntr	Contours on top of Tayloran
PP 1410–B	Plate 11	pp1410b_plt11_nvro_ext_line	Extent line for top of Navarroan
PP 1410–B	Plate 11	pp1410b_plt11_nvro_ext_poly	Extent polygon of contours on top of Navarroan
PP 1410–B	Plate 11	pp1410b_plt11_nvro_tp_cntr	Contours on top of Navarroan
PP 1410–B	Plate 13	pp1410b_plt13_mdwy_tp_cntr	Contours on top of Midwayan
PP 1410–B	Plate 13	pp1410b_plt13_mdwy_tp_ext_poly	Extent polygon of contours on top of Midwayan
PP 1410–B	Plate 15	pp1410b_plt15_sabn_ext_poly	Extent polygon of contours on top of Sabinian
PP 1410–B	Plate 15	pp1410b_plt15_sabn_flt	Faults from map for top of Sabinian
PP 1410–B	Plate 15	pp1410b_plt15_sabn_tp_cntr	Contours on top of Sabinian
PP 1410–B	Plate 17	pp1410b_plt17_clbrn_ext_poly	Extent polygon of contours on top of Claibornian
PP 1410–B	Plate 17	pp1410b_plt17_clbrn_flt	Faults from map for top of Claibornian
PP 1410–B	Plate 17	pp1410b_plt17_clbrn_tp_cntr	Contours on top of Claibornian
PP 1410–B	Plate 23	pp1410b_plt23_34_prlrvraq_ext_line	Downdip limit of permeable strata of Pearl River aquifer
PP 1410–B	Plate 23	pp1410b_plt23_prlrvraq_tp_cntr	Contours on top of Pearl River aquifer
PP 1410–B	Plate 23	pp1410b_plt23_prlrvraq_tp_ds_ext	Landward extent of groundwater containing greater than 10,000 milligrams per liter dissolved solids, Pearl River aquifer
PP 1410–B	Plate 23	pp1410b_plt23_prlrvraq_tp_ext_poly	Extent polygon of contours on top of Pearl River aquifer
PP 1410–B	Plate 23	pp1410b_plt23_prlrvraq_tp_hchrs	Hachured contours on top of Pearl River aquifer
PP 1410–B	Plate 34	pp1410b_plt34_prlrvraq_bs_cntr	Contours on base of Pearl River aquifer
PP 1410–B	Plate 34	pp1410b_plt34_prlrvraq_bs_ds_ext	Landward extent of groundwater containing greater than 10,000 milligrams per liter dissolved solids, base of Pearl River aquifer

Table 1. List of databases, raster surfaces, scanned images, and shapefiles with corresponding publication number, figure or plate number, and description.—Continued

[n/a, not applicable; PP, Profesional Paper]

Publication number	Figure or plate number	File name	Description
		Shapefiles—Continued	
PP 1410–B	Plate 34	pp1410b_plt34_prlrvraq_bs_ext_poly	Extent polygon of contours on base of Pearl River aquifer
PP 1410–B	Plate 36	pp1410b_plt36_38_cmnaq_ext_line	Downdip limit of permeable strata of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 36	pp1410b_plt36_cmnaq_ext_poly	Extent polygon of contours on top of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 36	pp1410b_plt36_cmnaq_tp_cntr	Contours on top of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 38	pp1410b_plt38_cmnaq_bs_cntr	Contours on base of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 38	pp1410b_plt38_cmnaq_ext_poly	Extent polygon of contours on base of Chattahoochee River or McNairy-Nacatoch aquifer
PP 1410–B	Plate 41	pp1410b_plt41_blkaq_ds_ext	Landward extent of groundwater containing greater than 10,000 milligrams per liter dissolved solids, top of Black Warrior River aquifer
PP 1410–B	Plate 41	pp1410b_plt41_blkaq_ext_poly	Extent polygon of contours on top of Black Warrior River aquifer
PP 1410–B	Plate 41	pp1410b_plt41_blkaq_tp_cntr	Contours on top of Black Warrior River aquifer
PP 1410–B	common	pp1410b_faults	Faults shown on various plates

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PP 1410–B	Renken, R.A., 1996, Hydrogeology of the Southeastern Coastal Plain aquifer system in Mississippi, Alabama, Georgia, and South Carolina: U.S. Geological Survey Professional Paper 1410–B, 101 p., 42 pls., accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/PP/pp_1410_b.djvu*.
PP 1088	Brown, P.M., Brown, D.L, Reid, M.S., Lloyd, O.B., Jr., 1979, Evaluation of the geologic and hydrologic factors related to the waste-storage potential of Mesozoic aquifers in the southern part of the Atlantic Coastal Plain, South Carolina and Georgia: U.S. Geological Survey Professional Paper 1088, 37 p., 11 pls., accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/PP/pp_1088.djvu*.
PP 524–G	Applin, P.L., and Applin, E.R., 1967, The Gulf series in the subsurface in northern Florida and southern Georgia: U.S. Geological Survey Professional Paper 524–G, 35 p., 8 pls., accessed January 7, 2012, at *http://onlinepubs.er.usgs.gov/djvu/PP/pp_524_g.djvu*.
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