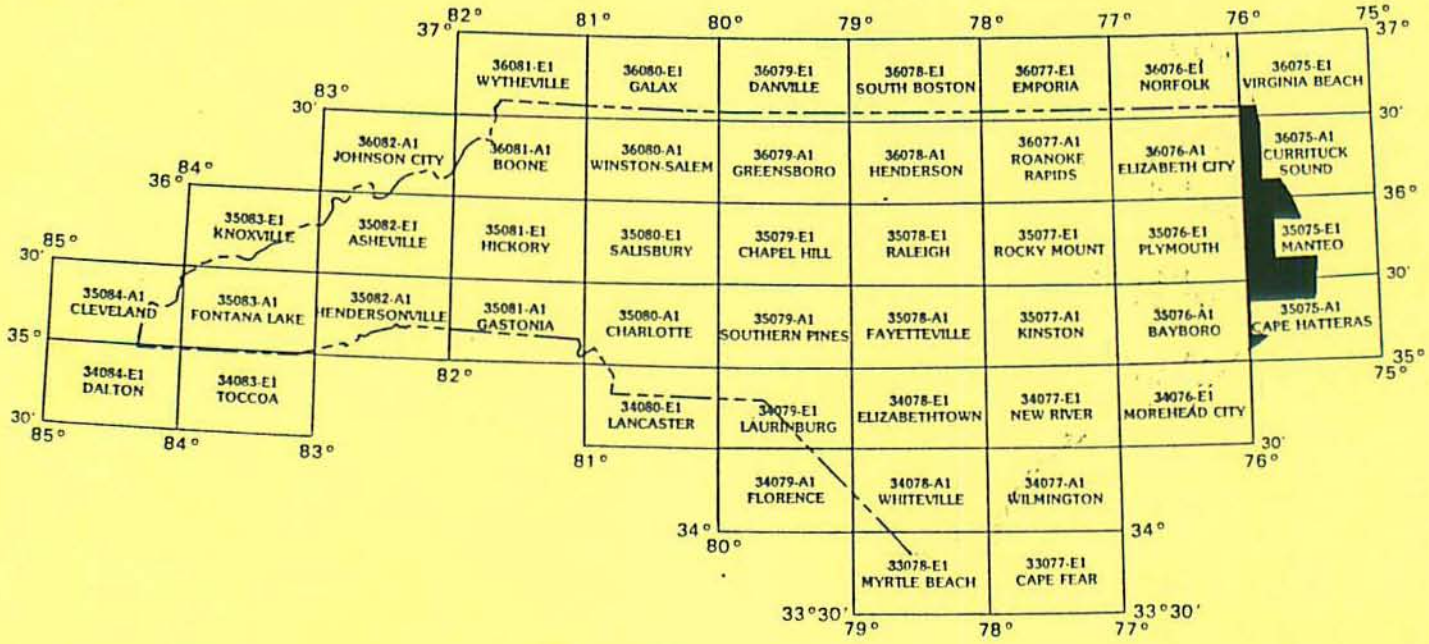
Listing of Concentrations of Variables of Stream Sediment, Stream Water, and Groundwater for the Virginia Beach, Currituck Sound, Manteo, and Cape Hatteras 30 x 60 - Minute Quadrangles - NURE Database

by
Robert H. Carpenter and Jeffrey C. Reid



NORTH CAROLINA GEOLOGICAL SURVEY
OPEN-FILE REPORT 93-34

State of North Carolina
James B. Hunt, Jr., Governor

Department of Environment, Health and Natural Resources
Jonathan B. Howes, Secretary
Division of Land Resources
Charles H. Gardner,
Director and State Geologist

July, 1993

GEOLOGICAL SURVEY SECTION

The Geological Survey Section examines, surveys and maps the geology, mineral resources, and topography of the State to encourage the wise conservation and use of these resources by industry, commerce, agriculture and government agencies for the general welfare of the citizens of North Carolina.

The Section conducts basic and applied research projects in environmental geology, mineral resources exploration and systematic geologic mapping. Services include identifying rock and mineral samples submitted by citizens and providing consulting services and specially prepared reports to agencies that need geological information.

The geological Survey section publishes Bulletins, Economic Papers, Information Circulars, Educational Series, Geologic Maps and Special Publications. For a list of publications or more information about the Section contact the Geological Survey Section, Division of Land Resources, at Post Office Box 27687, Raleigh, North Carolina 27611-7687.

Jeffrey C. Reid
Chief Geologist

Listing of Concentrations of Variables of Stream Sediment, Stream Water, and Groundwater for the Virginia Beach, Currituck Sound, Manteo, and Cape Hatteras 30 x 60 - Minute Quadrangles - NURE Database

by
Robert H. Carpenter and Jeffrey C. Reid

INTRODUCTION

This report is a compilation of geochemical data for stream sediment and groundwater for the Virginia Beach, Currituck Sound, Manteo, and Cape Hatteras 30 x 60 - minute quadrangles (Figure 1). Maps and tables were prepared from statewide data obtained by the Savannah River Laboratory under sponsorship of the U.S. Dept. of Energy in its National Uranium Resources Evaluation (NURE) program (Sargent and others, 1982). Sampling and analysis were performed during the period 1976 - 1980.

Because of the large size of the database, the North Carolina Geological Survey is presenting the database in both statewide and 30 x 60 - minute quadrangle formats. Statewide formats currently available include atlases of stream sediment and hydrogeochemical data which contain maps showing quartile distribution of concentrations of variables (Reid, 1991; Reid, 1993). Reid and Carpenter (1993a, 1993b) present listings of concentrations of variables which equal or exceed the 90th percentile (and pH and conductivity below the 10th percentile) for stream sediment and groundwater-stream water.

This open-file report is part of a series of reports that present sample-location maps and listings of analyses of all variables in all of the 30 x 60 - minute quadrangles that comprise the state of North Carolina. Subsequent reports will review the NURE data for individual 30 x 60 - minute quadrangles. These reviews will contain the following: 1) maps showing concentrations of all the variables in up to eight class intervals; 2) geologic review of the quadrangle and discussion of relationship of geochemical variables to rock units and structural features; 3) review of mineral resources and discussion of relationship of geochemical variables to mineral occurrences; and 4) discussion of outliers that may relate to anthropogenic contamination.

In this report, site-location maps use state boundaries, county boundaries and 7-1/2 - minute quadrangle boundaries as references to site-locations. The North Carolina Index to Topographic and Other Map Coverage, prepared by the U.S. Geological Survey, is a useful reference document. The List of Publications of the North Carolina Geological Survey indicates areas within the state for which some geologic and geophysical maps, and reports, are available.

Listings in this report are in the same basic format as those presented in microfiche by Sargent

and others (1982). Column 1 lists the laboratory numbers applied to each analyzed sample. Column 2 lists site identification codes. The first two characters are the codes for the county name. The next three digits are sample numbers. They are listed sequentially for each county in the order they were collected. The next two columns list the latitude and longitude of the sampling sites in decimal degree format. The remaining columns are data columns and analyses are given in parts per million (stream sediment) and parts per billion (groundwater). In these columns, a minus (-) sign indicates that a value is below the detection limit. If background is high, and an accurate estimate of minimum detection limit could not be made, a period (.) indicates that the element was not detected and that the detection limit is unusually high. Missing data are denoted by the letter "M". For gold, analyses are listed only for those samples in which gold was detected. For arsenic, a value of 0 is assigned for samples in which arsenic was analyzed, but not detected.

For stream sediment, two listings are presented. The first listing is for elements analyzed by neutron activation as well as field measurements for pH and conductivity of stream water. Variables included in this listing are pH, conductivity, uranium (U), thorium (Th), hafnium (Hf), cerium (Ce), iron (Fe), manganese (Mn), sodium (Na), scandium (Sc), titanium (Ti), vanadium (V), aluminum (Al), dysprosium (Dy), europium (Eu), lanthanum (La), samarium (Sm), ytterbium (Yb), and lutetium (Lu). The second listing is for supplemental elements analyzed by a variety of techniques. These include extractable uranium (Ux), silver (Ag), arsenic (As), barium (Ba), beryllium (Be), calcium (Ca), cobalt (Co), chromium (Cr), copper (Cu), potassium (K), lithium (Li), magnesium (Mg), molybdenum (Mo), niobium (Nb), nickel (Ni), phosphorous (P), lead (Pb), selenium (Se), tin (Sn), strontium (Sr), tungsten (W), yttrium (Y), and zinc (Zn). Stream sediment analyses are for the minus 100 mesh fraction (< 149 microns) unless otherwise noted.

Groundwater, normally samples of water from wells, was also analyzed by neutron activation. Field measurements were made of pH and conductivity. Variables included in listings of groundwater analyses include pH, conductivity, uranium (U), bromine (Br), chlorine (Cl), fluorine (F), magnesium (Mg), manganese (Mn), sodium (Na), vanadium (V), uranium/conductivity, aluminum (Al), and dysprosium (Dy). Stream water was also analyzed for these variables at 295 sites in North Carolina. Listings for stream water are included for areas in which these sites are located.

Although the data was acquired with considerable attention to quality control, some errors exist. These include uncertainties of sample locations due to the use of county road maps as base maps for field use and digitizing sampling sites. Malfunction of field equipment used in measurement of pH and conductivity has also been recognized in some areas. Some of the analyses are also in error. Some of these errors are apparent when concentrations show systematic "breaks" at county boundaries. This suggests that conditions of analysis for different batches of samples were not uniform. In general, analyses of stream sediment by neutron activation are more reliable than analyses of sediment by other supplemental methods.

For a number of counties, supplemental analyses were not made. Thus elements of interest for mineral exploration and environmental geochemistry are lacking for large areas.

REFERENCES

Reid, Jeffrey C., 1991 (revised 1993), A geochemical atlas of North Carolina: North Carolina Geological Survey, Bulletin 93, text plus 45 plates.

Reid, Jeffrey C., 1993, A hydrogeochemical atlas of North Carolina: North Carolina Geological Survey, Bulletin 94, text plus 26 plates.

Reid, Jeffrey C., and Carpenter, Robert H.,1993a, Listings of concentrations (stream sediments) of variables which equal or exceed the 90th percentile, and pH and conductivity below the 10th percentile in the North Carolina portion of the NURE database: North Carolina Geological Survey, Open-File Report 93-1, introductory text plus 178 pages of data.

Reid, Jeffrey C., and Carpenter, Robert H., 1993b, Listing of concentrations (groundwater and stream water) of variables which equal or exceed the 90th percentile, and pH and conductivity below the 10th percentile in the North Carolina portion of the NURE data base: North Carolina Geological Survey, Open-File Report 93-2, introductory text plus 162 pages of data.

Sargent, K.A., Cook, J.R., and Fay, W.M., 1982, Data report: North and South Carolina, National Uranium Resource Evaluation Program, Hydrochemical and stream sediment reconnaissance: E.I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S.C., under contract to the U.S. Dept of Energy, contract DE-AC09-76SR000001 (DPST-81-146-22; GBJX-102), 45 p. plus microfiche.

CONTENTS

COUNTY CODES

Code	County
CI	Currituck
DA	Dare

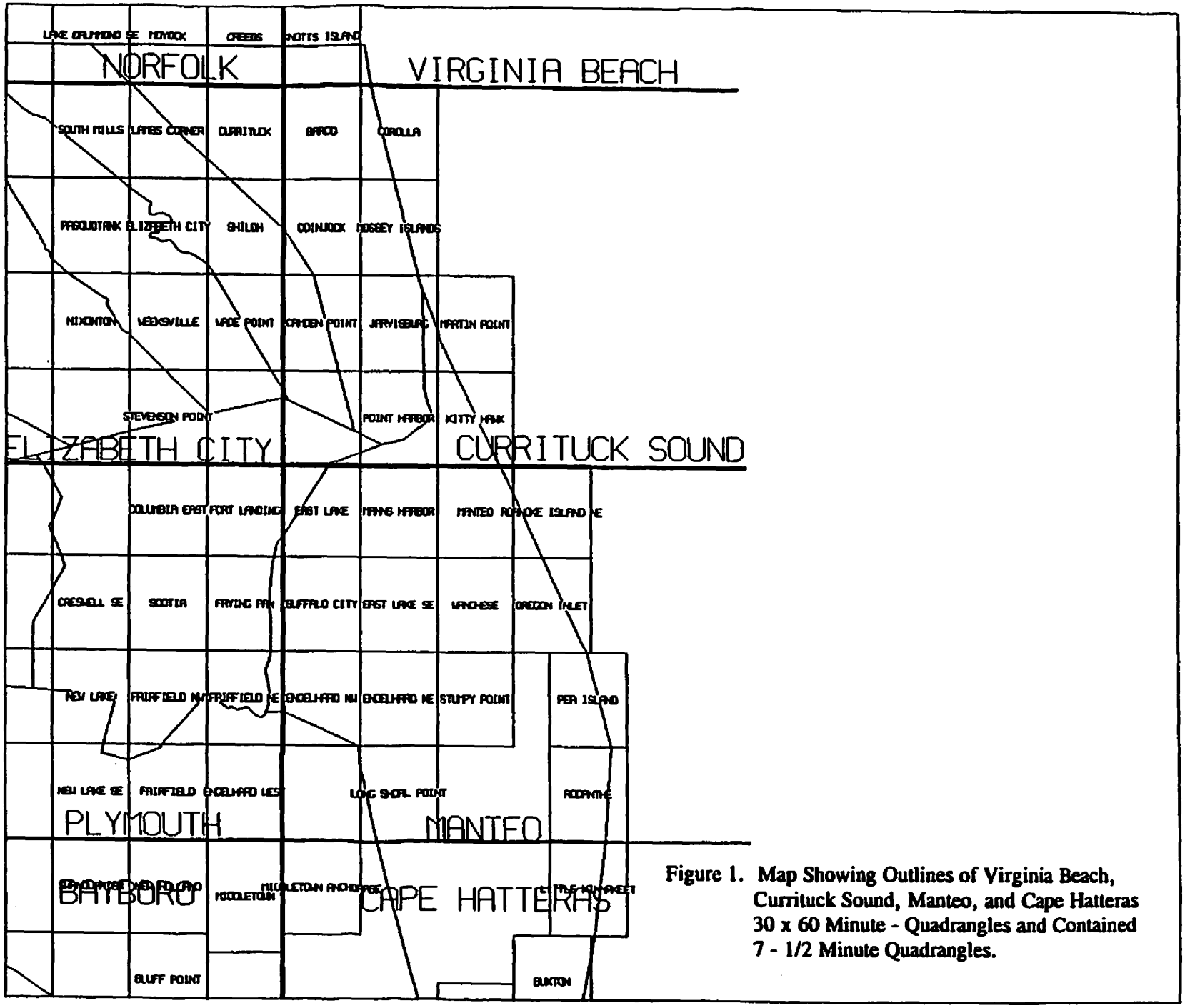


Figure 1. Map Showing Outlines of Virginia Beach, Currituck Sound, Manteo, and Cape Hatteras 30 x 60 Minute - Quadrangles and Contained 7 - 1/2 Minute Quadrangles.

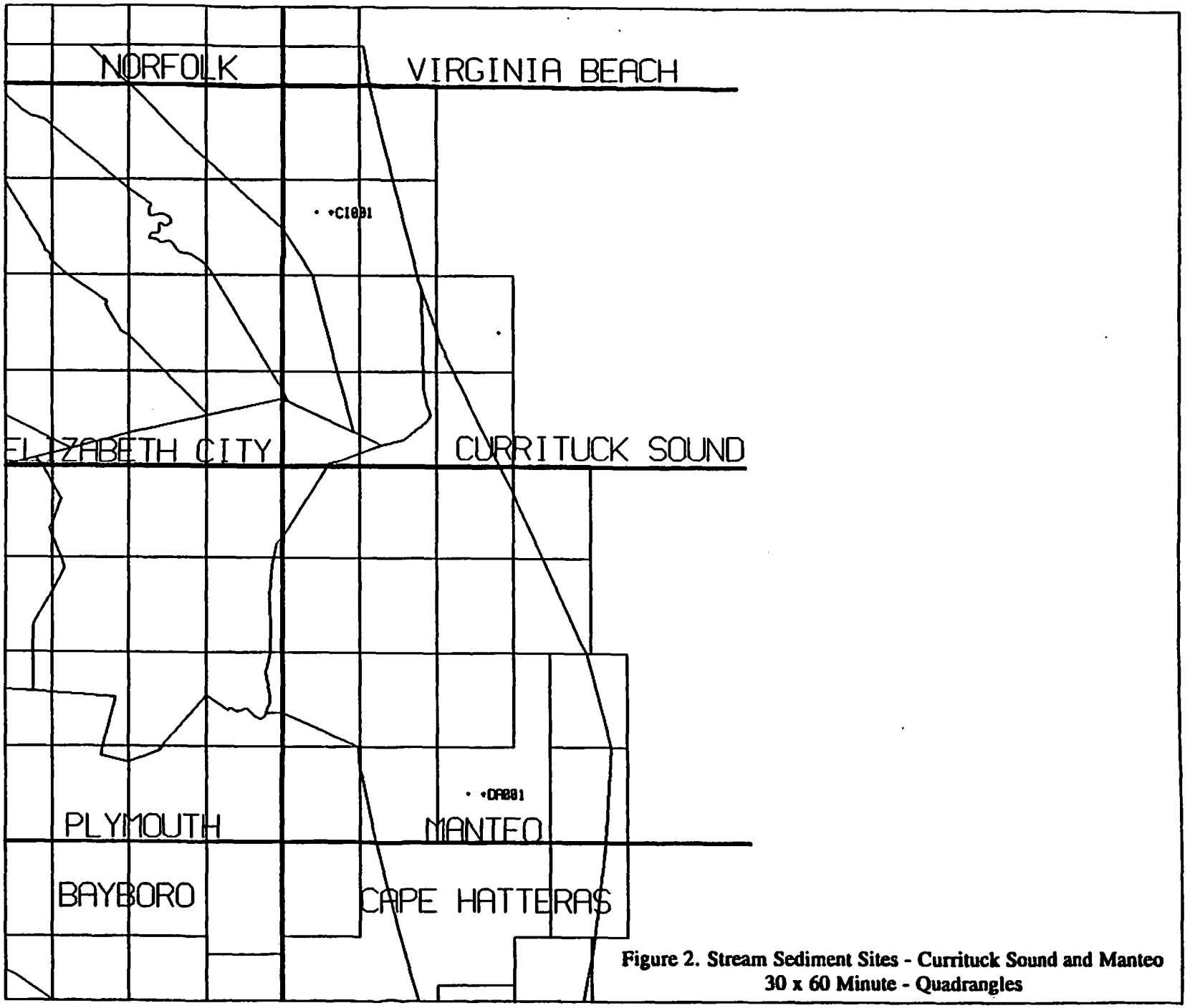


Figure 2. Stream Sediment Sites - Currituck Sound and Manteo 30 x 60 Minute - Quadrangles

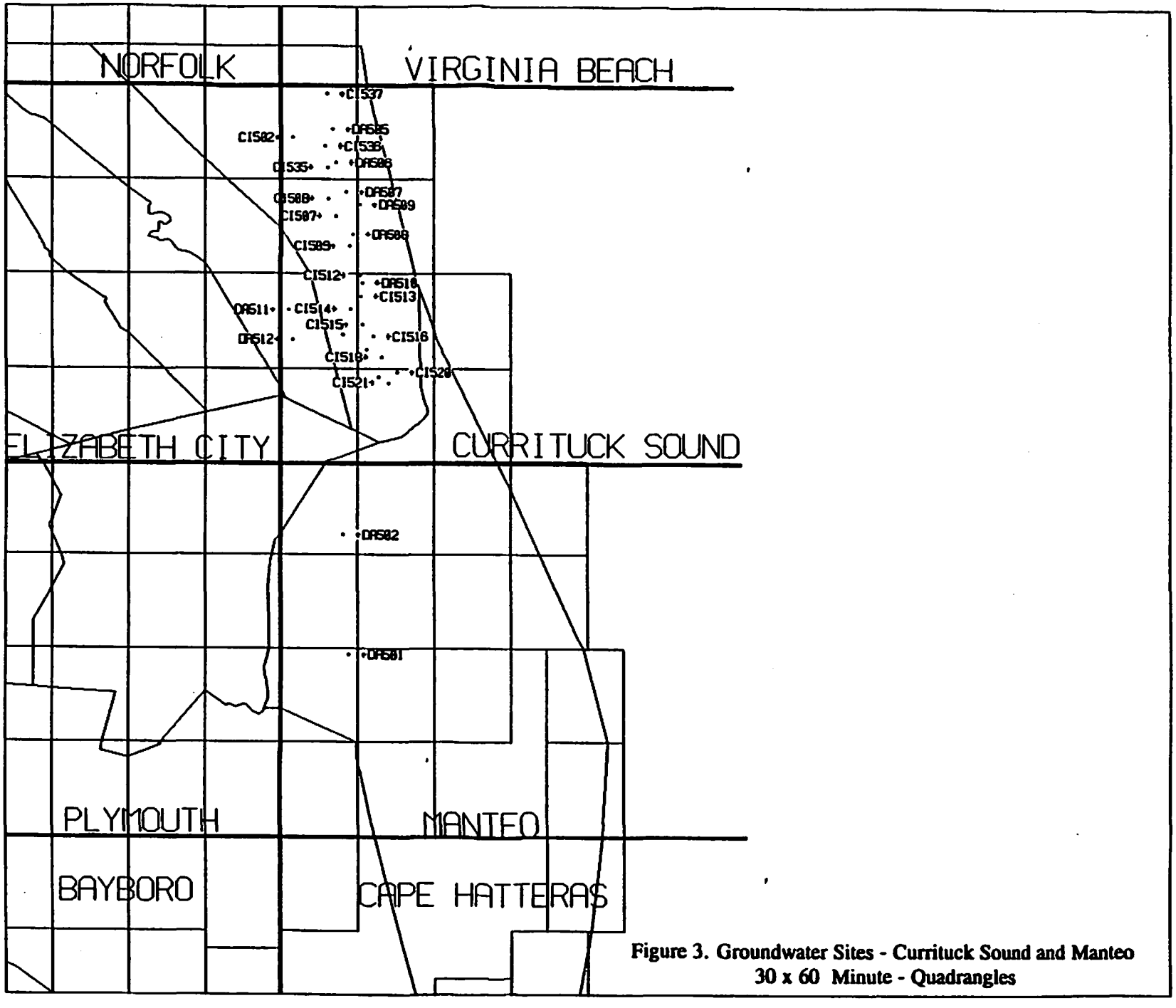


Figure 3. Groundwater Sites - Currituck Sound and Manteo 30 x 60 Minute - Quadrangles

CURRITUCK SOUND 100K QUADRANGLE - STREAM SEDIMENT

Lab #	County ID	Lat	Long	ph	Cond um/cm	U ppm	Th ppm	Hf ppm	Al ppm	Ce ppm	Fe ppm	Mn ppm	Na ppm	Sc ppm	Ti ppm	V ppm	Dy ppm	Eu ppm	La ppm	Sm ppm	Yb ppm	Lu ppm	Au ppm
1161	CI001	36.3323	75.9443	6.3	105	3.5	10	17	43900	63	13100	220	4900	6.3	7100	60	6.2	-1	N	7	N	0.4	

MANTEO 100K QUADRANGLE - STREAM SEDIMENT

Lab #	County ID	Lat	Long	ph	Cond um/cm	U ppm	Th ppm	Hf ppm	Al ppm	Ce ppm	Fe ppm	Mn ppm	Na ppm	Sc ppm	Ti ppm	V ppm	Dy ppm	Eu ppm	La ppm	Sm ppm	Yb ppm	Lu ppm	Au ppm
1672	DA001	35.5633	75.6988	3.9	65	1.3	5	8	39500	-20	17200	150	12000	2.6	3300	30	N	-1	14	3	N	0.3	

CURRITUCK SOUND 100K QUADRANGLE - GROUNDWATER

Lab #	County ID	Lat	Long	pH	Cond um/cm	U ppb	Br ppb	Cl ppb	F ppb	Mg ppb	Mn ppb	Na ppb	V ppb	U/cond x 1000	Al ppb	Dy ppb
1053	CI502	36.4295	75.9787	7.7	221	-0.002	115	20800	.	.	96	29740	0.4	0	126	-0.001
1055	CI504	36.3857	75.9785	7.7	230	-0.002	68	18300	63	3420	114	15540	0.6	0	116	-0.001
1056	CI505	36.3517	75.9614	7.7	900	0.016	136	139700	.	11120	.	102960	-0.1	0	259	-0.001
1057	CI506	36.3219	75.9387	7.6	930	-0.002	522	145300	.	25160	.	98720	-0.1	0	214	-0.001
1058	CI507	36.3264	75.9090	7.2	150	-0.002	47	13400	18	2480	52	17780	-0.1	0	196	-0.001
1059	CI508	36.3496	75.9210	6.9	111	0.004	38	9500	.	2150	41	12290	-0.1	0	154	-0.001
1060	CI509	36.2863	75.8869	6.9	308	0.094	122	25500	.	.	.	15730	1.4	0.3	142	-0.001
1061	CI510	36.2838	75.9155	6.6	80	-0.002	32	13600	.	.	70	10680	0.5	0	173	-0.001
1062	CI511	36.2451	75.8956	5.0	155	-0.002	60	13200	.	2080	86	9950	-0.1	0	749	-0.001
1063	CI512	36.2480	75.8704	7.7	260	0.011	40	9200	.	910	48	17120	-0.1	0	156	-0.001
1064	CI513	36.2210	75.8688	6.2	82	-0.002	47	8600	.	1250	44	12560	-0.1	0	131	-0.001
1065	CI514	36.2040	75.8849	6.2	152	-0.002	45	16700	.	1640	67	10500	-0.1	0	145	-0.001
1066	CI515	36.1831	75.8665	5.6	130	-0.002	69	17000	.	1740	37	14400	-0.1	0	185	-0.001
1067	CI516	36.1677	75.8486	5.0	380	0.017	1966	60200	.	8480	201	35090	-0.1	0	536	-0.001
1068	CI517	36.1505	75.8597	6.0	128	-0.002	55	9800	.	1830	73	11680	1.9	0	136	-0.001
1069	CI518	36.1404	75.8347	5.8	600	-0.002	114	66600	.	4200	113	83580	-0.1	0	245	-0.001
1070	CI519	36.1133	75.8411	5.5	700	0.015	162	57100	.	15800	548	30020	-0.1	0	343	-0.001
1071	CI520	36.1203	75.8106	6.8	610	-0.002	.	118400	.	11910	161	60960	1.7	0	249	0.240
1072	CI521	36.1067	75.8243	5.2	210	0.023	42	28400	.	2960	67	13880	1.2	0.1	596	-0.001
1086	CI535	36.3902	75.9228	5.0	385	0.139	100	19400	.	.	38	8200	0.5	0.3	61	-0.001
1087	CI536	36.4186	75.9260	5.6	415	0.187	53	13400	.	2520	38	5280	0.7	0.4	58	-0.001
1088	CI537	36.4866	75.9228	6.3	340	0.118	89	18600	.	950	43	6090	-0.1	0.3	38	-0.001
1611	DA503	36.1411	75.8922	7.6	500	0.018	.	17600	27	17060	231	41780	-0.1	0	174	-0.001
1612	DA504	36.1700	75.8976	7.5	790	-0.002	.	30800	105	7230	186	96400	-0.1	0	353	-0.001
1613	DA505	36.4404	75.9138	7.7	630	0.035	267	42000	56	.	73	104520	-0.1	0	393	-0.001
1614	DA506	36.3966	75.9085	7.9	500	0.005	95	32300	.	11190	104	51770	-0.1	0	159	-0.001
1615	DA507	36.3579	75.8919	7.6	465	0.017	48	19800	40	4840	111	26430	-0.1	0	174	-0.001
1616	DA508	36.3024	75.8817	7.6	410	0.002	.	18300	.	.	114	24030	-0.1	0	155	-0.001
1617	DA509	36.3411	75.8708	7.8	373	0.013	157	18000	159	12070	94	32490	-0.1	0	151	-0.001
1618	DA510	36.2386	75.8665	7.6	410	-0.002	17	16700	.	3560	190	23730	-0.1	0	176	-0.001
1619	DA511	36.2024	75.9860	8.0	700	0.010	105	22900	909	29080	.	179620	-0.1	0	293	-0.001
1620	DA512	36.1637	75.9796	7.5	1090	0.032	.	49600	363	28020	283	183450	-0.1	0	804	-0.001

MANTEO 100K QUADRANGLE - GROUNDWATER

Lab #	County ID	Lat	Long	pH	Cond us/cm	U ppb	Br ppb	Cl ppb	F ppb	Mg ppb	Mn ppb	Na ppb	V ppb	U/cond x 1000	Al ppb	Dy ppb
1609	DA501	35.7418	75.8893	7.6	385	0.021	.	24700	70	.	300	33800	-0.1	0	174	-0.001
1610	DA502	35.9021	75.8976	7.5	630	-0.002	106	23700	130	18090	282	54900	-0.1	0	374	-0.001