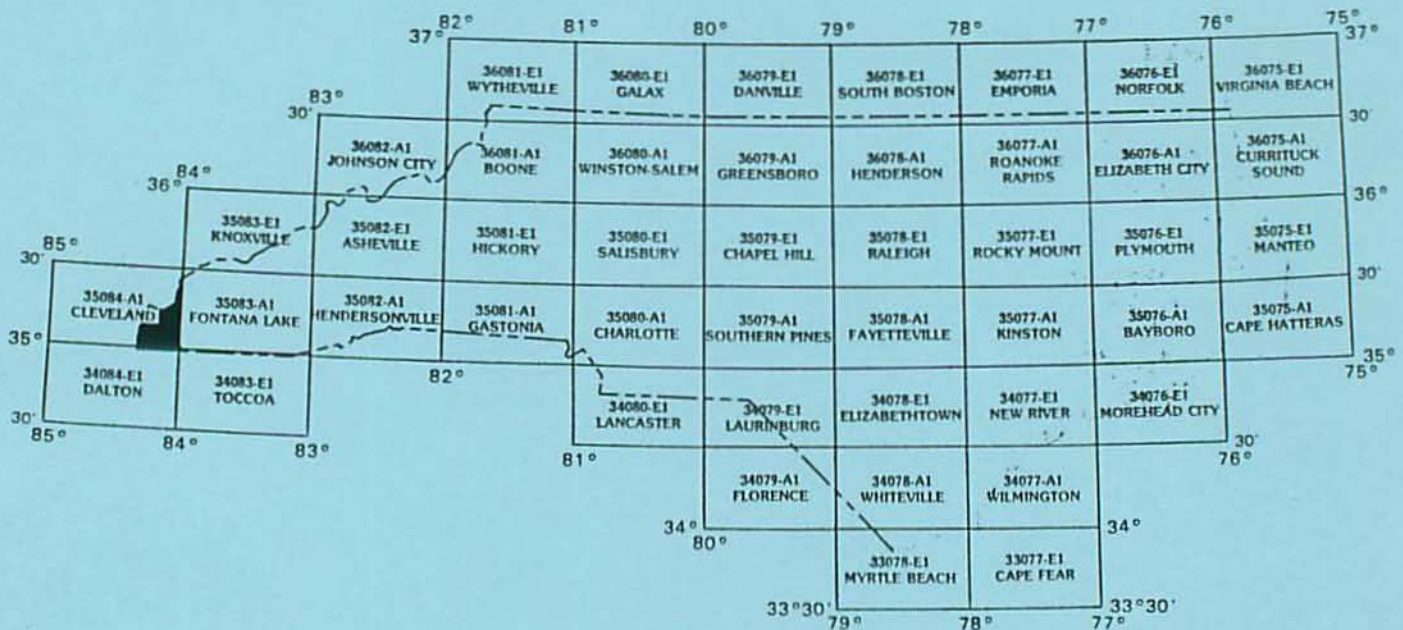


**Listing of Concentrations of Variables
of
Stream Sediment, Stream Water, and Groundwater
for the
Cleveland and Dalton 30 x 60 - Minute Quadrangles
-NURE Database**

by
Robert H. Carpenter and Jeffrey C. Reid



**NORTH CAROLINA GEOLOGICAL SURVEY
OPEN-FILE REPORT 93-3**

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.

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Jeffrey C. Reid
Chief Geologist

Listing of Concentrations of Variables of Stream Sediment, Stream Water, and Groundwater for the Cleveland and Dalton 30 x 60 - Minute Quadrangles -NURE Database

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INTRODUCTION

This report is a compilation of geochemical data for stream sediment and groundwater for the Cleveland and Dalton 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.

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- 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.

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[Note: There are no supplemental analyses for the Cleveland and Dalton 30 x 60 minute quadrangles.]

COUNTY CODES

<u>Code</u>	<u>County</u>
CE	Cherokee

Figure 1. Map Showing Outlines of Cleveland and Dalton 30 x 60 Minute Quadrangles and Contained 7 - 1/2 Minute Quadrangles.

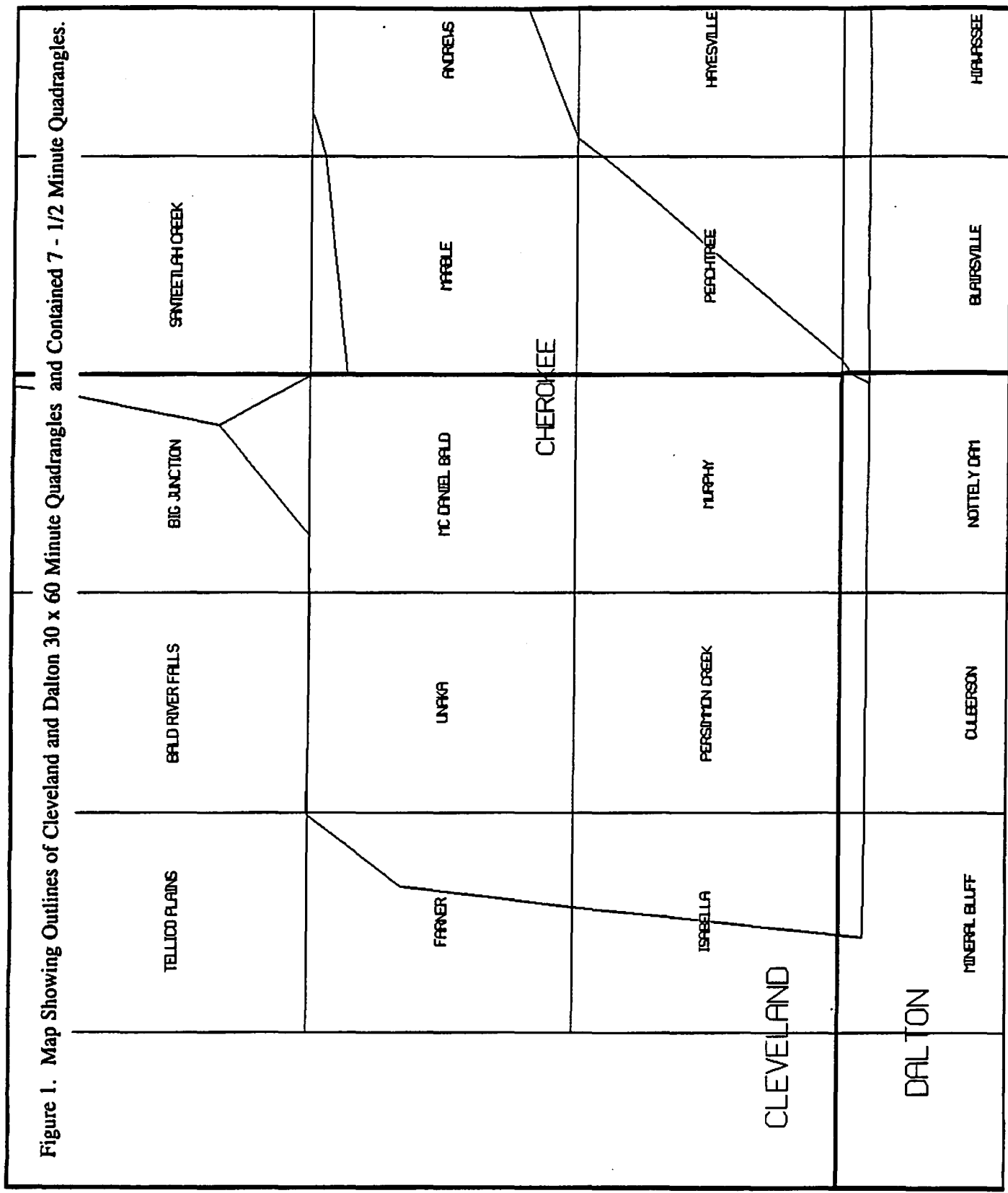


Figure 2. Stream Sediment Sites - Cleveland and Dalton 30 x 60 Minute Quadrangles

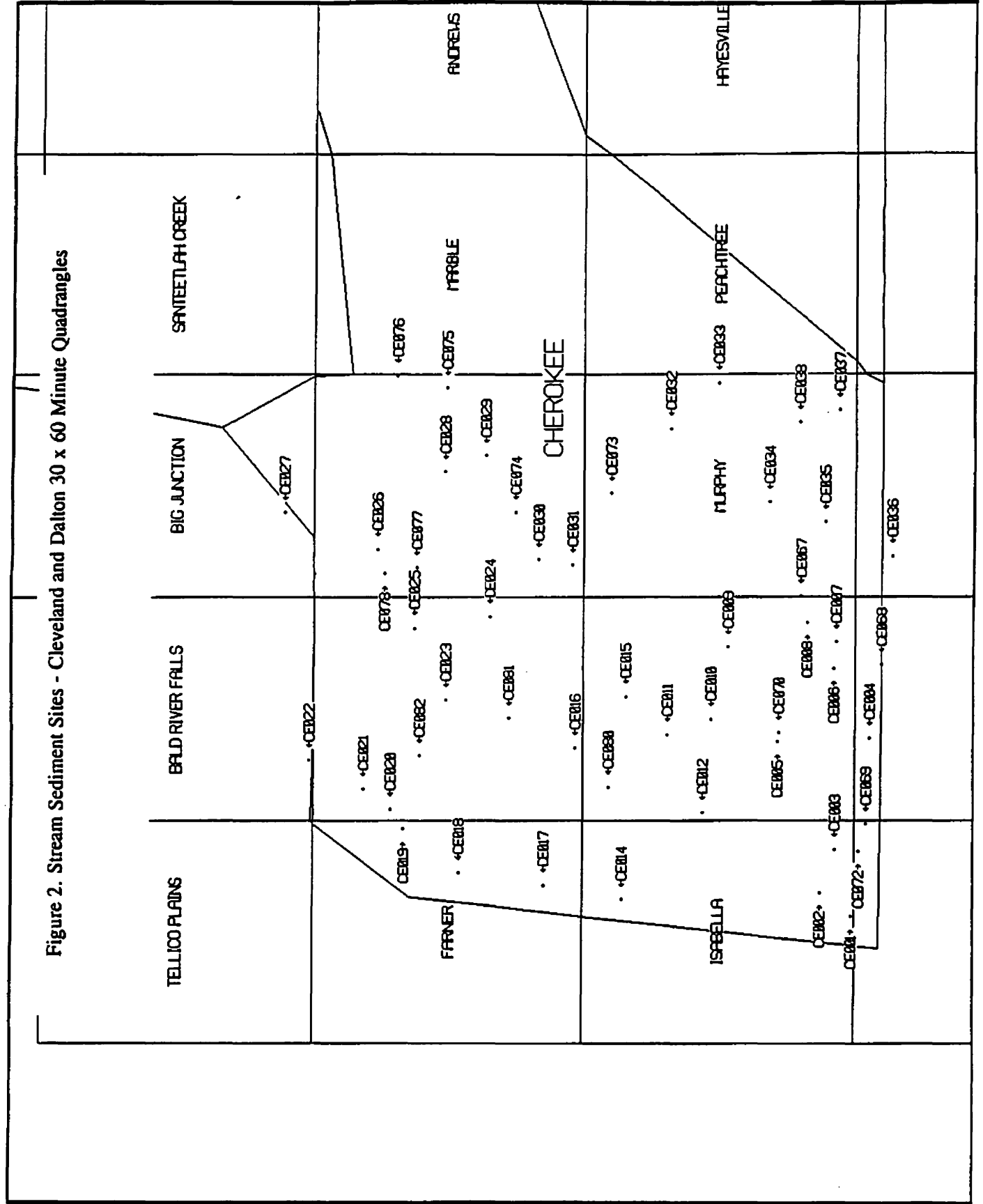
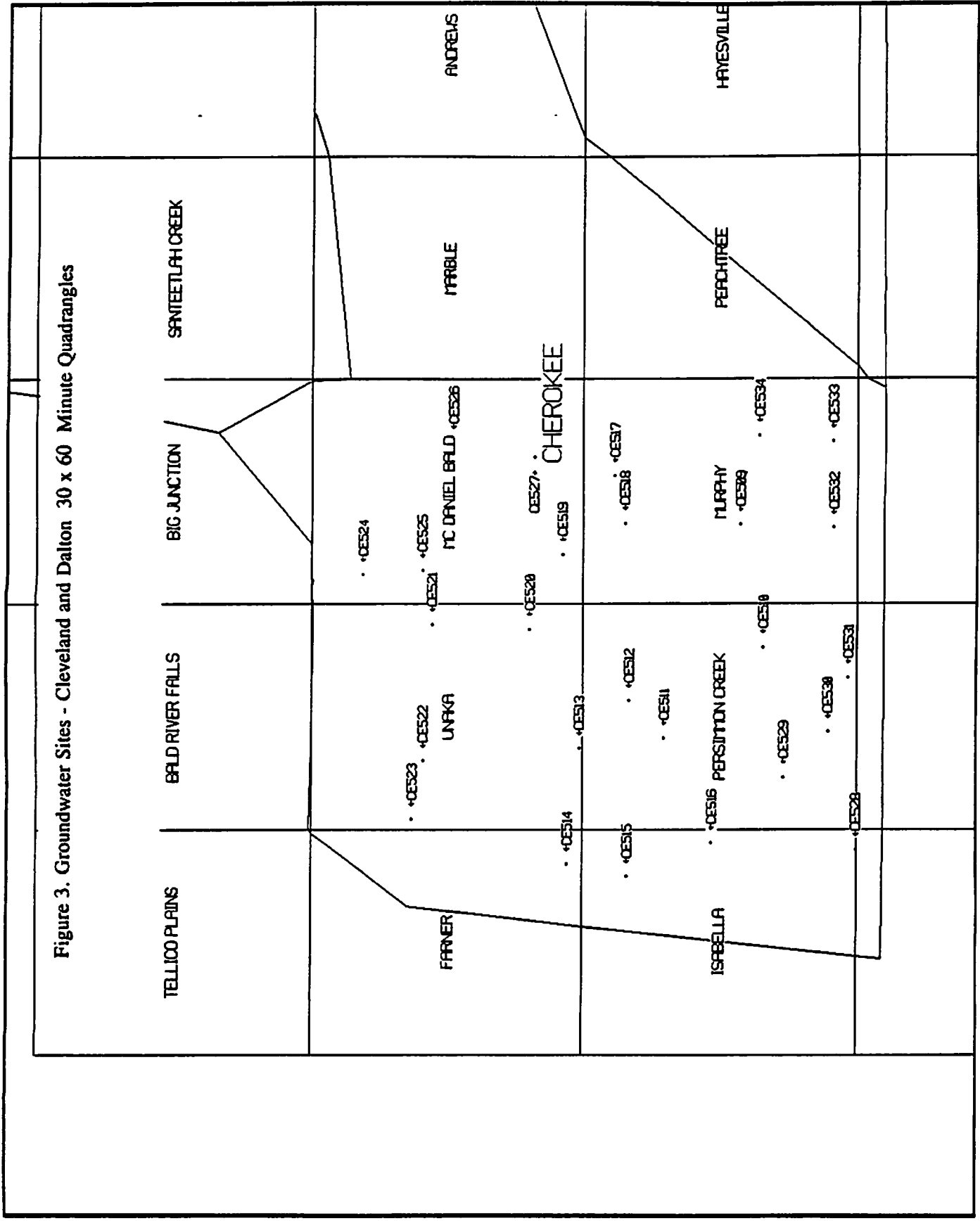


Figure 3. Groundwater Sites - Cleveland and Dalton 30 x 60 Minute Quadrangles



CLEVELAND 100K SHEET - NURE DATA - SEDIMENT

LAB #	County	Lat	Long	pH	Cond	U	Th	Hf	Al	Ce	Fe	Mn	Na	Sc	Ti	V	Dy	Eu	La	Sm	Yb	Lu	Gold
	ID				um/cm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
988	CE027	35.2634	84.0778	7.1	10	4.2	-4	30	41100	-20	21000	750	6700	5.1	6800	40	4.7	7.0	28	6	4.2	-0.3	
983	CE022	35.2519	84.2165	6.6	18	3.1	-3	20	32300	-20	23100	780	5800	3.1	6600	20	1.5	2.4	M	M	M	M	M
982	CE021	35.2272	84.2323	6.3	15	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
987	CE026	35.2211	84.0983	6.6	17	11.4	11	215	27600	27	23800	1050	4600	4.1	14500	30	5.0	-1.0	27	M	10.8	2.4	
1039	CE078	35.2178	84.1115	6.7	13	3.7	-4	49	31500	57	19700	590	17500	6.9	5400	20	4.3	-1.0	M	58	M	-0.3	
981	CE020	35.2147	84.2435	6.3	15	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
1037	CE076	35.2123	84.0006	6.5	12	2.6	6	10	75400	52	51100	1070	29400	8.8	8000	90	3.0	-1.0	50	13	6.7	M	
980	CE019	35.2086	84.2546	6.5	17	4.3	7	51	24000	17	13400	630	6500	3.6	8100	20	M	0.9	17	3	7.4	0.9	
986	CE025	35.2040	84.1420	6.6	18	2.7	4	21	32700	-20	26400	570	3800	4.0	4800	30	3.6	-1.2	M	25	4.6	-0.3	
1038	CE077	35.2030	84.1085	6.5	19	4.3	-5	57	35300	24	30200	1130	20600	9.7	19000	40	4.8	-1.0	M	M	4.3	0.8	
1043	CE082	35.2013	84.2138	6.5	12	4.5	5	60	29500	-20	22300	830	17700	7.6	7100	30	4.2	-1.0	M	37	M	-0.3	0.142
989	CE028	35.1899	84.0546	6.7	14	3.2	-4	9	49100	36	28900	630	6900	5.4	13700	60	5.8	-1.0	34	3	M	M	
984	CE023	35.1890	84.1824	6.5	17	6.9	14	99	30700	-20	16900	770	3900	4.1	7200	40	5.7	-1.0	24	5	M	1.4	
1036	CE075	35.1890	84.0072	6.5	13	2.5	-5	24	28900	40	22600	650	19100	4.2	7000	30	3.5	-1.0	25	5	4.8	0.5	
979	CE018	35.1829	84.2790	6.7	18	8.8	10	132	26500	21	23400	990	4400	5.0	10300	20	5.0	-1.0	23	3	8	1.5	
990	CE029	35.1710	84.0453	6.7	16	2.9	M	15	41100	41	66300	800	6300	4.8	11500	70	5.1	-1.0	18	5	4.6	M	
985	CE024	35.1686	84.1357	6.6	19	2.9	5	20	32300	-20	24700	440	3000	4.2	9700	40	5.8	1.7	M	17	6.5	0.4	
1042	CE081	35.1597	84.1928	6.5	19	2.9	M	32	24300	M	M	660	16300	5.5	6600	30	2.2	M	M	38	M	M	
1035	CE074	35.1567	84.0775	6.5	17	3.3	5	40	39100	-20	34300	760	20900	7.1	13700	40	4.0	-1.0	M	3	M	-0.3	
991	CE030	35.1460	84.1040	6.5	17	4.4	6	67	23400	-20	42100	870	4800	5.0	23200	40	5.1	-1.0	12	2	M	-0.2	
978	CE017	35.1429	84.2862	6.3	19	82.6	30	1687	41500	58	102900	6560	2200	18.0	91300	70	45.7	M	42	9	60.2	11.2	
992	CE031	35.1305	84.1071	6.5	19	2.6	5	20	25200	-20	18400	410	3400	3.0	6100	40	3.7	1.1	15	M	M	0.6	
977	CE016	35.1290	84.2094	6.3	18	1.8	-3	16	26600	-54	20800	390	2500	5.2	6000	30	4.3	M	16	2	5.6	-0.4	
1041	CE080	35.1132	84.2312	6.3	17	4.4	-4	69	25400	-20	25000	990	16700	6.8	13900	30	3.9	-1.0	M	M	M	-0.3	
1034	CE073	35.1125	84.0667	6.5	27	2.9	7	16	55100	-20	25200	690	20400	12.4	7500	70	2.6	-1.0	M	3	M	1.1	
975	CE014	35.1068	84.2942	6.0	13	2.4	3	32	18700	14	6300	210	300	3.8	3200	20	1.7	-1.0	11	1	M	0.3	
976	CE015	35.1055	84.1807	6.5	15	2.1	11	24	25100	31	17600	350	2000	7.2	4900	30	3.0	-1.7	228	12	M	0.4	
972	CE011	35.0862	84.2021	6.0	22	2.9	-6	38	26800	-40	38700	1040	1300	5.5	14200	30	M	M	7	M	M	-0.3	
993	CE032	35.0850	84.0302	6.8	103	3.3	12	14	44600	60	72200	960	4000	6.7	17000	140	2.8	1.5	61	4	6.2	-0.2	
973	CE012	35.0696	84.2456	6.3	15	3.0	4	48	28700	60	18600	500	2400	5.3	5200	30	2.3	2.6	13	3	M	0.5	
971	CE010	35.0661	84.1935	5.4	18	4.4	3	80	17000	19	17900	840	600	3.2	12500	20	6.5	-1.0	5	1	2.4	0.8	
994	CE033	35.0629	84.0046	7.2	18	2.7	6	25	29200	-20	62600	1140	3900	5.3	32300	70	M	-1.0	15	M	M	-0.3	
970	CE009	35.0583	84.1526	5.9	21	3.5	15	59	18700	52	20000	510	1300	4.5	7900	20	2.5	M	234	13	M	0.6	
995	CE034	35.0394	84.0717	7.1	28	3.4	8	28	21500	49	41900	760	2000	5.1	21900	30	4.8	-1.0	56	4	M	0.3	

CLEVELAND 100K SHEET - NURE DATA - SEDIMENT

LAB #	County	Lat	Long	pH	Cond	U	Th	Hf	Al	Ce	Fe	Mn	Na	Sc	Ti	V	Dy	Eu	La	Sm	Yb	Lu	Gold
ID					um/cm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
966	CE005	35.0351	84.2058	6.8	15	2.2	4	21	25300	39	M	410	900	3.6	6600	50	1.9	M	14	3	2.1	0.3	
1031	CE070	35.0347	84.2009	6.9	20	3.6	5	51	23800	-20	40400	690	17500	7.2	13400	60	3.8	-1.0	M	6	M	-0.3	
999	CE038	35.0254	84.0267	7.0	30	2.3	-4	21	30800	31	34000	520	2600	4.1	13100	50	2.9	-1.0	17	3	2.7	M	
1028	CE067	35.0246	84.1245	7.3	18	4.1	14	38	30400	120	34100	660	1500	8.6	13300	40	7.9	M	252	13	3	0.8	
969	CE008	35.0217	84.1389	7.2	17	4.6	10	38	28300	97	30000	780	1200	7.0	12900	50	5.2	1.4	45	11	7.6	0.9	
963	CE002	35.0155	84.2902	6.8	14	3.5	-4	48	30100	-47	29400	820	2000	5.4	11500	30	M	M	7	2	4.7	0.8	
996	CE035	35.0138	84.0832	6.0	11	2.8	6	18	31500	28	35400	830	1800	4.1	18800	30	3.7	-1.0	33	M	M	1.2	
967	CE006	35.0094	84.1647	6.8	24	4.2	17	75	30900	146	65700	710	1600	14.4	11800	60	6.1	3.3	74	12	8.3	1.5	
964	CE003	35.0089	84.2663	6.8	16	2.1	5	18	31400	-25	16300	470	2200	7.3	6500	30	2.6	M	14	3	M	-0.2	
968	CE007	35.0085	84.1498	6.6	14	3.7	-1	49	21700	52	23600	520	900	3.6	10800	20	6.5	5.8	16	6	M	0.7	0.316
998	CE037	35.0074	84.0199	7.1	18	1.9	11	17	19700	27	19800	410	1300	2.3	9700	20	2.9	-1.0	M	M	4.8	0.6	
962	CE001	35.0012	84.3037	6.7	22	4.1	5	64	29700	55	21200	440	1500	5.2	4000	30	2.4	-1.4	11	2	4	0.6	

DALTON 100K QUADRANGLE - STREAM SEDIMENT

LAB #	County	Lat	Long	pH	Cond um/cm	U	Th	Hf	Al	Ce	Fe	Mn	Ma	Sc	Ti	V	Dy	Eu	La	Sm	Yb	Lu	Gold
1033	CE072	34.9979	84.2670	6.9	19	4.0	-4	64	27600	-20	24400	890	16800	8.8	15400	20	3.0	-1.0	14	M	5.1	0.7	
1030	CE069	34.9946	84.2518	6.5	28	2.4	-5	26	27500	-20	32700	580	16700	6.5	7000	60	4.8	5.0	M	3	M	0.5	
965	CE004	34.9931	84.2040	6.3	14	3.0	7	24	22200	33	29200	540	3500	6.5	M	30	M	-1.0	18	3	4.6	0.6	
1029	CE068	34.9876	84.1628	6.4	23	4.6	16	53	22500	-20	23400	960	16600	4.4	15600	40	5.4	-1.0	19	9	3.0	0.7	
997	CE036	34.9827	84.1024	6.1	22	8.3	22	M	38400	243	30100	720	3000	4.9	13500	60	16.8	3.7	131	23	8.0	1.3	

CLEVELAND 100K SHEET - GROUNDWATER

Lab #	County	Lat	Long	pH	Cond um/cm	U ppb	Br ppb	Cl ppb	F ppb	Mg ppb	Mn ppb	Na ppb	V U/cond ppb	Al ppb	Dy ppb	
969	CE524R	35.2269	84.1086	7.2	13	-0.002	.	8000	11	.	36	2460	-0.1	-0.1	79	-0.001
968	CE523R	35.2043	84.2440	6.9	15	-0.002	.	7700	21	.	36	2450	-0.1	-0.1	74	-0.001
970	CE525R	35.1996	84.1062	6.7	19	-0.002	.	7000	18	.	33	2600	-0.1	-0.1	92	-0.001
967	CE522R	35.1992	84.2118	6.9	19	-0.002	.	7400	23	.	36	2670	-0.1	-0.1	79	-0.001
966	CE521R	35.1951	84.1364	5.1	57	-0.002	.	20900	.	.	154	6520	-0.1	0.0	199	-0.001
971	CE526R	35.1853	84.0347	5.8	19	-0.002	10	7300	.	.	58	2290	-0.1	-0.1	54	-0.001
965	CE520R	35.1496	84.1389	6.8	54	0.187	12	6900	111	.	52	3970	-0.1	3.4	51	-0.001
972	CE527R	35.1476	84.0430	6.7	13	-0.002	16	6900	28	.	39	1810	-0.1	-0.1	63	-0.001
964	CE519R	35.1345	84.0975	6.3	13	-0.002	7	7300	32	.	42	1910	-0.1	-0.1	61	-0.001
959	CE514R	35.1322	84.2691	5.9	21	0.027	12	3600	.	760	6	980	0.1	1.2	80	-0.001
958	CE513R	35.1267	84.2051	6.5	48	0.078	.	3200	40	.	6	3190	0.8	1.6	10	-0.001
962	CE517R	35.1105	84.0533	5.8	61	0.033	22	5700	.	.	20	2500	-0.1	0.5	14	-0.001
963	CE518R	35.1059	84.0801	6.4	18	0.022	15	3400	.	.	60	830	-0.1	1.2	9	-0.001
960	CE515R	35.1046	84.2760	6.4	18	0.023	16	3300	32	330	16	520	-0.1	1.2	13	-0.001
957	CE512R	35.1039	84.1787	5.7	20	0.025	14	3400	.	410	3	610	-0.1	1.2	15	0.030
956	CE511R	35.0878	84.1996	6.0	20	0.030	19	3200	.	420	15	1160	-0.1	1.5	13	-0.001
961	CE516R	35.0659	84.2572	5.7	23	0.031	.	3400	.	.	.	950	-0.1	1.3	13	-0.001
954	CE509R	35.0529	84.0810	5.9	13	0.021	8	3200	27	300	31	M	-0.1	1.6	13	0.090
979	CE534R	35.0445	84.0311	6.5	80	-0.002	47	9300	36	.	135	3690	-0.1	0.0	35	-0.001
955	CE510R	35.0425	84.1488	5.4	93	0.028	.	10200	.	2430	147	7380	-0.1	0.3	84	0.570
974	CE529R	35.0332	84.2212	6.3	18	-0.002	26	6500	.	.	42	2020	-0.1	-0.1	112	-0.001
975	CE530R	35.0129	84.1960	6.4	15	-0.002	.	6400	.	.	40	2330	-0.1	-0.1	86	-0.001
978	CE533R	35.0109	84.0345	6.6	18	-0.002	.	7800	43	.	43	2810	0.8	-0.1	237	-0.001
977	CE532R	35.0106	84.0828	6.6	19	0.013	15	8000	25	.	47	2450	-0.1	0.6	86	-0.001
976	CE531R	35.0038	84.1656	6.2	11	-0.002	.	7000	.	.	60	2330	-0.1	-0.1	86	-0.001
973	CE528R	35.0003	84.2611	7.0	20	0.005	19	7000	70	.	40	2800	-0.1	0.2	73	-0.001