20AJ57a

Person Requesting Analyses: Harold E. Gill

Date: April 7, 1975

Return Report to: Harold E. Gill

Latest Date results needed:

U.S. Geological Survey
Water Resourses Div. Ground Water Branch
HYDROLOGIC LABORATORY LOWNDES 19E043

SAMPLE-ANALYSIS REQUEST

Job. No. (Lab.use)

State Georgia

Project name and No.: Hydrology of the Valdosta area, Georgia GA-74-050C

Sample No's: (Lab.use)

Laboratory Sample No. (Lab.use)	Sample type 1/	Depth, ft. From	Depth, ft. To	Field No. (if any)	Location	Geologic Unit and Description of Sample Material	Analyses Desired: Permeability	Specific Yield 2/	MA Complete 2/	MA Sieve	Other 3/
25GA1	C	341			Valdosta, Ga	Principal artesian aquifer carbonates; ls. & dolo.					FF
2	C	406			"	"		PSDC			FF
3	C	590.5			"	"		PSDC			
4	C	597			"	"		PSDC			FF
5	C	604			"	"		PSDC			FF
6	C	754.5			"	"		PSDC			
7	C	760			"	"		PSDC			
8	C	761			"	"		PSDC			
9	C	907.5			"	"		PSDC			
10	C	911			"	"		PSDC			
11	C	916			"	"		PSDC			FF
12	C	1009.5			"	"		PSDC			
13	C	1012			"	"		PSDC			

1/ Sample type: Cyl = Sample cylinder; SB = Sample bag; SC = Sample can; C = Core; CH = Chunks.
2/ Sp. yield includes sp. retention and porosity; MA complete includes hydrometer and sieve anal.
3/ Other analyses: MC = Moisture content; P = Porosity; AL = Atterberg limits; LL = Liquid limits; PL = Plastic limit; SL = Shrinkage limit; SG = Specific gravity; SMT = Soil moisture tension; pH; GC = Gypsum content; CC = Carbonate content; CA = Capillarity; AS = Acid solubility; SC = Soil conductivity; HM = Heavy mineral; FF = Formation factor.

Forward copies 1-3 to Lab.
Copy 4 is packing list
Retain copy 5

GPO 855000

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY, ATLANTA, GEORGIA

75 GA 1-2

FOR DEPTHS
341'
406'

WATER QUALITY ANALYSIS
LAB ID # 273030 RECORD # 2413

SAMPLE LOCATION: U.S. GEOL. SURVEY, TW 1, P 7
STATION ID: 305149083172808 LAT.LONG.SEQ.: 305149 0831728 08
DATE OF COLLECTION: BEGIN--740927 END-- TIME-- 1200
COUNTY CODE: 185 PROJECT IDENTIFICATION: 13500073
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS:
TEMP=21.5C, TD=460.6 398-461

ALUMINUM DISSOLVED	UG/L	30	NITR. NO2 AS NO2 DIS	MG/L	0.03
ARSENIC DISSOLVED	UG/L	6	NITR. NO3 AS NO3 DIS	MG/L	0.00
BICARBONATE	MG/L	75	NITROGEN NO2 ASN DIS	MG/L	0.01
CADMIUM DISSOLVED	UG/L	3	NITROGEN NO3 ASN DIS	MG/L	0.00
CALCIUM DISS	MG/L	26	NO2+NO3 AS N DISS	MG/L	0.01
CARBONATE	MG/L	0	PH		8.1
CHLORIDE DISS	MG/L	5.3	PHOS ORTHO TOT AS P	MG/L	0.03
CHROMIUM DISSOLVED	UG/L	1	POTASSIUM DISS	MG/L	0.5
COLOR		40	RESIDUE DIS CALC SUM	MG/L	114
CONDUCTIVITY		162	RESIDUE DIS TON/AFT		0.15
COPPER DISSOLVED	UG/L	4	RESIDUE DIS 180C	MG/L	112
DEPTH(FT.FR.SURFACE)		398	SAR		0.4
FLUORIDE DISS	MG/L	0.1	SELENIUM DISSOLVED	UG/L	2
HARDNESS NONCARB	MG/L	23	SILICA DISSOLVED	MG/L	8.7
HARDNESS TOTAL	MG/L	85	SODIUM DISS	MG/L	7.5
IRON DISSOLVED	UG/L	130	SODIUM PERCENT		16
LEAD DISSOLVED	UG/L	8	STRONTIUM DISSOLVED	UG/L	390
MAGNESIUM DISS	MG/L	4.7	SULFATE DISS	MG/L	23
MANGANESE DISSOLVED	UG/L	0	WATER TEMP (DEG C)		21.5
MERCURY DISSOLVED	UG/L	5.6	ZINC DISSOLVED	UG/L	10

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
CALCIUM DISS	26	1.298	BICARBONATE	75	1.236
MAGNESIUM DISS	4.7	0.387	CARBONATE	0	0.000
POTASSIUM DISS	0.5	0.013	CHLORIDE DISS	5.3	0.150
SODIUM DISS	7.5	0.327	FLUORIDE DISS	0.1	0.006
			SULFATE DISS	23	0.479
			NO2+NO3 AS N D	0.01	0.001
TOTAL		2.023	TOTAL		1.870

$\frac{TDS}{1K \times 10^4} = 0.69$

PERCENT DIFFERENCE = 3.93 ?

QUALITY CONTROL INFORMATION FOR LAB ID # 273030 RECORD # 2413

**CATION/.01(CONDUCTANCE) RATIO IS EITHER BELOW 0.92 OR ABOVE 1.24---------RAT

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CENTRAL LABORATORY, ATLANTA, GEORGIA

75 GA 4-5

FOR DEPTHS
597'
604'

WATER QUALITY ANALYSIS
LAB ID # 273029 RECORD # 2410

SAMPLE LOCATION: U.S. GEOL SURVEY, TW 1, P 6
STATION ID: 305149083172807 LAT.LONG.SEQ.: 305149 0831728 07
DATE OF COLLECTION: BEGIN--740927 END-- TIME-- 0700
COUNTY CODE: 185 PROJECT IDENTIFICATION: 13500072
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS:
~~TEMP=22.0C~~, TD=613 613-550

ALUMINUM DISSOLVED	UG/L	20	NITR. NO2 AS NO2 DIS	MG/L	0.00
ARSENIC DISSOLVED	UG/L	3	NITR. NO3 AS NO3 DIS	MG/L	0.00
BICARBONATE	MG/L	80	NITROGEN N ASN DIS	MG/L	0.00
CADMIUM DISSOLVED	UG/L	3	NITROGEN NO3 ASN DIS	MG/L	0.00
CALCIUM DISS	MG/L	530/490	NO2+NO3 AS N DISS	MG/L	0.00
CARBONATE	MG/L	0	PH		7.3
CHLORIDE DISS	MG/L	15	PHOS ORTHO TOT AS P	MG/L	0.01
CHROMIUM DISSOLVED	UG/L	1	POTASSIUM DISS	MG/L	1.0
COLOR		14	RESIDUE DIS CALC SUM	MG/L	3300
CONDUCTIVITY		2825	RESIDUE DIS TON/AFT		3.84
COPPER DISSOLVED	UG/L	2	RESIDUE DIS 180C	MG/L	2820
DEPTH(FT.FR.SURFACE)		550	SAR		0.0
FLUORIDE DISS	MG/L	3.6	SELENIUM DISSOLVED	UG/L	0
HARDNESS NONCARB	MG/L	2500	SILICA DISSOLVED	MG/L	12
HARDNESS TOTAL	MG/L	2500	SODIUM DISS	MG/L	3.7/4.0
IRON DISSOLVED	UG/L	100	SODIUM PERCENT		0
LEAD DISSOLVED	UG/L	8	STRONTIUM DISSOLVED	UG/L	5000
MAGNESIUM DISS	MG/L	290/280	SULFATE DISS	MG/L	2400/2500
MANGANESE DISSOLVED	UG/L	0	WATER TEMP (DEG C)		22.0
MERCURY DISSOLVED	UG/L	0.1	ZINC DISSOLVED	UG/L	0

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
CALCIUM DISS	530	26.447	BICARBONATE	80	1.312
MAGNESIUM DISS	290	23.856	CARBONATE	0	0.000
POTASSIUM DISS	1.0	0.026	CHLORIDE DISS	15	0.424
SODIUM DISS	3.7	0.161	FLUORIDE DISS	3.6	0.190
			SULFATE DISS	2400	49.968
			NO2+NO3 AS N D	0.00	0.000
	TOTAL	50.489		TOTAL	51.892

$\frac{TDS}{KX10^6} = 0.98$

PERCENT DIFFERENCE = -1.37

**CATION/.01(CONDUCTANCE) RATIO IS EITHER BELOW 0.92 OR ABOVE 1.24---------RATI
**ANION/.01(CONDUCTANCE) RATIO IS EITHER BELOW 0.92 OR ABOVE 1.24----------RATI
**CALCULATED SOLIDS/CONDUCTANCE RATIO IS EITHER BELOW 0.55 OR ABOVE 0.81---RATI
**THE ROE (LC 27) /CONDUCTANCE RATIO IS EITHER BELOW 0.55 OR ABOVE 0.86---RATI
**ROE(LC 27)/CALCULATED SOLIDS RATIO IS EITHER BELOW 0.90 OR ABOVE 1.12----RATI

UNITED STATES DEPARTMENT OF THE INTERIOR 75 GA 11
GEOLOGICAL SURVEY
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FOR DEPTHS
916'

WATER QUALITY ANALYSIS
LAB ID # 273024 RECORD # 2395

SAMPLE LOCATION: U.S. GEOL. SURVEY, TW 1, P 1
STATION ID: 305149083172802 LAT.LONG.SEQ.: 305149 0831728 02
DATE OF COLLECTION: BEGIN--740924 END-- TIME--0715
COUNTY CODE: 185 PROJECT IDENTIFICATION: 13500067
DATA TYPE: 2 SOURCE: GROUND WATER GEOLOGIC UNIT:
COMMENTS:
TD=1014 ✓ 1014 - 902

ALUMINUM DISSOLVED	UG/L	10	NITR. NO2 AS NO2 DIS	MG/L	0.00
ARSENIC DISSOLVED	UG/L	2	NITR. NO3 AS NO3 DIS	MG/L	0.04
BICARBONATE	MG/L	101 ✓	NITROGEN NO2 ASN DIS	MG/L	0.00
CADMIUM DISSOLVED	UG/L	3	NITROGEN NO3 ASN DIS	MG/L	0.01
CALCIUM DISS	MG/L	530 /500	NO2+NO3 AS N DISS	MG/L	0.01
CARBONATE	MG/L	0	PH		7.4 ✓
CHLORIDE DISS	MG/L	72	PHOS ORTHO TOT AS P	MG/L	0.01
CHROMIUM DISSOLVED	UG/L	1	POTASSIUM DISS	MG/L	16
COLOR		3	RESIDUE DIS CALC SUM	MG/L	3710
CONDUCTIVITY		3550 ✓	RESIDUE DIS TON/AFT		5.58
COPPER DISSOLVED	UG/L	3	RESIDUE DIS 180C	MG/L	4100
DEPTH(FT.FR.SURFACE)		902 ✓	SAR		0.3
FLUORIDE DISS	MG/L	4.2	SELENIUM DISSOLVED	UG/L	0
HARDNESS NONCARB	MG/L	2700	SILICA DISSOLVED	MG/L	23
HARDNESS TOTAL	MG/L	2800	SODIUM DISS	MG/L	38 -0
IRON DISSOLVED	UG/L	410	SODIUM PERCENT		3
LEAD DISSOLVED	UG/L	8	STRONTIUM DISSOLVED	UG/L	12000
MAGNESIUM DISS	MG/L	360 /330	SULFATE DISS	MG/L	2600 /2600
MANGANESE DISSOLVED	UG/L	10	WATER TEMP (DEG C)		23.8 ✓
MERCURY DISSOLVED	UG/L	0.1	ZINC DISSOLVED	UG/L	10

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
CALCIUM DISS	530	26.447	BICARBONATE	101	1.656
MAGNESIUM DISS	360	29.614	CARBONATE	0	0.000
POTASSIUM DISS	16	0.410	CHLORIDE DISS	72	2.032
SODIUM DISS	38	1.653	FLUORIDE DISS	4.2	0.222
			SULFATE DISS	2600	54.132
			NO2+NO3 AS N D	0.01	0.001
	TOTAL	58.123		TOTAL	58.040

$\frac{TDS}{K \times 10^6} = 1.15 \; ; 1.05$

PERCENT DIFFERENCE = 0.07

**CATION/.01(CONDUCTANCE) RATIO IS EITHER BELOW 0.92 OR ABOVE 1.24---------RAT
**ANION/.01(CONDUCTANCE) RATIO IS EITHER BELOW 0.92 OR ABOVE 1.24---------RAT
**CALCULATED SOLIDS/CONDUCTANCE RATIO IS EITHER BELOW 0.55 OR ABOVE 0.81---RAT
**THE ROE (LC 27) /CONDUCTANCE RATIO IS EITHER BELOW 0.55 OR ABOVE 0.86---RAT

	desired wgt	+ wgt of paper	= total wgt	actually packed
$CaSO_4$	.0884	+ .4331	= .5215	.5220
$MgCl_2$	.0071	+ .4185	= .4256	.4257
$MgSO_4$	.0143	+ .4065	= .4208	.4207
KCl	.0010	+ .4044	= .4054	.4055
$NaHCO_3$	.1038	+ .4231	= .5269	.5269

	HCO_3^- (.236)	Cl^- (.150)	$SO_4^=$ (.977)
Ca^{++} (1.298)			1.298
Mg^{++} (.387)		.150	.237
K^+ (.013)			
Na^+ (.327)	.236		

factor

$Ca(HCO_3)_2$ (81.07) · (1.298) = 98.36

$MgCl_2$ (47.62) · (.150) =

$MgSO_4$ (60.20) · (.237)

KCl (74.56) · (.013)

$NaHCO_3$ (84) · (.236)

have

123.92 mg/l

1.71 + 1.41 =

3.12

.51

28.42

75.40

4.78 + .46 =

5.44

57.28

75G14-5

	desired wgt. of sample	+ wgt. of paper	= total wgt	actually added
$CaSO_4$	900.1336 mg/l .7181	+ .4187 g/l	= 1.3188 g/l	1.3129 g/l
$MgSO_4$	718.0656 .0005	+ .4262	= 1.1443	1.1450
KCl	.4698 .0619	+ .4175	= .418	.418
$NaHCO_3$	61.8734 .0500	+ .4407	= .5026	.5037
NaCl	49.9658	+ .4234	= .4734	.4736

Ph 7.3

Conductance $2.72 \times 10^3 = 2720$

2875 called for

75 64 4-5

1.312 HCO_3^-	0.0 $CO_3^=$	0.424 Cl^-	49.968 $SO_4^=$
26.447 Ca^{++}			26.447
23.856 Mg^{++}			23.856
.0126 K^+		.0126	
.161 Na^+ 1.473		.585	

F ion not accounted for. 3.6 mg/l or .190 meq/l desired

	conv. factor			
$CaSO_4$	(68.07) · (26.447) meq/l	=	1800.2472 mg/l	900.1336
$MgSO_4$	(60.20) · (23.856)	=	1436.1312	718.0656
KCl	(74.56) · (.0126)	=	.9395	.4698
$NaHCO_3$	(84.01) · (1.473)	=	123.7467	61.8734
$NaCl$	(58.46) · (.585)	=	99.9316	49.9658

wgt. of reagent in g/mole		desired	ion	present
$CaSO_4$	148.08 g/mole	530 mg/l	Ca^{++}	487.263
$MgSO_4 \cdot 7H_2O$	246.312	290	Mg^{++}	141.711
KCl	74.550	1.0	K^+	.4928 = 73.175
$NaHCO_3$	84.007	3.7	Na^+	33.8651 + 39.3102
$NaCl$	58.443	0.0	$CO_3^=$	
		.424	Cl^-	.4473 + 60.7014 = 61.1487
		49.968	$SO_4^=$	1167.097 + 559.738 = 1726.8285
		80	HCO_3^-	89.8562

~~892 - 991~~

892 - 2431

75GA 11

	2.456 HCO_3^-	0.0 $CO_3^=$	2.032 Cl^-	54.182 $SO_4^=$
Ca^{++} 26.447				26.447
Mg^{++} 29.614				29.614
K^+ .410			.410	
Na^+ 1.656 1.653			1.622	

(conv. factor)

$CaSO_4$	$(68.07)\cdot(26.447) =$	1800.2472	900.1236
$MgSO_4$	$(60.20)\cdot(29.614) =$	1782.7628	891.3814
KCl	$(74.56)\cdot(.410) =$	30.5696	15.2848
$NaCl$	$(58.46)\cdot(1.622) =$	94.8221	47.4111
$NaHCO_3$	$(84.01)\cdot(1.656) =$	139.1206	69.0603

wgt. of reagent in g/mole		desired	ion	Present
$CaSO_4$	148.08 g/mole	530	Ca^{++}	487.263
$MgSO_4\cdot 7H_2O$	246.312	360	Mg^{++}	175.915
KCl	74.550	16	K^+	16.034
$NaCl$	58.443	38	Na^+	37.300 + 38.073 = 75.373
$NaHCO_3$	84.007	101	HCO_3^-	101.020
		0.0	$CO_3^=$	0.0
		72	Cl^-	14.538 + 57.521 = 72.059
		2600	$SO_4^=$	1167.097

75 GAL

	desired wgt of salt	+ wgt of grapes	= total wgt	wgt added
$CaSO_4$	.7001	+ .4105 g	= 1.3106	1.3107
$MgSO_4$	.8914	+ .4075	= 1.2989	1.2988
KCl	.0153	+ .4184	= .4337	.4340
NaCl	.0474	+ .4289	= .4763	.4764
$NaHCO_3$	.0691	+ .4368	= .5059	.5060

Ph 7.8

conductivity 3200

3550 asked for

LABORATORY DETERMINATION OF SOIL RESISTIVITY AND FORMATION FACTOR

Sample number 75 GA	(1) Cross sectional area of sample (Cm^2) A	(2) Probe spacing (Cm) L	(3) Voltage drop across resistor V_e	(4) Resistor value (ohms) R_e	(5) Current through sample (Amps) (3)÷(4) I_e	(6) Voltage reading across probes V_s	(7) Resistance of sample (6)÷(5) R_s	(8) Soil resistivity ohm-meters $\frac{(1)X(7)}{100(2)}$ R_o	(9) Specific conductance interstitial water (ohm) C_w	(10) Resistivity of interstitial water (ohm-m) 10,000÷(9) R_w	Formation factor (8)÷(10) F
1	21.33	6.21	6.9×10^{-3}	100	6.9×10^{-5}	3.77	546.38	1876.7 ~~480.7~~	230	43.48	43.2 ~~[illegible]~~
2	79.33	4.00	7.6×10^{-3}	100	7.6×10^{-5}	3.77	496.05	9838	230	43.48	226.3
4	11.055	6.81	1.91×10^{-1}	100	1.91×10^{-3}	3.60	1884.8	30.458 ~~30.597~~	2820	3.55	8.6
5	80.118	3.50	.083	100	8.3×10^{-4}	3.71	4469.9	1023.5	2820	3.55	288.2
11	71.931	8.13	.764	100	7.64×10^{-3}	3.03	396.6	35.09	3400	2.94	11.9

Hydrologic Laboratory
Lakewood, Colorado

Laboratory determinations for samples 75GA1-13

Laboratory sample number	Depth (ft)	Soil resistivity ohm-metres	Resistivity of interstitial water (ohm-m)	Formation factor
75GA1	341	1876.7	43.48	43.2
2	406	9838.	43.48	226.3
4	597	30.458	3.55	8.6
5	604	1023.2	3.55	288.2
11	916	35.09	2.94	11.9