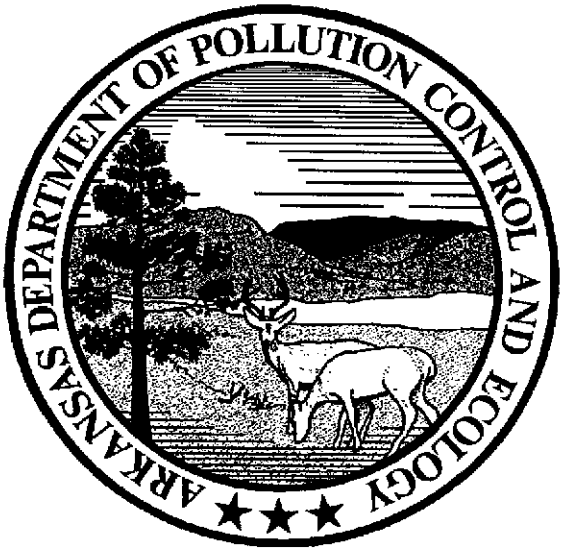
REPORT ON THE THIRD SAMPLING OF THE OMAHA MONITORING AREA



ARKANSAS AMBIENT GROUND WATER MONITORING PROGRAM

Arkansas Department of Pollution Control & Ecology
WQ97-06-3
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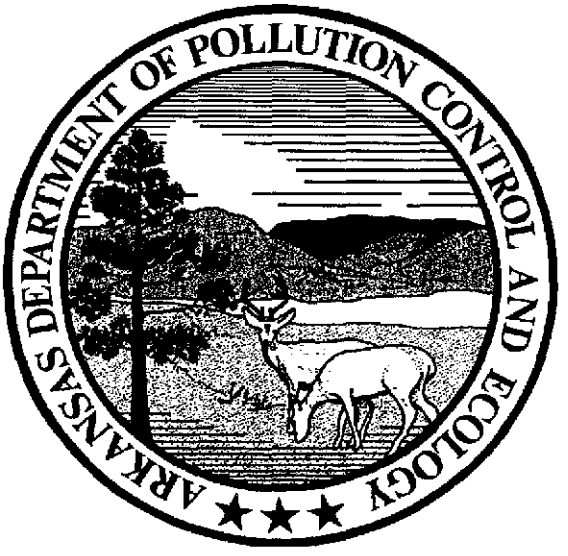

ARKANSAS AMBIENT GROUND WATER MONITORING PROGRAM

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Arkansas Department of Pollution Control & Ecology

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INTRODUCTION

The Arkansas Ambient Ground Water Monitoring Program was initiated in order to obtain background data in areas across Arkansas, with emphasis placed on those areas which are sensitive to ground-water contamination from anthropogenic impacts. The areas are sampled on approximate three-year intervals to evaluate whether regional activities are impacting ground-water quality.

The Omaha monitoring area occupies an approximate 160 square mile area surrounding the town of Omaha in northwestern Boone County, Arkansas (Figure 1). This area will be referred to as the study area in the remainder of this report. The study area straddles portions of the Springfield Plateau and the Salem Plateau of the Ozark Plateaus Physiographic Province. Area topography exhibits moderate relief with elevations ranging from approximately 700 feet above mean sea level (msl) in the northeastern portion of the area to approximately 1,600 feet above msl near the center of the area (Leidy and Morris, 1990). The study area is underlain by gently-dipping sedimentary rocks which have been deeply dissected by erosion. The predominantly carbonate rocks of the study area are readily weathered by dissolution. This process forms large fractures and solution channels which are conduits for ground water and contaminants. The study area also contains a relatively shallow regolith which increases ground-water contamination susceptibility. The study area was selected primarily because of increased animal production and contamination from a former wood-treatment plant Superfund site. Specific sources of ground-water contamination include leaking underground storage tanks, septic tanks, poultry and livestock farms, and the wood-treatment plant.

The study area is underlain by the Ozark Plateaus Aquifer System. Ground-water sampling of the Springfield Plateau Aquifer and the Ozark Aquifer has continued at three year intervals since the initial sampling event during the winter of 1989-90. The second sampling event was conducted during the winter of 1992-93. The third and most recent sampling event was completed during February, 1996. Ground-water samples were obtained from a combination of springs and wells in both aquifers during all sampling events. The number of sampling sites has remained relatively constant throughout the sampling periods.

Ground-water monitoring in the study area is an outgrowth of an investigation conducted by the United States Geological Survey (USGS) in cooperation with the Arkansas Department of Pollution Control and Ecology (Department). The ambient ground-water quality of the two aquifers was described initially by Leidy and Morris (1990) and was based on water samples from springs and wells in the Boone Formation and the Cotter Dolomite collected from March to October of 1987. This work resulted in USGS report WRIR 90-4066. Other publications describing the geology and/or water quality of the area include Adamski and others (1995), Bell and others (1996), Caplan (1960), Croneis (1930), and Imes and Emmett (1994).

STUDY OBJECTIVES

As referenced above, numerous potential contaminant sources exist in the study area. Dissolution of the carbonate rock from precipitation infiltration and groundwater movement creates complex ground-water flow paths which are highly irregular and unpredictable. The objectives of this program are to monitor potential changes in ground-water chemistry over time, examine the feasibility of long-

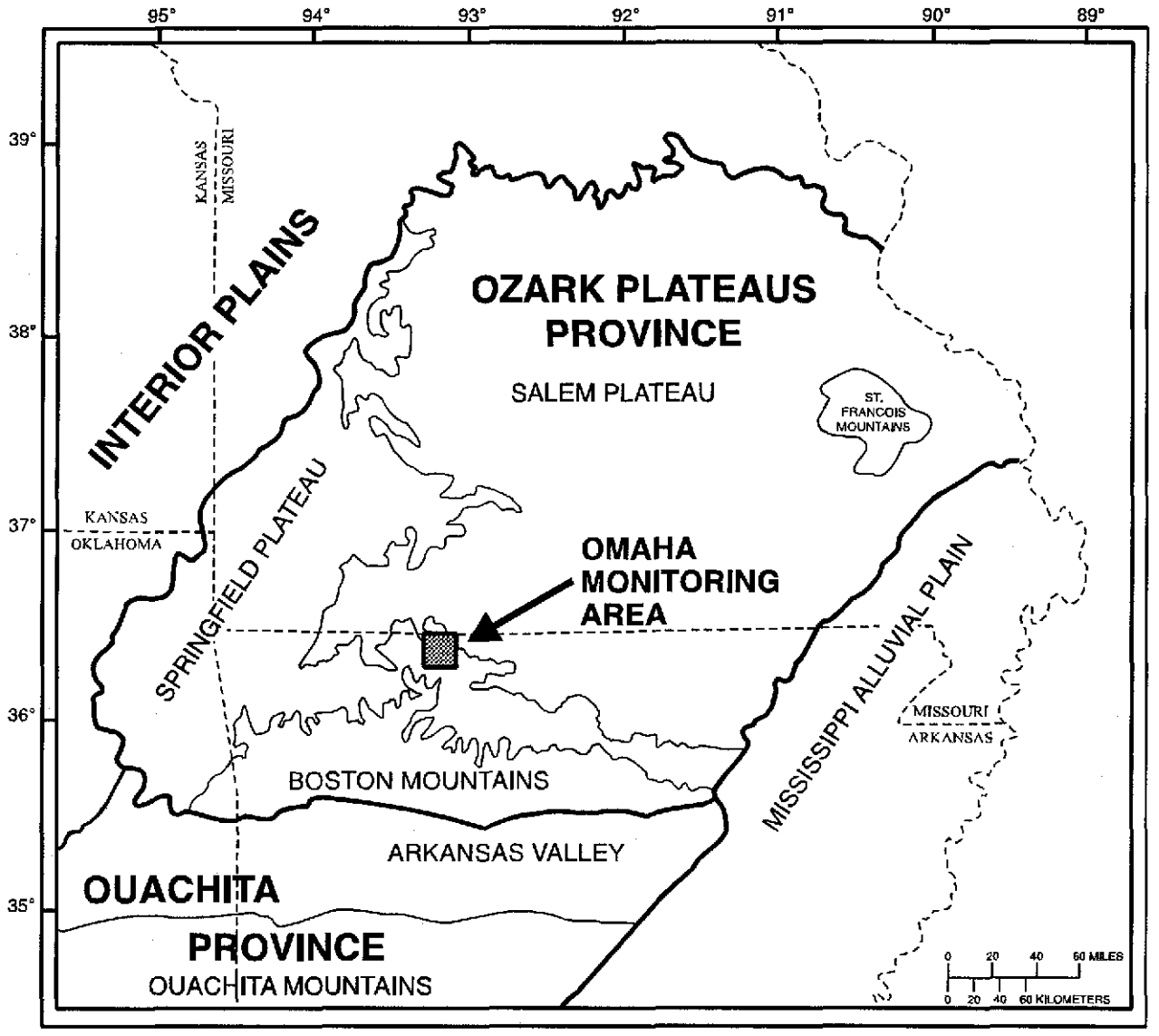

Figure 1 - Regional physiographic map and location of Omaha monitoring area. (after Imes and Emmett, 1994)

term monitoring in carbonate terrains, and to describe and compare the ambient ground-water quality in the Springfield Plateau aquifer and the Ozark aquifer.

AREA GEOLOGY

The study area is located in the Ozark Plateaus physiographic province which extends north into Missouri and west into Oklahoma and Kansas. The majority of the study area is located on the Springfield Plateau; however, large portions to the north, east and west are located on the Salem Plateau. According to Imes and Emmett (1994), the Ozark Plateau is an elliptical-shaped structural dome with a northeast trending axis. The study area is located south of the axis and is underlain by south-dipping Paleozoic rocks. The exposed rock units in the study area are characterized predominantly by Ordovician to Mississippian-aged limestones and dolostones. The geology of the study area is represented by the generalized stratigraphic column of northern Arkansas shown in Table 1.

The youngest unit exposed in the study area is the Mississippian-aged Batesville Sandstone, which has been mapped at the highest elevations in the western portions of the study area. The Batesville Sandstone is a coarse- to medium-grained, buff-colored calcareous sandstone (Croneis, 1930). This unit overlies the Mississippian Boone Formation which crops out over most of the central and southern portions of the study area and which coincides approximately with the Springfield Plateau. The Boone Formation consists of fine- to coarsely-crystalline bedded limestone with an abundant quantity of gray chert in the form of nodules or as massive beds. The St. Joe Limestone member comprises the lower portion of the Boone Formation and consists of a medium- to coarsely-crystalline limestone. The thickness of the Boone Formation in the Omaha area ranges from zero to 200 feet (Imes, 1990). The Boone Formation overlies the Mississippian and Devonian-aged Chattanooga Shale which is highly irregular in the study area. According to Leidy and Morris (1990), the Chattanooga Shale is a black, carbonaceous, highly-jointed fissile shale, which is very thin and discontinuous over the extent of the study area.

The Chattanooga Shale unconformably overlies thin exposures of the Ordovician-aged St. Peter Sandstone, Everton Formation and the Powell Dolomite. The Powell Dolomite overlies the Ordovician Cotter Dolomite which consists of massive, medium-grained, gray rock or fine-grained earthy, white to buff rock (Caplan, 1960) with minor amounts of shale, chert, and sandstone (Croneis, 1930). The Cotter Dolomite crops out in the east, northeast and northwest areas of the study area and approximately coincides with the Salem Plateau. The Cotter Dolomite may be as much as 500 feet thick and is the oldest exposed unit in the study area. Older units underlying the Cotter Dolomite include the Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite and the Van Buren Formation (which includes the Gunter Sandstone Member).

Table 1 - Generalized Stratigraphic Column of Northern Arkansas and Geohydrologic Units (modified from Imes and Emmett, 1994)

Era	System	Formation	Geohydrologic unit	Geohydrologic system
Paleozoic	Pennsylvanian	McAlester Formation Hartshorne Sandstone Atoka Sandstone Bloyd Shale Hale Formation		Western Interior Plains Confining System
	Mississippian	Pitkin Limestone Fayetteville Shale Batesville Sandstone Moorefield Formation		
		Boone Formation -Reeds Spring Member -St. Joe Limestone Member	Springfield Plateau Aquifer	Ozark Plateaus Aquifer System
	Devonian	Chattanooga Shale	Ozark Confining Unit	
		Clifty Limestone Penters Chert	Ozark Aquifer	
	Silurian	Lafferty Limestone St. Clair Limestone Brassfield Limestone		
	Ordovician	Cason Shale Fernvale Limestone Kimmswick Limestone Plattin Limestone Joachim Dolomite St. Peter Sandstone Everton Formation Smithville Formation Powell Dolomite Cotter Dolomite Jefferson City Dolomite Roubidoux Formation Gasconade Dolomite Van Buren Formation - Gunter Sandstone Member		
	Cambrian	Eminence Dolomite Potosi Dolomite		
		Doe Run Dolomite Derby Dolomite Davis Formation	St. Francois Confining Unit	
		Bonneterre Dolomite Reagan Sandstone Lamotte Sandstone	St. Francois Aquifer	
Precambrian Igneous and Metamorphic Roacks			Basement Confining Unit	

AREA HYDROGEOLOGY

Three aquifers, which are part of the Ozark Plateaus Aquifer System, are located within the study area. These geohydrologic units and their associated confining units are indicated on the stratigraphic column (Table 1). The uppermost Springfield Plateau aquifer is contained within the Boone Formation. This aquifer is underlain by the Ozark confining unit which is comprised of the Chattanooga Shale. The Ozark confining unit overlies the Ozark aquifer, which consists of several formations, including the St. Peter Sandstone, Everton Formation, Powell Dolomite, Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite, Van Buren Formation (which includes the Gunter Sandstone Member), Eminence Dolomite and the Potosi Dolomite. The St. Francois Aquifer and its confining unit underlie the Ozark aquifer and consists of the Bonneterre Dolomite, Reagan Sandstone and Lamotte Sandstone. This study investigated the Springfield Plateau and Ozark aquifers only. The St. Francois aquifer does not crop out in the study area and no wells are known to penetrate this aquifer in the study area.

The Springfield Plateau aquifer is generally under unconfined conditions. Recharge occurs from precipitation infiltration over the area. Ground-water movement occurs predominantly through fractures and solution cavities formed by dissolution and is also controlled by streams, topography and geology (Leidy and Morris, 1990). Local discharge from this aquifer is through springs and streams. The sampling points in the Springfield Plateau aquifer consist of one well and several springs emanating from the Boone Formation. Discharge rates of springs may range from 1.5 to 1,400 gallons per minute.

The Ozark confining unit generally separates the two aquifers, however, according to Leidy and Morris (1990), this unit is thin or may be absent in some of the study area, indicating probable gravity-driven, vertical movement of ground water from the Springfield Plateau aquifer to the underlying Ozark Aquifer. The Ozark aquifer is generally under confined conditions. Recharge of this aquifer occurs by precipitation infiltration in outcrop areas and by leakage from overlying beds (Leidy and Morris, 1990). Ground-water movement occurs primarily through fractures and solution cavities. Discharge occurs through springs and streams in outcrop areas and to deeper underlying beds. Most of the sampling points in the Ozark aquifer are wells drilled to the Cotter Dolomite; however, one sampling point was a well drilled to the Roubidoux-Gunter interval of the Ozark aquifer. Wells drilled into the Cotter Dolomite may yield 5 to 10 gallons per minute (Leidy and Morris, 1990).

METHODOLOGY

Ground-water samples collected for the present study were obtained from both natural spring sources and water-supply wells. Sampling sites included ten springs discharging from the Springfield Plateau aquifer, one spring discharging from the Ozark aquifer, one well drilled to the Springfield Plateau aquifer and thirteen wells drilled to the Ozark aquifer. The fourteen wells were drilled to depths ranging from 160 to 1,340 feet below the existing ground surface. Figure 2 shows the location of springs and wells sampled during the current sampling period. The location and description of the current sampling sites are listed in Table 2. For statistical purposes, the data has been divided into two groupings consisting of sampling points in the Springfield Plateau aquifer and the Ozark aquifer.

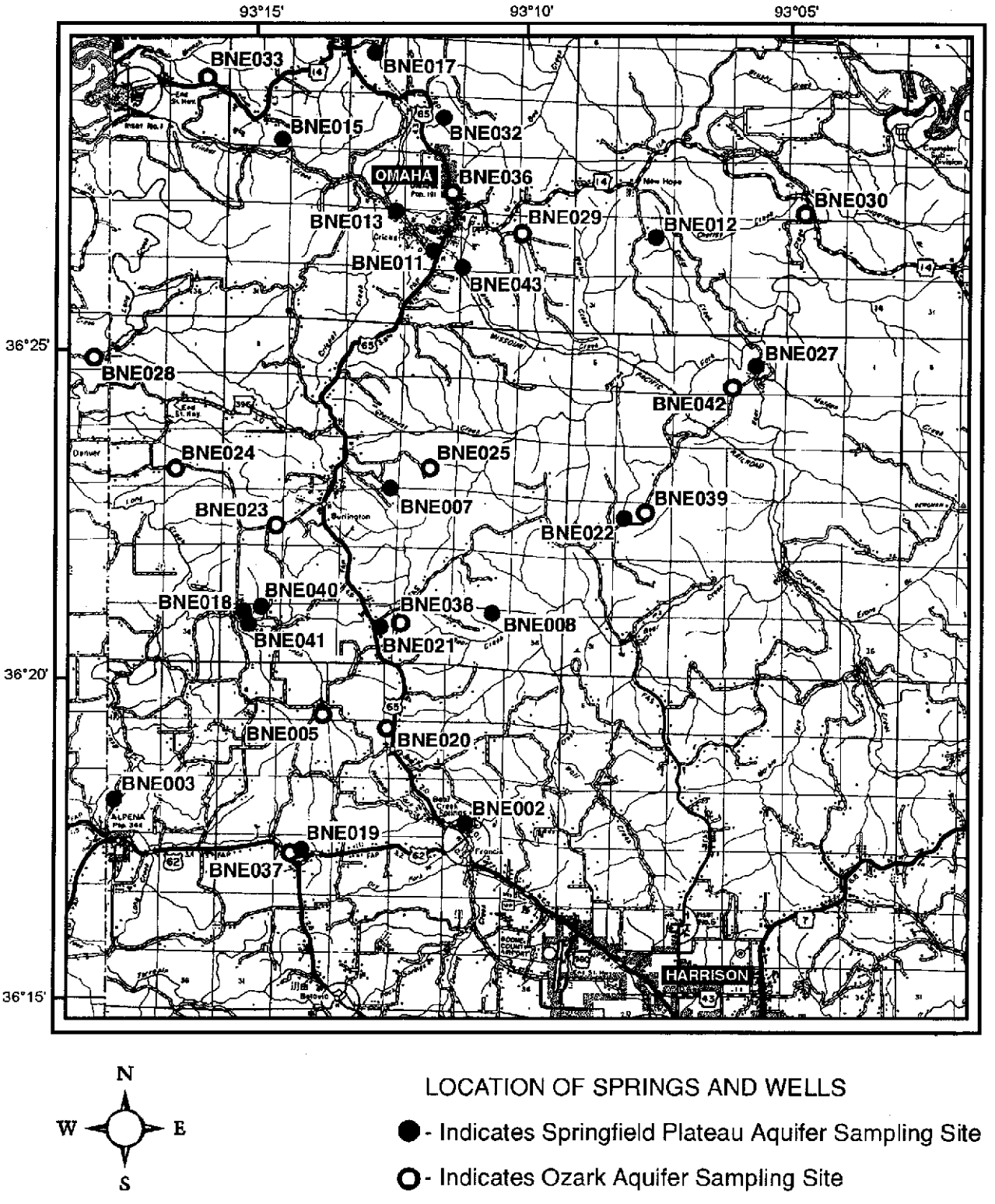

Figure 2 - Omaha monitoring area sampling locations.

Table 2 - Summary of Current Sampling Locations

Sampling Site	Sample Date	T/R Location	Latitude	Longitude	Formation	Aquifer	Type	Depth	Use
BNE002	02/13/96	19N21W14CDA1	36 17 53.1	93 11 05.9	Mb	SP	S	NA	U
BNE003	02/13/96	19N22W12CAB1	36 19 00.6	93 16 24.7	Mb	SP	S	NA	D
BNE005	02/13/96	19N21W05DDB1	36 19 43.6	93 13 46.1	Mb	SP	S	NA	St
BNE007	02/13/96	19N21W31ACB1	36 23 02.0	93 12 29.0	Mb	SP	S	NA	D
BNE012	02/14/96	21N20W29ACD1	36 26 47.0	93 07 31.0	Mb	SP	S	NA	D
BNE013	02/14/96	21N21W27BCB1	36 26 58.1	93 12 09.3	Mb	SP	S	NA	U
BNE015	02/14/96	21N21W17CCB1	36 28 19.0	93 14 24.0	Mb	SP	S	NA	U
BNE017	02/14/96	21N21W09BAD1	36 29 45.0	93 12 46.0	Mb	SP	S	NA	D
BNE020	02/13/96	19N21W10BCB1	36 19 15.2	93 12 19.9	Oc	O	W	550'	D
BNE023	02/13/96	20N21W33ACA1	36 22 31.0	93 14 29.5	Oc	O	W	565'	D
BNE024	02/13/96	20N22W13CBD1	36 23 20.6	93 16 24.4	Oc	O	W	460'	D
BNE025	02/13/96	20N21W15CAD1	36 23 18.0	93 11 52.0	Oc	O	W	455'	D
BNE028	02/13/96	20N22W03DDA1	36 25 01.0	93 17 50.9	Oc	O	W	400'	D
BNE029	02/14/96	21N21W26ADA1	36 26 54.0	93 10 10.0	Oc	O	W	675'	D
BNE030	02/14/96	21N20W23CDD1	36 27 05.0	93 04 36.0	Oc	O	W	755'	D
BNE032	02/13/96	21N21W15BDA1	36 28 43.2	93 11 49.2	Oc	O	W	705'	D
BNE033	02/14/96	21N22W12DCC1	36 29 10.0	93 16 00.0	Oc	O	W	550'	D
BNE036	02/14/96	21N21W22DDA1	36 27 24.0	93 11 19.4	Org	O	W	1340'	P
BNE037	02/13/96	19N21W20BDC1	36 17 22.2	93 14 14.8	Oc	O	W	450'	D
BNE038	02/13/96	20N21W33ACA1	36 20 57.7	93 12 19.9	Oc	O	W	~425'	D
BNE039	02/14/96	20N20W20ABC1	36 22 36.0	93 07 38.0	Oc	O	W	~300'	D
BNE040	02/13/96	20N21W31ABC1	36 21 05.0	93 14 58.0	Mb	SP	W	~160'	D
BNE041	02/13/96	19N21W31ACB1	36 20 59.0	93 15 02.0	Mb	SP	S	NA	U
BNE042	02/14/96	20N20W09AAA1	36 24 22.0	93 06 18.0	Oc	O	S	NA	U
BNE043	02/14/96	21N21W27DAD1	36 26 38.0	93 11 12.0	Mb	SP	S	NA	U

Notes: "T/R" indicates township and range; "Mb" indicates Mississippian-aged Boone Formation; "Oc" indicates Ordovician-aged Cotter Dolomite; "Org" indicates Ordovician-aged Roubidoux-Gunter interval; "SP" indicates Springfield Plateau Aquifer; "O" indicates Ozark Aquifer; "S" indicates spring; "W" indicates well; "NA" indicates not applicable; "D" indicates domestic supply; "P" indicates public supply; "St" indicates stock supply; "U" indicates currently unused for water supply.

Conductivity, temperature and pH were measured in the field until stabilized prior to obtaining all ground-water samples. Water samples were obtained by generally-accepted sampling methods, placed on ice, and transported to the Department laboratory in Little Rock. All ground-water samples were analyzed in the laboratory for total alkalinity, major and trace inorganic constituents, metals, nutrients and total organic carbon. In addition, volatile organic compound (VOC) analysis and semi-volatile organic compound (SVOC) analysis was conducted on selected ground-water samples. The results of the current and previous chemical analyses are listed in Tables 5 through 10 in Appendix A of this report.

Domestic wells in the study area are generally cased through the overburden until competent bedrock is reached. The remainder of the borehole is left open. Driller's logs were obtained, whenever possible, to verify the presence of grout, depth of wells, water-bearing intervals, and well-construction information.

Ground-water quality analyses from the current and previous sampling events, and complete site descriptions have been placed in the Federal Environmental Protection Agency (EPA) Storage and Retrieval (STORET) database. This information is available to all interested parties with access to STORET. In addition, copies of the laboratory analyses have been provided to all interested well or spring owners. For the purposes of GIS data collection, all sample sites have been surveyed with the Magellan NAV 5000 PRO; a hand-held GPS C/A-code and carrier phase code receiver. This instrument generally has a horizontal accuracy of approximately 12 meters.

GROUND WATER QUALITY

Many of the parameters analyzed during the third sampling event were not analyzed during the two previous sampling events. In addition, several sampling points have been added since the two previous sampling events. Analyses to date demonstrate that water quality is very good, though moderately hard. The parameters which have been consistently analyzed over time include chloride, nitrate-nitrogen, ammonia-nitrogen, ortho-phosphate and sulfate. The following percentages and maximum and average concentrations are listed for sampling locations over the three sampling periods.

Chloride (Cl) was detected in 100 percent of the Springfield Plateau aquifer samples with a maximum concentration of 16.6 milligrams per liter (mg/l) and an average concentration of 8.6 mg/l. Cl was also detected in 100 percent of the Ozark aquifer samples with a maximum concentration of 7.6 mg/l and an average concentration of 3.6 mg/l. The detection limit of Cl for all samples was 1.2 mg/l. The Springfield Plateau aquifer exhibited higher maximum and average Cl concentrations than the Ozark aquifer. This situation possibly reflects the susceptibility of the Springfield Plateau aquifer to contaminants as a result of a thinner regolith and/or exposed, fractured bedrock. Also, the water quality of the Springfield Plateau aquifer was described according to mainly spring-water samples, as there was only one well sampled in the Springfield Plateau aquifer. Generally, springs are connected more closely to surface influence than wells. They are developed in larger fracture sets and are much more susceptible to contamination.

Nitrate-nitrogen (NO_3-N) was detected in 100 percent of the Springfield Plateau aquifer samples with a maximum concentration of 8.5 mg/l and an average concentration of 2.4 mg/l. NO_3-N was detected in 75 percent of the Ozark aquifer samples with a maximum concentration of 1.2 mg/l and an average concentration of 0.3 mg/l. The detection limit of NO_3-N for all samples was 0.02 mg/l. The higher NO_3-N concentrations in the Springfield Plateau aquifer are attributable to the same factors referenced above in the section on Cl.

Ammonia-nitrogen (NH_3-N) was detected in 40 percent of the Springfield Plateau aquifer samples with a maximum concentration of 0.113 mg/l and an average concentration of 0.070 mg/l. NH_3-N was detected in 24 percent of the Ozark aquifer samples with a maximum concentration of 0.2 mg/l and an average concentration of 0.081 mg/l. The detection limit of NH_3-N for all samples was 0.05 mg/l.

Ortho-phosphate (O-phosphate) was detected in 30 percent of the Springfield Plateau aquifer samples with a maximum concentration of 0.081 mg/l and an average concentration of 0.04 mg/l. O-phosphate was not detected in any of the Ozark aquifer samples above the detection limit of 0.03 mg/l. The low O-phosphate concentrations detected may be due to nearby septic systems; however, no direct link between O-phosphate detections and nitrate detections was observed.

Sulfate (SO_4) was detected in 100 percent of the Springfield Plateau aquifer samples with a maximum concentration of 12.4 mg/l and an average concentration of 5.8 mg/l. SO_4 was also detected in 100 percent of the Ozark aquifer samples with a maximum concentration of 62.0 mg/l and an average concentration of 28.2 mg/l. The detection limit of SO_4 for all samples was 1.0 mg/l.

Several of the sampling points have shown increases over time, while several sampling points have shown decreases. None of these changes over time appear to be significant. In addition, none of the detected concentrations were above the EPA's drinking water maximum contaminant levels (MCLs). This report substantiates findings by Adamski and others (1995) who found that the Springfield Plateau aquifer is generally higher in chlorides and nitrates. Where confined, the Ozark aquifer is increasingly protected from surface impacts.

Additional parameters that were analyzed during the current sampling event included pH, conductivity, alkalinity, carbon dioxide, total organic carbon (TOC), total hardness, total phosphate, total dissolved solids (TDS) and total suspended solids (TSS). Common ions and metals were also analyzed. These included aluminum, arsenic, boron, barium, beryllium, bicarbonate, cadmium, calcium, carbonate, chromium, copper, iron, fluoride, potassium, magnesium, manganese, sodium, nickel, lead, selenium, silica, vanadium and zinc. These data are listed in Tables 5 through 10 in Appendix A of this report. Minimum, maximum and mean values were calculated for some selected parameters for both aquifers from the current sampling event data. Tables 3 and 4 list the descriptive statistics for the selected parameters.

Leidy and Morris (1990) gathered data for both "wet" and "dry" seasons and calculated descriptive statistics for both seasons. The current data was collected in February 1996 which is considered a "wet" season, although it was during a period of minor precipitation. The calculated means for the Springfield Plateau aquifer correlated well with Leidy and Morris' tabulated data for the Boone Formation with the exception of iron which was skewed by samples BNE013, BNE040 and BNE043.

Table 3 - Springfield Plateau Aquifer - Descriptive Statistics

Sample Location	HCO_3 mg/l	Cl mg/l	NH^3-N mg/l	NO_3-N mg/l	SO_4 mg/l	TDS mg/l	Ba ug/l	Ca mg/l	Fe ug/l	K mg/l	Mg mg/l	Na mg/l	SiO_2 mg/l
BNE002	305	7.99	0.104	1.42	9.6	221	33.7	77.9	5	0.79	1.57	3.11	10.6
BNE003	255	7.57	0.025	1.51	11.4	251.5	44.4	89	2.3	0.92	1.63	3.43	10.8
BNE005	245.2	8.6	0.051	1.68	6.5	241	39.2	85.2	5.7	0.98	1.37	3.14	11.3
BNE007	203.7	14.94	0.05K	1.91	8.6	228.5	35.2	73.1	2.3	0.96	1.61	4.8	11.6
BNE012	115.9	8.49	0.051	8.46	8.6	177.5	31.1	47.2	4.7	1.56	2.55	2.97	11.8
BNE013	222	7.52	0.065	0.03	12.4	210	61.4	67.8	1670	0.93	2.36	2.95	10
BNE015	117.1	16.65	0.05K	7.88	5.4	204	36.8	49.1	1.8K	1.67	3.25	5.96	11.1
BNE017	106.1	13.16	0.05K	1.88	4.2	131	40.1	35.5	1.8K	0.97	2.17	6	9.9
BNE040	225.7	4.58	0.052	2.3	4.2	219.5	33.8	78.4	87.6	0.67	1.39	2.1	11.9
BNE041	228.1	6.61	0.052	1.89	4.2	224.5	33.9	77.9	4.8	0.97	1.28	2.57	10.1
BNE043	74.4	8.38	0.05K	1.79	1.7	105.5	18.2	25.6	193	0.55	1.25	4.28	11.1
Min.	74.4	4.58	0.05K*	0.03	1.7	105.5	18.2	25.6	1.8K*	0.55	1.25	2.1	9.9
Max.	305	16.65	0.104	8.46	12.4	251.5	61.4	89	1670	1.67	3.25	6	13
Mean	181.1	9.49	0.045	2.79	6.98	201.3	37.1	64.2	179.7	0.98	1.86	3.76	10.9

* indicates actual value is less than the given value

Table 4 - Ozark Aquifer - Descriptive Statistics

Sample Location	HCO_3 mg/l	Cl mg/l	NH_3-N mg/l	NO_3-N mg/l	SO_4 mg/l	TDS mg/l	Ba ug/l	Ca mg/l	Fe ug/l	K mg/l	Mg mg/l	Na mg/l	SiO_2 mg/l
BNE020	351.4	4.65	0.05K	0.41	18.3	319	31.8	111	225	0.67	4.19	4.6	9.3
BNE023	206.2	3.52	0.05K	0.02	19.8	188	10.7	44.1	20	1.13	17.7	1.78	9.9
BNE024	279.4	3.83	0.058	0.19	18.3	245.5	10.2	50.6	17.1	2.9	26.1	6.11	9.1
BNE025	287.9	5.7	0.05	0.34	42.2	285	13.7	62.3	1.8	1.11	31.3	1.85	10.9
BNE028	234.2	4.11	0.075	1.14	16.6	216	7.5	47.7	24.6	2.62	19.5	5.87	9.2
BNE029	334.3	2.76	0.05K	0.42	56.1	332	23.7	70.9	46.2	2.17	33.2	1.39	8.9
BNE030	342.8	2.22	0.05K	0.48	20.6	292.5	4.6	58.9	29.8	2.22	32.9	1.83	9.1
BNE032	168.4	1.5	0.05K	0.04	38.5	183	14.3	38.1	36.7	1.48	20	0.91	9.1
BNE033	207.4	1.99	0.05K	0.16	14.1	179.5	9	36.6	1.8K	0.77	20.2	1.51	10.6
BNE036	218.4	2.24	0.05	0.02K	17.5	176	4K	39.2	174	0.96	18.9	0.76	9.8
BNE037	313.5	7.55	0.05K	0.49	27.4	295	22.7	76.4	21.1	0.82	18.7	11.1	10.1
BNE038	242.8	2.96	0.2	0.02K	19.1	209	43.7	42.9	1600	3.36	20.3	10.2	9
BNE039	331.8	1.97	0.05K	0.15	19.1	290	33.8	80.6	6.6	0.87	17.6	1.39	12
BNE042	400.2	3.68	0.05K	1.17	7.6	319	30.1	65.9	222	0.7	39.9	1.54	13
Min.	168.4	1.5	0.05K*	0.02K*	7.6	176	4K*	36.6	1.8	0.67	4.19	0.76	8.9
Max.	400.2	7.55	0.2	1.17	56.1	332	43.7	111	1600	3.36	39.9	11.1	13
Mean	279.9	3.48	0.047	0.36	23.9	252.1	18.4	58.9	173.2	1.56	22.9	3.63	10

* indicates actual value is less than the given value

Similarly, the calculated means for the Ozark aquifer also correlated well with Leidy and Morris' tabulated data for the Cotter Dolomite with the exception of iron which was skewed by samples BNE020, BNE036, BNE038 and BNE042.

According to Adamski and others (1995), water type, dissolved solids concentration, and various chemical constituents can differ among the aquifers, and between confined and unconfined parts of the same aquifer. The Ozark aquifer generally had higher TDS concentrations which is consistent with longer resident time for the ground water in the aquifer. The Springfield Plateau aquifer is characterized by calcium bicarbonate water, while the Ozark aquifer is characterized by calcium-magnesium bicarbonate water. As expected, calcium is the dominant cation in the ground water of the Springfield Plateau aquifer, whereas, calcium and magnesium are the dominant cations in the ground water of the Ozark Aquifer. Bicarbonate is the dominant anion in the ground water of both aquifers. Figures 3 and 4 illustrate the dominant cations and anions in piper diagram format.

Least-squares linear regression analysis using QuattroPro was conducted to compare the relationships between various chemical parameters. This method tests the variance between a set of independent and dependent variables. The r-squared value represents the reliability of the regression with a value between zero and unity. The linear relationship of the data set is more reliable as the r-squared value approaches unity.

Plots of calcium versus bicarbonate, magnesium versus bicarbonate and calcium+magnesium versus bicarbonate indicate several relationships and significant differences between the two aquifers. The plot of calcium versus bicarbonate (Figure 5) for the Springfield Plateau aquifer shows a strong linear relationship between the major cation and anion with an r-squared value of 0.87. The similar plot for the Ozark aquifer (Figure 6) shows a much less defined linear relationship with an r-squared value of 0.59. This is readily explained by the fact that the Springfield Plateau aquifer is comprised of limestone ($CaCO_3$); whereas, the Ozark aquifer is comprised of dolostone ($CaMg(CO_3)_2$) and varying amounts of the calcium have been replaced by magnesium. Although calcium concentrations for the Ozark aquifer are similar to the Springfield Plateau aquifer, bicarbonate concentrations are generally higher as a result of the increase in magnesium.

Plots of magnesium versus bicarbonate for both aquifers (Figures 7 and 8) show poor linear relationships. Low concentrations of magnesium in the Springfield Plateau aquifer have caused a random scattering of data points. The Ozark aquifer shows a slightly more linear relationship, although those points are also widely scattered. Plots of calcium + magnesium versus bicarbonate for both aquifers (Figures 9 and 10) show strong linear relationships. This is to be expected given the equilibrium relationship of both calcium and magnesium to bicarbonate in carbonate terrains. Sampling location BNE020 (#20 on Figure 8) is displaced to the far left by a very low magnesium concentration, which deviates considerably from the other wells. The magnesium concentration and ratio of magnesium to calcium would suggest that BNE020 derives a large part of its water from the Springfield Plateau aquifer; however, the high TDS, HCO_3, Zn and SO_4 concentrations are similar to the other wells in the Ozark aquifer. It is therefore possible that the magnesium analysis is in error. In addition, BNE002 (#2 on Figures 5, 7 and 9) shows a large deviation from the best-fit lines. Figure 9 suggests that either the bicarbonate is too high or the calcium + magnesium is to low. An inspection of the total cations (4.17 meq/L) versus the total anions (5.45 meq/L) confirms this

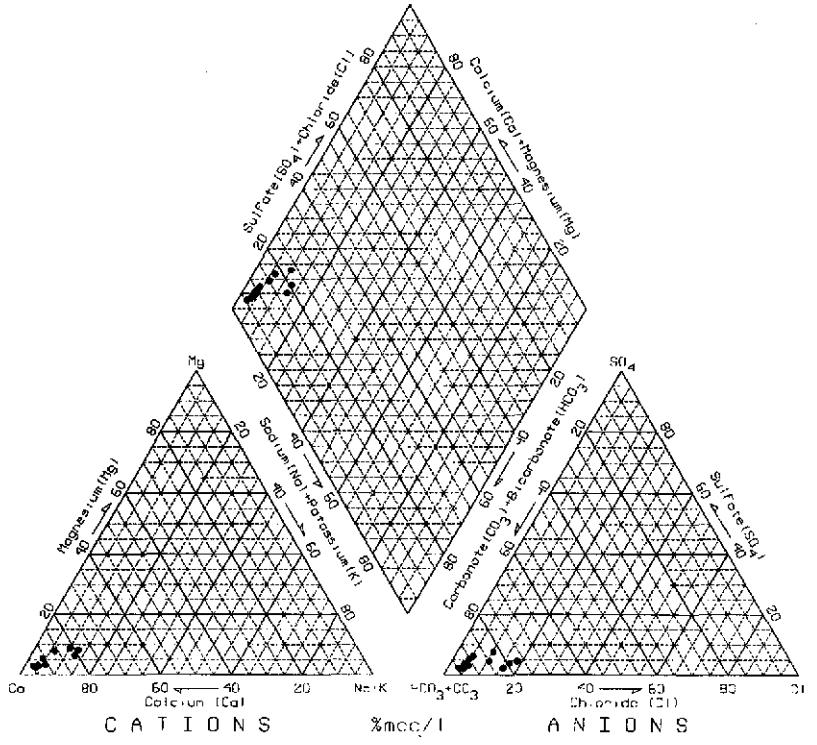

Figure 3 - Springfield Plateau aquifer piper diagram. Note the dominance of the calcium cation.

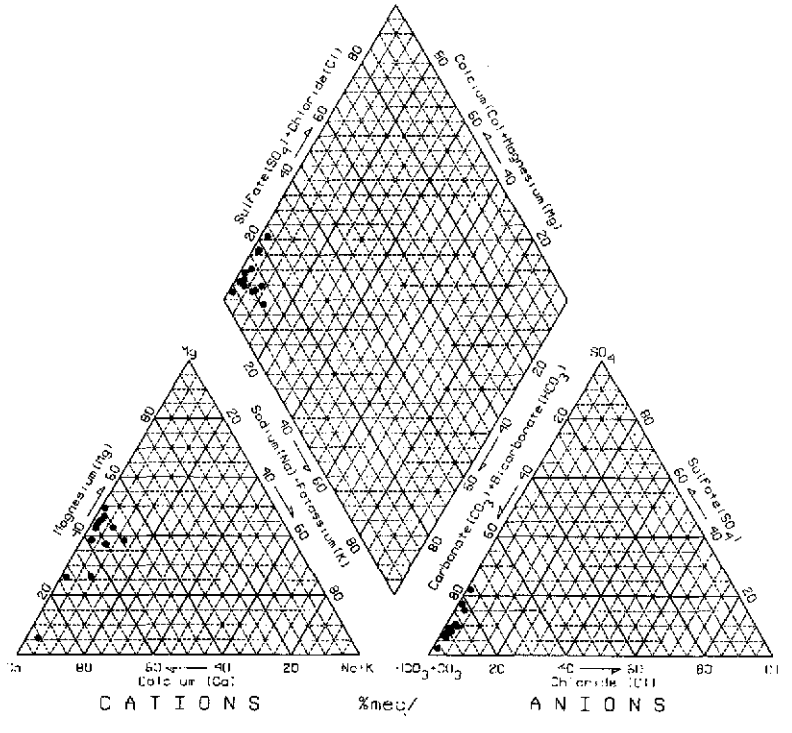

Figure 4 - Ozark aquifer piper diagram. Note the increase in the magnesium cation percentage.

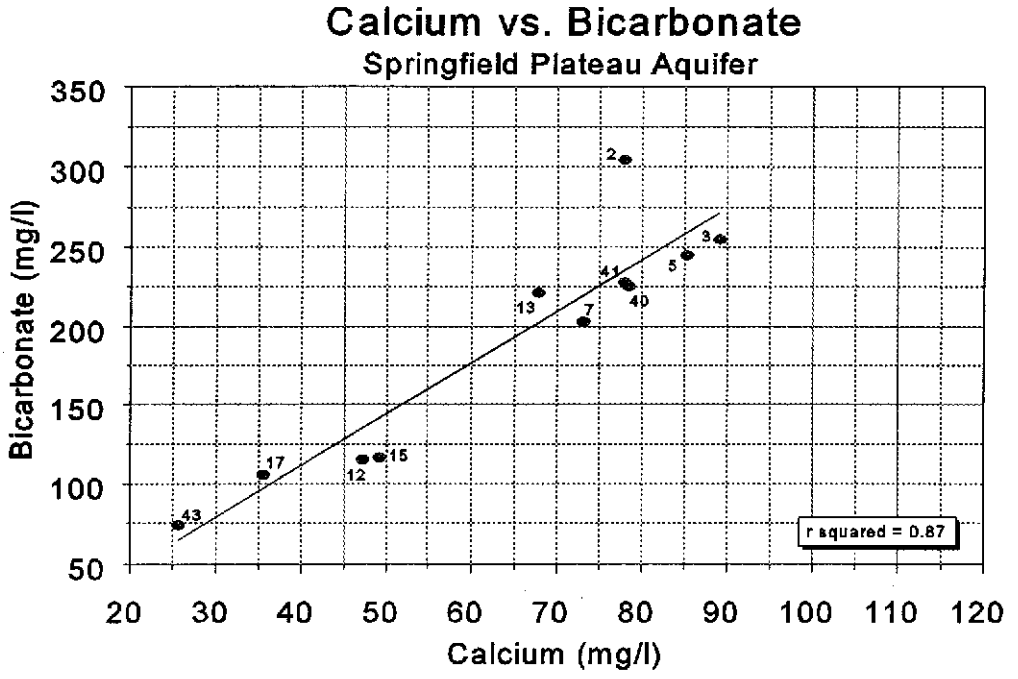

Figure 5 - Plot of calcium versus bicarbonate for the Springfield Plateau aquifer showing best fit linear regression. Numbers next to symbols indicate sampling locations.

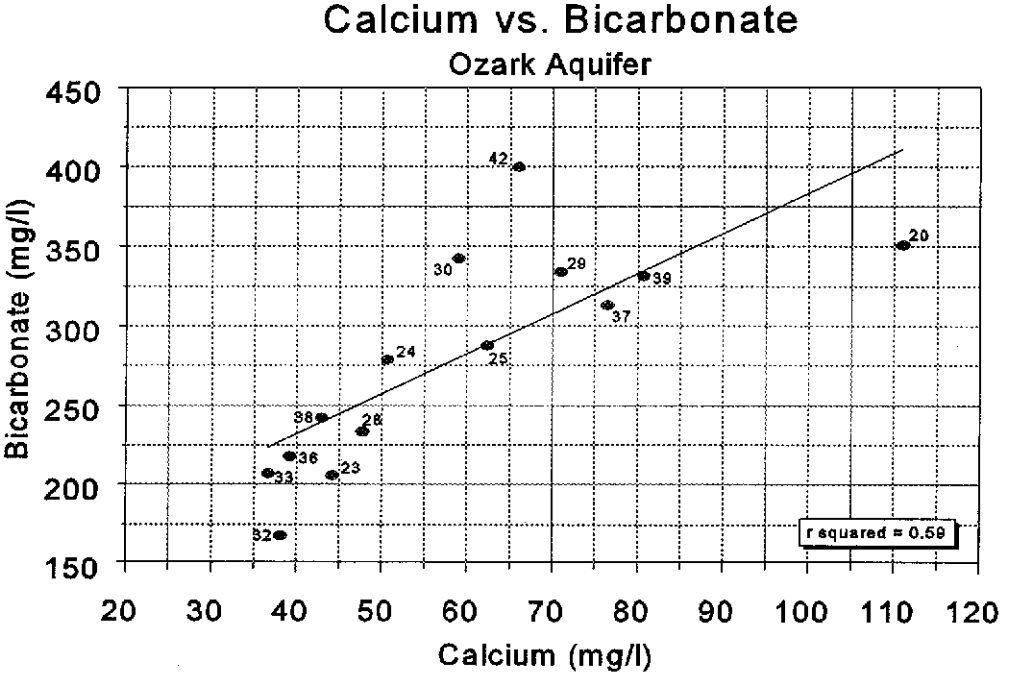

Figure 6 - Plot of calcium versus bicarbonate for the Ozark aquifer showing best fit linear regression. Numbers next to symbols indicate sampling locations.

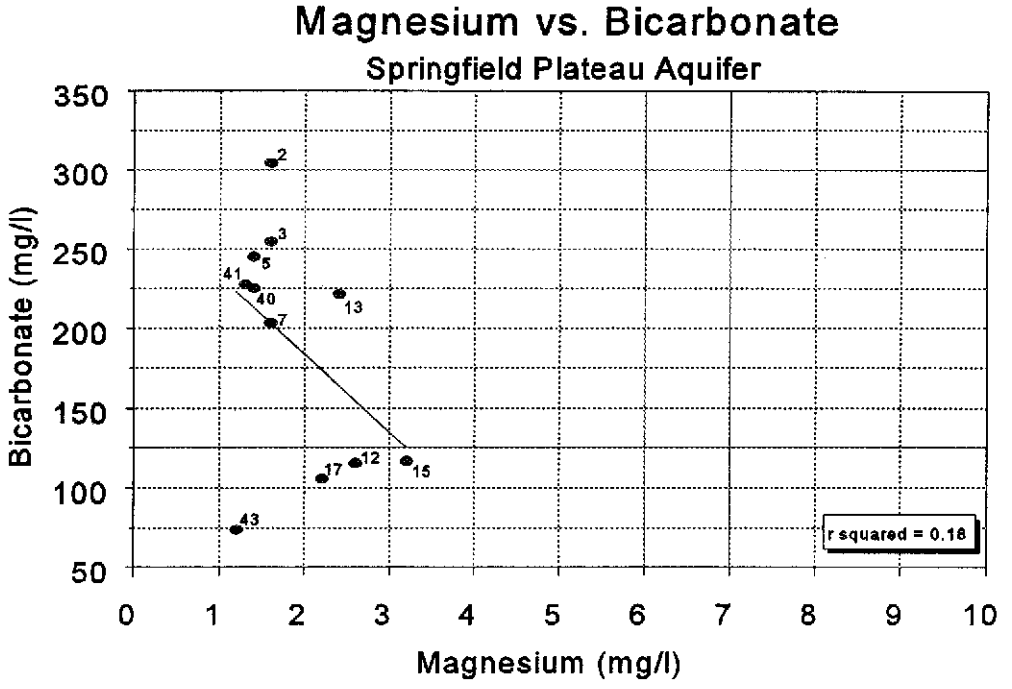

Figure 7 - Plot of magnesium versus bicarbonate for the Springfield Plateau aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

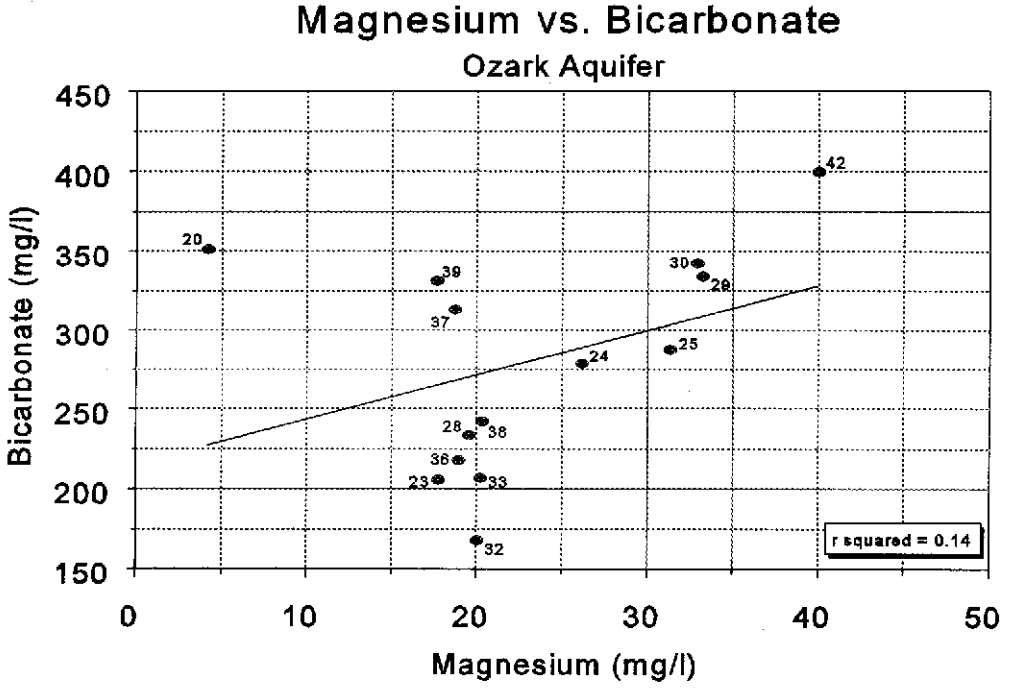

Figure 8 - Plot of magnesium versus bicarbonate for the Ozark aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

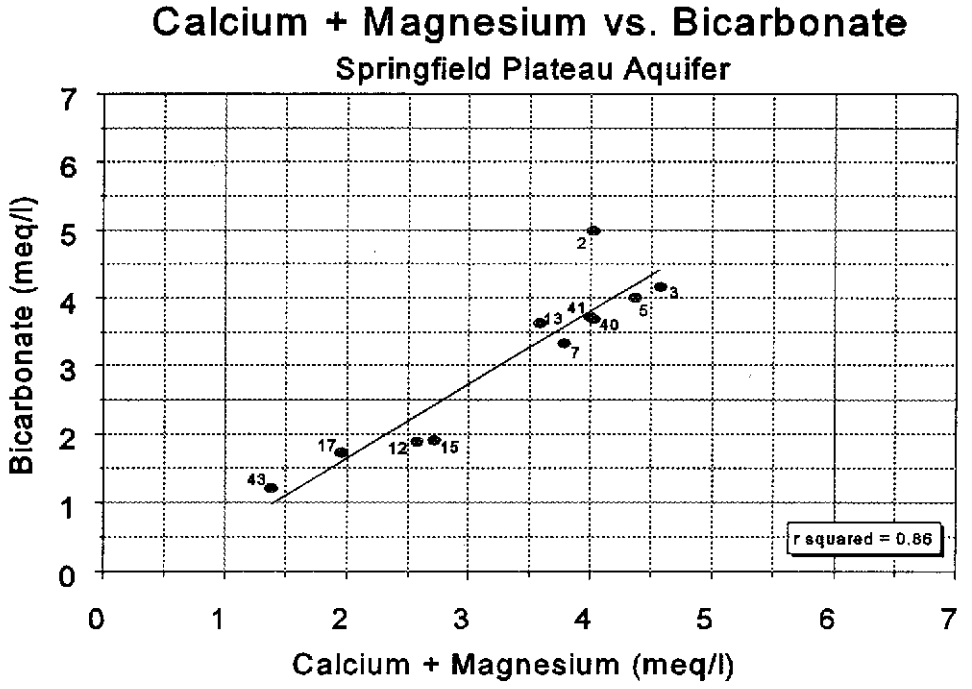

Figure 9 - Plot of calcium + magnesium versus bicarbonate for the Springfield Plateau aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

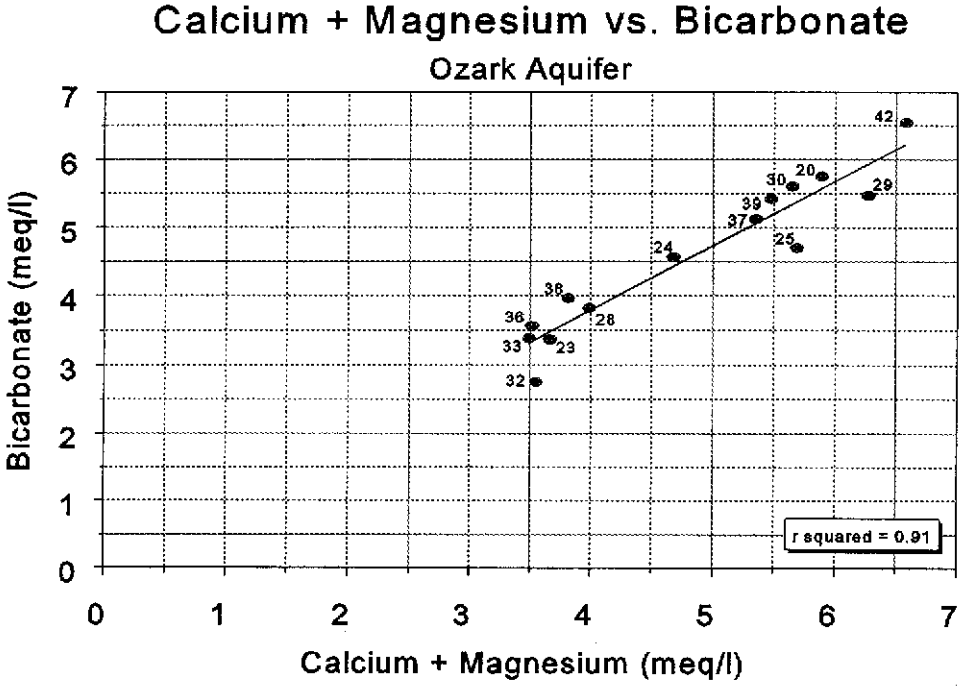

Figure 10 - Plot of calcium + magnesium versus bicarbonate for the Ozark aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

situation. A further inspection of the ratios of total cations and total anions to the measured conductivity (see Appendix B) would indicate that the calcium concentration is in error.

The plot of sodium versus chloride for the Springfield Plateau aquifer (Figure 11) shows a strong linear relationship while the similar plot for the Ozark aquifer (Figure 12) is much more scattered. Because sodium is expected to correlate closely with chloride, the weaker relationship in the Ozark aquifer data set possibly reflects cation exchange processes between calcium and sodium. Also, the values for both sodium and chloride were significantly lower in the Ozark aquifer and might reflect the effect of normal deviation (+/-) on the lower values.

VOC analysis was conducted on samples from several springs emanating from the Boone Formation. Methylene chloride, a common laboratory chemical, was detected in three of the samples at low concentrations. These detections are most likely due to laboratory contamination and probably do not reflect actual ground water conditions. No other VOC constituents were detected above their respective detection limits in any of the samples. Table 9 in Appendix A lists the analyzed VOC constituents.

SVOC analysis was conducted on the sample obtained from the spring located down gradient of the Superfund site (BNE013). Previous documentation (Leidy and Morris, 1990) indicated a pentachlorophenol concentration of 1200 ug/l in the ground water. Several SVOC constituents were detected in the current sample including substantially elevated levels of pentachlorophenol and 2-3-4-6-tetrachlorophenol. The concentration of pentachlorophenol had increased slightly since the previous analysis by Leidy and Morris. Several of the constituents detected during this sampling event were not detected by Leidy and Morris, however, detection limits at the time were noticeably higher. Table 10 in Appendix A lists the analyzed and detected SVOC constituents along with the reported detection limits.

QUALITY CONTROL

A procedure for checking correctness of analyses was used for quality control which was based on Section 1030 F of Standard Methods for the Examination of Water and Wastewater, 18th edition (Standard Methods). The procedure involved calculating the TDS, conductivity and cation/anion balance for each sample. The calculated TDS and conductivity were based on methods outlined in Standard Methods. Cations used for the calculations were Ca^{2+}, Mg^{2+}, K^{+} and Na^{+}. Anions used were Cl^{-}, F^{-}, HCO_3^{-}, NO_3^{-} and SO_4^{2-}. Ratios of measured TDS/calculated TDS, calculated conductivity/measured conductivity, calculated TDS/calculated conductivity, measured TDS/ measured conductivity, cations/conductivity and anions/conductivity were calculated for each sample. These ratios were then compared to recommended ranges of values (Standard Methods) to evaluate laboratory efficiency. The calculations for each sampling point are listed in Appendix B.

Probably the most useful indicator of laboratory efficiency is the percent difference between the cation and anion sums. Hem (1989) states that the percent difference should be less than 2 percent. According to Standard Methods, the error can be raised to five percent if the cation and anion sum is greater than 10 meq/l. Most of the values were within the recommended 2 to 5 percent error. The samples obtained from BNE002, BNE012, BNE013, BNE015, BNE033, BNE036, BNE039 and

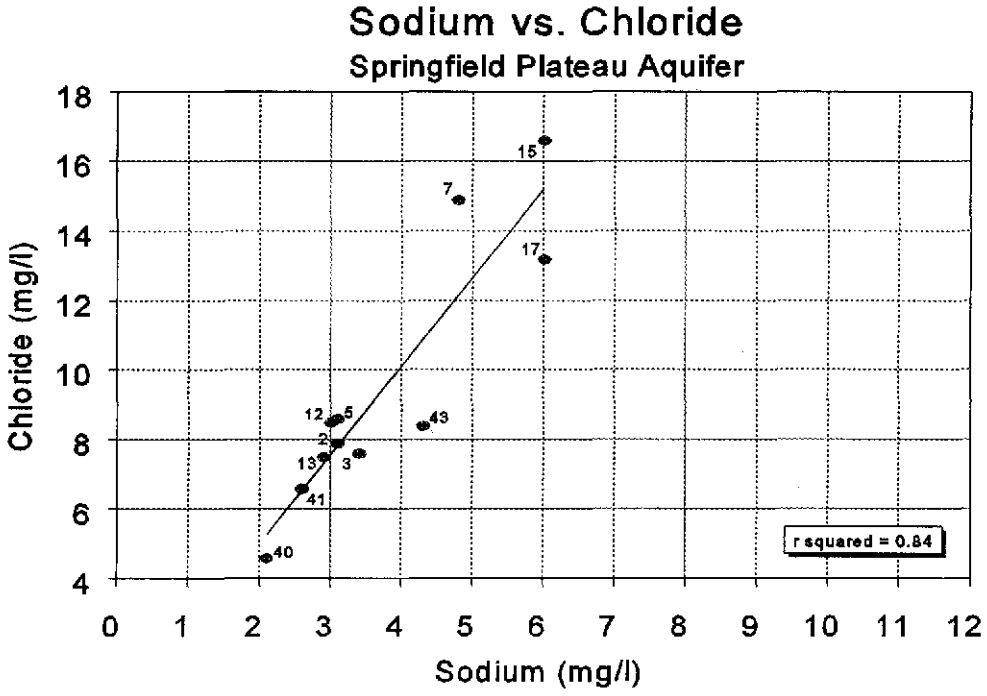

Figure 11 - Plot of sodium versus chloride for the Springfield Plateau aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

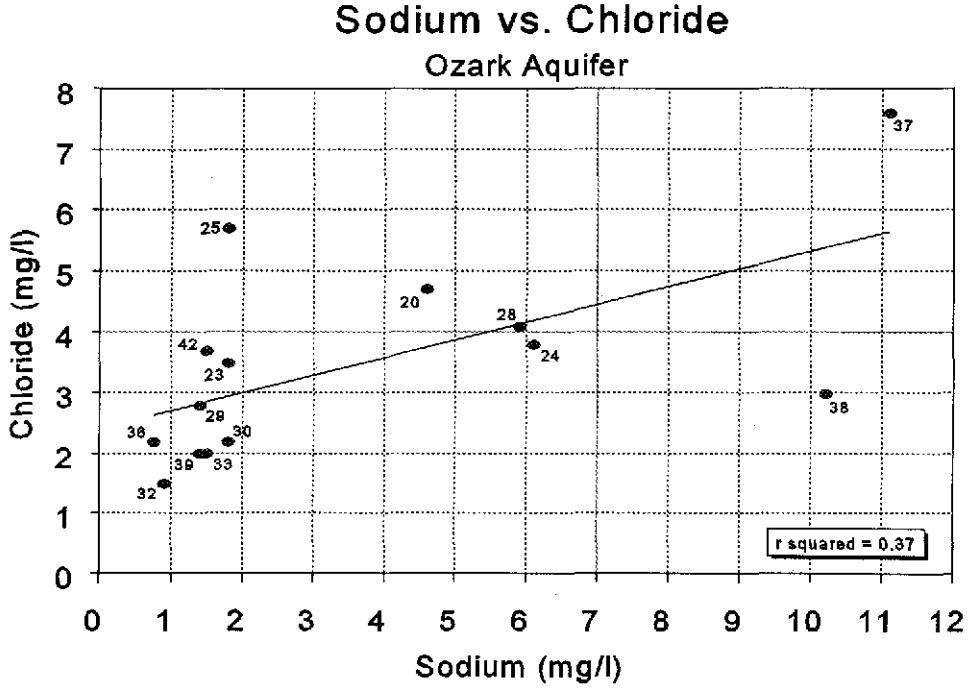

Figure 12 - Plot of sodium versus chloride for the Ozark aquifer showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

BNE040 were calculated at 13.29, 5.33, 4.90, 6.88, 2.47, 5.87, 3.01 and 2.21 percents, respectively. These percentages indicate a net loss of either cations or anions during the analysis procedure. The analysis indicates a net loss of cations for samples BNE002 and BNE013 and a net loss of anions for samples BNE012 and BNE015. No obvious loss could be determined for samples BNE033, BNE036, BNE039 and BNE040. No re-analysis on the samples could be conducted to assess these discrepancies due to the elapsed time since the original analysis; however, these discrepancies are small except for BNE002. This well, with the corresponding low calcium concentration, was explained in the previous section. A strong linear relationship is evident in the plot of calculated TDS versus laboratory-derived (weighted) TDS (Figure 13), which indicates the overall accuracy of the analyses. Figures 14 through 16, indicating total cations, total anions, and TDS versus conductivity showed moderate to strong linear relationships, which also indicate the overall accuracy of the analyses.

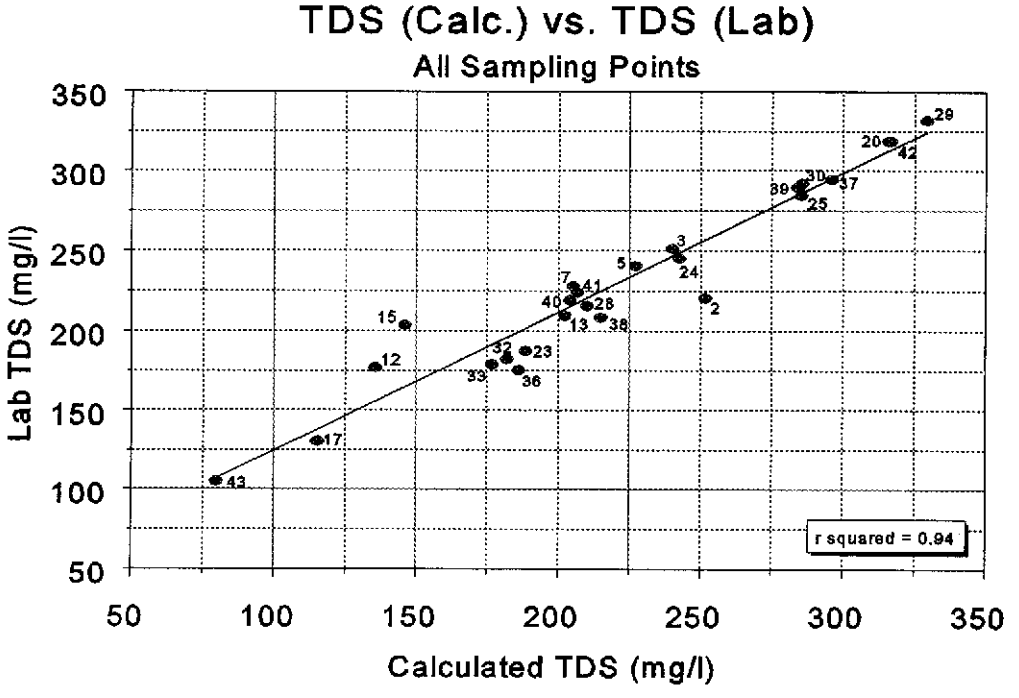

Figure 13 - Plot of calculated total dissolved solids versus laboratory total dissolved solids for all sampling points showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

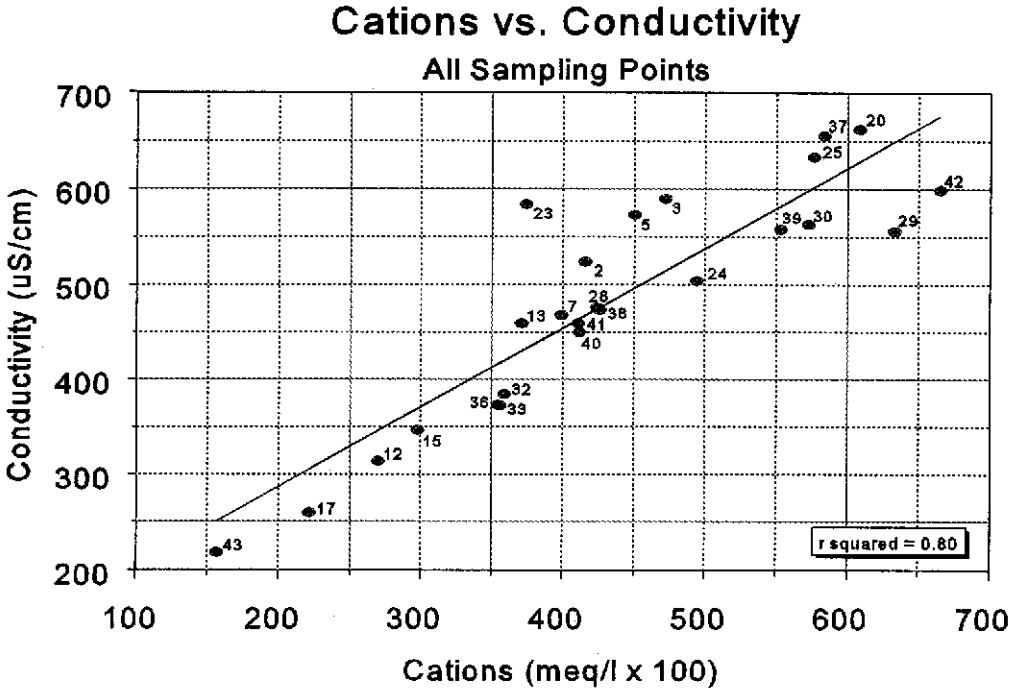

Figure 14 - Plot of cations versus conductivity showing best-fit linear regression. Numbers next to points indicate sampling locations.

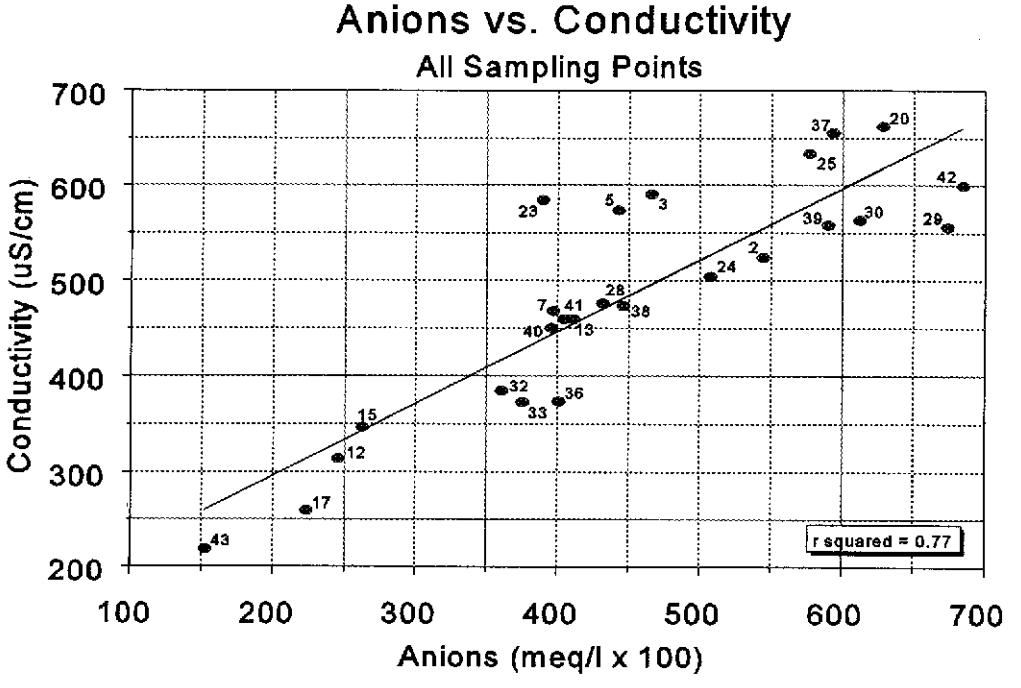

Figure 15 - Plot of anions versus conductivity showing best-fit linear regression. Numbers next to points indicate sampling locations.

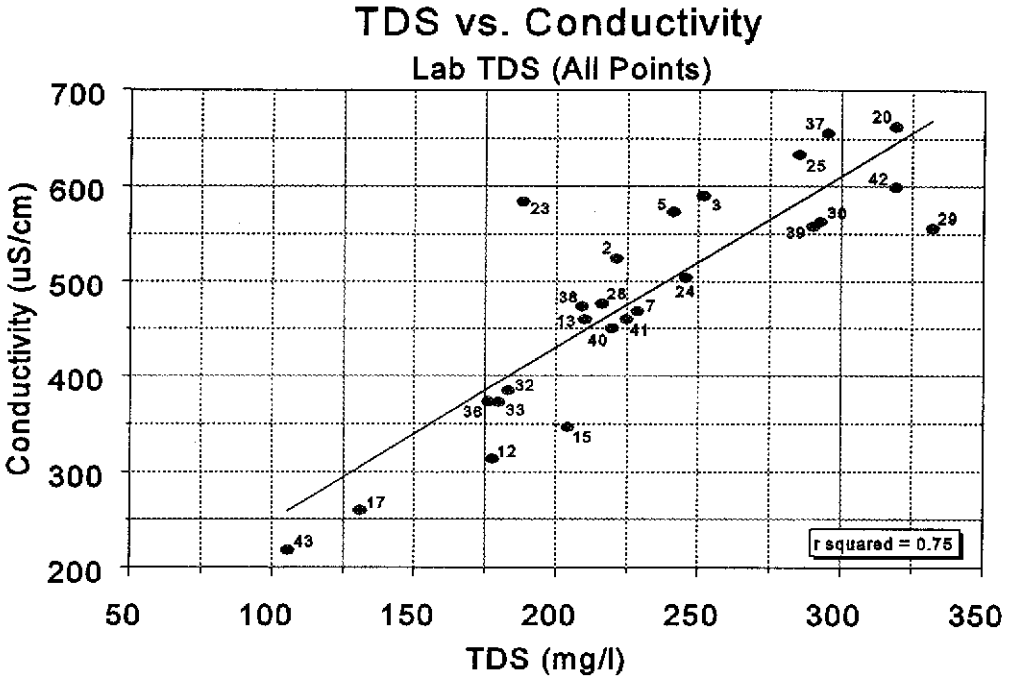

Figure 16 - Plot of total dissolved solids versus conductivity for all sampling points showing best-fit linear regression. Numbers next to symbols indicate sampling locations.

SUMMARY AND CONCLUSIONS

The Omaha Monitoring area is underlain by the Ozark Aquifer system which is comprised of two primary aquifers. The upper, unconfined aquifer is the Springfield Plateau Aquifer which is located within the Boone Formation. The lower, confined aquifer is the Ozark Aquifer which is dominantly comprised of the Cotter Dolomite. Ground-water quality is generally good in both aquifers, however, the Ozark aquifer was found to contain generally higher total dissolved solids. Nutrient levels were generally higher in the Springfield Plateau aquifer. Several SVOC constituents were detected in sampling site BNE013, located adjacent to an abandoned (Superfund) wood treatment facility. Several of the detected parameters were at concentrations above the EPA's drinking water MCLs. The source of the contamination appears to be a cave which had been backfilled with hazardous waste (Leidy and Morris, 1990). The extent and volume of the waste is currently unknown. An increase in pentachlorophenol since the 1990 Leidy and Morris report indicates a residual contaminant source still exists at the site. The present data has been turned over to the Hazardous Waste Division of the Department.

REFERENCES

Adamski, J.C., Petersen, J.C., Freiwald, D.A., and Davis, J.V., 1995, Environmental and Hydrologic Setting of the Ozark Plateaus Study Unit, Arkansas, Kansas, Missouri, and Oklahoma. U.S. Geological Survey Water-Resources Investigations Report 94-4022, 69 p.

Bell, R.W., Joseph, R.L., and Freiwald, D.A., 1996, Water-Quality Assessment of the Ozark Plateaus Study Unit, Arkansas, Kansas, Missouri, and Oklahoma - Summary of Information on Pesticides, 1970-90. U.S. Geological Survey Water-Resources Investigations Report 96-4003, 51 p.

Caplan, W.M., 1960, Subsurface Geology of Pre-Everton Rocks in Northern Arkansas. Arkansas Geological Conservation Commission Information Circular 21, 17 p.

Croneis, C.C., 1930, Geology of the Arkansas Paleozoic area, with especial reference to oil and gas possibilities. Arkansas Geological Survey Bulletin 3, 457 p.

Greenberg, A.E., Clesceri, L.S., and Eaton, A.D., eds., 1992, Standard Methods for the Examination of Water and Wastewater, 18th edition. American Public Health Association, American Water Works Association, Water Environment Federation.

Hem, J.D., 1989, Study and Interpretation of the Chemical Characteristics of Natural Water, Third Edition. United States Geological Survey Water-Supply Paper 2254, 263 p.

Imes, J.L., 1990, Major Geohydrologic Units in and Adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma - Springfield Plateau Aquifer. U.S. Geological Survey Hydrologic Atlas HA-711-G, 3 sheets.

Imes, J.L. and Emmett, L.F., 1994, Geohydrology of the Ozark Plateaus Aquifer System in Parts of Missouri, Arkansas, Oklahoma, and Kansas. U.S. Geological Survey Professional Paper 1414-D, 127 p.

Leidy, V.A., and Morris, E.E., 1990, Hydrogeology and Quality of Ground Water in the Boone Formation and Cotter Dolomite in Karst Terrain of Northwestern Boone County, Arkansas. U.S. Geological Survey Water-Resources Investigations Report 90-4066, 57 p.

Appendix A: Summary of Analytical Data

Table 5 - Springfield Plateau Aquifer - Conventional Parameters

Sample Location	Sample Date	pH	Cond. uS/cm	Total Alkalinity mg/l	Bicarb. Alkalinity mg/l	Carbonate Alkalinity mg/l	CO2 mg/l	HCO3 Bicarb. mg/l	CO3 Carbonate mg/l	TOC mg/l	Fecal Coliform cols./100ml	Total Hardness mg/l	Cl mg/l	NH3-N mg/l	NO3-N mg/l	O-Phos. mg/l	T-Phos. mg/l	SO4 mg/l	TDS mg/l	TSS mg/l
BNE002	12/89	*	*	*	*	*	*	*	*	*	*	*	5	0.05K	1.24	0.030	*	3.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	49	*	6	0.070	1.26	0.04K	*	6.0	*	*
	2/96	7.64	525	250	249	1	230.9	305	0.6	1.21	*	201	7.99	0.104	1.42	0.031	0.03K	9.6	221	1K
BNE003	12/89	*	*	*	*	*	*	*	*	*	*	*	9	0.05K	0.94	0.03K	*	8.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	13	*	7	0.05K	0.67	0.081	*	4.0	*	*
	2/96	6.20	591	209	209	0	447.6	255	0	1.64	*	229	7.57	0.05K	1.51	0.03K	0.03K	11.4	251.5	1K
BNE005	12/89	*	*	*	*	*	*	*	*	*	*	*	7	0.05K	1.10	0.030	*	3.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	>60	*	11	0.113	0.74	0.038	*	2.0	*	*
	2/96	7.64	574	201	200	1	185.7	245.2	0.5	3.14	*	218	8.60	0.051	1.68	0.03K	0.03K	6.5	241	1K
BNE007	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	54	*	*	*	*	*	*	*	*	*
	2/96	7.98	469	167	165.5	1.5	149.7	203.7	0.9	1.64	*	189	14.94	0.05K	1.91	0.03K	0.03K	8.6	228.5	1K
BNE012	12/89	*	*	*	*	*	*	*	*	*	*	*	6	0.05K	4.70	0.03K	*	7.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.13	314	95	93.7	1.2	84.4	115.9	0.7	1.62	*	128	8.49	0.051	8.46	0.03K	0.03K	8.6	178	1K
BNE013	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.01	460	182	181.8	0.2	195.6	222	0.1	4.33	*	179	7.52	0.065	0.03	0.031	0.03K	12.4	210	6
BNE015	12/89	*	*	*	*	*	*	*	*	*	*	*	8	0.05K	6.30	0.03K	*	4.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.08	347	96	94.9	1.1	85.5	117.1	0.6	1.48	*	136	16.65	0.05K	7.88	0.03K	0.03K	5.4	204	12
BNE017	12/89	*	*	*	*	*	*	*	*	*	*	*	8	0.05K	1.00	0.03K	*	3.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.13	260	87	85.8	1.1	77.3	106.1	0.7	1.17	*	98	13.16	0.05K	1.88	0.03K	0.03K	4.2	131	1K
BNE040	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.52	451	185	184.4	0.6	173.7	225.7	0.3	1.12	*	201	4.58	0.052	2.30	0.03K	0.03K	4.2	219.5	1
BNE041	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.74	460	187	186	1	170.9	228.1	0.6	1.04	*	200	6.61	0.052	1.89	0.03K	0.03K	4.2	224.5	1K
BNE043	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.03	219	61	60.3	0.6	54.5	74.4	0.4	1.93	*	69	8.38	0.05K	1.79	0.03K	0.04	1.7	105.5	21

Notes: * indicates no analyses conducted for the sample or no sample obtained on the given date
"K" indicates actual value is less than the given value

Table 6 - Springfield Plateau Aquifer - Total Metals, Cations & Anions

Sample Location	Sample Date	Al ug/l	As ug/l	B ug/l	Ba ug/l	Be ug/l	Ca mg/l	Cd ug/l	Co ug/l	Cr ug/l	Cu ug/l	Fe ug/l	F mg/l	K mg/l	Mg mg/l	Mn ug/l	Na mg/l	Ni ug/l	Pb ug/l	Se ug/l	SiO2 mg/l	V ug/l	Zn ug/l
BNE002	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	4.6	33.7	2K	77.9	0.5K	3K	1K	2K	5.0	0.06	0.79	1.57	2.0K	3.11	5K	2K	5.0K	10.6	5K	2.0K
BNE003	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	44.4	2K	89.0	0.5K	3.19	1K	2K	2.3	0.07	0.92	1.63	2.0K	3.43	5K	2K	5.0K	10.8	5K	2.0K
BNE005	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	39.2	2K	85.2	0.5K	3.39	1K	2K	5.7	0.04	0.98	1.37	2.0K	3.14	5K	2K	5.0K	11.3	5K	2.0K
BNE007	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	35.2	2K	73.1	0.5K	3.95	1K	2K	2.3	0.05	0.96	1.61	2.0K	4.80	5K	2K	5.0K	11.6	5K	2.39
BNE012	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	31.1	2K	47.2	0.5K	4.78	1K	2K	4.7	0.05	1.56	2.55	2.0K	2.97	5K	2K	5.5	11.8	5K	3.08
BNE013	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	19	5.0K	6.1	61.4	2K	67.8	0.5K	5.71	1	2.01	1670	0.07	0.93	2.36	1410	2.95	5K	2K	5.0K	10.0	5K	2.42
BNE015	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	36.8	2K	49.1	0.5K	4.29	1K	2K	1.8K	0.04	1.67	3.25	2.0K	5.96	5K	2K	5.0K	11.1	5K	2.0K
BNE017	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	40.1	2K	35.5	0.5K	3.31	1K	2K	1.8K	0.04	0.97	2.17	2.0K	6.00	5K	2K	5.0K	9.9	5K	2.55
BNE040	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	33.8	0.6	78.4	0.5K	3.01	1K	150	87.6	0.06	0.67	1.39	3.52	2.10	5K	13.9	5.0K	11.9	5K	165
BNE041	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	33.9	2K	77.9	0.5K	4.48	1K	2K	4.8	0.04	0.97	1.28	2.0K	2.57	5K	2K	5.0K	10.1	5K	2.34
BNE043	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	301	5.0K	3K	18.2	2K	25.6	0.5K	4.71	1K	3.71	193	0.03	0.55	1.25	90.3	4.28	5K	5	5.0K	11.1	5K	6.47

Notes: * indicates no analyses conducted for the sample or no sample obtained on the given date
"K" indicates actual value is less than the given value

Table 7 - Ozark Aquifer - Conventional Parameters

Sample Location	Sample Date	pH	Cond. uS/cm	Total Alkalinity mg/l	Bicarb. Alkalinity mg/l	Carbonate Alkalinity mg/l	CO2 mg/l	HCO3 Bicarb. mg/l	CO3 Carbonate mg/l	TOC mg/l	Fecal Coliform cols./100ml	Total Hardness mg/l	Cl mg/l	NH3-N mg/l	NO3-N mg/l	O-Phos. mg/l	T-Phos. mg/l	SO4 mg/l	TDS mg/l	TSS mg/l
BNE020	12/89	*	*	*	*	*	*	*	*	*	*	*	5	0.05K	0.02K	0.03K	*	25.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	1.0K	*	6	0.068	0.210	0.03K	*	22.0	*	*
	2/96	7.25	663	288	287.5	0.5	285.6	351.4	0.3	1.99	*	294	4.65	0.05K	0.410	0.03K	0.03K	18.3	319	1K
BNE023	12/89	*	*	*	*	*	*	*	*	*	*	*	4	0.05K	0.02K	0.03K	*	25.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	4	0.068	0.290	0.03K	*	39.0	*	*
	2/96	7.71	585	169	168.2	0.8	154.9	206.2	0.5	0.91	1.0K	183	3.52	0.05K	0.024	0.03K	0.03K	19.8	188	1K
BNE024	12/89	*	*	*	*	*	*	*	*	*	*	*	4	0.05K	0.120	0.03K	*	19.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	1.0K	*	3	0.05K	0.150	0.03K	*	19.0	*	*
	2/96	7.90	505	229	227.3	1.7	206.5	279.4	1	1.12	*	234	3.83	0.058	0.193	0.03K	0.03K	18.3	245.5	1K
BNE025	12/89	*	*	*	*	*	*	*	*	*	*	*	4	0.05K	0.02K	0.03K	*	46.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.72	634	236	234.8	1.2	216.1	287.9	0.7	1.17	*	284	5.70	0.050	0.336	0.03K	0.03K	42.2	285	1K
BNE028	12/89	*	*	*	*	*	*	*	*	*	*	*	4	0.05K	0.140	0.03K	*	17.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.79	477	192	190.9	1.1	174.6	234.2	0.7	0.77	*	199	4.11	0.075	1.143	0.03K	0.03K	16.6	216	1K
BNE029	12/89	*	*	*	*	*	*	*	*	*	*	*	3	0.05K	0.370	0.03K	*	62.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	1.0K	*	4	0.05K	0.550	0.03K	*	57.0	*	*
	2/96	8.11	557	274	270.7	3.3	243.8	334.3	2	0.95	*	314	2.76	0.05K	0.419	0.03K	0.03K	56.1	332	1K
BNE030	12/89	*	*	*	*	*	*	*	*	*	*	*	3	0.05K	*	*	*	22.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.03	564	281	278.1	2.8	251.2	342.8	1.7	1.09	*	283	2.22	0.05K	0.481	0.03K	0.03K	20.6	292.5	1K
BNE032	12/89	*	*	*	*	*	*	*	*	*	*	*	3	0.05K	0.02K	0.03K	*	42.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	1.0K	*	2	0.05K	0.030	0.03K	*	45.0	*	*
	2/96	7.99	385	138	136.7	1.3	123.6	168.4	0.8	1.08	*	177	1.50	0.05K	0.042	0.03K	0.03K	38.5	183	1K
BNE033	12/89	*	*	*	*	*	*	*	*	*	*	*	4	0.05K	0.080	0.03K	*	14.0	*	*
	12/92	*	*	*	*	*	*	*	*	*	1.0K	*	2	0.05K	0.02K	0.03K	*	29.0	*	*
	2/96	8.01	373	170	168.3	1.6	152.1	207.4	1	0.77	*	175	1.99	0.05K	0.158	0.03K	0.03K	14.1	179.5	1K
BNE036	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.95	374	179	177.5	1.5	160.8	218.4	0.9	1.02	*	176	2.24	0.050	0.02K	0.03K	0.03K	17.5	176	1K
BNE037	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	6.20	656	257	257	0	550.4	313.5	0	0.94	*	268	7.55	0.05K	0.487	0.03K	0.03K	27.4	295	1K
BNE038	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.82	474	199	197.7	1.3	180.5	242.8	0.7	1.26	*	191	2.96	0.200	0.02K	0.03K	0.03K	19.1	209	6.5
BNE039	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	8.12	559	272	268.6	3.3	241.9	331.8	2	0.78	*	274	1.97	0.05K	0.153	0.03K	0.03K	19.1	290	1K
BNE042	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	7.70	600	328	326.4	1.5	301	400.2	0.9	1.98	*	329	3.68	0.05K	1.165	0.03K	0.03K	7.6	319	20

Notes: * indicates no analyses conducted for the sample or no sample obtained on the given date
"K" indicates actual value is less than the given value

Table 8 - Ozark Aquifer - Total Metals, Cations & Anions

Sample Location	Sample Date	Al ug/l	As ug/l	B ug/l	Ba ug/l	Be ug/l	Ca mg/l	Cd ug/l	Co ug/l	Cr ug/l	Cu ug/l	Fe ug/l	F mg/l	K mg/l	Mg mg/l	Mn ug/l	Na mg/l	Ni ug/l	Pb ug/l	Se ug/l	SiO2 mg/l	V ug/l	Zn ug/l
BNE020	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	20.1	31.8	2K	111	0.5K	8.16	1K	12.3	225	0.21	0.67	4.19	15.8	4.60	5K	2K	5.0K	9.3	5K	1100
BNE023	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	19.0	10.7	2K	44.1	0.5K	3.28	1K	10.5	20	0.23	1.13	17.7	2.0K	1.78	5K	4.1	5.0K	9.9	5K	1090
BNE024	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	127.5	10.2	2K	50.6	0.5K	3.52	1K	22.1	17.1	0.65	2.9	26.1	2.0K	6.11	5K	7.9	5.0K	9.1	5K	1420
BNE025	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	21.7	13.7	2K	62.3	0.5K	4.16	1K	2.1	1.8	0.11	1.11	31.3	2.0K	1.85	5K	2K	9	10.9	5K	21
BNE028	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	13.8	170.1	7.5	2K	47.7	0.5K	3.56	1K	7.2	24.6	0.97	2.62	19.5	4.2	5.87	5K	2K	5.0K	9.2	5K	84.3
BNE029	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	61.7	23.7	2K	70.9	0.5K	4.68	1K	7.4	46.2	0.24	2.17	33.2	2.0K	1.39	5K	2K	5.0K	8.9	5K	571
BNE030	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	25.0	4.6	2K	58.9	0.5K	5.05	1K	22	29.8	0.37	2.22	32.9	2.0K	1.83	5K	2K	5.0K	9.1	5K	24.8
BNE032	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	16.3	14.3	2K	38.1	0.5K	3.28	1K	5.5	36.7	0.36	1.48	20	2.0K	0.91	5K	2K	5.0K	9.1	5K	170
BNE033	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3K	9.0	2K	36.6	0.5K	4.22	1K	5.3	1.8K	0.07	0.77	20.2	2.0K	1.51	5K	2.6	5.0K	10.6	5K	429
BNE036	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	6.7	4K	2K	39.2	0.5K	3.61	1K	2K	174	0.13	0.96	18.9	2.4	0.76	5K	8.6	5.0K	9.8	5K	1160
BNE037	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	38.1	22.7	2K	76.4	0.53	3K	1K	8.8	21.1	0.66	0.82	18.7	2.0K	11.1	5K	4.6	5.0K	10.1	5K	2050
BNE038	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	212	43.7	2K	42.9	0.5K	4.14	1K	64.9	1600	1.05	3.36	20.3	8.9	10.2	5K	2K	5.0K	9	5K	705
BNE039	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	16K	5.0K	3.6	33.8	2K	80.6	0.5K	4.31	1K	5.6	6.6	0.07	0.87	17.6	2.0K	1.39	5K	2K	5.0K	12	5K	13.4
BNE042	12/89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12/92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2/96	254.8	5.0K	3K	30.1	2K	65.9	0.5K	4.66	1K	2.1	222	0.07	0.70	39.9	24.5	1.54	5K	2.1	5.0K	13	5K	3.3

Notes: * indicates no analyses conducted for the sample or no sample obtained on the given date
"K" indicates actual value is less than the given value

Table 10 - Semi-Volatile Organic Compound Analyses

Parameter	D.L.	Units	BNE013	Parameter	D.L.	Units	BNE013
Acenapthene	0.0036	ug/l	9.3126	1-2-Diphenylhydrazine	0.00845	ug/l	*
Acenapthylene	0.00443	ug/l	0.68173	Ethyl-dimethyl-benzenes	0.1	ug/l	220
Acetophenone	0.00834	ug/l	0.67366	Flouranthrene	0.00214	ug/l	1.4392
4-Aminobiphenyl	0.00668	ug/l	*	Flourene	0.00428	ug/l	2.5897
Aniline	0.01734	ug/l	*	Hexachlorobenzene	0.00856	ug/l	*
Anthracene	0.00321	ug/l	*	Hexachlorobutadiene	0.00689	ug/l	*
Benzo(a)anthracene	0.00179	ug/l	*	Hexachlorocyclopentadiene	0.02488	ug/l	*
Benzo(b)flouranthene	0.00292	ug/l	*	Hexachloroethane	0.02303	ug/l	*
Benzo(k)flouranthene	0.00242	ug/l	*	Indane	0.1	ug/l	10
Benzo(g-h-i)perylene	0.00391	ug/l	*	Indeno(1-2-3-cd)pyrene	0.00423	ug/l	*
Benzo(a)pyrene	0.0031	ug/l	*	Isophorone	0.00841	ug/l	*
Bis(2-chloroethyl)-ether	0.04232	ug/l	*	3-Methylcholanthrene	0.00389	ug/l	*
Bis(2-chloroethoxy)-methane	0.02164	ug/l	*	2-Methylnapthalene	0.00708	ug/l	*
Bis(2-ethylhexyl) phthalate	0.00449	ug/l	2.1297	2-Methylphenol	0.0157	ug/l	*
4-Bromophenyl-phenyl-ether	0.00243	ug/l	*	4-Methylphenol	0.01076	ug/l	0.12195
Butyl-benzyl-phthalate	0.00685	ug/l	0.55546	Napthalene	0.0044	ug/l	1.0569
4-Chloro-3-methylphenol	0.00909	ug/l	*	1-Napthylamine	0.00766	ug/l	*
1-Chloronapthalene	0.00328	ug/l	*	2-Napthylamine	0.00683	ug/l	*
2-Chloronapthalene	0.00281	ug/l	*	2-Nitroaniline	0.04671	ug/l	*
2-Chlorophenol	0.01349	ug/l	0.1535	3-Nitroaniline	0.01327	ug/l	*
4-Chlorophenyl-phenyl-ether	0.0035	ug/l	*	4-Nitroaniline	0.01536	ug/l	*
Chrysene	0.00181	ug/l	*	Nitrobenzene	0.03596	ug/l	*
Dibenz(a-h)anthracene	0.00326	ug/l	*	2-Nitrophenol	0.0188	ug/l	*
Dibenzo(a-j)acridine	0.00404	ug/l	*	4-Nitrophenol	0.01737	ug/l	*
Dibenzofuran	0.0023	ug/l	3.2407	N-Nitrosodibutylamine	0.05213	ug/l	*
1-2-Dichlorobenzene	0.00768	ug/l	*	N-Nitroso-di-n-propylamine	0.08976	ug/l	*
1-3-Dichlorobenzene	0.00736	ug/l	*	N-Nitrosopiperidine	0.01361	ug/l	*
1-4-Dichlorobenzene	0.00673	ug/l	0.04892	Pentachlorobenzene	0.00754	ug/l	*
3-3'-Dichlorobenzidine	0.00591	ug/l	*	Pentachloronitrobenzene	0.0142	ug/l	*
2-4-Dichlorophenol	0.0084	ug/l	*	Pentachlorophenol	2.3842	ug/l	1446.8
2-6-Dichlorophenol	0.00862	ug/l	*	Phenacetin	0.00661	ug/l	*
Diethyl-phthalate	0.00524	ug/l	*	Phenanthrene	0.0029	ug/l	*
Dihydro-dimethyl-indenes	0.1	ug/l	60	Phenol	0.0971	ug/l	*
Dimethylaminoazobenzene	0.00384	ug/l	*	2-Picoline	0.05809	ug/l	*
Dimethylbenzo(a)anthracene	0.00435	ug/l	*	Pronamide	0.00461	ug/l	*
Dimethyl-Napthalenes	0.1	ug/l	60	Pyrene	0.00264	ug/l	1.5798
2-4-Dimethylphenol	0.00961	ug/l	*	1-2-4-5-Tetrachlorobenzene	0.0059	ug/l	*
Dimethyl-phthalate	0.00387	ug/l	*	2-3-4-6-Tetrachlorophenol	1.1144	ug/l	118.83
Di-n-butyl-phthalate	0.00268	ug/l	0.34037	1-2-4-Trichlorobenzene	0.00588	ug/l	*
Di-n-octyl-phthalate	0.00351	ug/l	*	2-4-5-Trichlorophenol	0.00408	ug/l	1.4584
4-6-Dinitro-2-methylphenol	0.01217	ug/l	*	2-4-6-Trichlorophenol	0.00435	ug/l	*
2-4-Dinitrotoluene	0.01052	ug/l	*	Trimethyl-benzenes	0.1	ug/l	30
2-6-Dinitrotoluene	0.01705	ug/l	*	Trimethyl-napthalenes	0.1	ug/l	180
Diphenylamine	0.0027	ug/l	*				

Note: * indicates constituent not detected for the sample

Table 9 - Volatile Organic Compound Analyses

			Samle Location:									
Parameter	D.L.	Units	BNE002	BNE003	BNE005	BNE007	BNE012	BNE013	BNE015	BNE017	BNE042	BNE043
Acetone	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Benzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Bromobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Bromochloromethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Bromodichloromethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Bromoform	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Bromomethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Carbon Tetrachloride	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Chlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Chloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Chloroform	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Chloromethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
2-Chlorotoluene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
4-Chlorotoluene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Dibromochloromethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2-Dibromo-3-chloropropane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2-Dibromoethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Dibromomethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2-Dichlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,3-Dichlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,4-Dichlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1-Dichloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2-Dichloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1-Dichloroethene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Cis-1,2-Dichloroethene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Trans-1,2-Dichloroethene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2-Dichloropropane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,3-Dichloropropane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
2,2-Dichloropropane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1-Dichloropropene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Cis-1,3-Dichloropropene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Trans-1,3-Dichloropropene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Ethylbenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Hexachlorobutadiene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Isopropylbenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Meta-xylene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Methyl ethyl ketone	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Methylene Chloride	2.00	ug/l	*	2.27	*	*	*	1.09	0.97	*	*	*
N-Butyl benzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
N-Propyl benzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Napthalene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Orthoxylene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
P-Isopropyl toluene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Para-xylene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Sec-butyl benzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Styrene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Tert-butyl benzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1,1,2-Tetrachlorethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1,2,2-Tetrachloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Tetrachloroethene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Toluene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2,3-Trichlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2,4-Trichlorobenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1,1-Trichloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,1,2-Trichloroethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Trichloroethene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Trichloroflouromethane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2,3-Trichloropropane	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,2,4-Trimethylbenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
1,3,5-Trimethylbenzene	2.00	ug/l	*	*	*	*	*	*	*	*	*	*
Vinyl Chloride	2.00	ug/l	*	*	*	*	*	*	*	*	*	*

Notes: * indicates constituent not detected for the sample

Appendix B: Quality Control Checks

Sample Location:	BNE002	Sample Date:	02-13-96

Alkalinity (mg/l)	**250**	
SiO2 (mg/l)	**10.6**	
Measured conductivity (umho/cm)	**525**	
Infinite dilution conductivity (umho/cm)	503.87	
Ionic strength (M)	0.0069	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**424.23**	
Measured TDS	**221**	
Calculated TDS	**263.00**	
Ratio: Meas TDS/Calc TDS	0.84	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.81	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.62	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.42	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**3.11**	**0.79**	**77.9**	**1.57**	**7.99**	**9.6**	**1.42**	**0.06**	**305**
Concentration (meq/L)	0.1353	0.0202	3.8872	0.1292	0.2253	0.1999	0.0229	0.0032	4.9990
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1353	0.0202	1.9436	0.0646	0.2253	0.0999	0.0229	0.0032	4.9990
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	6.78	1.48	231.29	6.86	17.21	15.99	1.64	0.17	222.45
Ionic strength	6.76E-05	1.01E-05	3.89E-03	1.29E-04	1.13E-04	2.00E-04	1.15E-05	1.58E-06	2.50E-03

Cation sum (meq/L)	4.17	
Anion sum (meq/L)	5.45	
% Difference	-13.29	Should be < 2%
Ion Difference	-1.28	
Ratio: Cation sum*(100)/Measured conductivity	0.79	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.04	Should be between 0.9 and 1.1

Sample Location:	BNE003	Sample Date:	02-13-96

Alkalinity (mg/l)	**209**	
SiO2 (mg/l)	**10.8**	
Measured conductivity (umho/cm)	**591**	
Infinite dilution conductivity (umho/cm)	503.79	
Ionic strength (M)	0.0071	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**423.27**	
Measured TDS	**251.5**	
Calculated TDS	**251.71**	
Ratio: Meas TDS/Calc TDS	1.00	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.72	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.43	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**3.43**	**0.92**	**89**	**1.63**	**7.57**	**11.4**	**1.51**	**0.07**	**255**
Concentration (meq/L)	0.1492	0.0236	4.4411	0.1341	0.2135	0.2373	0.0244	0.0037	4.1791
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1492	0.0236	2.2206	0.0671	0.2135	0.1187	0.0244	0.0037	4.1791
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	7.48	1.74	264.25	7.12	16.31	18.99	1.74	0.20	185.97
Ionic strength	7.46E-05	1.18E-05	4.44E-03	1.34E-04	1.07E-04	2.37E-04	1.22E-05	1.84E-06	2.09E-03

Cation sum (meq/L)	4.75	
Anion sum (meq/L)	4.66	
% Difference	0.96	Should be < 2%
Ion Difference	0.09	
Ratio: Cation sum*(100)/Measured conductivity	0.80	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.79	Should be between 0.9 and 1.1

Sample Location:	BNE005	Sample Date:	02-13-96
Alkalinity (mg/l)	**201**		
SiO2 (mg/l)	**11.3**		
Measured conductivity (umho/cm)	**574**		
Infinite dilution conductivity (umho/cm)	477.89		
Ionic strength (M)	0.0067		
Monovalent ion activity coefficient	0.92		
Calculated conductivity (umho/cm)	**403.23**		
Measured TDS	**241**		
Calculated TDS	**239.38**		
Ratio: Meas TDS/Calc TDS	1.01	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.70	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.42	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**3.14**	**0.98**	**85.2**	**1.37**	**8.60**	**6.5**	**1.68**	**0.04**	**245.2**
Concentration (meq/L)	0.1365	0.0251	4.2515	0.1127	0.2425	0.1353	0.0271	0.0021	4.0192
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1365	0.0251	2.1257	0.0564	0.2425	0.0677	0.0271	0.0021	4.0192
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	6.84	1.84	252.96	5.99	18.53	10.83	1.93	0.11	178.85
Ionic strength	6.83E-05	1.25E-05	4.25E-03	1.13E-04	1.21E-04	1.35E-04	1.35E-05	1.05E-06	2.01E-03

Cation sum (meq/L)	4.53	
Anion sum (meq/L)	4.43	
% Difference	1.11	Should be < 2%
Ion Difference	0.10	
Ratio: Cation sum*(100)/Measured conductivity	0.79	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.77	Should be between 0.9 and 1.1

Sample Location:	BNE007	Sample Date:	02-13-96
Alkalinity (mg/l)	**167**		
SiO2 (mg/l)	**11.6**		
Measured conductivity (umho/cm)	**469**		
Infinite dilution conductivity (umho/cm)	433.80		
Ionic strength (M)	0.0060		
Monovalent ion activity coefficient	0.92		
Calculated conductivity (umho/cm)	**369.26**		
Measured TDS	**228.5**		
Calculated TDS	**217.74**		
Ratio: Meas TDS/Calc TDS	1.05	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.79	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.49	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**4.80**	**0.96**	**73.1**	**1.61**	**14.94**	**8.6**	**1.91**	**0.05**	**203.7**
Concentration (meq/L)	0.2087	0.0244	3.6477	0.1325	0.4215	0.1791	0.0308	0.0026	3.3393
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2087	0.0244	1.8238	0.0662	0.4215	0.0895	0.0308	0.0026	3.3393
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	10.46	1.80	217.04	7.03	32.21	14.32	2.20	0.14	148.60
Ionic strength	1.04E-04	1.22E-05	3.65E-03	1.32E-04	2.11E-04	1.79E-04	1.54E-05	1.32E-06	1.67E-03

Cation sum (meq/L)	4.01	
Anion sum (meq/L)	3.97	
% Difference	0.50	Should be < 2%
Ion Difference	0.04	
Ratio: Cation sum*(100)/Measured conductivity	0.86	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.85	Should be between 0.9 and 1.1

Sample Location:	BNE012	Sample Date:	02-14-96

Alkalinity (mg/l)	**95**	
SiO2 (mg/l)	**11.8**	
Measured conductivity (umho/cm)	**314**	
Infinite dilution conductivity (umho/cm)	287.72	
Ionic strength (M)	0.0040	
Monovalent ion activity coefficient	0.94	
Calculated conductivity (umho/cm)	**251.71**	
Measured TDS	**177.5**	
Calculated TDS	**148.67**	
Ratio: Meas TDS/Calc TDS	1.19	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.80	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.57	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**2.97**	**1.56**	**47.2**	**2.55**	**8.49**	**8.6**	**8.46**	**0.05**	**115.9**
Concentration (meq/L)	0.1291	0.0399	2.3553	0.2098	0.2395	0.1791	0.1365	0.0026	1.8996
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1291	0.0399	1.1776	0.1049	0.2395	0.0895	0.1365	0.0026	1.8996
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	6.47	2.93	140.14	11.14	18.30	14.32	9.74	0.14	84.53
Ionic strength	6.46E-05	2.00E-05	2.36E-03	2.10E-04	1.20E-04	1.79E-04	6.82E-05	1.32E-06	9.50E-04

Cation sum (meq/L)	2.73	
Anion sum (meq/L)	2.46	
% Difference	5.33	Should be < 2%
Ion Difference	0.28	
Ratio: Cation sum*(100)/Measured conductivity	0.87	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.78	Should be between 0.9 and 1.1

Sample Location:	BNE013	Sample Date:	02-14-96

Alkalinity (mg/l)	**182**	
SiO2 (mg/l)	**10**	
Measured conductivity (umho/cm)	**460**	
Infinite dilution conductivity (umho/cm)	418.82	
Ionic strength (M)	0.0058	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**357.10**	
Measured TDS	**210**	
Calculated TDS	**213.24**	
Ratio: Meas TDS/Calc TDS	0.98	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.78	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.60	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.46	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**2.948**	**0.929**	**67.8**	**2.36**	**7.517**	**12.4**	**0.034**	**0.07**	**222**
Concentration (meq/L)	0.1282	0.0238	3.3832	0.1942	0.2121	0.2582	0.0005	0.0037	3.6392
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1282	0.0238	1.6916	0.0971	0.2121	0.1291	0.0005	0.0037	3.6392
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	6.42	1.75	201.30	10.31	16.20	20.65	0.04	0.20	161.95
Ionic strength	6.41E-05	1.19E-05	3.38E-03	1.94E-04	1.06E-04	2.58E-04	2.74E-07	1.84E-06	1.82E-03

Cation sum (meq/L)	3.73	
Anion sum (meq/L)	4.11	
% Difference	-4.90	Should be < 2%
Ion Difference	-0.38	
Ratio: Cation sum*(100)/Measured conductivity	0.81	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.89	Should be between 0.9 and 1.1

Sample Location:	BNE015	Sample Date:	02-14-96
Alkalinity (mg/l)	**96**		
SiO2 (mg/l)	**11.1**		
Measured conductivity (umho/cm)	**347**		
Infinite dilution conductivity (umho/cm)	315.58		
Ionic strength (M)	0.0042		
Monovalent ion activity coefficient	0.93		
Calculated conductivity (umho/cm)	**274.95**		
Measured TDS	**204**		
Calculated TDS	**158.63**		
Ratio: Meas TDS/Calc TDS	1.29	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.79	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.59	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**5.96**	**1.67**	**49.1**	**3.25**	**16.65**	**5.4**	**7.88**	**0.04**	**117.1**
Concentration (meq/L)	0.2592	0.0427	2.4501	0.2674	0.4696	0.1124	0.1271	0.0021	1.9196
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2592	0.0427	1.2250	0.1337	0.4696	0.0562	0.1271	0.0021	1.9196
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	12.98	3.14	145.78	14.20	35.87	8.99	9.08	0.11	85.42
Ionic strength	1.30E-04	2.14E-05	2.45E-03	2.67E-04	2.35E-04	1.12E-04	6.36E-05	1.05E-06	9.60E-04

Cation sum (meq/L)	3.02	
Anion sum (meq/L)	2.63	
% Difference	6.88	Should be < 2%
Ion Difference	0.39	
Ratio: Cation sum*(100)/Measured conductivity	0.87	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.76	Should be between 0.9 and 1.1

Sample Location:	BNE017	Sample Date:	02-14-96
Alkalinity (mg/l)	**87**		
SiO2 (mg/l)	**9.9**		
Measured conductivity (umho/cm)	**260**		
Infinite dilution conductivity (umho/cm)	244.84		
Ionic strength (M)	0.0033		
Monovalent ion activity coefficient	0.94		
Calculated conductivity (umho/cm)	**216.72**		
Measured TDS	**131**		
Calculated TDS	**126.01**		
Ratio: Meas TDS/Calc TDS	1.04	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.83	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.50	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**6.0**	**0.97**	**35.5**	**2.17**	**13.16**	**4.2**	**1.88**	**0.04**	**106.1**
Concentration (meq/L)	0.2610	0.0247	1.7715	0.1786	0.3713	0.0874	0.0303	0.0021	1.7396
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2610	0.0247	0.8857	0.0893	0.3713	0.0437	0.0303	0.0021	1.7396
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	13.08	1.82	105.40	9.48	28.37	7.00	2.17	0.11	77.41
Ionic strength	1.31E-04	1.24E-05	1.77E-03	1.79E-04	1.86E-04	8.74E-05	1.52E-05	1.05E-06	8.70E-04

Cation sum (meq/L)	2.24	
Anion sum (meq/L)	2.23	
% Difference	0.11	Should be < 2%
Ion Difference	0.00	
Ratio: Cation sum*(100)/Measured conductivity	0.86	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.86	Should be between 0.9 and 1.1

Sample Location:	BNE040	Sample Date:	02-13-96
Alkalinity (mg/l)	**185**		
SiO2 (mg/l)	**11.9**		
Measured conductivity (umho/cm)	**451**		
Infinite dilution conductivity (umho/cm)	428.98		
Ionic strength (M)	0.0061		
Monovalent ion activity coefficient	0.92		
Calculated conductivity (umho/cm)	**364.59**		
Measured TDS	**219.5**		
Calculated TDS	**216.57**		
Ratio: Meas TDS/Calc TDS	1.01	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.81	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.49	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**2.1**	**0.67**	**78.4**	**1.39**	**4.58**	**4.2**	**2.30**	**0.06**	**225.7**
Concentration (meq/L)	0.0915	0.0170	3.9122	0.1144	0.1291	0.0874	0.0370	0.0032	3.6992
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0915	0.0170	1.9561	0.0572	0.1291	0.0437	0.0370	0.0032	3.6992
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	4.59	1.25	232.77	6.07	9.87	7.00	2.64	0.17	164.62
Ionic strength	4.58E-05	8.51E-06	3.91E-03	1.14E-04	6.46E-05	8.74E-05	1.85E-05	1.58E-06	1.85E-03

Cation sum (meq/L)	4.14	
Anion sum (meq/L)	3.96	
% Difference	2.21	Should be < 2%
Ion Difference	0.18	
Ratio: Cation sum*(100)/Measured conductivity	0.92	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.88	Should be between 0.9 and 1.1

Sample Location:	BNE041	Sample Date:	02-13-96
Alkalinity (mg/l)	**187**		
SiO2 (mg/l)	**10.1**		
Measured conductivity (umho/cm)	**460**		
Infinite dilution conductivity (umho/cm)	434.22		
Ionic strength (M)	0.0061		
Monovalent ion activity coefficient	0.92		
Calculated conductivity (umho/cm)	**368.94**		
Measured TDS	**224.5**		
Calculated TDS	**217.73**		
Ratio: Meas TDS/Calc TDS	1.03	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.80	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.49	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**2.57**	**0.97**	**77.9**	**1.28**	**6.61**	**4.2**	**1.89**	**0.04**	**228.1**
Concentration (meq/L)	0.1116	0.0249	3.8872	0.1053	0.1864	0.0874	0.0305	0.0021	3.7392
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.1116	0.0249	1.9436	0.0527	0.1864	0.0437	0.0305	0.0021	3.7392
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	5.59	1.83	231.29	5.59	14.24	7.00	2.17	0.11	166.40
Ionic strength	5.58E-05	1.24E-05	3.89E-03	1.05E-04	9.32E-05	8.74E-05	1.52E-05	1.05E-06	1.87E-03

Cation sum (meq/L)	4.13	
Anion sum (meq/L)	4.05	
% Difference	1.02	Should be < 2%
Ion Difference	0.08	
Ratio: Cation sum*(100)/Measured conductivity	0.90	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.88	Should be between 0.9 and 1.1

Sample Location:	BNE043	Sample Date:	02-14-96

Alkalinity (mg/l)	**61**	
SiO2 (mg/l)	**11.1**	
Measured conductivity (umho/cm)	**219**	
Infinite dilution conductivity (umho/cm)	169.14	
Ionic strength (M)	0.0023	
Monovalent ion activity coefficient	0.95	
Calculated conductivity (umho/cm)	**152.60**	
Measured TDS	**105.5**	
Calculated TDS	**91.26**	
Ratio: Meas TDS/Calc TDS	1.16	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.70	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.60	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.48	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**4.28**	**0.55**	**25.6**	**1.25**	**8.38**	**1.7**	**1.79**	**0.03**	**74.4**
Concentration (meq/L)	0.18605	0.013941	1.27744	0.102863	0.236513	0.035394	0.028792	0.001579	1.219744
Molecular weight (mg/mM)	22.9898	39.0983	40.078	24.305	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.18605	0.013941	0.63872	0.051425	0.236513	0.017697	0.028792	0.001579	1.219744
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	9.32	1.02	76.01	5.46	18.07	2.83	2.06	0.09	54.28
Ionic strength	9.30E-05	6.97E-06	1.28E-03	1.03E-04	1.18E-04	3.54E-05	1.44E-05	7.90E-07	6.10E-04

Cation sum (meq/L)	1.58	
Anion sum (meq/L)	1.52	
% Difference	1.88	Should be < 2%
Ion Difference	0.06	
Ratio: Cation sum*(100)/Measured conductivity	0.72	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.69	Should be between 0.9 and 1.1

Sample Location:	BNE020	Sample Date:	02-13-96

Alkalinity (mg/l)	**288**	
SiO2 (mg/l)	**9.3**	
Measured conductivity (umho/cm)	**663**	
Infinite dilution conductivity (umho/cm)	656.99	
Ionic strength (M)	0.0093	
Monovalent ion activity coefficient	0.91	
Calculated conductivity (umho/cm)	**539.87**	
Measured TDS	**319**	
Calculated TDS	**326.09**	
Ratio: Meas TDS/Calc TDS	0.98	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.81	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.60	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.48	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**4.60**	**0.67**	**111**	**4.19**	**4.65**	**18.3**	**0.41**	**0.21**	**351.4**
Concentration (meq/L)	0.2000	0.0171	5.5389	0.3448	0.1312	0.3810	0.0066	0.0111	5.7588
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2000	0.0171	2.7695	0.1724	0.1312	0.1905	0.0066	0.0111	5.7588
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	10.02	1.26	329.56	18.31	10.03	30.48	0.47	0.60	256.27
Ionic strength	1.00E-04	8.54E-06	5.54E-03	3.45E-04	6.56E-05	3.81E-04	3.31E-06	5.53E-06	2.88E-03

Cation sum (meq/L)	6.10	
Anion sum (meq/L)	6.29	
% Difference	-1.52	Should be < 5%
Ion Difference	-0.19	
Ratio: Cation sum*(100)/Measured conductivity	0.92	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.95	Should be between 0.9 and 1.1

Sample Location:	BNE023	Sample Date:	02-13-96

Alkalinity (mg/l)	**169**	
SiO2 (mg/l)	**9.9**	
Measured conductivity (umho/cm)	**585**	
Infinite dilution conductivity (umho/cm)	405.90	
Ionic strength (M)	0.0059	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**345.96**	
Measured TDS	**188**	
Calculated TDS	**199.56**	
Ratio: Meas TDS/Calc TDS	0.94	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.59	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.32	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**1.78**	**1.13**	**44.1**	**17.7**	**3.52**	**19.8**	**0.024**	**0.23**	**206.2**
Concentration (meq/L)	0.0774	0.0289	2.2006	1.4565	0.0993	0.4122	0.0004	0.0121	3.3793
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0774	0.0289	1.1003	0.7282	0.0993	0.2061	0.0004	0.0121	3.3793
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	3.88	2.12	130.94	77.33	7.58	32.98	0.03	0.66	150.38
Ionic strength	3.87E-05	1.45E-05	2.20E-03	1.46E-03	4.96E-05	4.12E-04	1.94E-07	6.05E-06	1.69E-03

Cation sum (meq/L)	3.76	
Anion sum (meq/L)	3.90	
% Difference	-1.82	Should be < 2%
Ion Difference	-0.14	
Ratio: Cation sum*(100)/Measured conductivity	0.64	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.67	Should be between 0.9 and 1.1

Sample Location:	BNE024	Sample Date:	02-13-96

Alkalinity (mg/l)	**229**	
SiO2 (mg/l)	**9.1**	
Measured conductivity (umho/cm)	**505**	
Infinite dilution conductivity (umho/cm)	527.62	
Ionic strength (M)	0.0076	
Monovalent ion activity coefficient	0.91	
Calculated conductivity (umho/cm)	**441.04**	
Measured TDS	**245.5**	
Calculated TDS	**255.15**	
Ratio: Meas TDS/Calc TDS	0.96	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.87	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.49	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**6.11**	**2.9**	**50.6**	**26.1**	**3.83**	**18.3**	**0.193**	**0.65**	**279.4**
Concentration (meq/L)	0.2657	0.0742	2.5249	2.1478	0.1080	0.3810	0.0031	0.0342	4.5790
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2657	0.0742	1.2625	1.0738	0.1080	0.1905	0.0031	0.0342	4.5790
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	13.31	5.45	150.23	114.03	8.25	30.48	0.22	1.86	203.77
Ionic strength	1.33E-04	3.71E-05	2.52E-03	2.15E-03	5.40E-05	3.81E-04	1.56E-06	1.71E-05	2.29E-03

Cation sum (meq/L)	5.01	
Anion sum (meq/L)	5.11	
% Difference	-0.92	Should be < 5%
Ion Difference	-0.09	
Ratio: Cation sum*(100)/Measured conductivity	0.99	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.01	Should be between 0.9 and 1.1

Sample Location:	BNE025	Sample Date:	02-13-96

Alkalinity (mg/l)	**236**	
SiO2 (mg/l)	**10.9**	
Measured conductivity (umho/cm)	**634**	
Infinite dilution conductivity (umho/cm)	621.09	
Ionic strength (M)	0.0091	
Monovalent ion activity coefficient	0.91	
Calculated conductivity (umho/cm)	**511.63**	
Measured TDS	**285**	
Calculated TDS	**297.37**	
Ratio: Meas TDS/Calc TDS	0.96	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.81	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.45	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**1.85**	**1.11**	**62.3**	**31.3**	**5.70**	**42.2**	**0.34**	**0.11**	**287.9**
Concentration (meq/L)	0.0803	0.0284	3.1088	2.5757	0.1607	0.8786	0.0054	0.0058	4.7190
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0803	0.0284	1.5544	1.2877	0.1607	0.4393	0.0054	0.0058	4.7190
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	4.02	2.09	184.97	136.75	12.27	70.29	0.39	0.31	210.00
Ionic strength	4.02E-05	1.42E-05	3.11E-03	2.58E-03	8.03E-05	8.79E-04	2.71E-06	2.90E-06	2.36E-03

Cation sum (meq/L)	5.79	
Anion sum (meq/L)	5.77	
% Difference	0.20	Should be < 5%
Ion Difference	0.02	
Ratio: Cation sum*(100)/Measured conductivity	0.91	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.91	Should be between 0.9 and 1.1

Sample Location:	BNE028	Sample Date:	02-13-96

Alkalinity (mg/l)	**192**	
SiO2 (mg/l)	**9.2**	
Measured conductivity (umho/cm)	**477**	
Infinite dilution conductivity (umho/cm)	455.97	
Ionic strength (M)	0.0065	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**385.71**	
Measured TDS	**216**	
Calculated TDS	**222.88**	
Ratio: Meas TDS/Calc TDS	0.97	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.81	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.45	Should be between 0.55 and 0.7

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**5.87**	**2.62**	**47.7**	**19.5**	**4.11**	**16.6**	**1.14**	**0.97**	**234.2**
Concentration (meq/L)	0.2551	0.0670	2.3802	1.6047	0.1159	0.3456	0.0184	0.0511	3.8392
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.2551	0.0670	1.1901	0.8022	0.1159	0.1728	0.0184	0.0511	3.8392
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	12.78	4.93	141.62	85.20	8.86	27.65	1.32	2.78	170.84
Ionic strength	1.28E-04	3.35E-05	2.38E-03	1.60E-03	5.80E-05	3.46E-04	9.22E-06	2.55E-05	1.92E-03

Cation sum (meq/L)	4.31	
Anion sum (meq/L)	4.37	
% Difference	-0.73	Should be < 2%
Ion Difference	-0.06	
Ratio: Cation sum*(100)/Measured conductivity	0.90	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.92	Should be between 0.9 and 1.1

Sample Location:	BNE029	Sample Date:	02-14-96

Alkalinity (mg/l)	**274**	
SiO2 (mg/l)	**8.9**	
Measured conductivity (umho/cm)	**557**	
Infinite dilution conductivity (umho/cm)	707.04	
Ionic strength (M)	0.0103	
Monovalent ion activity coefficient	0.90	
Calculated conductivity (umho/cm)	**576.05**	
Measured TDS	**332**	
Calculated TDS	**340.45**	
Ratio: Meas TDS/Calc TDS	0.98	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	1.03	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.60	Should be between 0.55 and 0.7

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**1.39**	**2.17**	**70.9**	**33.2**	**2.76**	**56.1**	**0.42**	**0.24**	**334.3**
Concentration (meq/L)	0.0606	0.0555	3.5379	2.7320	0.0779	1.1680	0.0068	0.0126	5.4788
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0606	0.0555	1.7690	1.3658	0.0779	0.5840	0.0068	0.0126	5.4788
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	3.03	4.08	210.51	145.05	5.95	93.44	0.48	0.69	243.81
Ionic strength	3.03E-05	2.78E-05	3.54E-03	2.73E-03	3.89E-05	1.17E-03	3.38E-06	6.32E-06	2.74E-03

Cation sum (meq/L)	6.39	
Anion sum (meq/L)	6.74	
% Difference	-2.73	Should be < 5%
Ion Difference	-0.36	
Ratio: Cation sum*(100)/Measured conductivity	1.15	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.21	Should be between 0.9 and 1.1

Sample Location:	BNE030	Sample Date:	02-14-96
Alkalinity (mg/l)	**281**		
SiO2 (mg/l)	**9.1**		
Measured conductivity (umho/cm)	**564**		
Infinite dilution conductivity (umho/cm)	617.53		
Ionic strength (M)	0.0090		
Monovalent ion activity coefficient	0.91		
Calculated conductivity (umho/cm)	**509.00**		
Measured TDS	**292.5**		
Calculated TDS	**297.19**		
Ratio: Meas TDS/Calc TDS	0.98	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.90	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.52	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**1.83**	**2.22**	**58.9**	**32.9**	**2.22**	**20.6**	**0.48**	**0.37**	**342.8**
Concentration (meq/L)	0.0798	0.0568	2.9391	2.7073	0.0626	0.4289	0.0078	0.0195	5.6188
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0798	0.0568	1.4696	1.3535	0.0626	0.2144	0.0078	0.0195	5.6188
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	4.00	4.17	174.88	143.74	4.78	34.31	0.55	1.06	250.04
Ionic strength	3.99E-05	2.84E-05	2.94E-03	2.71E-03	3.13E-05	4.29E-04	3.88E-06	9.74E-06	2.81E-03

Cation sum (meq/L)	5.78	
Anion sum (meq/L)	6.14	
% Difference	-2.97	Should be < 5%
Ion Difference	-0.35	
Ratio: Cation sum*(100)/Measured conductivity	1.03	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.09	Should be between 0.9 and 1.1

Sample Location:	BNE032	Sample Date:	02-13-96
Alkalinity (mg/l)	**138**		
SiO2 (mg/l)	**9.1**		
Measured conductivity (umho/cm)	**385**		
Infinite dilution conductivity (umho/cm)	396.50		
Ionic strength (M)	0.0058		
Monovalent ion activity coefficient	0.92		
Calculated conductivity (umho/cm)	**338.25**		
Measured TDS	**183**		
Calculated TDS	**192.78**		
Ratio: Meas TDS/Calc TDS	0.95	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.88	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.57	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.48	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**0.91**	**1.48**	**38.1**	**20**	**1.50**	**38.5**	**0.042**	**0.36**	**168.4**
Concentration (meq/L)	0.0395	0.0379	1.9012	1.6458	0.0424	0.8016	0.0007	0.0190	2.7594
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0395	0.0379	0.9506	0.8228	0.0424	0.4008	0.0007	0.0190	2.7594
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	1.98	2.78	113.12	87.38	3.24	64.13	0.05	1.03	122.79
Ionic strength	1.98E-05	1.89E-05	1.90E-03	1.65E-03	2.12E-05	8.02E-04	3.39E-07	9.48E-06	1.38E-03

Cation sum (meq/L)	3.62	
Anion sum (meq/L)	3.62	
% Difference	0.02	Should be < 2%
Ion Difference	0.00	
Ratio: Cation sum*(100)/Measured conductivity	0.94	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.94	Should be between 0.9 and 1.1

Sample Location:	BNE033	Sample Date:	02-14-96

Alkalinity (mg/l)	**170**	
SiO2 (mg/l)	**10.6**	
Measured conductivity (umho/cm)	**373**	
Infinite dilution conductivity (umho/cm)	381.06	
Ionic strength (M)	0.0056	
Monovalent ion activity coefficient	0.93	
Calculated conductivity (umho/cm)	**326.06**	
Measured TDS	**179.5**	
Calculated TDS	**187.96**	
Ratio: Meas TDS/Calc TDS	0.95	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.87	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.48	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**1.505**	**0.768**	**36.6**	**20.2**	**1.985**	**14.1**	**0.158**	**0.07**	**207.4**
Concentration (meq/L)	0.0655	0.0196	1.8263	1.6623	0.0560	0.2936	0.0025	0.0037	3.3993
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0655	0.0196	0.9132	0.8310	0.0560	0.1468	0.0025	0.0037	3.3993
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	3.28	1.44	108.67	88.26	4.28	23.48	0.18	0.20	151.27
Ionic strength	3.27E-05	9.82E-06	1.83E-03	1.66E-03	2.80E-05	2.94E-04	1.27E-06	1.84E-06	1.70E-03

Cation sum (meq/L)	3.57	
Anion sum (meq/L)	3.76	
% Difference	-2.47	Should be < 2%
Ion Difference	-0.18	
Ratio: Cation sum*(100)/Measured conductivity	0.96	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.01	Should be between 0.9 and 1.1

Sample Location:	BNE036	Sample Date:	02-14-96

Alkalinity (mg/l)	**179**	
SiO2 (mg/l)	**9.8**	
Measured conductivity (umho/cm)	**374**	
Infinite dilution conductivity (umho/cm)	396.07	
Ionic strength (M)	0.0057	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**338.16**	
Measured TDS	**176**	
Calculated TDS	**196.89**	
Ratio: Meas TDS/Calc TDS	0.89	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.90	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.47	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**0.76**	**0.96**	**39.2**	**18.9**	**2.24**	**17.5**	**0.02**	**0.13**	**218.4**
Concentration (meq/L)	0.0330	0.0246	1.9561	1.5553	0.0631	0.3644	0.0003	0.0068	3.5792
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0330	0.0246	0.9780	0.7775	0.0631	0.1822	0.0003	0.0068	3.5792
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	1.65	1.81	116.39	82.58	4.82	29.15	0.02	0.37	159.28
Ionic strength	1.65E-05	1.23E-05	1.96E-03	1.56E-03	3.16E-05	3.64E-04	1.61E-07	3.42E-06	1.79E-03

Cation sum (meq/L)	3.57	
Anion sum (meq/L)	4.01	
% Difference	-5.87	Should be < 2%
Ion Difference	-0.44	
Ratio: Cation sum*(100)/Measured conductivity	0.95	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.07	Should be between 0.9 and 1.1

Sample Location:	BNE037	Sample Date:	02-13-96

Alkalinity (mg/l)	**257**	
SiO2 (mg/l)	**10.1**	
Measured conductivity (umho/cm)	**656**	
Infinite dilution conductivity (umho/cm)	627.25	
Ionic strength (M)	0.0089	
Monovalent ion activity coefficient	0.91	
Calculated conductivity (umho/cm)	**517.64**	
Measured TDS	**295**	
Calculated TDS	**307.36**	
Ratio: Meas TDS/Calc TDS	0.96	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.79	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.45	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**11.07**	**0.82**	**76.4**	**18.7**	**7.55**	**27.4**	**0.49**	**0.66**	**313.5**
Concentration (meq/L)	0.4815	0.0210	3.8124	1.5388	0.2130	0.5705	0.0079	0.0347	5.1389
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.4815	0.0210	1.9062	0.7693	0.2130	0.2852	0.0079	0.0347	5.1389
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	24.13	1.55	226.84	81.70	16.28	45.64	0.56	1.89	228.68
Ionic strength	2.41E-04	1.05E-05	3.81E-03	1.54E-03	1.07E-04	5.70E-04	3.93E-06	1.74E-05	2.57E-03

Cation sum (meq/L)	5.85	
Anion sum (meq/L)	5.97	
% Difference	-0.94	Should be < 5%
Ion Difference	-0.11	
Ratio: Cation sum*(100)/Measured conductivity	0.89	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.91	Should be between 0.9 and 1.1

Sample Location:	BNE038	Sample Date:	02-13-96

Alkalinity (mg/l)	**199**	
SiO2 (mg/l)	**9**	
Measured conductivity (umho/cm)	**474**	
Infinite dilution conductivity (umho/cm)	462.90	
Ionic strength (M)	0.0065	
Monovalent ion activity coefficient	0.92	
Calculated conductivity (umho/cm)	**391.44**	
Measured TDS	**209**	
Calculated TDS	**228.26**	
Ratio: Meas TDS/Calc TDS	0.92	Should be between 0.9 and 1.1
Ratio: Calc cond/Meas cond	0.83	Should be between 0.9 and 1.1
Ratio: Calc TDS/Calc cond	0.58	Should be between 0.55 and 0.7
Ratio: Meas TDS/Meas cond	0.44	Should be between 0.55 and 0.7

	Constituent:								
	Na	**K**	**Ca**	**Mg**	**Cl**	**SO4**	**NO3**	**F**	**HCO3**
Concentration (mg/L)	**10.2**	**3.36**	**42.9**	**20.3**	**2.959**	**19.1**	**0.02**	**1.05**	**242.8**
Concentration (meq/L)	0.4437	0.0859	2.1407	1.6705	0.0835	0.3977	0.0003	0.0553	3.9792
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.4437	0.0859	1.0704	0.8351	0.0835	0.1988	0.0003	0.0553	3.9792
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	22.23	6.32	127.37	88.69	6.38	31.81	0.02	3.01	177.07
Ionic strength	2.22E-04	4.30E-05	2.14E-03	1.67E-03	4.17E-05	3.98E-04	1.61E-07	2.76E-05	1.99E-03

Cation sum (meq/L)	4.34	
Anion sum (meq/L)	4.52	
% Difference	-1.98	Should be < 2%
Ion Difference	-0.18	
Ratio: Cation sum*(100)/Measured conductivity	0.92	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	0.95	Should be between 0.9 and 1.1

Sample Location:	BNE039	Sample Date:	02-14-96
Alkalinity (mg/l)	**272**		
SiO2 (mg/l)	**12**		
Measured conductivity (umho/cm)	**559**		
Infinite dilution conductivity (umho/cm)	599.32		
Ionic strength (M)	0.0087		
Monovalent ion activity coefficient	0.91		
Calculated conductivity (umho/cm)	**495.59**		
Measured TDS	**290**		
Calculated TDS	**296.91**		
Ratio: Meas TDS/Calc TDS	0.98	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.89	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.60	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.52	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**1.39**	**0.87**	**80.6**	**17.6**	**1.97**	**19.1**	**0.15**	**0.07**	**331.8**
Concentration (meq/L)	0.0606	0.0222	4.0219	1.4483	0.0554	0.3977	0.0025	0.0037	5.4389
Molecular weight (mg/mM)	22.9898	39.0983	40.0780	24.3050	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.0606	0.0222	2.0110	0.7241	0.0554	0.1988	0.0025	0.0037	5.4389
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	3.04	1.63	239.31	76.90	4.24	31.81	0.18	0.20	242.03
Ionic strength	3.03E-05	1.11E-05	4.02E-03	1.45E-03	2.77E-05	3.98E-04	1.23E-06	1.84E-06	2.72E-03

Cation sum (meq/L)	5.55	
Anion sum (meq/L)	5.90	
% Difference	-3.01	Should be < 5%
Ion Difference	-0.35	
Ratio: Cation sum*(100)/Measured conductivity	0.99	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.06	Should be between 0.9 and 1.1

Sample Location:	BNE042	Sample Date:	02-14-96
Alkalinity (mg/l)	**328**		
SiO2 (mg/l)	**13**		
Measured conductivity (umho/cm)	**600**		
Infinite dilution conductivity (umho/cm)	688.64		
Ionic strength (M)	0.0101		
Monovalent ion activity coefficient	0.90		
Calculated conductivity (umho/cm)	**561.88**		
Measured TDS	**319**		
Calculated TDS	**330.31**		
Ratio: Meas TDS/Calc TDS	0.97	Should be between 0.9 and 1.1	
Ratio: Calc cond/Meas cond	0.94	Should be between 0.9 and 1.1	
Ratio: Calc TDS/Calc cond	0.59	Should be between 0.55 and 0.7	
Ratio: Meas TDS/Meas cond	0.53	Should be between 0.55 and 0.7	

Constituent:	Na	K	Ca	Mg	Cl	SO4	NO3	F	HCO3
Concentration (mg/L)	**1.54**	**0.70**	**65.9**	**39.9**	**3.68**	**7.6**	**1.17**	**0.07**	**400.16**
Concentration (meq/L)	0.06686	0.017983	3.28841	3.283371	0.103728	0.158232	0.018791	0.003685	6.558622
Molecular weight (mg/mM)	22.9898	39.0983	40.078	24.305	35.4527	96.0636	62.0049	18.9984	61.0171
Concentration (mM)	0.06686	0.017983	1.644205	1.641486	0.103728	0.079116	0.018791	0.003685	6.558622
Charge z (absolute value)	1	1	2	2	1	2	1	1	1
Equivalent conductivity (mho-cm^2/equivalent)	50.1	73.5	59.5	53.1	76.4	80	71.4	54.4	44.5
Infinite dilution conductivity (umho/cm)	3.35	1.32	195.66	174.33	7.92	12.66	1.34	0.20	291.86
Ionic strength	3.34E-05	8.99E-06	3.29E-03	3.28E-03	5.19E-05	1.58E-04	9.40E-06	1.84E-06	3.28E-03

Cation sum (meq/L)	6.66	
Anion sum (meq/L)	6.84	
% Difference	-1.38	Should be < 5%
Ion Difference	-0.19	
Ratio: Cation sum*(100)/Measured conductivity	1.11	Should be between 0.9 and 1.1
Ratio: Anion sum*(100)/Measured conductivity	1.14	Should be between 0.9 and 1.1