Geophysical, Hydrogeologic, and Water-Quality Data for Areas Tributary to Lake Tahoe in Douglas County and Carson City, Nevada, Through 1987

By Carl E. Thodal

U.S. GEOLOGICAL SURVEY

Open-File Report 89-263

Prepared in cooperation with
DOUGLAS COUNTY and the
CARSON CITY PUBLIC WORKS DEPARTMENT

Carson City, Nevada
1992

U.S. DEPARTMENT OF THE INTERIOR

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
acre	0.4047	square hectometer
foot	0.3048	meter
inch	25.40	millimeter
inch per second	2.54	centimeter per second
mile	1.609	kilometer

For temperature, degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by using the formula °F=1.8(°C)+32.

SEA LEVEL

In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929, formerly called "Sea-Level Datum of 1929"), which is derived from a general adjustment of the first-order leveling networks of both the United States and Canada.

GEOPHYSICAL, HYDROGEOLOGIC, AND WATER-QUALITY DATA FOR AREAS TRIBUTARY TO LAKE TAHOE IN DOUGLAS COUNTY AND CARSON CITY, NEVADA, THROUGH 1987

By Carl E. Thodal

ABSTRACT

This report presents data collected as part of an investigation to delineate ground-water systems and to characterize the ground-water quality in the southeast part of the Lake Tahoe basin in Nevada. The data include: (1) Bouguer-gravity values from 31 gravity stations; (2) 59 well-drillers' reports, including water-level data; (3) information regarding U.S. Geological Survey hydrologic-data sites and 16 wells having historical water-quality analyses, including water levels measured in wells and discharge measurements of streams and springs; (4) particle-size distributions for 30 augered samples of unconsolidated sediment from 20 well bores; (5) 22 results of previous analyses of water from 16 wells; and (6) results of additional analyses to determine the physical properties, major dissolved chemical constituents, dissolved iron, total and dissolved species of nitrogen and phosphorus, total or dissolved organic carbon, and selected naturally occurring radionuclides for water samples collected during this study from 30 wells, 9 streams, and 3 springs.

Maximum and median dissolved-nutrient concentrations in the 48 water samples collected from 42 sites during 1986-87 are: nitrate-nitrogen, 8.2 and 0.028 milligrams per liter (mg/L); nitrite-nitrogen, 0.58 and 0.003 mg/L; ammonia nitrogen, 0.89 and 0.03 mg/L; organic nitrogen, 1.5 and 0.36 mg/L; phosphorus, 0.065 and 0.014 mg/L; orthophosphate, 0.049 and 0.007 mg/L; and iron, 22 and 0.066 mg/L.

INTRODUCTION

The water of Lake Tahoe is noted for its exceptional clarity. Water-quality studies during the past two decades suggest that this clarity has been decreasing as a result of increased phytoplankton productivity. This increase has been attributed to an increase in nutrient loads, especially nitrogen, to the lake. The elevated nutrient loading is considered to be a direct result of increased development in the basin tributary to the lake over the same period. Continued commercial and residential development in the Lake Tahoe basin may lead to long-term degradation of local ground-water resources, contribute to an increase in nutrient inflow to the lake, and result in the continued degradation in lake clarity (Goldman, 1974, 1981).

Purpose and Scope

The U.S. Geological Survey, in cooperation with Douglas County and the Carson City Public Works Department, initiated a reconnaissance investigation of ground water and ground-water quality in the Lake Tahoe basin in 1985. The objective of the investigation was to compile existing geophysical, hydrogeologic, and water-quality data into a data base and to collect additional data to describe the hydrogeologic setting and ground-water quality characteristics, particularly species of nitrogen and phosphorus and dissolved iron, in the Douglas County and Carson City parts of the Lake Tahoe basin. The purpose of this report is to present the geophysical, hydrogeologic, and water-quality data gathered during the investigation.

The data include: (1) Bouguer gravity values measured at 31 gravity stations; (2) 59 well-drillers' reports, including water-level data; (3) information regarding Geological Survey hydrologic-data sites and 16 wells having historical water-quality analyses, including water levels measured in wells and discharge measurements of streams and springs; (4) particle-size distributions for 30 augered samples of unconsolidated sediment from 20 well bores; (5) results of 22 previous analyses of water from 16 wells; and (6) results of additional analyses to determine the physical properties, major dissolved chemical constituents, dissolved iron, total and dissolved species of nitrogen and phosphorus, total or dissolved organic carbon, and selected, naturally occurring radionuclides for water samples, collected for this study in 1986 and 1987, from 30 wells, 9 streams, and 3 springs.

The information presented in this report may be used to (1) characterize ground-water flow systems and their potential interaction with the lake, (2) assess the affects of land-use activities on ground-water quality, and (3) identify additional data that will be necessary to assess the significance of ground water to the nutrient and hydrologic budgets of Lake Tahoe.

Description of Study Area

Douglas County and Carson City, Nev., occupy a combined area of about 29,360 acres in the east-southeast part of the Lake Tahoe basin (fig. 1; Matthews and others, 1971, p. 2). Within this area, the strongly dissected west slopes of the Carson Range reach a maximum altitude of 9,591 feet above sea level at East Peak and slope steeply past the lake shore (altitude, about 6,225 feet) to lake bottom, much of which lies at about 4,700 feet. The 13 tributaries that drain this area represent about 9 percent of the Lake Tahoe basin drainage area (Jorgensen and others, 1978, table 1). Precipitation occurs predominantly during winter storms, usually accumulating as snowpack at altitudes above 7,000 feet. Average annual precipitation at Glenbrook, Nev., (altitude 6,350 feet) for the 30-year period 1951-80 is 18.5 inches (Garcia, 1988, p. 9).

The vegetation in the area is predominantly coniferous forest, much of which has grown since the end of extensive logging in the late 1800's. Reforestation progressed relatively undisturbed until the 1950's, when interest in residential and recreational facilities expanded. Residential and seasonal communities have developed in the vicinity of, from south to north, Edgewood, Tahoe Village, Kingsbury, Elk Point, Round Hill, Zephyr Cove, Skyland, Lakeridge, Lincoln Park, and Glenbrook. Additional land uses include a ski area, two golf courses, various resorts and casinos, U.S. Highway 50, Nevada Highways 28 and 207, a State Park, and Federal forests.

According to Grose (1985, 1986) and Bonham and Burnett (1976), this area is dominated by intrusive igneous rock, primarily granodiorite. However, Grose (1985) describes the area east of Glenbrook Bay as a volcanic rock area, consisting primarily of porphyritic latite, hornblende trachyte, metamorphosed tuff and flows, and areas of oxidation, argillization, and propylitization. Beach sand has accumulated to estimated thicknesses as great as 80 feet along sheltered stretches of shoreline. Alluvium and colluvium, estimated to be as much as 30-80 feet thick, are found locally in low-relief areas.

Ground water typically is in aquifers composed of sedimentary deposits and bedrock. Aquifers in the study area are primarily unconsolidated sedimentary materials that have been deposited by alluvial, colluvial, and lacustrine processes, or that have accumulated by on-site weathering of the parent bedrock. Unweathered bedrock is considered to be relatively impervious to water, acting as a boundary to ground-water flow. Subsurface conveyance of water is not only in ground-water aquifers, however. Infiltrated precipitation may also move through the veneer of soil and decomposed rock that overlies the aquifers (Harrill, 1977).

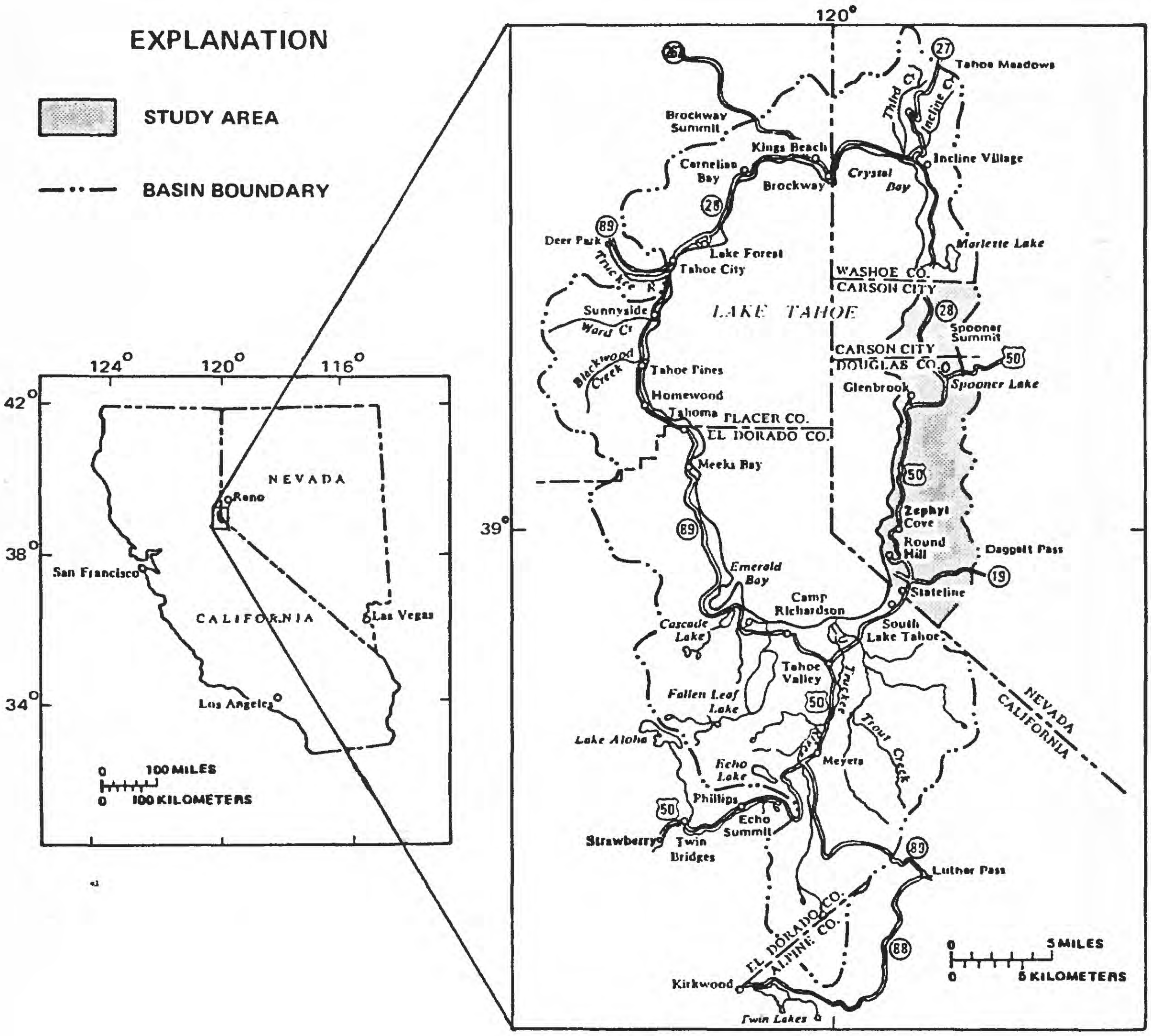


FIGURE 1.--*Location of study area.*

U.S. Geological Survey Site Designations

Standard Identification System

Sites are identified by the standard Geological Survey identification (ID). All site ID's except that of site 38 (table 5) are based on the grid system of latitude and longitude. The ID indicates the geographic location of each site, and provides a unique number for each. The ID consists of 15 digits: The first 6 denote the degrees, minutes, and seconds of latitude; the next 7 denote degrees, minutes, and seconds of longitude; and the last two digits (assigned sequentially) identify the site within a 1-second grid. For example, site 385742119564201 is at 38°57'42" latitude and 119°56'42" longitude, and it is the first site recorded in that 1-second grid. The assigned number is retained permanently even if more precise latitude and longitude are later determined. Because site 38 (table 5) is a U.S. Geological Survey streamflow gaging station, it has a standard eight-digit station number that is derived from downstream order position rather than from latitude and longitude.

Local Identification System

The local site-identification system used in this report is based on an index of hydrographic areas in Nevada (Rush, 1968) and the rectangular subdivision of the public lands referenced to the Mount Diablo base line and meridian. Each site designation consists of four units separated by spaces: The first unit is the hydrographic area number. The second unit is the township, preceded by an N or S to indicate location north or south of the base line. The third unit is the range, preceded by an E to indicate location east of the meridian. The fourth unit consists of the section number and letters designating the quarter section, quarter-quarter section, and the quarter-quarter-quarter section, (A, B, C, and D indicate the northeast, northwest, southwest, and southeast quarters, respectively), followed by a number indicating the sequence in which the site was recorded. As an example, site 90 N13 E18 27BDA1 is in the Lake Tahoe basin (hydrographic area 90). It is the first site recorded in the northeast quarter of the southeast quarter of the northwest quarter of section 27, Township 13 North, Range 18 East, Mount Diablo base line and meridian.

DESCRIPTION OF GEOPHYSICAL, HYDROGEOLOGIC, AND WATER-QUALITY DATA

Geophysical Data

Bouguer-gravity values, determined for geophysical measurements made at 31 gravity stations and compiled by Saltus (1988), are listed in table 3; the sites are shown in figure 2. The measurements in table 3 are reported in milliGals, where 1,000 milliGals (1 Gal) approximately equals a gravitational acceleration of 0.39 inch per second, per second. Gravimetry is a geophysical technique that measures the vertical acceleration of gravity at discrete locations on the surface of the Earth. Small variations in the gravitational attraction on the Earth's surface can be attributed to density variations in the material beneath the surface (Dobrin, 1976, p. 357-403).

The gravity data are corrected for tidal variations, latitude, and longitude. Corrections for terrain were made using the computer routine developed by Plouff (1977) for an area extending radially from each location outward from 1.4 miles to 104 miles. Terrain corrections within the inner zone [0-1.4-mile radius, normally done manually using a template (Dobrin, 1976, p. 419-420)] have not been made for these data. The corrections reduce all gravity measurements to a common altitude datum. The corrected Bouguer-gravity values reflect spatial variation in the Earth mass across the study area, which can be used to estimate the thickness of unconsolidated sedimentary deposits.

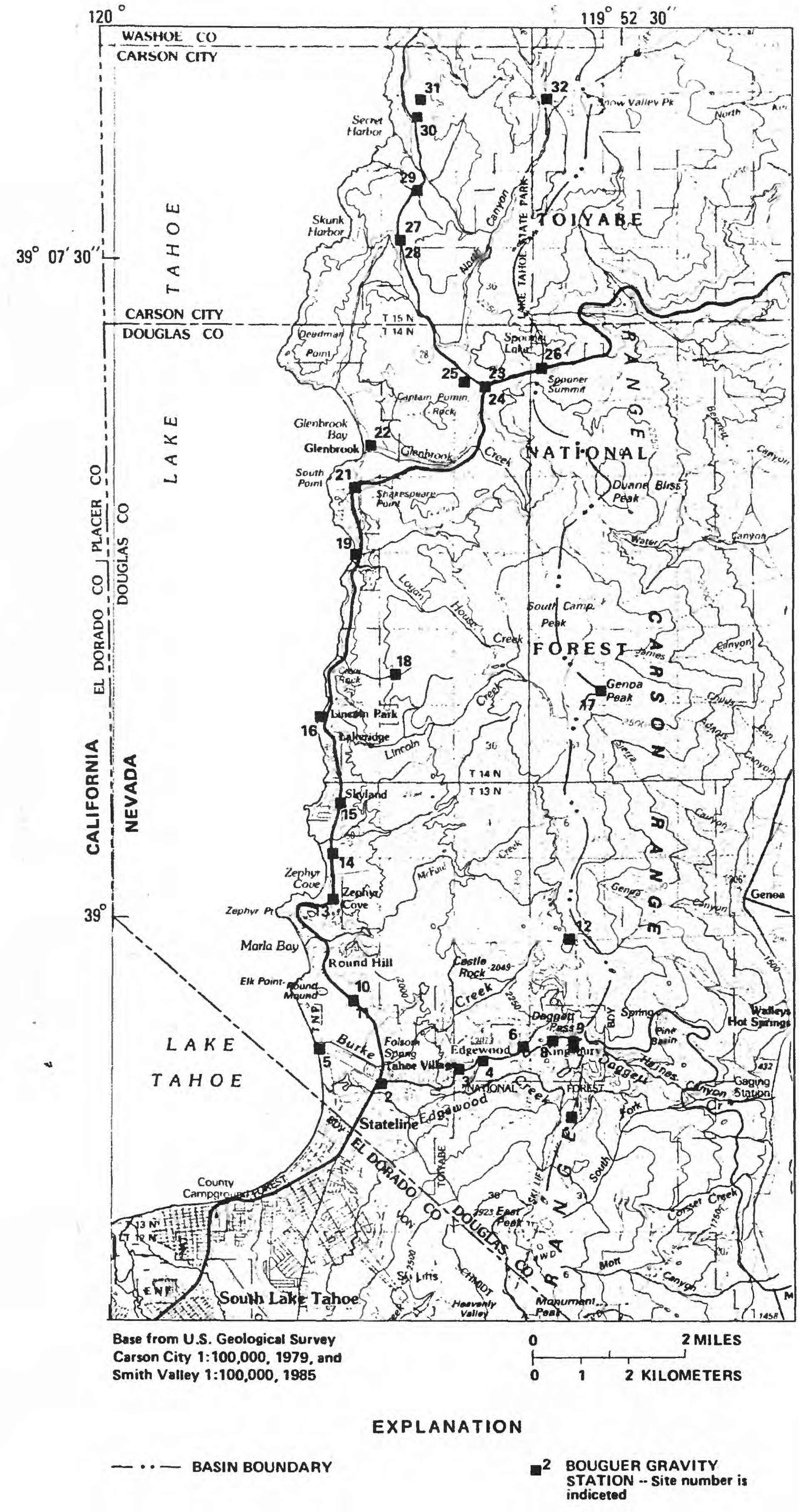


FIGURE 2.--*Bouguer-gravity stations.*

Hydrogeologic Data

An inventory of well drillers' reports filed with the Nevada State Engineer for 59 wells drilled in the study area is presented in table 4; the well locations are shown in figure 3. Included are data on well location and altitude, construction characteristics, and water levels reported by the driller at the time of well construction. Locations for 28 of the wells have been field verified; all other locations are based on information reported by the driller.

The Geological Survey collected data from 42 sites during 1986-87, including data on the location and altitude, construction characteristics, and water levels for 30 wells, and on the location, altitude, and discharge for 9 streams and 3 springs. These data are presented in table 5. Distribution of these sites is shown in figure 4. Sites 1-25 are non-domestic shallow wells which penetrate as much as 36 feet below land surface. The wells at sites 11-14 were installed at the Douglas County Sewer Improvement District treatment facility and effluent-holding pond prior to this study. No drillers' reports were found for these wells. The wells at sites 1-10 and 15-25 were installed for this study. These wells were drilled either by a gasoline-powered, 3-inch, solid-stem auger or by a 3-inch hand auger. Wells at sites 1, 2, 5-10, and 15-25 are constructed of 2-inch-diameter polyvinyl chloride (PVC) casing and factory-slotted well screen. Wells at sites 3 and 4 are constructed of 1-inch-diameter PVC casing with hand-slotted perforations wrapped with nylon porch screen. The annulus around each casing was backfilled with coarse, clean sand adjacent to the perforated interval, and a sanitary seal of bentonite clay was installed from the top of the open interval to land surface. A water-works control box was installed flush with land surface to protect each well. Wells at sites 3 and 4 are within 5 feet of each other, but completed at different depths. Sites 26-30 are domestic supply wells owned and maintained by property owners.

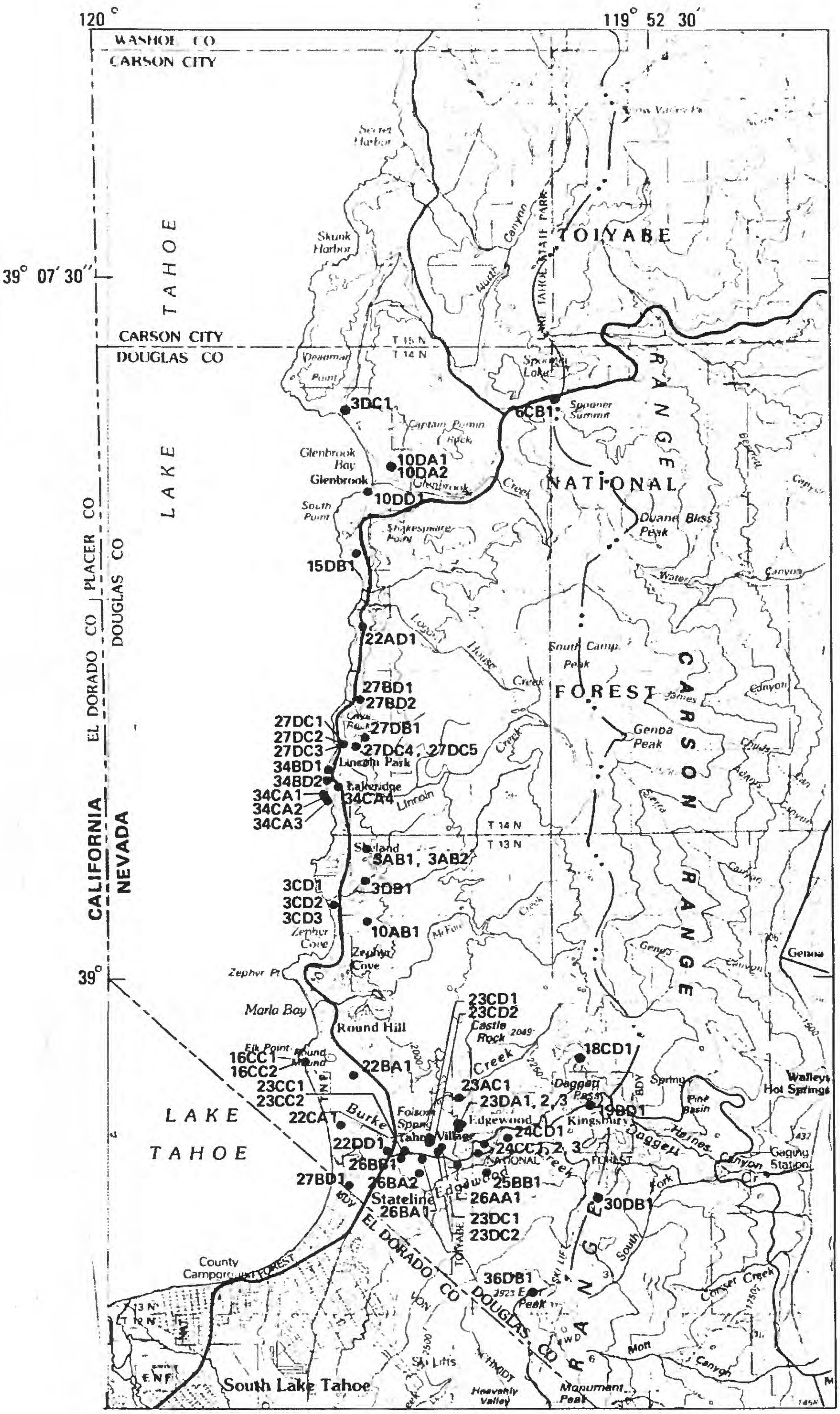
Particle-size distributions of samples of aquifer material collected from boreholes at 20 of the shallow well sites augered during this study are presented in table 6. The grain-size distribution of granular porous media is related to the hydraulic conductivity, and a representative grain-size diameter can, therefore, provide a rough estimate of hydraulic conductivity (Freeze and Cherry, 1979, p. 350).

Water-Quality Data

Data on ground-water quality obtained from the Nevada Bureau of Consumer Health Protection Services are in table 8. Information regarding these historical sites is in table 5 and their locations are shown in figure 5. The State data represent the analysis of whole-water (unfiltered) samples. Included in table 8 are results of analyses for 22 samples collected from 16 wells.

As part of the present study, 5 domestic wells, 25 test wells, 9 streams, and 3 springs were sampled to provide additional information for the water-quality data base. Water samples collected during this study were analyzed for major dissolved chemical constituents, physical properties, total and dissolved species of nitrogen and phosphorus, total or dissolved organic carbon, dissolved iron and manganese, and selected dissolved, naturally occurring radioisotopes. Information concerning the significance, consumer health considerations, and sources of measured chemical constituents and physical properties is listed in table 7.

Ground-water samples that were collected as part of the current study were obtained from wells by using either the existing pump, a peristaltic pump, or a bailer. A volume equivalent to at least three times the volume of water initially present in the well bore was removed from each well before sample collection, in an attempt to obtain water representative of the aquifer. Frequent field determinations of temperature, pH, and specific conductance were made on the well water during this flushing period to ascertain when these field properties stabilized, which in turn would indicate when a representative water sample could be collected. Samples of streams and springs were collected by simple grab techniques.



Base from U.S. Geological Survey
Carson City 1:100,000, 1979, and
Smith Valley 1:100,000, 1985

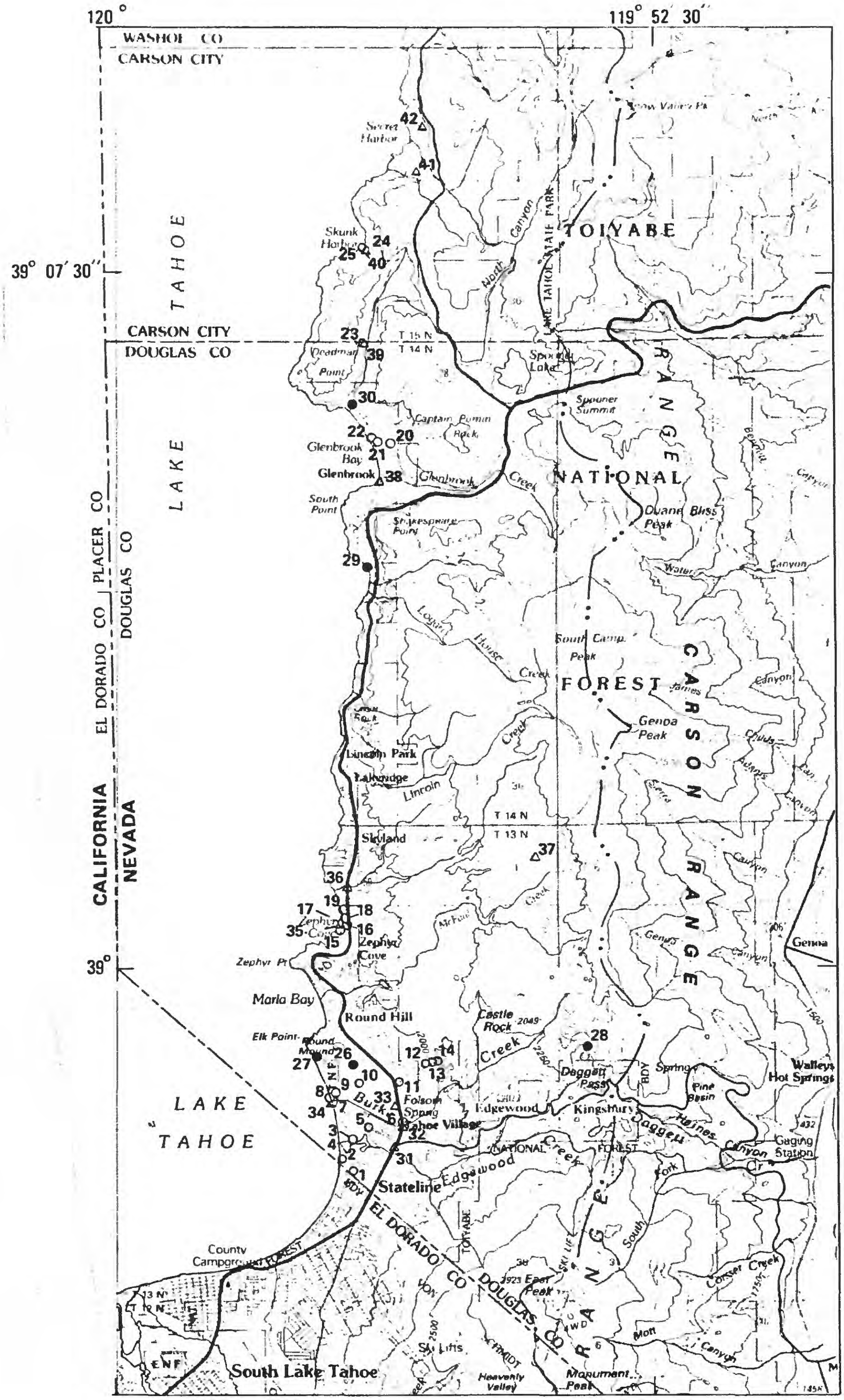
0 2 MILES
0 1 2 KILOMETERS

EXPLANATION

—··— BASIN BOUNDARY

• 3DC1 WELL -- Site number is indicated

FIGURE 3.--*Wells for which drillers' logs have been reported to Nevada State Engineer.*



Base from U.S. Geological Survey Carson City 1:100,000, 1979, and Smith Valley 1:100,000, 1985

0 — 2 MILES

0 1 2 KILOMETERS

EXPLANATION

—·· — BASIN BOUNDARY

● 18 DOMESTIC WELL -- Site number is indicated

○ 27 TEST WELL -- Site number is indicated

△ 38 STREAM OR SPRING -- Site number is indicated

FIGURE 4.--*U.S. Geological Survey sampling sites.*

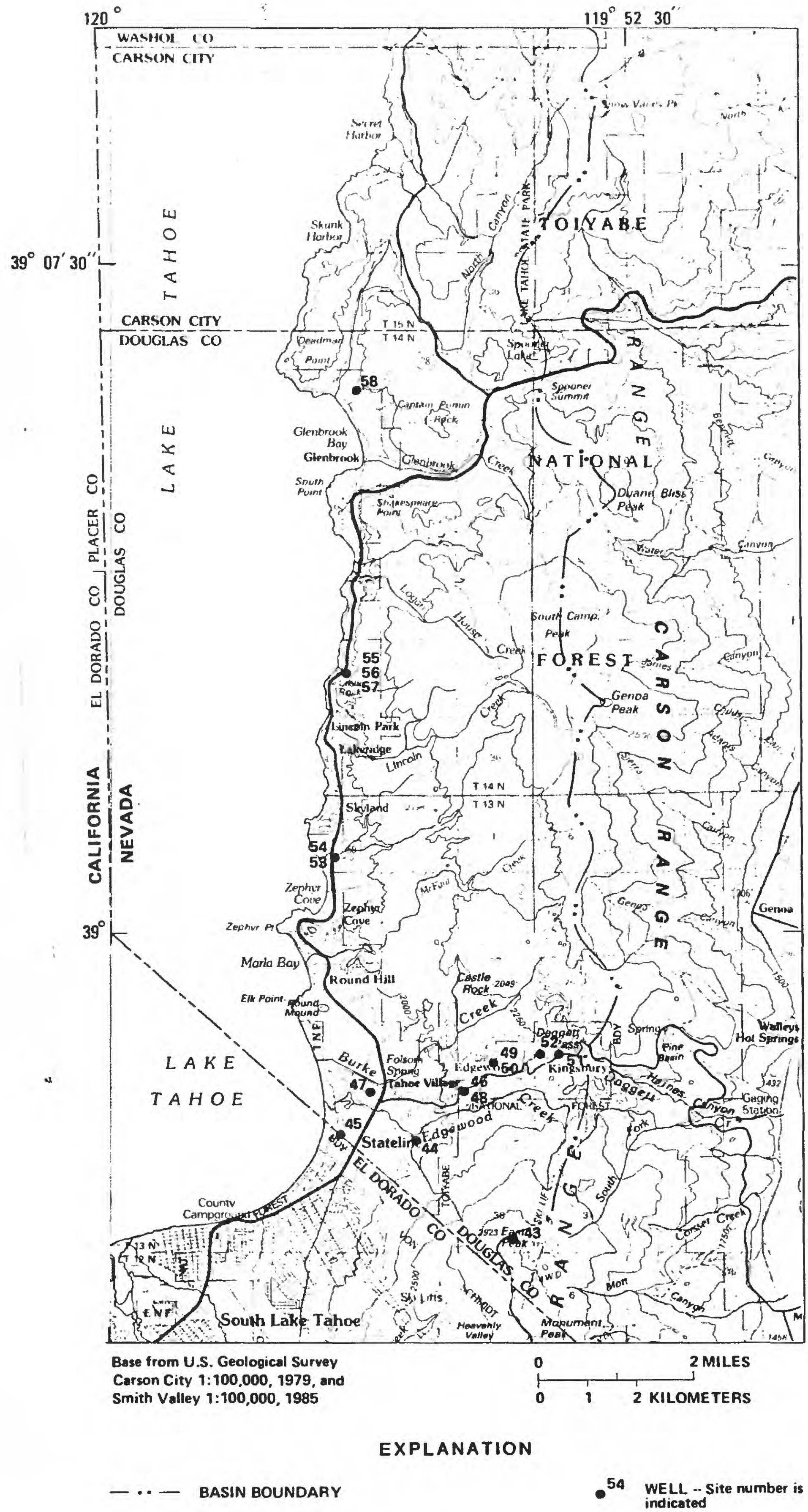


FIGURE 5.--*Nevada Bureau of Consumer Health Protection Services sites for data on ground-water quality.*

The field meters were calibrated at each site using appropriate pH buffers and conductivity standards. Alkalinity was determined onsite by incremental, digital titration of 50-milliliter aliquots of filtered sample water. Water samples for laboratory analysis were processed in the field by standard U.S. Geological Survey methods (Skougstad and others, 1979) and shipped within 2 days to the U.S. Geological Survey National Water-Quality Laboratory in Arvada, Colo. Sample containers and field treatments for laboratory analyses are described in table 1. The methods and precisions of these analyses are described by Feltz and Anthony (1984, part 5). Twenty-six samples collected for radon-222 determination were sent to the Department of Physics and Astronomy, University of Maine in Orono, for analysis by the liquid scintillation-counter technique (Prichard and Gesell, 1977, p. 577-581).

The resulting water-quality data are in tables 9-11 and a statistical summary, by constituent, of water-quality data collected at all of the current (1986-87) sites is presented in table 2. Mean and standard-deviation values listed in table 2 for data sets containing measurements below the detection limit of the laboratory method were estimated on the basis of log-probability regression analysis and 10th, 25th, 50th (median), 75th, and 90th percentile values were estimated by "log-normal maximum likelihood" procedures (Helsel and Cohn, 1988).

Maximum and median dissolved-nutrient concentrations, respectively, for the current (1986-87) sites are: nitrate-nitrogen, 8.2 and 0.028 mg/L; nitrite-nitrogen, 0.58 and 0.003 mg/L; ammonia nitrogen, 0.89 and 0.03 mg/L; organic nitrogen, 1.5 and 0.36 mg/L; phosphorus, 0.065 and 0.014 mg/L; orthophosphate, 0.049 and 0.007 mg/L; and iron, 22 and 0.066 mg/L.

TABLE 1.--*Sample containers and field treatments for laboratory analyses*

[Abbreviations: L, liter; mL, milliliter; °C, degree Celsius]

Type of analysis	Container	Sample treatment[1]
Laboratory pH, specific conductance, and total alkalinity	Field-rinsed, 250-mL, polyethylene bottle	None
Dissolved major anions	Field-rinsed, 250-mL, polyethylene bottle	Filtered
Dissolved major cations and trace constituents	Acid-rinsed, 500-mL, polyethylene bottle	Filtered, acidified
Total nutrients	Field-rinsed, 250-mL, amber, polyethylene bottle	Preserved, chilled to 4°C
Dissolved nutrients	Field-rinsed, 250-mL, amber, polyethylene bottle	Filtered, preserved, chilled to 4°C
Total organic carbon	125-mL, pre-baked, glass bottle	Chilled to 4°C
Dissolved organic carbon	125-mL, pre-baked, glass bottle	Silver filter, chilled to 4°C
Dissolved radium-226	Field-rinsed, 1-L, polyethylene bottle	Filtered, acidified
Dissolved radon-222	30-mL, glass, scintillation vial	None
Dissolved uranium	Field-rinsed, 1-L, polyethylene bottle	Filtered, acidified

[1] Sample treatment: filtered, 0.45-micrometer-pore size; acidified, 1 mL of concentrated (15-Normal) nitric acid per 250 mL of sample; preserved, 1 mL of mercuric chloride (9.6 grams mercury per liter of sodium chloride solution) per 250 mL of sample; silver filter, 0.45-micrometer pore size silver metal membrane.

TABLE 2.--*Statistical summary of water-quality data from current (1986-87) data-collection sites*[1]

Units of measure: Milligrams per liter, except as indicated.
Abbreviations: µS/cm, microsiemens per centimeter at 25°C; µg/L, micrograms per liter; °C, degrees Celsius; ROE, residue on evaporation at 180°C; NA, not applicable; pCi/L, picocuries per liter; N, nitrogen; P, phosphorus.

Constituent or property	Number of determinations	Number of determinations less than detection level	Mean	Standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Maximum	Minimum
Specific conductance (µS/cm)	48	0	273	232	116	139	219	354	434	1,560	102
pH (standard units)	48	0	NA	NA	6.5	6.6	7.0	7.4	7.7	8.4	6.2
Temperature (°C)	48	0	11.0	2.7	8.5	9.5	10.5	12.5	15.0	22	7.0
Calcium, dissolved	48	0	28	24	12	14	18	38	48	150	6.7
Magnesium, dissolved	48	0	6.8	7.0	2.3	2.7	3.7	9.8	13	43	1.2
Sodium, dissolved	48	0	16	10	6.8	8.9	13	20	32	55	5.5
Potassium, dissolved	48	0	3.0	1.6	1.9	2.1	2.6	3.4	5.0	10	0.9
Bicarbonate	45	0	111	60	64	77	89	124	198	366	53
Alkalinity	45	0	91	49	52	63	73	104	162	300	43
Sulfate, dissolved	48	0	7.9	8.9	1.5	2.2	4.0	11	19	50	1.1
Chloride, dissolved	48	0	27	75	0.79	2.8	6.8	20	65	500	.40
Fluoride, dissolved	48	17	.10	0.08	.06	0.07	0.10	0.10	0.11	0.50	<.10
Silica, dissolved	48	0	26	6.7	18	21	25	29	36	44	13
Dissolved solids (ROE)	48	0	177	146	82	104	140	206	284	994	55
Nitrogen, dissolved	46	4	1.0	1.6	.17	.35	.54	0.85	2.4	9.3	<.2
Nitrate, total (as N)	18	9	.37	.95	.0002	.0014	.012	.15	3.0	3.0	<.010
Nitrate, dissolved (as N)	47	21	.50	1.5	.0001	.005	.028	.15	1.6	8.2	<.010
Nitrite, total (as N)	18	0	.008	.007	.002	.003	.004	.016	.020	.022	.001
Nitrite, dissolved (as N)	48	18	.018	.084	.0005	.001	.003	.008	.015	.58	<.001
Ammonia, total (as N)	19	0	.08	.10	.01	.03	.06	.11	.13	.46	.003
Ammonia, dissolved (as N)	45	6	.07	.15	.005	.01	.03	.06	.18	.89	<.002
Organic nitrogen, total (as N)	14	1	.70	.40	.24	.36	.72	.89	1.4	1.7	<.2
Organic nitrogen, dissolved (as N)	48	6	.42	.27	.15	.22	.36	.54	.76	1.5	<.2
Orthophosphate, total (as P)	25	3	.021	.016	.002	.008	.016	.030	.052	.054	<.001

TABLE 2.--*Statistical summary of water-quality data from current (1986-87) data-collection sites*[1]--Continued

Constituent or property	Number of determinations	Number of determinations less than detection level	Mean	Standard deviation	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Maximum	Minimum
Orthophosphate, dissolved (as P)	48	13	0.011	0.011	0.002	0.003	0.007	0.015	0.032	0.049	<0.001
Phosphorus, total (as P)	30	1	.042	.036	.006	.015	.028	.064	.104	.14	<.005
Phosphorus, dissolved (as P)	48	8	.017	.014	.004	.007	.014	.020	.040	.065	<.005
Iron, dissolved (µg/L)	48	3	1,600	4,500	4	16	66	350	7,400	22,000	<3
Manganese, dissolved (µg/L)	48	8	150	230	.9	5.2	31	160	600	830	<1
Organic carbon, total	34	1	3.2	2.4	.8	1.3	3.0	4.3	7.0	10	<.1
Organic carbon[2], dissolved	6	0	.9	.3	--	--	--	--	--	2.9	.4
Radium-226, dissolved (µg/L)[2]	4	0	.009	.073	--	--	--	--	--	.20	.04
Radon-222 gas, dissolved (pCi/L)	31	6	3,700	4,400	73	180	1,400	7,700	10,000	16,000	<100
Uranium, dissolved (µg/L)[2]	11	0	19	25	--	--	--	--	--	83	.50

[1] Mean and standard deviation were estimated using log-probability regression; percentiles (10th, 25th, 50th, 75th, and 90th) were estimated using log-normal maximum likelihood (Helsel and Cohn, 1988, p. 1997-2004).

[2] Sample size insufficient for meaningful calculation of summary statistics.

DATA COMPILATIONS AND BACKGROUND INFORMATION

(Tables 3-11 follow.)

TABLE 3.--*Bouguer-gravity values*

[Compiled by Saltus, 1988]

Site number (fig. 4)	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Bouguer gravity (milliGals)
1	38 57 43	119 53 13	-204.5
2	38 58 05	119 56 2	-195.4
3	38 58 15	119 54 53	-195.7
4	38 58 21	119 54 32	-197.7
5	38 58 29	119 56 56	-195.8
6	38 58 31	119 53 56	-197.9
7	38 58 31	119 53 13	-197.3
8	38 58 35	119 53 31	-197.5
9	38 58 35	119 53 13	-197.3[a]
10	38 59 01	119 56 27	-193.4
11	38 59 02	119 56 27	-193.4[a]
12	38 59 45	119 53 16	-204.6
13	39 00 12	119 56 45	-190.2[a]
14	39 00 43	119 56 45	-189.0[a]
15	39 01 18	119 56 38	-188.3[a]
16	39 02 16	119 56 56	-192.5[a]
17	39 02 34	119 52 48	-213.9
18	39 02 45	119 55 51	-191.4[a]
19	39 04 07	119 56 27	-190.3[a]
20	39 04 52	119 56 27	-190.5[a]
21	39 05 21	119 56 13	-192.6[a]
22	39 06 01	119 54 32	-194.6[a]
23	39 06 02	119 54 32	-194.8[a]
24	39 06 05	119 54 50	-198.1[a]
25	39 06 15	119 53 42	-198.2[a]
26	39 07 42	119 55 47	-199.2[a]
27	39 07 43	119 55 47	-199.2
28	39 08 16	119 55 33	-197.8[a]
29	39 09 06	119 55 33	-202.0[a]
30	39 09 18	119 55 30	-202.5[a]
31	39 09 19	119 53 38	-204.8[a]
32	39 10 22	119 55 22	-201.1[a]

[a] Average of two measurements.

TABLE 4.--*Well drillers' reports*

[Filed with the Nevada Division of Water Resources, State Engineer. --, no data available]

Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Local U.S. Geological Survey site designation	Altitude (feet above sea level)	Depth drilled (feet)	Casing diameter (inches)	Depth of open interval (feet)	Static water-level depth (feet below measuring point)	Site location verified in field
38 56 40	119 54 21	90 N13 E18 36DB1	9,200	157	6	100-200	58	No
38 57 39	119 53 13	90 N13 E19 30DB1	7,600	447	9	--	17	No
38 57 47	119 56 38	90 N13 E18 27BD1	6,240	112	14	55-110	28	No
38 57 55	119 54 46	90 N13 E18 25BB1	6,740	193	7	--	1	No
38 57 55	119 55 41	90 N13 E18 26BA2	6,440	132	8	--	55	Yes
38 58 00	119 55 10	90 N13 E18 26AA1	6,560	320	8	--	42	Yes
38 58 04	119 55 39	90 N13 E18 26BA1	6,440	124	8	--	20	Yes
38 58 04	119 55 56	90 N13 E18 26BB1	6,330	224	6	74-94	103	No
38 58 08	119 55 53	90 N13 E18 23CC1	6,370	120	10	--	65	No
38 58 08	119 54 53	90 N13 E18 24CC3	6,690	70	10	--	12	No
38 58 09	119 56 07	90 N13 E18 22DD1	6,310	332	20	70-320	9	No
38 58 09	119 55 53	90 N13 E18 23CC2	6,370	130	8	--	24	No
38 58 09	119 55 26	90 N13 E18 23DC2	6,450	281	9	--	15	Yes
38 58 12	119 55 22	90 N13 E18 23DC1	6,460	244	6	84-206	1	No
38 58 14	119 54 48	90 N13 E18 24CC1	6,780	95	8	56-68	26	No
38 58 15	119 55 32	90 N13 E18 23CD2	6,450	120	8	--	28	No
38 58 15	119 54 48	90 N13 E18 24CC2	6,800	198	10	60-88	23	No
38 58 18	119 55 33	90 N13 E18 23CD1	6,450	100	8	60-80	39	No
38 58 18	119 54 28	90 N13 E18 24CD1	6,920	100	8	--	51	No
38 58 24	119 55 09	90 N13 E18 23DA2	6,560	135	14	--	33	No
38 58 26	119 56 45	90 N13 E18 22CA1	6,230	65	8	45-65	6	Yes
38 58 26	119 55 10	90 N13 E18 23DA1	6,560	209	12	169-209	30	Yes
38 58 26	119 55 06	90 N13 E18 23DA3	6,560	50	14	--	15	No
38 58 39	119 53 20	90 N13 E19 19BD1	7,335	--	--	--	--	No
38 58 44	119 55 08	90 N13 E18 23AC1	6,620	63	8	52-63	8	No
38 58 58	119 56 35	90 N13 E18 22BA1	6,280	200	7	[a]58-200	20	Yes
38 59 06	119 57 15	90 N13 E18 16CC2	6,238	153	12	130-153	0	Yes
38 59 07	119 57 15	90 N13 E18 16CC1	6,240	58	12	48-58	8	Yes
38 59 09	119 53 28	90 N13 E19 18CD1	7,400	83	6	63-83	30	Yes
39 00 37	119 56 24	90 N13 E18 10AB1	6,300	321	7	210-220	45	Yes
39 00 43	119 56 59	90 N13 E18 3CD3	6,270	264	16	200-223	19	Yes
39 00 46	119 56 59	90 N13 E18 3CD2	6,275	95	8	36-50	33	Yes
39 00 51	119 57 01	90 N13 E18 3AB1	6,260	84	6	74-84	49	No
39 00 52	119 57 01	90 N13 E18 3AB2	6,260	150	8	101-150	12	Yes
39 01 54	119 56 56	90 N14 E18 34CA3	6,410	110	6	--	30	No
39 01 57	119 56 59	90 N14 E18 34CA1	6,325	121	8	--	18	Yes
39 01 59	119 56 56	90 N14 E18 34CA2	6,360	72	8	51-71	30	Yes
39 02 03	119 56 48	90 N14 E18 34CA4	6,520	230	10	--	85	Yes
39 02 07	119 56 57	90 N14 E18 34BD2	6,330	119	9	65-85	48	Yes
39 02 14	119 56 56	90 N14 E18 34BD1	6,520	180	6	134-174	74	Yes
39 02 27	119 57 01	90 N14 E18 27DC3	6,240	160	8	--	50	Yes
39 02 29	119 57 01	90 N14 E18 27DC2	6,240	62	6	--	14	No
39 02 29	119 56 34	90 N14 E18 27DC5	6,780	128	6	--	29	No
39 02 30	119 56 59	90 N14 E18 27DC1	6,280	80	6	12-32	55	Yes
39 02 30	119 56 43	90 N14 E18 27DC4	6,620	98	6	--	73	No
39 02 39	119 56 39	90 N14 E18 27DB1	6,860	58	6	25-48	19	No
39 02 56	119 56 58	90 N14 E18 27BD2	6,280	76	6	56-68	15	No
39 03 00	119 56 53	90 N14 E18 27BD1	6,280	34	9	20-31	4	No
39 03 50	119 56 30	90 N14 E18 22AD1	6,560	142	7	120-142	42	Yes
39 04 19	119 56 29	90 N14 E18 15DB1	6,280	200	10	50-145	36	Yes
39 05 12	119 56 24	90 N14 E18 10DD1	6,260	300	7	200-300	200	No
39 05 14	119 55 46	90 N14 E18 11CD1	6,330	200	6	--	25	Yes
39 05 25	119 56 25	90 N14 E18 10DA2	6,260	127	7	63-127	21	No
39 05 26	119 56 25	90 N14 E18 10DA1	6,260	100	7	56-100	20	No
39 05 58	119 56 44	90 N14 E18 3DC1	6,235	150	6	--	--	Yes
39 06 04	119 56 42	90 N14 E18 3CD1	6,240	109	6	99-109	16	Yes
39 06 07	119 57 19	90 N14 E18 3DB1	6,320	155	8	116-136	120	No
39 06 05	119 56 42	90 N14 E18 3CD2	6,240	106	6	82-106	18	Yes
39 06 12	119 53 49	90 N14 E19 6CB1	7,240	68	8	33-68	--	Yes

[1] See section in text titled "U.S. Geological Survey Site Designations."

[a] Open hole in bedrock.

TABLE 5.--*Information regarding hydrologic-data sites*

[--, no data available]

Site number (fig. 4)	U.S. Geological Survey site designations[1]		Altitude (feet above sea level)	Depth of well (feet)	Depth of open interval (feet)	Water-level	
	Local identification	Standard identification				Date	Feet below land-surface datum
	Current (1986-87) well sites (U.S. Geological Survey)						
1	90 N13 E18 27BDA1	385742119565201	6,251.6	23.0	20.5-22.5	06-24-87 07-15-87	14.76 14.39
2	90 N13 E18 27BAC1	385756119565001	6,231.2	6.4	3.9-5.9	06-24-87 07-13-87	4.00 3.82
3	90 N13 E18 22CDD1	385808119564201	6,238.2	8.2	6.5-8.0	06-25-87 07-08-87 08-25-87	1.6 1.55 1.27
4	90 N13 E18 22CDD2	385808119564202	6,238.0	10.1	8.4-9.9	06-25-87 07-08-87 08-25-87	1.1 1.09 1.07
5	90 N13 E18 22DCA1	385816119563001	6,271.6	24.3	19.8-23.8	08-03-87 08-05-87	15.5 15.23
6	90 N13 E18 23CCB1	385819119560001	6,321.4	8.0	5.5-7.5	07-15-87 07-22-87 08-20-87	5.0 3.88 4.18
7	90 N13 E18 22BCD1	385834119565801	6,230.7	10.7	8.2-10.2	08-06-87 08-28-87 09-29-87	3.63 3.88 4.38
8	90 N13 E18 22BCD3	385836119570001	6,230.7	8.6	6.1-8.1	08-06-87 08-28-87 09-29-87	3.97 4.13 4.66
9	90 N13 E18 22BCD4	385839119565601	6,231.7	8.2	5.7-7.7	08-11-87 08-28-87 09-29-87	4.17 4.01 4.37
10	90 N13 E18 22BDA1	385842119564601	6,243.2	13.0	10.5-12.5	08-28-87 09-09-87 10-01-87	9.5 9.35 9.66
11	90 N13 E18 23BBC1	385813119560401	6,326.9	18.0	--	11-17-86 07-07-87 08-25-87	8.98 9.20 9.79
12	90 N13 E18 23ABB1	385857119555001	6,478.3	36.0	--	04-11-86 11-12-86 11-18-86 07-07-87	12.82 22.43 22.67 27.60
13	90 N13 E18 23BAA1	385858119554601	6,487.5	30.0	--	04-11-86 11-12-86 07-07-87	.0 7.92 10.46
14	90 N13 E18 14DCC1	385859119554001	6,505.7	31.0	--	04-11-86 11-18-86 07-07-87	.0 11.21 11.95
15	90 N13 E18 10BDB1	390022119565201	6,240	31.0	26.5-30.5	08-27-87 09-09-87 09-30-87 10-02-87	15.7 15.73 16.01 16.11
16	90 N13 E18 10BDA1	390025119564601	6,239.4	16.5	12.0-14.0	08-12-87 08-20-87 09-30-87	9.03 8.72 9.25

TABLE 5.--*Information regarding hydrologic-data sites*--Continued

Site number (fig. 4)	U.S. Geological Survey site designations[1] Local identification	Standard identification	Altitude (feet above sea level)	Depth of well (feet)	Depth of open interval (feet)	Water-level Date	Feet below land-surface datum
	Current (1986-87) well sites (U.S. Geological Survey)--Continued						
17	90 N13 E18 10BDB3	3900271195650	6,232.2	7.9	5.4-7.4	08-11-87	1.84
						08-20-87	1.93
						09-30-87	1.81
18	90 N13 E18 10BAD1	3900301195647	6,240	18.0	15.5-17.5	08-27-87	7.0
						09-09-87	7.03
						09-30-87	6.06
19	90 N13 E18 10BAB1	3900371195650	6,238.3	21.5	19.0-21.0	08-12-87	11.89
						08-20-87	11.25
						09-30-87	12.11
20	90 N14 E18 10ADA1	3905391195610	6,276.8	26.6	22.1-26.1	08-06-87	10.71
						08-20-87	10.85
						11-09-87	10.36
21	90 N14 E18 10ADB1	3905421195621	6,251.2	31.3	26.8-30.8	08-06-87	19.19
						08-20-87	18.88
						11-09-87	19.50
22	90 N14 E18 10ABD1	3905411195625	6,243.1	28.1	23.6-27.6	08-03-87	16.35
						08-20-87	16.12
						11-09-87	17.14
						11-19-87	17.25
23	90 N14 E18 3ABB1	3906431195632	6,340	18.8	16.3-18.3	08-03-87	4.38
						08-20-87	3.66
						11-09-87	3.31
24	90 N15 E18 27DCC2	3907431195631	6,274.1	9.3	6.8-8.8	07-21-87	2.46
						08-25-87	1.01
25	90 N15 E18 27DCC1	3907451195634	6,229.6	6.7	4.2-6.2	07-21-87	3.07
						08-25-87	3.78
26	90 N13 E18 22BAA1	3858571195642	6,280	200	[a]58-200	04-07-72	20
						04-09-86	14.60
						11-11-86	20.73
27	90 N13 E18 16CCC1	3859021195713	6,240	58	48-58	06-10-48	8
28	90 N13 E19 18CDB1	3859091195328	7,400	83	64-83	04-16-60	30
29	90 N14 E18 15DCA1	3904211195629	6,280	200	50-145	08-06-74	36
						04-04-86	35.85
						11-17-86	41.77
30	90 N14 E18 3CDA1	3906041195642	6,240	109	99-109	10-02-81	16
						04-04-86	9.70

TABLE 5.--*Information regarding hydrologic-data sites*--Continued

Site number (fig. 4)	Name	U.S. Geological Survey site designations[1]: Local identification	U.S. Geological Survey site designations[1]: Standard identification	Altitude (feet above sea level)	Discharge: Date	Discharge: Cubic feet per second
	Current (1986-87) streams, and spring (U.S. Geological Survey)					
31	Edgewood Creek	90 N13 E18 27AAD1	385803119560901	6,280	07-15-87	1.7
32	Burke Creek (Upper)	90 N13 E18 23CCB2	385816119560001	6,321	07-15-87	.20
33	Folsom Spring	90 N13 E18 23CBB1	385824119560401	6,320	07-27-87	.75
34	Burke Creek (Lower)	90 N13 E18 22BCD2	385833119565901	6,228	08-06-87	.73
35	Unnamed creek at Zephyr Cove	90 N13 E18 10BDB2	390028119565101	6,230	08-11-87	.11
36	Unnamed creek	90 N13 E18 3CAC1	390053119564701	6,260	07-27-87	.90
37	Unnamed seep	90 N13 E18 1ACC1	390112119541201	7,560	--	--
38	Glenbrook Creek	90 N14 E18 10DAC1	10336730	6,240	07-13-87	.53
39	Slaughterhouse Creek	90 N14 E18 3ABA2	390644119563101	6,340	08-03-87	.51
40	Unnamed creek at Skunk Harbor	90 N15 E18 27DCC3	390744119563201	6,268	07-21-87	.01
41	Bliss Creek	90 N15 E18 23CCC1	390835119554801	6,400	07-27-87	.02
42	Unnamed seep	90 N15 E18 23BDB1	390904119554201	6,400	07-27-87	.01

Site number (fig. 5)	U.S. Geological Survey site designation, local identification[1]	Altitude (feet above sea level)	Depth of well (feet)	Depth of open interval (feet)	Casing diameter (inches)	Water-level depth (feet)	Water use[2]
	Historical (1960-82) well sites (Nevada Consumer Health Protection Service, written communication, 1985)						
43	90 N13 E18 36DB01	9,200	157	100-120	6	58	P
44	90 N13 E18 2601	6,500	--	--	8	--	P
45	90 N13 E18 2701	6,300	--	--	--	--	P
46	90 N13 E18 24CC03	6,690	70	--	10	12	H
47	90 N13 E18 22DD01	6,310	332	70-320	20	9	P
48	90 N13 E18 24CC02	6,800	198	60-88	10	23	H
49	90 N13 E18 2401	6,800	--	--	--	--	H
50	90 N13 E18 2402	6,800	200	--	10	--	H
51	90 N13 E19 19BD01	7,200	--	--	--	--	P
52	[a] 90 N13 E19 19BC01	7,200	--	--	--	--	H
53	90 N13 E18 3CD03	6,270	264	200-223	16	19	P
54	90 N13 E18 3CD02	6,275	95	36-50	8	33	P
55	90 N14 E18 2701	6,800	--	--	--	--	P
56	90 N14 E18 2702	6,800	--	--	--	--	H
57	90 N14 E18 2703	6,800	--	--	--	--	H
58	90 N14 E18 3DC01	6,235	150	--	6	--	H

[1] See text section titled "U.S. Geological Survey Site Designations."
[2] P, public supply; H, domestic.
[a] Open hole in bedrock.

TABLE 6.--*Particle-size distribution of augered samples from U.S. Geological Survey boreholes*

Site number (fig. 4)	Depth below land surface (feet)	Water content[1]	Percent finer than indicated size (millimeters): Gravel 16.0	Gravel 8.0	Gravel 4.0	Sand 2.0	Sand 1.0	Sand 0.5	Sand 0.250	Sand 0.125	Silt 0.062	Silt 0.031	Silt 0.016	Silt 0.008	Clay 0.004	Clay 0.002
1	8	u	100	100	100	100	99	94	89	72	41	27	18	12	11	11
	20	s	100	100	100	99	92	61	32	16	9	6	4	4	3	3
2	5	s	100	100	100	90	44	5	2	1	0	0	0	0	0	0
4	6	u	100	100	99	95	81	64	48	31	12	7	5	3	3	3
	8	s	100	100	100	100	94	67	39	22	8	4	2	1	1	1
	10	s	100	100	98	92	76	48	19	4	1	0	0	0	0	0
5	20	s	100	100	100	100	100	86	58	34	14	8	5	4	4	4
6	5	u	100	100	100	93	70	47	27	13	4	2	1	1	1	1
	8	s	100	98	92	80	56	35	20	10	4	2	1	1	1	1
7	8	s	100	100	99	79	31	4	2	1	1	0	0	0	0	0
8	7	s	100	99	99	93	74	27	12	3	1	0	0	0	0	0
9	7	s	100	100	100	98	84	50	28	12	4	2	1	1	1	1
10	18	s	100	100	98	86	66	44	20	6	3	1	1	1	0	0
15	18	s	100	99	98	93	71	46	21	9	4	3	2	1	1	1
16	11	u	100	100	100	100	94	80	68	56	37	28	20	11	11	10
	13	s	92	84	67	54	41	31	18	7	2	1	1	0	0	0
	15	s	100	100	99	98	95	89	76	55	26	16	9	5	4	4
17	8	s	100	98	88	71	51	30	12	4	2	1	0	0	0	0
18	13	s	100	100	100	99	93	72	35	15	6	4	3	2	2	2
19	12	u	100	100	99	97	88	71	49	28	15	11	8	5	4	4
	15	s	100	100	100	99	90	64	39	22	12	9	6	4	4	3
20	17	s	100	100	100	100	99	76	53	35	20	16	13	9	7	6
21	18	s	100	100	100	100	93	70	43	23	10	7	5	4	4	3
22	8	u	100	100	99	97	78	50	28	16	8	6	5	4	3	3
	23	s	100	100	100	100	95	74	51	33	17	13	10	8	6	5
23	10	s	100	100	100	100	98	86	59	34	16	11	8	5	5	5
24	2	u	100	100	100	99	94	81	59	31	12	8	6	5	4	4
	4.5	s	100	98	95	88	72	51	29	13	5	2	1	1	1	1
25	4	s	100	100	100	99	84	57	40	21	10	6	4	2	2	2
	6	s	100	100	100	99	86	61	39	22	9	6	3	2	2	2

[1] s, saturated; u, unsaturated.

TABLE 7.--*Background information on constituents and properties of water*

[Modified from Nowlin (1982, table 2). Abbreviations: NBCHPS, Nevada Bureau of Consumer Health Protection Services (1980); USEPA, U.S. Environmental Protection Agency; µg/L, micrograms per liter; mg/kg, milligrams per kilogram; mg/L, milligrams per liter; mL, milliliter; pCi/L, picocuries per liter; °C, degrees Celsius; --, no data available]

Constituent or property	Source or cause of occurrence	Normal range of values in natural waters	Standards or criteria for water use[1]	Remarks
Specific conductance	Capability of water to conduct electric current at specified temperature of 25°C. Presence of charged ionic species dissolved in water makes solution conductive, whereas pure liquid water (without dissolved ions) has very low electrical conductance. As ion concentrations increase, conductance of solution increases; therefore, specific conductance is indication of ion concentrations (Hem, 1985, p. 66).	Generally less than 1,000 microsiemens per centimeter at 25°C for potable water (Hem, 1985, p. 67).	No enforceable standard.	Provides field estimate of dissolved-solids concentration and quality control for associated laboratory analysis.
pH	A measure of acidity (pH value less than 7.0) or alkalinity (pH greater than 7.0) of water, which is based on effective concentration (also called "activity") of dissolved hydrogen ions. Primary source of hydrogen ions in most natural ground-water systems is from reaction of water with carbon dioxide that is produced by soil micro-organisms; this reaction forms dissolved bicarbonate and hydrogen ions (Hem, 1985, p. 61-63).	The pH of pure water at 25°C is 7.00 (which is termed a neutral pH). Typical ground-water values range from about 6.0 to about 8.5 (Hem, 1985, p. 63-64).	Secondary standard: range of acceptable pH is from 6.5 to 8.5 (NBCHPS).	Toxicity of certain compounds (such as hydrogen cyanide or ammonia), solubility of metal compounds, and corrosiveness of water are affected by pH (USEPA, 1976, p. 178-179). The pH is also a controlling factor in geochemical equilibrium.
Calcium (Ca) and magnesium (Mg)	Dissolved from rocks and soils, especially those containing limestone, dolomite, and gypsum.	Calcium: ranges from 1 to more than 1,000 mg/L. Magnesium: Normally much less than calcium and usually less than sodium (Hem, 1985, p. 89-100).	Secondary standards for magnesium are 25 mg/L unless alternative supply unavailable, then 150 mg/L (NBCHPS).	Imparts hardness and scale-forming properties to water (see hardness). High concentrations are unsuitable for laundries, steam plants, textile processing, dyeing, and electroplating. Small amounts are desirable to prevent corrosion.
Sodium (Na) and potassium (K)	Dissolved from most rocks and soils. High concentrations may be found in natural brines, industrial waste, and sewage.	Sodium: generally ranges from 1 to 1,000 mg/L. Potassium: is commonly 0.1 to 0.5 times sodium; generally less than 10 mg/L (Hem, 1985, p. 100-105).	No enforceable standard.	Concentrations greater than 50 mg/L may cause foaming in boilers. Combines with chloride to impart salty taste. Sodium may contribute to hypertension and cardiovascular diseases. Sodium may be objectionable in irrigation water at concentrations that depend on type of crop and soil.

TABLE 7.--*Background information on constituents and properties of water*--Continued

Constituent or property	Source or cause of occurrence	Normal range of values in natural waters	Standards or criteria for water use[1]	Remarks
Bicarbonate (HCO_3) and carbonate (CO_3)	Dissolved from most rocks and soils by carbon dioxide reacting with carbonate minerals such as limestone and dolomite. Carbonate ion can exist only if pH is 8.3 or more.	Bicarbonate: is generally less than 200 mg/L in surface water and 500 mg/L in ground water. Carbonate: is generally less than 10 mg/L (Hem, 1985, p. 105-109).	No enforceable standard.	Increases alkalinity and, usually, pH of water. In combination with calcium and magnesium, causes scales in pipes and, upon heating, may release corrosive carbon dioxide.
Sulfate (SO_4)	Dissolved from rocks and soils containing gypsum and sulfide or sulfate minerals. Commonly associated with coal deposits, metallic ore deposits, and geothermal areas. May be derived from industrial wastes and atmospheric pollution.	Generally ranges from 1 to 1,000 mg/L (Hem, 1985, p. 116-117).	Secondary standards: 250 mg/L unless alternate supply unavailable, then 500 mg/L (NBCHPS).	Forms boiler scale in combination with calcium. Causes bitter taste when combined in high concentrations with other ions and may have laxative effects when ingested in higher concentrations than an individual is accustomed to. Combines with hydrogen ions in low-pH water to form sulfuric acid.
Chloride (Cl)	Dissolved in differing amounts from all rocks and soils. High concentrations may be derived from marine and desert evaporites and brines. Commonly present in sewage and industrial wastes. May be derived from salts used for control of ice on streets and highways.	Commonly less than 100 mg/L in potable water (Hem, 1985, p. 117-120).	Secondary standards: 250 mg/L unless alternate supply unavailable, then 400 mg/L (NBCHPS).	May contribute to corrosiveness of water. Imparts salty taste in concentrations as low as 100 mg/L. The chloride ion is very stable in ground water and is often used as a tracer of the movement of wastes in aquifers.
Fluoride (F)	Dissolved in small amounts from most rocks and soils. Added to many public water supplies to inhibit tooth decay.	Commonly less than 1.0 mg/L in potable natural water (Hem, 1985, p. 120-123).	Primary standard, 4.0 mg/L; secondary standard, 2.0 mg/L (USEPA, 1986b).	Concentrations between 0.6 and 1.7 mg/L may have beneficial effects on structure and resistance to decay of children's teeth. Concentrations in excess of 6.0 mg/L may cause mottling and disfiguration of teeth (Committee on Water Quality Criteria, 1973, p. 66).
Silica (SiO_2)	Dissolved in most natural water in hydrated form [$Si(OH)_4$] from rocks and soils containing minerals such as quartz, kaolinite, or potassium feldspar (Hem, 1985, p. 69-73).	Commonly 1 to 30 mg/L with concentrations up to 100 mg/L occurring frequently (Hem, 1985, p. 73).	No enforceable standard.	Silica solubility is controlled by temperature and pH, and changes in these properties may cause precipitation of silicate minerals from solution.

TABLE 7.--*Background information on constituents and properties of water*--Continued

Constituent or property	Source or cause of occurrence	Normal range of values in natural waters	Standards or criteria for water use[1]	Remarks
Dissolved solids	Sum of all minerals dissolved in water. Concentrations may be increased by industrial wastes, sewage, or agricultural drainage.	Ground water is generally in the range of 25 to 1,000 mg/L (Hem, 1985, p. 31).	Secondary standards: 500 mg/L unless alternate supply not available, then 1,000 mg/L (NBCHPS).	Specific effects upon water uses depend upon individual constituents present.
Nitrate (NO_3)	Derived naturally from atmosphere or leached from decaying organic matter. Man-caused contamination reported from fertilizers, sewage and industrial wastes, feedlots, internal-combustion engines, and combustion of fossil fuels (Hem, 1985, p. 124-125).	Generally 0-10 mg/L	Primary standard: 10 mg/L as N or 44 mg/L as NO_3 (NBCHPS).	Nitrogen is essential nutrient to all life, and nitrate is form most readily assimilated by most green plants. Bioassay experiments indicate that nitrate is primary nutrient controlling algae growth in Lake Tahoe (Goldman, 1974, p. 6-7). Concentrations in excess of 10 mg/L as N may cause methemoglobinemia (infant cyanosis or "blue-baby" syndrome). Nitrate may be internally reduced to form nitrite compounds, which are suspected to be carcinogenic (Hem, 1985, p. 125).
Nitrite (NO_2)	Intermediate nitrogen compound resulting from biological oxidation of ammonium (nitrification) or biological reduction of nitrate (denitrification). Unstable in aerated water; converted rapidly to nitrate (Hem, 1985, p. 124).	Less than 0.1 mg/L	No enforceable standard	Generally considered an indicator of pollution from sewage or organic waste, or of anaerobic or reducing conditions. In most situations, nitrite rapidly oxidizes to nitrate (Hem, 1985, p. 124).
Ammonium (NH_4)	Derived naturally by hydrolysis of organic matter (ammonification). Reported as contaminant due to fertilizer application, sewage and industrial waste, and feedlots (Hem, 1985, p. 124).	--	No enforceable standard. National criteria for "protection of aquatic organisms and their uses" have been established for freshwater organisms as a function of water temperatures and pH (USEPA, 1986b).	Ammonium cations are strongly adsorbed on mineral surfaces. At pH above 9.2, most ammonium ions are converted to uncharged ammonium hydroxide ions, which are not impeded by adsorption. Ammonium is readily oxidized (nitrification) to nitrite and nitrate (Hem, 1985, p. 126); thus it contributes to nitrogen load.
Organic nitrogen	Derived from decaying organic matter, primarily as amides, amines, amino acids, and proteins.	--	No enforceable standard.	Typically converted by soil bacteria into ammonium, nitrite, and nitrate. Elevated concentrations in ground water may indicate contamination by improper disposal of nitrogenous waste (Hem, 1985, p. 125). Complex molecular structure and electrostatic charge limit transport of organic nitrogen in ground-water systems.

TABLE 7.--*Background information on constituents and properties of water*--Continued

Constituent or property	Source or cause of occurrence	Normal range of values in natural waters	Standards or criteria for water use[1]	Remarks
Phosphorus (P), phosphate (PO_4)	Derived from phosphate minerals (notably apatite) common in many rocks and soils. May be present in sewage from human or animal wastes and from additives to synthetic detergents.	--	No enforceable standard. Criterion for fresh-water aquatic life: 0.025 to 0.05 mg/L as P (USEPA, 1986b).	Encourages growth of nuisance algae in lakes and streams where phosphorus is limiting nutrient.
Dissolved organic carbon (DOC)	Dissolved in moderate amounts from land-surface organic matter and from fossilized organic matter such as kerogen (Thurman, 1985, p. 14-15).	From 0.2 to 15 mg/L; commonly less than 2 mg/L (Thurman, 1985, p. 8-9).	No enforceable standard.	Normal concentrations of dissolved organic carbon play significant role in aqueous geochemistry and can facilitate movement of charged molecules and ions through aquifer. High concentrations may indicate contamination from landfill leachate.
Iron (Fe)	Dissolved from iron-bearing minerals present in most rocks and soils. Found in some industrial wastes, and can be corroded from pipes, well casings, pumps, and other equipment. Also can be concentrated in wells and springs by certain bacteria.	Concentrations in ground water as high as 1,000 to 10,000 µg/L may be common in some aquifers. Areal distribution is commonly erratic (Hem, 1985, p. 83).	Secondary standards: 300 µg/L unless alternate supply is unavailable, then 600 µg/L (NBCHPS).	Oxidizes to reddish-brown sediment. Stains utensils, enamelware, clothing, and plumbing fixtures. May cause taste and odor problems objectionable for food and beverage processing. Iron is essential element in metabolism of plants and animals (Hem, 1985, p. 77). Bioassay experiments by Goldman (1974, p. 6-7) suggest that dissolved iron is more significant nutrient to Lake Tahoe algae than phosphorus.
Manganese (Mn)	Dissolved from some rocks, soils, and lake-bottom sediments. Generally associated with iron; often associated with acid drainage from mines (Hem, 1985, p. 86).	Generally less than 1,000 µg/L; usually less than iron (Hem, 1985, p. 89).	Secondary standards: 50 µg/L unless alternate supply is unavailable, then 100 µg/L (NBCHPS).	Oxidizes to dark brown or black sediment. Problems are similar to those caused by iron.
Radium-226 (^{226}Ra)	Dissolved in very small amounts from rocks and soils containing minerals such as uranite or carnotite in which uranium-238 has been replaced by radium-226 through natural radioactive decay. Radium-226 (half-life: 1,620 years) is lost from solution by continued radioactive decay to daughter-product, radon-222 gas (Hem, 1985, p. 148-149).	Recent USEPA survey of 59,812 public water-supply systems Nationwide resulted in a range for radium-226 from less than 1 pCi/L to more than 40 pCi/L. Approximately 1 percent (less than 500) of the systems exceeded 5 pCi/L (Cothern and Lappenbusch, 1984, p. 503).	Primary standard, radium-226 plus radium-228 combined: 5 pCi/L (NBCHPS).	Human health effects have been investigated extensively concerning individuals involved in luminous-dial industry (radium-dial painters) and individuals who received radium as therapeutic nostrum during early 1900's. Because radium is a metabolic analog of calcium, it is deposited in skeleton, where it serves as sources of alpha radiation to bone and contiguous tissue (Hobbs and McClellan, 1980, p. 529).

TABLE 7.--*Background information on constituents and properties of water*--Continued

Constituent or property	Source or cause of occurrence	Normal range of values in natural waters	Standards or criteria for water use[1]	Remarks
Radon-222 (^{222}Rn)	Derived as water-soluble, alpha-emitting noble gas from radioactive decay of radium-226. Radon-222 is lost from solution by release to atmosphere and by radioactive decay (radon-222 half-life, 3.82 days; Hem, 1985, p. 149). Radon may enter buildings through cracked basements or foundation blocks, and it may be released from domestic water (Hiltebrand and others, 1987, p. 522).	Recent USEPA survey of 2,500 public drinking-water supply systems in contiguous USA resulted in mean radon-222 value of 340 pCi/L and range from less than reporting level to more than 10,000 pCi/L Horton, 1983, p. 10).	No enforceable standard.	Radon-222 poses no threat in open air, but may accumulate to hazardous levels if it seeps into enclosed spaces. USEPA recently estimated that one in eight American homes has radon levels equal in risk to smoking half a pack of cigarettes a day and considers radon as leading cause of lung cancer among nonsmokers (USEPA, 1986a). Relatively simple technologies currently are available to mitigate risk of radon gas. Impacts of ingestion of radon in water are unknown.
Uranium (U)	Dissolved in small amounts from rocks and soils containing minerals such as uranite or carnotite (Fairbridge, 1972, p. 1216). Uranium-238 is predominant isotope of natural uranium and is starting point in radioactive-decay series that includes radium-226 and radon-222 and ends with the stable lead-206 isotope (Hem, 1985, p. 148).	Generally less than 10 µg/L in most natural water (Hem, 1985, p. 148).	No enforceable standard.	Natural uranium (predominantly uranium-238 plus small amounts of uranium-235 and uranium-234) commonly is not a drinking-water health concern due to its low solubility. Soluble forms are reported to exhibit toxicity to kidneys through chemical action rather than radiation (Hobbs and McClellan, 1980, p. 521).

[1] Primary drinking-water standards specify maximum contaminant levels that are health-related and Federally mandated; secondary drinking-water standards are based on aesthetic qualities and are enforceable by the State of Nevada (Jeffrey A. Fontaine, Nevada Bureau of Consumer Health Protection Agency Services, oral communication, 1989). Criteria are recommended limits for specific water uses, based on current scientific knowledge. Some standards and criteria for trace elements and organic compounds are expressed in milligrams per liter in cited references; these values are herein converted to micrograms per liter to maintain consistency with units of measure used in accompanying water-quality data tabulations.

TABLE 8.--*Nevada Bureau of Consumer Health Protection Services data on ground-water quality, 1960-82*

[Abbreviations: mg/L, milligrams per liter; --, data not available; ND, not detected; significant figures shown are as reported by the Nevada State Health Laboratory]

Site number (figure 5)	Date	pH (standard unit)	Calcium (mg/L as Ca)	Magnesium (mg/L as Mg)	Sodium (mg/L as Na)	Potassium (mg/L as K)	Bicarbonate (mg/L as HCO_3)	Sulfate (mg/L as SO_4)	Chloride (mg/L as Cl)	Fluoride (mg/L as F)	Dissolved solids (mg/L)	Nitrate (mg/L as N)	Total iron (mg/L as Fe)
43	01-17-79	7.2	6	1	3	1	22	3	1	<0.1	17	0.02	0.13
44	07-11-63	7.0	17.6	3.9	27.6	*(a)*	71	38.4	7	--	114	3.4	--
	02-26-75	8.0	10	3	8	2	49	ND	12	ND	52	ND	ND
45	02-01-60	7.4	14.4	1	11	*(a)*	61	7	2	--	80	.68	.36
46	04-06-61	7.0	22.4	10.7	16.1	*(a)*	98	7.2	1	--	115	--	4
	06-22-61	6.8	22.4	3.9	76.3	*(a)*	115	149	2	--	108	--	--
47	05-25-61	9.2	--	--	34.9	*(a)*	60	19.2	1.8	--	90	1.9	.3
	06-22-61	7.2	17.6	3.9	45.8	*(a)*	83	3.0	3	--	91	.68	--
48	02-16-72	7.0	13	3	10	*(a)*	59	1	10	.19	105	.93	.04
49	11-12-75	8.2	16	2	14	4	59	2	2	ND	129	.07	ND
50	12-26-72	6.9	19	1	16	*(a)*	76	4	12	.13	117	1.0	.19
	10-04-74	7.1	14	2	18	2	61	2	22	.03	137	1.2	.14
51	06-07-76	8.1	7	2	31	2	73	4	27	1.06	126	.88	.36
52	07-10-63	7.4	16.0	4.9	26.8	*(a)*	93	33.6	4	--	90	.45	.03
53	07-11-63	6.6	12.8	11.7	36.1	*(a)*	120	52.8	4	--	119	--	.13
	02-17-72	7.2	16	7	8	*(a)*	88	1	6	.21	121	0.99	ND
	01-02-73	7.4	22	7	6	*(a)*	98	4	5	.06	131	1.9	.11
54	07-11-63	6.6	33.6	8.8	37.0	*(a)*	137	48.0	13	--	210	5.6	--
55	07-10-63	6.6	19.2	5.8	33.9	*(a)*	105	43.2	8	--	120	.90	.03
56	07-10-63	7.0	17.6	5.8	30.7	*(a)*	98	38.4	6	--	90	1.8	.10
57	02-16-72	7.1	26	8	9	*(a)*	129	2	7	.14	143	1.3	.06
58	01-10-82	7.1	18	6	11	3	107	6	1	ND	119	.14	3.95

[a] Value reported for sodium represents combined concentration of sodium plus potassium, computed as milliequivalent-per-liter difference between analytically determined sum of anions and cations, and expressed as sodium, in milligrams per liter.

TABLE 9.--*U.S. Geological Survey data on physical properties, major dissolved-chemical constituents, and manganese, 1986-87*

[Abbreviations: µS/CM, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; IT-FLD, incremental titration-field; µg/L, micrograms per liter; °C, degrees Celsius]

Site number (figure 4)	Date	Specific conductance (µS/cm)	pH (standard units)	Temperature, water (°C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Bicarbonate, IT-FLD (mg/L as HCO_3)
1	07-15-87	389	6.5	10.5	42	12	18	1.7	162
2	07-13-87	368	6.6	13.5	23	3.8	14	3.8	114
3	07-08-87	299	6.6	14.5	16	3.2	13	2.4	107
4	07-08-87	236	6.5	11.0	22	6.1	13	2.4	88
5	08-05-87	328	7.1	11.5	38	7.7	13	4.6	129
6	07-22-87	131	6.6	10.5	13	2.7	9.5	3.4	85
7	09-09-87	434	6.6	10.5	34	11	42	5.2	136
8	08-06-87	136	7.0	13.5	15	2.5	8.9	2.6	80
9	08-06-87	141	6.8	16.0	13	2.0	8.7	2.4	83
10	08-11-87	169	6.8	11.5	17	2.8	11	2.3	112
11	11-17-86	215	6.9	9.0	22	6.7	17	1.9	117
	07-07-87	246	6.5	10.5	20	6.1	15	1.9	117
12	04-11-86	140	6.6	7.5	15	3.7	9.2	2.1	76
	11-18-86	315	6.5	11.0	40	10	17	3.7	204
	07-07-87	363	6.6	11.5	38	9.3	17	3.6	194
14	11-18-86	395	6.7	8.5	46	12	24	3.4	244
	07-07-87	223	6.7	8.5	78	19	26	4.3	366
15	09-09-87	460	7.0	11.0	53	13	20	4.2	211
16	08-12-87	1,560	6.2	10.0	150	43	55	2.0	79
17	08-11-87	266	6.4	11.0	11	3.3	36	2.9	98
18	09-09-87	732	7.0	12.0	60	16	32	10	150
19	08-12-87	563	6.6	9.5	38	12	34	1.8	117
20	08-06-87	305	7.0	8.5	31	7.6	18	2.7	173
21	08-03-87	280	6.8	11.0	32	8.5	10	2.9	148
22	08-06-87	412	7.0	10.0	48	13	22	1.9	237
23	08-03-87	232	8.4	12.5	18	3.9	20	5.2	124
24	07-21-87	193	7.4	9.5	12	2.7	20	3.0	94
25	07-21-87	145	6.8	12.5	6.7	1.8	18	3.2	53
26	04-09-86	230	6.5	9.0	22	5.4	11	2.2	66
	11-11-86	255	6.5	9.0	25	5.9	12	2.4	73
27	04-24-86	155	7.3	11.0	9.3	1.2	21	0.90	68
28	04-11-86	110	7.5	7.5	12	3.0	6.0	2.3	60
29	11-17-86	365	7.2	9.5	39	15	13	7.6	124
30	04-04-86	200	7.5	10.0	23	4.7	10	5.0	128
31	07-15-87	110	8.0	12.5	12	1.6	6.8	2.0	59
32	07-15-87	128	7.9	14.5	15	2.3	7.1	3.0	78
33	04-23-86	165	7.1	9.5	18	2.9	9.6	2.6	89
	10-29-86	145	7.2	9.5	18	2.8	9.4	2.4	89
	07-27-87	149	7.2	10.5	16	2.7	9.0	2.5	89
34	08-06-87	134	7.4	22.0	15	2.3	8.5	2.4	82
35	08-11-87	121	7.6	17.0	14	3.0	6.6	2.6	78
36	07-27-87	108	7.7	9.0	13	2.7	6.1	2.0	73
37	10-28-86	102	7.6	7.0	12	2.4	5.5	2.0	66
38	07-13-87	401	7.6	15.5	47	11	14	2.7	57
39	08-03-87	139	7.5	14.5	15	3.7	7.9	2.2	84
40	07-21-87	138	7.8	10.0	16	2.4	9.6	1.8	93
41	07-27-87	117	7.4	9.0	13	2.7	7.3	2.6	76
42	07-27-87	140	7.2	10.5	15	3.1	8.7	2.7	78

TABLE 9.--*U.S. Geological Survey data on physical properties, major dissolved-chemical constituents, and manganese, 1986-87*--Continued

Site number (figure 4)	Date	Alkalinity, carbonate, IT-FLD (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Solids, residue at 180 °C, dissolved (mg/L)	Manganese dissolved (µG/L as Mn)
1	07-15-87	133	5.1	36	0.1	31	220	100
2	07-13-87	90	19	28	.1	22	170	74
3	07-08-87	88	28	11	<.1	39	179	<1
4	07-08-87	72	20	7.5	<.1	25	156	31
5	08-05-87	106	15	8.5	.2	21	206	480
6	07-22-87	70	10	0.80	.1	26	107	610
7	09-09-87	112	2.2	80	.1	25	279	150
8	08-06-87	66	3.0	2.3	.1	17	82	8
9	08-06-87	68	13	3.6	.1	24	97	54
10	08-11-87	92	2.0	3.1	.1	27	105	17
11	11-17-86	96	16	6.2	<.1	32	150	66
	07-07-87	96	12	6.0	<.1	30	149	60
12	04-11-86	62	3.6	5.0	<.1	25	110	<1
	11-18-86	167	1.3	8.6	<.1	28	201	24
	07-07-87	159	1.8	12	<.1	27	204	3
14	11-18-86	200	2.2	11	.1	28	237	380
	07-07-87	300	2.4	24	<.1	29	362	830
15	09-09-87	173	7.6	19	.1	34	281	760
16	08-12-87	65	10	500	.1	44	994	520
17	08-11-87	80	21	25	.1	22	161	90
18	09-09-87	123	4.2	140	.1	32	476	540
19	08-12-87	96	3.0	110	.4	41	314	340
20	08-06-87	142	11	3.9	.1	25	176	600
21	08-03-87	121	11	3.9	.1	27	170	40
22	08-06-87	194	18	6.2	.1	27	242	600
23	08-03-87	106	3.4	2.5	.2	13	131	36
24	07-21-87	77	10	10	.1	22	129	170
25	07-21-87	43	4.4	13	.1	28	84	110
26	04-09-86	54	11	34	<.1	36	172	29
	11-11-86	60	1.4	40	<.1	37	151	18
27	04-24-86	55	7.5	8.0	.5	22	105	8
28	04-11-86	49	1.8	2.8	<.1	15	81	<1
29	11-17-86	102	3.8	63	<.1	28	222	31
30	04-04-86	105	4.6	1.3	<.1	24	129	28
31	07-15-87	48	1.6	4.3	<.1	20	55	40
32	07-15-87	64	4.1	.70	<.1	19	98	6
33	04-23-86	73	1.5	7.5	.1	21	110	<1
	10-29-86	73	2.2	4.3	.1	21	112	<1
	07-27-87	73	1.7	2.9	.1	20	107	<1
34	08-06-87	67	3.4	2.3	.1	16	83	5
35	08-11-87	64	3.1	1.3	.1	18	82	8
36	07-27-87	60	2.4	.40	.1	18	82	<1
37	10-28-86	54	1.1	.50	<.1	18	80	<1
38	07-13-87	47	50	21	<.1	23	254	250
39	08-03-87	69	9.2	3.7	.1	21	99	27
40	07-21-87	76	2.9	.50	.1	25	108	3
41	07-27-87	62	1.4	.90	.1	26	104	3
42	07-27-87	64	3.1	7.3	.1	31	108	9

TABLE 10.--*U.S. Geological Survey data on nutrients, iron, and organic carbon, 1986-87*

[Abbreviations: mg/L, milligrams per liter; µg/L, micrograms per liter; --, data not available; NO2+NO3, nitrite plus nitrate]

Site number (fig. 4)	Date	Nitrogen, nitrate, total (mg/L as N)	Nitrogen, nitrate, dissolved (mg/L as N)	Nitrogen, nitrite, total (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Nitrogen, NO2+NO3, total (mg/L as N)	Nitrogen, NO2+NO3, dissolved (mg/L as N)	Nitrogen, ammonia total (mg/L as N)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, organic, total (mg/L as N)	Nitrogen, organic, dissolved (mg/L as N)
1	07-15-87	--	0.011	--	0.002	--	0.013	0.11	0.035	0.49	0.36
2	07-13-87	<0.010	<.010	0.003	.003	<0.010	<.010	.46	.45	.94	.65
3	07-08-87	3.0	2.8	.022	.009	3.0	2.8	.039	.020	--	.18
4	07-08-87	3.0	2.8	.020	.017	3.0	2.8	--	.029	--	.27
5	08-05-87	--	8.2	--	.047	8.9	8.3	--	.89	--	.11
6	07-22-87	--	<.010	--	.002	.010	<.010	.11	.080	.79	.52
7	09-09-87	--	<.010	--	.002	--	.010	.078	.064	.32	<.20
8	08-06-87	--	.077	--	.003	.084	.080	--	.055	--	.54
9	08-06-87	<.010	<.010	--	.005	<.010	<.010	.13	.13	--	.67
10	08-11-87	<.010	<.010	--	.002	<.010	<.010	--	.048	--	.35
11	11-17-86	--	<.10	--	<.010	--	<.10	--	.050	--	.45
	07-07-87	<.010	<.010	.005	.003	<.010	<.010	--	.054	--	.35
12	04-11-86	--	<.10	--	<.010	--	<.10	--	<.010	--	<.20
	11-18-86	--	<.10	--	<.010	--	<.10	--	.020	--	.38
	07-07-87	--	.12	.016	.005	--	.126	.044	.035	1.3	.36
14	11-18-86	--	<.10	--	<.010	--	<.10	--	.050	--	.35
	07-07-87	.15	.15	.007	.004	.16	.15	--	.058	--	.44
15	09-09-87	--	5.2	--	.58	7.1	5.8	--	.26	--	.24
16	08-12-87	--	.019	--	.008	--	.027	.11	.10	1.7	.60
17	08-11-87	.16	.093	.019	.006	.18	.099	--	.026	--	1.5
18	09-09-87	--	.12	--	.015	--	.14	--	.25	--	.75
19	08-12-87	<.010	<.010	.003	.002	<.010	<.010	.13	.002	--	1.0
20	08-06-87	.092	.088	.004	.003	.096	.091	--	.041	--	.92
21	08-03-87	--	1.3	--	.019	1.3	1.3	--	.026	--	.87
22	08-06-87	--	.36	--	.014	--	.37	--	.040	--	.16
23	08-03-87	--	.058	--	.005	--	.063	--	.028	--	.57
24	07-21-87	--	.16	.018	.005	.17	.16	.078	.078	.72	.32
25	07-21-87	--	.028	.018	.006	--	.034	.065	.056	.54	.54
26	04-09-86	--	<.10	--	<.010	--	<.10	--	<.010	--	<.20
	11-11-86	--	<.10	--	<.010	--	<.10	--	<.010	--	.20
27	04-24-86	--	.99	--	<.010	--	.99	--	.010	--	<.20
28	04-11-86	--	<.10	--	<.010	--	<.10	--	<.010	--	.30
29	11-17-86	--	.29	--	<.010	--	.29	--	.010	--	.29
30	04-04-86	--	<.10	--	<.010	--	<.10	--	.070	--	.13
31	07-15-87	--	.49	--	.002	--	.051	.020	.010	1.1	.39
32	07-15-87	<.010	<.010	<.002	.002	<.010	<.010	.013	.006	--	.49
33	04-23-86	--	.19	--	<.010	--	.19	--	.020	--	<.20
	10-29-86	--	.19	--	<.010	--	.19	--	<.010	--	.50
	07-27-87	.16	.16	.003	<.001	.16	.16	.033	.031	.17	.17
34	08-06-87	<.010	<.010	.002	.002	<.010	<.010	--	.019	--	.68
35	08-11-87	<.010	<.010	.001	<.001	<.010	<.010	.003	<.002	.80	.70
36	07-27-87	.033	.024	.003	<.001	.036	.024	.034	<.002	<.20	<.20
37	10-28-86	--	<.10	--	<.010	--	<.10	--	<.010	--	.30
38	07-13-87	--	.068	--	.002	--	.070	--	.032	--	.36
39	08-03-87	.040	.040	.004	.004	.044	.044	--	.014	--	.39
40	07-21-87	--	<.010	--	.002	.068	<.010	.090	.008	.71	.19
41	07-27-87	.034	.032	.003	<.001	.037	.032	.031	.005	--	.30
42	07-27-87	<.010	<.010	.003	<.001	<.010	<.010	.032	<.002	.37	<.20

TABLE 10.--*U.S. Geological Survey data on nutrients, iron, and organic carbon, 1986-87*--Continued

Site number (fig. 4)	Date	Nitrogen, ammonia + organic, total (mg/L as N)	Nitrogen, ammonia + organic, dissolved (mg/L as N)	Nitrogen, total (mg/L as N)	Nitrogen, dissolved (mg/L as N)	Phosphorus, total (mg/L as P)	Phosphorus, dissolved (mg/L as P)	Phosphorus, ortho, total (mg/L as P)	Phosphorus, ortho, dissolved (mg/L as P)	Iron, dissolved (µg/L as Fe)	Carbon, organic total (mg/L as C)	Carbon, organic dissolved (mg/L as C)
1	07-15-87	0.60	0.40	--	0.41	0.070	0.016	0.035	0.009	24	4.0	--
2	07-13-87	1.4	1.1	1.4	1.1	.11	.033	.025	.024	8,400	10	--
3	07-08-87	--	.20	--	3.0	.012	<.005	.008	.003	12	0.9	--
4	07-08-87	--	.30	--	3.1	.019	<.005	--	.005	34	3.3	--
5	08-05-87	1.1	1.0	10	9.3	.026	.014	<.001	<.001	160	.6	--
6	07-22-87	.90	.60	0.91	.60	.067	.054	.052	.049	1,400	5.0	--
7	09-09-87	.40	<.20	--	<.20	.017	.010	.021	.007	44	4.1	--
8	08-06-87	.80	.60	.88	.68	.035	.016	.027	.012	130	2.7	--
9	08-06-87	--	.80	--	.80	--	.065	.054	.037	8	3.4	--
10	08-11-87	--	.40	--	.40	.045	<.005	--	.008	7,300	1.4	--
11	11-17-86	--	.50	--	.50	--	.010	--	<.010	1,800	--	2.9
	07-07-87	4.3	.40	4.3	.40	.14	.017	.011	.002	2,300	4.4	--
12	04-11-86	--	<.20	--	<.20	--	.010	--	<.010	13	--	1.8
	11-18-86	--	.40	--	.40	--	.020	--	<.010	20	--	2.4
	07-07-87	1.3	.40	--	.53	.073	.014	.026	.010	15	5.6	--
14	11-18-86	--	.40	--	.40	--	.010	--	<.010	54	--	2.5
	07-07-87	3.7	.50	3.9	.66	--	.019	.011	.011	35	5.4	--
15	09-09-87	1.0	.50	8.1	6.3	--	.010	--	< .002	24	1.0	--
16	08-12-87	1.8	.70	--	.73	.028	<.005	--	.010	22,000	1.8	--
17	08-11-87	--	1.5	--	1.6	.044	<.005	.023	.020	1,100	8.3	--
18	09-09-87	--	1.0	--	1.1	<.005	<.005	<.002	<.001	19,000	8.7	--
19	08-12-87	1.0	1.0	1.0	1.0	.006	.005	<.001	<.001	9,400	1.9	--
20	08-06-87	--	1.0	--	1.1	--	.018	.009	.009	7	1.3	--
21	08-03-87	--	.90	--	2.2	.065	.051	--	.035	<3	1.2	--
22	08-06-87	.40	.20	--	.57	.027	.018	.007	.007	4	1.1	--
23	08-03-87	--	.60	--	.12	.040	.034	--	.022	87	.7	--
24	07-21-87	.80	.40	.97	.56	.13	.031	.034	.016	2,300	4.3	--
25	07-21-87	.60	.60	--	.63	.062	.040	.052	.033	65	1.7	--
26	04-09-86	--	<.20	--	<.20	--	<.010	--	<.010	30	--	0.7
	11-11-86	--	.20	--	.20	--	.010	--	<.010	57	--	.8
27	04-24-86	--	<.20	--	1.0	--	.010	--	<.010	150	--	1.0
28	04-11-86	--	.30	--	.30	--	<.010	--	<.010	7	--	.8
29	11-17-86	--	.30	--	.59	--	.010	--	<.010	270	--	1.5
30	04-04-86	--	.20	--	.20	--	.040	--	.030	1,100	--	.6
31	07-15-87	1.1	.40	--	.45	.028	.019	.016	.007	250	1.3	--
32	07-15-87	--	.50	--	.50	.017	.010	.010	.008	98	1.1	--
33	04-23-86	--	<.20	--	--	--	.020	--	.020	12	--	.7
	10-29-86	--	.50	--	.69	--	.030	--	.020	<3	--	.4
	07-27-87	.20	.20	.36	.36	.016	.016	.016	.013	<3	<.1	--
34	08-06-87	.90	.70	.90	.70	--	.014	.007	.005	100	--	--
35	08-11-87	.80	.70	.80	.70	.012	.006	.002	.002	120	3.3	--
36	07-27-87	<.20	<.20	--	--	.005	.005	--	.002	18	1.8	--
37	10-28-86	--	.30	--	.30	--	.020	--	.030	4	--	.8
38	07-13-87	2.0	.40	--	.47	.064	.017	.027	.010	380	2.7	--
39	08-03-87	.90	.40	.94	.48	.061	.023	.039	.014	170	3.8	--
40	07-21-87	.80	.20	.87	.20	.024	.006	--	.004	68	4.3	--
41	07-27-87	--	.30	--	.33	.009	.008	--	.005	28	4.1	--
42	07-27-87	.40	<.20	.40	<.20	.006	.006	--	.003	210	3.4	--

TABLE 11.--*U.S. Geological Survey data on dissolved radium-226, radon-222, and uranium, 1986-87*

[Abbreviations: µg/L, micrograms per liter; pCi/L, picocuries per liter; --, no data available]

Site number (fig. 4)	Date	Radium-226, dissolved, radon method (pCi/L)	Radon-222, dissolved (pCi/L)	Uranium, dissolved, extraction (µg/L)
1	08-25-87	--	11,000	--
2	08-25-87	--	520	--
4	08-25-87	--	2,200	--
6	08-11-87	--	9,100	--
7	09-09-87	--	1,200	--
8	08-11-87	--	1,000	--
9	08-11-87	--	780	--
10	08-11-87	--	2,500	--
11	11-17-86	0.20	2,000	0.50
	08-25-87	--	1,400	--
12	04-11-86	--	--	.52
14	11-18-86	--	--	18
15	09-09-87	--	9,900	--
16	08-12-87	--	16,000	--
17	08-11-87	--	3,900	--
18	09-09-87	--	1,200	--
19	08-12-87	--	9,500	--
20	08-25-87	--	180	--
21	08-25-87	--	660	--
22	08-25-87	--	<100	--
23	08-25-87	--	560	--
24	08-25-87	--	10,000	--
25	08-25-87	--	7,700	--
26	04-09-86	--	--	2.1
	11-11-86	.06	4,600	2.3
27	04-24-86	--	--	36
28	04-11-86	--	--	5.2
29	11-17-86	.06	2,700	12
30	04-04-86	--	--	31
32	08-25-87	--	<100	--
33	04-23-86	--	--	83
	10-29-86	--	4,200	--
	08-11-87	--	4,500	--
34	08-11-87	--	<100	--
35	08-11-87	--	<100	--
37	10-28-86	.04	100	15
39	08-25-87	--	<100	--
40	08-25-87	--	<100	--

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