INTRODUCTION

This atlas presents data on ground-water quality for the Elko 1° x 2° quadrangle. The basic data were compiled as part of the Great Basin Regional Aquifer-Systems Analysis of the U.S. Geological Survey (Harrill and others, 1983).

The data herein were obtained from various sources, including published reports and computerized data files. The computer files accessed for this effort are: (1) WATSTORE, the National Water-Data Storage and Retrieval system maintained by the Water Resources Division of the U.S. Geological Survey; (2) WADS, a system created by the Desert Research Institute, University of Nevada; and (3) RASS, a system maintained by the Geologic Division of the U.S. Geological Survey. Other potential major sources of data are: the National Uranium Resource Evaluation (NURE), a U.S. Department of Energy project; reports of sampling efforts begun in 1980 by the U.S. Bureau of Land Management; and U.S. Geological Survey reports on various hydrographic areas. Only those analyses that pass certain quality-control criteria are included herein. A chemical analysis is excluded if (1) determinations do not exist for all of the principal ions, or (2) the analytical results do not meet the following criterion for electrical balance: total cations and total anions must agree within 10 percent, using the formula:

$$\text{imbalance (in percent)} = \frac{\text{(cations - anions)}}{\text{(cations + anions)}} \times 100 ,$$

where the concentrations are expressed in milliequivalents per liter. This electrical imbalance should be small for comprehensive analyses and it therefore serves as a check on the quality of the analytical results.

Where sample sites are closely spaced, or where more than one analysis is available for a single site, areal averaging is required to prevent overprinting of information on the map (see side 1). Furthermore, if data for a deep well or for a thermal water are available within an area containing other data (shallow or nonthermal), the other data are not included in the averaging. Finally, if data for both a deep well (1,000 feet or greater) and a thermal water (30°C or greater) are available, only the deep data are used. The averaging is done over a map area of 0.5 inch by 0.5 inch at a scale of 1:250,000, which is equivalent to about 4 square miles. One consequence of this procedure is that the actual map location corresponding to the sampling site does not necessarily coincide exactly with the computer-plotted location on the map (which is at the center of the 4-square-mile averaging area). Thus, the plotted data for springs may be offset from the spring locations shown on the topographic base map.

The general chemical character of each water (that is, the relative proportions of principal cations and anions) is shown in the trilinear diagrams (side 1) and indicated by a letter code on the map (see "Explanation"). The characteristics and uses of trilinear diagrams are discussed by Hem (1970, p. 264-270). Both the map and the trilinear diagrams use the same depth-and-temperature symbols. The bar graph (side 1) indicates the relative proportion of major cations and anions for the indicated ranges of dissolved-solids concentration.

REFERENCES CITED

Ghusn, George, Jr., 1981, Statewide assessment, *in* Trexler, D. T., Koenig, B. A., Flynn, Thomas, Bruce, J. L., and Ghusn, George, Jr., Low-to-moderate temperature geothermal resource assessment for Nevada, area specific studies: Nevada Bureau of Mines and Geology Report DOE/NV/10039-3, p. 191-196.

Harrill, J. R., Welch, A. H., Prudic, D. E., Thomas, J. M., Carman, R. L., Plume, R. W., Gates, J. S., and Mason, J. L., 1983, Aquifer systems in the Great Basin Region of Nevada, Utah, and adjacent states--a study plan: U.S. Geological Survey Open-File Report 82-445, 49 p.

Hem, J. D., 1970, Study and interpretation of the chemical characteristics of natural water (2d ed.): U.S. Geological Survey Water-Supply Paper 1473, 363 p.

Johnson, C. A., 1980, Environmental controls on occurrence and chemistry of groundwater in a carbonate terrane of eastern Nevada: Desert Research Institute Publication 41066, 101 p.

CONVERSION FACTORS AND ABBREVIATIONS

"Inch-pound" units of measure used in this report may be converted to International-System (metric) units by using the following factors:

Multiply	*By*	*To obtain*
Feet (ft)	0.3048	Meters (m)
Inches (in.)	25.40	Millimeters (mm)
Square miles (mi^2)	2.590	Square kilometers (km^2)

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

Site designation[1]	Latitude, longitude (deg-min-sec)[2]		Type of site	Temperature (degrees Celsius)	pH (units)	Specific conductance (microsiemens per centimeter at 25°C)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate	Carbonate	Sulfate	Chloride	Fluoride	Silica	Dissolved solids[3]	Cation-anion balance[4]	Sampling date (year-month-day)	Well depth (feet)	Source of data[5]
CRACKER JOHNSON #2	400034	1153521	Spring	18	7.9	627	55	11	60	1.8	250	0	55	46		43	400	-2	70-08-25		Johnson, 1980
CHERRY SPRING	400325	1153718	Spring	13	7.8	507	42	37	18	1.0	300	0	31	11		15	300	0	70-08-25		Johnson, 1980
UPPER CHERRY SPRING	400348	1153710	Spring	20	7.8	513	49	45	16	0.8	340	0	22	9.5		15	320	4	70-08-25		Johnson, 1980
PETE HOLLUM SPRING	400418	1154123	Spring	9	7.8	451	47	21	22	1.0	250	0	22	17		21	270	0	71-01-26		Johnson, 1980
NARCISE SPRING	400431	1153150	Spring	10	7.9	312	35	19	5.0	0.8	210	0	8.6	2.6		11	180	-1	70-08-24		Johnson, 1980
WATER SPOUT	400446	1153619	Spring	9	7.8	304	51	7.0	4.5	0.5	200	0	6.4	2.8		7.8	180	-1	70-08-25		Johnson, 1980
GERALD CLARK WELL #2	400458	1143714	Well	15	7.8	310	41	9.7	20	6.5	170	0	15	25	0.2	60	260	1	73-07-27		WATSTORE
WALKER SPRING	400515	1154019	Spring	12	8.0	432	47	22	14	1.1	260	0	14	10		16	250	-1	70-08-25		Johnson, 1980
NOT SPECIFIED	400537	1143839	Spring	10	8.6	360	30	16	9.0	2.9	140	7	20	6.1	0.2	16	180	2	78-08-24		WATSTORE
BUCK SPRING	400538	1153750	Spring	11	7.9	405	59	13	11	0.5	250	0	15	7.7		15	250	-2	70-08-25		Johnson, 1980
COLLAR AND ELBOW SPRING	400545	1143747	Spring	22	7.7	418	49	17	8.4	4.0	230	0	20	5.1	0.3	24	240	1	80-05		Ghusn, 1981
WILLOW CREEK	400546	1154029	Spring	14	7.7	613	69	35	18	3.3	400	0	20	8.9		26	380	-1	70-08-25		Johnson, 1980
COUNTY LINE	400735	1153147	Spring	11	7.8	300	38	17	3.2	0.6	200	0	6.2	2.8		7.5	170	-1	70-08-24		Johnson, 1980
COUNTY LINE NORTH	400750	1153130	Spring	11	8.0	295	40	13	4.9	0.5	190	0	6.8	2.3		9.6	170	0	70-08-26		Johnson, 1980
HOUSE SPRING	400751	1153948	Spring	2	8.0	487	60	29	8.9	1.3	340	0	11	5.2		19	300	-1	71-03-11		Johnson, 1980
FLYN AND HAGER	400811	1153152	Spring	7	7.8	253	46	6	2.4	0.5	180	0	4.1	1.2		6.5	160	-3	70-06-10		Johnson, 1980
FLYN SPRING	400947	1153020	Spring	7	7.9	307	49	11	3.0	0.5	210	0	5.3	1.2		10	180	-1	71-01-26		Johnson, 1980
LEAR WELL, N. STEPTOE VALLEY	400954	1144424	Well	16	7.6	380	44	19	8.3	1.1	230	0	12	3.0	<0.1	26	230	0	83-06-14	331	WATSTORE
MITCHELL CREEK (N. FORK)	401022	1153659	Spring	12	8.1	453	59	28	5.7	1.1	320	0	9.1	3.0		6.3	270	0	70-08-25		Johnson, 1980
FISH HATCHERY SPRING	401104	1152927	Spring	11	7.9	287	36	15	2.6	0.6	190	0	9.1	1.3		11	170	-2	70-08-24		Johnson, 1980
BELMONT SPRING	401137	1153923	Spring	17	7.8	505	65	22	14	1.3	330	0	17	7.1		22	310	-2	70-08-25		Johnson, 1980
BRESSMAN SPRING	401323	1152909	Spring	11	8.0	269	31	16	5.0	0.8	200	0	5.0	1.2		8.5	160	-4	70-08-26		Johnson, 1980
PEARL CREEK	401625	1154019	Spring	11	8.1	370	76	5	7.5	2.8	270	0	5.5	2.6		25	260	-0	71-01-26		Johnson, 1980
BUTTE SPRING	401819	1152711	Spring	18	8.2	361	39	20	8.4	2.0	230	0	15	8.0		16	220	-3	70-08-24		Johnson, 1980
N29 E69 5A	402506	1141229	Spring	10		1,100	88	42	99	2.3	280	0	120	170		17	680	1	77-11-17		WATSTORE
N30 E69 33A	402553	1141107	Spring		8.1	549	52	22	28	2.0	150	0	55	60		15	310	3	77-11-17		WATSTORE
UNN HOT SP RUBY MARSH	403125	1152433	Spring	65	8.0	600	45	12	58	14.0	380	0	24	6.5		50	390	-6	65-05-28		WATSTORE
SULPHER HOT SPRINGS	403512	1151710	Spring	93	8.5	601	1.0	0.0	130	8.9	240	15	40	23	18.0	210	550	1	65-05-28		WATSTORE
NOT SPECIFIED	403513	1151707	Spring	93	8.4	630	1.0	0.1	140	9.2	210	13	41	29	17.0	150	490	7	77-05-17		WATSTORE
N32 E68 26A	403711	1141449	Spring	9.5	6.8	400	59	15	23	1.1	240	0	24	20		30	290	2	78-06-02		WATSTORE
N32 E68 22C	403747	1141639	Spring	10	7.0	480	65	22	12	0.8	280	0	22	9.7		17	290	2	78-06-02		WATSTORE
N32 E68 24B	403820	1141438	Spring	11	8.3	366	47	11	16	2.0	190	0	16	18		28	230	0	77-10-05		WATSTORE
HOT HOLE	404907	1154636	Spring	56	7.2	908	60	16	120	39.0	490	1	72	16	1.9	65	630	2	65-05-28		WATSTORE
HOT HOLE	404907	1154636	Spring	52	7.5		64	16	110	38.0	480	0	53	19		130	670	3	65-06-01		WATSTORE

[1] Sample-site designations having format N14 E50 04C indicate township, range, and section, respectively; letter following section number indicates quarter section, as follows: A, northeast; B, northwest; C, southwest; D, southeast. Townships and ranges are referenced to Mount Diablo base line and meridian.

[2] Data are listed in order of increasing latitude and, for identical latitudes, increasing longitude.

[3] Computed sum (with bicarbonate multiplied by 0.492 to make results comparable with residue-on-evaporation values).

[4] Computed as described in introductory text. Negative value indicates that anions exceed cations.

[5] WATSTORE is U.S. Geological Survey's National Water Data Storage and Retrieval System. Citations for other sources are listed under "References Cited."