

Data for Radon-222 and Other Radionuclides In Ground Water, Nevada, 1986-89

By Michael S. Lico

U.S. GEOLOGICAL SURVEY

Open-File Report 91-488

Prepared in cooperation with the
NEVADA BUREAU OF MINES AND GEOLOGY and the
NEVADA BUREAU OF CONSUMER HEALTH PROTECTION SERVICES



Carson City, Nevada
1992

U.S. DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., *Secretary*

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, *Director*

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not constitute endorsement by the U.S. Government.

For additional information
write to:

U.S. Geological Survey
Room 227 Federal Building
705 North Plaza Street
Carson City, NV 89701

Copies of this report may be
purchased from:

U.S. Geological Survey
Books and Open-File Reports Section
Federal Center
Box 25425
Denver, CO 80225

CONTENTS

	Page
Abstract	1
Introduction	1
Purpose and scope	2
Methods of sample collection and analysis	2
Radionuclide data	4
References cited	17

ILLUSTRATIONS

(plate is in pocket at back of report)

Plate 1. Map showing location of ground-water sites in the Carson, Truckee, and Walker River basins, northwestern Nevada, where water samples were collected and analyzed for radioactive constituents	
Figure 1. Map showing location of areas in figures 2-4 and plate 1 and hydrographic areas in Nevada	3
2-4. Maps showing location of sampling sites:	
2. Smoke Creek Desert hydrographic area	5
3. Marys Creek hydrographic area	6
4. Amargosa Desert hydrographic area	7

TABLES

Table 1. Statistical summary of radon-222 activities in ground-water samples collected in Nevada, 1986-89	8
2. Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89	9

ABBREVIATED WATER-QUALITY UNITS USED IN THIS REPORT

L (liter)
µg/L (micrograms per liter)
µm (micrometer)
mg/L (milligrams per liter)
mL (milliliter)
pCi/L (picocuries per liter)

DATA FOR RADON-222 AND OTHER RADIONUCLIDES IN GROUND WATER, NEVADA, 1986-89

By Michael S. Lico

ABSTRACT

The U.S. Geological Survey collected an extensive amount of radionuclide data from ground water in many parts of Nevada during 1986-89. Data presented in this report include a statistical summary of all radon-222 data in the U.S. Geological Survey NWIS data base, location and other information on the 278 wells and springs sampled, and results of chemical analyses that include radon-222 activity, gross alpha and gross beta radioactivity, radium-226 activity, and uranium concentrations. Maps are provided to show locations of sampled wells and springs.

INTRODUCTION

Radon is a naturally occurring, colorless, odorless, inert gas formed by the radioactive decay of uranium-238 (Wanty and Schoen, 1991). Uranium-238 is present in trace concentrations in all rocks, but certain types--such as granitic rocks, late-stage volcanic rocks, shales, and limestones--generally contain the highest concentrations (Lanctot and others, 1985, p. 68).

Radon and its decay products are radioactive and, if present at sufficient activities in air, can cause lung cancer in humans (Cothorn, 1987, p. 7). Radon released to air from drinking-water sources has been estimated to cause as much as 7 percent of the 5,000 to 20,000 lung-cancer fatalities per year in the United States (Cothorn and others, 1986, p. 40). Radon gas can be released from water to the atmosphere by any one of several household activities, including showering and laundering (Lowry and others, 1987, p. 363). Human exposure to radon and its radioactive decay products occurs primarily in two ways: (1) inhalation of radon gas or decay products that have adhered to small dust particles, directly affecting the lungs, and (2) ingestion of radon-containing water, increasing the net dose of radiation to the stomach and intestines (Brutsaert and others, 1981, p. 407). Potential health effects are greatest to private domestic well-water users because of the generally short time between pumping and consumption of well water. The half-life of radon is relatively short (3.82 days); thus, long storage times in supply tanks and aeration with subsequent loss of radon to the atmosphere can greatly decrease the amount of radon in the well water by the time of actual use.

Recent increases in the population of Nevada have resulted in the construction of many new private and municipal wells for domestic water supplies. Many of these new wells are constructed in areas where previous studies indicate high activities of radon may exist. However, little is known about the distribution and occurrence of radon (specifically radon-222) in ground water of Nevada and further study is needed to determine the extent of high radon activities. Otton and others (1985, p. 21) found anomalously high activities of radon (as much as 345 pCi/L) in water from springs in the Lake Tahoe basin. A study of public drinking-water supplies (Horton, 1985, p. 123) found high activities of radon in the Gardnerville (724 pCi/L), Reno (1,104 pCi/L), and Yerington (1,348 pCi/L) areas (fig.1).

Purpose and Scope

The purpose of this report is to release data collected by the U.S. Geological Survey from 1986 through 1989, in cooperation with the Nevada Bureau of Mines and Geology and the Nevada Bureau of Consumer Health Protection Services. Data included in this report are all analyses for radon-222 activity, gross alpha radioactivity, gross beta radioactivity, radium-226 activity, and uranium concentrations in ground-water samples. Most of the data are from northern Nevada, but data from three sites in the Amargosa Desert also are included. The 278 sample-collection sites are shown in figures 2 through 4 and on plate 1.

Methods of Sample Collection and Analysis

Water samples were obtained at each well by pumping or bailing until water temperature, specific conductance, and pH were constant, and a minimum of three well-bore volumes of water was extracted. Existing in-well pumps were used to sample public-supply and domestic wells. Samples were collected as near to the well as possible, and in all cases samples were taken before the water entered a pressure tank. Observation wells were sampled using a positive-displacement bladder pump or a Teflon bailer. Samples were collected from a polyethylene tube fitted to the pump discharge, or they were taken directly from the bailer.

Samples obtained from springs were collected as close as possible to the orifice using a syringe or a peristaltic pump.

Water samples for gross alpha and beta, radium, and uranium analysis were filtered through a 0.45-micrometer nitrocellulose membrane into 1-liter, acid-cleaned, polyethylene bottles and acidified to a pH of about 1 with concentrated hydrochloric acid (Thatcher and others, 1977, p. 11).

Gross alpha and beta radioactivity were determined by evaporating an aliquot of sample and counting the emitted alpha and beta radiation. The measured radiation was compared to the radiation emitted by standard materials--natural uranium in the case of alpha and an equilibrium mixture of strontium-90/yttrium-90 for beta. A detailed description of this analytical method is given by Thatcher and others (1977, p. 29-32). This method is regarded as a semiquantitative measure of gross sample activity.

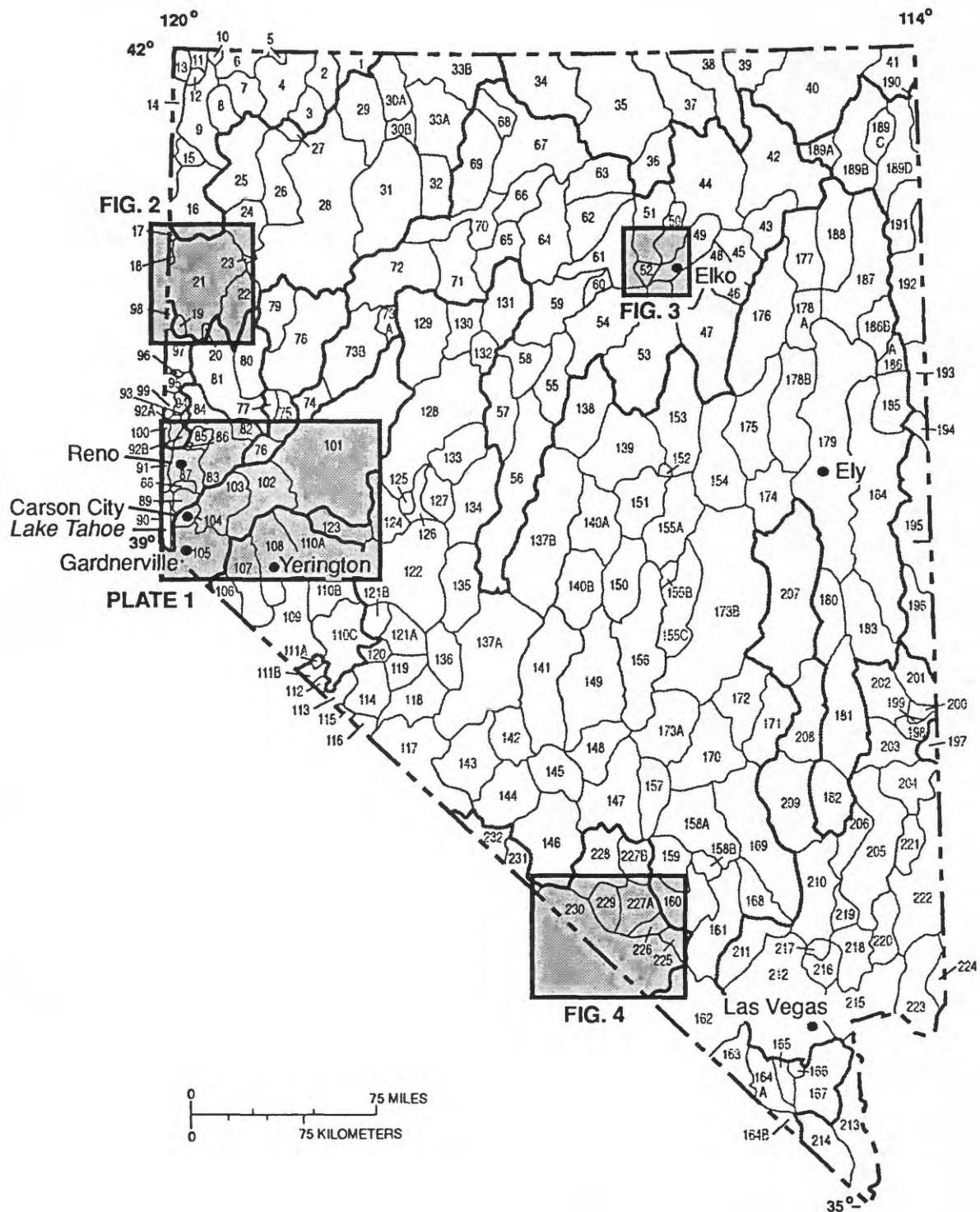


FIGURE 1.--Location of areas shown in figures 2 through 4 and plate 1 (this report) and hydrographic areas in Nevada. Modified from Rush (1968). Names and numbers of hydrographic areas where radon samples were collected are listed in table 1.

Radium-226 activity was determined by coprecipitating radium with barium sulfate, centrifuging to collect the precipitate, dissolving the precipitate in an alkaline sodium diethylene triamine pentacetate solution, allowing time for the ingrowth of alpha-emitting daughters, and counting the alpha activity (Thatcher and others, 1977, p. 43-49).

Dissolved uranium concentration was determined by evaporating an aliquot of sample, fusing the residue with a flux of sodium fluoride, sodium carbonate, and potassium carbonate, and allowing the residue-flux mixture to dry into a small disk. If a sample contained more than 10,000 mg/L of dissolved solids, a different procedure was followed: The uranium was first purified prior to evaporation by coprecipitation on aluminum phosphate, dissolving the precipitate in dilute nitric acid, and extracting the uranium with ethyl ether in the presence of magnesium nitrate. The fluorescence of the disk under ultraviolet light was measured in a reflection-type fluorimeter (Thatcher and others, 1977, p. 83-92).

Samples for laboratory analysis of total radon activity were obtained by bottom filling a 500 mL plastic beaker and allowing several beaker volumes of water to overflow, withdrawing a 10-mL aliquot of sample with a syringe from near the bottom of the beaker, carefully injecting the aliquot beneath 10 mL of a mineral-oil-based scintillator contained in a 30-mL glass scintillation vial, and tightly capping and shaking the vial. The vials were then shipped by express mail to the U.S. Geological Survey laboratory in Arvada, Colo., for analysis by liquid-scintillation counting (Prichard and Gesell, 1977). Samples were shipped as soon as possible after collection (within 24 hours) to minimize radon decay prior to analysis.

Dissolved-radon concentrations were also measured, using a field-screening method. A 1-liter polyethylene bottle was filled with 750 mL of water and capped with a septum cap. The bottle was shaken vigorously for 30 seconds to evolve radon gas in solution, then allowed to settle for 3 minutes. A 50-mL sample of the head-space gas was removed through the septum cap with a syringe and needle. The gas sample was injected, through a septum connector, into an evacuated Lucas-type, phosphor-coated cell. The cell was inserted into an EDA-200 alpha-scintillometer and the gas activity counted for 30 minutes. The counts were converted to radon activities, in pCi/L.

Duplicate water samples were collected from each well for radon analysis. If the duplicate analyses agreed to within 5 percent, the average of the two analyses was used; if not, the larger value was used. Loss of radon gas due to aeration during pumping may be significant for samples from public-supply wells, so these analyses probably represent lower radon activities at the wellhead than in the undisturbed aquifer.

RADIONUCLIDE DATA

A statistical summary of all radon-222 analyses of ground-water samples collected by the U.S. Geological Survey in Nevada during 1986-89 is presented in table 1. This table lists statistics for radon-222 activities in the entire State as well as for selected hydrographic areas. Table 2 contains all data collected for radon-222, gross alpha and gross beta radioactivity, radium-226, and uranium, and other information for the 278 wells and springs sampled during 1986-89.

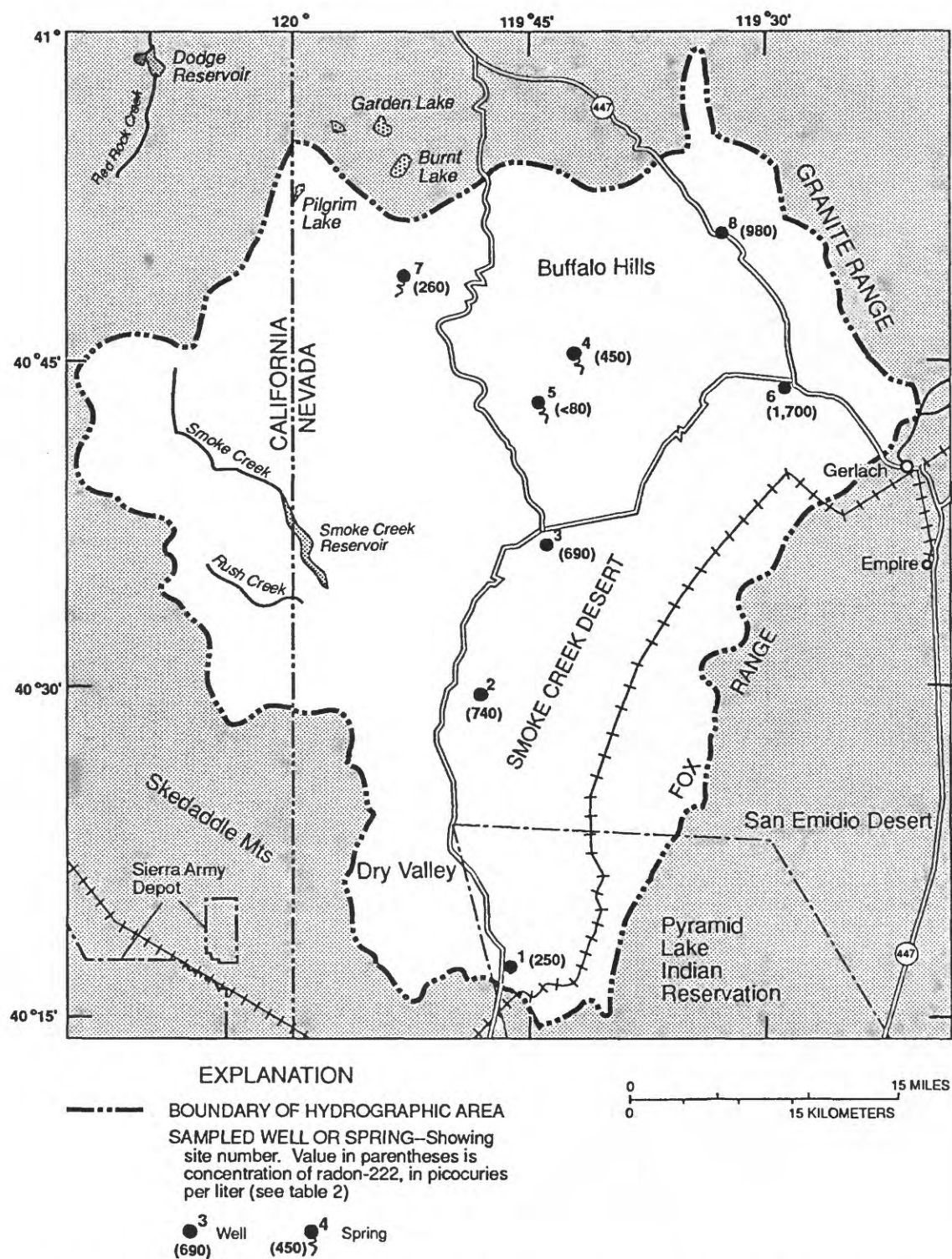


FIGURE 2.--Location of sampling sites in the Smoke Creek Desert hydrographic area.

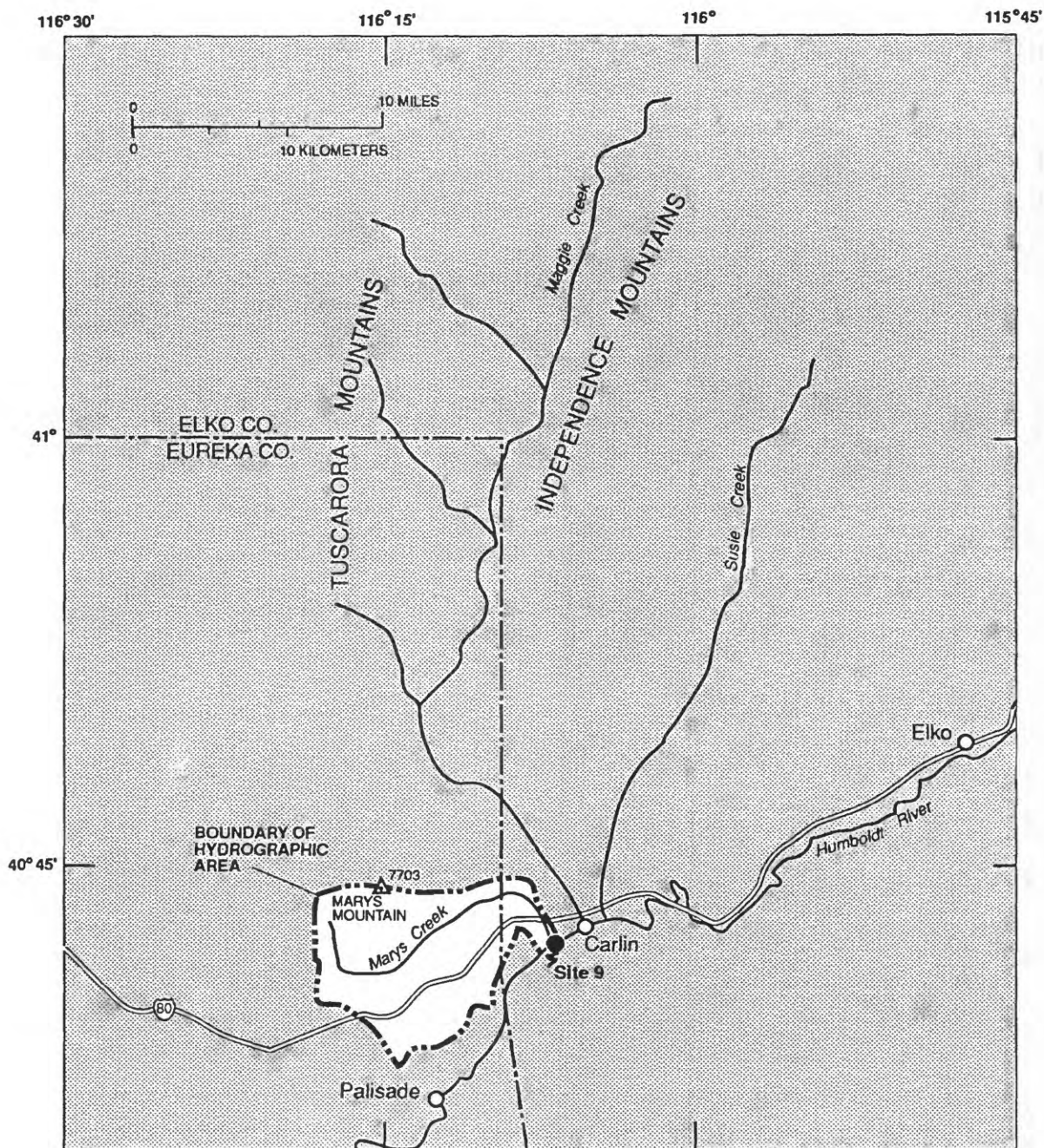


FIGURE 3.--Location of spring-sampling site in the Marys Creek hydrographic area. Concentration of radon-222 was 530 picocuries per liter.

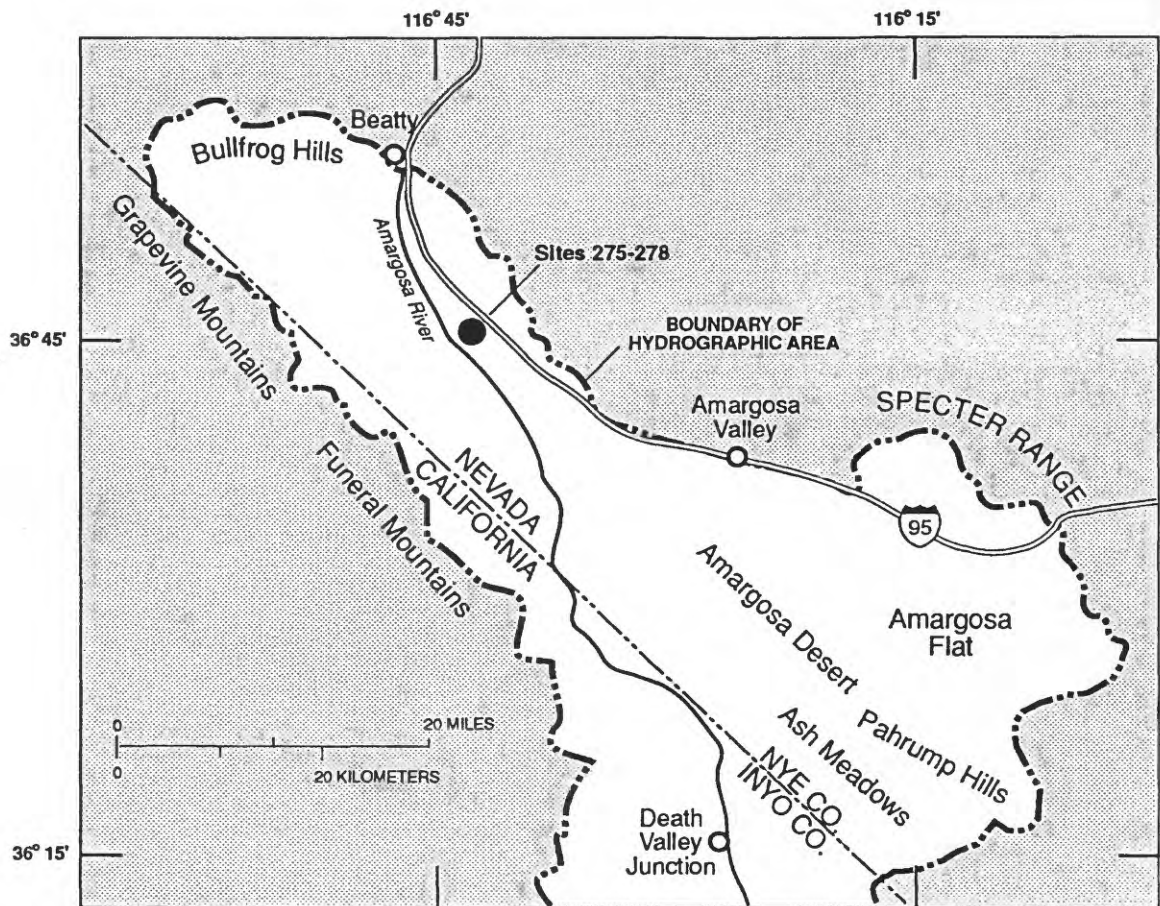


FIGURE 4.--Location of well-sampling sites in the Amargosa Desert hydrographic area. Concentrations of radon-222 at sites 275-278 ranged from 320 to 460 picocuries per liter.

TABLE 1.--Statistical summary of radon-222 activities in ground-water samples collected in Nevada, 1986-89

[Radon-222 activities are in picocuries per liter; "<," activity is less than the indicated value; "--," statistical parameters not computed for fewer than eight sites.]

Hydrographic area/number (figure 1)	Number of sites	Arithmetic mean	Median	Standard deviation	Minimum	Maximum	Percentiles	
							25 th	75 th
Smoke Creek Desert/21	8	640	570	525	<80	1,700	252	920
Marys Creek Area/52	1	--	--	--	530	530	--	--
Fernley Area/76	3	--	--	--	<80	720	--	--
Spanish Springs V./85	3	--	--	--	420	880	--	--
Truckee Meadows/87	12	780	750	192	560	1,200	635	878
Pleasant Valley/88	3	--	--	--	800	4,100	--	--
Washoe Valley/89	4	--	--	--	500	12,000	--	--
Lake Tahoe Basin/90	25	4,188	2,500	4,377	<100	16,000	720	8,400
Lemmon Valley/92	1	--	--	--	640	640	--	--
Carson Desert/101	70	659	555	387	<80	2,200	400	852
Churchill Valley/102	10	529	470	294	160	1,000	300	852
Dayton Valley/103	23	726	750	366	190	1,800	430	970
Eagle Valley/104	54	2,780	2,050	2,886	<80	14,000	1,200	3,125
Carson Valley/105	54	1,171	730	1,764	<80	14,000	495	1,100
Antelope Valley/106	3	--	--	--	300	1,400	--	--
Amargosa Desert/230	4	--	--	--	320	460	--	--

All sites	278	1,556	766	2,388	<80	16,000	487	1,400

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89

Map No.: Corresponds to site number on plate 1 and in figures 2 through 4.
Well depth: Total depth of well, in feet below land surface (to convert feet to meters, multiply by 0.3048); Sp, sample site is a spring.
Use of well: D, domestic; I, irrigation; L, livestock supply; N, industrial; O, observation; P, public supply; and, U, unused.
Lithology of aquifer: Type of rock or sediment in which the well is completed or from which spring issues: Basal fill, undifferentiated alluvium, colluvium, lacustrine, or other recent sedimentary deposits; granite, undifferentiated intrusive igneous rocks; meta sed, metamorphosed sedimentary rocks; volcanic, undifferentiated volcanic rocks.

[Chemical analyses are measures of dissolved activity or concentration unless otherwise noted. All values rounded to three significant figures. Abbreviations: pCi/L, picocuries per liter; Sr/Y-90, strontium-90/yttrium-90; µg/L, micrograms per liter; "<," activity or concentration less than indicated value; "--," data or information not available.]

Map No.	Local identification ¹	Site location		Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pCi/L)	Gross radioactivity			Radium-226 (pCi/L) as U	Uranium (µg/L as U)
		Latitude	Longitude						Alpha (µg/L as U)	Beta (pCi/L as Sr/Y-90)			
1	21 N28 E20 19BDCD1	40°16'54"N	119°47'01"W	--	U	Basin fill	07-13-88	250	--	--	--	--	--
2	21 N30 E19 11DAAB1	40°29'14"N	119°48'25"W	72	U	Basin fill	07-14-88	740	--	--	--	--	--
3	21 N31 E20 09ADB1	40°34'48"N	119°43'47"W	88	U	Basin fill	07-14-88	690	--	--	--	--	--
4	21 N33 E20 11DCAL	40°45'06"N	119°41'54"W	Sp	L	Volcanic	07-11-88	450	--	--	--	--	--
5	21 N33 E20 33AABB1	40°42'21"N	119°43'45"W	Sp	U	Volcanic	07-11-88	<80	--	--	--	--	--
6	21 N33 E22 27BABD1	40°43'15"N	119°28'57"W	--	L	Basin fill	08-04-88	1,700	--	--	--	--	--
7	21 N34 E19 20CDDB1	40°48'41"N	119°52'27"W	Sp	U	Volcanic	07-11-88	260	--	--	--	--	--
8	21 N34 E22 18BBAC1	40°50'20"N	119°32'45"W	--	L	Basin fill	08-04-88	980	--	--	--	--	--
9	52 N33 E52 28DDC1	40°42'40"N	116°07'30"W	Sp	P	Basin fill	04-10-89	530	--	--	--	--	--
10	76 N20 E25 15BCBA1	39°36'10"N	119°10'04"W	15	O	Basin fill	06-21-89	<80	--	--	--	--	18
11	76 N20 E25 22BCC1	39°35'07"N	119°10'03"W	60	O	Basin fill	06-20-89	720	--	--	--	--	6.9
12	76 N21 E25 34BCC1	39°38'51"N	119°10'08"W	12	O	Basin fill	06-21-89	<80	--	--	--	--	1.2
13	85 N20 E20 21ACDA1	39°35'12"N	119°44'15"W	220	P	Volcanic	08-30-89	420	--	0.07	--	--	9.5
14	85 N20 E21 06BBCE1	39°38'01"N	119°40'31"W	605	P	Andesite	08-30-89	880	--	--	--	--	--
15	85 N21 E20 35DCCA1	39°38'15"N	119°42'12"W	203	P	Basin fill	08-30-89	790	--	--	.10	--	13
16	87 N18 E19 24ACCA1	39°24'46"N	119°47'45"W	760	P	Basin fill	08-24-89	820	--	--	--	--	--
17	87 N18 E19 26ACAD1	39°23'56"N	119°48'45"W	710	P	Basalt	08-24-89	630	--	--	--	--	--
18	87 N18 E19 34CDCC1	39°22'31"N	119°50'19"W	236	P	Basin fill	08-18-89	660	--	--	--	--	--
19	87 N18 E20 06ACDD1	39°27'18"N	119°46'34"W	323	P	--	09-05-89	880	--	--	.34	--	4.4
20	87 N18 E20 07ACBB1	39°26'36"N	119°46'44"W	--	P	--	09-05-89	870	--	--	.19	--	3.0
21	87 N18 E20 19AABB1	39°25'06"N	119°46'22"W	645	P	Basin fill	08-18-89	1,200	--	--	--	--	--
22	87 N18 E20 27BBD1	39°24'04"N	119°43'45"W	108	P	--	08-31-89	650	--	--	.06	--	1.7
23	87 N18 E20 30CBBC1	39°23'42"N	119°47'16"W	831	P	Granite	08-24-89	1,000	--	--	--	--	--
24	87 N18 E20 33DCD1	39°22'36"N	119°44'22"W	145	P	Basin fill	08-25-89	830	--	--	--	--	--
25	87 N19 E19 12AABA1	39°32'03"N	119°47'28"W	490	P	--	09-05-89	560	--	--	.06	--	9.6
26	87 N19 E20 08BAAD1	39°32'19"N	119°45'49"W	282	P	--	09-05-89	570	--	--	.14	--	2.1
27	87 N19 E20 18BBA1	39°31'27"N	119°47'13"W	660	P	--	09-05-89	680	--	--	.10	--	4.2
28	88 N17 E18 23CDD1	39°19'21"N	119°56'00"W	Sp	U	Basin fill	09-01-89	800	--	--	.09	--	.22
29	88 N17 E19 18CDB1	39°19'59"N	119°53'34"W	500	U	Granite	09-06-89	4,100	--	--	.12	--	145
30	88 N17 E20 07CCD1	39°20'52"N	119°47'12"W	151	P	Basin fill	08-25-89	2,900	--	--	--	--	--
31	89 N16 E19 01DDAB1	39°16'35"N	119°47'24"W	--	U	--	09-01-89	500	--	--	--	--	--
32	89 N16 E19 05BABA1	39°17'11"N	119°52'04"W	Sp	P	Granite	09-07-89	2,600	--	--	.14	--	5.3
33	89 N16 E19 11CDBA1	39°15'36"N	119°49'20"W	155	D	Basin fill	08-17-89	910	--	--	--	--	--
34	89 N17 E19 27DCAA1	39°18'16"N	119°49'49"W	--	P	--	09-01-89	12,000	--	--	.30	--	10
35	90 N13 E18 01ACCA1	39°01'12"N	119°54'12"W	Sp	U	Basin fill	10-28-86	--	109	--	.04	--	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location			Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, (pCi/L)	Gross radioactivity			Uranium (µg/L as U)
		Latitude	Longitude							Radon-222 (pCi/L)	Alpha (µg/L as U)	Beta (pCi/L as Sr/Y-90)	
36	90 N13 E18 10B8B1	39°00'37"N	119°56'50"W		22	O	Basin fill	08-12-87	9,500	--	--	--	--
37	90 N13 E18 10B8D1	39°00'30"N	119°56'47"W		18	O	Basin fill	09-09-87	1,200	--	--	--	--
38	90 N13 E18 10B8A1	39°00'25"N	119°56'46"W		16	O	Basin fill	08-12-87	16,000	--	--	--	--
39	90 N13 E18 10B8B3	39°00'27"N	119°56'50"W		8	O	Basin fill	08-11-87	3,900	--	--	--	--
40	90 N13 E18 10B8D1	39°00'22"N	119°56'52"W		31	O	Basin fill	09-09-87	9,900	--	--	--	--
41	90 N13 E18 22B8A1	38°58'57"N	119°56'42"W		200	P	Granite	11-11-86	--	4,630	--	0.06	--
42	90 N13 E18 22B8D1	38°58'34"N	119°56'58"W		11	O	Basin fill	08-11-87	1,000	--	--	--	--
43	90 N13 E18 22B8D3	38°58'36"N	119°57'00"W		9	O	Basin fill	08-11-87	780	--	--	--	--
44	90 N13 E18 22B8D4	38°58'39"N	119°56'56"W		8	O	Basin fill	08-11-87	2,500	--	--	--	--
45	90 N13 E18 22B8A1	38°58'42"N	119°56'46"W		13	O	Basin fill	08-11-87	2,500	--	--	--	--
46	90 N13 E18 22B8D2	38°58'06"N	119°56'44"W		10	O	Basin fill	08-25-87	2,200	--	--	--	--
47	90 N13 E18 22B8A1	38°58'16"N	119°56'30"W		24	O	Basin fill	11-17-86	2,000	--	--	--	--
48	90 N13 E18 23B8C1	38°58'46"N	119°56'04"W		18	P	Granite	11-17-86	--	2,030	--	.20	--
49	90 N13 E18 23C8B1	38°58'24"N	119°56'04"W		Sp	U	Basin fill	08-25-87	1,400	--	--	--	--
50	90 N13 E18 23C8B1	38°58'19"N	119°56'00"W		8	O	Basin fill	10-29-86	4,500	--	--	--	--
51	90 N13 E18 27B8A1	38°57'56"N	119°56'50"W		6	O	Basin fill	08-25-87	520	--	--	--	--
52	90 N13 E18 27B8A1	38°57'48"N	119°56'42"W		23	O	Basin fill	08-25-87	11,000	--	--	--	--
53	90 N14 E18 03A8B1	39°06'43"N	119°56'32"W		19	O	Basin fill	08-27-87	560	--	--	--	--
54	90 N14 E18 10A8D1	39°05'41"N	119°56'25"W		28	O	Basin fill	08-25-87	660	--	--	--	--
55	90 N14 E18 10A8A1	39°05'39"N	119°56'10"W		27	O	Basin fill	08-25-87	180	--	--	--	--
56	90 N14 E18 10A8B1	39°05'42"N	119°56'21"W		31	O	Basin fill	08-25-87	<100	--	--	--	--
57	90 N14 E18 15D8A1	39°03'47"N	119°56'25"W		145	P	Granite	11-17-86	--	2,720	--	.06	--
58	90 N15 E18 27D8C1	39°07'45"N	119°56'34"W		7	O	Basin fill	08-27-87	10,000	--	--	--	--
59	90 N15 E18 27D8C2	39°07'43"N	119°56'31"W		9	O	Basin fill	08-27-87	7,700	--	--	--	--
60	92 N20 E19 17B8D1	39°36'05"N	119°52'27"W		248	P	Basalt	08-31-89	640	--	--	.32	0.20
61	101 N17 E29 05B8B1	39°22'00"N	118°45'42"W		24	O	Basin fill	03-08-89	700	--	68	39	52
62	101 N17 E29 12B8B2	39°21'32"N	118°41'10"W		30	O	Basin fill	01-17-89	1,300	--	430	530	220
63	101 N17 E29 12B8B3	39°21'32"N	118°41'10"W		19	O	Basin fill	01-18-89	1,100	--	330	460	390
64	101 N17 E29 12B8B4	39°21'32"N	118°41'10"W		15	O	Basin fill	01-18-89	1,100	--	270	580	320
65	101 N17 E29 12B8B1	39°21'27"N	118°41'10"W		34	O	Basin fill	02-02-89	1,300	--	500	590	520
66	101 N17 E29 12B8B2	39°21'27"N	118°41'10"W		24	O	Basin fill	02-02-89	1,000	--	--	--	--
67	101 N17 E29 12B8B3	39°21'27"N	118°41'10"W		14	O	Basin fill	02-02-89	1,300	--	590	720	660
68	101 N17 E29 12B8C1	39°21'22"N	118°41'10"W		34	O	Basin fill	01-19-89	1,100	--	400	580	310
69	101 N17 E29 12B8C2	39°21'22"N	118°41'10"W		25	O	Basin fill	01-19-89	1,200	--	490	580	480
70	101 N17 E29 12B8C3	39°21'22"N	118°41'10"W		15	O	Basin fill	01-19-89	1,100	--	820	510	630
71	101 N17 E29 12B8A1	39°21'17"N	118°41'09"W		35	O	Basin fill	02-03-89	1,100	--	510	610	390
72	101 N17 E29 12B8B2	39°21'17"N	118°41'09"W		25	O	Basin fill	02-03-89	840	--	360	630	510
73	101 N17 E29 12B8B3	39°21'17"N	118°41'09"W		15	O	Basin fill	01-18-89	1,400	--	790	670	390
74	101 N17 E29 12B8C3	39°21'12"N	118°41'09"W		25	O	Basin fill	01-20-89	1,100	--	820	470	580
75	101 N17 E29 12B8C4	39°21'12"N	118°41'09"W		15	O	Basin fill	01-20-89	1,100	--	470	370	490
76	101 N18 E28 08B8A1	39°26'43"N	118°51'53"W		17	D	Basin fill	04-19-89	760	--	23	18	--
77	101 N18 E28 08B8C1	39°26'21"N	118°52'23"W		59	D	Basin fill	08-10-89	480	--	--	--	--
78	101 N18 E28 10C8A1	39°26'15"N	118°49'43"W		175	L	Basin fill	01-27-89	560	--	.7	8.0	<.40
79	101 N18 E28 12A8A1	39°26'42"N	118°47'09"W		14	O	Basin fill	07-12-88	280	--	8.2	7.9	8.2
80	101 N18 E28 23A8A1	39°24'31"N	118°46'59"W		128	D	Basin fill	04-20-89	280	--	76	14	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location		Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pCi/L)	Radon-222 (pCi/L)	Gross radioactivity			Radium-226 (pCi/L)	Uranium (µg/L as U)
		Latitude	Longitude							Alpha (µg/L as U)	Beta (pCi/L as Sr/Y-90)			
81	101 N18 E28 23ADBD1	39°24'25"N	118°47'04"W	12	O	Basin fill	07-12-88	580	--	54	31	--	--	48
82	101 N18 E28 35CDBD1	39°22'32"N	118°48'51"W	126	D	Basin fill	04-18-89	320	--	2.7	6.9	0.04	--	--
83	101 N18 E29 02BAD1	39°27'30"N	118°41'48"W	82	D	Basin fill	04-28-89	470	--	--	--	--	--	--
84	101 N18 E29 05CCCB1	39°26'48"N	118°45'40"W	120	D	Basin fill	04-20-89	<80	--	54	8.2	0.03	--	--
85	101 N18 E29 05DDAB1	39°26'59"N	118°44'40"W	129	D	Basin fill	03-08-89	470	--	34	9.2	--	--	1.2
86	101 N18 E29 07ABAD1	39°26'40"N	118°46'03"W	23	D	Basin fill	03-06-89	1,300	--	90	41	--	--	70
87	101 N18 E29 18BAAD1	39°25'48"N	118°46'18"W	144	D	Basin fill	04-20-89	270	--	15	4.8	0.04	--	--
88	101 N18 E29 20ABCL1	39°24'58"N	118°44'48"W	14	O	Basin fill	07-13-88	250	--	30	29	--	--	33
89	101 N18 E29 27CDAD1	39°23'27"N	118°42'54"W	14	O	Basin fill	07-13-88	180	--	600	420	--	--	660
90	101 N18 E29 28DDCD1	39°23'19"N	118°43'38"W	180	D	Basin fill	04-21-89	340	--	28	8.1	<0.02	--	--
91	101 N18 E29 30DBAD1	39°23'51"N	118°46'26"W	24	D	Basin fill	03-07-89	540	--	41	31	--	--	45
92	101 N19 E27 13CCCB1	39°30'18"N	118°54'40"W	179	I	Basin fill	02-28-89	760	--	5.3	17	--	--	8.2
93	101 N19 E27 19CB1	39°29'57"N	119°00'18"W	100	D	Basin fill	02-28-89	680	--	1.5	4.6	--	--	.50
94	101 N19 E27 21ACAA1	39°30'01"N	118°56'59"W	40	D	Basin fill	04-26-89	1,000	--	--	--	--	--	--
95	101 N19 E28 17DAAC1	39°30'38"N	118°51'22"W	14	O	Basin fill	06-20-88	370	--	18	22	--	--	17
96	101 N19 E28 19CCCB1	39°29'26"N	118°53'30"W	18	O	Basin fill	09-01-88	700	--	30	21	--	--	31
97	101 N19 E28 21BBCA1	39°30'04"N	118°51'13"W	36	D	Basin fill	02-23-89	890	--	67	44	--	--	68
98	101 N19 E28 22DDAD1	39°29'29"N	118°49'07"W	88	D	Basin fill	04-18-89	470	--	--	--	--	--	--
99	101 N19 E28 23CDB1	39°29'25"N	118°48'20"W	30	D	Basin fill	03-09-89	690	--	16	8.6	--	--	5.8
100	101 N19 E28 25BCDD1	39°28'59"N	118°47'40"W	108	D	Basin fill	03-07-89	500	--	1.7	4.8	--	--	<.40
101	101 N19 E28 27DDAD1	39°28'35"N	118°49'05"W	26	D	Basin fill	08-30-89	720	--	--	--	.18	--	--
102	101 N19 E28 30ADBC1	39°29'03"N	118°52'44"W	24	D	Basin fill	02-23-89	890	--	49	27	--	--	43
103	101 N19 E28 32BAAB1	39°28'29"N	118°52'00"W	13	O	Basin fill	06-21-88	560	--	2.6	4.0	--	--	2.3
104	101 N19 E28 32CDAB1	39°27'48"N	118°51'57"W	13	O	Basin fill	06-21-88	660	--	1.9	4.7	--	--	--
105	101 N19 E28 34BCAA1	39°28'13"N	118°49'53"W	13	O	Basin fill	08-03-88	840	--	23	9.9	--	--	34
106	101 N19 E28 34CCBD1	39°27'45"N	118°50'06"W	32	D	Basin fill	02-15-89	720	--	1.4	4.0	--	--	1.6
107	101 N19 E29 07DAAD1	39°31'29"N	118°45'46"W	63	D	Basin fill	03-01-89	360	--	31	36	--	--	45
108	101 N19 E29 08BBB1	39°30'14"N	118°38'41"W	27	D	Basin fill	04-26-89	500	--	17	5.2	--	--	.50
109	101 N19 E29 08DABC1	39°31'41"N	118°45'11"W	300	D	Basin fill	04-25-89	440	--	--	--	--	--	--
110	101 N19 E29 16ACBB1	39°30'51"N	118°43'58"W	132	D	Basin fill	04-25-89	300	--	--	--	--	--	--
111	101 N19 E29 17ABAD1	39°31'01"N	118°45'18"W	100	D	Basin fill	03-06-89	520	--	5.7	4.1	--	--	<.40
112	101 N19 E29 18CBB1	39°30'27"N	118°46'15"W	510	I	Basalt	03-02-89	240	--	3.0	7.5	--	--	1.5
113	101 N19 E29 24ABDD1	39°30'03"N	118°40'20"W	14	O	Basin fill	08-03-88	450	--	--	--	--	--	40
114	101 N19 E29 25AAD1	39°29'14"N	118°40'06"W	17	D	Basin fill	08-03-88	540	--	--	--	.11	--	--
115	101 N19 E29 25ADBD1	39°29'04"N	118°40'13"W	96	D	Basin fill	08-30-89	410	--	16	19	.16	--	--
116	101 N19 E29 27CDAA1	39°28'42"N	118°42'54"W	14	O	Basin fill	06-22-88	650	--	21	16	--	--	17
117	101 N19 E29 29BACB1	39°29'07"N	118°45'37"W	67	P	Basalt	03-01-89	110	--	3.5	8.8	--	--	2.5
118	101 N19 E29 29CACAL	39°28'47"N	118°45'18"W	93	P	Basalt	02-22-89	550	--	11	2.3	--	--	<.40
119	101 N19 E29 30CBAD1	39°28'50"N	118°46'34"W	484	P	Basalt	01-25-89	210	--	2.8	8.7	--	--	2.2
120	101 N19 E29 30CDBC2	39°28'37"N	118°46'29"W	521	P	Basalt	01-25-89	<80	--	2.3	8.2	--	--	2.2
121	101 N19 E29 33CBBC1	39°28'00"N	118°44'32"W	540	P	Basalt	01-26-89	120	--	2.9	8.6	--	--	1.7
122	101 N19 E30 13ACAA1	39°30'52"N	118°33'35"W	12	O	Basin fill	08-02-88	670	--	--	--	--	.09	210
123	101 N19 E30 23DBCD1	39°29'38"N	118°34'53"W	17	D	Basin fill	04-25-89	650	--	--	--	--	--	--
124	101 N19 E30 27ADDA1	39°29'02"N	118°35'32"W	29	O	Basin fill	08-30-89	400	--	--	--	--	--	610
125	101 N19 E30 30BBBA1	39°29'21"N	118°40'00"W	21	D	Basin fill	06-21-88	720	--	960	890	--	--	--
						Basin fill	04-19-89	660	--	55	39	0.7	--	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location			Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pCi/L)	Gross radioactivity			Uranium (µg/L as U)
		Latitude	Longitude							Radon-222 (pCi/L)	Alpha (µg/L as U)	Beta (pCi/L as Y-90)	
126	101 N19 E30 31BAD1	39°28'22"N	118°39'54"W		11	O	Basin fill	06-22-88	380	--	190	230	160
127	101 N20 E29 22BAC1	39°35'06"N	118°43'22"W		12	O	Basin fill	06-22-88	360	--	180	250	--
128	101 N20 E31 34BAC1	39°33'41"N	118°43'16"W		294	D	Basalt	08-02-88	490	--	430	210	450
129	101 N20 E31 04CAD1	39°37'19"N	118°30'33"W		14	O	Basin fill	03-09-89	2,200	--	6.2	16	.70
130	101 N20 E31 15BAB1	39°36'24"N	118°29'41"W		12	O	Basin fill	06-15-89	490	--	--	--	8.3
131	102 N17 E24 03BAD1	39°22'26"N	119°16'21"W		360	D	Meta sed	09-21-89	180	--	--	--	--
132	102 N17 E25 18DD1	39°19'52"N	119°12'40"W		150	D	Basin fill	09-25-89	580	--	--	--	--
133	102 N17 E25 29BAB1	39°18'47"N	119°11'38"W		13	O	Basin fill	07-26-88	480	--	1.4	4.7	.70
134	102 N17 E25 32BAA1	39°18'08"N	119°12'07"W		17	O	Basin fill	07-26-88	390	--	36	20	28
135	102 N18 E24 15CCBA1	39°25'18"N	119°17'04"W		400	D	Basin fill	09-30-89	340	--	24	20	--
136	102 N18 E24 25AAD1	39°24'03"N	119°13'51"W		400	P	Basin fill	01-13-89	890	--	2.2	8.6	2.1
137	102 N18 E24 28CBBD1	39°23'30"N	119°17'54"W		282	D	Basin fill	09-21-89	340	--	--	--	--
138	102 N18 E24 33BDA1	39°23'11"N	119°17'45"W		230	D	Basin fill	09-26-89	460	--	--	--	--
139	102 N18 E24 35ABAD1	39°23'20"N	119°15'09"W		196	D	Basin fill	09-26-89	840	--	--	--	--
140	102 N18 E25 17CCBC1	39°25'15"N	119°12'37"W		145	P	Basin fill	02-01-89	1,000	--	5.0	18	4.0
141	103 N15 E20 14CAAA1	39°09'49"N	119°42'15"W		500	P	Basin fill	06-08-88	360	--	3.9	3.8	2.7
142	103 N15 E20 22BAC1	39°09'17"N	119°43'07"W		15	O	Basin fill	08-30-88	1,100	--	2.5	2.9	1.5
143	103 N15 E21 29BAC1	39°08'30"N	119°38'55"W		Sp	U	Basin fill	06-02-89	970	--	--	--	--
144	103 N16 E20 01ADAC1	39°17'00"N	119°40'57"W		Sp	U	Andesite	06-07-89	250	--	--	--	1.2
145	103 N16 E21 12ADAB1	39°16'10"N	119°33'59"W		18	O	Basin fill	06-23-88	310	--	2.3	3.0	1.1
146	103 N16 E21 14ACAD1	39°15'26"N	119°35'18"W		130	P	Volcanic	12-01-88	1,200	--	6.7	9.5	4.1
147	103 N16 E21 15CCDC1	39°14'41"N	119°37'01"W		128	D	Volcanic	02-24-89	1,800	--	31	21	23
148	103 N16 E21 23BAA1	39°14'17"N	119°35'18"W		180	P	Basin fill	12-01-88	1,000	--	--	--	--
149	103 N16 E21 26CBAB1	39°13'08"N	119°35'52"W		102	P	Basin fill	05-02-89	690	--	--	--	--
150	103 N16 E21 29DCDD1	39°12'59"N	119°38'42"W		82	D	Basin fill	09-19-89	970	--	--	--	--
151	103 N16 E22 06CDD1	39°16'27"N	119°33'21"W		120	I	Basin fill	12-08-88	580	--	2.2	4.2	1.5
152	103 N16 E22 09BCBC1	39°16'05"N	119°31'34"W		68	O	Basin fill	06-23-88	190	--	2.6	14	1.6
153	103 N16 E22 09CACA1	39°15'38"N	119°31'13"W		133	D	Basin fill	11-29-88	320	--	6.3	13	6.8
154	103 N17 E22 20DABB1	39°19'36"N	119°31'51"W		280	D	Basin fill	09-27-89	620	--	--	--	--
155	103 N17 E22 27DACC1	39°18'23"N	119°29'34"W		132	D	Basin fill	09-20-89	750	--	--	--	--
156	103 N17 E22 30DABC1	39°18'37"N	119°33'05"W		200	D	Basin fill	09-27-89	750	--	--	--	--
157	103 N17 E22 32DDBC1	39°17'23"N	119°31'50"W		96	D	Basin fill	01-31-89	770	--	2.5	5.4	<.40
158	103 N17 E23 02BCC1	39°21'44"N	119°22'34"W		305	P	Basin fill	12-05-88	750	--	3.3	5.2	1.9
159	103 N17 E23 10BCCA1	39°21'15"N	119°23'39"W		200	D	Basin fill	02-01-89	960	--	6.3	10	3.7
160	103 N17 E23 17DCBC1	39°20'07"N	119°25'35"W		150	D	Basin fill	01-10-89	480	--	2.6	6.7	1.6
161	103 N17 E23 36BADC1	39°17'58"N	119°21'10"W		389	I	Basin fill	10-02-89	430	--	--	--	--
162	103 N17 E24 34DDAC1	39°17'28"N	119°16'06"W		110	P	Basin fill	01-24-89	810	--	27	9.3	8.8
163	103 N18 E23 35DCDC1	39°22'35"N	119°21'56"W		268	P	Basin fill	01-11-89	630	--	1.6	4.2	1.0
164	104 N14 E19 12ADAB1	39°05'42"N	119°47'20"W		155	D	Basin fill	08-27-87	--	--	--	--	--
165	104 N14 E20 06CBAB2	39°06'23"N	119°47'05"W		96	D	Basin fill	08-27-87	--	--	--	--	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location			Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222 total (pCi/L)	Gross radioactivity			Radon-226 (pCi/L)	Uranium (µg/L as U)
		Latitude	Longitude							Radon-222 (pCi/L)	Alpha (µg/L as U)	Beta (pCi/L as Y-90)		
166	104 N15 E19 02DDC1	39°11'13"N	119°48'19"W		250	P	Granite	09-07-88	14,000	--	41	21	--	39
167	104 N15 E19 12CDBD1	39°10'17"N	119°47'55"W		195	D	Basin fill	09-07-88	14,000	--	44	21	--	--
168	104 N15 E19 12DADD2	39°10'35"N	119°47'15"W		470	P	Basin fill	08-27-87	4,300	--	--	--	--	--
169	104 N15 E19 13CDBB1	39°09'38"N	119°48'00"W		250	D	Granite	05-11-88	4,900	--	--	8.1	--	13
170	104 N15 E19 23CCBB1	39°08'46"N	119°49'17"W		Sp	L	Alluvium	06-02-89	14,000	--	3.5	3.6	0.15	29
171	104 N15 E19 28ADAD1	39°08'14"N	119°50'36"W		Sp	U	Granite	05-31-89	<80	--	--	--	--	--
172	104 N15 E19 33DDDD1	39°06'47"N	119°50'05"W		290	P	Granite	08-11-88	2,300	--	1.8	1.8	--	1.2
173	104 N15 E19 35BDAA1	39°07'20"N	119°49'11"W		Sp	L	Alluvium	06-01-89	220	--	--	--	--	--
174	104 N15 E20 01CCBC1	39°11'08"N	119°42'07"W		455	P	Granite	08-24-88	2,600	--	5.4	3.8	--	2.7
175	104 N15 E20 03CCCB1	39°11'23"N	119°43'53"W		69	D	Basin fill	08-30-88	1,900	--	52	28	--	56
176	104 N15 E20 05ABDA1	39°12'04"N	119°45'14"W		120	D	Basin fill	08-17-88	2,000	--	3.5	2.3	--	2.2
177	104 N15 E20 06DAAC2	39°11'33"N	119°46'17"W		455	P	Basin fill	05-25-88	2,400	--	19	9.9	--	25
178	104 N15 E20 06DDAC1	39°11'20"N	119°46'17"W		18	O	Basin fill	03-09-89	2,300	--	--	--	--	--
179	104 N15 E20 07CACB1	39°10'36"N	119°47'00"W		92	D	--	06-02-89	1,200	--	--	--	--	--
180	104 N15 E20 07DDAC1	39°10'37"N	119°46'15"W		21	O	Basin fill	09-04-87	3,100	--	--	--	--	--
181	104 N15 E20 07DDBB1	39°10'31"N	119°46'23"W		470	P	Granite	08-27-87	2,500	--	--	--	--	--
182	104 N15 E20 08BAC1	39°10'07"N	119°46'53"W		30	O	Basin fill	05-11-88	4,000	--	13	11	--	19
183	104 N15 E20 08BDB1	39°11'04"N	119°45'48"W		227	P	Basin fill	02-27-89	11,000	--	--	--	--	--
184	104 N15 E20 09DACC1	39°10'39"N	119°44'02"W		96	D	Basin fill	09-02-88	2,800	--	38	19	--	37
185	104 N15 E20 09DBD1	39°10'39"N	119°44'30"W		11	O	Basin fill	03-20-88	2,100	--	21	7.8	--	12
186	104 N15 E20 10ADDA2	39°10'58"N	119°42'46"W		1,250	P	Granite	01-20-89	1,100	--	--	--	--	--
187	104 N15 E20 10BDDA1	39°10'53"N	119°43'25"W		18	O	Basin fill	08-24-88	630	--	1.1	5.9	--	.5
188	104 N15 E20 16BBB1	39°10'05"N	119°45'00"W		21	O	Basin fill	03-07-89	660	--	--	--	--	--
189	104 N15 E20 16CBC1	39°09'43"N	119°45'00"W		30	O	Basin fill	06-02-89	590	--	--	--	--	--
190	104 N15 E20 17AADA1	39°10'10"N	119°45'04"W		300	P	Basin fill	02-24-89	2,400	--	--	--	--	--
191	104 N15 E20 17AADC1	39°10'14"N	119°45'07"W		700	P	Basin fill	09-09-87	1,500	--	--	--	--	--
192	104 N15 E20 17ADCA4	39°10'08"N	119°45'06"W		29	P	Basin fill	07-12-89	1,500	--	--	--	--	--
193	104 N15 E20 17ADCS5	39°10'08"N	119°45'06"W		58	P	Basin fill	09-03-87	3,200	--	--	--	--	--
194	104 N15 E20 17ABD1	39°10'10"N	119°45'21"W		19	O	Basin fill	03-02-87	1,400	--	--	--	--	--
195	104 N15 E20 17BACC1	39°10'13"N	119°45'50"W		19	O	Basin fill	05-31-89	5,100	--	--	--	--	--
196	104 N15 E20 17CABA1	39°09'57"N	119°45'48"W		35	O	Basin fill	01-12-89	3,200	--	--	--	--	--
197	104 N15 E20 17CABA2	39°09'57"N	119°45'48"W		30	O	Basin fill	03-03-89	2,700	--	--	--	--	--
198	104 N15 E20 17CABA3	39°09'57"N	119°45'48"W		25	O	Basin fill	03-03-89	2,400	--	--	--	--	--
199	104 N15 E20 17CABA4	39°09'57"N	119°45'48"W		20	O	Basin fill	03-06-89	2,600	--	--	--	--	--
200	104 N15 E20 17CAD1	39°09'43"N	119°45'38"W		21	O	Basin fill	02-28-89	1,800	--	--	--	--	--
201	104 N15 E20 17DBD1	39°09'50"N	119°45'29"W		820	P	Basin fill	03-03-89	2,700	--	--	--	--	--
202	104 N15 E20 17DDA1	39°09'33"N	119°45'06"W		604	P	Basin fill	03-03-89	2,400	--	--	--	--	--
203	104 N15 E20 18ACAA1	39°10'05"N	119°46'57"W		21	O	Basin fill	09-08-88	1,700	--	16	8.9	--	19
204	104 N15 E20 18DCA1	39°09'45"N	119°46'28"W		20	O	Basin fill	03-08-89	1,500	--	1.1	1.9	--	1.1
205	104 N15 E20 20BDD1	39°09'15"N	119°45'55"W		16	O	Basin fill	02-27-89	6,800	--	--	--	--	--
								06-02-89	5,100	--	--	--	--	--
								02-24-89	1,100	--	--	--	--	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location			Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pci/L)	Gross radioactivity			Radium-226 (pci/L as U)	Uranium (µg/L as U)
		Latitude	Longitude							Alpha (µg/L as U)	Beta (µg/L as Sr/Y-90)			
206	104 N15 E20 20CACC1	39°08'52"N	119°45'46"W		100	D	Basin fill	08-18-88	1,300	3.1	3.6	--	--	1.2
207	104 N15 E20 20DBD1	39°08'55"N	119°45'29"W		14	O	Basin fill	02-28-89	1,400	--	--	--	--	--
208	104 N15 E20 21BACC1	39°09'15"N	119°44'46"W		18	O	Basin fill	03-07-89	1,000	--	--	--	--	--
209	104 N15 E20 21CABA1	39°08'57"N	119°44'34"W		68	D	Basin fill	03-31-89	700	--	--	--	--	--
210	104 N15 E20 28CCBD1	39°07'51"N	119°44'54"W		152	D	Basin fill	08-26-88	1,300	14	5.6	--	--	8.5
211	104 N15 E20 29BDB1	39°08'02"N	119°46'17"W		120	P	Basin fill	08-19-88	690	4.5	2.6	--	--	2.8
212	104 N15 E20 29BCAC1	39°08'03"N	119°45'42"W		560	P	Basin fill	08-16-88	830	1.4	1.3	--	--	.6
213	104 N15 E20 31BABA1	39°07'43"N	119°46'31"W		344	D	Granite	05-24-88	1,200	2.7	2.1	--	--	2.7
214	104 N15 E20 31DCC1	39°06'55"N	119°46'31"W		160	P	Basin fill	03-24-88	930	2.9	2.4	--	--	--
215	104 N15 E20 32BDBA1	39°07'33"N	119°45'55"W		590	P	Basin fill	08-11-88	2,300	6.6	3.1	--	--	5.9
216	104 N16 E19 36DAAC1	39°12'24"N	119°47'21"W		91	P	Granite	08-15-88	1,100	4.3	3.6	--	--	3.2
217	104 N16 E20 31ACCB1	39°12'34"N	119°46'40"W		289	D	Basin fill	05-24-88	2,500	42	18	--	--	38
218	105 N11 E20 06BDA1	38°50'49"N	119°46'45"W		70	D	Basin fill	08-12-88	7,100	18	17	--	--	14
219	105 N11 E21 35ABAB1	38°46'45"N	119°35'33"W		115	D	Basin fill	07-28-88	3,200	4.0	4.8	--	--	--
220	105 N12 E19 10DCCA1	38°54'41"N	119°49'55"W		107	D	Granite	08-20-87	220	--	--	--	--	--
221	105 N12 E19 13BAAB1	38°55'22"N	119°48'13"W		27	O	Basin fill	05-04-88	7,100	2.2	2.7	--	--	.8
222	105 N12 E19 15DBAA1	38°54'10"N	119°49'45"W		300	P	Basin fill	08-23-88	550	5.3	5.0	--	--	5.5
223	105 N12 E19 23DD1	38°52'55"N	119°48'23"W		141	D	Basin fill	07-07-87	--	--	--	--	--	--
224	105 N12 E19 24CCAA1	38°53'03"N	119°48'02"W		132	D	Basin fill	08-20-87	3,600	--	--	--	--	--
225	105 N12 E19 36DADA2	38°51'22"N	119°47'15"W		17	O	Basin fill	08-20-87	10,100	--	--	--	--	--
226	105 N12 E20 04ADA1	38°56'04"N	119°43'56"W		300	P	Basin fill	07-07-87	7,200	--	--	--	--	--
227	105 N12 E20 04BAB1	38°56'21"N	119°44'45"W		300	P	Basin fill	08-12-86	5,020	--	--	0.56	--	--
228	105 N12 E20 06ADDD1	38°55'54"N	119°46'14"W		460	I	Basin fill	07-07-87	3,610	--	--	--	--	--
229	105 N12 E20 06DB1	38°55'46"N	119°46'37"W		120	D	Basin fill	08-20-87	5,600	--	--	--	--	--
230	105 N12 E20 09BCAD1	38°55'12"N	119°44'48"W		350	I	Basin fill	08-20-87	2,700	--	--	--	--	--
231	105 N12 E20 11ADD1	38°55'09"N	119°41'48"W		125	D	Basin fill	06-16-88	700	--	--	--	--	3.6
232	105 N12 E20 15ADD1	38°54'14"N	119°42'54"W		375	P	Basin fill	07-11-88	840	.8	1.5	--	--	<.4
233	105 N12 E20 16CCD1	38°53'45"N	119°44'51"W		176	N	Basin fill	07-06-87	--	4.9	5.0	--	--	--
234	105 N12 E20 17CCD1	38°53'52"N	119°45'54"W		91	D	Basin fill	08-23-88	940	--	--	--	--	3.2
235	105 N12 E20 20ABAA1	38°53'42"N	119°45'17"W		450	P	Basin fill	07-21-88	860	4.9	5.5	--	--	--
236	105 N12 E20 24DCC2	38°53'21"N	119°40'50"W		145	D	Basin fill	07-21-88	1,200	7.2	4.2	--	--	5.7
237	105 N12 E20 32DBD1	38°51'25"N	119°45'28"W		15	O	Basin fill	07-25-88	1,300	1.1	2.9	--	--	.80
238	105 N12 E21 18CAB1	38°54'12"N	119°40'14"W		--	N	Basin fill	05-04-88	760	2.0	3.6	--	--	1.50
239	105 N13 E19 02AD1	39°01'10"N	119°48'30"W		500	I	Basin fill	07-14-88	1,100	<.4	2.0	--	--	--
240	105 N13 E19 09ADCA1	39°00'21"N	119°50'43"W		180	D	Basin fill	08-20-87	440	--	--	--	--	--
241								08-24-87	530	--	--	--	--	--
242								07-21-88	1,400	--	2.0	--	--	.50
243								08-10-88	1,500	7.9	5.5	--	--	6.1
244								08-24-87	800	--	--	--	--	--
245								07-07-87	763	--	--	--	--	--
246								08-24-87	<100	--	--	--	--	--
247								07-07-88	1,800	1.7	2.2	--	--	.50
248								07-07-88	1,700	1.8	2.3	--	--	--
249								07-30-86	601	--	--	.06	--	--
250								07-07-87	593	--	--	--	--	--
251								09-20-88	700	1.6	2.7	--	--	<.40
252								08-18-86	704	--	--	.09	--	--
253								08-27-87	380	--	--	--	--	--

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986--Continued

Map No.	Local identification ¹	Site location			Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pCi/L)	Radon-222 (pCi/L)	Gross radioactivity			Radium-226 (pCi/L)	Uranium (µg/L as U)
		Latitude	Longitude								Alpha (µg/L as U)	Beta (pCi/L as Sr/Y-90)			
241	105 N13 E19 10DBB1	39°00'15"N	119°50'01"W		115	-	Basin fill	07-07-87	--	1,130	--	--	--	--	--
242	105 N13 E19 12BBAD1	39°00'37"N	119°48'07"W		400	I	Basin fill	06-09-88	1,400	--	4.3	3.9	--	--	<0.40
243	105 N13 E19 13BCC1	38°59'25"N	119°48'33"W		500	D	Basin fill	08-18-86	--	546	--	--	0.07	--	--
244	105 N13 E19 25CDD1	38°57'16"N	119°47'54"W		260	I	Basin fill	07-06-87	--	504	--	--	--	--	2.0
245	105 N13 E20 02CBB1	39°01'06"N	119°42'43"W		176	-	Basin fill	07-25-88	690	--	2.8	3.8	--	--	--
246	105 N13 E20 03DDDB1	39°00'48"N	119°49'34"W		24	O	Basin fill	08-27-86	--	577	--	--	.04	--	--
247	105 N13 E20 05CDD1	39°00'45"N	119°45'38"W		300	D	Basin fill	08-25-87	--	320	--	--	--	--	--
248	105 N13 E20 07DADD1	39°00'05"N	119°46'11"W		170	D	Basin fill	07-14-88	560	--	1.8	6.7	--	--	<.40
249	105 N13 E20 08CAA1	39°00'17"N	119°45'39"W		135	D	Basin fill	06-13-88	460	--	1.6	1.7	--	--	.80
250	105 N13 E20 08CDB1	39°00'00"N	119°45'41"W		17	O	Basin fill	07-07-89	1,700	--	--	--	--	--	--
251	105 N13 E20 17BDC1	38°59'24"N	119°45'48"W		286	I	Basin fill	07-06-89	500	--	--	--	--	--	--
252	105 N13 E20 19BACC1	38°58'42"N	119°46'56"W		18	O	Basin fill	04-30-87	460	--	--	--	--	--	--
253	105 N13 E20 19DABC1	38°58'22"N	119°46'25"W		6	O	Basin fill	08-14-89	500	--	--	--	--	--	--
254	105 N13 E20 26ABBB1	38°58'01"N	119°42'15"W		130	D	Basin fill	08-05-88	790	--	6.1	3.7	--	--	5.6
255	105 N13 E20 26BACC1	38°57'44"N	119°42'39"W		200	P	Basin fill	07-06-88	<80	--	28	12	--	--	21
256	105 N13 E20 29BDD1	38°57'42"N	119°45'38"W		118	D	Basin fill	08-09-88	1,200	--	25	15	--	--	26
257	105 N13 E20 29CDD1	38°57'19"N	119°45'47"W		400	P	Basin fill	08-27-87	--	674	--	--	.07	--	--
258	105 N13 E20 31BAA1	38°56'42"N	119°46'45"W		413	I	Basin fill	07-27-88	710	--	1.4	2.5	--	--	1.1
259	105 N13 E20 34ACC1	38°56'54"N	119°43'18"W		80	D	Basin fill	08-18-87	--	780	--	--	--	--	3.0
260	105 N13 E21 33BCAB1	38°57'03"N	119°38'13"W		163	D	Basin fill	08-10-88	1,000	--	3.4	2.9	--	--	--
261	105 N13 E21 33CDD1	38°56'26"N	119°37'52"W		132	D	Basin fill	08-25-87	860	--	1.5	4.0	--	--	2.0
262	105 N14 E19 14BBD1	39°04'57"N	119°49'13"W		100	D	Basin fill	07-07-89	530	--	--	--	--	--	--
263	105 N14 E19 25BDD2	39°03'17"N	119°47'30"W		18	O	Basin fill	06-16-88	860	--	6.2	4.3	--	--	3.6
264	105 N14 E20 05BBA1	39°06'42"N	119°45'54"W		290	D	Granite	06-18-88	820	--	--	--	.04	--	--
265	105 N14 E20 17ADCA1	39°04'46"N	119°45'14"W		27	O	--	08-12-86	--	898	--	--	--	--	--
266	105 N14 E20 18ABAB1	39°05'03"N	119°46'35"W		425	P	Basin fill	07-06-87	--	658	--	--	--	--	--
267	105 N14 E20 28CDD1	39°02'32"N	119°44'32"W		88	D	Basin fill	06-09-88	790	--	2.1	2.2	--	--	2.5
268	105 N14 E20 31DDC1	39°01'39"N	119°46'19"W		257	I	Basin fill	07-20-88	880	--	35	21	--	--	36
269	105 N14 E20 34BDC1	39°02'08"N	119°43'32"W		100	D	Basin fill	08-17-88	2,200	--	6.2	3.1	--	--	4.3
270	105 N15 E20 02CDD1	39°11'21"N	119°42'28"W		125	N	Basin fill	06-24-87	310	--	--	--	--	--	--
								08-05-87	--	<100	--	--	--	--	--
								08-26-87	--	<100	--	--	--	--	--
								08-06-86	--	610	--	--	.05	--	--
								08-18-87	--	560	--	--	--	--	--
								07-28-88	940	415	6.2	2.0	--	--	--
								08-26-87	--	200	--	--	--	--	--
								08-04-88	850	--	.7	3.8	--	--	<.40
								08-25-87	460	--	--	--	--	--	--
								08-19-88	240	--	.6	4.7	--	--	<.40

TABLE 2.--Radionuclide analyses and other information for wells and springs sampled in parts of Nevada, 1986-89--Continued

Map No.	Local identification ¹	Site location		Well depth (feet below land surface)	Use of well	Lithology of aquifer	Date	Radon-222, total (pCi/L)	Gross radioactivity			Radium-226 (pCi/L)	Uranium (µg/L as U)
		Latitude	Longitude						Alpha (µg/L as U)	Beta (pCi/L as Sr/Y-90)			
271	105 N15 E20 33CCDD1	39°06'53"N	119°44'43"W	235	P	Granite	08-01-88	1,700	--	3.0	2.5	--	2.5
272	106 N10 E22 15DCB1	38°43'33"N	119°30'17"W	--	P	--	08-04-86	--	339	--	--	0.06	--
							08-19-87	--	480	--	--	--	--
							08-19-87	--	301	--	--	--	--
273	106 N10 E22 29CAD1	38°41'56"N	119°32'33"W	183	D	Basin fill	08-18-87	--	1,410	--	--	--	--
274	106 N10 E22 32BAB2	38°41'36"N	119°32'39"W	105	D	Basin fill	08-01-86	--	836	.1	--	--	--
							08-19-87	--	450	--	--	--	--
							08-19-87	--	365	--	--	--	--
275	230 S13 E47 26DCCB1	36°46'15"N	116°41'24"W	307	O	Basin fill	08-15-89	430	--	--	--	--	--
276	230 S13 E47 35ACB1	36°45'57"N	116°41'18"W	326	O	Basin fill	08-17-89	320	--	--	--	--	--
277	230 S13 E47 35BAD1	36°45'57"N	116°41'30"W	575	O	Basin fill	08-14-89	410	--	--	--	--	--
278	230 S13 E47 35BDB1	36°45'56"N	116°41'35"W	404	O	Basin fill	08-17-89	460	--	--	--	--	--

¹The 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: 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 so on (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. For example, site 105 N12 E20 04ADA1 is in Carson Valley (hydrographic area 105). It is the first site recorded in the northeast quarter of the southeast quarter of the northeast quarter of section 4, Township 12 North, Range 20 East, Mount Diablo base line and meridian.

REFERENCES CITED

- Brutsaert, W.F., Norton, S.A., Hess, C.T., and Williams, J.S., 1981, Geologic and hydrologic factors controlling radon-222 in ground water in Maine: *Ground Water*, v. 19, no. 4, p. 407-417.
- Cothern, C.R., 1987, Development of regulations for radionuclides in drinking water, in Graves, Barbara, ed., *Radon, radium, and other radioactivity in ground water*: Chelsea, Mich., Lewis Publishers, p. 1-11.
- Cothern, C.R., Lappenbusch, W.L., and Michel, Jacqueline, 1986, Drinking-water contribution to natural background radiation: *Health Physics*, v. 50, p. 33-47.
- Horton, T.R., 1985, Nationwide occurrence of radon and other natural radioactivity in public water supplies: U.S. Environmental Protection Agency report 520/5-85-008, 208 p.
- Lanctot, E.M., Tolman, A.L., and Loiselle, Marc, 1985, Hydrogeochemistry of radon in ground water: Eastern Regional Ground Water Conference, Association of Ground Water Scientists and Engineers, National Water Well Association, Portland, Maine, July 1985, Proceedings, p. 66-85.
- Lowry, J.D., Hoxie, D.C., and Moreau, Eugene, 1987, Extreme levels of Rn and U in a private water supply, in Graves, Barbara, ed., *Radon, radium, and other radioactivity in ground water*: Chelsea, Mich., Lewis Publishers, p. 363-375.
- Otton, J.K., Zielinski, R.A., and Been, J.M., 1985, Uranium in Holocene valley-fill sediments, and uranium, radon, and helium in waters, Lake Tahoe-Carson Range area, Nevada and California: U.S. Geological Survey Open-File Report 85-389, 30 p.
- Prichard, H.M., and Gesell, T.F., 1977, Rapid measurements of Rn concentrations in water with a commercial liquid scintillation counter: *Health Physics*, v. 33, p. 577-581.
- Rush, F.E., 1968, Index of hydrographic areas in Nevada: Nevada Division of Water Resources, Information Report 6, 38 p.
- Thatcher, L.L., Janzer, V.J., and Edwards, K.W., 1977, Methods for determination of radioactive substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A5, 95 p.
- Wanty, R.B., and Schoen, Robert, 1991, A review of the chemical processes affecting the mobility of radionuclides in natural waters, with applications, in Gundersen, L.C.S., and Wanty, R.B., eds., *Field studies of radon in rocks, soils, and water*: U.S. Geological Survey Bulletin 1971, p. 183-194.