Data on Uranium and Radium in Ground Water in the United States 1954 to 1957

By R. C. SCOTT *and* F. B. BARKER

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A compilation of data collected as part of a survey of radioelements in the water resources of the conterminous United States

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DATA ON URANIUM AND RADIUM IN GROUND WATER, IN THE UNITED STATES 1954 TO 1957

BY R. C. SCOTT AND F. B. BARKER

ABSTRACT

This report is one of a series resulting from a study by the U.S. Geological Survey to determine the occurrence and distribution of naturally radioactive substances in water. From 1954–57 uranium and radium concentrations were determined in 561 samples, mainly of ground water, having wide geologic and geographic distribution. These concentrations, together with data on the hydrologic and geologic environment, the beta-gamma activity, and the chemical characteristics of each sample, are tabulated by States.

The conterminous United States was subdivided into 10 geotectonic regions to facilitate statistical interpretation of the occurrence of uranium and radium in fresh water in approximately homogeneous geologic provinces. For each geotectonic region, the range and median were determined for the concentrations of radium and uranium; for regions from which sufficient data were available, log-normal frequency distribution curves were calculated and superimposed on histograms of radium and uranium concentrations in the samples. An "anomaly threshold" is suggested for both radioelements for each region analyzed statistically. The western stable region had the greatest median and highest "anomaly threshold" for uranium. This region also had the highest "anomaly threshold" for radium, but the largest median for radium was found for samples collected in the Ozark-Ouachita system. The median concentration for uranium was lowest for the Atlantic and Gulf Coastal Plain and the Pacific orogenic belt. This latter region also had the lowest median-radium content.

INTRODUCTION

PURPOSE AND SCOPE

A study of radioactivity, both naturally occurring and artificially produced, in water was begun in 1952 by the Geological Survey as part of its overall responsibility to evaluate the quantity and quality of the water resources of the Nation. The rather new field, radiohydrology, is broad and includes the investigation of the hydrogeochemistry of the naturally radioactive elements, the use of radioactive tracers in measurements of direction and velocity of water movement, the dispersal of radioactive wastes released to the hydrosphere, the concentration of radioactive substances by waterborne sediments and aquifer material, and other aspects of hydrology in which radioactivity is a factor.

Basic to several of these investigations in the field of radiohydrology is the determination of the occurrence and distribution of naturally radioactive elements in ground water. This investigation was begun in 1952 to (a) determine the natural levels of radioactivity in the ground-water resources of the Nation, (b) evaluate the suitability of these elements as natural tracers or as other aids to hydrologic investigations, and (c) study the hydrogeochemistry of these elements to ascertain some of the functions of water in dissolving, transporting, and depositing mineral matter. The first phase of the investigation involves determining concentrations of radioactive elements in many water samples from sources having wide geologic, hydrologic, and geographic distribution. Most of these samples were defined in terms of their chemical composition and geologic and hydrologic environments to provide usable data for other phases of the investigation.

Uranium and radium were the first radioelements to be investigated for several reasons:

1. The chemistry and the geologic distribution of these elements are such that significant concentrations of them occur in most types of water.

2. Methods of analysis sufficiently sensitive for the low concentrations expected and that could readily be adapted to water analysis were available.

3. Radium-226 is the most hazardous radionuclide according to public health standards, and its physiologic effects are similar to those of several of the fission products. The allowable concentration of these fission products in human-water supplies must therefore be decreased in proportion to the amount of radium-226 present relative to its maximum permissible concentration. Thus, the types and amounts of radioactive waste material that may be released safely in any locality will be limited in part by the concentrations of radium-226 in the water of the area.

4. Uranium is of economic importance; hence, aids to geochemical prospecting, such as data on "normal" concentrations in water, are valuable.

5. Radium-226 is a radioactive daughter of uranium; the two are, therefore, always associated in nature.

Knowledge of the deviations from equilibrium that may be found in water may lead to a better understanding of some hydrogeochemical processes.

6. The ubiquitous nature of these elements suggests their use as tools in other types of hydrologic investigations.

7. The chemistry of radium is similar to that of the alkaline earth elements; thus, studies of the hydrogeochemical behavior of radium may be extrapolated to trace quantities of certain divalent ions, especially strontium and barium. The chemistry of uranium is similar in some respects to other polyvalent heavy metals; hence, knowledge of the geochemistry of uranium may aid in understanding some types of ore-forming processes.

This report is mainly a tabulation of data relating to 561 samples collected before January 1, 1958, in the course of a general reconnaissance of the United States. Information on the geology and hydrology of the aquifer, on the chemical character of the water, and on the uranium and radium content is included. The tabulations given here may be useful to those interested in the concentrations of radium and uranium in water from some of the more important aquifers of the United States.

To aid in comparing characteristics of specific samples to the general radiochemical characteristics of ground-water, the ranges and medians of uranium and radium concentrations in water from various regions of the United States are discussed. Each region is for the most part geologically and hydrologically homogeneous, and the regions provide workable units for deriving statistical parameters that describe the natural distribution of uranium and radium in water. The information presented in the section on regional distribution characteristics represents revisions that bring up-to-date a report previously published in the proceedings of the Second International Conference on Peaceful Uses of Atomic Energy (Scott and Barker, 1958).

ACKNOWLEDGMENTS

The work described here was conducted under the general supervision of the Chief, Branch of Quality of Water and Chief, Branch of Ground Water. Most of the samples were collected and much of the geologic and hydrologic data were furnished by personnel of the district offices of the Ground Water Branch; the analyses were performed by personnel of the Quality of Water Branch in Washington and Denver. Special thanks are extended to Messrs. R. L. Nace and J. D. Hem, who originally supervised this work and who have been continually helpful even though no longer directly associated with this project.

COLLECTION AND EXAMINATION OF SAMPLES

SAMPLING PROCEDURES

Field personnel were given considerable freedom to select specific sampling sites within their areas of operation because their knowledge of local conditions would aid in selecting sources that would best meet the needs of this study. Most samples were obtained from wells and springs; however, a few samples from lakes and streams were collected for purposes of comparison. Sites at which samples were collected are shown on plate 1.

SELECTION OF SAMPLING SITES

A sampling network was designed to give each State as wide a geographic and stratigraphic coverage as possible. When specific sites were being selected for certain stratigraphic units or for a particular region, emphasis was placed first on sources furnishing water for public supplies provided the desired geologic and hydrologic requirements were also satisfied. Some sampling sites, which otherwise would have been desirable, were excluded because well logs or other geologic data were insufficient to identify the aquifer, because wells or springs were dry owing to a drought, or because wells were not equipped with operating pumps.

METHOD OF SAMPLE COLLECTION

A set of 2 samples of about 2 or 4 liters each and 2 samples of about 100 ml (milliliters) each was collected at each sampling site. To aid in keeping the dissolved uranium and radium in solution until the time of analysis, one large sample was acidified with 8 ml of glacial acetic acid immediately after collection to lower the pH, and at the same time 2 ml of chloroform was added to control algae and fungi growth. The other large sample and the two small ones, to be analyzed for ordinary chemical constituents, were not treated. The samples were shipped to the laboratory as soon as feasible, usually within 3 days after collection.

Samples from wells or developed springs were obtained at the point of discharge or, if the sample was collected from a pipeline, as near the source as possible. Samples from pumped wells were collected after pumps had operated long enough to clear the water that had been standing in the casings; samples from domestic pressure systems, or other sources where storage tanks were used, were obtained if possible after there had been recent turnover of water in the tank. Samples from undeveloped springs and seeps were obtained at their orifices; care was used to avoid sediment and other contaminating material.

CHEMICAL AND RADIOCHEMICAL ANALYSES

After receipt in the laboratory, the unacidified samples were analyzed for the common chemical constituents and physical properties according to methods regularly used by the Geological Survey (Rainwater and Thatcher, 1960). A few samples also were analyzed for some of the more uncommon chemical constituents, including sulfide, arsenic, boron, zinc, copper, bromide, iodide, and barium, according to standard methods.

The acidified samples were analyzed for uranium, radium, and gross beta-gamma activity according to methods described briefly below.

URANIUM DETERMINATION

Concentrations of uranium in the samples were determined by the fluorophotometric method (Thatcher and Barker, 1957). A suitable volume of the sample was evaporated to dryness and fused with a fluoride-carbonate flux. After the melt had solidified and cooled, the intensity of the fluorescence excited by near-ultraviolet light was measured photometrically and was compared with that from standard melts containing known amounts of a pure uranium salt.

The precision of this method is about ± 15 percent of the reported value or ± 0.1 ppb (parts per billion), whichever is greater. The accuracy depends somewhat on other constituents of the sample—especially heavy metals—but it is probably within a few percent.

RADIUM DETERMINATION

Concentrations of radium in the samples were determined by coprecipitating the radium in a suitable volume of sample with barium sulfate and measuring the alpha activity of the precipitate (Barker and Thatcher, 1957). This activity was compared with that of similar precipitate containing a known fraction of a National Bureau of Standards radium-226 standard.

The method described is almost equally sensitive to the three alpha-emitting isotopes of radium when they are present in the precipitate. The amounts of radium-226 and radium-224 in the precipitate when the activity is measured are representative of the concentrations in the remainder of the sample at that same time. The concentration of radium-223 in the sample may not be strictly represented by its activity in the precipitate. However, because of the low natural abundance of radium-223 (less than 1 percent as abundant as radium-226) in terms of radioactivity and its usual close association with radium-226, errors in the reported quantities of radium probably are negligible. The beta-emitting isotope, radium-228, is not measured by this method; the results, therefore, apply only to the three alpha-emitting isotopes.

The concentration of radium-226 does not measurably change between the time of collection and the time of analysis of the sample, provided there is no precipitation or adsorption within the sample container. Radium-224, however, has a short half-life; therefore, the concentration depends both on the time between collection and analysis and on the amount of its long-lived parent, thorium-228, in the sample. Although the results given in the report apply only to the total radium in the sample at time of analysis, usually 2 to 8 weeks after the time of collection, they can be considered as the maximum concentration of radium-226 at the time of collection and, in fact, often serve as a good approximation to the actual radium-226 concentration. Because of the importance of radium-226 to public health, this limit may be of great significance.

The precision of this method varies with the amount of radium present, but for most samples it is about ± 20 percent or ± 0.1 $\mu\mu c$ per l (micromicrocuries per liter), whichever is greater. The accuracy is limited by interferences from other alpha-emitting nuclides, the most important of which are polonium-210 and the alpha-emitting isotopes of thorium. These isotopes give rise to errors respectively equivalent to about one-tenth and one-fourth their concentrations in micromicrocuries per liter. These interferences do not detract greatly from the value of the data because the chemistry of these nuclides is such that their concentrations in most natural waters are expected to be rather low. The errors caused by these interferences are no more serious than those caused by interferences in some of the common chemical determinations, such as the usual method of analysis for bicarbonate.

BETA-GAMMA ACTIVITY DETERMINATION

The gross beta-gamma activities of the samples were determined by measuring the beta-gamma activity of the residue left upon evaporation. A volume of the sample containing about 100 milligrams of solids was evaporated to dryness. The residue was then made into a slurry with distilled water and quantitatively transferred to an aluminum planchet. After the water was removed by drying under an infrared lamp, the activity of the residue was measured with an end window Geiger-Müller counter having a window thickness of 1.4 milligrams per square centimeter and mounted inside an iron shield 2 inches thick.

Such a counter is about 100 percent efficient for the beta particles that penetrate the window. However, of the beta particles that are emitted by the sample the fraction penetrating the window depends partly on absorption in the window, in the air between the sample and the window, and in the sample itself, and partly on scattering from the sample and the planchet. The absorption and scattering vary with the energy of the beta particles; therefore, the overall efficiency is energy dependent.

The efficiency of a Geiger-Müller counter for photons (mainly gamma rays) depends upon the energy of the radiation; the amounts of absorption and scattering, though small, are also energy dependent. However, the efficiency of the counter is so low for photons, generally only a few percent, that the overall error is increased only slightly.

Each radionuclide is thus counted with a different efficiency which depends on the energy of the radiations and on the ratio of beta particles to gamma rays emitted. Counting data can be exactly transformed into units of radioactivity only when the radionuclides present are known, and even then only with difficulty if the mixture is complex. Thus, the selection of one reference nuclide, in terms of which all data could be reported, was deemed desirable. Thallium-204 was chosen for this study because of its availability in standardized form, its rather average beta energy, and its widespread use as a standard of comparison for unknown fission product mixtures. All beta-gamma results listed in this report, therefore, represent the amount of thallium-204 activity that would produce the same counting rate as the sample when measured by the techniques and instruments described. The results thus serve for intercomparison of samples, though they cannot be interpreted in absolute terms. The fact that the results depend on the instrumentation and sample mounts precludes exact comparison of results obtained by the Geological Survey laboratories with those obtained by other workers using different instruments. However, the order of magnitude of the results should be comparable.

The precision of this determination depends largely on the background counting rate of the instruments and on the level of activity in the sample volume used. The standard deviation of a net counting rate (Friedlander and Kennedy, 1955, p. 252–265) is given by

$$\sigma=\sqrt{(R/t_r)+(B/t_b)}$$

where

σ=standard deviation of the net counting rate

R=gross counting rate, sample plus background

B=background counting rate

t_r=time during which sample was counted

t_b=time during which background was counted.

A given net counting rate ($N=R-B$) is considered to be significant only when it lies more than two standard deviations above zero; that is

$$N-2\sigma>0$$

$$N>2\sqrt{(R/t_r)+(B/t_b)}.$$

For counting rates near the detection limit ($R\approx B$) and where both counting times are approximately the same (the condition under which these samples were counted), the equation reduces to

$$N>2\sqrt{2(B/t)}.$$

For the instruments and counting times used in collecting these data, the minimum detectable activity is found to be from 3.5 to 5 $\mu\mu$c. The sample volume used depends on the solid content of the sample; thus, the minimum concentration that may be detected varies with the total amount of mineral matter in solution.

The certainty is less than 95 percent that a significant amount of activity is present if the counting rate of a sample is not greater than that indicated above. Such a sample is reported to contain less than (<) the detectable activity. Zero could not be reported because almost all samples contain at least a few micromicrocuries of activity owing to the amounts of potassium and radium daughters in most water.

The precision of a measurement lying below the detection limit is of little concern; by definition, the probability that the true value exceeds the reported figure is less than 50 percent. The precision of a measurement slightly above the detection limit may be taken as about 50 percent.

The accuracy of the method is controlled largely by the uniformity of the deposit on the planchet. However, accuracy probably is less affected by laboratory techniques than by the uncertainties arising from the counting statistics for most of the analyses.

REGIONAL DISTRIBUTION CHARACTERISTICS

To facilitate statistical interpretation of the data, the Conterminous United States was divided into the 10 geotectonic regions shown on plate 2. The boundaries of these regions were based upon considerations of tectonics (National Research Council, 1944; Eardley, 1951), geology (Stose and Ljungstedt, 1933), physiography (Fenneman, 1946), and ground-water provinces (Meinzer, 1923, 1939). The grouping of areas having similar characteristics permitted delineation of regions in which the geology and hydrology are for the most part homogeneous and which are suitable units for deriving statistical data to describe the natural regional distribution of uranium and radium.

The regional characteristics of the waters were determined from only 509 of the 561 analyses available. Data from those samples having more than 3,000 ppm (parts per million) dissolved solids were not used in the statistical computations because it is probable that such water may represent only local conditions or may have many characteristics that are not obtained from the host rock from which the samples were collected. Analyses of samples obtained from mining areas also were omitted because mining operations commonly alter the local geochemical regimen.

INTERPRETATION OF DATA

The uranium and radium concentrations in samples from those geotectonic regions where sufficient data were available to justify statistical treatment were plotted as histograms, on a logarithmic base, as shown in figures 1 to 6. The class intervals for the statistical treatment were chosen in a manner to be consistent with the precision of the analyses (one significant figure at low concentrations), to cover the full range of concentrations with a reasonable number of intervals, and still be of reasonably uniform width. The reported concentrations and their probable ranges, together with the logarithmic class intervals are—

Concentrations		Class interval	
Reported	Probable range	Logarithmic base	Width
<0. 1	0– 0. 069	<−1. 16	-------
0. 1	0. 070– . 149	−1. 160– −0. 826	0. 334
0. 2– 0. 3	. 150– . 349	− . 825– − . 457	. 368
0. 4– 0. 8	. 350– . 850	− . 456– − . 071	. 385
0. 9– 1. 8	. 851– 1. 850	− . 070– . 267	. 337
1. 9– 4. 4	1. 851– 4. 450	. 268– . 648	. 380
4. 5– 10	4. 451– 10. 50	. 649– 1. 021	. 372
11 – 23	10. 51 – 23. 49	1. 022– 1. 361	. 339
24 – 54	23. 50 – 54. 50	1. 362– 1. 736	. 374
55 –120	54. 51 –125. 0	1. 737– 2. 097	. 360
130 –290	125. 1 –294. 9	2. 098– 2. 470	. 372
>290	>294. 9	>2. 470	-------

Although the class intervals are not of exactly equal width, the maximum variation is less than ±8 percent from the average of 0.362; this is considered to be sufficiently good for the present needs.

Smoothed log-normal frequency distributions were calculated from the data and the curves representing these smoothed distributions are superimposed on the histograms for the appropriate regions. These frequency distributions and the log-normal curves were calculated as follows:

The cumulative frequencies of the concentrations were plotted on logarithmic-probability paper, and the best straight line through the points was determined by the method of least squares.

The mean value and standard deviation of the best-fit log-normal curve were determined from the straight line and substituted into the Gaussian equation.

The resulting equation was normalized to the scale of the histogram for the appropriate region, and the curve representing the equation was plotted in superposition on the histogram.

The distribution of those samples lying below the detection limit was estimated from the best-fit log-normal curve and is shown as the dotted portion of the histogram. This technique makes possible an estimation of the distribution of those concentrations below the detection limit, provided that 50 percent or more of the samples are above the detection limit.

Although there is little reason to expect the universes from which the samples were taken to be distributed exactly according to a log-normal law, it can be seen from the figures that the approximation is sufficiently good that a log-normal distribution can be used as a model of each universe. To illustrate the differences between universe and sample distributions, a synthetic universe was sampled in a manner corresponding to the actual experiments. A universe having a log-normal distribution was constructed from a table of random numbers; 80 samples were then withdrawn at random from this universe and divided into 10 class-intervals. The histogram representing the 80 samples, together with the curve corresponding to the universe, are shown in figure 7. It will be observed that this fit is about the same as that observed in the plots representing the geotectonic regions; therefore, the proposed log-normal distributions are satisfactory models.

The antilog of the mean of the log-normal distribution curve corresponds to both the median and geometric mean of the concentrations in the model universe described by that curve. The antilog of the value lying two standard deviations above the mean of the log-normal distribution represents the concentration that would be exceeded by only about 2 percent of the members of the model universe. Therefore, a sample exceeding this value might well represent an anomaly, and this critical concentration is called the "anomaly threshold" for that universe. Values of the geometric mean and anomaly threshold of the model universe for each geotectonic region susceptible to statistical treatment are given in table 1, together with the range and median for the sets of samples from each geotectonic region.

Uranium, as well as its daughter, radium, is in almost all rocks; hence, these elements probably are in all ground water as well as most surface water even though the amounts in many samples were below the detection limit. Samples of water having concentrations of radioelements greater than the anomaly threshold suggest local areas in which the rocks may be somewhat enriched in uranium. An exception to the above interpretation must be made for radium, because the method of analysis used in this study does not permit differentiating between radium-226 of the uranium series and

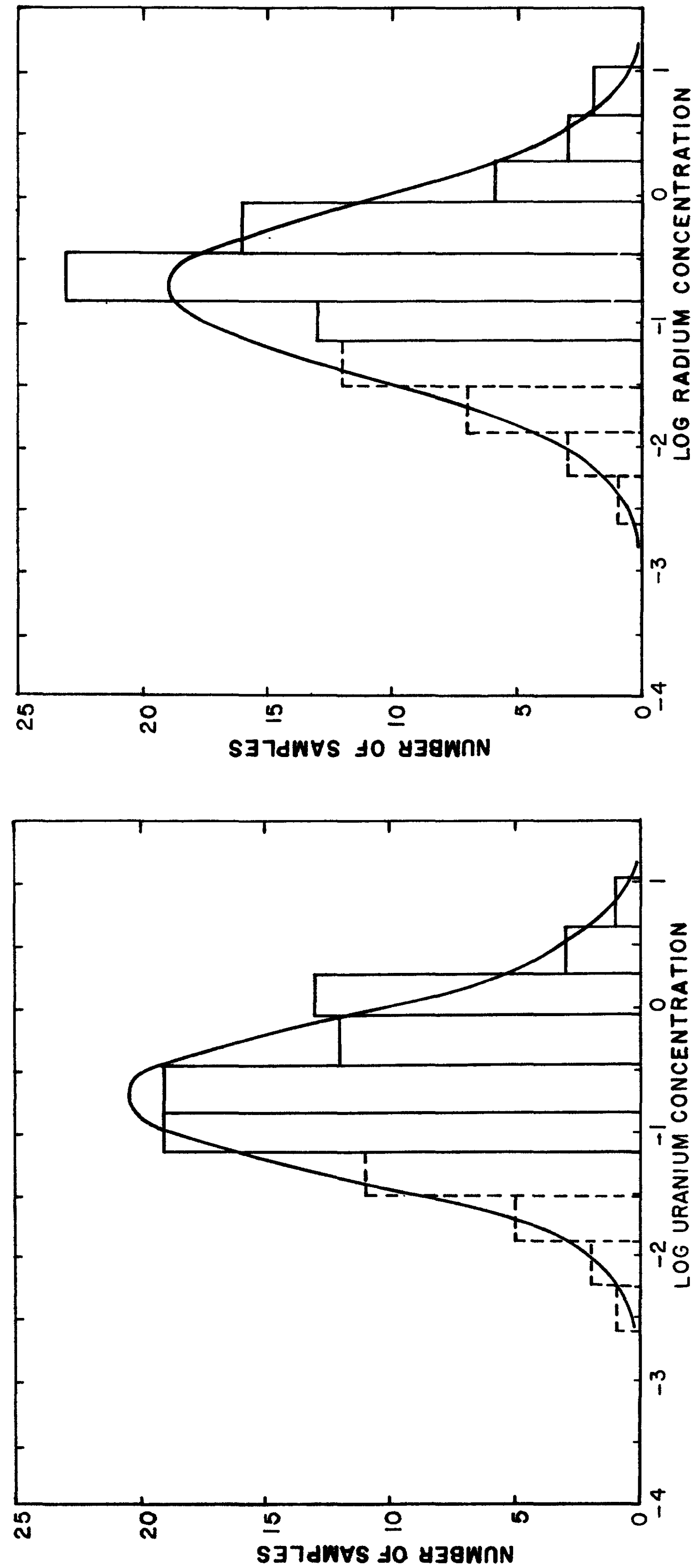

FIGURE 1.—Distribution of uranium and radium in samples from geotectonic region I.

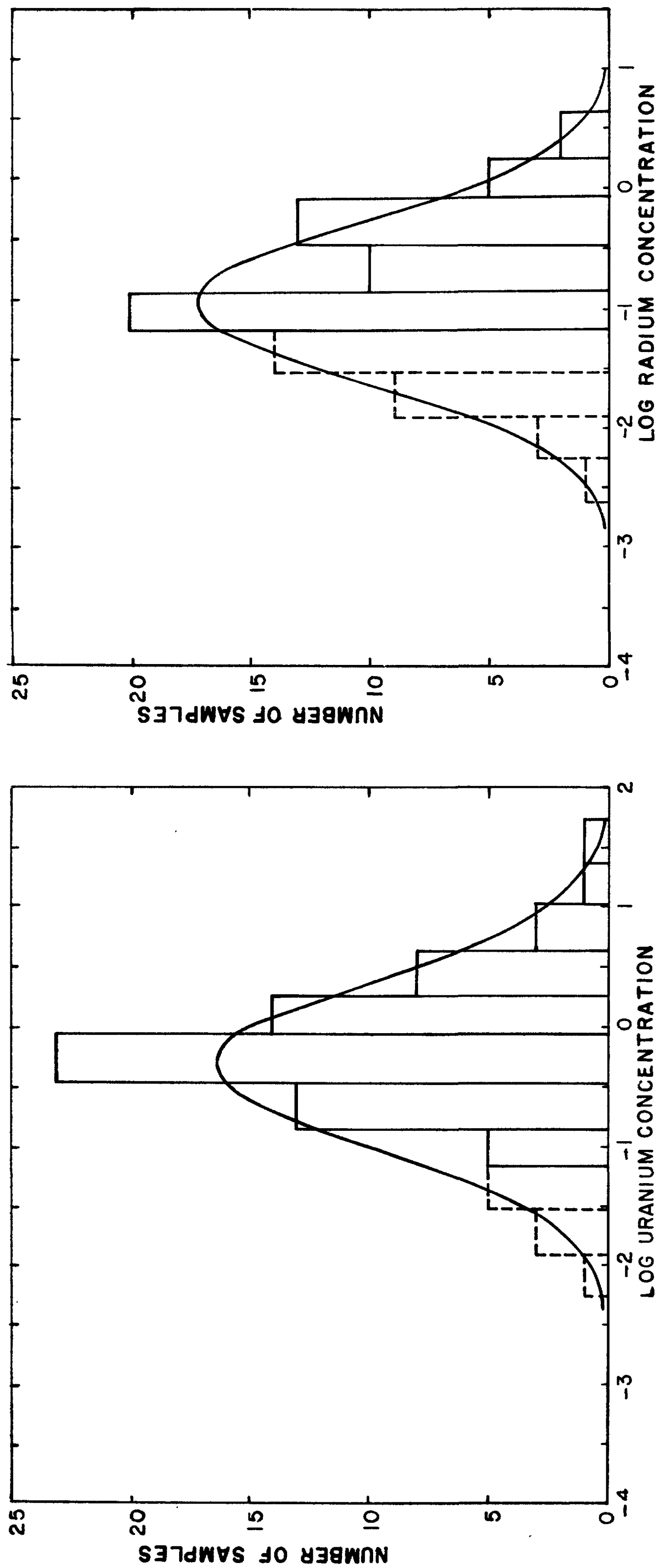

FIGURE 2.—Distribution of uranium and radium in samples from geotectonic region II.

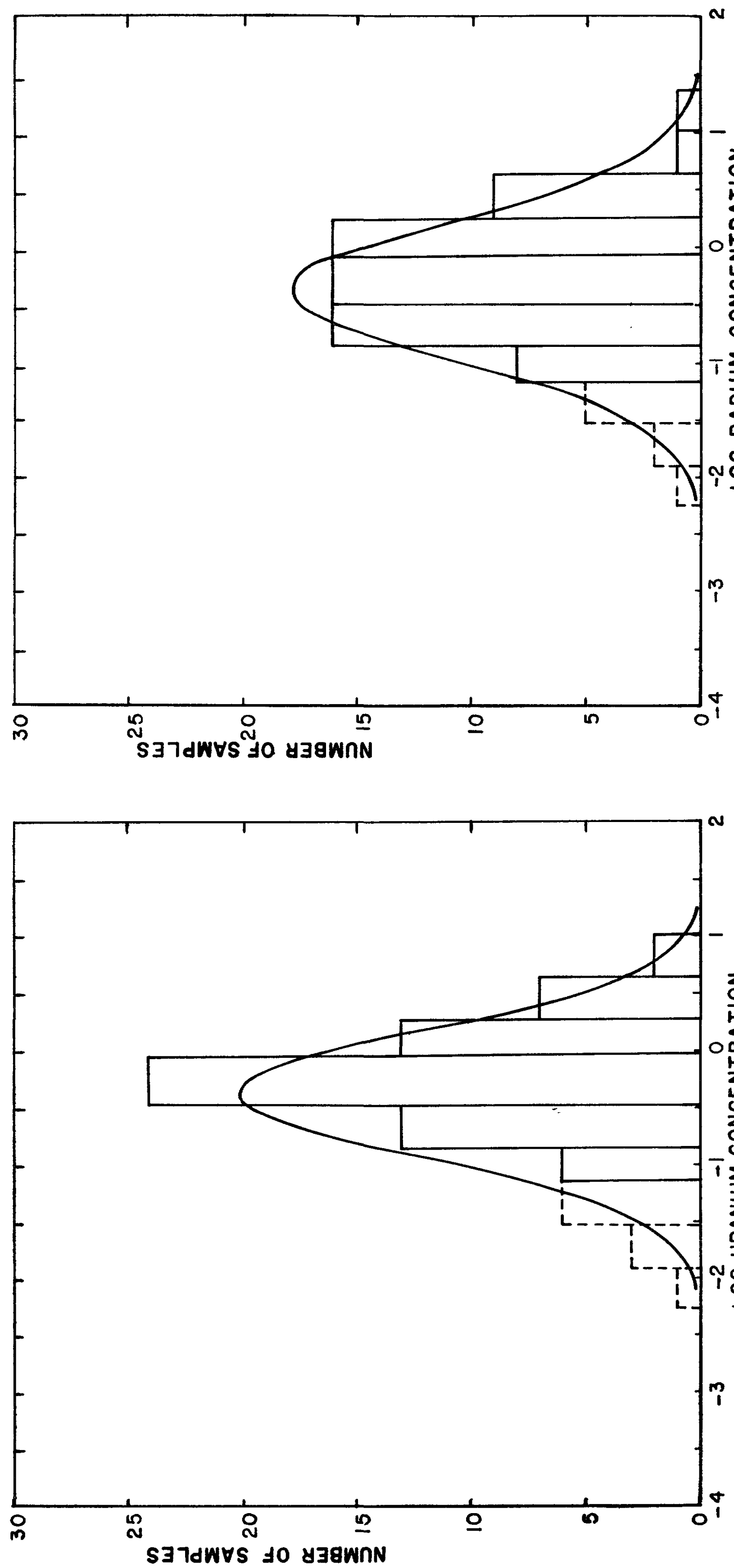

FIGURE 3.—Distribution of uranium and radium in samples from geotectonic region V.

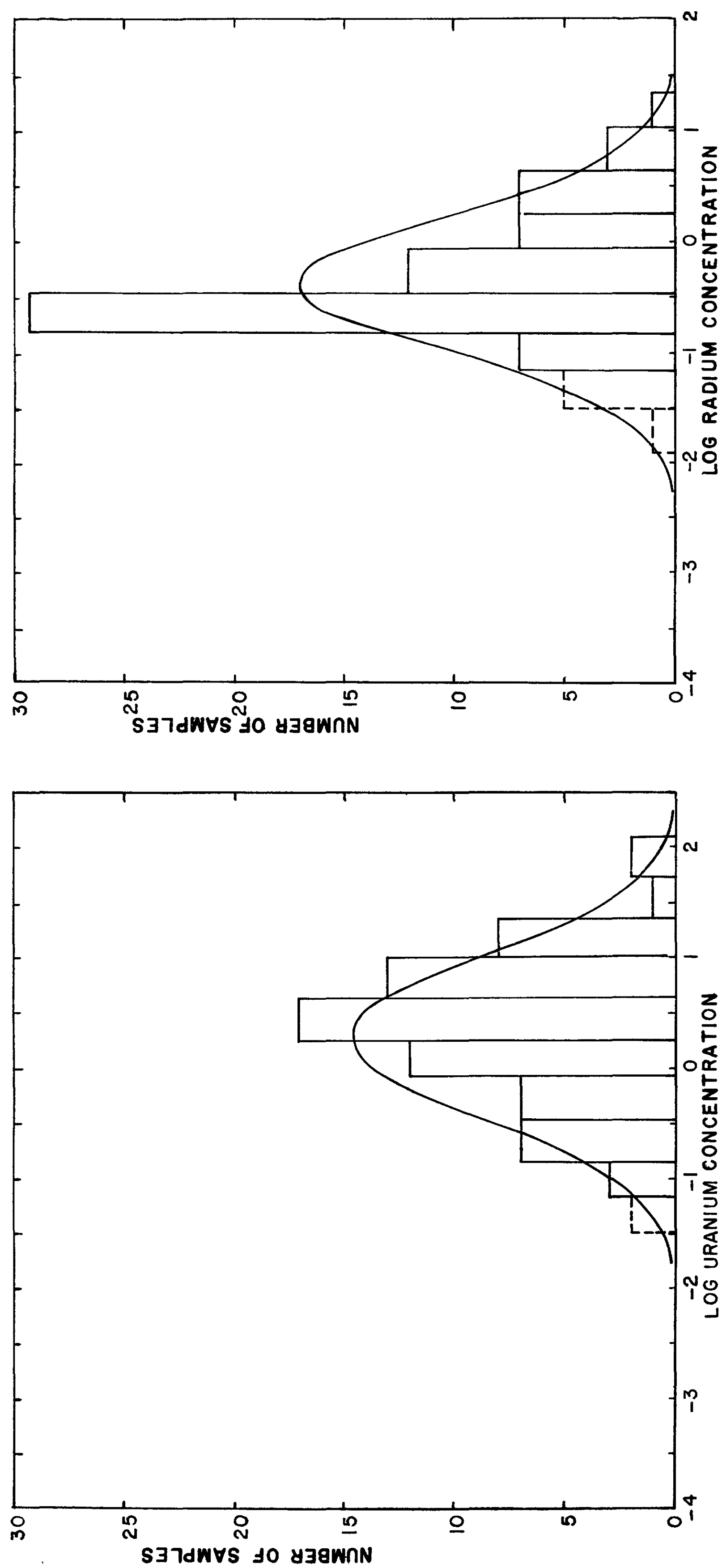

FIGURE 4.—Distribution of uranium and radium in samples from geotectonic region VI.

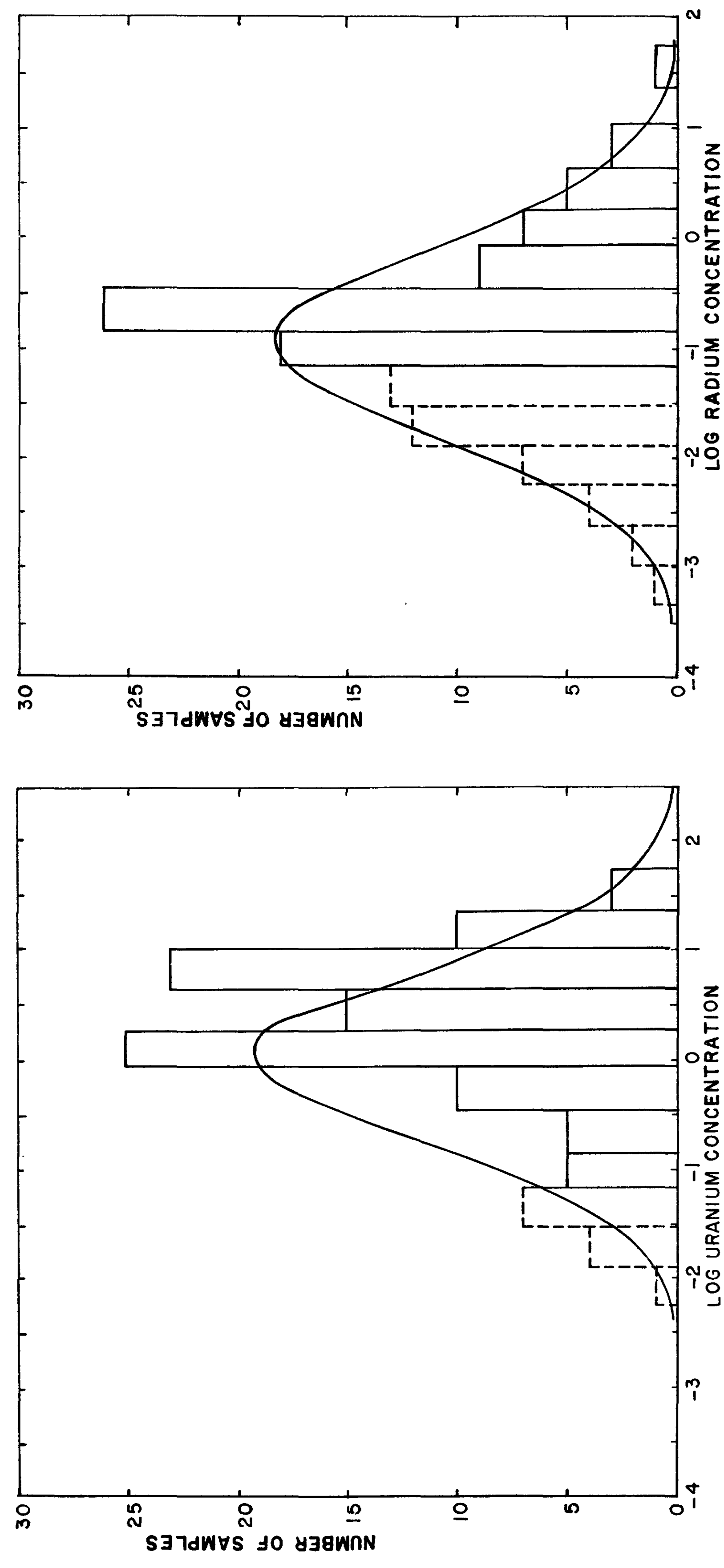

FIGURE 5.—Distribution of uranium and radium in samples from geotectonic region VIII.

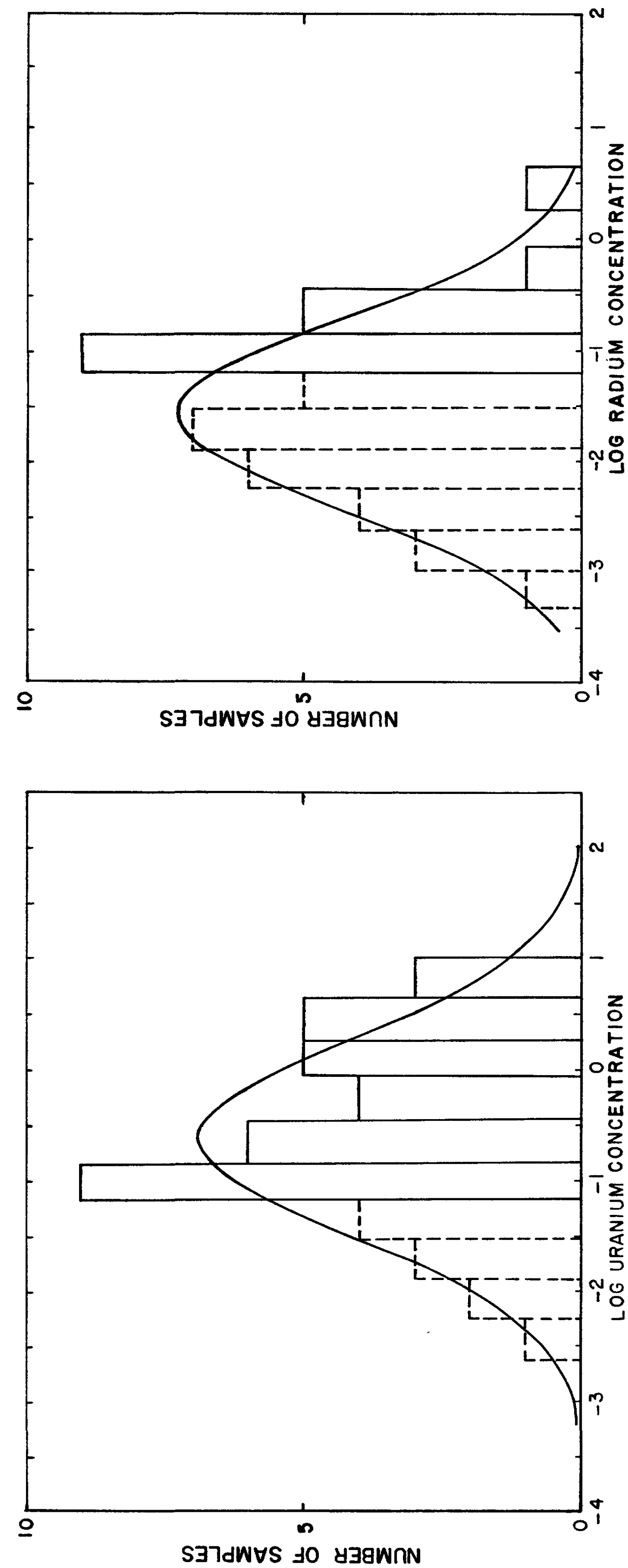

FIGURE 6.—Distribution of uranium and radium in samples from geotectonic region X.

TABLE 1.—*Summation of data on concentrations of radioelements*

Geotectonic region	Number of samples	Uranium (μg U per l)				Ratio of uranium to dissolved solids (μg U per g DS)		Radium (μμc Ra per l)				Ratio of radium to dissolved solids (μμc Ra per g DS)	
		Range	Median	Geometric median	Anomaly threshold	Maximum	Median	Range	Median	Geometric median	Anomaly threshold	Maximum	Median
I	86	<0.1- 15	0.2	0.2	3.3	62	1.4	<0.1- 8.6	0.2	0.2	3.8	174	1.0
II	77	<.1- 24	.5	.5	12	70	4.0	<.1- 3.3	.1	.1	2.2	21	1.0
III	17	<.1- 1.5	.5	--------	--------	21	1.4	<.1- 1.5	.1	--------	--------	4.1	.6
IV	7	.2- 4.3	1.1	--------	--------	10	7.0	<.1- 2.6	.1	--------	--------	12	.8
V	75	<.1- 8.9	.5	.4	5.3	18	.9	<.1-22	.6	.6	7.0	96	1.0
VI	72	<.1-120	2.2	1.9	48	319	4.9	<.1-11	.3	.3	7.3	25	.90
VII	12	<.1- .6	.3	--------	--------	2.2	1.2	<.1- 2.3	1.0	--------	--------	13	2.1
VIII	108	<.1- 37	1.7	1.2	54	63	5.1	<.1-29	.1	.1	5.9	75	.4
IX	13	.1- 6.1	.8	--------	--------	12	2.4	<.1- 5.5	.1	--------	--------	25	.5
X	42	<.1- 7.6	.2	.2	12	25	1.3	<.1- 2.5	<.1	<.1	1.1	10	.3

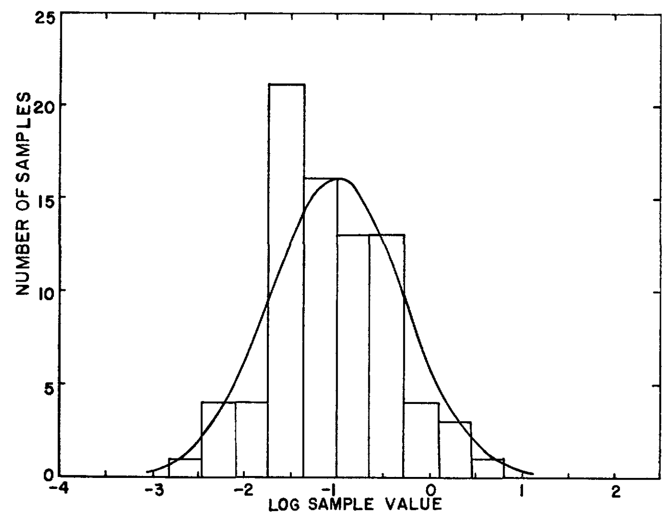

FIGURE 7.—Distribution of 80 samples from a synthetic log-normal universe, with true distribution curve.

radium-224 of the thorium series. Therefore, any sample containing anomalous amounts of radium that is mostly radium-224 would represent water that has had a history in rocks enriched in thorium. However, the geochemical cycles of uranium and thorium are sufficiently different in the lithosphere and hydrosphere so that most of the radium in the samples described in this report may be expected to be the daughter product of uranium.

The ratios of the concentrations of radioelements to that of the dissolved solids (U:DS) and (Ra:DS), expressed as micrograms of uranium per gram of dissolved solids and micromicrocuries of radium per gram of dissolved solids, respectively, are useful as indices for comparing samples of different dissolved-solids content on an equal basis. Differences in these ratios probably are controlled mainly by the abundances and solubilities of the radioelement-bearing minerals relative to the abundances and solubilities of minerals of the ordinary chemical constituents. The maximums and medians of these ratios for each geotectonic region are included in table 1.

In computing the medians of the U : DS and Ra : DS ratios, the uncertain values (that is, those representing samples in which the uranium or radium concentrations were below the detection limit of the analytical method) were included if they could not be greater than the median and were not included if they could lie on either side of the median.

In most geotectonic regions, a few samples of weakly mineralized water contained less uranium or radium than the anomaly threshold, but they had larger U:DS ratios than the maximum U:DS ratio of the anomalous samples. Therefore, even though the actual amounts of uranium and radium in these samples seemingly are low, the magnitude of the U:DS ratios may suggest areas that are locally enriched with uranium.

GEOTECTONIC REGIONS

REGION I. ATLANTIC AND GULF COASTAL PLAIN

The coastal plains of the eastern and southern margins of the United States are underlain by marine and continental sediments of Mesozoic and Cenozoic age derived principally from older rocks of the Appalachian orogenic belt and the Central stable interior. The important aquifers in much of the area are beds of sand and gravel interbedded with clay and marl; but limestone is included in Texas, Georgia, South Carolina, and Florida, and material of glacial origin is included on Long Island and in the northern part of the Mississippi embayment.

The median concentration of uranium in this area (0.2 ppb) is as small as that found in any region. Two samples contained quantities of uranium greater than the anomaly threshold (3.3 ppb) suggested in table 1. One sample (table 2: Texas 15), containing 15 ppb uranium, was obtained from the Oakville sandstone and the other (table 2: Texas 16), containing 3.5 ppb uranium, was from the Lagarto clay. Both formations are of Miocene age and are in an area where the Tertiary rocks contain much volcanic ash and uranium deposits. The volcanic material may be the source of the uranium ore deposits found in the area (Eargle and Snider, 1957, p. 30).

The U:DS ratio for the sample from the Oakville sandstone is 13 μg per g solids and is the larger of the two samples. Six samples from the Atlantic and Gulf Coastal Plain (table 2: Alabama 11, New Jersey 4, New York 12, South Carolina, 3, Florida 1, Kentucky 11) had equivalent or larger U:DS ratios and may be considered anomalous for this region.

Samples containing more radium than the anomaly threshold (3.8 μμc per l) were collected from an aquifer of Cretaceous limestone and clastic rocks (table 2: Texas 10) and from an Eocene marine sand (table 2: South Carolina 7). Both these samples were low in bicarbonate (HCO_3^- less than 38 percent of the anions) and contained small amounts of uranium. None of the samples containing less than anomalous amounts of radium had Ra:DS ratios greater than the South Carolina sample described above.

REGION II. APPALACHIAN OROGENIC BELT

This region has a structural history of related Paleozoic metamorphism, faulting, and folding. The rocks are predominantly granite, gneiss, and schist of Precambrian age and shale, sandstone, and limestone of Paleozoic age. Most of the rocks have been metamorphosed to some extent. Ground-water supplies in this area are commonly obtained from springs and shallow wells in rocks which transmit water through fractures. In the northern part of the region, material of glacial origin (Pleistocene) contains clastic aquifers of local importance. Elsewhere, small areas of sandstone and shale of Triassic age also may yield moderate supplies. Although this region does not have numerous exploitable deposits of uranium, it does include two geologic terranes that may be considered uraniferous. These are the marine black shales of Paleozoic (probably Devonian) age in the southern part of the area and the granites at White Mountain in New Hampshire (McKelvey, and others, 1955, p. 475, 514).

The occurrence of disseminated uranium in these terranes may be reflected by the somewhat greater radioactivity of water from this region as shown in table 1. One sample contained more uranium than the anomaly threshold (12 ppb). This sample, containing 24 ppb uranium, was from shales of Triassic age, probably of fluviatile origin (table 2: North Carolina 12).

Three samples had U:DS ratios exceeding that of the above sample (17 μg per g solids). Two of these samples were waters from New England granites (table 2: Maine 3 and Massachusetts 2) and the other was from a metasediment (table 2: Georgia 7). These data suggest that there are additional uraniferous areas in this region.

A sample from a granitic terrane in Maine had the only radium concentration (3. 3 μμc per l) greater than the anomaly threshold (2.2 μμc per l). The Ra:DS ratio for this sample, 21 μμc per g solids, also was the maximum for this region.

REGION III. APPALACHIAN PLATEAUS

This region is underlain by a thick sequence of clastic sediments and limestone of Paleozoic age, and includes many important coal beds. The principal sources of ground water are sandstones and limestone of Paleozoic age, but throughout considerable parts of the region the supplies obtained from those aquifers are meager or of poor quality. In many of the valleys large supplies are obtained from glacial outwash and other alluvial sands and gravels (Meinzer, 1923, p. 311).

Because this region is contiguous to the Appalachian Mountains to the east, and also contains uraniferous Paleozoic marine black shales, the radioelement characteristics of the ground water may be about the same as those of the Appalachian orogenic belt. However, too few samples have been collected in this region to enable statistical determination of an anomaly threshold. Using the criteria of the Appalachian orogenic belt, one sample from this region may be significant. A sample collected from a limestone terrane (table 2: Kentucky 8) had U:DS ratio of 21 μg per g solids. No other radioelement characteristics were considered significant for samples collected in this area.

REGION IV. CANADIAN SHIELD

This region is the southern part of the Precambrian complex of intrusive and metamorphic rocks which has been stable since Precambrian time. Much of the area in the United States is covered with a mantle of glacial drift and outwash. Most of the ground-water supplies are obtained from the glacial deposits, and some of this material may contain thorium minerals or possibly some heavy insoluble uraniferous minerals, concentrated as placers. However, the logical host rock for uranium minerals in this region (the Precambrian bedrock) is covered with glacial debris. Thus, ground water tributary to the glacial overburden from this bedrock may carry radioelements that reflect the history that the water has had in the bedrock.

Too few samples were collected in this region for reliable statistical interpretation. However, if the trend of values shown in table 1, especially those for uranium, can be sustained by additional sampling, ground water in this region normally may have a high radioelement content.

REGION V. EASTERN STABLE REGION

The central stable Interior in the United States is that part of the North American craton coextensive with the Canadian shield and is overlain by a sequence of sedimentary rocks of Paleozoic age. For this study it has been subdivided into two regions in order to treat separately the eastern part with its partial cover of glacial sediments and the western part, most of which has a thick cover of important water-bearing sediments of post-Paleozoic age in addition to the other sedimentary rocks of Paleozoic age. Most water supplies in the eastern stable region are obtained from glacial drift and outwash; however, other important sources of supply are the sandstones and limestones of Paleozoic age and, in the northwestern part of the region, a sandstone of Cretaceous age.

Samples containing more uranium than the anomaly threshold (5.3 ppb) were obtained from a Precambrian quartzite (table 2: Minnesota 10) and a sandstone of Cretaceous age (table 2: Iowa 4). The U:DS ratios for these samples were 4.7, and 4.1 μg per g solids, respectively. Two other samples (table 2: Kentucky 9 and Michigan 6) from this area had concentration factors greater than the maximum factor mentioned above (4.7 μg per g solids) and may indicate other areas having uranium mineralization above background.

The second greatest range of radium content was found in samples from this area, and the anomaly threshold for radium is also second highest (7.0 μμc per l). The largest radium concentration (22 μμc per l) was found in a sample collected from a limestone of Ordovician age, (table 2: Kentucky 4) and the Ra:DS ratio (96 μμc per g solids) also was the maximum for the region. One other sample (table 2: Kentucky 1) in this region contained an anomalous amount of radium (9.8 μμc per l).

REGION VI. WESTERN STABLE REGION

This region is that part of the central stable interior lying west of the divide between the Missouri and Mississippi Rivers. Principal aquifers in the region are Tertiary sand and gravel and Cretaceous sandstone of marine or near-shore origin. Most of the post-Paleozoic sediments were derived from the granitic and metamorphic rocks of the Rocky Mountain orogenic belt. Many of the Tertiary rocks contain much volcanic ash. Samples of ground water from this region contained the largest amounts of uranium and had the second highest anomaly threshold for uranium. These data are compatible with the lithology of the aquifers; volcanic ash and the large amount of material weathered from granitic rocks probably are responsible for the high uranium content.

Although the anomaly threshold for uranium in this region (48 μg per l) seemingly is disproportionately high, there is no justification for treating this region diffierently from the others. In view of the relatively high median concentration and the lack of significant skewness of the distribution curve, a high anomaly threshold appears justified. Further sampling may indicate that a lower anomaly threshold applies to small areas within this region.

The largest uranium concentration (120 μg per l) was found in a sample from the Rush Springs sandstone of Permian age at Cement, Okla. (table 2: Oklahoma 9). The Rush Springs is a reddish sandstone of littoral origin which crops out over a large area in central Oklahoma. This sample also had the largest U:DS ratio (319 μg per g solids) found for this region. Asphaltic and other bituminous sandstone, mostly of Permian age, occurring elsewhere in Oklahoma are known to be abnormally radioactive. It has been suggested that some of the locally bleached and altered Permian red beds overlying the Cement oil field should be examined for radioelement ore bodies (Branson and others, 1955, p. 19).

About 5 miles southeast of the sampling site at Cement another sample was collected from the Rush Springs sandstone (table 2: Oklahoma 10). It contained only 2.2 μg per l of uranium and had a U:DS ratio of 4.9 μg per g solids. More geochemical work probably will disclose that uraniferous material occurs only locally in the area underlain by the Rush Springs sandstone.

A sample from alluvium of Pleistocene age (table 2: Kansas 6) was the only other sample having a uranium content above the anomaly threshold. The uranium content was 74 μg per l and the U:DS ratio was 31 μg per g solids. The uranium in these sediments may represent a concentration of minerals derived by the reworking of relatively uraniferous Tertiary rocks during Pleistocene time.

Three samples (table 2: Colorado 13, Kansas 15, and New Mexico 1) contained amounts of radium larger than the anomaly threshold (7.3 μμc per l) suggested in table 1, but the uranium content of these samples was relatively low. Thus, the anomalous radium concentrations may indicate areas for further investigation for geologic accumulations of radioelements in addition to those based on the uranium data. The maximum Ra:DS ratio of these samples was 6.4 μμc per g solids. Using this factor as a criterion, four other samples (table 2: Colorado 16, Kansas 7, and Oklahoma 3 and 11) having radium concentration factors greater than 6.4, also may suggest sites where more work should be done to determine the cause of the abnormal radioactivity.

REGION VII. OZARK-OUACHITA SYSTEM

Two minor tectonic elements make up this region, but, because both are deformed Paleozoic rocks, they are considered as one unit in this paper. The Ozark dome to the north is formed of beds of limestone and dolomite dipping gently off the Precambrian granitic core of the St. Francis Mountains. Southward the proportion of clastics increases, shale and sandstone predominating in the Ouachita Mountains.

Although there are insufficient samples for statistical analysis, seemingly the uranium content of the ground water of this region will be among the lowest in the country.

The high radioactivity of the numerous hot springs in the southern part of the Ouachita Mountains is well known and has been studied by many investigators. Although the radioactivity of the thermal waters is caused primarily by radon gas, many of the spring waters contain large amounts of radium. The median-radium concentration (1.0 $\mu\mu$c per l) and median Ra:DS ratio (2.1 $\mu\mu$c per l solids) for this region are the highest for all the regions.

REGION VIII. ROCKY MOUNTAIN OROGENIC BELT

This region for the most part is the area affected by the Laramide orogeny at the end of the Cretaceous and in early Tertiary time. Subsequent uplift and erosion exposed both igneous and sedimentary rocks of Precambrian age in the eastern central part of the region. Most of the area is underlain by folded and faulted sedimentary rocks of Paleozoic and Mesozoic age, granitic rocks of Mesozoic age, and sediments deposited in Tertiary basins. Many of the sedimentary rocks of Cretaceous and Tertiary age contain considerable amounts of volcanic ash. Important exploitable radioactive mineral deposits have been found in Precambrian igneous rocks and in the sedimentary rocks of Mesozoic and Tertiary age. Abundant ground-water supplies are obtained from Tertiary strata and many of the sandstones of Cretaceous age.

The anomaly threshold is highest and the median-uranium concentration and the median U:DS ratio are both second highest for the geotectonic regions of the United States. Excepting mine waters, two samples contained more uranium than the anomaly threshold (54 μg per l). Both were collected from granitic rocks of probable Jurassic or Cretaceous age in southeastern California. These samples (table 2: California 28 and 32) contained 32 and 37 μg per l and the U:DS ratios were 15 and 51 μg per g solids, respectively. One sample (table 2: South Dakota 7) collected in a uranium mine contained 960 μg per l of uranium and had a U:DS ratio of 619 μg per g solids. The analytical results of this sample were not included in the statistical analysis of this region because samples collected during mining operations may be contaminated and not representative of natural conditions.

A sample collected from an industrial well on the uranium property of the Lucky Mc. Uranium Co. (table 2: Wyoming 13) contained 2,100 ppb uranium and had a U:DS ratio of 1,533 μg per g solids. This sample was also excluded from the statistical analysis. These mine water samples were the only samples of fresh water that had U:DS ratios greater than 51 μg per g solids.

The radium anomaly threshold (5.9 $\mu\mu$c per l) was exceeded, excepting the above mine waters, in only one sample (table 2: New Mexico 24) from this region. The Ra:DS ratio of the above sample was 75 $\mu\mu$c per g solids and is the maximum for the region. The sample was obtained from a thermal spring, and such waters commonly have large amounts of radium and high radium-concentration factors.

REGION IX. COLORADO PLATEAU

The Colorado Plateau is a stable region within the area that was structurally deformed by the Laramide orogeny. The basement, primarily a Precambrian crystalline complex, is overlain by rocks of Paleozoic and Mesozoic age which correlate with most of the rocks of the same age in the western stable region. The post-Laramide igneous activity that was widespread throughout the Rocky Mountain orogenic belt was common in this region also. Ground-water supplies on the plateau are meager, but supplies adequate for most needs locally are obtained from sandstones of Mesozoic age and gravel of Quaternary age.

This region is the chief uranium province of the United States, both areally and quantitatively. It was not possible before preparation of this report to collect sufficient samples of ground water for statistical treatment from sources known to be unassociated with uranium deposits. Most ground-water supplies in the area are developed for mining and milling operations; hence, the wells are drilled into, or adjacent to, ore bodies.

Because of the small number of samples, statistical interpretation of the data is not practical. The values given for region IX in table 1 seemingly are too low for an uraniferous province; however, this is to be expected because of the selective sampling which discriminated against known uraniferous areas in the region. The statistical results from the western stable region might tentatively be used to evaluate this region, for these two regions were coextensive before the Laramide orogeny. If the anomaly threshold for region VI is used, none of the samples of ground water collected on the Colorado Plateau had radioelement contents that suggested areas that have much radioelement mineralization. However, a sample obtained from the Colorado River at

Dewey Bridge, near Cisco, Utah, had a Ra:DS ratio of 25 $\mu\mu$c per g solids. This factor is much greater than the significant radium concentration factor of region VI (6.4 $\mu\mu$c per g solids). The seemingly disproportionate amount of radium in the river water is attributed to uranium milling operations located along several of the tributaries to the Colorado River.

Many of the water samples collected in this region were obtained from rocks which elsewhere do contain important uranium ore bodies in the oxidized zone. It should be emphasized that the samples were collected only from presumably barren areas, because samples of ground water from known ore bodies were specifically omitted from the sampling program.

REGION X. PACIFIC OROGENIC BELT

This region is one of complex tectonic history involving several orogenic movements of different ages, some so recent that strata of Pleistocene age, and even of Recent age, have been deformed. Cenozoic sedimentary and volcanic rocks are the most common aquifers in this region, and much of the area is underlain by material resulting from intense volcanic activity that began in Permian time and has continued intermittently until Recent time. Crystalline rocks of the batholithic intrusions emplaced in Mesozoic time have been uncovered in some of the mountain ranges existing today. Ground-water supplies are obtained principally from late Tertiary and Quaternary valley fill, but where these deposits are absent, satisfactory supplies often are obtained locally from sedimentary rocks and lava flows of Tertiary age.

The radiochemical data shown in table 1 indicate that the aquifer material of this region is not particularly uraniferous. According to the analyses, none of the samples contained more uranium than the anomaly threshold (12 μg per l). Therefore, none of the U:DS ratios are considered significant.

The median concentration, median Ra:DS ratio, and anomaly threshold shown in table 1 for radium in this region are the smallest values found in the conterminous United States. A sample collected from sediments of Tertiary age (table 2: Nevada 6) that probably contain interbedded volcanic rocks, exceeded the radium anomaly threshold for this region. This sample containing the largest radium concentration and having the largest Ra:DS ratio may be indicative of the radioelement content of the volcanic rocks.

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GEOLOGIC, HYDROLOGIC, AND CHEMICAL DATA

Data for each State are presented in table 2. This table is divided into two parts; one on each of facing pages. One part, a record of sampling sites, contains brief descriptions of the location and the geologic and hydrologic characteristics of sources of the samples; the facing part, a compilation of chemical data, presents the results of the chemical and radiochemical analyses. The table is also subdivided according to the States, which are listed alphabetically.

Information to be found under the headings of the tables is explained below.

No. on plate 1.—All sampling sites are shown on the accompanying map, plate 1; these sites were numbered serially in a general north-south direction for each State, beginning at the northwest corner of the State. The number in the table corresponds with the location number on the map. These columns are the same in the two parts of the table.

Location—Locations are shown by county and by proximity to towns.

Well or spring number or name. —Well or spring number used by Ground Water Branch district offices is given wherever possible, as well as local names if they exist. Owners' well and spring numbers are shown only when no other means of identification exists.

Use.—Letter symbols for use are—

D	Domestic, a source that furnishes drinking and culinary water for one or several households.
I	Irrigation.
Ind	Industrial.
M	Municipal.
N	Not used.
Obs	Observation well.
Pf	Public facility, a source available to segments of the general public other than municipal supply. These facilities include such places as hospitals, military bases, and public parks.
S	Stock.

Yield.—The discharge obtained by pumping or the unrestricted flow from artesian wells or springs is given. Letters "r" and "e" are used to indicate reported and estimated discharges, respectively.

Well characteristics.—The total depth of the well and the diameter of the casing are reported as obtained from available records. The water levels reported are the latest known measurements made before the collection of the sample. The water levels are shown as feet above (+) or below (−) land-surface datum (LSD).

Water-bearing formation.—The known or most probable source of the water is shown by formation name, age, and geologic terrane. Most of these data were obtained from Ground Water Branch district personnel who collected the samples and from the literature. The terranes are the authors' system for classifying many lithologic units into a few categories of the same general geologic and geochemical characteristics in order to facilitate the comparison of large groups of samples.

Igneous rocks are divided into two classes, volcanic and plutonic, each of which is further subdivided into silicic, intermediate, and basic. Metamorphic terranes are not common aquifers and few were sampled; thus, only the classes metaplutonic, metavolcanic, and metasedimentary are used. Sedimentary terranes are given a binomial classification; the first term indicates depositional environment, and the second, the lithologic category. For sedimentary terranes commonly described as specific types of unconsolidated material, the terrane types of the consolidated equivalents are shown. For the many samples obtained from sources yielding water thought to have originated about equally from two or more terranes, all the terranes are indicated. However, if a sample represents water that has had most of its history in one geologic terrane, even though other terranes are involved, then the terrane which has had the predominant geochemical influence on the water is the only one shown.

Geologic ages are indicated by the following symbols:

Q	Quaternary	₮	Triassic
Qr	Recent	Pal	Paleozoic
Qp	Pleistocene	P	Permian
T	Tertiary	C	Carboniferous
Tp	Pliocene	ℙ	Pennsylvanian
Tm	Miocene	M	Mississippian
To	Oligocene	D	Devonian
Te	Eocene	S	Silurian
Tpe	Paleocene	O	Ordovician
K	Cretaceous	Є	Cambrian
J	Jurassic	pЄ	Precambrian

Probable source of water.—The history of the water before entering the terrane indicated is given. The hydrology of the areas from which many of the samples were collected is not known in detail; hence, many of the data in this column are conjectural.

Temperature.—Temperature was measured at the time samples were collected. Where water passed through tanks or long pipelines, attempts were made to obtain true temperature of the water in the aquifer by permitting sufficient amounts of water to flush out stored water before measurements were made.

Date of collection.—The date on which the sample was taken.

Chemical constituents and physical properties.—These items are, for the most part, self-explanatory. Unless otherwise noted, the concentrations may be taken to represent rather closely the conditions in the aquifer. The main exceptions are aluminum, iron, and manganese, which hydrolize readily. For these constituents, footnotes indicate the interpretation that must be applied. The pH, an indication of hydrogen-ion activity, is also affected by hydrolytic reactions and may, therefore, change between collection and analysis. It is difficult, however, to predict the magnitude and direction of changes in pH so that it should be taken only as a general indication of conditions in the aquifer.

The beta-gamma activities and radium concentrations are expressed in micromicrocuries per liter ($\mu\mu$c per l). One micromicrocurie is the quantity of a radioactive substance that undergoes 2.22 disintegrations per minute. Uranium concentrations are reported as micrograms per liter (μg per l). This is nearly equivalent to parts per billion, except when the density of the sample differs greatly from that for pure water.

Remarks—Relevant information not shown under any of the preceding headings is included in this column.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*

GEOLOGIC AND HYDROLOGIC DATA

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Alabama																
1	Tuscumbia	Colbert	Spring, field No. 79.	M	37,320					Warsaw limestone	M	Marine limestone.	Direct precipitation.	61	Apr. 10, 1956	
2	Huntsville	Madison	Well CT No. 2.	M		200	8			Fort Payne chert, 35 to 133.7 ft; Chattanooga shale, 133.7 to 137 ft.	M, D	Mixed marine limestone and black shale.		63	May 24, 1954	
3	do	do	Huntsville Big Spring.	M						Tuscumbia limestone.	M	Marine limestone.		62	do	
4	Collinsville	DeKalb	Spring Dek-1.	D	1,700					Bangor limestone; crystalline and oolitic limestone.	M	do	Direct precipitation.	59	Apr. 14, 1955	
5	Anniston	Calhoun	Cold Water Spring.	M	r20,800					Weisner quartzite; sandstone and locally shale beds.	Є	Fluviatile sandstone.		64	May 23, 1954	
6	Birmingham	Jefferson	Well, Jefferson 1.	Obs	e200	139	6	−47	April 1955	Bangor limestone, 68 to 139 ft; crystalline and oolitic limestone.	M	Marine limestone.	Direct precipitation and streams.	63	Apr. 12, 1955	
7	Sylacauga	Talladega	City well 1	M	520	179	10	−31	do	Sylacauga marble mbr. of Talladega slate, 131 to 179 ft.	pЄ or Pal	do		67	Apr. 27, 1955	
8	Wedgeworth	Hale	Well, field No. 50.	Pf	1,240	1,490	12–8		April 1944	Tuscaloosa group(?)	K	Fluviatile sandstone.		74	Mar. 31, 1956	Flowing well.
9	11 miles southwest of Demopolis.	Marengo	Well, field No. E-6.	D, S	3.5	1,038	4	+35	May 1956	Eutaw fm.; 950 to 1,038 ft; glauconitic sand.	K	Littoral sandstone.	Direct precipitation.	75	May 16, 1956	Do.
10	Montgomery	Montgomery.	City well 44	M	500	742	18–12	−52	January 1957.	Eutaw, Gordo, and Coker fms., 286 to 742 ft; sand, gravel, and glauconitic sand.	K	Mixed littoral, paludal, and continental clastic rocks.	do	68	Jan. 23, 1957	
11	Tuskegee	Macon	Well, field No. Mac 1.	Obs		335	18	−72	April 1955	Tuscaloosa group (sand 299 to 335 ft).	K	do	Direct precipitation and streams.	65	Apr. 29, 1955	
12	Camden	Wilcox	Well, field No. O-9.	M	120	401	8	−146	March 1956.	Ripley fm. (sand 357 to 398 ft); sands and clays locally calcareous and glauconitic.	K	Mixed marine and littoral sandstone and clay.	Direct precipitation.	73	Mar. 31, 1956	
13	Calhoun	Lowndes	Well, field No. S-8.	N		1,432	4	−149	December 1955.	Gordo fm., 1,412 to 1,432 ft; sand and gravel.	K	Continental and paludal clastic rocks.	do	70	Apr. 4, 1956	
14	Brewton	Escambia	Well, field No. O-150.	M	800	731	16–10	−35	January 1957.	Lisbon fm. (sand 600 to 721 ft); calcareous clayey sand and glauconitic sand.	Te	Littoral sandstone.	Direct precipitation and streams.	76	Jan. 31, 1957	

CHEMICAL ANALYSES

[Results, in parts per million, except as indicated]

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Alabama																									
1	7.7	[1]0.0	[1]0.02	[1]0.00	0.00	0.00	43	1.2	1.5	0.7	133	0	3.2	2.2	0.1	5.9	0.0	130	112	224	7.3	<10	0.2	0.3	Sample turbid.
2	8.0	------	.18	------	------	------	100	7.6	[2]6.0		270	0	44	8.0	.0	18	.4	------	280	559	7.2	<25	.1	.2	
	11	[1]1.2	[1].04	------	------	------	112	16	6.5	1.0	268	0	98	12	.0	22	------	425	346	629	7.2	------	------	------	Sample turbid. Collected Mar. 7, 1952.
3	8.6	------	.05	------	------	------	48	3.6	[2]2.1		152	0	3.2	8.0	.0	------	.0	------	135	269	7.5	<10	<.1	.5	
	8.4	[1]1.0	[1].04	------	------	------	46	4.2	1.5	.8	146	0	4.0	3.5	.0	7.3	------	139	132	250	7.0	------	------	------	Sample turbid. Collected Mar. 28, 1952.
4	6.7	[1].0	[1].01	[1].00	.00	.13	26	1.1	.8	.2	76	0	4.3	2.0	.1	4.0	.0	91	70	135	7.5	8	.1	.7	Sample turbid.
5	13	------	.24	------	------	------	23	11	[2]1.7		127	0	.8	1.0	.0	------	.0	------	103	202	7.7	10	.1	.5	
	12	1.0	.03	------	------	------	23	12	1.7	1.6	127	0	1.6	2.0	.0	.9	------	108	107	197	7.6	------	------	------	Collected May 27, 1952.
6	1.3	[1].0	[1].00	[1].00	.00	.01	29	4.1	4.4	6.3	72	0	41	2.8	.1	5.8	.0	135	89	208	7.3	42	<.1	.5	Sediment in sample.
7	9.9	[1].0	.03	.04	.00	.15	39	10	2.7	.3	162	0	2.4	3.8	.0	5.8	.0	159	139	260	7.9	<10	<.1	<.1	
8	1.3	[1].0	[1].01	[1].01	.00	.00	129	26	680	9.0	90	0	5.6	1,380	.4	2.5	.0	2,450	429	4,180	7.1	<200	<.1	.5	Sample turbid.
9	12	[1].2	1.3	.11	.00	.16	186	55	3,340	24	150	0	24	5,640	1.3	30	.0	9,620	691	16,500	7.3	<200	2.2	<.1	
10	9.4	[1].1	.16	.02	.00	.02	8.4	.3	80	.7	204	6	.8	8.5	1.1	.4	.9	236	22	379	8.6	<10	.1	<.1	
11	16	[1].0	[1].00	[1].13	.00	.12	1.2	.8	3.3	4.1	17	0	1.9	1.9	.0	2.0	.0	38	7	38	6.4	8	.2	1.5	Sediment in sample.
12	13	[1].0	.10	.00	.00	.00	1.6	.5	185	1.0	332	16	33	61	1.4	2.0	.1	474	6	805	8.8	<25	2.1	.2	
13	.7	[1].0	[1].05	[1].00	.03	.11	57	.5	1,950	14	0	64	22	3,100	.8	7.2	.1	5,440	144	9,130	10.6	<500	.3	2.5	Hydroxide (OH), 8.9 Sample turbid.
14	39	[1].0	.15	.00	.00	.04	28	5.6	19	5.4	165	0	2.3	2.9	.3	.3	.0	192	93	292	8.1	<10	<.1	1.2	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Arizona																
1	Chloride	Mohave	Well, (B-23-18) 9c.	S	e1		8	−27	January 1956.	Sand and gravel; overlies fractured bedrock schist and granite.	Q	Fluviatile sand.	Direct precipitation.	62	Jan. 17, 1956	
2	6 miles southwest of Flagstaff.	Coconino	Well, (A-21-6) 35cd.	D	206	1,600	15	−1,295	December 1954.	Coconino sandstone, 760 to 1,570 ft; crossbedded dune deposit.	P	Eolian sandstone.		52	Dec. 14, 1954	
3	3 miles north of Chino Valley.	Yavapai	Well, (B-16-2) 2abd.	S, I	r550	730	12–10			Interbedded basalt, tuff, and alluvium.	Q, T(?)	Basic volcanic rocks.		73	Dec. 13, 1954	Flowing well.
4	Chrysotile	Gila	Orange Spring, (A-5-16) 13a.	N	1					Quartzite with diabasic intrusives.	pЄ	Metasedimentary rocks.	Direct precipitation and juvenile(?) or connate(?).	74	Jan. 25, 1956	Depositing travertine.
5	do	do	Green Spring, (A-5-16) 13a.	N						do	pЄ	do	do	70	do	Do.
6	Glendale	Maricopa	Well, (A-2-2) 6acb.	M	r1,200	1,901	20	−176	January 1957.	Sand and gravel lenses in silt and clay beds.	Q, T	Fluviatile clastic rocks.	Surface water infiltration.	107	Jan. 25, 1957	
7	Buckeye	do	Well, (C-1-3) 5bac.	M	r400	550	10	−170	do	do	Q, T	do	do	80	Jan. 28, 1957	
8	Globe	Gila	Well, (A-1-15) 25 ccb.	M	220	701	20–16	−26	December 1955.	Gila conglomerate(?)	Qp, T, Tr	do	do	68	Dec. 9, 1955	
9	Fort Thomas	Graham	Well, (D-5-23) 2cd.	N		53	60	−52	February 1956.	Alluvium	Qp	do		67	Feb. 7, 1956	
10	1.5 miles northwest of Pima.	do	Well, (D-6-24) 13abd.	I	e1,200	3,767	24–8			Valley fill	Q, T(?)	do		137	Apr. 20, 1954	Flowing well.
11	Clifton	Greenlee	Well, (D-16-22) 15cbb.	Pf	e500	22		−16	January 1956.	Alluvium	Q, T(?)	do		106	Jan. 11, 1956	
12	Yuma	Yuma	Colorado River (c-8-23) 36bcb.	M										58	Dec. 12, 1955	
13	7.5 miles east of Roll.	do	Well, (C-7-16) 24dcc.	D, S	30	150	12			Younger valley fill	Q	Fluviatile clastic rocks.		66	Jan. 26, 1956	
14	5 miles southeast of Mammoth.	Pinal	Well, (D-8-17) 36acd.	S	r2	425	6	−255	1949	Gila conglomerate	Qp, T	do	Surface water infiltration.	75	Nov. 13, 1954	
15	Duncan	Greenlee	Well, (D-8-32) 19adc.	I	1,450	74	20	−14	November 1954.	Alluvium	Q, T(?)	do		61	Nov. 24, 1954	
16	Tucson	Pima	Well, (D-14-12) 36aac.	S	e10	165	6	−126	January 1956.	Limestone overlain by alluvium.					Jan. 5, 1956	
17	5 miles south of Tucson.	do	Well, (D-14-13) 35cdc.	M	r500	275	12	−40	April 1952	Valley fill	Q, T(?)	Fluviatile clastic rocks.		70	Apr. 19, 1954	
18	Dragoon	Cochise	Well, (D-16-22) 15cbb.	D	e40	16		−10	January 1956.					62	Jan. 12, 1956	
19	Bisbee	do	Well, (D-24-23) 13aac.	M	r340	170	60	−85	January 1957.	Alluvium	Q, T(?)	Fluviatile clastic rocks.		68	Jan. 21, 1957	
20	Douglas	do	Well, (D-24-27) 10dbb.	M	r1,200	340	20–12	−57	December 1955.	Valley fill	Q, T(?)	do		63	Dec. 13, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Arizona																									
1	47	1.5	0.03	0.00	------	------	558	191	500	12	171	0	1,820	840	1.3	14	0.0	4,180	2,180	5,310	7.4	240	0.3	12	
2	23	.0	.00	.00	------	------	24	12	5.2	2.6	141	0	1.7	2.5	.2	1.5	.0	132	109	223	8.2	<7	1.0	.5	
3	33	.0	.00	[1].00	------	------	26	9.7	17	2.4	146	0	7.6	8.2	.3	3.0	.1	172	105	269	8.0	<7	<.1	1.0	
4	25	12	1.0	.30	------	------	546	199	13,200	238	1,930	0	1,100	20,000	------	------	.4	36,800	2,180	53,100	6.8	<1,700	220	14	
5	29	[3]3.5	[3]2.1	[3].30	------	------	456	214	12,800	228	1,820	0	1,060	19,300	------	------	.2	35,100	2,020	51,400	7.2	<1,700	162	13	Boron (B), 24.
6	22	.1	.12	.00	------	------	6.4	.0	124	2.2	86	4	88	81	.6	3.5	.05	371	16	625	8.4	<23	<.1	.5	
7	21	.3	.87	.00	------	------	196	56	260	7.2	73	0	189	688	.7	51	.05	1,510	720	2,650	7.6	<85	.1	2.6	
8	30	.2	.00	.00	------	------	37	15	49	6.4	256	0	22	20	.1	11	.7	285	154	510	7.9	29	.1	3.6	
9	34	.5	.18	.00	------	------	30	3.9	17	1.0	102	0	35	6.0	.6	.6	.2	174	91	266	6.9	<14	<.1	.4	
10	39	------	.00	------	------	------	63	6.6	1,170	11	96	0	408	1,620	5.2	1.8	------	3,430	184	5,950	8.1	57	.3	1.0	
	47	------	[1].02	------	------	------	71	7.0	[2]1,200		101	0	412	1,630	5.2	1.9	------	3,440	206	5,850	7.7	------	------	------	Collected May 8, 1952.
11	70	[3]1.4	[3].85	[3].32	------	------	890	34	3,040	173	115	0	66	6,360	2.8	------	.0	11,200	2,470	18,200	7.0	<490	13	.9	Strontium (Sr) 18.
12	17	[3].3	[3].14	[3].00	------	------	114	36	175	5.4	212	0	388	164	.3	1.4	.0	1,000	432	1,550	8.0	<45	.2	6.9	Sample turbid.
13	15	.3	.34	.00	------	------	21	3.4	388	3.6	83	2	268	390	6.8	.6	.1	1,070	66	2,000	8.4	<68	.2	.9	
14	55	.3	[1]1.1	[1].00	------	------	.8	.2	117	2.6	96	47	7.6	6.0	30	15	------	325	3	504	9.5	<11	.1	.7	
15	37	.1	[1].02	[1].06	------	------	88	15	102	4.4	341	0	154	44	1.9	1.9	------	616	281	933	7.5	<23	<.1	15	Boron (B), 0.42.
16	22	[3]1.7	[3].57	[3].00	------	------	57	77	875	3.8	963	0	1,200	220	2.0	.2	.0	2,800	458	4,150	7.9	<140	1.5	11	
17	35	------	.03	------	------	------	75	13	67	2.7	286	0	121	16	.7	3.3	------	481	240	720	7.9	11	.1	9.4	
	39	------	[1].00	------	------	------	76	16	[2]71		288	0	138	19	.6	3.1	------	508	256	753	7.4	------	------	------	Collected Apr. 29, 1952.
18	24	[3]1.8	[3]1.2	[3].00	------	------	14	1.9	17	1.4	65	0	14	7.0	.8	.2	.0	106	43	166	6.6	<11	.1	<.1	
19	35	.0	.07	.00	------	------	54	6.8	18	2.2	211	0	12	8.0	.3	5.2	.00	244	163	387	7.3	<14	.1	.7	
20	27	.0	.02	.00	------	------	3.2	1.0	262	2.4	149	16	125	210	2.0	2.5	.05	679	12	1,260	9.0	<34	<.1	3.8	

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Arkansas															
1	1 mile east of Melbourne.	Izard	Spring, 16N-9W-1dda.	M	e10					St. Peter sandstone; well-sorted sandstone locally calcareous and ferruginous with few thin beds of dolomite and shale.	O	Eolian sandstone.		62	Sept. 19, 1954	
2	Cave City	Sharp	Spring, 15N-5W-17cac.	D						do	O	do		60	Sept. 20, 1954	Pool in cave.
3	Lepanto	Poinsett	Well, 11N-7E-3cab.	M	e150	1,290	8-6	−16	January 1956.	Wilcox group (1,400 ft sand); interbedded sand, clay, and lignite.	Te	Mixed littoral, paralic, and fluviatile clastic rocks.		76	Jan. 18, 1957	May contain some connate water.
4	4 miles southeast of Bald Knob.	White	Well, 7N-5W-4add.	S	1,200	86	16-12	−17	November 1955.	Sand and gravel overlain by clay.	Q	Fluviatile sand.	Direct precipitation and surface water infiltration.	63	Nov. 29, 1955	
5	4 miles east of Owensville.	Saline	Well, 1S-17W-13bdd.	D		114	7	−33	September 1954.	Blakely sandstone; black argillaceous shale with interbedded quartzitic sandstone; local calcareous cementation.	O	Marine clastic rocks.		64	Sept. 22, 1954	
6	Hot Springs National Park.	Garland	Springs	Pf						Bigfork chert; chert interbedded with small amount of shale and limestone.	O	Littoral clastic rocks.		91	May 28, 1956	
7	do	do	Well 1	Ind	85	200	8	−20	May 1956	Bigfork chert; 180 to 200 ft.	O	do		84	do	
8	do	do	Well 2	Ind	200	200	8	−20	do	Bigfork chert; 150 to 200 ft.	O	do		88	do	
9	Norman	Montgomery.	Spring, 3S-25W-14ddb.	Pf	e15					Blakely sandstone(?); black argillaceous shale interbedded with quartzitic sandstone; local calcareous cementation.	O	Marine clastic rocks.		59	Sept. 22, 1954	
10	Pine Bluff	Jefferson	Well, 6S-9W-4cdd4, city well 11.	M	r1,680	840		−97	December 1955.	Claiborne group; sand interbedded with clay and marl.	Te	Littoral sandstone.	Direct precipitation.	76	Dec. 11, 1955	
11	Murfreesboro	Pike	Well, 8S-25W-17acc.	M	125	89	6			Trinity group; clay, sand, gravel, limestone, gypsum, and celestite; overlain by Woodbine and Tokio fms. (Cretaceous).	K	do	do	65	Jan. 19, 1957	Flowed when drilled.
12	3 miles northeast of Monticello.	Drew	Well, 12S-7W-13aadl.	S		37	8	−33	December 1955.	Jackson group; shale, sand, and marl.	Te	Marine shale	do		Dec. 13, 1955	
13	7 miles northeast of Monticello.	do	Well, 11S-6W-30adbl.	D, S		22	30	−12	do	do	Te	do	do		do	
14	3 miles east of Magnolia.	Columbia	Well, 17S-20W-16cad.	N		7,618	6			Smackover fm.; limestone banded in lower part with carbonaceous argillaceous partings; overlain by anhydrite and red shale of Buckner mbr. of Haynesville fm.	J	Marine limestone.	Connate(?)	110	Dec. 12, 1955	Oil-well-brine bottom-hole temperature 206° to 207° F.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Arkansas																									
1	12	0.2	0.06	0.00	-----	------	50	6.0	2.4	3.0	184	0	2.1	1.8	0.0	6.5	0.0	172	149	299	7.4	<7	0.1	0.3	
2	12	.1	.05	.00	-----	------	17	5.6	6.0	4.8	66	0	6.5	9.5	.1	19	.0	109	65	188	6.9	9	.1	<.1	
3	12	[3] .0	[1] .00	[3] .00	-----	------	1.6	.0	44	.8	110	0	4.3	4.0	.2	.0	1.0	126	4	185	7.6	<7	<.1	<.1	Sample turbid.
4	27	[3] 4.0	[1] .12	[3] .93	-----	------	192	54	520	3.7	191	0	3.3	1,200	.3	1.8	.0	2,460	701	3,890	6.9	<110	1.9	.2	Sediment in sample.
5	21	.6	.12	.00	-----	------	43	8.7	3.5	2.8	176	0	8.7	2.0	.4	.1	.0	172	143	288	7.8	<7	.4	.3	
6	45	.0	.00	.00	-----	------	45	4.9	4.0	1.6	162	0	7.8	2.0	.1	.3	.1	192	132	276	7.7	<7	1.8	--------	
7	26	.9	.95	.18	-----	------	26	1.9	7.4	2.8	68	0	34	2.2	.1	.1	.0	134	73	199	6.5	<7	.8	--------	
8	24	.5	.78	.2	-----	------	34	4.4	6.8	3.0	90	0	45	2.8	.1	.1	.0	169	103	256	6.7	<7	1.1	--------	
9	16	.0	.02	.00	-----	------	42	5.9	2.4	3.0	162	0	4.5	1.5	.3	.1	.0	151	129	260	7.5	<7	.1	.3	
10	16	[3] 1.0	[1] .03	[1] .00	-----	------	7.2	1.6	12	6.8	67	0	1.4	2.0	.2	.0	.0	79	25	136	6.6	<11	.3	.1	
11	9.6	.0	1.2	.06	-----	------	51	9.7	46	4.2	204	0	65	28	.1	.0	.00	317	167	541	7.2	<23	.6	<.1	
12	88	64	.85	8.6	-----	------	455	329	456	16	0	0	2,870	440	2.0	1.2	.0	4,880	2,490	5,230	3.5	<170	7.1	69	Acidity as H_2SO_4, 280.
13	98	28	.88	9.6	-----	------	424	194	416	11	0	0	2,420	380	1.8	3.1	.0	4,190	1,860	4,570	4.0	<140	1.7	17	Acidity as H_2SO_4, 140.
14	------	[3] 21	[1] .99	[1] .00	-----	------	32,200	3,210	54,100	1,400	157	0	158	160,000	------	--------	.00	333,000	93,500	198,000	6.0	<17,000	99	.7	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									California							
1	6 miles northeast of Ager.	Siskiyou	Soda Springs, 47N/5W-13P1.	N						Volcanic rocks of the Western Cascades; mostly pyroxene andesite but ranges from olivine basalt to rhyolite; overlies fluviatile and paludal clastics (Umpqua fm.?) of Eocene age and (or) marine sandstone (Chico fm.) of Cretaceous age.	Te, Tm	Intermediate volcanic rocks.	Chico fm	76	Sept. 25, 1954	
2	5 miles southwest of Mount Shasta City.	do	Neys Springs, 40N/4W-32.	Pf	e1					Volcanic rocks chiefly andesitic and partly serpentinized overlying older metasedimentary rocks.	Te to Tm (?) and J to K (?).	Mixed intermediate volcanic rocks, metasedimentary, and metavolcanic rocks.	Direct precipitation.	50	Dec. 13, 1956	Easternmost of group of several springs.
3	4 miles south of Eagleville.	Modoc	Menlo Spring, 39N/17E-7.	D, S	e75					Andesite(?) flows overlain by alluvium.	T	Intermediate (?) volcanic rocks.		134	Oct. 20, 1956	Located on major fault.
4	5 miles south of Dunsmuir	Shasta	Castle Crag Spring, 38N/4W-12.	N	e20					Andesite(?) flows	T	do		50	Dec. 14, 1955	
5	10 miles northeast of Red Bluff.	Tehama	Tuscan Springs, 28N/2W-32B.	N	e5					Chico fm.; sandstone and shale, overlain by several hundred feet of Tuscan fm. of Pliocene age.	K	Marine clastic rocks.		83	do	
6	10 miles northeast of Chico.	Butte	Richardson Springs, spring 1, 23N/2E-20.	Pf	e2					Tuscan fm.; andesite breccias, tuffs, and agglomerates overlying marine sandstone and shale of Chico fm. of Cretaceous age.	Tp	Intermediate volcanic rocks.	Chico fm	62	Dec. 15, 1955	Some gas present.
7	10 miles southwest of Stony Ford.	Colusa	Fouts Spring, Redeye Spring, 17N/7W-5N.	Pf	e2					Franciscan fm.; serpentine.	K, J	Metavolcanic rocks.			Dec. 14, 1955	
8	18 miles southwest of Williams.	do	Wilburs Springs, 14N/5W-28C.	Pf	e20					Sandstone and conglomerate overlying serpentine.		Marine sandstone.		123	Dec. 15, 1955	
9	12 miles east of Cloverdale.	Sonoma	The Big Geysers, Spring, 11N/9W-13A1.	N						Franciscan fm.; sandstone, shale, chert, and serpentine.	K, J	Mixed metasedimentary and metavolcanic rocks.		113	Sept. 21, 1954	
10	12 miles southeast of Santa Rosa.	do	Well, 6N/6W-4J1.	I	260	252	12-10	−40	September, 1954.	Sonoma volcanics; tuff, tuff-breccia, basalt, andesite, and rhyolite.	Tp	Silicic volcanic rocks.	Direct precipitation.	77	do	
11	Winters	Solano	Well, 8N/1W-28R4.	D		67	6	−38	May 1952	Alluvial valley fill	Q	Fluviatile clastic rocks.	Surface-water infiltration.	64	May 19, 1954	
12	Sacramento	Sacramento.	Well, 9N/5E-23F2.	M	1,550	360	14	−39	February 1952.	Sand and gravel	Q	Fluviatile sand.	Direct precipitation.	65	Dec. 31, 1956	
13	do	do	Well, 9N/5E-23L2	M	e1,000	467	14	−50	November 1955.	do	Q	do	do	69	Nov. 29, 1955	

14	2 miles south of Byron.	Contra Costa.	Byron Hot Springs, well 1S/3E-15G2.	Pf	e1	35	12			Alluvium, 0 to 35 ft; overlies contact of Tertiary Kreyenhagen shale (Eocene and Oligocene) and Contra Costa gr. of Ham (Pliocene).	Q	Fluviatile clastic rocks.	Underlying Tertiary sediments.	72	Dec. 16, 1955
15	do	do	Byron Hot Springs, spring 1S/3E-15G1.	N	.4					do	Q	do	do	96	Oct. 2, 1954
16	1 mile southwest of Deep Springs.	Inyo	Deep Springs, 7S/36E-3.	S	e30					Granitic rocks (fault zone).	K	Silicic plutonic rocks.	Direct precipitation.	66	May 26, 1957
17	11 miles southwest of Fresno.	Fresno	Well, 15S/18E-2G1.	I	836	197	16	−38	April 1952	Sand and clay	Q	Fluviatile sand.	Sierra Nevada Mtns.	72	May 18, 1954
18	18 miles west of Coalinga.	do	Coalinga Mineral Springs, 20S/13E-34K1.	Pf	e1					Panoche(?) fm.; shale, concretionary sandstone, and conglomerate, overlies Franciscan fm.	K	Marine clastic rocks.	Direct precipitation.	90	Dec. 17, 1955
19	45 miles southeast of Big Pine, Saline Valley.	Inyo	Little Hunter Canyon Spring, 14S/38E-28.	D	e150					Limestone and dolomite.	Pal Undifferentiated	Marine limestone.	do	80	May 27, 1957
20	do	do	Salt Lake, 14S/38E-27.	N						Lake bottom windblown sand and evaporities; fed by streams from quartz monzonite and other silicic plutonic rock terranes of Cretaceous age and undifferentiated Paleozoic sedimentary rocks.		Mixed lacustrine clastic and evaporite rocks.	Surface-water runoff.	100	do
21	do	do	Lower Warm Springs, 13S/39E-18.	Pf	e20					Silicic and basic volcanic flows and tuffs overlain by alluvium.	T	Mixed silicic and basic volcanic rocks.		110	do
22	30 miles west of Death Valley Junction.	do	Navares Springs, 28N/1E-G1.	D	r350					Alluvium, overlying Furnace Creek fault zone in younger Tertiary volcanic and sedimentary rocks.	Q	Fluviatile clastic rocks.	Deeply circulating meteoric water.	102	Dec. 22, 1955
23	4 miles south of Santa Maria.	Santa Barbara.	Well, 9N/34W-10D2.	M	e380	234	16	−225	November 1955.	Orcutt and Paso Robles fms.; gravel, sand, clay, and silt; scattered thin beds of limestone near base of Paso Robles.	Qp, Qp or Tp	do	Surface-water infiltration and direct precipitation.		Nov. 29, 1955
24	Santa Barbara	do	Veronica Springs.	Pf	e1					Rincon shale; consolidated marine mudstone, contains calcareous nodules, overlies marine Vaqueros sandstone, underlies marine Monterey shale.	Tm	Marine clastic rocks.	Connate(?)	54	Dec. 18, 1955
25	Carpinteria	do	Well, 4N/25W-29D4.	M	500	411	12	−27	January 1957.	Alluvium and Santa Barbara fm.; unconsolidated clay, silt, and sand.	Qp	Mixed fluviatile and marine clastic rocks.	Direct precipitation.	65	Jan. 7, 1957
26	5 miles northwest of Ojai.	Ventura	Matilija Hot Springs, 5N/23W-29J1.	Pf	e10					Sandstone and shale, probably faulted.	Te, Tpe	Marine clastic rocks.	Deeply circulating meteoric water.	108	Dec. 19, 1955
27	4 miles south of Edwards.	Kern	Well, 9N/10W-24F1.	Pf	630	530	12	−18	January 1952.	Sand, gravel, and clay, 70 to 530 ft.	Qp	Mixed fluviatile and lacustrine (?) clastic rocks.	Underflow from adjacent mountains.	66	May 19, 1954
28	Randsburg	do	Butte Lodge Mine, 29S/40E-36.	Ind, M		600 (Shaft)		−375	February 1957.	Quartz monzonite intrusive into Rand schist of Hulin (Precambrian(?)).	J(?)	Silicic plutonic rocks.	Direct precipitation.	60	Feb. 1, 1957
29	25 miles southwest of Shoshone.	San Bernardino.	Saratoga Springs, 18N/5E-2E.	Pf	e25					Pahrump series; faulted quartz diorite.	p€	do	Deeply circulating meteoric waters.	82	Dec. 22, 1955

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									California—Continued							
30	2 miles north of Tecopa.	Inyo	Tecopa Hot Springs, 21N/7E-33P.	Pf	e200					Stirling quartzite; pink vitreous quartzite with some included sandstone, shale, and dolomite.	Є	Metasedimentary rocks.	Deeply circulating meteoric waters.	108	Dec. 22, 1955	
31	17 miles west of Nipton.	San Bernardino.	Well, 16N/13E-13F1.	D	r40	200	8			Sulfide Queen carbonate ore body; calcite, dolomite, ankerite, and rare-earth minerals emplaced in Precambrian gneisses associated with skonkinite-seyenite intrusives.	pЄ(?)	Silicic plutonic rocks.	Direct precipitation.	50	Dec. 22, 1955	
32	12 miles west of Nipton.	do	Wheaton Springs, 15½N/14E-28B.	D	e5					Metamorphic complex intruded by granite.	pЄ	Mixed metasedimentary and metaigneous rocks.	do	51	do	
33	Long Beach	Los Angeles.	Well, 4S/12W-14C1.	M	330	324	16	−131	January 1957.	Sand and gravel	Qp	Fluviatile sand.	Direct precipitation on nearby mountains.	71	Jan. 7, 1957	
34	Redlands	San Bernardino.	Well, 1S/2W-21E1.	M	510	207	10	−80	December 1955.	Gravel, from 0 to 87 ft; clay from 87 to 207 ft.	Qr	Fluviatile clastic rocks.	do	59	Dec. 28, 1955	
35	2 miles east of San Jacinto.	Riverside.	Soboba Springs (Black Sulfur Spring), 4S/1E-30D.	Pf	e5					Fault contact of Southern California batholith (tonalite, granodiorite, and gabbroic rocks) and Pleistocene nonmarine rocks.	K	Intermediate plutonic rocks.	Deeply circulating meteoric water.	102	Dec. 20, 1955	
36	Hemet Hot Springs.	do	Gilman Well, 4S/1W-9Q.	D, I	e50	611	6			Lake and bog sediments.	Q	Mixed lacustrine and paludal clastic rocks.	Surface-water infiltration.	78	do	
37	2 miles east of Pala.	San Diego.	Spring, 9S/1W-19N1.	D	1					Pegmatite in diorite	K(?)	Silicic plutonic rocks.	Direct precipitation.	70	Nov. 12, 1954	Developed spring in 15-ft. pit.
38	33 miles northwest of Westmoreland.	Imperial	Palm Wash Spring, 10S/9E-22E1.	N	<e1					Palm Spring fm.; sandstone and red clays may be associated with Truckhaven rhyolite of Diblee at depth.	Tm	Fluviatile clastic rocks.	do	58	Dec. 20, 1955	
39	30 miles north of Westmoreland	do	Truckhaven Well, 10S/10E-18N.	D	e12	1,286	2.5			Brawley fm. of Diblee; clays and sands; and (or) Borrego fm. of Diblee (lacustrine facies of Palm Spring fm.).	Qp, Tp	Mixed fluviatile and lacustrine clastic rocks.	Recharge in nearby mountains.	100	do	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
California																									
1	75	0.3	0.08	0.00	-----	-----	189	54	3,690	102	3,510	0	46	4,280	0.8	-----	0.1	10,500	694	15,900	6.7	<480	1.7	1.2	
2	31	[1].0	.01	.00	0.00	0.16	9.3	7.7	3.8	.3	77	0	.2	.5	.1	0.0	.1	87	55	118	7.2	<5	<.1	.1	
3	58	.0	.03	.00	-----	-----	5.0	.2	95	1.6	39	12	122	27	3.0	.8	.00	346	13	486	9.0	<17	<.1	.1	
4	65	[1].9	9.4	.41	.00	.00	192	243	1,170	37	3,020	0	4.0	1,170	.2	50	.2	4,420	1,480	6,710	6.5	<500	2.6	<.1	Barium (Ba), 0.0.
5	15	[1].9	[3].19	[1].25	.00	.00	19	17	7,900	59	1,060	154	.0	11,800	5.0	289	.5	21,500	176	32,500	8.4	<500	5.2	6.0	Barium (Ba), 72; hydrogen sulfide (H_2S), 172.
6	25	[1].9	[3].16	.16	.00	.00	536	19	6,730	9.9	287	0	3,050	9,400	10	109	.1	20,700	1,420	29,100	7.8	<500	.3	9.2	Hydrogen sulfide (H_2S), 65.
7	109	[1]1.3	6.9	.38	.00	.00	148	226	5,450	117	5,680	0	.0	6,460	4.0	254	.0	15,600	1,360	22,300	6.8	<500	5.7	15	Barium (Ba), 73.
8	182	[1].3	.12	.32	.12	.00	15	41	9,250	493	7,280	0	284	10,800	4.5	1,190	.2	25,700	208	32,200	7.5	<500	3.0	.8	Hydrogen sulfide (H_2S), 95.
9	282	[3]32	[1]100	[3]2.4	-----	-----	42	453	9.5	2.6	0	0	8,060	1,590	.2	12	.2	10,700	1,970	15,800	2.2	<340	.1	.6	Sample turbid. Boron (B), 3.6; acidity as H_2SO_4, 375.
10	96	.1	.17	.00	-----	-----	7.4	5.2	14	5.6	79	0	3.5	4.8	.2	.2	-----	178	40	146	7.3	6	<.1	<.1	
11	21	.2	.00	.00	-----	-----	22	34	17	1.1	237	0	24	8.0	.2	.8	-----	234	195	417	8.0	<10	<.1	.6	
	24	-----	.0	-----	-----	-----	21	32	18	1.2	221	0	28	7.8	.0	1.2	-----	230	184	407	7.5	-----	-----	-----	Sample turbid. Collected May 9, 1952.
12	78	[3].0	[3].03	[3].00	-----	-----	22	11	14	3.2	113	0	2.4	28	.1	1.1	.15	219	100	276	7.3	<8	.1	.2	Sample turbid.
13	78	.0	.00	.00	-----	-----	27	15	18	3.6	114	0	2.0	54	.1	1.0	.0	296	129	357	7.8	<17	<.1	.3	
14	38	[1].1	[3]3.2	[3].64	.15	.00	814	114	5,010	74	165	0	38	9,870	.0	108	.0	17,100	2,500	26,200	7.2	<1,000	40	3.8	Do.
15	30	.4	.20	.30	-----	-----	736	81	3,640	47	124	0	4.9	7,260	.3	-----	.0	13,000	2,170	20,300	7.0	<680	32	2.3	
16	43	[1].1	.06	.01	.00	.00	16	10	46	16	180	3	43	5.4	.3	.6	.0	262	81	376	8.4	<20	.1	6.0	Arsenic (As), 0.00; boron (B) 0.01.
17	62	.0	.00	.00	-----	-----	24	13	23	5.9	137	0	6.5	22	.1	19	-----	255	113	342	7.9	<10	<.1	4.4	
	77	-----	.0	-----	-----	-----	26	13	20	6.6	140	0	6.9	21	.0	18	-----	257	118	343	7.5	-----	-----	-----	Collected Apr. 30, 1952.
18	63	[1].1	.71	.00	.00	.02	1.6	.6	129	.3	148	26	40	62	4.0	.0	.0	414	7	637	8.9	<25	<.1	<.1	
19	29	[1].1	.08	.00	.00	.01	88	34	23	5.1	153	1	263	10	.3	.3	.0	539	360	774	8.3	<25	.3	12	Arsenic (As), 0.01; boron (B), 0.42.
20	74	[1].9	[1].07	-----	.05	.81	458	363	102,000	1,220	504	0	12,300	154,000	2.0	.0	1.0	275,000	2,640	224,000	7.3	<20,000	1.2	34	Arsenic (As), 0.03; bromide (Br), 126; iodide (I), 1.9.
21	45	[1].0	.05	.00	.00	.00	66	20	200	20	432	0	243	66	5.2	.0	.1	895	247	1,319	7.4	<50	.3	.4	Arsenic (As), 0.03; boron (B), 1.1.
22	32	.2	.00	.00	-----	-----	43	21	145	11	350	0	174	36	2.8	.0	.0	620	194	988	7.9	30	5.7	1.5	
23	48	.0	.00	.00	-----	-----	26	12	44	2.4	73	0	67	56	.0	10	.4	310	114	473	7.2	<17	.2	.1	
24	11	[1]12	[3]1.3	[1]2.4	.33	12	480	3,980	2,490	54	1,350	0	16,800	1,830	31	2,500[1]	.2	29,700	17,700	22,800	7.8	<500	1.6	660	Sample turbid.
25	27	.1	.13	.08	-----	-----	90	22	59	1.4	347	0	112	24	.4	2.5	.10	504	315	791	7.4	<23	.1	1.5	
26	46	[1].0	.20	.02	.00	.08	3.1	.1	85	.8	134	12	28	21	2.6	7.6	.0	272	8	387	8.8	<20	.3	.1	
27	25	.0	.00	.00	-----	-----	24	3.0	50	2.4	142	0	53	7.2	.5	.6	-----	241	72	363	8.2	<10	<.1	4.3	
	30	-----	.0	-----	-----	-----	24	3.6	54	3.1	144	0	56	8.0	.4	.7	-----	243	75	368	8.0	-----	-----	-----	Collected June 6, 1952.
28	27	.3	.40	.00	-----	-----	328	126	128	19	262	0	1,150	125	.2	3.9	.00	2,130	1,340	2,440	7.1	<85	.6	32	Arsenic (As), 0.04; boron (B), 0.22.
29	44	.0	.03	.00	-----	-----	33	34	970	30	420	0	1,040	680	2.2	4.7	.2	3,080	222	4,640	8.1	<140	<.1	16	
30	100	.0	.0	.00	-----	-----	5.6	1.9	756	16	724	8	518	400	2.7	.7	.6	2,190	22	3,330	8.3	<85	.2	5.2	
31	34	.2	.00	.00	-----	-----	74	39	38	4.6	256	0	111	64	1.0	13	.0	520	345	811	8.0	<27	.8	11	
32	30	.4	.00	.00	-----	-----	90	69	72	2.0	516	0	132	76	.6	.6	.0	722	508	1,180	8.1	<34	<.1	37	
33	22	.0	.00	.00	-----	-----	38	3.9	29	2.6	182	0	15	6.0	.4	.0	.10	205	111	331	7.8	<11	<.1	1.8	
34	18	.1	.0	.00	-----	-----	53	11	11	3.0	194	0	32	3.5	.6	5.8	.0	227	178	402	7.8	37	<.1	5.6	
35	59	[1].7	.08	.00	.02	.02	1.7	.1	72	.6	7	54	41	19	2.0	.0	.0	264	9	358	9.2	<20	<.1	.1	
36	45	[1].0	[1].13	[1].02	.07	.05	52	3.2	85	4.0	144	0	1.4	154	3.8	.0	.4	436	143	742	7.6	<25	.2	.1	Sample turbid.
37	39	[3].1	[3].05	[1].00	-----	-----	73	16	50	4.4	249	0	33	86	.2	.5	-----	446	248	712	7.7	<23	<.1	5.6	
38	19	[3].4	[3].13	[3].00	-----	-----	529	126	5,410	21	209	0	1,810	8,220	4.6	1.0	.5	16,600	1,840	25,200	7.2	<850	.3	6.5	Do.
39	34	.0	.18	.00	-----	-----	11	6.1	1,460	14	1,180	0	.9	1,600	1.6	1.4	.1	3,750	52	6,460	7.8	<170	1.2	<.1	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Colorado							
1	Fleming	Logan	Well, B 8-49-9ada.	M	22	202	8	−125	June 1954	Ogallala fm.; tuffaceous sand and gravel, with included beds of volcanic ash, bentonitic clay, limestone, and caliche.	Tp	Fluviatile sand.	Direct precipitation.	60	June 17, 1954	
2	10 miles southeast of Holyoke.	Phillips	Well, B 7-43-35abb.	I	780	200	18	−40	do	do	Tp	do	do	57	do	
3	Yuma	Yuma	Well, B 2-48-22bad.	M	650	312	16	−169	January 1957.	do	Tp	do	do	56	Jan. 12, 1957	
4	Wray	do	Well, B 2-44-36bbb.	M	700	180	16	−40	do	do	Tp	do	do	58	do	
5	Arvada	Jefferson	Well, C 3-69-15adl.	M	125	550	8	−350	June 1954	Arapahoe fm.; (sandstone 485 to 540+ ft) overlain by shale.	K	do	Surface-water infiltration.	60	June 10, 1954	
6	Glenwood Springs.	Garfield	Azure-Yampah Spring, 6-89-9a.	Pf	e2, 000					Paradox fm.(?); shale, mudstone, sandstone, limestone, and gypsum.	P	Mixed marine and paralic clastic rocks.	Deeply circulating meteoric waters.	122	June 19, 1955	
7	Burlington	Kit Carson.	Well, C 8-44-36dd.	M	r500	290	18	−165	December 1955.	Ogallala fm.; arkosic sand and gravel, tuffaceous sediments, with included beds of volcanic ash, bentonitic clay, limestone, and caliche.	Tp	Fluviatile sand.	Direct precipitation.	59	Dec. 21, 1955	
8	Stratton	do	Well, C 9-47-1baa.	M	r300	230	16	−180	do	do	Tp	do	do	58	do	
9	Flagler	do	Well, C 9-51-2acc.	M	r100	103	72	−92	do	do	Tp	do	do	57	do	
10	Carbondale	Pitkin	Avalanche Spring, Bath House Spring 5.	Pf	e15					Maroon fm; sandstone and conglomerate, at or near contact with quartz monzonite stock; overlain by alluvium.	P	Mixed marine and paralic sandstone.	Deeply circulating meteoric water(?).	111	June 18, 1955	Strata deformed by Tertiary intrusives.
11	Grand Junction	Mesa	Well, 1-1-21da.	D	13	996	8-5	+54	June 1955	Wingate sandstone, 942 to 996 ft (principal aquifer); and Entrada sandstone, 746 to 869 ft; fine-grained sandstone cemented with calcium carbonate.	Ꞧ, J	Eolian sandstone.	Surface-water infiltration.	64	do	
12	do	do	Well, 1-1-26bc.	D	19	1, 213	10	+119	do	Wingate and Entrada sandstones, 725 to 1,193 ft; fine-grained sandstone cemented with calcium carbonate.	Ꞧ, J	do	do	69	do	
13	Wiley	Prowers	Well, 22-47-8bbd.	M	e30	552	10	−280	January 1957.	Cheyenne sandstone mbr. of Purgatoire fm. and Dakota sandstone, 144 to 505 ft; fine-grained massive sandstone with some included clayey to sandy shale.	K	Fluviatile sandstone.	Direct precipitation and storage.	69	Jan. 18, 1957	
14	Walsenburg	Huerfano	Well, 26-68-25ab.	S	e2	2, 175				Dakota sandstone, 1,365 to 1,510 ft; fine-grained sandstone with some included clayey to sandy shale.	K	do	do	61	June 15, 1954	Flowing well.

15	La Veta	do	Well, 29-68-12bc.	D, S, I.		55	6	−11	June 1954	Poison Canyon fm., 46 to 55 ft; sandstone and sandy shale.	Tpe	do	Direct precipitation and surface-water infiltration.	56	do
16	Blaine	Baca	Well, 29-43-22cc.	D, S.	4	300+	6	−20	May 1952	Cheyenne sandstone mbr. of Purgatoire fm.; fine-grained massive sandstone, overlain by Kiowa shale mbr.	K	do	Direct precipitation.	59	do
17	Towaoc	Montezuma.	Well, 33½-17-7dd.	D	4	958	7	−625	June 1955	Salt Wash sandstone mbr. of Morrison fm., 790 to 958 ft; fine-grained sandstone dipping off Tertiary laccolith.	J	do	Direct precipitation on nearby outcrops.	69	do

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
												Colorado													
1			0.00								207	0								395	8.0	11	<0.1	7.4	
	50		.06	0.05			33	11	33	8.8	197	0	22	10	0.8	9.2		280	129	406	8.2				Boron (B), 0.05. Collected May 20, 1952.
2			.00								169	0								336	8.1	14	.1	3.9	
	45		.10				41	8.1	9.9	7.1	175	0	6.0	4.0	.7	4.2		220	136	316	7.7				Boron (B), 0.04. Collected May 20, 1952.
3	62	.0	.02	.00			37	10	17	8.2	182	0	16	6.0	.9	6.9	0.00	248	133	341	7.6	19	.2	6.5	
4	68	.0	.03	.00			35	11	17	8.2	186	0	13	6.0	.9	5.6	.00	244	133	337	7.6	<11	.1	6.0	
5	11	.0	.16	.00			27	2.9	170	2.4	353	0	137	11	.7	.2		532	80	857	8.1	9	.7	.1	
6	35	[3] .3	[1] .02	[1] .04			481	89	6,690	162	734	0	1,130	10,100	2.4	9.4	.0	19,000	1,570	29,100	6.4	1,600	26	.2	
7	48	1.0	.19	.00			33	13	24	4.0	180	0	18	8.0	1.4	16	.0	235	136	373	8.1	<17	.3	16	
8							40	8.3			169	0		4.0					134	314	8.1	<14	.2	7.0	
	34	.1	.00	[1] .00			40	8.8	10	4.4	168	0	6.2	2.0	.3	19	.2	161	136	313	7.9				Boron (B) 0.13. Collected Oct. 18, 1955.
9							32	13			200	0		6.0					133	372	8.2	<17	.2	13	
	48	.1	.00	[1] .00			34	12	30	4.4	200	0	17	6.0	.9	12	.2	263	134	383	7.9				Boron (B), 0.14. Collected Oct. 18, 1955.
10	84	.2	[1] .03	[1] .00			378	64	384	26	562	0	1,210	225	2.2	.8	.1	2,710	1,210	3,330	6.6	<110	.1	1.6	
11	18	.0	[1] .17	[1] .00			8.8	3.4	232	2.6	323	4	229	20	.8	.0	.1	677	36	1,060	8.3	<28	.1	.1	
12	19	.1	[1] .19	[1] .00			15	8.0	110	3.3	289	0	55	9.2	.6	.1	.00	362	70	579	7.9	<17	.3	.1	
13	9.5	.1	1.4	.11			64	31	556	14	526	0	1,030	22	1.8	.0	.00	2,000	287	2,770	7.1	<110	11	.4	
14			[3] .15								1,440	31		440						3,520	8.4	<34	.3	.6	Sample turbid.
									854		1,430	35	26	442				2,110	9	3,530	8.4				Boron (B), 2.2. Collected May 22, 1952.
	23						13	5.5	[2] 871		1,320	118	31	452		.0		[4] 2,160	55	3,480					Hydrogen sulfide (H_2S) present. Collected Oct. 11, 1949.
15	13	.1	.02	.00			20	1.3	128	1.0	204	4	71	52	2.4	.0		388	56	633	8.4	11	<.1	.1	
	12		.44				42	19	28	4.0	196	0	74	7.0	1.6	.2		292	182	479	7.1				Boron (B), 0.19. Collected May 23, 1952.
16											248	0	287							956	7.7	18	4.4	12	
									67	5.5	244	0	286	19				680	365	976	7.7				Boron (B), 0.23. Collected May 24, 1952.
	14		[1] .03				86	40	[2] 69		249	0	286	16	.8	2.6		[4] 637	379	943	7.4				Collected July 16, 1948.
17	10	[3] 3.8	[1] .05	[1] .07			4.0	.7	264	2.2	431	69	98	7.0	.8	1.1	.2	714	13	1,080	9.3	<17	.4	.2	Sample turbid.

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment. [4] Sum of dissolved constituents.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Connecticut																
1	Stratton Brook Park west of Sinsbury.	Hartford	Well, Si-81	M	300	74	12	−3	October 1955.	Glacial outwash sand	Qp	Glacial sedimentary rocks.	Direct precipitation.	49	Oct. 26, 1955	
2	1 mile east of Manchester.	do	Well, M-60	Ind	457	602	10-8	−33	November 1954	Continental arkose	TR	Fluviatile clastic rocks.	do	55	Nov. 4, 1954	
3	Williamantic	Windham	Well, Wil-5	Ind	e10	180	6	−20	October 1954	Williamantic gneiss of Gregory, probably of granitic rock origin.	Pre-TR	Metaigneous rocks.	do	56	Oct. 25, 1954	
4	Plainville	Hartford	Well Pv-1	M	r500	64	10	−3	March 1957.	Glacial sand and gravel.	Qp	Glacial sedimentary rocks.	Direct precipitation and streams.	51	Mar. 6, 1957	
5	1 mile west of South Meriden.	New Haven.	Spring, Me-160sp.	Pf	1.5					Arkose in the Newark group.	TR	Fluviatile clastic rocks.	Direct precipitation.	52	June 24, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Connecticut																									
1	10	[1] 0.0	0.01	0.06	0.02	0.06	11	1.3	2.8	0.5	23	0	9.6	4.5	0.0	5.6	0.0	58	33	89	6.9	<5	<0.1	0.1	
2	14	[1] .1	[1] .02	[1] .08	.00	.00	27	10	2.3	.8	80	0	31	5.6	.1	18	.1	155	109	233	7.8	<10	.1	.6	Sediment in sample.
3	13	[1] .1	.09	.00	.00	.06	19	5.1	4.4	3.2	39	0	30	5.8	.7	15	.0	114	69	178	6.9	<10	<.1	.5	
4	17	[1] .0	.00	.00	.00	.00	31	7.9	4.6	1.3	114	0	20	5.4	.1	.6	.1	136	110	202	8.2	<5	.1	.5	
5	22	[1] .0	.05	.00	.00	.00	26	6.2	5.4	.5	90	0	19	5.0	.1	7.0	.2	139	90	204	7.8	<10	<.1	.7	
	23	.0	.02	------	------	------	28	6.6	4.5	.5	91	0	19	6.9	.1	5.2	.0	141	97	221	7.7	------	------	------	Sample turbid. Collected Aug. 29, 1951.

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (°F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Delaware															
1	New Castle	New Castle.	Well, CD-52-13.	M	280	130	10	−7 −76	August 1952. October 1955.	Sand 120 to 130 ft, interbedded in thick sequence of non-marine sands and clays.	K	Fluviatile clastic rocks.	Younger rocks at distant (3 to 15 miles) recharge area.	55	Oct. 28, 1955.	Artesian well.
2	Middletown	do	Well, Fb 33-3.	M	r115	100	8			Sand (green sand) 70 to 90 ft, overlain by Pleistocene sediments. Water probably confined by Eocene clay bed.	Te	Littoral sand	do	58	Apr. 17, 1957.	Do.
3	Dover Air Base	Kent	Well, Je 31-1	Pf	700	270	16-10	−26	February 1953.	Deeper Miocene sand, contains shells, clay, and silt; Miocene fm. overlain by 23 ft of Pleistocene material.	Tm	Marine clastic rocks.	do	57	Feb. 28, 1955.	Do.
4	Milford	Sussex	Well, Me 15-13.	M	346	242	10	−92	March 1939.	Shallower Miocene sand, 218 to 236 ft; fossiliferous sand interbedded with clay beds; Miocene fm. overlain by 42 ft of Pleistocene material.	Tm	do	do	59	June 18, 1954.	Do.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
									Delaware																
1	9.4	[1]0.0	2.1	0.18	0.01	0.00	3.9	1.5	3.0	1.2	19	0	0.6	2.4	0.0	1.8	0.0	27	16	47	6.0	<5	0.2	0.1	
2	20	[1].1	5.7	.14	.00	.04	7.1	2.4	4.8	2.0	20	0	17	6.2	.1	.1	.1	73	28	93	5.8	10	<.1	.2	
3	44	[1].1	.04	.08	.00	.00	31	5.9	15	3.0	165	0	3.8	2.0	.0	1.0	.1	186	102	263	8.0	<10	<.1	1.1	
4	48	------	.02	------	------	------	49	5.3	[2]9.1		188	0	5.4	2.4	.1	------	.3	------	144	301	7.6	<10	.2	.3	
	54	[1].0	.03	.00	.00	------	39	10	6.7	2.8	186	0	3.8	3.0	.2	.4	.3	213	138	296	8.1	------	------	------	Collected Jan. 18, 1952.

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Florida																
1	Pensacola	Escambia	Well, Escambia-86.	M	2,000	234	20	−15	February 1957.	Citronelle fm.; sand, gravel, and clay.	TP	Littoral clastic rocks.	Direct precipitation and streams.	72	Feb. 26, 1957	
2	Tallahassee	Leon	Well, Leon-6	M		414	20	−164	January 1941.	"Floridan aquifer"; includes all or parts of middle Eocene, upper Eocene, Oligocene, and Miocene; water always under artesian pressure.	Te, To, Tm	Marine limestone.	do	68	Jan. 18, 1956	
3	14 miles S. of Tallahassee.	Wakulla	Wakulla Springs.	Pf	137,000					Tampa limestone; limestone, argillaceous limestone, clay, and sand.	Tm	do	do	72	May 12, 1954	
4	Foley	Taylor	Well, Taylor-41.	Ind	e6,400	382	26	−46.5	December 1954	Ocala limestone; foraminiferal limestone, locally coquina.	Te	do	do	71	Dec. 29, 1954	
5	Lake City	Columbia	Well, Columbia-15.	M	700	275	12			do	Te	do	do	72	Mar. 16, 1957	
6	Trenton	Gilchrist	Well, Gilchrist-9.	M	e630	531	8			Avon Park limestone 250 to 350 ft, and Lake City limestone 350 to 531 ft; limestone, dolomite, locally some gypsum and chert.	Te	do	do	77	Dec. 16, 1954	
7	Salt Springs near Lake Kerr.	Marion	Salt Springs	Pf	35,400					Sandy limestone	Tp (?), Qp (?)	Littoral limestone.	do	76	May 10, 1954	
8	Silver Springs	do	Silver Springs.	Pf	370,000					Ocala limestone; foraminiferal limestone locally coquina.	Te	Marine limestone.	do	75	May 11, 1954	
9	Lakeland	Polk	Well, LSmd-5.	M	e4,000	828	24	−74	July 1945	Limestone and clays	To, Te	do	do	80	Jan. 6, 1955	
10	Bartow	do	Well, 753-150-1.	M	e400	725	6	+34	1949	"Floridan aquifer"; includes all or parts of middle Eocene, upper Eocene, Oligocene, and Miocene; water always under artesian pressure.	Te, To, Tm	do	Streams and lakes.	77	Dec. 28, 1955	
11	Immokalee	Collier	Well, Collier-131.	Obs	200	54	6	−4	March 1955.	Tamiami fm., 22 to 54 ft; limestone, clay, calcareous marl, and calcareous sand.	Tm	do	Direct precipitation, streams, and lakes.	77	Mar. 10, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Florida																									
1	7.0	[1]0.0	0.03	0.00	0.00	0.00	0.9	0.7	5.3	0.3	2	0	5.9	5.5	0.1	4.8	0.0	35	5	38	5.4	<5	0.7	0.9	
2	14	[1].0	.04	.02	.00	.00	32	9.1	2.8	.2	142	0	2.6	4.0	.2	1.5	.1	133	117	238	7.9	<10	.2	1.2	
3	12	--------	.04	--------	--------	--------	39	9.4	[2]6.0		148	0	22	3.0	.2	--------	.1	--------	136	272	7.4	<10	.2	.5	
	11	[1].0	.06	[1].00	.00	.2	36	10	3.3	.2	144	0	10	5.5	.1	.7	.0	153	131	255	7.6	--------	--------	--------	Collected Mar. 12, 1952.
4	6.4	[1].1	1.4	.00	.00	.00	44	18	3.2	.1	226	0	.1	4.5	.2	1.0	.2	189	184	349	7.9	<10	.3	1.3	
5	25	[1].1	.17	.00	.00	.02	39	15	7.5	1.3	196	0	1.8	9.8	.5	.8	.1	202	159	327	8.0	14	.6	.2	
6	17	[1].2	.07	.04	.00	.03	50	18	3.2	1.2	235	0	5.4	4.0	1.3	1.5	.0	219	200	380	7.9	<10	.6	.4	
7	11	--------	.13	--------	--------	--------	194	128	[2]1,240		81	0	560	2,160	.0	--------	.1	--------	1,010	7,180	7.4	<200	4.7	.5	
	13	[1].2	[1].04	[1].00	.00	.1	202	140	1,280	42	81	0	528	2,350	.0	3.1	.0	4,860	1,080	7,400	7.2	--------	--------	--------	Collected 1952 (?).
8	13	--------	.05	--------	--------	--------	68	8.6	[2]9.4		202	0	46	8.0	.2	--------	.1	--------	205	407	8.2	<20	.3	1.1	
	12	[1].1	[1].00	[1].00	.00	.1	62	13	5.2	.3	205	0	35	8.2	.1	1.1	.0	248	208	402	7.5	--------	--------	--------	Collected Feb. 13, 1952.
9	17	[1].1	.01	.03	.22	.70	54	15	7.5	1.0	249	0	2.4	6.0	.2	1.0	.1	233	198	394	8.0	<10	.9	.1	
10	15	[1].0	.08	.02	.00	.00	73	19	8.5	.7	168	0	122	10	.6	4.8	.3	344	182	519	7.6	<25	1.5	.1	
11	17	[1].3	4.2	.02	.12	.00	114	16	50	2.6	451	0	.1	69	.3	2.0	.0	534	353	876	7.3	<25	1.9	.5	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Georgia							
1	2.5 miles North of Gore.	Chattooga	Spring, S-21	N	200					Floyd shale; gray to black shale with interbedded limestone.	M	Marine shale	Direct precipitation and streams.	59	May 18, 1954	
2	Dawsonville	Dawson	Town spring	M						Ocoee series of G. W. Crickmay, 1936; biotite gneiss and mica schist injected by granite and locally thin lenses of pegmatite, locally includes migmatite.	pЄ	Mixed metasedimentary and metaigneous, including metavolcanic(?) rocks.	do	58	Jan. 7, 1957	
3	Meg Hayes Place.	do	Dug well	N		60				Saprolite derived from weathering of migmatized quartz-mica schist (Ashland schist) as used by the Georgia State Department of Mines, Mining and Geology.	pЄ	Fluviatile clastic rocks.	Direct precipitation.	60	May 3, 1956	
4	Georgia Nuclear Laboratory site near Dawsonville.	do	Well, TW-1	Obs	32	400	6	−145	October 1956.	Ashland mica schist as used by the Georgia Department of Mines, Mining and Geology; migmatized quartz-mica schist and amphibolite schist.	pЄ	Metasedimentary rocks.		62	Oct. 16, 1956	
5	do	do	Well, TW-2	Obs	24	400	6	−69	do	do	pЄ	do		62	Oct. 9, 1956	
6	do	do	Well, TW-6	Obs	25	400	6	−110	do	do	pЄ	do		66	Oct. 3, 1956	
7	do	do	Well, TW-7	Obs	2	75	6	−47.5	do	do	pЄ	do		69	Oct. 8, 1956	
8	do	do	Amicalola Creek.											60	May 3, 1956	
9	do	do	Etowah River											63	do	
10	do	do	Shoal Creek												do	
11	Suwanee	Gwinnett	Town well	M	129	600	8	−20	January 1957.	Brevard schist; garnet-mica schist, muscovite quartzite, graphitic schist and slate, and marble.	Є	Metasedimentary rocks.	Direct precipitation through overlying soil.	65	Jan. 8, 1957	
12	Atlanta	Fulton	Well, Fulton-122.	Pf	30	740	12			Granitic injection complex.	pЄ	Plutonic rocks	Direct precipitation.	65	May 17, 1955	
13	Eatonton	Putnam	Well, Putnam-10.	M	300	436	8			Hornblende gneiss 37.5 to 436 ft: metavolcanic facies of the "Carolina Slate Belt," intruded by granite and granitic gneiss.	pЄ	Metavolcanic rocks.	do	65	May 18, 1955	Flowing well.
14	Sandersville	Washington.	Well, Washington-51.	M	600	760	10			Tuscaloosa fm.; arkosic sand with interbedded clay lenses, underlies Eocene and younger fms.	K	Fluviatile clastic rocks.	do	70	May 19, 1955	
15	Cusseta	Chattahoochee.	Well, Chattahoochee-13.	M	150	1,140	8	−272	May 1955	do	K	do	do	74	do	
16	Savannah	Chatham	Well, Chatham-359.	M	600	1,000	20	−61	do	Ocala limestone 300 to 1,000 ft; porous fossiliferous limestone.	Te	Marine limestone.	do	76	May 25, 1955	
17	Edison	Calhoun	Well, Calhoun-6.	M	300	515	8	−52	do	Clayton fm.; limestone, locally calcareous sand and clay, underlies water-bearing marine Tuscahoma sand (Eocene).	Tpe	do	Direct precipitation and Eocene sands.	71	May 19, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
													Georgia												
1	8.3	[1]0.1	0.12	0.00	0.05	0.01	25	2.2	0.07	0.4	87	0	4.8	1.7	0.1	1.6	0.0	95	72	150	8.0	<10	<0.1	0.2	
	8.0	[1].0	.03	.01	-----	-----	37	3.8	1.3	.7	126	0	6.0	1.8	.1	1.3	.1	130	108	216	7.9	-----	-----	-----	Collected June 12, 1952
2	11	[1].0	.04	.03	.00	.05	4.5	1.3	3.7	.7	21	0	.4	3.5	.0	5.2	.0	41	17	56	7.9	<5	<.1	<.1	
3	11	[1].0	[1].00	[1].03	.00	.13	8.2	3.6	12	4.1	23	0	.8	18	.1	27	.2	120	36	159	6.6	9	<.1	.1	Sample turbid.
4	26	[1].6	.30	.35	1.2	.00	22	3.2	7.0	1.4	92	0	8.6	1.0	.2	.2	.1	107	68	164	7.8	<5	.3	.1	
5	27	[1].0	.11	.00	.00	.00	4.0	.6	4.8	.7	22	0	2.6	.5	.1	1.2	.4	53	12	42	6.9	<5	.1	2.2	
6	22	[1].0	1.3	.15	.05	.28	23	3.8	5.0	4.2	97	0	10	.9	.2	.1	.1	117	73	168	7.9	13	.7	.8	
7	21	[1].0	.31	.85	.00	.04	10	3.6	2.7	.6	56	0	.2	1.3	.1	.0	.1	66	40	90	6.9	<5	<.1	3.5	
8	7.2	[1].0	[1].03	[1].00	.00	.00	.7	.0	1.0	.7	6	0	.2	.3	.0	.3	.0	34	2	14	6.5	6	.3	.3	Do.
9	8.8	[1].0	[1].06	[1].00	.00	.00	1.0	.3	1.2	.7	9	0	.2	.3	.1	.3	.0	42	4	19	6.5	7	.4	.3	Sediment in sample.
10	6.8	[1].0	[1].09	[1].00	.00	.00	.8	.1	1.0	.8	7	0	.2	.5	.0	.4	.0	35	3	16	6.5	8	.3	.4	Do.
11	21	[1].0	.11	.02	.00	.02	27	5.7	16	.7	138	0	9.6	2.5	.5	.0	.0	151	91	237	8.0	<10	.2	.3	
12	25	[1].0	.08	.08	.00	.09	22	5.7	11	3.6	63	0	32	12	.0	6.8	.1	153	78	216	6.1	11	.5	5	
13	26	[1].0	.09	.05	.00	.14	191	3.2	27	3.2	85	0	464	6.2	1.1	1.0	.0	792	490	927	7.7	66	1.4	2.0	
14	21	-----	.05	-----	-----	-----	15	1.6	[2]3.6		45	0	11	2.7	.0	-----	.0	-----	44	98	6.3	<5	.5	.4	
	21	[1].3	.34	.03	-----	-----	18	2.0	2.1	.5	56	0	7.2	3.2	.1	.2	.1	94	53	112	7.1	-----	-----	-----	Collected June 12, 1952.
15	52	[1].0	4.4	.12	.00	.05	11	.6	14	3.1	58	0	2.2	9.0	.1	1.2	.0	148	33	129	7.1	<10	.1	1.1	
16	44	[1].0	.00	.05	.00	.19	25	9.4	23	2.9	138	0	12	20	.5	1.0	.0	210	101	305	7.9	10	.2	.4	
17	21	[1].0	.08	.07	.00	.05	36	3.8	12	2.0	149	0	9.7	1.0	.1	1.0	.0	157	106	246	7.9	<10	<.1	.7	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
									Idaho							
1	16 miles northeast of Bear.	Adams	Spring, 21N-2W-3	N	e200					Seven Devils volcanics; altered andesitic flows and pyroclastics cut by intrusive dikes.	TR, P	Metavolcanic rocks.	Direct precipitation.	37	Aug. 8, 1954	
2	74 miles south of Salmon.	Custer	Rock Spring, 12N-22E-24a1.	S	e10					Limestone (fault zone).	D, M, or P(?)	Marine limestone.	do	42	Aug. 10, 1954	
3	Kaufman	Clark	Birch Creek, 10N-30E-32.							Watershed primarily alluvial fans, glaciofluvial material, and Snake River basalt.	T, Q	Mixed fluviatile and glaciofluviatile clastic rocks and basic volcanic rocks.	do	56	May 25, 1957	
4	2 miles northwest of Spencer.	do	Spring, 12N-36E-4cc1.	N	e15,000					Silicic volcanic rocks	T	Silicic volcanic rocks.	do	38	May 24, 1957	
5	Ririe	Bonneville.	Spring, 3N-42E-13b1.	I	e25,000					Limestone	Pal (?)	Marine limestone.	do	50	Nov. 29, 1956	
6	Bruneau	Owyhee	Well, 6S-5E-24dd1.	M	e25	976	6-4			Idaho fm.; sand (960 to 967 ft); interbedded in lake and terrestrial deposits of silt, clay, and sand containing considerable volcanic ash.	Tp	Lacustrine sand.	Deeply circulating meteoric water.	93	Aug. 5, 1954	Flowing well. Not used for drinking.
7	6 miles southeast of Bruneau.	do	Well, 7S-6E-9ba2.	I	630	960	8	+40	August 1954	Idaho fm.(?); sand interbedded in lake and terrestrial deposits of silt and clay containing considerable volcanic ash.	Tp	do	do	112	do	Flowing well.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Idaho																									
1	8.9	0.0	0.00	0.00	----	----	12	0.5	1.8	2.6	38	0	6.3	0.0	0.1	0.2	0.0	53	32	78	7.7	<5	<0.1	0.2	
2	4.1	.0	.00	.00	----	----	28	5.6	.9	2.0	102	0	8.6	.8	.2	.5	.1	98	93	177	8.0	<7	.2	.6	Carbon dioxide (CO_2)(?) present.
3	12	.1	.06	.00	----	----	38	18	5.9	1.3	163	6	28	5.0	.2	1.0	.00	196	169	335	8.4	<8	.1	1.4	
4	22	.1	.01	.00	----	----	22	6.3	3.5	.8	94	0	5.8	2.8	.3	.0	.15	110	81	174	7.9	<15	<.1	.3	
5	11	.0	[3] .05	[3] .00	----	----	111	32	29	4.8	344	0	134	42	.5	.3	.10	565	408	871	7.4	<34	.3	.4	Organic debris present.
6	----	----	----	----	----	----	----	----	----	----	8	116	----	----	30	----	.10	----	----	451	8.7	<14	<.1	<.1	Boron (B), 0.72.
	77	----	.00	----	----	----	3.6	.5	100	3.1	141	----	38	12	24	2.9	----	321	11	455	7.9	----	----	----	Boron (B), 0.28, Collected Nov. 23, 1953.
7	91	----	----	----	----	----	----	----	----	----	52	47	----	----	22	----	.25	----	----	439	9.5	<14	<.1	<.1	Boron (B), 0.61.
	99	----	.04	----	----	----	2.4	1.4	100	2.9	111	24	30	10	24	.5	----	271	12	449	9.2	----	----	----	Boron (B), 0.19. Collected Nov. 23, 1953.

[3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Illinois															
1	Bureau	Bureau	City well 4	M	134	336	8			Niagara group; dolomitic limestone 249 to 336 ft.	S	Marine limestone.		56	Apr. 25, 1956	Flowing well.
2	Paxton	Ford	City well 5	M	e70	149	8			Illinoian(?) drift; gravel and sand, 117 to 149 ft.	Qp	Glacial sedimentary rocks.		55	Oct. 26, 1954	
3	Greenview	Menard	City well 8	M	90	149	8	−42	February 1948.	Sand and gravel	Qp	do		57	Apr. 25, 1956	
4	Pittsfield	Pike	City well 1	M	e70	190	6	−48	February 1954.	Keokuk and Burlington limestones, 160 to 190 ft; cherty limestone, locally dolomitic and glauconitic.	M	Marine limestone.		57	Oct. 26, 1954	
5	Boulder	Clinton	Well 1	Ind	1, 750	66. 5	168			Sand and gravel, 2 to 66.5 ft.	Qp	Glacial sedimentary rocks.	Direct precipitation and streams.	55	Mar. 21, 1957	Ranney collector with five laterals.
6	Bridgeport	Lawrence	Well, WS-1	Ind	815	95	9	−12	September 1929.	Sand and gravel, 32 to 95 ft.	Qp	do	Direct precipitation and overlying fms.	58	do	
7	Wayne City	Wayne	City well 1	M	e7	214	7			Caseyville group 130 to 150 ft; sandstone, black shale, and thin coal seams, locally limestone and other calcareous sediments.	P	Mixed fluviatile, paralic, and marine sedimentary rocks.		58	Oct. 28, 1954	
8	Mound City	Pulaski	do	M	e450	630	8			Clear Creek limestone 380 to 630 ft; siliceous limestone.	D	Marine limestone.		63	Oct. 27, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Illinois																									
1	6.6	[1]0.0	0.56	0.08	0.00	0.00	12	5.2	779	8.0	601	6	166	790	4.8	0.0	0.0	2,140	52	3,690	8.3	<200	0.4	0.8	Barium (Ba), 0.0.
2	15	[1].1	.82	.04	.00	.00	38	19	61	2.8	363	0	1.6	1.3	.7	16	.1	350	174	556	8.3	<25	.1	.5	
3	15	[1].4	[1].03	[1].08	.05	.00	100	320	220	3.0	905	0	1,140	58	.3	50	.1	2,340	1,570	3,220	6.9	<100	.2	<.1	Sample turbid.
4	13	[1].4	[1].08	[1].05	.01	.00	95	46	24	2.0	580	0	.4	.3	.4	18	.7	519	429	850	7.6	<25	.2	<.1	Do. Barium (Ba), 0.0.
5	17	[1].1	[1].20	[1].24	.08	.00	101	22	24	1.7	320	0	88	30	.0	1.3	.1	474	342	727	7.6	<25	.2	.6	Sample turbid
6	17	[1].1	[1].06	[1].01	.00	.00	75	27	17	1.1	338	0	17	29	.1	1.3	.2	352	298	609	7.7	<25	.1	.2	Do.
7	32	[1].7	6.6	.82	.02	.81	103	28	26	1.0	492	0	26	7.8	.2	.8	.1	493	379	773	7.5	<25	.1	.4	
8	10	[1].1	.17	.02	.00	.00	35	11	45	5.9	177	0	15	63	.1	.4	.0	300	133	529	8.0	<25	.3	.3	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
								Indiana								
1	7.5 miles southwest of Michigan City.	Porter	Well, R-10	Pf	90	118	6	−7	October 1944.	Gravel, 109 to 118 ft	Qp	Glacial sedimentary rocks.	Direct precipitation and overlying fms.	52	Mar. 15, 1957	
2	Bourbon	Marshall	City well 3, R-6.	M	e275	117	8	−25	June 1951	Coarse sand and gravel (Wisconsin drift), 104 to 117 ft.	Qp	do	do	54	Nov. 16, 1954	
3	Monroe	Adams	Well, R-8	M	212	206	10	−20	October 1950.	Limestone	S	Marine limestone.	do	53	Apr. 30, 1956	
4	Marion	Grant	Well, R-5	Ind	e100	330	8	−30	November 1954.	Liston Creek fm., 265 to 290 ft; bedded limestone and limestone reef rock.	S	do	do	56	Nov. 15, 1954	
5	Lafayette	Tippecanoe.	Well 1, R-9	Pf	e520	265	26	−175	1954	Sand and gravel, 231 to 265 ft.	Qp	Glacial sedimentary rocks.	do	53	Mar. 11, 1957	
6	Allisonville	Marion	Well, R-1	Ind	r25	50	6			Sand and gravel (Wisconsin drift), 0 to 50 ft.	Qp	do	do	58	June 14, 1954	
7	North Terre Haute.	Vigo	Well, R-2	Ind		93	6			Gravel and sand (Wisconsin drift), 0 to 93 ft.	Qp	do	do	56	June 15, 1954	
8	Columbus	Bartholomew.	City well 5, R-4.	M	600	98	12	−17	November 1954.	Gravel and sand (Wisconsin drift), 12 to 98 ft.	Qp	do	do	58	Nov. 9, 1954	
9	Jasper	Dubois	Well, R-3	Ind	e4	385	5			Mansfield(?) fm., 217 to 385 ft; sandstone with abundant iron concretions, locally contains conglomerate, shale, coal, and limestone.	P	Fluviatile sandstone.	do	59	do	
10	English	Crawford	Well, R-7	N	40	1,424	7			Meramec series(?); limestone.	M	Marine limestone.	do	56	May 2, 1956	Well partially plugged at 420 ft below land surface. Flowing well.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
													Indiana												
1	17	[1] 0.1	1.0	0.00	0.00	0.00	71	27	11	3.6	388	0	1.0	4.3	0.2	1.1	0.0	328	288	560	7.9	<25	1.8	0.5	
2	19	[1] .0	1.3	.01	.00	.00	34	25	13	1.4	258	0	.1	2.9	.8	.9	.0	206	188	380	8.3	<20	.6	<.1	
3	13	[1] .2	3.0	.06	.00	.00	326	109	91	3.5	150	0	1,280	13	1.3	.2	.5	2,000	1,260	2,180	7.4	<100	.7	1.0	
4	14	[1] .0	.36	.08	.00	.00	34	31	62	1.5	130	15	160	33	1.5	1.2	.0	427	212	677	8.6	<25	.1	.3	
5	17	[1] .7	.32	.00	.00	.00	69	29	5.6	2.3	323	0	32	6.6	.1	.0	.0	323	291	595	7.8	<25	.3	1.1	
6	13	-------	2.9	-------	-----	------	104	27	[2] 7.1		324	0	106	7.0	.0	--------	.0	--------	371	662	7.7	<25	.6	.3	
	11	-------	[1] .03	[1] .00	-----	------	90	29	3.1	1.4	292	0	111	3.8	.0	.1	------	416	344	626	7.6	--------	-------	--------	Collected Apr. 17, 1952.
7	13	-------	.73	-------	-----	------	73	21	[2] 4.8		229	0	81	5.0	.0	--------	.0	--------	269	511	8.0	<25	.2	.4	
	11	-------	1.7	.03	-----	------	70	24	5.2	1.6	226	0	87	5.0	.1	.2	------	320	272	512	7.7	--------	-------	--------	Collected Apr. 18, 1952.
8	12	[1] .0	1.5	.20	.01	.00	50	25	3.3	1.1	221	0	46	6.6	.4	.2	.0	264	228	451	7.6	<20	.3	.3	
9	8.0	[1] .0	.12	.01	.00	.02	2.9	2.6	1,110	3.1	1,260	86	7.3	880	9.5	4.8	.1	2,820	18	4,800	8.9	<500	1.7	.6	
10	9.7	[1] .4	3.0	.01	.00	.00	430	284	425	7.2	180	0	1,950	731	2.0	.0	.2	4,170	2,240	4,910	7.3	200	8.4	2.0	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Iowa															
1	Manson	Calhoun	Well	M	e500	1,211	16-10	−150	November 1955.	Granite, gneissoid granite metasomatic origin and gneiss; garnetiferous, quartzose, and feldspathic.	p€	Silicic plutonic rocks.	Underflow from intruded Paleozoic rocks.	61	Nov. 16, 1955	
2	Edgewood	Delaware	do	M	e100	269	10	−76	May 1955	Dolomite and dolomitic limestone (Niagaran).	S	Marine limestone.	Underflow from distant source.	51	May 5, 1955	
3	Millville	Clayton	do	Ind	e100	130	8			St. Peter sandstone, 90 to 125 ft; clean quartzose sandstone.	O	Marine sandstone.	do	52	do	
4	Breda	Carroll	Well Breda 2	M	200	340	10-5.5	−190	May 1955	Dakota sandstone, 305 to 335 ft; arkosic sandstone.	K	Mixed marine and littoral sandstone.	do	54	May 4, 1955	
5	Nevada	Story	Well, 83-22-6da.	M	500	3,342	20-8	−198	June 1954	Prairie du Chien group; dolomite with some interbedded sandstone; Trempealeau dolomite; Franconia sandstone; glauconitic sandstone and shale with dolomitic cementation.	O,€	Mixed marine and littoral sandstone and limestone.	do	69	June 3, 1954	
6	Ferguson	Marshall	Well, Town well 1	M	e50	175	8-6	−75	March 1957.	Hampton fm. as used by Iowa Geological Survey 80 to 150 ft; limestone overlain by glacial debris.	M	Marine limestone.	Direct precipitation.	53	Mar. 18, 1957	
7	Clinton	Clinton	Well, 81-6-22d	Ind	750	160	16-14	−10	June 1954	Alluvium of Mississippi River valley, 140 to 160 ft.	Qp	Fluviatile clastic rocks.	Surface-water infiltration.	54	June 8, 1954	
8	Malcom	Poweshiek	Well	D, S	3	407	6	−180	November 1955.	Sand and gravel, 377 to 407 ft; glacial drift.	Qp	Glacial sedimentary rocks.	Underflow from distant source.	54	Nov. 17, 1955	
9	2.5 miles west of Monroe.	Jasper	do	S	7	145	5	−90	May 1955	Sandstone, 105 to 145 ft; probably Des Moines series.	P	Mixed paludal and littoral sandstone.	Surface-water infiltration and direct precipitation.	51	May 6, 1955	
10	Glasgow	Jefferson	do	S	e5	328	10	−180	March 1957.	Burlington limestone, 250 to 275 ft; limestone.	M	Marine limestone.	Direct precipitation.	54	Mar. 21, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Iowa																									
1	12	0.0	0.00	0.00	------	------	15	1.0	280	1.2	105	0	112	307	3.6	0.4	0.0	775	42	1,420	8.1	<19	0.3	0.3	
2	14	.0	.80	.00	------	------	73	21	7.7	2.0	332	0	11	1.5	.3	.8	.0	293	268	511	7.6	<17	.7	.1	
3	17	.1	.02	.00	------	------	101	49	4.9	1.2	470	0	68	3.0	.0	2.7	.0	482	454	791	7.4	<23	.2	.9	
4	28	.2	.32	1.1	------	------	220	73	124	7.4	373	0	757	7.2	.4	8.4	.1	1,500	849	1,780	7.3	<7	1.0	6.2	
5	8.8	.2	2.8	.00	------	------	131	44	168	17	343	0	497	55	1.7	.2	------	1,130	508	1,570	7.6	53	4.1	.6	
	11	------	.3	------	------	------	130	40	144	17	332	0	458	50	1.8	4.2	------	1,050	491	1,500	7.2	------	------	------	Boron (B) 0.99. Collected Apr. 15, 1952.
6	9.5	[3].2	[1].02	[3].30	------	------	196	86	109	5.6	388	0	727	4.0	.6	.4	.00	1,410	842	1,760	7.1	<68	2.7	1.3	Sample turbid
7	18	.1	.04	.00	------	------	44	18	6.0	2.5	144	0	53	5.0	.1	28	------	256	184	397	8.0	6	<.1	.3	
	17	------	[3].13	------	------	------	54	23	6.5	1.2	159	0	58	9.0	.1	48	------	304	228	481	7.8	------	------	------	Boron (B), 0.11. Collected Apr. 15, 1952.
8	14	.8	.26	[1].05	------	------	120	49	122	6.2	339	0	439	6.0	.1	26	.0	993	501	1,330	7.4	<45	.2	.1	
9	28	[3].6	[1].00	[1].12	------	------	113	25	15	2.6	444	0	47	.8	.5	2.0	.0	451	385	729	7.2	<23	1.6	<.1	Sediment in sample.
10	10	.6	2.1	.36	------	------	448	165	174	8.0	281	0	1,840	4.0	.3	9.0	.00	2,920	1,800	2,990	7.1	<85	.8	.1	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Kansas															
1	Mahaska	Washington.	Well, 1 (1-1-7aa).	M	e50	280	8	−210	November 1955.	Dakota sandstone, 80 to 280 ft.	K	Littoral sandstone.	Direct precipitation.	55	Nov. 22, 1955	
2	Summerfield	Marshall	Well, 1 (1-9-1db).	M	e22	75	6	−48	do	Council Grove group, 66 to 75 ft; limestone interbedded with shale.	P	Marine limestone.	do	55	do	
3	Agra	Phillips	Well, 3-16-27cd.	M	e45	121	12	−52	November 1954.	Niobrara fm.; shale, limestone, and marl.	K	Mixed marine and littoral limestone.	do		Nov. 22, 1954	
4	8 miles northeast of Bogue.	Graham	Well, 7-21-2bcc3.	S	5	290	6			do	K	do	do	58	Nov. 23, 1954	
5	Green	Clay	Well, 7-4-17dd.	M	25	180	8	−98	February 1957.	Barneston limestone, 140 to 170 ft; limestone with some interbedded chert and shale.	P	Marine limestone.	do	55	Feb. 21, 1957	
6	Paradise	Russell	Well, 1 (11-14-7ba).	M	e40	40	72	−28	November 1955.	Sand and gravel	Qp	Fluviatile sand.	do	56	Nov. 21, 1955	
7	Longford	Clay	Well, 10-1-17dc.	M	e100	110	8	−30	February 1957.	Dakota sandstone, 0 to 110 ft.	K	Littoral sandstone.	do	55	Feb. 21, 1957	
8	Keats	Riley	Spring, D9-6-36aa.	S	e100					Wreford limestone; cherty limestone.	P	Marine limestone.		57	June 11, 1954	
9	Bethamy	Greely	Well, 16-40-14da.	S		128	6	−110	June 1954	Ogallala fm.; sand, gravel, and silt, predominately calcareous; contains caliche beds.	Tp	Fluviatile clastic rocks.		59	June 16, 1954	
10	Dighton	Lane	Well, 18-29-13dd.	M	340	85	18	−55	November 1954.	do	Tp	do	Direct precipitation.	58	Nov. 23, 1954	
11	Bushton	Rice	Well, 18-10-2acl.	M	r70	99	8			Dakota sandstone, 18 to 99 ft.	K	Littoral sandstone.		60	June 7, 1954	
12	Hope	Dickinson	Well, 16-3-2bb.	M	100	55	8	−25	February 1957.	Nolans limestone; underlies Pearl shale of former usage.	P	Marine limestone.	Direct precipitation.	56	Feb. 21, 1957	
13	Allen	Lyon	Well, 1 (16-11-22adl).	M	el	32	6	−25	November 1955.	Long Creek limestone, 20 to 27 ft; dolomitic limestone.	P	do	do	57	Nov. 21, 1955	
14	15 miles north of Wichita.	Sedgwick	Wichita city well field (30 wells).	M	1,000 (Average)	80 to 300	16	−10 to −30	February 1952.	McPherson fm.; unconsolidated stream and slope deposits in McPherson Valley; locally cemented with calcium carbonate and locally contains volcanic ash beds.	Qp	Fluviatile clastic rocks.	do	60	June 9, 1954	Composite sample; wells pumped in groups 8 to 10 at intervals of several weeks.
15	Girard	Crawford	Well, 29-23-24d.	M	400	1,203		−281	June 1954	Roubidoux dolomite (?), and Cotter dolomite(?), sandstone and cherty sandy dolomite, and argillaceous dolomite, overlain by Jefferson City dolomite.	O	Mixed marine sandstone and limestone.	do	74	June 3, 1954	
16	Fowler	Meade	Well, 31-26-6bb.	M	400	275	12	−31	November 1954.	Ogallala fm.; sand, gravel, and silt, predominately calcareous; contains caliche beds.	Tp	Fluviatile clastic rocks.	do	59	Nov. 23, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Kansas																									
1	11	0.7	0.12	[1] 0.00	----	----	20	5.8	276	5.8	432	0	115	141	0.8	0.4	0.0	780	74	1,320	8.1	<68	2.7	0.1	
2	24	.4	.09	.14	----	----	240	117	55	6.2	357	0	833	18	.6	27	.00	1,590	1,080	1,870	7.6	<45	.1	33	
3	50	.2	[1] .14	[1] .03	----	----	99	11	16	7.2	295	0	57	23	.4	2.8	----	427	292	625	7.6	17	1.6	8.2	
4	15	.5	[1] .90	[1] .00	----	----	54	14	172	6.6	394	0	159	63	2.4	1.4	----	685	192	1,080	8.2	<23	2.3	7.6	
5	20	.2	.25	.00	----	----	79	42	19	3.0	418	0	35	9.0	.3	22	.00	412	370	724	7.5	<23	.4	2.1	
6	27	.3	.12	[1] .03	----	----	488	54	116	12	406	0	1,240	58	.2	.4	.0	2,350	1,440	2,540	7.4	<45	.5	74	
7	15	.2	.32	.00	----	----	12	3.9	6.4	.8	44	0	18	4.0	.1	.8	.00	72	46	128	6.3	<7	1.8	2.1	
8	17	.1	.03	.00	----	----	86	11	6.9	1.6	298	0	27	6.2	.4	4.7	----	321	260	520	7.7	<7	.2	1.9	
	14	----	[1] .00	----	----	----	100	18	7.0	.9	354	0	36	5.0	.3	2.2	----	360	324	595	7.3	----	----	----	Collected Feb. 12, 1952.
9	37	[3] .6	[3] 6.8	[3] .00	----	----	86	43	44	6.8	148	0	242	54	1.8	55	----	680	392	942	8.1	19	.2	14	
	38	----	[3] .05	----	----	----	58	30	33	4.8	175	0	124	32	1.8	26	----	453	268	650	7.7	----	----	----	Collected Feb. 7, 1952.
10	82	.1	[1] .02	[1] .00	----	----	63	35	19	8.4	292	0	41	26	3.2	29	----	458	301	656	7.7	<17	.4	11	
11	24	.1	.02	.00	----	----	88	7.3	19	2.8	320	0	6.7	13	.3	4.6	----	322	250	543	7.5	<7	1.2	3.7	
	22	----	[1] .00	----	----	----	98	10	26	2.6	328	0	24	25	.3	9.8	----	383	286	639	7.3	----	----	----	Collected Feb. 11, 1952.
12	15	[3] .3	[1] .02	[3] .00	----	----	360	55	37	3.2	335	0	826	47	.3	.6	.00	1,520	1,120	1,860	7.3	<68	.2	1.4	Sample turbid.
13	15	.2	.00	[1] .00	----	----	292	63	98	2.8	376	0	762	27	.0	70	.0	1,580	988	1,910	7.4	<45	.2	4.5	
14	----	----	----	----	----	----	----	----	----	----	265	0	----	34	----	----	----	----	----	608	7.5	<8	.4	1.2	
	17	----	.00	----	----	----	58	9.5	54	2.6	250	0	47	34	.3	.1	----	351	184	578	7.3	----	----	----	Collected Feb. 14, 1952.
15	14	.1	.25	.00	----	----	103	42	315	11	318	0	130	520	.9	.0	----	1,380	430	2,360	7.4	<34	8.9	.5	
16	43	.2	[1] .03	[1] .00	----	----	54	10	18	4.2	215	0	30	5.5	.8	3.9	----	274	176	412	7.7	<11	.2	5.5	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
							Kentucky									
1	Sanders	Carroll	Well, 8455–3835–2.	D		75+	6	−24	April 1956	Cynthiana fm., limestone, shale, argillaceous limestone, and calcareous clay.	O	Littoral limestone.		55	Apr. 5, 1956	
2	2 miles west of Charters.	Lewis	Well, 8325–3830–1.	D, S		50	6			Crab Orchard shale, as used by Kentucky Geological Survey and Brassfield limestone.	S	Mixed marine shale and limestone.		59	Apr. 4, 1956	
3	Vanceburg	do	Well, 8315–3835–1.	M	75	76	10	−35	April 1956	Sand and gravel (alluvium).	Q	Fluviatile clastic rocks.	Infiltration from streams.	55	do	
4	Versailles	Woodford	Spring, 8440–3800–1.	M						Limestone	O	Marine limestone.		55	Apr. 5, 1956	
5	Corydon	Henderson.	Well, 8740–3740–50.	M	13	185	6	−30	May 1954	Sandstone, 150 to 185 ft.	O	Fluviatile sandstone.		58	May 28, 1954	
6	Owensboro	Daviess	Well, S–1, 611.8–528.6.	M	r1,000	127	10-12-18	−35	February 1957.	Sand and gravel (alluvium).	Q	Fluviatile clastic rocks.	Infiltration from streams.	62	Feb. 4, 1957	
7	Bardstown	Nelson	Spring, 8525–3745–1.	Ind	15					Laurel dolomite, limestone rich in crinoids.	S	Marine limestone.		58	Jan. 4, 1955	
8	Natural Bridge State Park.	Powell	Spring, 8340–3745–1.	D	e100					St. Louis limestone and Ste. Genevieve limestone overlain by Beattyville shale of Miller (1917) and Rockcastle conglomerate mbr. of the Lee fm.	M	do	Percolation from overlying fms.	49	Jan. 5, 1955	
9	Dawson Springs	Hopkins	Well, 8740–3705–1.	M	150	188	12			Caseyville sandstone; conglomeratic sandstone with thin shale and coal seams.	P	Littoral sandstone.			Jan. 3, 1955	
10	Benton	Marshall	Well, S 1239.52 (5)–203.00(0).	M		180	8	−18	February 1957.	Ripley fm. 20 ft of sand overlain by 160 ft of clay.	K	do		59	Feb. 4, 1957	
11	Murray	Calloway	Well, 8815–3635–1.	M	e600	254	7-12-18	−65	May 1954	Ripley fm.; sand, marine and brackish fossiliferous sands and clays.	K	do		59	May 26, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Kentucky																									
1	9.4	[1]0.0	2.5	0.04	0.00	0.68	75	35	720	17	657	0	42	1,020	2.3	0.5	0.0	2,340	332	4,110	8.0	<200	9.8	0.5	
2	8.8	[1].0	1.1	.03	.00	1.2	116	59	570	17	305	0	55	1,110	.5	.5	.0	2,190	534	3,930	7.6	<200	<.1	.5	
3	15	[1].1	6.0	.00	.00	.02	209	48	285	7.0	321	0	39	775	.3	4.0	.0	1,620	720	2,960	7.4	<200	1.5	1.3	Hydrogen sulfide (H_2S) present.
4	6.1	[1].0	.19	.00	.00	.00	67	4.3	3.8	1.1	163	0	35	7.4	.2	20	.9	230	185	391	7.9	<20	22	<.1	
5	28	[1].0	[1].02	[1].01	.00	.66	77	29	70	1.2	203	0	141	63	.4	115	.0	662	312	936	7.2	60	.5	.1	Sediment in sample.
	14	-------	.20	.26	-----	------	44	18	175	1.5	331	0	126	64	.5	88	------	702	185	1,120	7.5	---------	-------	--------	Collected May 19, 1952.
6	8.3	[1].0	.65	.25	.00	.00	52	8.1	15	2.7	120	0	72	20	.3	.9	.1	248	163	420	7.6	<20	<.1	<.1	
7	11	[1].1	.02	.00	.00	.00	61	34	9.0	1.1	291	0	20	11	.1	44	.0	361	293	587	8.2	<25	<.1	.7	
8	5.2	[1].0	.05	.13	.00	.05	8.7	1.0	.5	.9	29	0	2.8	.5	.0	1.0	.0	33	26	57	7.4	4	<.1	.7	
9	9.4	[1].1	4.2	.21	.00	.00	16	6.4	13	2.2	98	0	14	3.0	.1	1.0	.0	114	67	194	7.2	10	1.3	2.1	
10	13	[1].0	.39	.00	.00	.08	5.8	2.1	3.2	.7	21	0	1.2	10	.2	.1	.1	46	16	67	7.2	<5	.2	.1	
11	16	-------	2.1	-------	-----	------	6.0	2.7	[2]4.9		16	0	20	1.8	.1	--------	.0	--------	26	71	7.3	<20	.1	2.4	
	17	-------	1.4	.09	-----	------	5.2	4.1	3.2	1.1	19	0	18	1.8	.2	.0	------	63	30	79	7.3	---------	-------	--------	Collected May 22, 1952.

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (°F)	Date of sample collection	Remarks
	Town	Parish				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
									Louisiana							
1	Benton	Bossier	Well, Bo-4	M	r50	297	10	−143	November 1955.	Wilcox group; sand 243 to 297 ft.	Tpe, Te	Paralic sand	Direct precipitation and surface-water infiltration.	72	Nov. 15, 1955	
2	Ruston	Lincoln	Well, L-2	M	e750	637	16-10	−165	1940	Sparta sand, 544 to 637 ft; sand and gravel.	Te	Fluviatile sand.	do	75	May 11, 1955	
3	West Monroe	Ouachita	Well, Ou-6	M	800	473	16	−200	April 1952	Sparta sand, 406 to 468 ft; sand and gravel.	Te	do	do	73	Apr. 28, 1954	
4	Mansfield	De Soto	Well, DS-18	M	140	245	16	−181	May 1955	Logansport fm. of G. E. Murray, Jr. (1941), 215 to 245 ft; sand calcareous silt and shale, and lignitic carbonaceous shale.	Tpe	Paralic clastic rocks.	do	69	May 11, 1955	
5	Natchitoches	Natchitoches.	Well, Na-245	M	515	680	10	−77	February 1957.	Wilcox group; sand 582 to 670 ft.	Tpe, Te	Paralic sand	do	77	Feb. 11, 1957	
6	Boyce	Rapides	Well, R-587	Pf	100	2,803	5	+25	November 1955.	Cockfield fm.; lignitiferous sand and clay.	Te	do	Deeply circulating meteoric water and (or) connate(?) water.	114	Nov. 15, 1955	
7	Bayou Rapides well field, 6 miles west of Alexandria.	do	Well, R-421	M	420	935	12	−196	April 1952	Catahoula sandstone, 929 to 935 ft.	Tm (?)	Fluviatile sandstone.	Direct precipitation and surface-water infiltration.	78	Apr. 27, 1954	
8	Leesville	Vernon	Well, V-5	M		436	8	−37	1942	do	Tm (?)	do	do	68	May 10, 1955	
9	De Ridder	Beauregard.	Well, Be-4	M	770	186	12	−25	May 1955	Bently fm.; sand and gravel.	Qp	do	do	70	do	
10	Hammond	Tangipahoa.	Well, Ta-268	M	1,585	2,449	8	+125	February 1957.	Sand and clay	Tm	Marine(?) clastic rocks.	do	92	Feb. 12, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Louisiana																									
1	13	0.0	0.17	0.00	------	------	9.6	1.9	532	4.0	674	0	0.4	434	2.2	5.7	0.6	1,340	32	2,370	8.0	<68	0.2	0.2	
2	33	.0	.25	.00	------	------	2.0	.5	69	1.8	160	0	13	14	.3	.5	.8	216	7	309	7.8	<8	<.1	<.1	
3	13	------	.12	[1].60	------	------	.5	.1	127	.8	268	14	3.5	18	.5	1.5	4.7	320	2	518	8.7	<10	.2	.5	Boron (B), 0.39.
	14	------	.01	.07	------	------	.5	.5	124	1.6	282	7	.7	18	.5	1.5	4.8	317	3	530	8.7	------	------	------	Boron (B) 0.35. Collected Apr. 23, 1952.
4	24	.0	.62	.00	------	------	22	5.4	149	3.8	334	0	37	70	.2	2.4	.4	477	8	791	7.8	28	.5	<.1	
5	18	.1	[1].00	.00	------	------	3.6	.0	302	1.2	662	0	2.6	76	.6	.0	1.4	733	9	1,210	8.2	<34	.1	<.1	
6	15	2.4	6.2	.35	------	------	1,310	515	20,200	82	200	0	24	34,600	------	------	.0	60,800	5,390	80,900	6.9	<3,400	43	.2	Methane (CH_4)(?) present.
7	41	------	.07	------	------	------	.6	.2	110	1.8	276	0	.3	13	1.3	.3	------	312	2	458	7.9	<10	.6	<.1	Boron (B), 0.64.
	50	------	[1].03	[1].00	------	------	.9	.5	112	1.2	277	0	.4	13	1.3	.0	------	318	4	472	7.6	------	------	------	Boron (B), 0.57. Collected Apr. 23, 1952.
8	74	.0	.65	.00	------	------	4.8	.2	9.6	2.8	32	0	3.4	7.0	.1	.0	.0	116	13	79	6.2	<5	.2	.1	
9	54	.0	.11	.00	------	------	4.0	1.0	12	2.8	36	0	.8	10	.0	.1	.1	101	14	91	6.3	<5	.1	.1	
10	56	.0	.05	.00	------	------	1.2	.0	60	.4	148	0	7.6	3.0	.5	.0	2.2	206	3	261	8.1	<8	.1	.1	Hydrogen sulfide (H_2S) present.

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl.	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Geologic age	Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Maine							
1	Vassalboro	Kennebec	Well, Vasselboro 1.	D, Pf	8	250	6	−5	March 1957.	Schist (bedrock) 4 to 250 ft; fine-grained quartzitic schist.	S(?)	Metasedimentary rocks.	Direct precipitation.	51	Mar. 27, 1957	
2	Augusta	do	Triangle well	M	r1,000	89	18	−10.5	do	Sand and gravel overlain by clayey alluvium.	Qp	Glacial sedimentary rocks.	do	47	do	
3	South Windham	Cumberland.	Well, Windham 1.	D, Pf	10	96	6	−20	do	Granite; coarse-grained gray granite, locally graphic and rich in mica.	Pre-M	Silicic plutonic rocks.	do	53	do	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Maine																									
1	13	[1] 0.0	0.09	0.00	0.00	0.12	29	9.7	35	3.6	183	0	28	7.9	1.1	0.0	0.0	225	112	344	8.0	<5	0.1	<0.1	
2	13	[1] .0	.02	.02	.00	.00	45	1.6	5.5	3.6	134	2	12	6.2	.0	.7	.0	160	119	258	8.4	<5	<.1	.8	
3	53	[1] .0	.09	.00	.00	.59	17	2.5	20	8.4	74	0	18	17	.2	2.0	.0	157	53	209	7.0	7	3.3	11	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
Maryland																
1	0.5 mile east of Hancock.	Washington.	Well, Wa-Ad 3.	D		90	6	−10	November 1955.	Parkhead sandstone mbr. of Jennings fm.; interbedded fossiliferous sandstone and shale.	D	Marine sandstone.			Nov. 28, 1955	
2	Clear Spring	do	Clear Spring, Wa-Bf 2.	M	e100					Alluvium overlying Martinsburg shale (Ordovician).	Q	Fluviatile clastic rocks.	Direct precipitation.	50	Feb. 21, 1957	
3	0.5 mile south of Antietam.	do	Well, Wa-Ei 1.	D	r20	66	6	−24	November 1955.	Tomstown dolomite overlain by Waynesboro fm.; dolomite with interbedded limestone and marble overlying interbedded sandstones, shales, and dolomite.	Є	Marine limestone.	do	55	Nov. 28, 1955	
4	Woodsboro	Frederick	Well, P-1039	M	110–150	200	10–8	−5	March 1955.	Limestone	Є,O	do	do	53	Mar. 15, 1955	
5	Union Mills	Carroll	Well, P-6551	S	r15	47	6	−32.5	do	Schist overlain by phyllite, basalt, and locally by marble and limestone.	pЄ	Metasedimentary rocks.	do	53	do	
6	Ellicott City	Howard	Well, How-Bf 8.	Pf	r10	108	6	−9	May 1954	Baltimore(?) gabbro of Ernst Cloos (1937).	Pal	Basic plutonic rocks.	do		May 18, 1954	
7	Atholton	do	Well, How-Ce 41.	M	r20	286	8	−5	February 1957.	Wissahickon fm.; oligoclase mica schist intruded by Guilford granite of Ernst Cloos and C. H. Broedel, 1940.	Pal (?)	Metasedimentary rocks.	do		Feb. 20, 1957	
8	Easton	Talbot	Well, Tal-Ce 50.	M	200	630	10–6			Aquia greensand; clayey glauconitic sandstone, locally abundantly fossiliferous.	Te	Littoral clastic rocks.		70	July 21, 1955	
9	Denton	Caroline	Well, Care-Dd 2.	M	300	402	8			Piney Point fm.; glauconitic sand with intercalated indurated shell layers.	Te	do		63	do	
10	3 miles west of Huntington.	Calvert	Well, Cal-Ca 2.	Pf	5–7	468	6			Aquia greensand; clayey glauconitic sandstone, locally abundantly fossiliferous.	Te	do			May 19, 1954	Flowing well.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
									Maryland																
1	19	[1]0.2	[1]0.04	[1]0.40	0.00	1.8	13	9.4	7.2	0.4	106	0	0.4	4.2	0.1	0.0	0.0	113	76	177	6.8	<10	<0.1	<0.1	
2	5.2	[1].0	.10	.00	.00	.00	36	2.4	1.7	1.1	120	0	1.0	1.3	.1	.8	.0	109	100	208	7.8	<5	.1	<.1	
3	20	[1].5	[1].03	[1].00	.00	.83	91	34	3.9	1.4	389	0	72	3.3	.2	.8	.0	464	372	704	7.3	<25	.6	.5	Sediment in sample.
4	8.3	[1].0	.05	.02	.00	.18	70	7.6	1.2	1.9	208	0	10	7.7	.0	29	.0	249	206	413	7.4	<20	.1	1.0	
5	4.2	[1].3	.12	.01	.02	.00	4.8	1.7	1.8	.8	5	0	7.5	5.0	.0	8.1	.0	42	21	64	5.5	<5	<.1	.7	
6	35		[1].01				16	5.8	[2]5.8		72	0	11	4.0	.1		.1		64	173	7.3	<10	.2	.3	
	36	[1].3	.15	.00	.00	.8	24	.8	6.6	3.1	74	0	11	3.6	.0	5.4	.0	128	63	169	7.0				Collected Feb. 5, 1952.
7	22	[1].0	.48	.02	.00	.11	4.1	1.0	19	1.2	64	0	.2	3.5	.1	3.0	.1	86	14	124	7.5	<5	.3	.9	
8	13	[1].0	.11	.00	.00	.00	3.8	1.3	193	8.1	504	11	12	3.1	3.2	.9	.2	501	15	792	8.4	<25	<.1	<.1	
9	25	[1].0	.13	.00	.00	.04	5.1	2.7	194	6.9	547	0	7.6	3.3	1.2	.7	.6	522	24	799	8.2	<25	.1	<.1	
10	15		.02				30	15	[2]13		183	0	13	1.5	.1		.0		137	303	8.0	20	.1	1.1	
	16	[1].0	[1].00	[1].00	.00	.0	35	13	4	11	184	0	11	1.0	.2	.8	.0	182	141	304	7.9				Collected Feb. 1, 1952.

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Massachusetts															
1	1 mile south of Deerfield Center.	Franklin	Spring, Deerfield 6sp.	------	2	------	------	------	------	Sugarloaf fm.; feldspathic sandstone and conglomerate	TR	Fluviatile clastic rocks.	------	50	Dec. 9, 1954	
2	Lowell	Middlesex.	Well, Lowell 45.	Pf	85	500	10-8	−26	March 1957	Ayer granodiorite, 40.5 to 500 ft; biotite-muscovite granite feldspar phenocrysts frequently abundant.	D(?)	Silicic plutonic rocks.	Direct precipitation.	51	Mar. 27, 1957	
3	Winchester	do	Well, Winchester 22.	D	5	92	8-6	−18	June 1954	Newburyport quartz diorite, 85 to 92 ft; hornblende-quartz diorite.	Pre-D	do	------	54	June 16, 1954	
4	South Egremont.	Berkshire	Well, Egremont 7.	D	22	100	6	−38	December 1954.	Stockbridge group, 98 to 100 ft; metamorphosed limestones and shales.	Є,O	Metasedimentary rocks (marine depositional environment).	------	50	Dec. 8, 1954	
5	2 miles southeast of Southhampton.	Hampshire.	Spring, Southhampton 4sp.	S	1.5	------	------	------	------	Sugarloaf fm., unaltered debris from granite and coarse pegmatite veins.	TR	Fluviatile clastic rocks.	------	53	June 16, 1954	
6	Chicopee	Hampden	Well, Chicopee 27.	Ind	70	110	6	------	------	Chicopee shale; coaly calcareous shale and shaly sandstone.	TR	Paralic clastic rocks.	------	55	Dec. 8, 1954	
7	Abington	Plymouth	Well, Abington 28.	D, S	75	354	8	−30	March 1957	Wamsutta fm., 80 to 354 ft; sandstone, shale, conglomerate, and lava flows.	IP	do	Direct precipitation.	50	Mar. 27, 1957	
8	Taunton	Bristol	Well, Taunton 70.	Ind	55	210	6	------	------	Rhode Island fm.; 50 to 210 ft; shaly and slaty coalbearing beds intercalated with sandstones and conglomerates; locally contains graphite coal beds.	IP	do	------	53	Oct. 28, 1955	
9	New Bedford	do	Well, New Bedford 115.	Ind	100	205	8	------	------	Dedham granodiorite, 202 to 205 ft.	Early Pal(?)	Silicic plutonic rocks.	------	50	Oct. 31, 1955	Flowing well.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Massachusetts																									
1	12	[1]0.0	0.07	0.00	0.00	0.00	8.4	3.9	2.9	0.2	24	0	20	1.6	0.1	0.8	0.1	55	37	88	7.1	3	<0.1	0.7	
2	15	[1].0	.26	.00	.00	.01	28	1.1	5.8	2.5	64	0	25	6.4	.1	4.6	.0	116	74	186	7.9	<5	<.1	3.4	
3	11	-------	[1]1.0	-------	-----	------	28	1.8	[2]18		49	0	56	14	.0	--------	.0	--------	80	220	7.3	<10	<.1	.4	Sample turbid.
	9.4	[1].7	.11	[1].00	-----	3.0	25	4.0	9.8	.8	54	0	37	16	.1	1.0	.0	140	79	221	7.1	---------	-------	-------	Collected June June 13, 1952.
4	6.9	[1].0	.27	.06	.00	.03	.2	.1	103	.2	243	0	15	6.0	.0	8.6	.0	259	1	423	8.2	<20	.1	2.8	
5	10	[1].1	[1].00	[1].00	.00	.00	13	3.4	3.2	1.4	24	0	24	4.6	.0	7.0	.2	90	47	124	6.4	<5	.1	.3	Sediment in sample.
	12	[1].0	[1].00	[1].00	-----	------	15	3.0	3.9	2.1	22	0	24	6.4	.0	11	.0	90	50	147	6.3	---------	-------	-------	Sample turbid. Collected Aug. 30, 1951.
6	15	[1].0	1.0	.08	.00	.03	96	19	18	1.5	133	0	208	25	.4	.4	.0	468	318	690	7.8	<25	.7	1.5	
7	15	[1].0	.06	.11	.00	.00	14	2.3	8.8	1.2	68	0	1.2	5.1	.1	.2	.7	79	44	126	7.9	<5	.4	<.1	
8	24	[1].0	2.0	.42	.00	.48	15	2.5	14	1.1	48	0	25	13	.3	.3	.3	116	50	182	6.9	<10	.5	<.1	
9	17	[1].0	.04	.00	.00	.03	17	7.3	16	.9	51	0	22	15	.0	27	.1	147	72	236	6.3	<10	.3	1.6	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Geologic age	Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Michigan							
1	Gratiot Lake Air Force Base.	Keweenaw.	Well, 57N 30W 8-1.	Pf	100	250	12	−25	October 1954.	Jacobsville sandstone, 59 to 250 ft; red sandstone, often argillaceous, with thin clay shale streaks, locally conglomeratic.	€,p€	Fluviatile sandstone.	----------	44	Oct. 12, 1954	
2	Negaunee	Marquette.	Well, 47N 26W 6-1.	------	180	142	10	−68	do	Negaunee iron-fm., 70 to 142 ft; ferruginous slates, schists, cherts, and jaspilite; underlies Goodrich quartzite.	p€	Metasedimentary rocks.	Overlying fms.	45	Oct. 15, 1954	Used to drain operating mines.
3	Tahquamenon Falls State Park.	Chippewa.	Well, 49N 7W 31-1.	Pf	7	192	4	−97	November 1954.	Munising sandstone, 170 to 192 ft; red sandstone, locally contains clay and conglomerate.	€	Fluviatile sandstone.	----------	46	Nov. 11, 1954	
4	Sault Sainte Marie.	do	Well, 47N 1E 10-1.	D	e5	189	4	+5	June 1956	Glacial drift overlying Jacobsville sandstone.	Qp	Glacial sedimentary rocks.	Jacobsville sandstone.	39	June 1, 1956	
5	Northeast of Cedarville.	Mackinac.	Well, 42N 1E 31-3.	Pf	----------	120	6	−32	October 1956.	Manistique dolomite; dolomite with bioherms.	S	Marine limestone.	----------	------	Oct. 18, 1956	
6	Mackinaw City.	Cheboygan.	Well, 39N 3W 7-5.	M	500±	147	4	−6	May 1957	Bois Blanc fm., 8 to 147 ft; brecciated limestone, dolomite, chert, shale, and gypsum.	D	do	Direct precipitation.	48	May 1, 1957	
7	Tawas City	Iosco	Well, 22N 7E 25-1.	M	225	137.5	8	−79	October 1954.	Marshall fm.; 115 to 137 ft; predominantly light-colored sandstone, shaly micaceous sandstone, and conglomerate at base, overlain by Grand Rapids group.	M	Fluviatile sandstone.	Overlying glacial drift.	47	Nov. 12, 1954	
8	Midland	Midland	Well, 14N 2E 27-3.	Ind	e100	5,150	9	−3,000	June 1954	Sylvania fm., 4,906 to 5,060 ft; sandstone and siliceous dolomite.	D	Mixed fluviatile and marine sandstone.	Connate(?)	106	June 6, 1954	Dow Chemical Co. well 3.
9	Breckenridge	Gratiot	Well, 12N 1W 30-1.	M	e125	393	10	−70	October 1954.	Saginaw sandstone, 320 to 393 ft; sandstone and shale with some interbedded limestone and coal.	P	Mixed marine, littoral and paralic clastic rocks.	Overlying glacial drift	52	Oct. 13, 1954	
10	Lansing	Ingham	Well, 4N 2W 9-9.	M	e150	432	14	−196	June 1954	do	P	do	do	51	June 17, 1954	
11	Pontiac	Oakland	Well, 2N 9E 8-1.	D	e6	42	2	−25	January 1956.	Sand and gravel, 0 to 42 ft; moraines, till plains, and associated outwash deposits.	Qp	Glacial sedimentary rocks.	Direct precipitation.	53	Jan. 17, 1956	
12	do	do	Well, 3N 10E 28-2.	M	e710	195	12	−88	do	Gravel, 113 to 185 ft; interbedded in moraines, till plains, and associated outwash deposits.	Qp	do	do	50	do	

13	do	do	Well, 3N 10E 28-1.	M	e690	178	12	−90	do	Gravel, 128 to 178 ft, interbedded in moraines, till plains, and associated outwash deposits.	Qp	do	do	49	do
14	do	do	Well, 3N 10E 31-1.	M	e1,000	279	12	−160	do	Gravel and sand, 208 to 279 ft; interbedded in moraines, till plains, and associated outwash deposits.	Qp	do	do	51	do
15	Southeast of Carlton.	Monroe	Well, 5S 9E 21-1.	M	e75	100	8	−17	October 1956.	Sylvania, fm., 32 to 97 ft; sandstone, locally contains siliceous dolomite.	D	Mixed fluviatile and marine sandstone.	Direct precipitation, may contain some connate water.	52	Oct. 23, 1956
16	South of Monroe.	do	Well, 8S 8E 1-1.	Pf	Small	185	6	0.0	do	Bass Island dolomite, 80 to 185 ft; dolomite, shaly dolomite, and shale.	S	Marine limestone.	do	56	do

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Michigan																									
1	14	[1]0.0	0.16	0.02	0.00	0.15	30	6.7	16	0.8	124	0	20	11	0.1	1.0	0.0	159	103	263	8.3	<10	0.1	1.6	
2	14	[1].2	.11	.00	.00	.10	64	22	10	3.2	256	0	36	16	.0	10	.0	288	251	493	8.3	<20	<.1	1.2	
3	14	[1].2	.24	.16	.00	.60	28	5.2	14	2.4	154	0	.8	1.3	.2	.4	.1	147	94	232	8.2	<10	.3	.4	
4	12	[1].3	.10	.06	.00	2.7	735	63	740	17	134	0	10	2,540	.2	.1	.0	4,870	2,100	7,800	7.9	<200	6.6	37	
5	10	[1].1	.46	.00	.00	.00	29	32	4.5	1.9	245	0	12	.7	.9	.1	.0	226	204	402	7.9	<25	<.1	.8	
6	8.9	[1].1	.58	[1].00	.00	.00	58	30	11	1.2	220	0	70	31	.1	.1	.0	306	268	668	8.0	<20	.8	1.7	
7	9.0	[1].1	.64	.03	.00	.00	98	55	246	3.0	166	0	450	304	.6	1.0	.0	1,310	471	1,940	7.8	<100	.5	.6	
8	----	----	[1]5.5	----	----	----	65,700	9,420	[2]27,600		445	0	112	187,000	----	.0	.0	----	206,000	185,000	5.3	<1,000	720	20	Strontium (Sr), 2,960; bromine (Br), 2,870; iodine (I), 35. Sample turbid.
	102	----	32	----	----	----	73,340	9,477	22,070	9,208	[5]0	0	13	200,100	----	----	----	325,600	----	----	5.3	----	----	----	Strontium (Sr), 2,730; bromine (Br), 2,920; iodine (I), 38. Collected Mar. 26, 1952.
9	10	[1].1	.59	.03	.00	.00	92	69	80	2.4	194	0	470	38	.2	.8	.1	890	514	1,140	7.7	<50	1.9	.3	
10	15	----	.03	----	----	----	103	37	[2]10		426	0	68	7.0	.3	----	.0	----	408	723	7.5	<25	3.1	.9	
	14	----	[1].09	----	----	----	83	32	6.5	2.5	400	0	24	2.0	.3	.9	----	355	340	630	7.3	----	----	----	Collected June 4, 1952.
11	13	[1].2	.84	.02	.00	.06	83	24	1.0	.4	317	0	48	2.0	.1	.0	.0	340	306	563	7.8	<20	.3	.6	
12	19	[1].2	.80	.02	.00	.00	77	29	28	1.3	364	0	45	22	.5	.8	.0	418	312	691	7.7	<25	.6	<.1	
13	17	[1].1	.05	.01	.00	.00	85	33	17	1.4	360	0	58	28	.5	.1	.0	432	348	722	7.8	<25	.4	.2	
14	19	[1].1	1.4	.01	.00	.00	70	25	24	1.2	355	0	7.6	25	.6	.0	.1	351	278	618	7.8	<25	1.4	.2	
15	14	[1].2	.71	[1].00	.00	.00	153	63	24	3.8	330	0	362	30	1.1	.1	.0	840	641	1,190	7.6	<50	1.2	2.1	Hydrogen sulfide (H_2S) present.
16	13	[1].3	2.5	[1].01	.00	.00	362	154	20	3.5	174	0	1,360	14	1.8	.1	.0	2,240	1,540	2,300	7.6	<100	.9	2.3	do

[1] In solution when analyzed. [2] Calculated. [5] Alkalinity to methyl red reported as HCO_3.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Geologic age	Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Minnesota							
1	Grand Rapids	Itasca	Well, 55.25. 17ddb2.	M	r630	573	16	−32	September 1954.	Biwabik iron fm. 214 to 573 ft; ferruginous nonclastic rocks overlain by glacial drift.	p€	Paralic nonclastic rocks.		46	Sept. 22, 1954	
2	Eden Valley	Meeker	Well, 121.31. 1dda3.	M	200	80	12	−7	November 1955.	Glacial outwash; sand and gravel.	Qp	Glacial sedimentary rocks.	Direct precipitation.	46	Nov. 2, 1955	Municipal supply for Watkins.
3	Wayzata	Hennepin	Well, 117.22. 5abd1.	N	e2,300	483	24–16			Jordan sandstone, 395 to 485 ft; Shakopee dolomite, and Oneota dolomite.	€,O	Marine sandstone and dolomite.	Ground-water storage.	51	Sept. 23, 1954	
4	Minneapolis	do	Well, 29.24. 27a.	D, Ind	e2,800	805	20			Jordan sandstone, 350 to 440 ft; Franconia sandstone and Dresbach, gr. 620 to 805 ft; glauconitic sandstones, locally conglomeratic and shaly.	€	Littoral sandstone.	do	51	do	
5	St. Paul	Ramsey	Well, 29.22. 31bab.	Ind	600	1,083	12			Dresbach sandstone and Hinckley fm., 795 to 1,075 ft; glauconitic and ferruginous sandstones.	€, p€	Mixed littoral and continental(?) fluviatile sandstone.	do	51	Sept. 21, 1954	
6	Marshall	Lyon	Well, 111.41. 17abd.	M	150	428	16	−120	November 1955.	Dakota(?) sandstone; sandstone, pebbly sandstone, and shale, locally ferruginous.	K	Littoral sandstone.	do	54	Nov. 8, 1955	
7	Wanda	Redwood	Well, 110.36. 19d.	M	e45	190	6	−40	March 1957.	do	K	do	do	50	Mar. 27, 1957	
8	Tracy	Lyon	Well, 109.40. 23a.	M	250	638	16–8	−217	August 1957.	Alternating beds of sandstone and (or) shale and clay; overlies Precambrian granite, overlain by glacial drift.	K	Marine sandstone.	do	57	Aug. 20, 1957	
9	Rochester	Olmested	Well, 106.14. 2abal.	D, Ind	800	430	20			Jordan sandstone, 175 to 430 ft; friable well-sorted white sandstone.	€	Littoral sandstone.	do	53	Sept. 22, 1954	
10	Fulda	Murray	Well, 105.40. 25b.	M	e150	1,300	12	−60	March 1957.	Sioux quartzite, 236 to 1,300 ft; quartzite layers interbedded with slightly cemented, porous sandstone, arkosic sandstone, and pyrophyllite shale.	p€	Metasedimentary rocks.	do	51	Mar. 27, 1957	
11	Worthington	Nobles	Well, 102.40. 33ddd1.	M	e150	40–45	36	−12	December 1955.	Glacial outwash; sand and gravel 10 to 45 ft.	Qp	Glacial sedimentary rocks.	Direct precipitation.	49	Dec. 2, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Minnesota																									
1	14	0.0	0.65	0.00	-----	------	54	19	7.5	5.8	271	0	6.1	0.5	0.1	1.2	0.0	224	213	413	7.8	<14	2.6	0.2	
2	24	.1	.00	[1].08	-----	------	86	27	5.1	3.0	337	0	60	6.0	.0	.0	.2	380	325	623	7.5	<17	.3	.7	
3	19	.1	.98	.00	-----	------	73	30	6.2	4.8	383	0	4.6	1.0	.1	2.9	.1	311	306	563	7.8	<17	.8	.1	
4	21	.1	.50	.00	-----	------	82	30	7.7	4.4	353	0	47	10	.1	1.0	.0	374	328	621	7.7	<17	1.6	1.2	
5	9.5	.1	1.2	.00	-----	------	50	16	12	7.2	252	0	5.9	10	.2	.9	.0	226	191	415	7.7	<8	2.1	<.1	
6	11	.2	.00	[1].00	-----	------	112	40	440	15	384	0	988	66	.4	.0	.2	1,830	444	2,590	7.8	<85	1.2	.2	
7	9.1	.1	.06	.00	-----	------	16	5.8	342	4.6	297	0	398	94	3.6	.6	.30	1,000	64	1,600	8.1	<45	.2	.4	
8	20	[1].2	[1].11	[1].04	-----	------	209	64	62	8.6	374	0	599	4.0	.5	.7	.1	1,180	784	1,500	7.1	<50	.9	.3	Hydrogen sulfide (H_2S) present.
9	14	.1	.09	.00	-----	------	83	23	11	4.0	315	0	47	16	.1	4.9	.0	357	302	596	7.6	<17	1.1	1.6	
10	19	.1	.30	.66	-----	------	280	90	168	9.4	405	0	1,030	6.0	.3	1.0	.30	1,890	1,070	2,190	7.4	<85	3.5	8.9	
11	32	.9	.46	.18	-----	------	131	40	26	1.0	390	0	213	6.0	1.8	.3	6.0	659	492	930	7.7	<34	.3	6.9	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Mississippi							
1	Oxford	Layfayette	Well, L-1	M	325	132	18	−80	October 1954	Meridian sand mbr. Tallahatta fm., 96 to 132 ft; quartz sand containing much kyanite, staurolite, muscovite, and stringers of the overlying Basic City shale.	Te	Fluviatile sandstone.	Direct precipitation and ground-water storage.	63	Oct. 26, 1954	
2	Fulton	Itawamba	Well, G-27, city well 4.	M	178	210	10	−50	do	Tuscaloosa gr.; micaceous sand, locally lignitiferous, and some pebble beds.	K	do	do	63	do	
3	Houston	Chickasaw.	Well, K-16	M	300	1,030	8	−100	do	Eutaw fm.; lignitiferous sand and clay, overlain by and interbedded with Selma chalk.	K	do	do	75	Oct. 27, 1954	
4	4.5 miles west of Hollandale.	Washington.	Well, O-101	Pf	r346	1,696	6	+55	December 1955.	Meridian sand mbr., Tallahatta fm.; quartz sand containing much kyanite, staurolite, muscovite, and stringers of the overlying Basic City shale.	Tc	do	Direct precipitation on distant outcrop; possibly some connate water.	97	Dec. 7, 1955	Flowing well.
5	7 miles southeast of Brandon.	Rankin	Well, M-11	Pf	50	901	4	−301	October 1954.	Cockfield fm., 838 to 878 ft; lignitiferous sands and clays.	Te	do	Direct precipitation and ground-water storage.	73	Oct. 28, 1954	
6	Meridian	Lauderdale.	Well, N-3	M	1,004 800	769 782	18-12	−50	December 1955.	Wilcox fm. (basal sands); interbedded sand and silt, overlain by lignitic shales.	Te	do	do	77	Dec. 19, 1955	Composite sample from 2 wells.
7	Prentiss	Jefferson Davis.	Well, E-101	M	r262	148	10	−21	do	Hattiesburg fm., 108 to 148 ft; coarse sand interbedded in clay.	Tm	do	do	67	do	
8	Collins	Covington.	Well, C-1	M	r450	240	6			Catahoula sandstone; sand, gravelly sand, clay, silt, shale, and sandy shale.	Tm	Littoral sandstone.	do	66	do	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Mississippi																									
1	13	0.0	0.00	0.00	-----	------	5.6	2.7	7.5	3.2	14	0	6.9	11	0.0	15	0.1	74	25	104	6.6	<5	0.4	0.1	
2	7.9	.6	11	.32	-----	------	8.4	1.5	1.5	3.6	30	0	5.9	1.8	.1	.4	.5	44	27	69	6.3	<5	.3	.1	
3	14	.0	.03	.00	-----	------	9.0	1.3	110	4.6	168	0	.5	96	.2	1.9	.2	315	28	565	8.0	<17	.1	.1	
4	19	.1	.15	.00	-----	------	.8	.7	440	2.8	860	24	.2	146	.6	1.1	2.5	1,080	5	1,740	8.6	<45	.1	.1	
5	13	.4	1.2	.00	-----	------	.8	.0	109	2.8	228	2	24	16	.1	1.7	1.1	281	2	450	8.3	<14	<.1	<.1	
6	18	.6	1.7	.02	-----	------	6.4	.0	36	4.2	106	0	6.1	7.0	.1	.2	.1	126	16	198	7.3	<11	<.1	<.1	
7	12	.2	.00	.00	-----	------	1.2	.5	2.1	.8	8	0	.5	2.0	.0	2.2	.0	22	5	26	6.1	<5	.1	<.1	
8	25	.2	.41	.00	-----	------	2.4	.5	2.6	2.0	18	0	1.4	2.5	.1	.0	.0	41	8	38	6.2	<5	.2	.1	

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Missouri															
1	Ironton	Iron	Well, 34N-4E-32.	M	r30	296	8	−40	September 1954.	Lamotte sandstone; sandstone with basal conglomerate and arkose, some shale and dolomite, overlies granitic terrane, overlain by dolomite.	Є	Marine sandstone.	Direct precipitation.	59	Sept. 17, 1954	
2	Carthage	Jasper	Well, 28-31-3db.	M	375	1,008	13-10	−165	December 1954.	Cotter dolomite, Jefferson City dolomite, Roubidoux fm. (sandstone, chert, dolomite, shale), and Gasconade dolomite.	O	Marine limestone.	do	60	Dec. 2, 1954	
3	Joplin	do	Well, 27-34-2ac.	Ind	305	1,450	18-12	−110	do	Roubidoux fm. and Gasconade dolomite, 400 to 1,450 ft; sandstone, chert, dolomite, and shale.	O	Mixed marine clastic rocks and limestone.	do	68	do	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Missouri																									
1	19	0.1	0.11	0.00	------	------	44	18	8.0	4.6	222	0	20	5.0	0.7	0.1	0.0	222	184	389	7.5	<14	2.3	0.2	
2	11	.2	[1].02	[1].00	------	------	73	10	6.1	1.6	244	0	19	7.0	.1	15	------	267	223	450	7.6	<11	.5	.6	
3	10	.0	[1].04	[1].00	------	------	33	14	6.8	2.4	163	0	15	7.5	.4	.1	------	167	140	300	7.8	<7	2.2	.2	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Montana															
1	4 miles northeast of Blackfoot.	Glacier	Well, B-33-9-22cc.	D, S	e15	165	6			Horsethief sandstone; coarse-grained sandstone; locally contains shale.	K	Mixed fluviatile and littoral sandstone.	Direct precipitation and surface-water infiltration.	46	Aug. 11, 1954	
2	6 miles east of Chinook.	Blaine	Well, A-33-20-34dd.	D, S	e15	174	6	+6	August 1954.	Judith River fm.; interbedded sandstone and shale; locally contains coal beds.	K	Fluviatile sandstone.	do	47	Aug. 10, 1954	Flows 0.5 gpm.
3	8 miles northwest of Big Sandy.	Chouteau	Well, A-29-12-5dd.	S	e15	629	6			Virgelle sandstone mbr. of Eagle sandstone.	K	Littoral sandstone.	do	48	do	Natural gas caused well to flow occasionally.
4	Garrison	Powell	Anderson Phosphate Mine.	N	e300					Phosphoria fm.; phosphatic shale with thin limestone beds, chert mbr. at top.	P	Marine shale	Direct precipitation.	55	Apr. 2, 1957	Sampling site about 1,000 ft below surface.
5	Hamilton	Ravalli	Well, 6-20-31aal.	M	e800	70	12	−20	December 1955.	Alluvium	Qr	Fluviatile clastic rocks.	Surface-water infiltration.	50	Dec. 6, 1955	
6	Anaconda	Deer Lodge.	Well, B-5-12-33ca.	M, Ind	e700	55	12			Alluvial sand and gravel.	Q	Fluviatile sand.	do	46	Apr. 2, 1957	
	Whitehall	Jefferson	Well, B-1-4-3b.	M	450	349	12-8	−14	April 1957	Lakebeds of interbedded clay, sand, and gravel overlying crystalline bedrock, overlain by fluviatile sand and gravel.	T	Lacustrine clastic rocks.	do	51	Apr. 3, 1957	
8	Big Timber	Sweet Grass	Well, D-1-14-16d.	M	e100+	8-10	48 by 72			Alluvial sand and gravel.	Q	Fluviatile sand.	do	46	Dec. 12, 1955	Infiltration gallery close to Boulder River.
9	Lodge Grass	Big Horn	Well, D-6-35-13ac.	M	75	220	8			Parkman sandstone of Montana gr. 40 to 220 ft; shale and limestone with some sandstone beds.	K	Littoral limestone.		49	Aug. 30, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Montana																									
1	6.8	0.2	0.00	0.00	------	------	78	51	93	5.0	364	0	277	7.8	0.2	4.4	0.0	695	404	1,050	7.8	<34	0.2	3.4	Boron (B), 0.41.
2	7.3	.2	.12	.00	------	------	1.0	.2	635	1.8	1,250	33	195	80	1.7	.0	.0	1,580	4	2,480	8.6	<68	.3	1.0	Boron (B), 2.0.
3	7.1	2.6	.59	.00	------	------	50	12	2,760	7.5	268	0	.3	4,200	.7	--------	.8	7,210	174	12,500	7.9	<340	1.9	.1	Boron (B), 5.1.
4	8.6	[3] .1	[1] 1.3	[3] .00	------	------	36	14	2.3	1.8	131	0	40	2.0	.9	.8	.45	172	147	294	7.4	<8	2.1	2.7	Sample turbid.
5	20	.0	.00	.00	------	------	38	10	8.6	2.4	181	0	5.1	2.0	.0	3.2	.0	176	136	295	7.5	<11	<.1	1.2	
6	13	.0	.01	.00	------	------	46	10	3.7	2.0	181	0	17	1.0	.4	1.6	.30	181	156	314	7.7	<11	<.1	1.6	
7	58	.1	.08	.00	------	------	92	15	68	7.4	186	0	157	85	.5	4.3	.35	590	291	867	7.5	<34	.2	15	
8	14	.2	.00	.00	------	------	35	9.7	5.1	1.4	130	0	34	.5	.1	.8	.0	165	127	272	8.1	<11	<.1	1.5	
9	7.8	.0	[1] 5.8	[1] .00	------	------	2.4	.7	432	.7	467	16	479	6.2	.8	2.3	.2	1,160	9	1,760	8.6	<45	<.1	.2	Boron (B), 0.72.

[1] In soluti n when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Nebraska																
1	Crofton	Knox	Well, 32-2-23dd.	S	e2	760	3	−295	September 1954.	Dakota sandstone; ferruginous sandstone.	K	Littoral sandstone.	Direct precipitation.	54	Sept. 15, 1954	
2	25 miles southwest of Crawford.	Sioux	Well, 29-53-19ba.	D	e2	207	6	−172	do	Arikaree gr.; fine-grained sandstone containing calcareous concretions.	Tm	Fluviatile sandstone.		54	Sept. 19, 1954	
3	Oakland	Burt	Well, A22-8-36dd	M	e300	350	14-8	−27	November 1955.	Dakota sandstone, 300 to 350 ft; ferruginous sandstone.	K	Littoral sandstone.	Direct precipitation.	52	Nov. 17, 1955	
4	Harrisburg	Banner	Well, 19-54-30aab.	D		45	6	−22	1949	Brule fm.; siltstone and sandy silt containing admixed volcanic ash, local stringers of sandstone.	To	Mixed lacustrine and fluviatile siltstone.	do	55	Sept. 17, 1954	
5	do	do	Well, 18-56-2db.	D	e5	80	18	−52	November 1955.	do	To	do	do	54	Nov. 9, 1955	
6	David City	Butler	Well, A15-3-19ab, city well 4.	M	e250	424	10	−220	May 1954	Sand and gravel 394 to 424 ft; glacial drift overlain by loess.	Qp	Glacial sedimentary rocks.	do	56	May 2, 1957	
7	Aurora	Hamilton	Well, 10-6-4bc.	M	1,000	170	18	−72.5	April 1957	Sand and gravel, 50 to 170 ft; glacial outwash overlain by loess.	Qp	do	do	54	Apr. 3, 1957	
8	2 miles east of Louisville.	Cass	Well, A12-12-19ba.	D, S	e4	532	5	−282	September 1954.	Dolomite	D	Marine limestone.		58	Sept. 23, 1954	
9	Imperial	Chase	Well, 6-38-5ad.	M	e550	135	16	−89	April 1957	Ogallala fm, 90 to 135 ft; sand, silt, and gravel, some volcanic ash, overlain by algal limestone, caliche sandstone, and shale.	Tp	Fluviatile clastic rocks.	Direct precipitation.	56	Apr. 11, 1957	
10	Douglas	Otoe	Well, A7-9-10da.	M	e20	80	9-4	−15	November 1955.	Shawnee gr.(?), 30 to 80 ft; limestone.	P	Marine limestone.	do	54	Nov. 15, 1955	

CHEMICAL ANALYSES—*continued*

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Nebraska																									
1	7.0	0.1	9.4	0.02	-----	-----	203	44	53	20	132	0	617	46	2.1	0.0	-----	1,130	688	1,400	7.3	<34	1.2	<0.1	
2	61	.1	1.1	.15	-----	-----	35	9.1	7.8	6.0	161	0	5.5	4.0	.3	3.2	-----	191	125	283	7.8	<14	<.1	3.8	
3	16	.7	.60	[1] .14	-----	-----	134	27	81	17	412	0	245	35	.6	1.8	0.0	783	446	1,150	7.7	<34	1.4	.2	
4	60	.1	.09	.00	-----	-----	39	10	22	5.9	182	0	20	9.5	.4	7.4	-----	269	138	366	7.8	<11	.2	7.0	
5	64	.4	.00	.00	-----	-----	44	9.2	129	10	346	0	76	42	.1	16	.2	566	148	839	7.7	<23	.1	16	
6	50	.1	.01	.00	-----	-----	114	31	29	11	458	0	96	3.5	.3	.8	.20	581	412	848	7.2	<23	.8	1.0	
7	31	.0	.03	.00	-----	-----	53	7.8	19	5.4	201	0	31	8.0	.4	3.9	.95	259	164	409	7.3	<17	<.1	2.6	
8	7.9	.1	.43	.00	-----	-----	11	6.6	1,090	9.2	744	0	807	680	8.4	.6	-----	2,970	54	4,630	7.9	<140	1.3	2.4	
9	55	.1	.18	.00	-----	-----	37	10	12	8.8	178	0	15	2.0	.8	4.8	.00	231	134	375	7.6	<11	.2	4.4	
10	18	1.9	.02	[1] .00	-----	-----	180	88	135	9.0	328	0	671	81	.4	1.2	.2	1,430	811	1,810	7.4	<45	.2	.4	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (°F)	Date of sample collection	Remarks
									Nevada							
1	Elko	Elko	Well, 34/55-11c6.	M	e600	488	12-15	−34	May 1954	Humboldt fm.; gravel, 18 to 24 ft, sand and gravel 54 to 120 ft and 320 to 385 ft; sand and gravel interbedded with marl, pumiceous tuff, and clay.	Tm, Tp (?)	Lacustrine sand.	Direct precipitation and surface-water infiltration.	65	May 26, 1954	
2	Battle Mountain.	Lander	Well, 32/45-17cc2.	M	r250	725	10-6	+8	March 1956.	Humboldt fm.; sand, and gravel interbedded with marl, pumiceous tuff, and clay.	Tm, Tp (?)	do	do	74	Mar. 29, 1956	
3	15 miles east of Lovelock.	Pershing	Well, 29/33-33aa.	M	450	345	12	−105	do	Humboldt fm.; sand and gravel, 105 to 345 ft; sand and gravel interbedded with marl, pumiceous tuff, and clay.	Tm, Tp (?)	do	do	64	do	
4	12 miles south of Reno.	Washoe	Steamboat Springs, spring, 18/20-33bdl, (spring 50).	Pf, D	e5					Granodiorite intruded into metavolcanic and metasedimentary rocks overlain by rhyolite and basalt flows that are younger than some hot spring sinter.	J(?)	Silicic and intermediate plutonic rocks.	do	136	Feb. 5, 1957	
5	Gardnerville	Douglas	Well, 13/20-32 d2.	M	e500	230	12	−15	April 1957	Alluvium	Q	Fluviatile clastic rocks.	do	53	Apr. 24, 1957	
6	11 miles north of Smith.	Lyon	Well, 13/23-25 cbl.	I	405	540	14	+23	April 1955	Alluvium; possibly some penetration of well into volcanic bedrock.	Q, T	do	do	82	Apr. 6, 1955	
7	Schurz	Mineral	Well, 13/28-36cl.	Ind	266	190	12	−16	February 1955.	Sand and gravel	Qp	Lacustrine sand.	do	59	Feb. 7, 1955	
8	Ruth	White Pine.	Deep Ruth Shaft, Kennecott Copper Co. Mine.	N	e2,000	1,000				Ely limestone, 420 to 950 ft; some Chainman shale; cherty limestone and carbonaceous shale.	P, M	Marine limestone.	Direct precipitation.	59	do	

9	12 miles northwest of Round Mountain.	Nye	Darrough Springs, 11/43-7.	L, Pf	e50					Valley fill	Q, T(?)	Fluviatile clastic rocks.	Deeply circulating meteoric water.	180-200	Jan. 31, 1957	Composite sample from several springs and seeps.
10	Hawthorne	Mineral	Well, 8/30-27cl.	M	e1,000	600	16	−297	May 1957	Alluvial sand and gravel.	Q	Fluviatile sand.	Direct precipitation.	80	May 1, 1957	
11	14 miles southwest of Current.	Nye	Well, 8/56-2dl.	I	200	1,204	10			Alluvium and lake beds.	Q	Mixed fluviatile and lacustrine clastic rocks.	do	68	June 8, 1954	Flowing well.
12	5 miles west of Coaldale.	Esmaralda	Well, 2/36-8a.	Ind	e3					Valley fill	Q	do	do	60	May 24, 1957	Do.
13	13 miles northeast of Tonopah.	Nye	Well, 4/44-8bal.	M	e200	54	14	−7	May 1957	Alluvium with intercalated basalt flows.	Q	Fluviatile clastic rocks.	do	54	May 1, 1957	
14	6 miles east of Beatty.	do	Amargosa Hot Springs, 11S/47-16dcl.	D, Pf	e20					Rhyolite	T	Silicic volcanic rocks.	Deeply circulating meteoric water.	100	Feb. 22, 1956	
15	5 miles north of Beatty.	do	Crystal Spring, 11S/47-7dcl.	D	e10					Rhyolite and other silicic volcanic rocks.	T	do	Direct precipitation.	66	do	
16	4 miles north of Beatty.	do	Indian Springs, 11S/47-26cal.	N	e10					Rhyolite colluvium	T	do	do	60	do	Former municipal supply of Rhyolite.
17	Rhyolite	do	Red Fox Mine.	D	e20					Rhyolite	T	do	do	45	do	
18	2 miles east of Beatty.	do	Beatty Municipal Spring, 12S/47-5cal.	M	e100					Ryolite colluvium and rhyolite flows overlain by alluvium.	T	do	do	76	do	

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Nevada—Continued															
19	Yucca Flat	Nye	White Rock Spring.	S	e30					Oak Spring tuff; rhyolitic to quartz latitic tuff, welded in part, lacustrine in part; contains rhyolite flows and many other volcanic rock types.	Tm (?), or younger	Silicic volcanic rocks.	Direct precipitation.		Apr. 5, 1957	
20	do	do	Supply well 3	Ind	35	1,575	8-6	−1,339	April 1957	Oak Spring tuff, 1,530 to 1,575 ft; rhyolitic to quartz latitic tuff, welded in part, lacustrine in part; contains rhyolite flows and many other volcanic rock types.	Tm (?), or younger	do	do		Apr. 4, 1957	
21	Frenchman Flat	do	Supply well 5a.	Pf	80	910	8	−750	do	Valley fill; unconsolidated detrital material from limestone, dolomite, quartzite, conglomerate, shale, tuff, rhyolite, and other igneous rocks; volcanic rock material probably predominates.	Q	Mixed fluviatile and lacustrine clastic rocks and silicic volcanic rocks.	do		do	
22	do	do	Supply well 5b.	Pf	165	900		−700	do	do	Q	do	do		do	
23	do	do	Supply well 5c.	Pf	135	1,060	10			do	Q	do	do	70	do	
24	14 miles west of Lathrop Wells.	do	Well, 16/48-36a.	D, I	r600	165	16	−62	February 1956.	Tuffaceous valley fill, 0 to 165 ft.	Q	do	do	74	Feb. 21, 1956	
25	7 miles southeast of Pahrump.	do	Well, S21/54-16a.	I	r1,095	795	12	+71	February 1955.	Valley fill	Q	Mixed fluviatile and lacustrine clastic rocks.	do	74	Feb. 10, 1955	
26	Las Vegas	Clark	Well, S20/61-31dacl.	M	e950-1,700	940	10			Older alluvial deposits; gravel, sand, some silt, little clay.	Qp (?), Tp (?)	Fluviatile sand.	do	78	May 20, 1954	
27	2 miles west of Good Springs.	do	Iron-Gold Mine.	N						Moenkopi fm.; volcanic tuff and agglomerate, limestone, and shale, cut by granite porphyry.	Ꞧ	Mixed silicic volcanic rocks and marine limestone.	do	60	Feb. 21, 1956	Pool at bottom of 100-ft shaft.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
											Nevada														
1	79	0.0	0.02	0.00	----	----	44	9.4	41	14	189	0	54	28	0.2	2.1	----	371	148	494	7.6	16	<0.1	5.8	
	84	----	.05	.00	----	----	46	9.0	41	15	192	0	57	30	.2	2.3	----	383	152	511	7.8	----	----	----	Boron (B), 0.08. Collected May 21, 1952.
2	85	.0	.00	.00	----	----	26	5.8	50	8.0	164	0	37	22	.4	.8	0.0	318	89	425	8.0	17	.1	3.1	
3	26	.0	.00	.00	----	----	46	3.9	30	2.2	144	0	36	32	.0	.9	.0	260	131	425	7.9	<14	.1	2.7	
4	205	.0	.08	[1].05	----	----	14	1.9	644	59	328	0	142	790	2.2	.4	2.7	2,130	43	3,240	6.7	<110	.3	<.1	Boron (B), 2.2.
5	32	.0	.01	.00	----	----	31	9.2	17	3.2	147	0	22	5.8	.1	2.3	.30	191	115	299	7.0	<11	<.1	1.3	
6	36	.0	.03	[1].00	----	----	2.0	.2	69	3.4	146	4	23	6.2	1.0	.2	.6	244	6	305	8.5	<8	2.5	.5	Hydrogen sulfide (H_2S) present.
7	----	----	----	----	----	----	9.6	1.9	----	----	92	0	----	5.5	----	----	----	----	----	206	8.0	<8	.1	2.1	
	58	----	[3].02	----	----	----	9.2	2.3	[2]35 (Na + K)		94	0	20	5.8	.5	.2	.2	[4]120	----	203	7.5	----	----	----	Boron (B), 0.2. Collected Aug. 8, 1950.
8	12	.2	.12	[1].00	----	----	149	39	25	4.6	231	0	355	15	1.0	4.1	.0	761	532	1,020	7.8	<34	1.1	3.7	
9	105	.1	.05	.00	----	----	1.2	.0	104	2.4	112	24	40	12	15	.0	.10	369	3	472	8.7	<17	.2	<.1	Boron (B), 0.27.
10	25	.1	.01	.00	----	----	82	14	148	6.4	82	0	403	79	.7	.2	.00	810	262	1,180	7.4	45	.1	7.6	
11	----	----	----	----	----	----	----	----	----	----	214	0	----	22	----	----	----	----	----	444	8.1	11	<.1	1.8	
	80	----	.05	.00	----	----	17	11	65	10	220	0	22	24	.9	.5	----	324	88	448	7.8	----	----	----	Boron (B), 0.22. Collected May 20, 1952.
12	47	[1].0	[1].02	[1].00	0.00	0.01	4.4	.1	130	86	97	149	254	1,680	2.3	.0	.7	3,660	12	6,410	9.3	<200	.2	.4	Arsenic (As), 0.20.
13	60	.0	.01	.00	----	----	43	2.4	25	7.4	137	0	34	13	.3	11	.20	270	117	357	7.4	<11	<.1	5.7	
14	65	.0	.00	.00	----	----	18	.0	167	7.4	256	0	121	45	5.0	.3	.0	535	45	821	7.9	<27	.6	10	
15	55	.0	.00	.00	----	----	21	2.9	58	3.0	147	0	27	24	.7	12	.0	266	64	399	7.7	<17	<.1	2.4	
16	52	.0	.22	.00	----	----	8.0	1.0	62	2.0	131	0	22	16	.5	6.7	.2	224	24	319	7.9	17	<.1	5.0	
17	42	.3	.10	.00	----	----	42	6.8	84	1.2	232	0	40	52	----	8.0	.0	376	133	623	8.2	<17	<.1	8.2	
18	68	.4	.12	.00	----	----	14	1.9	106	5.8	194	0	69	27	4.0	.8	.0	368	43	552	8.2	<17	<.1	4.5	
19	80	1.1	.62	.00	----	----	4.8	.0	39	5.4	72	0	23	11	.4	4.9	.50	217	12	215	8.9	<8	<1.0	1.3	Strontium (Sr), 0.0.
20	74	.1	.01	.00	----	----	22	12	40	7.4	192	0	22	8.0	.9	7.1	.20	274	104	421	7.8	<14	<.2	3.1	Strontium (Sr), 0.2.
21	58	.1	.03	.00	----	----	3.2	.0	160	6.2	346	18	25	12	2.2	4.8	.30	456	8	677	8.6	25	<.2	13	Strontium (Sr), 0.0.
22	64	.1	.01	.00	----	----	8.0	1.5	96	11	168	5	55	25	.8	11	.15	356	26	501	8.4	35	<.2	4.8	Do.
23	56	.1	.08	.00	----	----	3.2	.1	126	5.4	266	16	25	10	.7	6.1	.25	368	8	543	8.7	<17	<.2	4.3	Do.
24	82	.2	.14	.00	----	----	70	3.9	62	9.0	142	0	107	61	1.4	17	.0	489	190	700	7.9	<23	<.1	4.7	
25	16	.0	.00	.00	----	----	53	22	7.1	.8	224	0	47	3.0	.5	.6	.0	259	223	428	7.8	<14	.1	1.6	
26	13	.0	.03	[1].00	----	----	50	25	8.0	3.5	229	0	52	3.8	.3	1.5	----	260	228	452	7.8	20	.3	2.0	
	14	----	.05	.00	----	----	48	25	8.1	3.6	222	0	51	6.5	.2	1.0	----	266	222	447	7.4	----	----	----	Collected May 16, 1952.
27	15	[3]1.0	[2]1.0	[3].30	----	----	392	379	246	16	366	0	2,380	260	.0	2.2	.0	4,280	2,540	4,380	7.3	<140	4.9	110	Sample turbid.

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment. [4] Sum of dissolved constituents.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level		Name, character, thickness, overlying formations	Geologic age	Terrane				
								Feet + or − LSD	Date of measurement							
	New Hampshire															
1	North Conway	Carroll	Well, North Conway 1.	M	r 300	67	18	−26	April 1957	Unconsolidated and stratified sand and gravel, 0 to 67 ft.	Q	Fluviatile sand.	Infiltration from Saco River.	47	Apr. 2, 1957	
2	Plymouth	Grafton	Well, Py-1	M	350	48	24	−5	October 1955.	Alluvial sand and gravel, 0 to 48 ft.	Q	do	Direct precipitation and streams.	49	Oct. 19, 1955	
3	Epsom	Merrimack.	Well, Epsom 1.	D, S	e15	203	6	−25	September 1954.	Littleton fm.; mica schist and quartzite.	D	Metasedimentary rocks.	----------	54	Sept. 28, 1954	
4	North of Rochester.	Stafford	Well, R-18	Pf	r7.5	260	6	−17	October 1955.	do	D	do	Overlying Quarternary sediments.	54	Oct. 20, 1955	Rock in this well rich in pyrrhotite.
5	Greenfield	Hillsboro.	Well, Greenfield 1.	Pf	2-16	500	8	10-20	April 1957	Littleton fm.; 10 to 500 ft; mica schist and quartzite.	D	do	Direct precipitation.	49	Apr. 3, 1957	Yield fluctuates seasonally.
6	Hampton	Rockingham.	Well, H-3	M	460	58	18	−8	September 1954.	Stratified sand and gravel (fluvioglacial deposit).	Qp	Glacial sedimentary rocks.	----------	52	Sept. 28, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
													New Hampshire												
1	11	[1]0.0	0.16	0.06	0.00	0.00	4.8	0.4	2.3	1.0	13	0	4.2	2.6	1.3	0.4	0.1	51	14	44	7.2	<5	0.1	0.2	
2	13	[1].0	.01	.03	.00	.00	6.8	1.2	2.6	.9	17	0	9.0	5.0	.1	1.2	.0	55	22	72	6.1	<5	<.1	.1	
3	18	[1].4	1.8	.00	.00	.49	5.6	2.9	8.5	2.3	47	0	7.8	1.4	.5	.5	.2	72	30	98	7.5	<5	.1	.3	
4	10	[1].0	.24	.03	.00	.00	9.2	2.1	10	1.9	55	0	8.8	1.2	1.0	.1	.1	74	32	113	8.2	<5	.5	.5	
5	9.9	[1].0	1.1	.08	.00	.07	35	3.4	28	3.3	40	0	34	63	.0	9.5	.1	233	101	371	6.8	<10	.1	.3	
6	12	[1].1	.08	.00	.00	.00	16	3.5	8.1	2.2	40	0	21	12	.0	4.2	.0	102	55	164	7.8	<5	.1	.6	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
							New Jersey									
1	Wyckoff	Bergen	Midland Ave. well.	M	330	300	6			Brunswick fm., 70 to 300 ft; red sandstone and shale.	TR	Fluviatile clastic rocks.	Direct precipitation.	51	Feb. 27, 1957	Flows 30 gpm.
2	Phillipsburg	Warren	Ingersoll-Rand airlift pump.	Ind	116	807	10–8	−123	April 1956	Kittatinny limestone, 760 to 807 ft; cherty magnesium limestone with some interbedded shale and locally cryptozoon heads.	O,Є	Marine limestone.	do	55	Apr. 24, 1956	
3	2 miles south of Princeton.	Mercer	Well, Princeton B-3.	M	350	301	14–10	−35	do	Stockton fm., 29 to 301 ft; feldspathic sandstone, conglomerate, and red shale.	TR	Fluviatile clastic rocks.	Direct precipitation and Millstone River.	55	Apr. 17, 1956	
4	Camden	Camden	Well, Morris Sta. 3A.	M	1,000	107	18	−12	do	Magothy and Raritan fms., 73 to 107 ft; sand and clay deposited in estuaries, lagoons, and marshes.	K	Mixed paralic and fluviatile clastic rocks.	Direct precipitation and Delaware River.	55	do	
5	New Lisbon	Burlington.	County institutional well 2.	Pf	260	397	8–6	−27 −58	do	Englishtown fm., 337 to 397 ft; lignitic and glauconitic sand with some gravel and clay lenses.	K	Paralic sandstone.	Direct precipitation.	58	Apr. 23, 1956	
6	Atlantic City	Atlantic	Atlantic City Electric Co., well 1-B.	Ind	e400	806	16–6	−61	March 1956	Kirkwood fm., 746 to 806 ft; fossiliferous coarse-grained sand.	Tm	Marine sandstone.	do	66	Apr. 17, 1956	
7	Woodbine	Cape May.	Well 4	M	500	160	10	−17	February 1957.	Cohansey sand, 135 to 160 ft; sand with lenses of gravel and clay.	Tm (?)	Fluviatile sandstone.	do	59	Feb. 28, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
New Jersey																									
1	16	[1] 0.0	0.02	0.00	0.00	0.00	29	16	12	1.1	126	0	22	12	0.2	26	0.0	196	138	340	7.9	<10	<0.1	1.4	
2	14	[1] .1	.04	.00	.00	.00	40	26	5.5	2.0	200	3	29	6.2	.0	14	.0	240	207	397	8.3	<10	<.1	.4	
3	23	[1] .0	.03	.00	.00	.08	26	9.4	12	1.4	63	0	44	13	.0	19	.2	198	104	280	7.1	<10	1.6	2.3	
4	6.9	[1] .1	7.2	2.7	.00	.10	9.8	6.7	4.8	2.1	49	0	18	6.2	.1	3.5	.0	90	52	151	6.3	8	.6	1.2	
5	9.7	[1] .0	.24	.01	.00	.02	27	4.6	2.7	7.4	112	0	6.4	2.2	.1	.9	.1	118	86	196	8.0	11	.2	.2	
6	34	[1] .0	.16	.02	.00	.22	8.2	.8	18	2.8	65	0	12	3.4	.1	.5	.9	115	24	140	7.8	<5	<.1	<.1	
7	39	[1] .2	1.3	.04	.09	.11	1.6	1.4	4.8	2.1	0	0	2.5	12	.1	5.0	.0	55	10	112	4.5	<5	.7	<.1	

[1] In solution when analyzed.

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
New Mexico																
1	4 miles southwest of Springer.	Colfax	Well	S	20	574	6			Dakota sandstone; sandstone and interbedded shale.	K	Mixed marine and littoral sandstone.	Direct precipitation on distant outcrop.	60	May 24, 1954	Flowing well.
2	8 miles west-northwest of Los Alamos.	Sandoval	Valle Toledo Spring, Baca location 1.	S	e600					Rhyolite	Qp	Silicic volcanic rocks.	Direct precipitation.	57	May 25, 1954	
3	7 miles west of Los Alamos.	do	Valle Grande Spring.	S	e200–300					do	Qp	do	do	55	do	
4	Gallup	McKinley	Well, 15.18.16 .333.	M	r180	2,308	15–8			Gallup sandstone, 1,125 to 1,350 ft; Dakota sandstone and Morrison fm., 2,070 to 2,308 ft; chiefly fine-grained sandstone with some shale and coal beds in Gallup and Dakota.	K, J	Mixed marine, littoral, and paralic sandstone.	Direct precipitation and surface-water infiltration.	78	Nov. 28, 1955	
5	do	do	Well, 15.18.14 .242.	M	150	320	10			Gallup sandstone, 219 to 320 ft; fine-grained sandstone with some shale and coal beds.	K	Mixed littoral and paralic sandstone.	do	57	do	
6	Santa Fe	Santa Fe	Well, 17.9.27 .232.	M	r1,000	740	16	−92	December 1955.	Tesuque fm., 0 to 740 ft; arkosic sandstone with some conglomerate and siltstone beds (valley fill).	Tm (?) Tp	Fluviatile clastic rocks.	Surface-water infiltration.	75	Dec. 5, 1955	
7	20 miles west of Grants.	McKinley	Well, 14.9.28 .144.	Ind, D	15	710	5	−440	December 1956.	Westwater Canyon sandstone mbr. of Morrison fm., 560 to 710 ft; sandstone overlain by variegated shale.	J	Littoral sandstone.	Direct precipitation on distant outcrop.	63	Dec. 12, 1956	

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (°F)	Date of sample collection	Remarks
	New Mexico—Continued															
8	2 miles west of Las Vegas.	San Miguel.	Well, 16.16.33 .100.	M	e325	738	8	−58	January 1957.	Dockum group; principally Santa Rosa fm., 665 to 738 ft; coarse gray sandstone overlain by red sandstones and shales.	Ꞧ	Littoral sandstone.	Direct precipitation on distant outcrop.	65	Jan. 16, 1957	
9	2 miles east of Bluewater.	Valencia	Well, 12.11.24 .411.	D, Ind	e900	360	14–12	−156	May 1954	San Andres limestone 252 to 358 ft; massive limestone and cherty limestone.	P	Marine limestone.	do	56	May 21, 1954	
10	Albuquerque	Bernalillo	Wells 1 and 3, Atrisco well field.	M	1,000 to 1,100 each.	(1) 558 (3) 369	14–10	−130	May 1952	Santa Fe gr.; sandstone, marl, and some gravel.	Tm to Qp(?)	Mixed fluviatile and lacustrine sandstone.	Direct precipitation.	(1) 66 (3) 68	May 17, 1954	Composite sample.
11	5 miles west of Tucumcari.	Quay	Well, 11.30.30 .413.	M	210	378.5	12	−308	December 1952.	Entrada sandstone; fine- to medium-grained poorly cemented sandstone.	J	Eolian sandstone.	Direct precipitation on distant outcrop.	65	Jan. 25, 1955	
12	Logan	do	Well, 13.33.11 .321.	M	r50	240.8	12	−117	February 1955.	Chinle fm., 223(?) to 243 ft; sandstone, clay, shale, siltstone, and some thin zones of conglomerate, overlain by Entrada sandstone.	Ꞧ	Fluviatile clastic rocks.	do	63	Feb. 25, 1955	
13	Negra	Torrance	Well, 5.13.4 .222.	M	r105	500	10	−100	December 1956.	Quartzite(?) locally cut by diorite(?) dikes.	p€	Metasedimentary rocks.	Direct precipitation.	58	Dec. 15, 1956	Supplies Encino and Vaughn.
14	Socorro	Socorro	Socorro Main Spring, (infiltration gallery).	M	353	27	36	−27	January 1957.	Datil(?) fm.; rhyolite agglomerate, and rhyolite and andesite flows with reworked tuffs and clays.	T	Silicic volcanic rocks.	Surface-water infiltration.	90	Jan. 24, 1957	
15	3 miles northeast of Aragon.	Catron	Spring	S, I	e1,000					Lake beds of extinct Lake San Augustine; sand, gravel, and clay.	Tp, Qp(?)	Lacustrine clastic rocks.	do	68	Nov. 8, 1954	
16	Carrizozo	Lincoln	Well, 8s.10.14.110.	M	180	215	12(?)	−49	April 1955.	Alluvium, 0 to 110 ft, and a sandstone in Mesaverde gr., 170 to 210 ft.	Q, K	Mixed fluviatile clastic rocks and marine sandstone.	Direct precipitation.	62	Dec. 7, 1956	
17	Truth or Consequences.	Sierra	Hot Mineral Spring, Yucca Baths.	Pf	1.1					Alluvium	Q	Fluviatile clastic rocks.	Deeply circulating meteoric water.	109	May 28, 1954	
18	10 miles southeast of Roswell.	Chaves	Well, 11.25.15.343.	D, I	e2,000	843	12			San Andres limestone, 690 to 843 ft; massive limestone, locally cherty or fossiliferous.	P	Marine limestone.	Direct precipitation on distant outcrop.	69	May 14, 1954	Flowing well.
19	10 miles northeast of Silver City.	Grant	Well, 17.15.7.313.	S	e2	95.6	6	−39	January 1955.	Gila(?) conglomerate; gravel locally cemented with calcareous material.	Tp, Qp	Fluviatile gravel.	Direct precipitation and surface-water infiltration.	63	Apr. 20, 1957	
20	11 miles west-northwest of Silver City.	do	Well, 17.16.24.113a.	S	e5	275	6	−89.7	April 1957	do	Tm	do	do	65	do	
21	12 miles west of Silver City.	do	Well, 17.16.11.113.	S	e5	284	6	−249.6	do	do	Tm	do	do	67	do	
22	5.5 miles west of Silver City.	do	Well, 18.15.11.313.	M	r300	600	14	−250	November 1954.	do	Tm	do	do	68	Nov. 11, 1954	

23	6 miles southwest of Silver City.	do	Well, 18.15.25.442a.	D, S	5	600	10	−377	April 1957	do	Tm	do	do	65	Apr. 21, 1957	
24	11 miles southwest of Dwyer.	do	Faywood Hot Spring, 20.11.20.243.	S	e50					Quartz latite and rhyolite overlain by alluvium.	T	Silicic volcanic rocks.	do	128	Apr. 19, 1957	
25	Radium Hot Springs.	Dona Ana.	Radium Hot Springs.	D, Pf						Rhyolite dikes intruded into latitic tuffs, overlain by alluvium.	T	do	do	128	Nov. 17, 1954	
26	Lordsburg	Hidalgo	Well, 25.19.7.234.	N		95	18	−36	April 1954	Valley fill	Q	Fluviatile clastic rocks.	do	210	Apr. 27, 1954	Well bottom in "hard red rock."
27	Deming	Luna	City well 1	M	575	400	16			do	Q	do	do	71	Nov. 17, 1954	
28	Carlsbad	Eddy	Well, 22.26.1.2336.	M	e1,000	148	13	−40	December 1955.	Capitan limestone, primarily reef limestone.	P	Marine limestone.	do	70	Dec. 7, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
									New Mexico																
1	7.4	[3] 0.3	[1] 0.07	[3] 0.00			19	10	970	13	897	0	94	990	4.9	1.1		2,560	88	4,420	8.2	188	9.3	0.6	Sediment in sample.
	12		[1] .14				31	9.7	[2] 893		838	0	106	885	5.2	1.1		2,360	118	4,050	7.4				Collected June 6, 1952.
2	50	[3] .0	[3] .02	[3] .00			5.4	1.8	10	1.6	41	0	1.8	2.0	1.8	.2		103	21	81	7.8	<10	<.1	.3	Sample turbid.
											43	0		1.5						84	7.1				Sample turbid. Collected June 11, 1952.
3	55	[3] .1	[3] .08	[3] .00			4.4	1.4	11	1.2	42	0	1.9	2.0	.6	.3		100	17	80	7.2	<10	<.1	.2	Sample turbid.
											44	0		1.2						78	6.9				Collected June 11, 1952.
4	16	.0	.00	.00			8.0	1.9	290	1.0	344	4	303	30	.7	.6	.0	839	28	1,250	8.3	35	.1	.3	
5	15	.6	.66	.45			84	23	193	2.0	447	0	320	23	.5	4.4	.0	892	304	1,320	7.9	<34	.7	1.0	
6	18	[3] .0	[3] .00	[3] .00			53	4.9	5.8	.0	154	0	10	8.0	.1	22	.0	207	152	327	7.9	<14	.2	.9	Sediment in sample.
7	18	[3] .0	[3] 4.0	[3] .02			59	24	186	4.8	314	0	381	7.0	.5	.0	.00	859	246	1,230	7.6	69	1.1	<.1	Do.
8	18	.0	.05	.00			34	12	112	1.2	370	0	54	10	.4	2.3	.00	418	134	684	7.7	<23	.6	2.2	
9	12	.1	.01	[1] .00			142	46	118	7.8	361	0	376	70	.6	11		1,060	544	1,410	8.0	24	.4	6.1	
	15		[1] .01				165	49	[2] 103		402	0	380	70	.5	15		1,010	643	1,460	7.2				Collected Apr. 23, 1952.
10	58	.1	.00	[1] .00			21	4.6	74	6.8	161	0	85	12	1.0	.2		344	71	475	8.1	<10	<.1	5.5	Composite of two wells.
											168	0		13		.4			77	467	7.9				Collected May 1, 1952.
11	21	[3] .0	[3] .19	[1] .00			35	26	44	4.6	292	0	34	9.8	1.6	4.4	.0	306	194	541	7.8	<14	.3	13	Sediment in sample.
12	27	[3] .1	[2] 1.4	[3] .04			109	32	51	2.8	314	0	170	51	.6	3.6	.0	622	404	932	7.4	<23	.7	3.5	Do.
13	21	.0	.05	.00			58	19	51	4.0	215	0	111	25	2.8	1.5	.00	410	222	637	7.5	29	.1	26	
14	27	.0	[1] .00	.00			18	3.9	52	2.8	154	0	28	15	.6	1.2	.15	224	61	348	7.8	<11	.2	1.8	
15	42	.1	[1] .05	[1] .00			21	6.6	19	3.3	139	0	2.9	4.5	.6	1.5		175	80	234	8.2	<7	<.1	1.1	Boron (B), 0.04.
16	28	.2	1.4	.00			228	45	94	2.8	142	0	620	136	.1	3.2	.00	1,280	754	1,670	7.3	<68	<.1	1.1	
17	41	.1	.02	.19			154	21	735	61	216	0	93	1,290	3.3	2.0		2,670	470	4,510	7.3	100	.7	3.3	
	39		[1] .01				174	25	[2] 701		221	0	98	1,240	2.8	2.7		2,640	537	4,430	7.2				Collected Mar. 31, 1952
18	12	.2	.01	[1] .01			140	41	31	1.3	236	0	315	42	.9	3.8		750	518	1,040	7.6	<10	.1	1.0	
	13		[1] .01				140	43	[2] 21		241	0	303	38	.8	4.1		701	526	997	7.4				Collected Mar. 11, 1952
19	35	.1	.03	.00			104	7.3	16	2.0	327	0	34	6.5	.2	21	.10	398	289	612	7.4	<17	<.1	1.1	
20	29	.1	.01	.00			42	23	17	1.4	244	0	7.8	8.2	.6	13	.10	246	199	432	7.7	<14	<.1	1.4	
21	31	.0	.03	.00			26	22	19	1.8	214	0	6.7	7.8	.5	4.7	.10	216	155	369	7.7	<11	<.1	1.1	
22	28	.1	[1] .03	[1] .00			36	16	24	2.8	219	0	6.7	14	.4	7.1		238	156	394	8.1	<14	<.1	1.8	
23	36	[3] .1	[3] .01	[3] .00			62	7.8	13	1.6	194	0	20	22	.5	1.9	.00	264	187	423	7.5	<14	<.1	1.2	Sediment in sample.
24	43	.0	.01	.00			38	7.3	85	7.8	278	0	52	16	6.8	.2	.00	384	125	605	7.4	19	29	.1	
25	75	.1	[1] .15	[1] .40			126	12	1,100	161	317	0	255	1,650	4.8	1.1		3.620	364	6,100	7.2	170	.6	1.8	
26	138	.1	.07	.00			21	.7	324	21	145	6	474	83	9.9	.3		1,160	56	1,580	8.4	12	.3	.2	
											163	7		82		.4			55	1,600	8.2				Collected Mar. 28, 1952
27	36	.1	.03	.00			30	5.8	37	3.3	185	0	17	9.5	.6	1.8		235	99	350	8.1	<11	<.1	3.3	
28	17	.0	.00	.00			170	49	142	1.4	260	0	418	196	.5	3.0	.0	1,130	626	1,700	7.7	<45	.2	2.1	

[1] In solution when anlyzed. [2] Calculated. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level		Name, character, thickness, overlying formations	Geologic age	Terrane				
								Feet + or − LSD	Date of measurement							
								New York								
1	Bloomingdale	Essex	Well, ES 15	M		304	8			Grenville series	p€	Metasedimentary rocks.		49	June 7, 1954	
2	Lake Pleasant Village.	Hamilton	Well, H 2	Pf	e10	179	8	−22	October 1954.	Syenite, 124 to 179 ft	p€	Intermediate plutonic rocks.		50	Oct. 5, 1954	
3	Lyons	Wayne	Well, Wn 546	Ind	150	393	8–6	−20	May 1956	Salina gr., 130 to 371 ft; shale, marl, marly sandstone, and some impure limestone impregnated with salt.	S	Marine shale	Precipitation on distant outcrop.	51	May 3, 1956	
4	Syracuse	Onondaga	Well, Od 161	Ind	75	300	6	−100	do	Camillus and Vernon fms. of Salina gr., 75 to 300 ft; shale, gypsum, and salt beds, and dolomite.	S	do	Direct precipitation	52	do	
5	2 miles west of Victor.	Ontario	Spring, Ot 39sp.	M	e200+					Sandy gravel (kame deposit).	Qp	Glacial sedimentary rocks.	do	48	do	
6	5 miles south of Canandaigua.	do	Well, Ot 263	S	15	192	6			Ludowville shale, 6 to 192 ft; soft dark fossiliferous shale.	D	Marine shale	Surface-water infiltration.	55	July 12, 1954	
7	1 mile northeast of Sand Lake.	Rensselaer.	Well, Re 579	D	e1	166	8	−45	September 1954.	Rensselaer graywacke, 32 to 166 ft; graywacke, locally calcareous, with interbedded shale and phyllite.	€(?)	Littoral clastic rocks.	Direct precipitation.	50	Sept. 20, 1954	
8	Lebanon Springs Village.	Columbia	Lebanon Springs, spring Cb 11 sp.	M	75					Stockbridge limestone; crystalline limestone in places dolomitic, quartzose, micaceous, or feldspathic, rarely fossiliferous.	€,O	Marine limestone.	do	73	do	
9	Carmel	Putman	Well, P 509	Pf	0.36	180	8			Granitic gneiss	p€	Mixed metasedimentary and metaigneous complex.	do	57	May 12, 1956	Flows in pit 6 ft below land surface.
10	Greenwood Lake.	Orange	Well, O 10	D	3	50	6			Granitic gneiss, 12 to 50 ft.	p€	do	do	51	Sept. 15, 1954	
11	Westbury	Nassau	Well, Sta. 12N 5655.	M	1,050	255	20–12	−47	March 1957.	Magothy (?) fm., 195 to 255 ft; unconsolidated sand and gravel overlain by glacial outwash.	K	Littoral sandstone.	do	51	Mar. 26, 1957	
12	do	do	Well, Sta. 9N 2602.	M	e1,000	800	20–12	−94	do	Lloyd sand mbr. of Raritan fm., 760 to 800 ft; unconsolidated sand and gravel.	K	do	do	59	do	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
New York																									
1	23	-------	0.40	-------	-------	-------	33	7.2	[2] 1.1		108	0	15	7.0	0.2	-------	0.0	-------	112	261	7.4	<10	<0.1	1.0	
	15	0.0	5.7	0.02	0.0	0.0	31	5.5	6.0	1.6	112	0	11	9.8	.3	.3	.0	143	100	238	7.2	-------	-------	-------	Collected May 26, 1952.
2	19	[1].0	.14	.00	.00	.03	9.5	2.3	2.8	.6	38	0	2.8	2.1	.1	2.5	.1	60	33	80	7.6	<5	.1	.6	
3	15	[1].0	4.4	.16	.00	.15	2,040	487	11,600	107	91	0	2,650	21,200	1.2	25	.0	40,100	7,090	54,000	6.7	<1,000	11	6.1	Strontium (Sr), 13. Sample turbid.
4	5.5	[1].0	[3] 3.5	[3].13	.02	.00	227	29	12	2.7	288	0	439	24	.0	.9	.0	888	686	1,210	7.6	<50	<.1	2.1	
5	12	[1].0	.19	.03	.02	.00	56	26	3.0	1.0	270	0	29	3.0	.0	6.3	.0	278	246	462	8.0	<20	<.1	.6	
6	11	-------	3.1	-------	-------	-------	75	18	[2] 280		750	0	1.4	179	.4	-------	.0	-------	262	1,610	7.3	<50	1.0	1.0	
	11	[3] 2.9	[3] 2.1	[3].09	.00	1.2	76	16	285	2.6	769	0	2.0	185	.2	.5	.0	963	256	1,630	7.1	-------	-------	-------	Collected June 5, 1952.
7	12	[1].0	.62	.02	.00	.35	74	20	34	1.2	381	0	26	2.7	.2	1.0	.0	352	268	609	8.2	<25	.1	5.0	
8	13	[1].3	.17	.00	.00	.03	36	13	7.2	1.6	147	4	23	6.2	.2	1.0	.1	177	145	312	8.5	<10	.1	1.4	
9	17	[1].1	.13	.03	.00	.00	89	40	21	6.1	397	0	43	48	.0	13	.1	500	387	812	7.4	<25	1.8	1.5	
10	6.1	[1].4	1.1	.11	.00	3.2	17	1.6	2.2	.7	50	0	17	1.2	.0	1.8	.0	78	56	120	7.1	<5	.1	.4	
11	7.5	[1].4	.01	.00	.00	.00	1.3	.1	2.7	.7	5	0	1.0	4.3	.1	1.4	.0	25	4	24	6.1	<5	<.1	.3	
12	8.3	[1].0	.35	.00	.00	.00	1.1	.6	2.8	.7	8	0	.8	3.8	.2	.1	.0	27	5	31	6.1	<5	<.1	1.1	

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (°F)	Date of sample collection	Remarks
North Carolina																
1	1 mile south of Mebane.	Alamance	Well, A-2	D	e20	106	6	−35	March 1955.	Rhyolite tuff	Pal (?)	Silicic volcanic rocks.		59	Mar. 23, 1955	
2	Edenton	Chowan	Well, C-4	M	e750	391	24-12	−12	January 1956.	Calcareous glauconitic sand.	Tpe	Littoral sandstone.	Direct precipitation.	62	Jan. 16, 1956	
3	2 miles east of Valdese.	Burke	Well, B-15	Pf	112	400	8	−37	March 1952.	Mica schist	Pal (?)	Metasedimentary rocks.		59	May 22, 1954	
4	3 miles south of Cleveland.	Rowan	Well, R-8	S	e10	250	2	−15	March 1955.	Gabbro	Pal (?)	Basic plutonic rocks.		62	Mar. 22, 1955	
5	Landis	do	Well, R-120	M	e35	1,108	8	−35	January 1956.	Granite	Pal (?)	Silicic plutonic rocks.		62	Jan. 18, 1956	
6	Farmer	Randolph	Well, Ra-18	Pf	e20	160	6	−35	March 1955.	Andesite tuff	Pal (?)	Intermediate volcanic rocks.		59	Mar. 22, 1955	
7	Terra Ceia	Beaufort	Well, B-38	D	15	402	2	+1	do	Glauconitic sand and clay, 380 to 402 ft; overlain by limestone and phosphatic sands.	Tpe Te	Littoral sandstone.	Direct precipitation.	60	Mar. 8, 1955	
8	2 miles northwest of Pantego.	do	Well, B-46	D		231	2	−3	do	Castle Hayne limestone, 217 to 231 ft; 90 percent shell fragments in calcareous matrix, 10 percent phosphate pebbles, overlain by 57 ft of phosphatic sand.	Te	Marine limestone.	do	61	Mar. 18, 1955	
9	Swindell	do	Well, B-12	S		190	2	−2.1	January 1957.	Phosphatic sand	Tm	Marine sandstone.	do	62	Jan. 15, 1957	
10	Bath	do	Well, B-84	D	e100	145	1.5	−14	March 1954.	Castle Hayne limestone, 138 to 145 ft; 95 percent shell fragments, 5 percent phosphate pebbles, overlain by 48 ft of phosphatic sand.	Te	Marine limestone.	do	62	Mar. 18, 1954	
11	2 miles north-northwest of Gaylord.	do	Well, B-35	D		225	2			Castle Hayne limestone, 200 to 225 ft; 85 percent shell fragments and limestone, 15 percent quartz sand, overlain by 80 ft of phosphatic sand.	Te	do	do	62	do	
12	0.5 mile east of Pekin.	Montgomery.	Well, Mon.-42.	D	e2	130	6			Red shale, 0 to 130 ft; cut by diabase dikes (Triassic?).	Ꞧ(?)	Fluviatile shale.	Surface-water infiltration.	64	Feb. 28, 1955	
13	Wallace	Duplin	Well, Du-85	M	720	380	10	−3	January 1957.	Black Creek fm.; interbedded sand and carbonaceous clay, overlain by Peedee fm (Cretaceous).	K	Paralic clastic rocks.	do	64	Jan. 22, 1957	
14	3 miles southeast of Kelly.	Bladen	Small unnamed stream.	N						Peedee fm	K	Fluviatile sandstone.	Direct precipitation and seeps from "connate" water.		Jan. 12, 1956	

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
North Carolina																									
1	39	[1]2.7	1.1	0.00	0.00	1.4	12	2.2	6.8	0.6	80	0	0.1	2.0	0.1	0.8	0.1	102	56	130	6.9	5	<0.1	1.3	
2	52	[1].1	.05	.02	.00	.00	59	14	139	10	464	7	31	85	.8	.3	.2	639	205	1,050	8.3	<50	<.1	<.1	Hydrogen sulfide (H_2S) present.
3	31	---	.05	---	---	---	17	1.1	[2]6.9		69	0	4.8	.2	.0	---	.1	---	47	124	7.7	7	.3	.2	
	29	---	[3].48	[1].00	---	---	17	1.7	[2]7.4		69	0	6.9	1.1	.1	.0	---	98	49	130	7.1	---	---	---	Collected Mar. 22, 1952.
4	39	[1].0	1.1	.00	.01	.00	18	7.1	5.6	1.2	59	0	.1	8.4	.0	30	.1	147	74	189	6.8	<5	<.1	.3	
5	28	[1].0	2.7	.02	.00	.00	134	3.1	6.8	1.8	92	0	272	2.0	2.2	.0	.0	521	347	679	8.0	<25	2.1	8.9	
6	31	[1].2	.16	.03	.01	.25	14	5.6	9.6	.4	74	0	.1	8.8	.0	6.8	.0	114	60	163	7.2	<5	<.1	.9	
7	37	[1].2	.14	.00	.00	.01	59	29	33	20	427	0	.1	15	.4	1.0	.0	411	268	663	7.6	35	.1	.4	
8	52	[1].2	1.1	.00	.02	1.3	49	28	38	24	400	0	.1	19	.6	1.5	.0	395	240	638	7.7	42	<.1	.2	Hydrogen sulfide (H_2S) present.
9	3.0	[1].1	[1].02	[1].00	.00	.07	13	16	84	12	339	10	.6	7.0	1.2	.1	.4	326	98	563	8.5	23	.2	.2	Do. Sample turbid.
10	62	[1].0	.39	.02	.00	.26	74	17	9.1	2.8	327	0	.1	5.4	.6	1.5	.0	347	255	518	7.5	<20	<.1	.2	Hydrogen sulfide (H_2S) present.
11	53	[1].1	[1].01	[1].00	.01	.66	75	21	27	15	417	0	.1	6.8	.4	.5	.0	395	275	616	7.7	<25	.3	.3	Sample turbid.
12	17	[1].1	[1].00	[1].02	.12	.05	48	29	447	8.4	579	0	1.5	536	1.2	.2	.0	1,390	224	2,410	8.1	<100	.6	24	
13	16	[1].1	.21	.01	.03	.10	25	4.5	27	11	186	0	.7	3.0	.3	.6	.2	179	81	303	8.1	<10	.3	.3	
14	7.7	[1].4	.55	.01	.00	.00	12	9.0	320	13	127	0	19	483	.2	.5	.1	945	70	1,770	7.6	<100	<.1	.8	

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Geologic age	Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									North Dakota							
1	Langdon	Cavalier	Well, 161-60-14d.	M	e100	35	240	−20	October 1954.	Pierre shale; micaceous and bentonitic shale containing abundant pyrite, selenite, and siderite; locally contains lignite; overlain by glacial till.	K	Marine shale	Direct precipitation and glacial till.	43	Oct. 27, 1954	
2	St. Thomas	Pembina	Well, 159-53-2d.	N	e10	450	4			St. Peter(?) sandstone; overlain by Cretaceous shales.	O	Marine sandstone.	Direct precipitation on distant outcrop and connate(?) water.	43	Oct. 26, 1954 May 28, 1956	Flowing well. Standby for fire fighting.
3	Stanley	Mountrail	Well, 156-92-28b.	D	e70	185	12	−85	September 1954.	Fort Union fm.; sand, sandy shale, sandy clay, clay; lignite beds are common and volcanic ash is present in upper mbr.; overlain by glacial till.	Tpe	Marine clastic rocks.	Direct precipitation.	42	Sept. 30, 1954	
4	Devils Lake	Ramsey	Well, 154-64-34dcc2.	M	e50	1,500	18-12-6			Dakota sandstone, 1,385 to 1,500 ft; white sandstone with a small amount of shale.	K	Littoral sandstone.	Direct precipitation on distant outcrop.	64	June 4, 1954	Flowing well.
5	Michigan	Nelson	Well, 153-58-32d.	D	6	108	6	−20	May 1956	Pierre shale; micaceous and bentonitic shale containing abundant pyrite, selenite, and siderite; locally contains lignite; overlain by glacial till.	K	Marine shale	Direct precipitation and glacial till.	46	May 29, 1956	
6	4 miles west of Grand Forks.	Grand Forks.	Well, 152-51-33d.	S	e8	103	3	+6	do	Dakota(?) sandstone, white micaceous sandstone, overlain by Benton fm.	K	Littoral sandstone.	Direct precipitation on distant outcrop.	42	do	
7	Belfield	Stark	Well, 139-99-4acc.	M	r40	85	8	−44	March 1957	Coal, 65 to 85 ft; probably in Fort Union fm.	Tpe	Paralic sedimentary rocks.	Direct precipitation and glacial till.	41	Mar. 9, 1957	
8	New Salem	Morton	Well, 139-85-9aac.	M	e45	360	6	−160	April 1957	Hell Creek fm., 310 to 360 ft; alternating beds of sandstone, shale, and bentonitic shale, with thin impure lignite beds in the lower part; overlain by Tertiary sediments.	K	Mixed fluviatile and paludal clastic rocks.	Direct precipitation and Tertiary sediments.	40	Apr. 16, 1957	
	Mandan	do	Well, 138-81-16a.	D, S	e30	400	2.5	−100	September 1954.	Lance fm.; sandstone and shale with local beds of lignite.	K	do	Direct precipitation.	49	Sept. 22, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
											North Dakota														
1	26	2.2	3.5	[1]21	------	------	416	143	362	14	104	0	2,170	38	0.2	0.1	------	3,360	1,630	3,560	6.3	<110	<0.1	0.3	
2	5.6	11	2.0	[1].00	------	------	1,310	538	13,400	264	180	0	2,480	22,800	1.7	------	0.0	44,200	5,480	58,800	6.9	<1,700	74	.6	
	7.4	2.4	17	[1].00	------	------	1,320	535	13,600	268	201	0	2,470	23,300	1.6	------	------	44,300	5,490	57,400	7.0	<1,700	35	.5	Collected Oct. 26, 1954.
3	17	.0	.50	.00	------	------	16	3.6	520	3.1	807	0	494	5.5	.0	2.6	.1	1,440	55	2,170	8.1	<68	<.1	.4	
4	------	------	.44	------	------	------	------	------	------	------	------	------	------	880	------	------	------	------	------	5,980	------	58	.5	.4	
	14	------	------	------	------	------	8.0	7.3	1,400	7.0	749	41	1,130	878	5.0	1.4	------	3,920	50	6,100	8.5	------	------	------	Boron (B), 4.5. Collected June 14, 1952.
5	34	.1	.10	[1].00	------	------	4.0	1.2	316	4.4	497	0	183	76	.8	3.1	1.2	864	15	1,360	8.1	<34	<.1	<.1	
6	31	.8	.59	[1].33	------	------	208	88	1,100	22	258	0	1,400	1,170	2.6	4.0	.0	4,380	881	6,370	7.5	<170	.4	.3	
7	11	[3].1	[1].05	[3].09	------	------	74	53	624	5.4	702	0	1,080	25	.3	.0	.15	2,130	402	3,060	7.1	<85	.2	1.0	Sample turbid.
8	8.6	[3].4	[1].03	[3].00	------	------	2.4	2.9	560	2.3	1,030	58	250	4.0	1.6	2.4	.9	1,380	18	2,170	8.4	170	.1	.3	
9	14	.1	.32	.00	------	------	5.3	3.9	565	2.2	1,020	8	387	14	.7	3.8	.7	1,530	29	2,270	8.3	<68	.2	.2	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
									Ohio							
1	Lowellville	Mahoning.	City well 2	M	150	68	12	−13	June 1952	Sharon conglomerate and Connoquenessing sandstone mbrs. of Pottsville fm.; alternating beds of sandstone, shale, coal, fire clay, and limestone.	P	Mixed paludal and paralic clastic rocks.	----------	57	June 21, 1954	
2	4 miles northeast of Ashland.	Ashland	Well, Ashland County O.D.W.1.	Pf	e10	40	6	−12	May 1955	Berea sandstone, 26 to 40 ft; siltstone to fine-grained sandstone.	M	Littoral sandstone.	Direct precipitation.	53	May 24, 1955	
3	Canton	Stark	Well, Canton 2.	M	700	175	----------	−65	June 1954	Outwash gravel (Wisconsin), 0 to 175 ft.	Qp	Glacial sedimentary rocks.	----------	50	June 16, 1954	
4	Kenton	Hardin	Well 4	M	350	300	10	−21	March 1957	Bass Island dolomite, 80 to 300 ft.	S	Marine limestone.	Direct precipitation.	53	Mar. 14, 1957	Sample included some water from well 1 at same depth and fm.
5	Marion	Marion	Well	M	362	259	14	−48	1954	Bass Island dolomite, 60 to 259 ft.	S	do	do	55	Mar. 23, 1956	
6	Fort Recovery	Mercer	Well, Mercer County O.D.W.12.	M	e400	208	6	−18	May 1955	Niagara gr.; stratified limestone and dolomite beds overlain by glacial till.	S	do	do	59	May 20, 1955	
7	Sidney	Shelby	Well 5	M	200	231	10	−50 −45	April 1952 June 1954	Niagara gr. 80 to 231 ft; limestone and dolomite.	S	do	----------	52	June 24, 1954	
8	Marysville	Union	Well	Pf	350	±300	10	−15	March 1957	Bass Island dolomite, dolomite overlain by as much as 100 ft of glacial till.	S	do	Direct precipitation.	55	Mar. 14, 1957	
9	Vandalia	Montgomery.	Well, Montgomery County O.D.W.122, well "C."	Ind	35	135	12	−92	May 1955	Niagara gr.; limestone and interbedded shale overlain by glacial till.	S	do	do	59	May 23, 1955	
10	Grove City	Franklin	Well	M	200	290	8	−106	March 1956	Bass Island dolomite, 170 to 290 ft.	S	do	do	53	Mar. 10, 1956	
11	3 miles west of Bainbridge.	Ross	Well, Ross County O.D.W.5.	Pf	e10	95	5.5	−18	May 1955	Peebles dolomite of Foreste, AF (1929), 10 to 95 ft.	S	do	do	56	May 13, 1955	

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Ohio																									
1	11	--------	0.27	--------	------	------	71	36	[2]23		328	0	95	4.4	0.1	--------	0.0	--------	325	650	7.3	<25	1.5	0.4	
	11	--------	[1].28	0.17	------	------	82	24	12	2.1	313	0	63	4.5	.2	1.0	------	363	304	615	7.4	--------	------	------	Collected June 8, 1952.
2	10	[1]0.2	[1].01	[1].05	0.00	0.00	127	45	19	2.0	401	0	184	21	.2	.4	.0	629	503	952	7.5	<25	.1	1.0	Sediment in sample.
3	12	--------	.39	--------	------	------	107	28	[2]12		317	0	137	4.0	.0	--------	.0	--------	382	709	7.3	<25	.3	.5	
	12	--------	.41	.21	------	------	120	29	3.9	.4	326	0	154	8.5	.0	.0	------	524	420	783	7.7	--------	------	------	Collected June 16, 1952.
4	13	[1].2	.60	.00	.00	.00	138	51	31	3.5	357	0	298	16	2.1	.8	.0	761	554	1,080	7.8	<50	1.0	1.9	Hydrogen sulfide (H_2S) present.
5	12	[1].1	.38	.00	.00	.00	216	86	18	2.4	352	0	630	13	1.7	2.5	.0	1,160	893	1,530	7.3	<100	2.4	1.0	
6	14	[1].2	[1].09	[1].01	.00	.00	178	86	76	3.5	285	0	707	11	1.7	1.1	.0	1,290	799	1,510	7.4	<50	.6	2.0	Sample turbid.
7	17	--------	1.3	--------	------	------	68	42	[2]43		461	0	46	5.6	.9	--------	.0	--------	342	745	7.4	<25	1.8	.9	
	18	--------	1.4	.00	------	------	94	40	17	2.2	471	0	49	9.0	.8	2.4	------	527	400	764	6.7	--------	------	------	Collected Apr. 11, 1952.
8	2.2	[1].2	[1].12	[1].00	.00	.00	96	85	41	3.8	79	0	574	9.7	1.6	3.0	.1	885	589	1,180	7.5	<50	.8	1.9	Hydrogen sulfide (H_2S) present.
9	16	[1].2	5.2	.14	.00	.00	101	46	10	1.4	524	0	26	7.0	1.2	.6	.0	465	443	791	7.3	<25	.7	1.7	
10	11	[1].1	.78	.00	.00	.16	254	99	35	9.0	315	0	820	24	2.0	2.2	.0	1,490	1,040	1,750	7.4	<100	.1	.6	Do.
11	11	[1].0	.48	.13	.00	1.7	28	72	3.5	1.7	398	0	28	5.0	.1	31	.0	395	368	663	7.6	<25	.2	.8	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Oklahoma															
1	Guymon	Texas	Well, 3N15E-32-1.	M	530	405	16	−189	June 1954.	Ogallala fm., 150 to 600 ft; unconsolidated sand, gravel, and clay, locally cemented with calcium carbonate.	Tp	Fluviatile sandstone.	Direct precipitation and surface-water infiltration.	68	June 25, 1954	
2	Beaver	Beaver	Spring, 2N23E-14-2.	S						do	Tp	do	Direct precipitation.	53	Dec. 3, 1954	
3	Miami	Ottawa	Well, 28N23E-31-2.	M	400	1,247	10	−300	May 1952.	Roubidoux fm., 105 to 180 ft; dolomite and sandstone with many cherty zones, quartzose oolite zone at the top; overlain by Jefferson City dolomite.	O	Mixed marine sandstone and limestone.	Direct precipitation and Lake O' The Cherokees.	70	June 14, 1954	
4	Claremore	Rogers	Well, 21N16E-8-1.	Pf		1,150				Arbuckle gr.; limestone, magnesian limestone, siliceous limestone, and locally with cherty concretions.	Є, O	Marine limestone.	Connate(?).		Sept. 23, 1954	
5	2 miles south of Salina.	Mayes	Spring, 21N 20E-26-1.	Pf	e20					do	Є, O	do	do		do	2 springs.
6	Hinton	Caddo	Well, 12N 11W-34-1.	M	e80	315	16	−130	March 1956.	Rush Springs sandstone, 140 to 315 ft; sandstone with silty lenses; overlain by Cloud Chief fm.	P	Littoral sandstone.	Direct precipitation.	62	Mar. 26, 1956	
7	Norman	Cleveland	Well, 9N3W-13.	M	300	635.5	11	−297	March 1952.	Wellington fm. and Garber sandstone, 500 to 1,500 ft; red shale and sandstone with mudstone, clay, shale, and siltstone beds; overlain by Hennessey shale.	P	Mixed littoral and fluviatile clastic rocks.	do	66	June 9, 1954	
8	Seminole	Seminole	Well, 9N6E-27-1.	M	120	734	11	−150	March 1956.	Vamoosa fm., 125 to 550 ft; shale, sandstone, and chert conglomerates; truncated edge overlain by Ada fm.	P	Littoral clastic rocks.	Direct precipitation and Ada fm.	67	Mar. 27, 1956	
9	Cement	Caddo	Well, 5N6W-3-1.	M	25	200	10	−50	February 1957.	Rush Springs sandstone, 140 to 315 ft; sandstone with silty lenses; overlain by Cloud Chief fm.	P	Littoral sandstone.	Direct precipitation.	60	Feb. 19, 1957	
10	Cyril	do	Well, 5N10W-1-1.	M	30	200	10	−40	do	Rush Springs sandstone; sandstone with silty lenses.	P	do	do		Feb. 25, 1957	
11	Sulphur	Murray	Well, 1N3E-27-1.	Ind		838				Bromide fm. about 400 ft thick; sandstone, limestone, and shale; overlain by Viola limestone.	O	Mixed marine sandstone and limestone.	Direct precipitation in Arbuckle Mtn. area.	63	Dec. 9, 1954	
12	do	do	Spring, 1S3E-24-1.	D,S						Oil Creek fm. about 750 ft thick; sandstone, limestone, shale, and dolomite; overlain by McLish fm.	O	do	do	63	do	
13	Hugo	Choctaw	Well, 6S17E-21-7.	M	450	494	8	−123	June 1954.	Paluxy sand; fine sand, locally calcareous and argillaceous.	K	Littoral sandstone.	Direct precipitation.	68	Dec. 10, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Oklahoma																									
1	-------	-------	-------	-------	---	-------	-------	-------	-------	-------	232	0	-------	6.0	-------	-------	-------	-------	-------	538	7.9	<7	0.1	10	
	28	-------	[1] 0.00	-------	---	-------	48	29	22	4.7	223	0	78	7.5	1.8	9.9	-------	338	239	535	7.9	-------	-------	-------	Collected Mar. 17, 1952.
2	37	0.1	[1] .02	[1] 0.04	---	-------	70	18	9.0	5.4	267	0	30	12	.7	7.2	-------	325	248	506	7.4	<14	.3	4.3	
3	12	.0	.06	.05	---	-------	32	14	85	3.6	150	0	15	135	.8	.0	-------	379	138	701	8.1	19	3.5	.2	
	10	-------	[1] .00	-------	---	-------	32	15	63	3.0	148	0	18	103	.7	.0	-------	320	142	592	7.9	-------	-------	-------	Collected May 20, 1952.
4	20	[3] 1.7	[1] .15	[3] .00	---	-------	1,660	556	13,800	204	329	0	70	26,600	.6	-------	0.0	47,700	6,430	63,300	6.8	<1,700	390	.4	Hydrogen Sulfide (H_2S) present.
5	17	1.4	.09	.00	---	-------	1,870	598	11,500	156	357	0	471	22,500	1.2	-------	.0	40,400	7,120	54,300	6.7	<1,700	230	.3	
6	31	.0	.03	.00	---	-------	146	26	53	1.4	263	0	313	24	.2	2.5	.0	734	471	1,030	7.4	<34	.4	7.4	
7	-------	-------	-------	-------	---	-------	-------	-------	-------	-------	316	16	-------	6.0	-------	-------	-------	-------	-------	576	8.8	<7	.3	12	
	9.0	-------	[1] .00	-------	---	-------	5.0	3.4	122	1.0	308	10	14	5.8	.3	1.2	-------	326	26	524	8.7	-------	-------	-------	Collected Mar. 11, 1952.
8	12	.0	.12	.00	---	-------	38	7.8	32	3.2	192	0	37	5.0	.4	.4	.0	211	127	384	7.7	<11	.7	<.1	
9	20	.2	.08	.20	---	-------	102	4.9	8.8	.8	216	0	30	48	.1	16	.00	376	274	588	7.1	37	2.0	120	
10	24	.1	.07	.00	---	-------	110	18	15	.8	268	0	99	27	.1	21	.10	450	348	714	7.3	<23	.3	2.2	
11	14	.2	.19	.00	---	-------	55	24	133	7.8	334	0	24	166	.5	.6	.0	573	236	1,050	7.8	<27	4.1	.3	Hydrogen Sulfide (H_2S) present.
12	11	.2	[1] .02	[1] .00	---	-------	75	36	8.2	2.2	404	0	9.8	12	.1	4.1	-------	352	335	634	7.5	<17	.3	1.3	
13	17	.1	[1] .30	[1] .06	---	-------	78	7.3	30	3.4	315	0	22	12	.2	.4	-------	322	224	540	7.6	<14	2.4	.1	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
										Oregon						
1	5 miles SW. of Scapoose.	Columbia.	Well, 3N/2W-17F1.	N	10	4,426	12			Tuffaceous shales and sandstones.	To (?)	Marine clastic rocks.	Connate and meteoric.	68	Nov. 18, 1955	Flowing well; abandoned oil test hole.
2	Monroe	Benton	Well, 14S/5W-28D1.	D	e10	213	4			Clastic rocks, 100 to 213 ft.	T	Mixed marine and fluviatile clastic rocks.	Direct precipitation and surface-water infiltration.	56	Apr. 29, 1955	
3	Madras	Jefferson	Well, 1S/15E-22B2.	I	e2,250	560	20			Clarno fm.; sand 412 to 457 ft.; rhyolite, andesite, and tuff.	Te (?)	Marine sandstone.	do	55	Apr. 30, 1955	
4	Mitchell	Wheeler	Spring, 11S/22E-18B1.	D				0.0	April 1955	Conglomerate	K	Marine clastic rocks.	do	55	do	
5	1 mile north of Haines.	Baker	Radium Hot Spring.	Pf	r230					Fractured quartz diorite.	J or K	Silicic plutonic rocks.	Deeply circulating meteoric water.	135	May 1, 1955	
6	8 miles northwest of Fife.	Crook	Spring, 20S/22E-34Q1	I, D, S	e1					Basalt	Tp	Basic volcanic rocks.	Direct precipitation.	64	Nov. 29, 1956	One spring of several along a zone 2 miles long.
7	Burns	Harney	Well, 23S/30E-12J1	M		251	12	−94	November 1956.	Danforth fm., 0 to 251 ft; tuff breccia, basalt breccia, siltstone, sandstone, conglomerate, basalt flows, volcanic ash, and rhyolite flows.	Tp	do	do	58	Nov. 16, 1956	
8	Cave Junction	Josephine	Well, 39S/8W-28K1	M	r500	40	16	−10	December 1956.	Gravel, 15 to 40 ft; gravel derived from metamorphosed and igneous rocks.	Q	Fluviatile gravel.	Surface-water infiltration.		Dec. 19, 1956	
9	11 miles north of Denio.	Harney	Spring	D, S	e35					Schist, gneiss, and other metamorphosed rocks.	J(?)	Metasedimentary rocks.	Direct precipitation.	60	June 28, 1956	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/1)	Radium (Ra) (µµc/1)	Uranium (U) (µg/1)	Remarks
Oregon																									
1	34	0.9	0.33	0.86	-----	-----	1,610	24	8,340	28	16	0	4.4	15,200	-----	-----	0.0	28,800	4,120	40,000	6.8	<1,100	5.9	0.2	
2	50	.4	.27	[1].06	-----	-----	1.4	3.2	11	1.5	75	0	10	3.0	.3	.2	.1	126	48	145	7.5	<5	<.1	<.1	
3	36	[3].1	[3].06	[1].00	-----	-----	23	5.6	77	3.5	278	0	23	4.3	.5	.2	.0	309	80	466	8.1	<14	.2	.6	Sample turbid.
4	17	[3].1	[3].03	[3].00	-----	-----	67	45	38	2.8	341	0	145	4.2	.2	2.6	.0	486	352	762	7.9	<23	<.1	.7	
5	80	.0	.00	[1].00	-----	-----	1.6	.0	63	2.0	5	47	31	17	1.0	.2	.0	244	4	290	9.7	<8	<.1	<.1	
6	70	.0	.00	.02	-----	-----	18	12	58	8.6	214	0	14	28	.3	1.5	.20	309	94	444	7.7	<17	<.1	1.2	
7	62	.2	.00	.00	-----	-----	14	5.8	20	5.2	112	0	7.7	4.0	.3	3.1	.20	178	59	217	7.6	<8	.1	.3	
8	25	.0	.03	.00	-----	-----	6.4	7.8	5.8	.2	64	0	.8	5.5	.0	.7	.00	73	48	113	6.5	<7	<.1	<.1	
9	29	.0	.00	.00	-----	-----	56	5.8	12	4.6	124	0	83	4.0	.1	.0	.0	271	118	376	7.4	<11	.7	.1	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (°F)	Date of sample collection	Remarks
									Pennsylvania							
1	South Montrose	Susquehanna.	Well, Sq-2	Ind	e35	550	8	−40	May 1955	Catskill fm.; shale, sand, and gravel of fresh-water origin interbedded with onlapping marine beds.	D	Mixed fluviatile and marine clastic rocks.		51	May 10, 1955	
2	0.5 mile northeast of Jamestown.	Crawford	Well, W3-179	M		122	6	−80	May 1954	*Pocono fm. 114 to 122* ft; interbedded sandstone and shale.	M	do		51	May 26, 1954	
3	Worthington	Armstrong.	Well, Ar-7	D	20	300	6			Homewood sandstone mbr. of Pottsville fm.; sandstone with scattered quartz pebbles and limonite-filled fractures, locally micaceous.	P	Fluviatile sandstone.			Mar. 3, 1955	
4	1 mile northwest of Jim Thorpe	Carbon	Spring, F20D-0165.	N	3					Pottsville fm.; shale, sandstone, conglomerate, locally coal and limestone strata.	P	Mixed fluviatile and littoral clastic rocks.		46	May 25, 1954	
5	Avonmore	Westmoreland.	Well	M	e20	300	6	−150	January 1956.	Conemaugh fm. shale with discontinuous beds of sandstone and limestone and local beds of coal, sandstone with thin shale and coal beds.	P	Mixed paludal and paralic clastic rocks.		53	Jan. 17, 1956	
6	Summerdale	Cumberland.	Well, 14 (Cu-37).	D	e90	300	8	−105	April 1955	Martinsburg shale; basal carbonaceous shale overlain by soft sandstone.	O	Fluviatile clastic rocks.		53	Apr. 15, 1955	
7	Boiling Springs	do	Well, Cu 46. J15b-7000.	M	e100	60–65	8	−10	March 1957	Elbrook dolomite, 50 to 60 ft; earthy or shaly limestone with thin beds of impure marble.	Є	Marine limestone.	Direct precipitation and some surface-water infiltration.	55	Mar. 5, 1957	
8	Shiloh	York	Well, Yo-4	M	100	300	8			New Oxford fm.; red micaceous sandstone, arkose, and conglomerate.	Ћ	Fluviatile clastic rocks.		52	Jan. 6, 1956	
9	Lititz	Lancaster	Well, 4 (Ln-6)	M	450	150	8	−20	April 1955	Conococheague limestone; limestone, dolomite, black chert bands, and marble.	Є	Marine limestone.		41	Apr. 18, 1955	
10	Lansdale	Montgomery.	Well, Mg-76	M	e250	387	10			Brunswick fm., 0 to 387 ft; red shales, locally micaceous, subordinate local sandstone beds, conglomerate at top	Ћ	Littoral shale			May 25, 1957	
11	Ambler	do	Well, Mg-12	M	600	300	12			Shenandoah limestone; crystalline dolomitic limestone.	Є,O	Marine limestone.	Direct precipitation.	54	Mar. 29, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Pennsylvania																									
1	11	[1]0.0	0.12	0.01	0.00	0.00	28	6.4	5.8	0.9	90	0	16	8.3	0.1	10	0.0	136	96	228	7.8	15	<0.1	0.8	
2	14	[1].0	1.3	.00	.00	.00	44	11	60	4.1	327	0	22	4.4	.2	2.0	.0	312	155	533	7.4	<20	.6	.7	
	8.3		[1].02				12	3.7	2.0	1.0	30	0	24	1.8	.0	1.7			45	117	7.1				Collected Feb. 27, 1952.
3	8.0	[1].1	.16	.00	.00	.00	44	7.6	12	3.9	163	0	28	6.4	.1	1.2	.0	187	142	327	8.0	<10	<.1	.2	
4	4.5		.15				6.6	2.1	[2]4.8		6	0	27	2.0	.0		.0	[4]50	25	67	6.1	<5	<.1	.7	
	3.3		[1].01				5.2	2.9	1.1	.9	5	0	23	1.8	.0	.1			25	72	6.6				Collected Feb. 21, 1952.
5	8.9	[1].1	.00	.00	.00	.08	60	15	11	.9	218	0	53	4.4	.1	.4	.0	270	212	440	8.2	<20	<.1	.5	
6	15	[1].0	.34	.02	.00	.03	27	6.1	5.8	.7	114	0	13	.8	.0	.5	.0	130	92	205	7.8	<10	<.1	.3	
7	9.6	[1].0	[1].00	[1].00	.00	.00	30	7.4	2.2	2.0	124	0	6.4	3.0	.2	.8	.2	137	105	219	7.8	<5	.1	.5	Sediment in sample.
8	21	[1].0	[1].00	[1].00	.00	.00	46	6.9	11	.5	148	0	16	9.1	.0	26	.2	213	143	339	7.8	<10	.1	1.2	Sample turbid.
9	9.9	[1].0	.13	.00	.00	.00	78	9.8	2.6	1.8	236	0	19	7.3	.0	25	.0	280	235	462	7.4	<20	<.1	.8	
10	19		[1].01				34	16	[2]6.3		176	0	11	6.0	.1		.1	[4]179	151	338	7.6	<10	1.2	2.3	
	21		[1].01				24	20	[2]5.1		150	0	22	5		.4			142	321	6.4				Collected Feb. 21, 1952.
11	11	[1].1	.01	.00	.00	.00	53	24	8.4	2.7	234	0	33	11	.0	9.0	.0	282	231	466	7.9	<20	<.1	.4	

[1] In solution when analyzed. [2] Calculated. [4] Sum of dissolved constituents.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Rhode Island															
1	East Providence	Providence	Well, EPR-9	Ind	e27	380	10	−17	June 1954	Rhode Island fm., 88 to 380 ft; sandstone and shale, locally coal.	P	Mixed fluviatile and paludal clastic rocks.	Direct precipitation.	55	June 21, 1954	
2	do	do	Well, EPR-78	M	1,200	58	16			Sand and gravel of outwash plain.	Qp	Glacial sedimentary rocks.	do	51	Apr. 8, 1957	
3	West Warwick	Kent	Well, Wwa-91	Pf	e3	140	6	−20	May 1955	Cowesett granite, 60 to 140 ft.	M(?)	Silicic plutonic rocks.	do	52	May 26, 1955	
4	Alton	Washington.	Well, Ric-7	M		14	48	−6.6	November 1955.	Sand and gravel of outwas 1 plain.	Qp	Glacial sedimentary rocks.	do	55	Nov. 7, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Rhode Island																									
1	15	-------	0.01	-------	-----	------	29	2.2	[2]10		79	0	21	11	0.2	--------	0.5	--------	81	208	7.2	<10	0.4	0.9	
	15	[1]0.2	.19	[1]0.00	0.0	0.0	28	1.8	10	1.0	76	0	20	12	.3	0.1	.1	125	77	202	7.9	--------	-------	--------	Collected June 10,1952.
2	12	[1].0	.05	.01	.00	.00	16	2.1	7.2	1.0	28	0	23	9.1	.0	14	.0	95	49	148	6.7	<5	<.1	.1	
3	20	[1].0	.19	.04	.00	.07	6.5	2.6	5.9	.8	38	0	.9	5.0	.5	1.5	.0	60	27	76	7.6	15	.4	1.4	
4	9.2	[1].0	.03	.07	.00	.02	8.1	.3	7.6	3.5	12	0	16	8.7	.0	9.5	.0	78	22	111	5.9	<10	1.2	<.1	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (°F)	Date of sample collection	Remarks
	South Carolina															
1	Greenville	Greenville.	Well, GRV-52.	Ind	e85	208	8	−25	November 1954.	Porphyritic granite	p€ to C	Silicic plutonic rocks.	Direct precipitation.	64	Nov. 24, 1954	
2	West Spring	Union	Well, UN-12	D	e1	170	6	−45	do	Schist	p€(?)	Metasedimentary rocks.	do	63	do	
3	McBee	Chesterfield.	Well, CTF-2.	M	r45	188	10			Tuscaloosa fm.; coarse micaceous sand and kaolinitic clay.	K	Fluviatile sandstone.	do	66	Dec. 15, 1954	
4	John de la Howe School.	McCormick.	Well, MCK-8.	Pf	e30-35	242	8	−45	November 1954.	Granite	p€ to C	Silicic plutonic rocks.	do	65	Nov. 24, 1954	
5	Sumter	Sumter	Well, SU-64	M	1,600	607	26			Tuscaloosa fm., 404 to 607 ft; coarse micaceous sand and kaolinitic clay.	K	Fluviatile sandstone.		70	Nov. 30, 1955	
6	Ocean Drive Beach.	Horry	Well, HO-202	M	e300	460	18	−6	March 1957.	Peedee fm.; micaceous, glauconitic, argillaceous sand, and impure limestone.	K	Marine sandstone	Direct precipitation.	66	Mar. 30, 1957	
7	North	Orangeburg.	Well, ORB-1A.	M		135	10	−42	November 1955.	McBean fm.; sand	Te	do	do	66	Nov. 30, 1955	
8	Georgetown	Georgetown.	Well 7	M	225	720	6	−49	May 1954.	Peedee and Black Creek fms.; micaceous, glauconitic, argillaceous sand; some impure limestone; soft shales and black clay, locally ferruginous.	K	Mixed marine and paralic sandstone and clays.	do	75	May 29, 1954	
9	Yemassee	Hampton	Well 9	M	100	667	8	−35	May 1952.	Limestone and marl	T	Marine limestone.	do	72	May 24, 1954	
10	Parris Island	Beaufort	Well, BFT-117.	Pf		95	12	−25	March 1957.	Limestone and chalky coquina.	Te to Tm	do	do	67	Mar. 30, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
													South Carolina												
1	28	[1]0.0	1.8	0.40	0.00	0.00	44	6.1	17	2.0	181	0	0.1	16	0.2	0.6	0.0	214	136	337	6.9	13	0.2	2.3	
2	34	[1].0	[1].08	[1].01	.03	.02	8.5	5.0	5.2	1.5	61	0	.1	2.3	.4	.7	.1	92	42	101	7.3	<5	<.1	1.5	Sample turbid.
3	6.4	[1].0	.05	.06	.00	.02	1.2	.1	1.8	.2	1	0	.1	3.8	.1	2.1	.0	16	4	19	4.7	4	.6	1.0	
4	35	[1].1	.18	.13	.00	.09	13	4.3	8.4	3.5	72	0	6.9	3.8	.2	.4	.1	124	51	150	7.0	8	.2	.4	
5	11	[1].1	1.9	.02	.00	.00	.7	.5	2.0	1.4	1	0	6.4	3.0	.0	.0	.0	31	5	36	4.7	<5	.7	.1	
6	9.0	[1].1	.54	.03	.00	.00	57	1.4	44	1.8	234	0	1.6	37	.4	1.1	.1	305	148	472	8.0	<20	.2	<.1	
7	6.5	[1].0	.26	.01	.05	.03	.8	.7	3.6	.1	3	0	.0	3.4	.0	8.5	.1	27	5	34	5.2	<5	4.7	.2	
8	11	--------	[1].00	--------	--------	--------	2.5	.6	[2]205		482	12	.6	26	.9	--------	.2	--------	9	842	8.5	<25	<.1	.3	
	12	--------	[1].02	--------	--------	--------	1.6	.7	[2]210		447	32	1.5	28	.9	.0	--------	516	7	--------	8.6	--------	--------	--------	Collected Jan. 10, 1947.
	--------	--------	1.6	--------	--------	--------	--------	--------	--------	--------	477	21	1	30	1.2	.2	--------	--------	14	--------	--------	--------	--------	--------	Collected Mar. 23, 1946.
9	26	[1].1	.11	[1].00	.06	.03	9.1	2.6	76	4.8	247	0	6.0	3.4	1.2	.6	.1	258	34	395	7.8	<10	<.1	1.3	
	44	--------	[1].05	[1].00	--------	--------	28	9.4	--------	19	171	0	2.8	4.5	.2	.1	--------	192	108	276	7.4	--------	--------	--------	Collected May 26, 1952.
10	44	[1].1	.51	.09	.00	.00	51	5.9	11	3.2	201	0	.2	7.2	.3	1.2	.0	233	152	328	7.9	<10	<.1	2.1	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	South Dakota															
1	Buffalo	Harding	Well, A-19-5-30addl.	M	r38.5	92	12	−25	March 1957	Hell Creek fm., 52 to 92 ft; sandstone, sandy bentonitic shale, abundant siderite, cemented concretions, few thin beds of lignite.	K	Fluviatile sandstone.	Direct precipitation.	51	Mar. 22, 1957	
2	3 miles southwest of Sturgis.	Meade	Well, A-5-5-20ccccl	Pf	e8					Limestone and limestone talus.	Pal	Marine limestone.	do	42	do	
3	Ellsworth Air Force Base.	Pennington.	Well, A-2-9-18bal.	Pf	360	4,645	20	−543	May 1942	Pahasapa limestone; overlain by Minnelusa sandstone (Pennsylvanian and Permian) and other younger fms.	M	do	Deeply circulating meteoric water.	120	Aug. 20, 1954	
4	8 miles southwest of Rapid City.	do	Well, D-1-7-10.	D	10	308	6-5	−264	August 1954.	Minnelusa sandstone; buff and red calcareous sandstone with few thin stringers of limestone.	P, P	Marine sandstone.	Percolation from overlying fms.	51	Aug. 21, 1954	
5	Kadoka	Jackson	Well, D-2-22-32abadl.	M	e150	2,956	10-5	−150	December 1955	Dakota sandstone, 2,347 to 2,440 ft; carbonaceous, micaceous sandstone, overlain by Graneros shale.	K	Mixed marine and littoral sandstone.	Precipitation on distant outcrop.	130	Dec. 13, 1955	
6	1 mile west of Sioux Falls.	Minnehaha.	Well, 101-50-13cccc.	D	e10	172	6	70 to 100	1953	Sioux quartzite, 142 to 172 ft; ferruginous quartzite, overlain by blue clay.	p€	Metasedimentary rocks.	Direct precipitation.	53	Aug. 28, 1954	
7	Triangle	Custer	Giant Cycle Mine.	N		70				Fall River fm.; interbedded sandstone and thin shale lenses, overlain by Graneros shale.	K	Mixed fluviatile and marine sandstone.	do		October 1957	
8	20 miles northwest of Edgemont.	Fall River.	Well, D-7-1-9a.	N						do	K	do	do		do	
9	Minnekahta	do	Well, D-7-2-12bal.	D	e10	170	6	−30	December 1955.	Sundance fm. 130 to 170 ft; ferruginous sandstone with some interbedded green shales.	J	Marine sandstone.	Direct precipitation and surface-water infiltration.	48	Dec. 15, 1955	
10	Hot Springs	do	Well, D-7-5-13cbda.	N	400	264	10	+13	February 1954.	Minnekahta limestone, 230 to 264 ft; thin-bedded limestone, overlain by gypsiferous Spearfish fm.	P	Marine limestone.	Direct precipitation distant outcrop.	88	Aug. 21, 1954	Flowing well.
11	do	do	Spring, D-7-5-13b.	Pf	5,000					Minnelusa sandstone; buff and red calcareous sandstone with few thin stringers of limestone.	P, P	Marine sandstone.	Deeply circulating meteoric waters.	90	Nov. 1, 1957	
12	2 miles northeast of Hot Springs.	do	Spring, D-7-5-35b.	S						do	P, P	do	Direct precipitation.	52	do	

13	4 miles southwest of Hot Springs.	----do----	Spring, D-7-6-10c.	S	e10	----------	----------	----------	----------	Minnelusa sandstone and Lakota(?) fm.; quartz sand with some altered feldspar(?) clay, and carbon fragments, locally beds of coal near the base, few thin stringers of limestone.	P, P, K	Mixed fluviatile, marine, and paludal sandstone.	----do----	48	----do----
14	Cascade Springs	----do----	Spring, D-5-8-20c.	N	e50	----------	----------	----------	----------	Minnelusa sandstone; buff and red calcareous sandstone with few thin stringers of limestone.	P, P	Marine sandstone.	Direct precipitation on distant outcrop.	72	----do----
15	Edgemont	----do----	Well, D-9-2-1.	M	8	2,983	6	----------	----------	Minnelusa sandstone and Pahasapa limestone, 2,950 to 2,983 ft; limestone, and buff and red calcareous sandstone with few thin stringers of limestone.	P, P, M	Mixed marine sandstone and limestone.	Deeply circulating meteoric waters.	145	October 1957

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
													South Dakota												
1	15	0.0	0.07	0.00	----	----	2.4	0.0	292	1.2	516	12	165	10	0.6	1.1	0.80	758	6	1,180	8.4	<34	0.3	0.3	
2	14	.0	.02	.00	----	----	56	25	2.3	1.2	289	0	8.1	1.0	.1	1.0	.00	248	242	444	7.8	<17	.1	1.0	
3	23	.1	[1].00	[1].00	----	----	92	37	5.9	4.9	207	0	214	1.8	.5	.3	.0	508	382	705	7.4	<17	2.0	6.4	Boron (B), 0.41.
4	9.6	[3].4	[1]2.6	[1].00	----	----	48	17	5.1	3.2	227	0	11	2.0	.2	.0	.0	206	190	365	7.6	<10	.3	1.1	Sample turbid. Hydrogen sulfide (H_2S) present.
5	11	.2	.03	.00	----	----	119	89	238	12	308	0	908	11	.0	.4	.0	1,570	663	2,060	7.8	<68	.5	2.8	
6	15	.2	[1].91	[1]1.6	----	----	102	35	12	4.6	346	0	130	3.0	.5	.4	.0	486	398	742	7.4	<17	2.2	8.1	Boron (B), 0.41.
7	10	.6	1.6	.86	----	----	230	71	132	10	132	0	961	20	.4	2.6	.10	1,550	866	1,860	6.6	1,500	500	960	Boron (B), 0.08.
8	8.0	.0	.68	.07	----	----	72	27	200	11	214	0	525	18	.3	.0	.00	935	290	1,410	7.6	54	1.8	.1	Boron (B), 0.08.
9	26	.0	1.5	.06	----	----	61	10	512	9.5	212	0	1,000	65	.7	.2	.0	1,700	193	2,540	7.6	<68	3.4	<.1	
10	24	.1	[1].00	[1].00	----	----	404	62	100	12	220	0	1,090	119	1.0	.5	.0	2,040	1,260	2,330	7.3	<68	.4	7.1	Boron (B), 0.62.
11	27	.1	.00	.00	----	----	252	51	86	9.8	232	0	639	112	.8	1.0	.00	1,300	838	1,740	7.0	<50	.4	7.5	Boron (B), 0.24.
12	2.4	.3	.03	.00	----	----	508	112	21	15	112	0	1,610	13	.2	.0	.00	2,420	1,730	2,510	7.4	<76	<.1	6.3	Boron (B), 0.19.
13	13	.1	.00	.00	----	----	64	34	9.8	4.0	306	0	51	8.0	.7	1.7	.00	350	300	561	8.0	<19	.2	10	Boron (B), 0.06.
14	22	.2	.03	.00	----	----	568	92	54	6.2	235	0	1,540	62	.9	.6	.00	2,530	1,800	2,700	7.0	<76	.9	5.7	Boron (B), 0.19.
15	34	.1	.06	.00	----	----	108	32	260	14	229	0	453	240	.9	.3	.00	1,220	401	1,910	7.8	<47	3.0	5.1	Boron (B), 0.42.

[1] In solution when analyzed. [3] Includes any material present in sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Tennessee															
1	Mt. Juliet	Wilson	Well	D	6	69	6			Lebanon limestone, 50 to 69 ft.	O	Marine limestone.	Direct precipitation.	57	Nov. 17, 1954	
2	Huntingdon	Carroll	do	M		270	8			McNairy sand mbr. of Ripley fm.; sand with some clay.	K	Mixed fluviatile and littoral sandstone.	do	63	Dec. 1, 1955	
3	Camden	Benton	do	M	800	165	10	−90	November 1954.	Camden and Harriman cherts; thoroughly fractured chert and novaculite containing solution channels.	D	Marine nonclastic rocks.	do	61	Nov. 16, 1954	
4	Lexington	Henderson.	do	M	75	110	24–12			McNairy sand mbr. of Ripley fm.; sand with some clay.	K	Mixed fluviatile and littoral sandstone.	do	61	Dec. 1, 1955	
5	3 miles southwest of McMinnville.	Warren	do	D	e12	78	7			Fort Payne chert; very fossiliferous chert and cherty limestone.	M	Marine limestone and other nonclastic rocks.	do	57	Nov. 17, 1954	
6	Maryville	Blount	Well, 5-290-1	D		60	6	−10	June 1954	Chattanooga shale; black shale, overlain by Fort Payne chert (Mississipian).	D, M	Marine shale	do	59	June 7, 1954	
7	Memphis	Shelby	Well, 79: 8-50	M	550	1,310	10	−125	June 1957	Wilcox gr.; interbedded sands, with some clay, locally contains lignites, and marls, overlain by Claiborne gr.	Te	Mixed littoral and paralic clastic rocks.		72	June 17, 1957	
8	do	do	Well, 51	M	650	547	10	−130	do	Claiborne gr.; sand with interbedded clays, locally lignitic.	Te	do	Direct precipitation.	63	do	
9	Ducktown	Polk	Well	M						Great Smoky gr.; conglomerate, sandstone, quartzite, graywacke, mica schist, garnet schist, and shale.	p€	Fluviatile clastic rocks.	do	62	Oct. 8, 1954	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Tennessee																									
1	9.2	[1]0.0	0.22	0.33	0.00	0.85	124	28	14	3.0	460	0	57	18	0.1	5.0	0.0	516	426	808	7.8	<25	0.1	1.2	
2	11	[1].0	1.3	.05	.00	.00	4.2	2.0	4.4	.9	1	0	28	1.2	.0	.0	.1	50	19	89	4.7	<5	.6	<.1	
3	12	[1].0	.18	.23	.00	.00	53	17	75	10	238	0	46	95	1.3	2.0	.1	444	202	778	7.8	<25	.7	.3	
4	13	[1].1	.08	.06	.03	.00	17	8.6	22	4.9	36	0	40	31	.0	28	.1	186	78	287	5.9	11	1.7	.5	
5	11	[1].1	.13	.00	.00	.50	44	12	1.2	.1	189	0	6.4	1.2	.5	.4	.0	178	161	310	8.2	<10	<.1	.3	
6	23	------	12	------	------	------	8.6	5.7	[2]48		92	0	69	.6	.3	------	.0	------	45	288	7.2	<10	.4	.8	
	26	[1]1.2	10	------	------	------	8.8	8.4	34	2.9	65	0	71	2.0	.3	.0	------	180	56	264	6.4	------	------	------	Collected Feb. 27, 1952.
7	19	[1].0	1.32	.04	.05	.05	2.2	.7	35	1.5	100	0	4.6	1.0	.0	.6	.3	111	8	164	7.5	<5	.1	.3	Boron (B), 0.02.
	12	[1]1.2	2.9	------	------	------	2.7	2.0	35	1.7	100	0	5.6	2.0	.1	.6	------	101	15	162	7.4	------	------	------	Collected Mar. 8, 1952.
8	13	[1].0	.94	.02	.00	.04	8.8	2.2	7.9	.4	54	0	3.0	3.3	.0	.1	.1	71	30	103	7.0	<5	.2	.1	Boron (B), 0.00.
	11	[1]1.3	1.0	------	------	------	8.5	4.3	7.8	.9	54	0	4.4	4.2	.1	1.2	------	66	39	119	6.9	------	------	------	Collected Mar. 8, 1952.
9	.2	[1].0	5.5	.02	.00	.40	1.6	1.9	1.1	1.2	13	0	5.5	.8	.0	.5	.0	19	13	37	7.5	5	.1	.7	

[1] In solution when analyzed. [2] Calculated.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level		Name, character, thickness, overlying formations	Geologic age	Terrane				
								Feet + or − LSD	Date of measurement							
Texas																
1	17 miles east of Fort Worth.	Tarrant	Well, 352	Pf	625	1,846	14	−487	June 1954	Travis Peak fm. 1,670 to 1,830 ft; sand, conglomerate, and a few clay lenses, locally cemented with calcareous material.	K	Littoral sandstone.	Direct precipitation on distant outcrop.	90	June 2, 1954	
2	Colorado City	Mitchell	Well, 14	M	35	238	10	−128	December 1954.	Dockum gr.; sandstone, conglomerate, shale, and some gypsum and anhydrite.	Tr	Fluviatile clastic rocks.	Direct precipitation.	66	Dec. 15, 1954	
3	3 miles Northwest of Dell City.	Hudspeth	Well, C-1	I	360	750	16	−182	August 1949.	Bone Spring limestone; black limestone.	P	Marine limestone.	do	70	Dec. 14, 1954	
4	Kermit	Winkler	Well, E-52	M	278	300	14	−65	January 1957.	Santa Rosa sandstone; coarse sandstone with conglomerate at base.	Tr	Fluviatile clastic rocks.	do	71	Jan. 30, 1957	
5	8 miles northwest of Crane.	Crane	Well, F-19	M	50	75	8	−52	January 1957.	Alluvium	Q	do	do	67	Jan. 29, 1957	
6	Eden	Concho	Well	M	e200	4,150	16-6	−350	June 1954	Hickory sandstone mbr. of Riley fm.; sandstone and conglomerate, with alternating beds of sandstone and glauconitic limestone near top.	Є	Mixed fluviatile and littoral sandstone.	do	130	June 3, 1954	
7	15 miles south of San Saba.	San Saba	Spring 343	S	e150					Ellenburger gr.; cherty limestone and dolomite.	O	Marine limestone.	do	71	Dec. 14, 1954	Measured flow 1,150 gpm. October 1938.
8	Valentine	Jeff Davis	Well	M	r110	870	8	−270	January 1955.	Gravel	Q	Fluviatile gravel.	do	79	Jan. 3, 1955	
9	Alpine	Brewster	Well, city 3	M	100	443	10-6	−200	do	Rhyolitic trachyte or seyenite plug.	T	Silicic volcanic rocks.	do	70	Jan. 4, 1955	
10	Manor	Travis	Well, E-46	M	49	3,001	4	+55	December 1955.	Sligo fm.; dark shale with lenses of limestone and sandstone.	K	Mixed marine limestone and clastic rocks.	Deeply circulating meteoric waters.	108	Dec. 8, 1955	Flowing well.
11	Houston	Harris	Well, NE-8	M	2,370	1,970	24-12	−303	June 1954	Lissie fm., and Willis sand, 1,010 to 1,950 ft; sand and gravel with some red clay, locally ferruginous and calcareous.	Qp Tp (?)	Fluviatile sand.	Direct precipitation on distant outcrop.	84	June 10, 1954	
12	Uvalde	Uvalde	Well	M	r1,000	500		−68	December 1954.	Edwards limestone, 268 to 478 ft; generally massive limestone; contains siliceous nodules.	K	Marine limestone.	do	73	Dec. 23, 1954	
13	Crystal City	Zavala	Well, N5-48a	M	e1,000	980	10	−274	June 1954	Carrizo sand, 700 to 980 ft; sand locally ferruginous, micaceous, or calcareous; contains beds of ferruginous clay.	Te	Fluviatile sand.	do	91	June 8, 1954	

14	Karnes	Karnes	Well, D-531	M	r320	870	12-6	−217	December 1955.	Catahoula tuff, 800 to 870 ft; volcanic ash and tuff interbedded with tuffaceous clays, sandstone, and volcanic conglomerate, containing pebbles of trachyandesite and trachyte.	Tm (?) To	Intermediate volcanic rocks.	do	93	Dec. 9, 1955
15	Kenedy	do	Well, G-503	M	r325	416	12	−84	do	Oakville sandstone, 320 to 400 ft; crossbedded tuffaceous sandstone containing clay nodules and interbedded with lenses and other beds of clay, overlain by Lapara sand.	Tm	Fluviatile stone.	do	80	do
16	Goliad	Goliad	Well, D-78	M	561	557	12-6	−80	March 1955.	Lagarto clay, 380 to 557 ft; interbedded clay and sand, locally capped by limestone.	Tm	Fluviatile clastic rocks.	do		Jan. 25, 1957

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Texas																									
1	14	0.1	0.02	0.18	--	--	2.0	1.0	330	1.4	538	14	107	98	2.0	0.2	--	828	9	1,370	8.5	<10	0.2	0.1	
	12	--	[1].23	[1].00	--	--	2.2	1.7	324	4.4	516	19	121	88	2.6	1.5	0.8	837	12	1,400	8.6	--	--	--	Boron (B) 0.59. Collected June 13, 1952.
2	15	[3].1	[3]16	[3].15	--	--	58	35	112	5.6	281	0	227	46	1.2	.7	.0	631	288	1,000	8.0	<27	1.1	1.4	Sample turbid.
3	19	.3	.00	.00	--	--	352	146	240	6.6	190	0	1,440	206	.9	30	.0	2,710	1,480	3,110	7.5	<85	2.6	11	
4	29	.0	.13	.00	--	--	30	5.4	17	2.0	120	0	21	6.0	1.8	2.1	.05	170	97	263	7.7	<11	.2	1.6	
5	58	.0	.17	.00	--	--	52	10	18	3.2	162	0	23	34	2.8	2.5	.00	301	171	428	7.6	<14	<.1	1.9	
6	23	.0	.08	.00	--	--	6.0	2.2	408	21	439	0	22	400	2.0	.8	--	1,100	24	1,960	8.1	36	6.1	.2	
	25	--	[1].05	[1].00	--	--	5.9	2.2	417	19	438	0	23	400	2.6	.5	.00	1,120	24	2,040	8.0	--	--	--	Boron (B), 1.3. Collected Mar. 16, 1952.
7	9.3	.1	.00	.00	--	--	82	45	5.9	2.8	464	0	8.5	10	.2	7.5	.0	407	390	707	7.4	<17	.2	.5	
8	31	.1	.03	[1].00	--	--	5.2	.5	76	2.2	154	0	27	14	1.6	5.8	.0	234	15	354	8.2	<8	<.1	.9	
9	55	1.0	.95	[1].00	--	--	51	11	35	3.6	226	0	19	24	2.0	8.5	.0	318	172	484	7.7	<11	<.1	2.1	
10	22	.6	1.3	.00	--	--	88	24	504	22	372	0	727	270	3.6	.3	.0	1,770	318	2,770	7.5	<68	8.6	<.1	
11					--	--					287	0		57						622	8.0	<8	1.2	.1	
	20	--	[1].01	[1].00	--	--	20	6.4	110	1.6	280	0	8.0	57	.6	.0	.2	363	76	622	7.9	--	--	--	Boron (B), 0.25. Collected Apr. 16, 1952.
12	16	.0	.00	[1].00	--	--	104	8.3	12	1.4	285	0	26	30	.5	14	.0	362	294	602	7.4	24	.2	1.0	
13											290	0		38						663	7.7	<8	1.2	.2	
	21	--	[1].05	[1].00	--	--	59	17	59	.8	285	0	59	40	.4	.5	.2	407	217	673	7.6	--	--	--	Boron (B), 0.24. Collected Apr. 21, 1952.
14	91	.0	.07	.00	--	--	7.2	.0	484	14	324	0	101	500	1.4	.6	.0	1,270	18	2,290	8.2	<45	.8	.2	
15	58	.1	.05	.00	--	--	65	6.8	374	20	378	0	85	442	.8	5.2	.1	1,150	190	2,130	7.6	<68	.2	15	
16	35	.0	.12	.00	--	--	101	29	118	3.8	334	0	42	215	.6	1.7	.00	733	371	1,250	7.2	<68	.5	3.5	

[1] In solution when analyzed. [3] Includes any material present as sediment.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
							Utah									
1	Cache Juntion	Cache	Well. (B-13-1, 30acc-1.	S	1.1	90	2	+18	May 1952	Sand and gravel	Qp	Fluviatile sand.	Direct precipitation and surface-water infiltration.	54	June 8, 1954	Flowing well.
2	7 miles west-northwest of Corinne.	Pox Elder	Stinking Hot Springs, (B-10-4)25.	Pf	5					Limestone	Pal	Marine limestone.	Deeply circulating meteoric and connate(?) water.	122	do	
3	1 mile southwest of Ogden.	Weber	Well, (B-5-2) 1ddd.	M		527	14	−144	June 1954	Sand and gravel, 428 to 476 ft.	Qp	Fluviatile sand.	Direct precipitation and surface-water infiltration.	63	June 7, 1954	
4	2 miles west of Roy.	do	Well, (B-5-2) 16ddc.	N	5	1,300	8			Alluvium; alternating beds of sand, silt, and clay.	Qp	Fluviatile clastic rocks.	do	63	Dec. 18, 1956	Do.
5	Sunset	Davis	Well, (B-5-2) 25bcb-2.	M	e350	759	10			Pre-Lake Bonneville lacustrine sediments.	Qp (?)	Lacustrine clastic rocks.	do	57	Dec. 8, 1955	
6	Leytona	do	Well, (B-4-1) 8add-1.	M	2,250	802	20–12	−344	March 1957	Lake Bonneville gr., 675 to 765 ft; sand and gravel.	Qp	Lacustrine sand.	do	55	Mar. 12, 1957	
7	13 miles southeast of Wendover.	Tooele	Well, (C-2-18)10.	Ind	e300	1,200	12			Lake Bonneville gr.	Qp	do	do	76	June 25, 1957	
8	Salt Lake City	Salt Lake	Well, (C-1-1) 22bdal.	D	e5	325	2	+12	June 1952	do	Qp	do	do	58	June 9, 1954	
9	Murray	do	Well, (D-2-1) 8adb-23.	M	r560	198	16			do	Qp	do	Surface-water infiltration.	52	Dec. 15, 1955	Do.
10	30 miles east of Kamas.	Duchesne	Spring, (D-1-9)26c.	D	e20					Mutual fm. and older metasedimentary rocks; chiefly quartzite.	p€	Metasedimentary rocks.	Direct precipitation.	45	Oct. 20, 1954	
11	Tabiona	Duchesne	Spring, (C-1-8)36d.	D	e50					Uinta fm.; sandstone with calcareous stringers, clay, and gravel.	Te	Lacustrine sandstone.	do	56	Oct. 20, 1954	
12	Dugway Proving Ground	Tooele	Well, (C-7-8) 9dcb-1.	Pf	1,040	347	16	−85	February 1957.	Lake beds; (sand and gravel, 100 to 195 ft and 215 to 320 ft).	Qp	Lacustrine sand.	do	57	Feb. 7, 1957	
13	Dugway	Juab	Well, (C-11-11)12aba	S	e5	306	6	−270	March 1957	Alluvium, 287 to 306 ft.	Q	Fluviatile clastic rocks.	Deeply circulating meteoric water.	98	Apr. 9, 1957	
14	5 miles north of Delta.	Millard	Well, (C-16-6) 33badl.	Pf	e3	302	6	−119	June 1954	Lake Bonneville gr.; sand and gravel.	Qp	Lacustrine sand.	Surface-water infiltration.	60	June 7, 1954	
15	Venice	Sevier	Well, (C-23-2) 16bdd3.	Pf		167	3	+6	do	Alluvium	Qp	Fluviatile clastic rocks.	do	54	June 8, 1954	
16	Colorado River at Dewey Bridge.	Grand								Drainage area approximately 24,100 sq. mi. underlain chiefly by Tertiary and Mesozoic rocks.			Direct precipitation.	63	June 21, 1957	
17	Milford	Beaver	Well, (C-28-10)adb-1	M	e600	533	18	+5	December 1955.	Valley fill	T	Fluviatile clastic rocks.	do	78	Dec. 2, 1955	Static water level 25 ft below LSD during summer months; flows during winter months.

18	14 miles west of Minersville	do	Thermo Hot Springs, (C-30-12)22b.	N	2					Valley fill associated with rhyolitic, andesitic, and basaltic flows, tuffs, and breccias.	T	Mixed fluviatile clastic rocks and silicic and subsilicic volcanic rocks.	Deeply circulating meteoric water.	158	Oct. 17, 1954
19	3 miles west of Loa.	Wayne	Spring, (D-27-2)33d	I	e400					Basalt flows	T	Basic volcanic rocks.	Direct precipitation and surface-water infiltration.	63	Oct. 20, 1954
20	Zion Canyon	Washington.	Weeping Rock Spring (C-41-10)2c.	N	50					Navajo sandstone	J, J(?)	Eolian sandstone.	Direct precipitation.	55	Oct. 16, 1954

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Utah																									
1											348	0		40						673	7.7	18	5.0	0.1	
	71		[1]0.38				56	21	57	8.6	362	0	3.1	40	0.3	0.4		425	226	671	7.4				Boron (B), 0.08. Collected May 27, 1952.
2			.08											21,400						54,300		850	14	3.0	Hydrogen sulfide (H_2S) present.
	53		[1].02	[3]0.10			898	355	11,200	658	518	0	58	20,400	.0			[4]33,900	3,700	48,900	6.4				Boron (B), 4.5; hydrogen sulfide (H_2S) 36. Collected Oct. 27, 1952.
											497	0		21,600						51,000	6.4				Collected June 29, 1952
											501	0		22,700						53,000	6.3				Collected May 21, 1952.
3											276	0		22						503	8.2	10	.4	.1	
	18		.67	.10			54	17	30	5.3	278	0	13	20	.1	.4		297	204	510	7.6				Boron (B), 0.07. Collected May 27, 1952.
4	36	0.05	.59	.00			29	9.2	53	4.0	200	0	6.4	39	.9	.0	0.15	280	110	446	7.7	<17	.2	<.1	
5	20	.5	.56	.14			48	14	36	5.6	278	0	.2	23	.0	6.4	.5	292	178	496	7.7	<17	.4	<.1	
6	19	[3].2	[1].02	[3].30			61	13	15	1.6	240	0	16	16	.1	3.4	1.7	265	206	457	7.6	<17	.2	5.3	Sediment in sample.
7	33	.8	1.9	.00			1,620	1,160	43,300	1,570	110	0	5,210	69,500	3.9		.00	127,000	8,810	141,000	7.0	<3,500	2.6	.1	
8											208			19						673	7.9	<8	.1	.1	
	25		.55	.00			65	24	46	2.3	206	0	151	19	.2	1.6		454	260	667	7.4				Boron (B), 0.08. Collected June 3, 1952.
9	14	.0	.00	.00			48	15	10	3.0	182	0	40	11	.2	2.9	.0	232	181	392	8.1	<14	<.1	1.0	
10	3.6	.0	.00	.00			2.6	.4	1.0	1.8	8	0	3.4	.8	.1	1.2	.1	20	8	36	6.5	<5	.1	<.1	
11	8.6	.1	.02	.00			50	23	6.0	2.2	258	0	14	3.5	.0	2.2	.1	235	219	424	7.8	<14	.1	.9	
12	52	.0	.05	.00			77	19	171	11	202	0	160	220	.4	8.5	.10	825	270	1,320	7.5	<34	<.1	3.1	
13	32	1.1	.32	.14			455	88	3,340	92	295	0	133	6,030	2.4	.8	.05	10,400	1,500	17,800	7.0	<680	1.5	11	
14											170	0		15						327	8.1	<4	.1	1.6	
	31		[1].05	[1].00			19	20	18	2.4	168	0	10	15	.2	1.8		198	130	329	7.8				Boron (B), 0.06. Collected May 22, 1952.
15	35	.2	.03	.00			102	34	23	4.4	332	0	63	69	.1	11		545	394	838	7.6	<8	<.1	4.3	
	32		.07	.00			112	39	21	4.1	338	0	76	80	.2	16		598	440	919	7.1				Boron (B), 0.07. Collected May 29, 1952.
16	11	[3].2	[1].00	[1].00			36	8.0	16	2.4	97	0	70	2.0	.4	2.5	.05	221	123	345	7.1	<2	5.5	2.8	Sediment in sample.
17	35	.0	.00	[1].00			13	5.8	62	2.8	160	0	40	16	.6	.5	.0	253	56	390	8.2	<17	<.1	5.9	
18	112	[3].5	[3].78	[3].00			82	11	370	51	384	0	458	212	6.0	.6	.1	1,500	250	2,160	7.1	<85	5.2	.4	
19	38	.1	.00	.00			22	5.1	13	3.6	115	0	3.1	5.5	.2	2.1	.2	152	76	212	7.8	<7	<.1	1.5	
20	12	.0	.02	.00			39	18	54	4.4	157	0	62	70	.1	1.4	.0	340	172	602	8.1	<34	<.1	.8	

[1] In solution when analyzed. [3] Includes any material present as sediment. [4] Sum of dissolved constituents.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
									Virginia							
1	6 miles northwest of Staunton.	Augusta	Spring	M	350					Conococheague limestone and Elbrook dolomite; limestone with few thin sandstone lenses and cherty limestone.	Є	Marine limestone.	Direct precipitation.	53	June 7, 1955	
2	Fredericksburg	Spotsylvania.	Well, Co-37	M	15	286	5	−169	June 1955	Patuxent fm.; sand in part arkosic, sandy clays, and a few gravel lenses.	K	Littoral sand	Direct precipitation and surface-water infiltration.	59	June 1, 1955	
3	New Church	Accomack	Well	Ind	189	259	10-8	−28	May 1955	Chesapeake gr., 140 to 252 ft; sand and shell fragments, locally argillaceous and diatomaceous.	Tm	Marine sand	do	60	May 30, 1955	
4	1 mile southeast of North.	Mathews	Well, 23 Mathews.	D	1.5	596	4			Mattaponi(?) fm.; sand interbedded with clay.	K, Tpe	do	Direct precipitation and some connate(?) water.	68	Sept. 19, 1956	
5	West point	King William.	Well, 6-F ST	Ind	r880	710	18-8	−210	April 1952	do	K, Tpe	do	do	66	June 1, 1954	
6	Franklin	Isle of Wight.	Well	Ind	2,500	623	20-12	−45	June 1955	Potomac gr. (coarse sand 473 to 488 ft and 578 to 623 ft); sand interbedded with clay and gravel.	K	Fluviatile sand.	Direct precipitation and surface-water infiltration.	65	June 3, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Virginia																									
1	7.6	[1]0.1	0.03	0.02	0.00	0.00	61	22	1.5	1.3	294	0	1.9	1.4	0.2	2.8	0.0	251	243	439	7.6	<25	<0.1	0.3	
2	30	[1].0	3.8	.17	.07	.00	15	4.7	16	4.0	103	0	7.6	6.1	.1	.7	.8	142	65	201	7.2	13	.6	<.1	
3	28	[1].1	.64	.10	.01	.00	28	13	64	14	229	0	6.7	66	.2	.9	.6	345	124	567	8.0	<25	<.1	.1	
4	21	[1].1	.28	.02	.00	.00	13	7.2	621	26	815	0	54	528	1.3	.1	.2	1,760	62	2,890	8.2	<100	1.2	.1	
5	27	------	.00	------	------	------	.8	.2	[2]181		429	0	14	17	2.0	------	1.2	------	3	718	8.2	<25	<.1	.3	
	48	------	[1].02	------	------	------	1.0	1.3	182	3.5	344	41	28	20	2.0	.3	------	[4]496	8	727	8.5	------	------	------	Collected Apr. 2, 1952.
6	26	[1].0	.06	.02	.00	.00	.7	.1	149	5.5	331	0	12	25	5.5	.3	2.7	408	2	616	8.2	<25	<.1	<.1	

[1] In solution when analyzed. [2] Calculated. [4] Sum of dissolved constituents.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Washington															
1	Orcas Island	San Juan	Well, 37/2W-14A2.	D		168	6	−16	October 1954.	Argillite and other metasedimentary rocks with local igneous intrusions.	Pal	Metasedimentary rocks.	Direct precipitation.	50	Oct. 28, 1954	
2	9 miles north of Concrete.	Whatcom	Spring, 37/8-25E1s.	N	e2,000					Basalt and other volcanic flow rocks.	Q(?)	Basic volcanic rocks.	do	54	Oct. 27, 1954	
3	6 miles northeast of Tonasket.	Okanogan	Spring, 38/26-20F1s.	D	4.5					Schist and slate	Pal	Metasedimentary rocks.	do	53	Oct. 25, 1954	
4	Port Angeles	Clallam	Sol Duc Hot Springs.	Pf	r50					Basalt	Te (?)	Basic volcanic rocks.	Deeply circulating meteoric water.	132	Nov. 30, 1954	
5	10 miles southeast of Everett.	Snohomish	Well, 27/4-21N1.	M		341	12-8	−100	September 1953.	Unconsolidated glacial drift; sand and gravel.	Qp	Glaciofluvial sedimentary rocks.	Direct precipitation and surface-water infiltration.	49	Dec. 1, 1954	
6	Ellensburg	Kittitas	Well, 17/18-1B1.	M	r700	1,209	16	−31	March 1957.	Ellensburg fm.; andesitic sandstone, conglomerate, and shale of fluviatile origin.	Tm, Tp	Intermediate volcanic rocks.	do	55	Mar. 14, 1957	
7	Moses Lake	Grant	Well, 19/28-15Q1.	M	1,400	909	16-12	−25	November 1955.	Columbia River basalt.	Tm (?)	Basic volcanic rocks.	Direct precipitation and infiltration from irrigation and surface-water.	65	Nov. 29, 1955	
8	Napavine	Lewis	Well, 13/2W-34A3.	M	120	101	8	−36	February 1957.	Logan Hill fm., 60 to 100 ft; deeply weathered glaciofluvial gravel.	Qp	Glaciofluvial gravel.	Direct precipitation and surface-water infiltration.	52	Feb. 27, 1957	
9	Vancouver	Clark	Well, 2/1-23Q1.	M	r2,000	250	16	−168	December 1955.	Gravel, 188 to 248 ft	Qp	do	do	50	Dec. 13, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (μmhos at 25° C)	pH	Beta-gamma activity (μμc/l)	Radium (Ra) (μμc/l)	Uranium (U) (μg/l)	Remarks
Washington																									
1	11	0.1	0.03	[1]0.00	------	------	3.2	0.0	91	0.6	202	6	11	16	0.2	0.0	------	238	8	393	8.6	<11	0.1	0.1	
2	23	.1	.02	[1].00	------	------	8.4	3.9	6.4	2.4	27	0	25	4.0	.2	.3	------	88	37	113	7.3	<5	<.1	.1	
3	18	.1	.00	[1].00	------	------	82	9.0	9.1	2.8	234	0	63	1.5	.1	1.2	------	306	242	481	7.7	<14	.1	1.4	
4	58	.1	.00	.00	------	------	1.2	.0	80	2.6	92	26	34	17	1.6	1.0	0.0	262	3	355	9.2	<8	<.1	<.1	
5	42	.0	.00	.04	------	------	13	7.8	9.6	4.6	103	0	2.0	3.0	.3	.0	.7	127	64	171	8.1	<5	<.1	.2	
6	58	.4	.74	.00	------	------	18	9.2	8.6	2.0	120	0	1.3	2.0	.2	.8	.25	151	83	197	7.4	12	<.1	<.1	
7	68	.0	.00	.00	------	------	2.8	.2	79	11	154	10	24	16	1.6	.4	.0	278	8	380	8.7	<14	<.1	<.1	
8	59	.0	.05	.00	------	------	14	7.3	9.7	1.6	94	0	1.3	6.0	.0	1.2	.35	132	65	169	6.8	<7	<.1	<.1	
9	52	.0	.00	.00	------	------	20	5.8	5.1	3.6	82	0	8.4	4.0	.0	11	.2	154	74	186	7.6	14	<.1	.2	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	West Virginia															
1	Blacksville	Monongalia.	Well, 9-2-4	M	10-12	169	8	−20	December 1955.	Waynesburg sandstone mbr. Washington fm.; coarse-grain sandstone, locally some shale, coal, and thin limestone beds.	P	Fluviatile sandstone.	Direct precipitation and connate(?) water.	50	Dec. 3, 1955	
2	Sisterville	Tyler	Well, 5-1-24	N		1,403	10			Big Injun sand (Burgoon sandstone mbr.) of Pocono fm., coarse sandstone, locally conglomeratic.	M	Mixed fluviatile and marine sandstone.	Connate(?) water.	50	Dec. 9, 1955	Oil-well brine.
3	Mannington	Marion	Well, 10-1-1	M	e50	160				Gilboy sandstone mbr., Monongahela fm.; sandstone interbedded with shale, limestone, and coal.	P	Littoral sandstone.	Direct precipitation.	54	Dec. 13, 1955	
4	Charles Town	Jefferson	Spring	M						Conococheague limestone; thick-bedded limestone with some dolomite and coarse-grained sandstone beds.	Є	Marine limestone.	do	54	May 3, 1957	
5	Parkersburg	Wood	Wells, 27-3-17, 27-3-24.	M	1,400 3,500	52		−50	December 1955.	Sand and gravel	Qp	Fluviatile sand.	Infiltration from Ohio River.	62	Dec. 3, 1955	Radial collectors 13 ft long.
6	Shrewsbury	Kanawha	Well	M	e60	62	8	−31	March 1957.	Alluvium, 49 to 62 ft	Q	Fluviatile clastic rocks.	Surface-water infiltration.	58	Mar. 26, 1957	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
West Virginia																									
1	8.3	[1]0.1	1.1	0.05	0.02	0.00	17	3.8	956	3.6	700	0	5.0	1,140	0.0	12	0.1	2,530	59	4,340	7.7	<200	0.7	1.5	
2	7.5	[1]10	39	3.1	-----	------	7,960	1,330	31,100	179	28	0	.0	66,700	.5	104	1.9	112,000	25,400	130,000	5.4	<5,000	210	13.6	Barium (Ba), 206; strontium (Sr), 76; bromide (Br), 488; iodine (I), 2.7.
3	9.0	[1].0	3.1	.52	.00	.01	43	4.4	66	1.9	214	0	21	60	.0	.0	.0	339	127	550	7.6	<25	.8	<.1	
4	11	[1].1	.16	.02	.00	.00	62	15	1.9	1.9	238	0	5.0	4.1	.2	15	.0	247	216	415	7.7	<20	.1	.9	
5	10	[1].1	.04	1.3	.01	.01	58	13	23	2.8	101	0	116	39	.0	.6	.1	338	200	517	7.0	<25	<.1	<.1	
6	14	[1].0	1.7	.38	.00	.03	18	8.8	33	2.9	106	0	52	15	.0	.1	.	202	81	332	7.0	<10	.1	.8	

[1] In solution when analyzed.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
									Wisconsin							
1	Superior	Douglas	Well, Ds-49/14W/15-5.	Ind	r100	611	4	−32	1940	Lake Superior sandstone, 350 to 611 ft; red sandstone, locally contains gravel and clay.	Є	Fluviatile sandstone.	Direct precipitation.	47	Oct. 20, 1954	
2	Roberts	St. Croix	Well, SC-29/18W/22-17.	M	r837	302	10	−118	April 1957	Prairie du Chien gr. 110 to 302 ft; dolomite.	O	Marine limestone.	do	47	Apr. 19, 1957	
3	Vesper	Wood	Well, Wd-23/5/18-6.	Ind	e200	52	48	−32	April 1953	Clay and other decomposition minerals from granite and gneiss.	pЄ	Silicic plutonic rocks.	do	48	do	
4	Kaukauna	Outagamie.	Well, Ou-21/18/25-47.	M	250	557	10	−50	October 1955.	Galena dolomite, Platteville fm. 55 to 245 ft; Prairie du Chien gr. 245 to 440 ft, and Cambrian sandstone, 440 to 557 ft.	O,Є	Mixed marine limestone and sandstone.	Direct precipitation and surface-water infiltration.	55	Oct. 27, 1955	Cambrian sandstones probably are most important aquifers.
5	Sauk City	Sauk	Well, Sk-9/6/12-10.	Ind	e275	532	16	+30	October 1954.	Eau Claire and Mount Simon sandstones, 128 to 530 ft; sandstone, silt, glauconitic sandstone, and shale.	Є	Marine sandstone.	do	54	Oct. 14, 1954	
6	2 miles west of West Allis.	Milwaukee.	Well, Ml-6/21/6-130.	Pf	e200	500	10	−62	do	Niagara dolomite, 100 to 500 ft; dolomite and limestone.	S	Marine limestone.	do	51	Oct. 29, 1954	
7	Belmont	Lafayette	Well, Lf-3/1/14-71.	M	280	500	12	−125	do	St. Peter sandstone, 230 to 500 ft; sandstone and shale.	O	Mixed marine, littoral, and continental sandstone.	do	51	Oct. 7, 1954	
8	Beloit	Rock	Well, Ro-1/13/19-27.	M	2,011	1,130	20	−50	October 1955.	Sandstone, 282 to 1,130 ft.	Є	Marine sandstone.	do	52	Oct. 20, 1955	

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Wisconsin																									
1	8.3	[1] 0.1	0.04	0.00	0.00	0.00	40	15	125	3.9	76	0	100	202	0.9	0.5	0.1	548	162	977	7.9	<50	0.6	4.3	
2	20	[1] .1	.05	.00	.00	.00	36	19	2.7	.5	197	0	11	1.0	.0	5.2	.0	183	168	314	7.2	13	<.1	.5	
3	21	[1] .0	7.1	.09	.00	.00	36	8.3	4.3	1.8	120	0	25	6.0	.0	.6	.0	175	124	265	6.6	<10	.3	.8	
4	6.9	[1] .0	.72	.07	.00	.12	157	21	14	4.6	241	0	330	8.0	1.9	.3	.0	702	500	963	7.3	<25	2.7	.5	Strontium (Sr), 20.
5	13	[1] .1	.32	.00	.00	.01	60	29	3.9	1.9	328	0	8.8	2.0	.2	.5	.0	276	270	510	8.2	<20	1.0	.4	
6	18	[1] .2	.39	.03	.00	.00	35	33	28	1.3	241	0	88	1.0	.9	1.2	.0	329	224	511	8.2	<25	.1	<.1	
7	12	[1] .1	.26	.00	.00	.06	67	33	2.7	.4	343	0	21	1.4	.1	4.8	.0	316	304	560	8.2	<20	.4	.7	
8	10	[1] .1	.04	.00	.04	.04	57	34	2.4	1.4	348	0	7.0	1.2	.1	.4	.0	280	282	519	7.5	<20	1.8	.1	

[1] In solution when analyzed.

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location: Town	Location: County	Name or field number or source	Use	Yield (gpm)	Well characteristics: Depth (feet)	Well characteristics: Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Water-bearing unit: Name, character, thickness, overlying formations	Water-bearing unit: Geologic age	Water-bearing unit: Terrane	Probable source of water	Temperature (° F)	Date of sample collection	Remarks
Wyoming																
1	5 miles east of Gillette.	Campbell.	Well, 50-71-27bcb.	Ind	----------	540	12-10	----------	----------	Fort Union fm.; ferruginous sand, clay, and marl with numerous lignite beds; partly overlain by Wasatch fm.	Tpe	Mixed fluviatile and paludal clastic rocks.	Direct precipitation.	57	Sept. 21, 1954	
2	3 miles south of Worland.	Washakie.	Well, 46-92-7bc.	D	300	425	8-6	−90	September 1954.	Willwood fm.; variegated shale with interbedded sandstone and locally abundant conglomerate lenses; overlain by thin alluvial deposits.	Te	Fluviatile clastic rocks.	----do----------	53	Sept. 22, 1954	
3	1.5 mile north of Tensleep.	---do-------	Well, 47-88-8cab.	I	207	901	6	−3	October 1953.	Tensleep sandstone, 620 to 900 ft; sandstone, locally intercalated thin layers of limestone, dolomite, and chert; overlain by Phosphoria fm.	P, P	Littoral sandstone.	Direct precipitation and surface-water infiltration.	55	Sept. 21, 1954	Flowing well.

TABLE 2.—*Geologic and hydrologic data on sampling sites and chemical analyses of samples*—Continued

GEOLOGIC AND HYDROLOGIC DATA—continued

No. on pl. 1	Location		Name or field number or source	Use	Yield (gpm)	Well characteristics				Water-bearing unit			Probable source of water	Temperature (° F)	Date of sample collection	Remarks
	Town	County				Depth (feet)	Diameter (inches)	Water level: Feet + or − LSD	Water level: Date of measurement	Name, character, thickness, overlying formations	Geologic age	Terrane				
	Wyoming—Continued															
4	7 miles north of Newcastle.	Weston	Salt Springs	N	e170					Spearfish fm.; interbedded sandy claystone, siltstone, and silty sandstone with some beds of gypsum; overlain by Sundance or Gypsum Spring fm.	T̅R, P	Fluviatile clastic rocks.	Direct precipitation in Black Hills.	47	October 1957	
5	Newcastle	do	Spring, 45-60-17c.	N	e170					Minnekahta limestone; thin-bedded fine-grained limestone; overlain by Spearfish fm.	P	Marine limestone.	do	54	do	
6	do	do	Well, 45-61-20	M	350	2,638	20-5			Pahasapa limestone; fine-grained massive limestone, cavernous in places; overlain by Minnelusa fm.	M	do	do	76	Apr. 1, 1957	Do.
7	do	do	Spring, 45-60-31d.	N	e35					Minnelusa fm.; sandstone with some interbedded thin beds of dolomite and shale; overlain by Opeche fm.	P, P	Marine sandstone.	do	55	October 1957	
8	do	do	Spring, 45-60-31a.	N	e210					Minnekahta limestone; thin-bedded fine-grained limestone.	P	Marine limestone.	do	55	do	
9	Salt Creek oil field.	Natrona	Well, 13	Ind		1,205	7			Wall Creek sandstone mbr. of Frontier fm., firmly cemented medium-grained sandstone; contains petrified wood, marine shells, and fish teeth; overlain by 1,175 ft of dark shales.	K	Marine sandstone.	Moderately to deeply circulating meteoric water.	85	Oct. 31, 1955	Water mixed with oil.
10	Edgerton	do	Well, 40-78-15a.	M	10	130	8-6	−68	April 1957	Fox Hills sandstone; shale 0 to 80 ft, sandstone 80 to 127 ft, shale 127 to 130 ft.	K	Littoral sandstone.	Direct precipitation.	52	Apr. 9, 1957	
11	Steamboat Butte oil field.	Fremont	Well, no. E-3	N		5,306	10-5			Sundance fm., 5,183 to 5,305 ft; sandy claystone and siltstone with some sandstone beds and thin layers of shaly limestone; overlain by Morrison fm.	J	Marine clastic rocks.	Deeply circulating meteoric water and (or) connate(?) water.	130	Sept. 30, 1955	Do.
12	Riverton	do	Well, A-1-4-27ddd.	D	e200	600	10-8	−80	March 1951.	Wind River fm.; sandstone, sandy shales, clay with some gypsum; much bentonitic and volcanic material in some of the beds; some lignite, or lignitic shale(?), shales, and coal beds present.	Te	Fluviatile sandstone.	Direct precipitation.	54	Sept. 23, 1954	
13	42 miles east-southeast of Riverton.	do	Well, 33-90-22	Ind		110	12	−40	April 1957	do	Te	do	do		Apr. 8, 1957	

14	Wheatland	Platte	Well, Wheatland 6.	M	450	506	15-10	−20	July 1955	Arikaree fm.; sandstone containing some admixed volcanic ash and layers of limy concretions; overlain by thin alluvial deposits.	Tm	do	Direct precipitation and applied irrigation water.	62	Sept. 26, 1955	
15	Terrington	Goshen	Well, 24-61-10.	Pf	15	470	6			Lance fm., 298 to 340 ft; lenticular sandstone, interbedded claystone, and thin beds of carbonaceous shale; overlain by Fort Union fm. (Paleocene).	K	do	Direct precipitation.	60	Apr. 1, 1957	Flowing well.
16	Rawlins	Carbon	Well, 18-88-10bd.	M	42	960	10			Cloverly fm.; sandstone, siltstone, claystone, shale, and conglomerate with local coal beds.	K	Littoral clastic rocks.	do	58	Oct. 1, 1955	Do.
17	Lyman	Uinta	Well, 16-114-31addl.	N	r2.5	1,200	6			Wasatch fm.; sandstone and shale containing many coal beds; overlain by Green River fm.	Te	Mixed lacustrine and paludal clastic rocks.	do	50	Sept. 30, 1954	Do.
18	Cheyenne	Laramie	Well, State 5	M	444	158	12			Ogallala fm., 0 to 147 ft; Brule fm., 147 to 158 ft; sand, gravel, clay, and silt, calcareous cementation in part.	Tp To	Fluviatile clastic rocks.	do	50	Oct. 4, 1955	Do.

CHEMICAL ANALYSES—continued

No. on pl. 1	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophosphate (PO_4)	Dissolved solids (residue at 180° C)	Hardness as $CaCO_3$	Specific conductance (µmhos at 25° C)	pH	Beta-gamma activity (µµc/l)	Radium (Ra) (µµc/l)	Uranium (U) (µg/l)	Remarks
Wyoming																									
1	12	0.1	0.25	0.0			4.6	2.1	99	5.0	283	0	1.5	6.2	1.2	0.0		266	20	437	7.8	<14	0.3	<0.1	
2	7.0	.4	1.6	.02			41	9.9	710	5.3	190	0	1,300	105	1.0	72		2,340	143	3,290	7.9	<85	.2	3.9	
3	8.7	.1	.05	.00			46	27	3.2	3.2	260	0	18	1.0	.3	.5		227	226	421	7.7	<14	.9	4.1	Boron (B), 0.05.
4	19	.4	.04	.00			1,310	246	16,500	19	235	0	3,680	25,000	.9	.0	0.00	46,900	4,280	66,700	7.2	<1,700	.7	17	Boron (B), 2.0.
5	13	.1	.04	.00			402	56	3.8	1.6	190	0	1,040	1.0	.2	1.4	.00	1,680	1,230	1,860	7.5	<45	.1	4.7	Boron (B), 0.05.
6	14	.1	.01	.00			64	28	2.8	2.2	290	0	38	2.0	.2	1.9	.40	297	274	504	7.4	50	.1	<.1	
7	16	[1].2	[1].00	[1].00			532	83	5.4	2.6	225	0	1,420	4.0	.4	4.7	.00	2,340	1,670	2,380	7.6	<70	.4	12	Boron (B), 0.07.
8	14	[1].4	[1].00	[1].00			472	78	5.5	2.6	227	0	1,260	5.0	.4	3.2	.00	2,110	1,500	2,190	7.7	<76	.2	11	Boron (B), 0.11.
9	19	[3].3	[3].25	[1].00			6.4	1.0	[2]1,330		2,570	0	8.2	582	5.0	.4	.2	3,200	57	5,180	8.1	<170	2.1	<.1	
10	9.1	.0	.18	.00			2.4	1.0	164	1.8	279	12	117	2.0	.2	1.0	.2	434	10	735	8.5	<23	<.1	.7	
11	23	[3].2	[3].38	[1].00			4,380	93	[2]4,320		379	0	11,100	6,260	1.0	.3	.1	27,200	11,300	31,700	7.2	<1,100	12	<.1	Hydrogen sulfide (H_2S) present.
12	11	.0	.00	.00			1.5	.1	142	1.7	185	12	117	9.0	.4	.0		378	4	613	8.9	<17	.2	<.1	
13	12	[3]26	[1].05	[3]1.6			278	33	68	10	7	0	914	9.0	.3	.0	.05	1,370	829	1,600	5.3	1,100	40	2,100	Sample turbid
14	65	[3].2	[3].06	[1].00			56	18	[2]23		186	0	73	16	.6	13	.1	373	214	507	7.8	29	<.1	14	
15	11	[3].0	[3].05	[3].00			3.2	.1	282	2.4	698	16	.9	6.0	2.2	.4	.65	664	8	1,090	8.5	<34	.7	1.8	
16	19	[3].1	[1].03	[1].00			9.6	1.9	[2]69		176	0	30	2.0	1.4	.0	.2	213	32	340	7.3	<5	.3	<.1	Hydrogen sulfide (H_2S) present.
17	12	[3]1.5	[1].11	[3].00			30	7.2	160	3.8	136	0	328	4.5	.2	.8	.0	612	104	939	8.1	<34	.9	.8	Sample turbid.
18	24	[3].0	[3].00	[1].00			46	5.4	[2]10		172	0	7.7	2.0	.1	8.0	.2	184	137	297	7.9	<8	.2	1.5	

[1] In solution when analyzed. [2] Calculated. [3] Includes any material present as sediment.