

WATER RESOURCES REPORT

NUMBER TWELVE - A

ARIZONA STATE LAND DEPARTMENT

OBED M. LASSEN, COMMISSIONER

GEOHYDROLOGIC DATA IN THE NAVAJO AND HOPI INDIAN RESERVATIONS, ARIZONA, NEW MEXICO, AND UTAH

PART I

RECORDS OF GROUND-WATER SUPPLIES

By G. E. Davis, W. F. Hardt, L. K. Thompson, and M. E. Cooley

United States Department of the Interior, Geological Survey

Prepared in cooperation with the Bureau of Indian Affairs
and the Navajo Tribe

Tucson, Arizona
April 1963

159 pp.
Bibkey 52810
CACH, ~~HUTR~~, NAVA

GEOHYDROLOGIC DATA IN THE NAVAJO AND HOPI INDIAN RESERVATIONS, ARIZONA, NEW MEXICO, AND UTAH

PART I RECORDS OF GROUND-WATER SUPPLIES

By G. E. Davis, W. F. Hardt, L. K. Thompson, and M. E. Cooley

Introduction

The geohydrologic data in this report represent a field inventory completed in 1956 of the Navajo and Hopi Indian Reservations. This inventory includes 846 drilled wells, 537 dug wells, and 955 springs. The report also summarizes the results of bailing and pumping tests of the wells. The data were compiled to provide an easy reference for obtaining information about individual wells and springs, which will supplement the information contained in the forthcoming comprehensive report on the ground-water resources and the geology of the reservations. The comprehensive report is to be published as a U.S. Geological Survey Professional Paper.

Purpose, Scope, and Organization of the Report

In 1946 the U.S. Geological Survey was asked by the Bureau of Indian Affairs to make a series of hydrologic investigations to help alleviate the water shortage at several localities. Later, in 1950, the U.S. Geological Survey in cooperation with the Bureau of Indian Affairs began a comprehensive investigation of the geology and ground-water resources of the Navajo and Hopi Indian Reservations, which occupy parts of northeastern Arizona, northwestern New Mexico, and southeastern Utah (fig. 1). The principal objectives of the investigation were as follows: (1) To determine the feasibility of developing ground-water supplies for stock, domestic, institutional, and industrial use in particular areas and at several-hundred well sites scattered throughout the reservations and in adjoining areas owned by the Navajo Tribe; (2) to compile an inventory of the existing ground-water supplies; (3) to make a comprehensive investigation of the geology and determine the hydrogeologic factors that control the occurrence and movement of ground water; and (4) to appraise the water potential for future development.

The basic geohydrologic data of the Navajo and Hopi Indian Reservations are reproduced separately in sections as Parts I, II, III, and IV of Arizona State Land Department Water Resources Report No. 12. Part I (this report) contains a compilation of the records of drilled wells, dug wells, and springs which were inventoried before 1957. Part II is a compilation of selected chemical analyses from the wells and springs that were sampled. Part III contains selected drillers' logs, lithologic logs, and stratigraphic sections. Part IV consists only of maps of the reservations showing the locations of the wells and springs listed in Parts I, II, and III. Information about other wells that were drilled after the completion of this study is available in the open files of the Geological Survey Ground Water Branch offices in Tucson and Holbrook, Ariz.

Personnel

The collection, compilation, and analysis of the data contained in this report were under the general supervision of A. N. Sayre, former chief, and O. M. Hackett, present chief, of the Ground Water Branch; and S. F. Turner, L. C. Halpenny, and J. W. Harshbarger, former district supervisors, and P. E. Dennis, present district supervisor, of the Ground Water Branch in Arizona. The collection of the data was begun under the direct supervision of Mr. Halpenny and was continued by Mr. Harshbarger.

Substantial contributions, including field inventory of the water developments, geological descriptions and correlations, and other hydrologic work, were made by other personnel of the Navajo Project. Those deserving special mention are E. L. Gillespie, R. A. McCleve, J. R. Howard, D. K. Greene, J. T. Callahan, P. R. Stevens, William Kam, H. G. Page, J. P. Akers, H. A. Whitcomb, H. A. Yazzie, N. E. McClymonds, J. H. Irwin, S. E. Galloway, R. L. Cushman, W. A. Beldin, A. E. Robinson, H. O. Ash, and C. A. Repenning. The well and spring records were typed by Mrs. Ruth Blubaugh and Mrs. Carol Jenkins.

Acknowledgments

The Geological Survey is grateful for the assistance, cooperation, and information given by the late J. J. Schwartz, former head of the Bureau of Indian Affairs water development program for the Navajo Indians; by M. H. Miller, Bureau of Indian Affairs engineer; by Buster Kingsley, Bureau of Indian Affairs supervisor of the Hopi Indians; and by other personnel of the Bureau of Indian Affairs and the Navajo and Hopi Indian Tribes connected with the well-development program. The hydrologic information given the Geological Survey by the El Paso Natural Gas Co. and various religious missions and trading posts is greatly appreciated. Acknowledgment is due the many water-well drillers who, since 1948, conscientiously collected drill cuttings of the wells and supplied hydrologic data, with special thanks to Cowley Bros. Drilling Co., St. Johns, Ariz.; Perry Bros. Drilling Co., Flagstaff, Ariz.; and Myers Drilling Co., Holbrook, Ariz.

Location and Land-Net System

The Navajo and Hopi Indian Reservations are in the south-central section of the Colorado Plateau. The Navajo Indian Reservation occupies parts of Apache, Navajo, and Coconino Counties in northeastern Arizona, San Juan and McKinley Counties in northwestern New Mexico, and San Juan

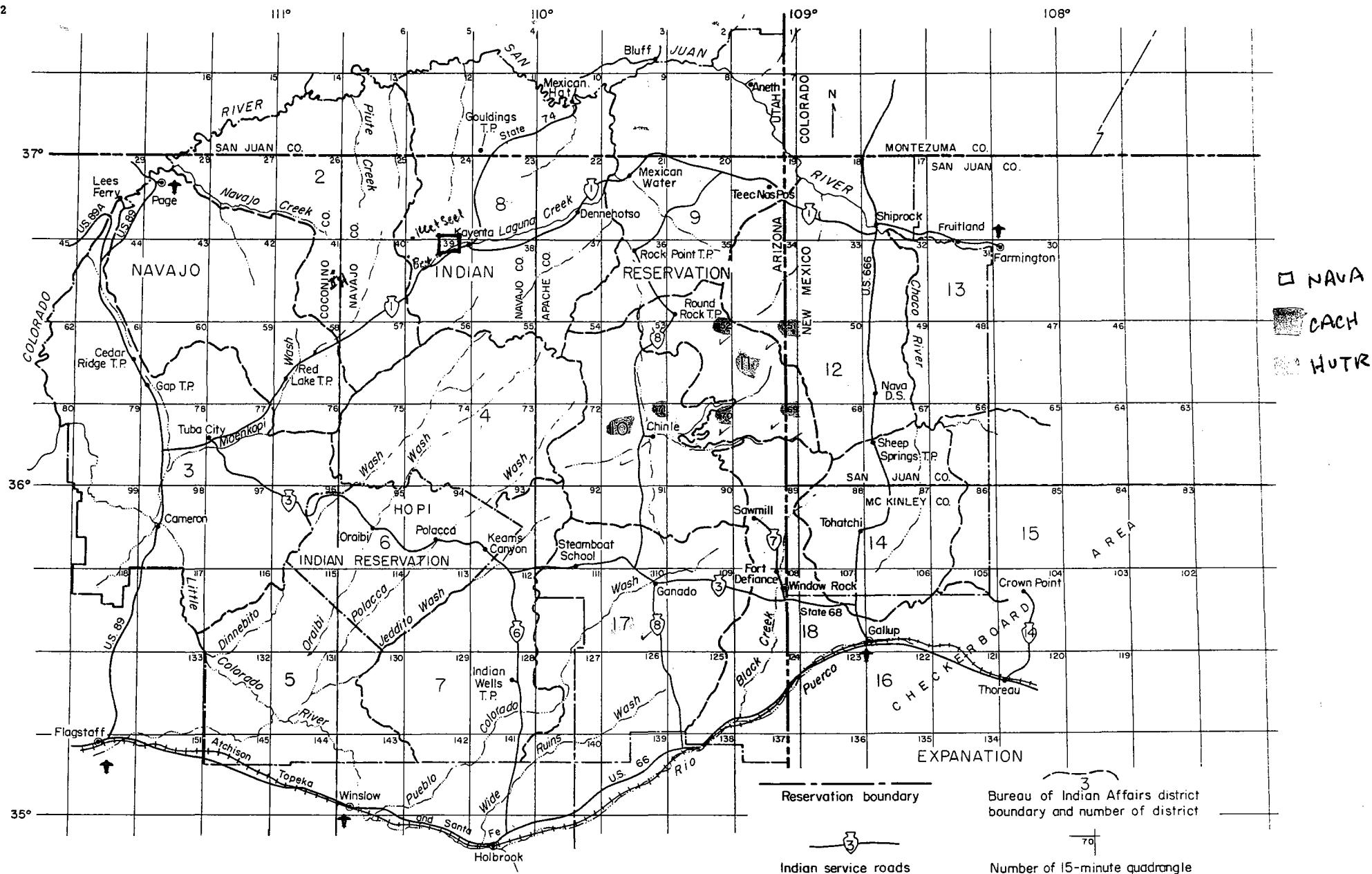


Figure 1.--Map of the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah, showing roads, villages, Bureau of Indian Affairs district boundaries, and 15-minute quadrangles.

69 = Sonsela Buttes

51 = Lukachukai

70 = Canyon del Muerto

52 = Yellowstone Canyon

71 - checked locations on Gazetteer

10 0 10 20 30 miles

24 = Boot Mesa ⇒ Keet Seel ~ 13.5 W, ~ 14 S

41

Inscription House

110 - checked on Gazetteer

Beta taktin

County in southeastern Utah (fig. 1). The Hopi Indian Reservation is within the central part of the Navajo Indian Reservation in Arizona. The reservations comprise an area of about 25,000 square miles, which is about three times the size of New Jersey.

The Navajo Indian Reservation is divided into 17 administrative districts, numbered 1 to 5 and 7 to 18, and the Hopi Indian Reservation comprises district 6 (fig. 1). District 19 is east of the reservation boundary in New Mexico. The reservations and adjoining area were not mapped in detail at the time of study, but 15-minute planimetric maps of the area had been made from aerial photographs. These maps were used for the geologic and hydrologic base maps and are arbitrarily numbered from 1 to 151, starting in the upper-right corner of the area and numbering consecutively in rows from right to left.

Explanation of the Ground-Water Records

The well and spring records are arranged in the numerical order of the 18 administrative districts of the Bureau of Indian Affairs and in accordance with the 15-minute quadrangles within each district. In each quadrangle the drilled wells are listed first, followed in order by the dug wells, springs, and other types of developments. No data are included in this report from district 19, which is outside the reservation boundary in New Mexico. Many private wells drilled in the reservations that were not included in the Bureau of Indian Affairs inventory are listed alphabetically by name.

Bureau of Indian Affairs Field Number

The ground-water and surface-water developments were inventoried during the 1930's by personnel of the Bureau of Indian Affairs. The water developments, regardless of type, were numbered consecutively within each administrative district. Since this field inventory, new water developments—principally drilled wells—were assigned a number and added to the inventory.

The wells and springs assigned a Bureau of Indian Affairs field number are identified by a compound number consisting of two main parts. The first part is divided into a numeral that designates the Bureau of Indian Affairs district and a letter that indicates one of several factors. Since about 1950, it denotes the source of funds used in the drilling of a well; the letter "K" is used for wells drilled under the Bureau's drilling program, and the letter "T" is used for wells drilled under the Navajo Tribal Well-Development Program. However, new wells drilled and all developments inventoried before 1950 may use instead of "K" or "T" the first letter of the last name of the person who first inventoried the well or spring for the Bureau of Indian Affairs. The second part of the Bureau field number represents the consecutive order in which the drilled wells, dug wells, and springs were inventoried in each district. Some developments contain an additional letter at the end of the field number. These letters are arranged consecutively, beginning with "A." Usually, these field numbers are obtained from the number of a nearby development that was inventoried previously.

Other dug wells or springs and a few drilled wells not inventoried previously were assigned a field number during the inventory of the early 1950's. This field number consists of three parts. The first part is formed from the district number and is followed by the letters "GS." The second part is

the quadrangle number. The third part is the number representing the order in which the new developments were inventoried in the quadrangle.

Quadrangle Location Number

The quadrangle location number indicates the position of a development within a 15-minute quadrangle and consists of two parts. The first part is the distance in miles west of the northeast corner of the quadrangle, and the second part is the distance in miles south of the northeast corner of the quadrangle (fig. 2). The letter "A" at the end of the quadrangle location number means an approximate location.

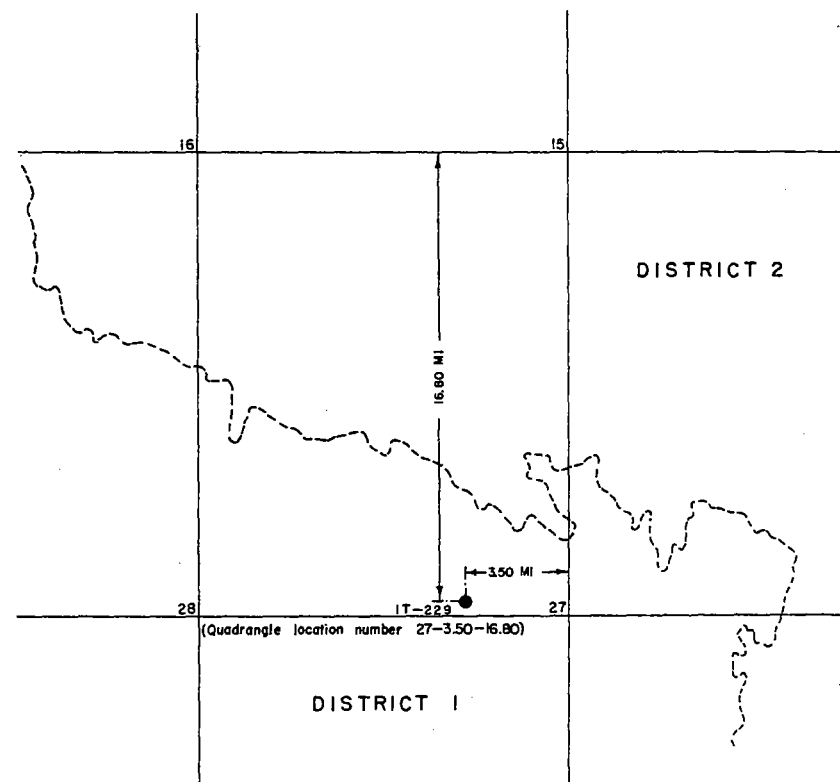


Figure 2. --Sketch showing well-numbering system used in the Navajo and Hopi Indian Reservations.

SYSTEM	SERIES	ENTIRE AREA		
QUATERNARY		Alluvium Spring deposits Landslide deposits and talus Windblown sands Terrace deposits Volcanic rocks		
TERTIARY	PLIOCENE	Bidahochi Formation Upper member Volcanic member (tuff) Lower member		
	PLIOCENE(?)	Chuska Sandstone		
	PALEOCENE	Nacimiento Formation		
CRETACEOUS	UPPER	<u>BLACK MESA BASIN</u> <		

TRIASSIC(?)	UPPER	Kayenta Formation Moenave Formation Springdale Sandstone Member Dinosaur Canyon Sandstone Member				
TRIASSIC	UPPER	Wingate Sandstone Lukachukai Member Rock Point Member Chinle Formation Church Rock Member Owl Rock Member Petrified Forest Member Upper part Sonsela Sandstone Bed Lower part Monitor Butte Member Lower red member Shinarump Member				
	MIDDLE(?) AND LOWER	<u>SOUTHERN AND SOUTHWESTERN PARTS OF THE RESERVATIONS</u> Moenkopi Formation Holbrook Member Moqui Member Wupatki Member		<u>MONUMENT VALLEY</u> Moenkopi Formation Upper siltstone member Middle sandstone member Lower siltstone member Hoskinnini Member		
TRIASSIC(?)						
PERMIAN		<u>GRAND CANYON</u> Kaibab Limestone Toroweap Formation Coconino Sandstone	<u>DEFIANCE PLATEAU</u> De Chelly Sandstone Upper member Tongue of Supai Formation Lower member	<u>ZUNI MOUNTAINS</u> San Andres Limestone Glorieta Sandstone Yeso Formation Abo Formation	<u>MONUMENT VALLEY</u> Cutler Formation De Chelly Sandstone Member Organ Rock Tongue Cedar Mesa Sandstone Member Halgaito Tongue	
CARBONIFEROUS	PERMIAN AND PENNSYLVANIAN	Supai Formation	Supai Formation		Rico Formation	
	PENNSYLVANIAN				Hermosa Formation	
	MISSISSIPPIAN	Redwall Limestone			Stratigraphic units not listed below the Hermosa Formation	
	CAMBRIAN	MIDDLE	Muav Limestone Bright Angel Shale			
		MIDDLE AND LOWER	Tapeats Sandstone			
PRECAMBRIAN		Granite	Quartzite and granite	Granite		

Figure 3. --Names of the rocks and sediments of the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah.

Altitude Above Mean Sea Level

The altitudes of the wells and springs were obtained by using barometric altimeters. The altitudes are rounded to the nearest 10 feet, although this should not imply that all the altitudes are correct to that figure. After 1955, some topographic maps of the reservations were available and in these areas the altitudes were estimated from the maps. Some corrections of the altitudes of the wells will be possible when additional topographic maps become available.

Construction Data

The construction data listed includes the well depth, diameter and depth of casing in the well, finish of the well, and other improvements. The finish for drilled wells describes the perforated interval, placement of well screen, and other related information. "Open hole" means there is no casing in the well below the last casing depth. The finish for dug wells describes the type of construction or material used in the wellcurb. The finish for springs describes the type of construction used for collecting the water. The word "none" under the heading "Finish" means the spring is not developed.

Water-Bearing Strata

The water-bearing strata are referred to by their standard geologic names and are divided into formations and members. Some aquifers consist of combinations of two or more formations and/or members. Figure 3 lists the stratigraphic names of the rocks that yield some water to wells and springs in the Navajo and Hopi Indian Reservations.

The principal unit (or units) yielding water to a well or spring are listed under the heading "Stratigraphic unit." Strata that are open to the well and yield a negligible quantity of water are not listed under this heading. Other water-yielding zones may be present but cased out of a well either because of undesirable chemical quality or small yield. These zones are not listed under the "Stratigraphic unit" column but may be noted in the "Remarks" column.

The columns "Depth below land surface to top of stratigraphic unit" and "Thickness" apply only to the strata penetrated by drilled wells. "Thickness" refers to the thickness of the stratigraphic unit or aquifer that yields sizable amounts of ground water to a well. Many wells penetrate only part of the stratigraphic unit. These partial thicknesses are denoted by the letter "P" following the figure in the "Thickness" column.

Artesian aquifers are fully saturated and the thickness of the water-bearing strata is equal to the saturated thickness. If water-table conditions prevail, the thickness of the saturated zone penetrated by a well is not necessarily equal to the thickness of the stratigraphic unit. The saturated thickness penetrated by the well may be calculated by subtracting the depth of the static water level from the total depth of those wells that penetrate only part of the aquifer. The total saturated thickness of the stratigraphic unit may be calculated by subtracting the depth of the static water level from the depth of the base of the aquifer. The depth to the base of the aquifer is the sum of the figures in the columns headed "Depth below land surface to top of stratigraphic unit" and "Thickness."

Hydrologic Data

The hydrologic data consist of information that gives an indication of the aquifer's potential yield in that area. The principal hydrologic information contained in this report are static water levels, yields, and results of bail, pump, or flow tests.

The static water level is the distance in feet measured below the land surface when the well is not pumping. All water-level measurements more than 115 feet below the land surface are rounded off to the nearest 1 foot. The water-level measurements were obtained by a steel tape or by electrical measuring equipment. The word "flow" in the column containing the depth of the static water level means a flowing well.

The production or discharge rate of the well or spring is indicated under the heading "Yield." The yield listed for a dug well or a nonflowing drilled well represents only the estimated rate at which the well is pumped during normal operation. The yield for wells having windmills was estimated roughly from the size of the windmill and the amount of lift. The rate of discharge measured or estimated from a flowing well is listed in the "Yield" column. The rate listed for springs is the rate of discharge that was either measured or estimated when the spring was inventoried or last visited. Estimated flowing-well and spring discharges are indicated by the letter "E."

The data listed under the heading "Bail or pump test" describe the water-yielding characteristics of the well and of the water-bearing strata penetrated by the well. Most bail tests were made in cooperation with the driller at the time of completion of the well. The drawdown is the amount of lowering of the water level in the well caused by bailing or pumping water from the well. The rate of pumping or bailing is the average rate maintained only during the test and is not related to the rate of discharge of the well listed under the heading "Yield."

Quality

Samples of water were taken from selected wells and springs for chemical analysis. If there is a "yes" under the heading "Chemical analysis," the analysis is contained in Part II, "Selected Chemical Analyses of the Ground Water," of the "Geohydrologic Data in the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah."

A sensory test was determined by inspection of the quality-of-water analysis, or it was estimated by field inspection if no sample for chemical analysis was taken of the water. The water analyzed chemically is classified as "good" if there are less than 1,000 ppm (parts per million) total dissolved solids, "fair" if there are between 1,000 and 2,500 ppm total dissolved solids, and "poor" if there are more than 2,500 ppm total dissolved solids.

Records of ground-water supplies in the Navajo and Hopi

Quad- rangle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 8—Continued												
38 con.	Drilled well	8K-420	0.90-3.35	13 NNE of Chilchinbito T. P.	12/51	Top of mesa	5,620	900	8 6	593 900	Perforated 590-900	W, Ta, Tr
	do.	8K-426	4.55-15.20	1 NW of Chilchinbito T. P.	6/54	Small valley	5,960	769	8	769	Perforated 125-135 636-745	P, Ta
	do.	8T-419	7.00-9.90	6 NNW of Chilchinbito T. P.	4/52	do.	5,980	1,280	7	1,130	Open hole	W, Ta, Tr
	Dug well	8A-107	10.95-7.65	11 NW of Chilchinbito T. P.		do.	5,760	12.5	6 x 6	12.5	Masonry cribbed	Tr
	do.	8A-114	6.35-12.75	4 NW of Chilchinbito T. P.		Broad valley	5,780	7		7	do.	Tr
	do.	8A-127	4.95-11.40	4 NNW of Chilchinbito T. P.		Narrow valley	5,760	12	6	12	do.	Tr
	do.	8A-128	3.00-10.90	5 N of Chilchinbito T. P.	2/40	Side of wash	5,500	5.5	5	5.5	Rock cribbed	Tr
	Spring	8A-100	8.05-1.85	6 E of Kayenta		Broad valley	5,480				Collection well	Tr
	do.	8A-109	8.70-11.20	6 NW of Chilchinbito T. P.		Head of canyon	6,030				do.	C, Tr, Ta
	do.	8A-111	8.05-11.00	6 NW of Chilchinbito T. P.		Side of cliff	6,070				Masonry wall	N
	do.	8A-120	6.80-12.60	4 NW of Chilchinbito T. P.		Small valley	5,840				None	N
	do.	8A-122	3.90-15.70	0.25 SE of Chilchinbito T. P.	3/30	Base of cliff	5,890				Collection well	Tr
	do.	8A-122A	3.80-15.65	1 E of Chilchinbito T. P.		do.	5,930				None	N
	do.	8A-124	4.65-14.20	2 NNW of Chilchinbito T. P.		do.	5,880				Collection gallery	Tr
	do.	8A-126	3.80-11.85	4 N of Chilchinbito T. P.		Bed of wash	5,600				None	N
	do.	8A-182	10.80-4.20	4 SE of Kayenta	12/38	Hillside	5,640				Collection well	C, Tr
	do.	8A-241	0.25-0.05	14 E of Kayenta		Side of cliff	5,380				Collection gallery	C, Tr
	Combination spring	8A-125	5.55-14.90	2 NW of Chilchinbito T. P.		Small valley	5,860				None	N
39	Drilled well	8A-295	0.20-1.30	Kayenta	/36	Broad valley	5,630	840	8	788	Perforated 268-280 691-788	P, Ta
	do.	8A-295A	0.25-1.35	Kayenta	8/24	do.	5,640	349	6	47	Open hole	N
	do.	8K-401	7.20-1.50	7 W of Kayenta	2/39	Stripped plain	6,050	250	6	148	do.	W, Ta, Tr
	Dug well	Tsegi T. P.	10.25-6.80	11 WSW of Kayenta		Bed of wash	6,100					P, Ta
	Spring	8A-115A	8.80-0.90	8 W of Kayenta		Small valley	6,320				None	N
	do.	8A-119	12.65-14.00	18 SW of Kayenta		Head of canyon	7,000				do.	N
	do.	8A-139	9.50-13.95	15 SW of Kayenta		Narrow valley	6,600				do.	N
	do.	8A-140	10.00-14.50	16 SW of Kayenta		do.	6,570				do.	N
	do.	8A-143	8.00-14.75	15 SSW of Kayenta		do.	6,550				do.	N
	do.	8A-144	7.15-14.25	14 SSW of Kayenta		do.	6,600				do.	N
	do.	8A-145	6.75-14.00	14 SSW of Kayenta		do.	6,620				do.	N
	do.	8A-153	3.50-17.05	16 S of Kayenta		Bed of wash	6,600				do.	N
	do.	8A-295B	0.35-1.45	0.1 S of Kayenta		Hillside	5,660				Collection well	Ta
	do.	8M-141	9.05-15.40	16 SW of Kayenta		Narrow valley	6,460				None	N
	Stream	8A-268		3 W of Kayenta							do.	N

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Tem- pera- ture (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chem- ical anal- ysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw- down (feet)	Duration of test (hours)					
DISTRICT 8—Continued															
600	300 P	Navajo	LL	416	5/14/52	2-3		13	17	1	D, S	Yes	Good	60	
0	769 P	Morrison (Westwater Canyon, Recapture, Salt Wash)	LL	90	6/24/54	3-4		19	170	1½	PS	Yes	Fair		Chilchinbito Trailer School.
1,080	200 P	Navajo	LL	438	10/ 7/52	2-3		7	19	1	D, S	Yes	Good		Pump test Oct. 7, 1952.
		Morrison (Recapture)		10.5	10/13/54						D, S	Yes	Good	60	
		Alluvium		4.9	7/15/52						S	Yes	Fair	61	
		Morrison (Recapture)		5.9	10/13/54						D, S	Yes	Good	62	
		Alluvium		2.8	10/13/54	.8 R	2/27/40				D, S	Yes	Good	64	
		Terrace				.2 E	8/12/49				D, S	Yes	Good	66	
		Dakota				< 1 E	10/13/54				D, S	No			
		do.				.2 E	10/13/54				D	Yes	Good	57	
		Alluvium				1 E	10/13/54				S	No	Fair		
		Morrison (Recapture)				2.5 R	3/ /30				D, S	Yes	Fair	62	
		do.				3 E	2/10/55				D, S	Yes	Fair	56	
		Morrison (Westwater Canyon)				5 E	10/13/54				D, S	Yes	Fair	56	
		Alluvium				2 E	7/15/52				S	Yes	Good	65	
		Morrison (Salt Wash)				1 E	10/13/54				S	No	Fair		
		do.				< .1	10/13/54				S	No	Fair	60	
		Alluvium, Dakota, and Morrison (Westwater Canyon)				1.6 R	10/ 5/54				S	No	Good		
10 682	672 158 P	Navajo Kayenta		48		.1 E	10/ 5/54				S	Yes	Bad	58	
47	302 P	Navajo		43	6/30/54	4 E	10/13/54	35	5/ 9/48	52	54	PS	Yes	Good	Kayenta School.
0	250 P	do.	DL	123	12/12/52	3-4		23	30	8	Un	No			Abandoned; Kayenta School.
		Alluvium				< .1	10/14/54				D, S	Yes	Good	69	
		Wingate (Rock Point)									D	No	Good		Tsegi T. P. well.
		Toreva									S	No	Good		
		Wepo									D, S	Yes	Good	54	Corral around spring.
		Alluvium				1 E	10/15/54				S	Yes	Bad	38	
		Wepo									S	No	Bad		
		do.				1 E	10/15/54				S	Yes	Fair	48	
		do.				1 E	10/15/54				S	No		48	
		do.				1 E	10/15/54				S	No		48	
		do.				1 E	10/15/54				S	No			
		Carmel				2 E	2/12/48				D	Yes	Good	41	"Hyde Spring."
		Alluvium				2 E	10/ 8/54				D, S	No			
											D, S, Irr	No			"Laguna Creek."

Records of ground-water supplies in the Navajo and Hopi

Quad- rangle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 9—Continued												
35	Drilled well	9T-222	9.65-1.80	11 E of Rock Point	6/54	Top of mesa	6,220	853	12 6	8 508	Open hole	W, Ta, Tr
	Spring	9Y-88	12.80-0.35	8 ENE of Rock Point	11/28	Head of canyon	5,870				Collection gallery	Tr
	do.	9Y-119	7.35-1.25	5 S of Emanuel Mission		do.	5,550				None	N
	do.	9Y-120	5.35-2.50	7 SSE of Emanuel Mission		do.	5,840				do.	N
	do.	9Y-121B	6.20-0.00	4 SSE of Emanuel Mission		Bed of wash	5,500				do.	N
36	Drilled well	9K-215	10.80-11.50	10 SSW of Rock Point	9/52	Stripped plain	5,470	641	6	641	Perforated 500-641	W, Ta, Tr
	do.	9Y-97	4.30-7.85	6 SSE of Rock Point	6/37	Broad valley	5,080	165	6	152	10-foot screen	W, Ta, Tr, Re
	do.	9Y-98	7.20-2.20	Rock Point	6/37	do.	5,000	124	6	114	do.	W, Ta, Tr
	do.	9Y-98A	7.25-2.40	Rock Point School	9/37	do.	5,000	127	6	127	do.	P
	do.	9Y-98B	6.95-2.60	1 SSE of Rock Point	9/34	do.	5,000	233	6	210	Perforated 205-209	N
	do.	9Y-107	10.3-13.3 A	11 SSW of Rock Point		Stripped plain	5,650 E	418				
	Dug well	9Y-96	10.50-10.00	8 SSW of Rock Point		Head of canyon	5,280	8.5	5 x 6	8.5	Masonry cribbed	H, Tr
	Spring	9A-25	9.50-2.00	2 W of Rock Point		do.	5,210				None	N
	do.	9R-7	3.40-7.30	6 SE of Rock Point		Base of butte	5,220				Collection gallery	Tr
	do.	9R-9	5.30-3.25	2 ESE of Rock Point		Small valley	5,040				do.	C, Tr
	do.	9Y-89	3.75-3.30	4 ESE of Rock Point		Bed of wash	5,190				None	N
	do.	9Y-114	7.35-7.35	5 S of Rock Point		Head of canyon	5,300				Collection gallery	Tr
37	Drilled well	9Y-92	1.85-14.25	15 SW of Rock Point	1/39	Bank of wash	5,580	300	8 6	154 300	Perforated 154-300	W, Tr
	do.	9Y-95	0.10-16.15	16 SSW of Rock Point	11/37	Stripped plain	5,650	300	8 6	145 300	Perforated 145-300	W, Ta, Tr
53	None											
54	do.											

DISTRICT 10

36	Dug well	10R-162A	5.65-16.65	11 N of Many Farms		Broad valley	5,160	8.5	6	8.5	Steel caisson	H, Tr
	Spring	10R-90	12.30-13.20	12 NNE of Chinle	no	Bottom of canyon	5,840				None	N
53	Drilled well	10K-7	6.45-10.00	Many Farms	6/39	Broad valley	5,300	1,509	5	732	Open hole	W, Tr
	do.	10K-213	0.30-11.05	6 E of Many Farms	4/39	Edge of mesa	5,840	344	6	223	do.	W, Ta, Tr
	do.	10K-216	6.55-10.05	Many Farms	6/40	Broad valley	5,300	290	13 10	246 276	Perforated 165-175 190-230	N
	do.	10K-217	6.55-9.90	0.25 NW of Many Farms	12/40	do.	5,300	1,253	10	720	Open hole	N
	do.	10K-218	5.30-10.20	1 E of Many Farms	8/41	Bank of wash	5,290	174	6	174	Perforated 168-173	N
	do.	10K-235	13.45-5.75	8 WNW of Many Farms	8/52	Broad valley	5,750	703	8	496	Perforated 180-203 474-496	W, Ta, Tr
	do.	10R-98	6.20-10.70	1 S of Many Farms	8/36	do.	5,300	110	6 4	95 110	Perforated 89-93	W, Ta, Tr
	do.	10R-166	5.45-16.15	Chinle Valley Store	8/36	do.	5,380	190	6	169	Perforated 164-167	P, Ta, Tr
	do.	10R-174	11.45-1.90	10 NNW of Many Farms	9/37	Stripped plain	5,690	192	8 6	108 192	Perforated	W, Ta, Tr

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Temperature (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chemical analysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 9—Continued															
570	283 P	Wingate (Lukachukai)	LL	710	6/19/54	1-2		7	115	2	D, S	Yes	Good		Navajo Sandstone drv.
		Navajo				Dry	10/15/54				Un	No			
		Wingate (Lukachukai)				.5	10/15/54				S	No	Good		
		Navajo				.5 E	10/15/54				S	No	Good		
		do.				.2 E	10/15/54				S	No	Good	66	
360	281 P	Wingate (Lukachukai)	LL	15	9/16/52	3-4		8	435	3	D, S	Yes	Good	60	Show of Navajo Sandstone water.
0	152	Alluvium	DL	46	6/ 6/52	3-4		12			D, S	Yes	Good	62	
0	124 P	do.		21	8/ 3/49	3-4		12	18		D, S	Yes	Good		
0	127 P	do.		21	12/17/49			25	23	2	D, S, Irr	Yes	Good	57	Rock Point School.
0	210	do.	DL	22 R	9/30/34			23 R		8	Un	No	Fair	57	Abandoned.
4	76	Navajo													
112	288	Wingate (Lukachukai)		70				1			Un	No			Do.
		Kayenta		4.6	12/ 3/54						D, S	Yes	Good	42	
		Navajo				3 E	12/ 1/54				D, S	Yes	Good	46	
		Wingate (Lukachukai)				.2 R									
						.5	11/ 9/54				D, S	Yes	Good	46	
		do.				.2 R									
						.5 E	12/ 2/54				S	No	Good		
		do.				1 R	9/25/36								
						.5 E	12/ 2/54				D, S, Irr	No	Good		
		do.				1 E	12/ 2/54				D, S	No	Fair		
50	250 P	Navajo	DL	169	12/13/52	3-4		13			D, S	Yes	Good	53	
68	176 P	do.		106	11/13/53	3-4		11			D, S	Yes	Good	62	
DISTRICT 10															
		Alluvium		7	7/29/54						D, S	No	Fair		Indian developed.
		De Chelly				2.5 R									
		Chinle (Shinarump)				Dry	7/28/54				S	No			Temporary.
740	90	De Chelly	DL	Flow	1/29/48	9	/39	110		6	D, S	Yes	Good		
830	502	De Chelly													
218	126 P	De Chelly	DL	204	7/28/54	3-4		12			D, S	Yes	Good		Show of Chinle (Shinarump) water.
0	202	Alluvium		37	7/29/54			150			Un	Yes	Fair	56	Abandoned.
730	523 P	Chinle (Shinarump) and De Chelly		Flow	1/29/48	12					D, S	Yes	Good		
0	148	Alluvium		15	8/12/54			26		4	Un	No			Abandoned.
30	570	Navajo, Kayenta, and Wingate (Lukachukai)		100	7/30/54	3-4		10	90	1	D, S	Yes	Good	62	
0	88	Alluvium		24	7/29/54	3-4		13			D, S	Yes	Good		
0	163	do.	DL	13	4/17/52	3-4		30	45		D, S	Yes	Good		
50	142 P	Wingate (Lukachukai)	DL	97.4	7/29/54	3-4		3			D, S	Yes	Good	57	Original depth 601 feet, plugged.

Records of ground-water supplies in the Navajo and Hopi

Quad- range	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 10—Continued												
con.	Drilled well	10T-233	7.05-15.30	13 SE of Chinle	/51	Edge of canyon	6,740	730	8		Open hole	W, Ta, Tr
	do.	10T-243	12.65-12.00	6 SE of Chinle	6/54	Stripped plain	6,300	629	8	16	do.	W, Ta, Tr
	Dug well	10R-73	7.05-14.40	12 SE of Chinle		Bank of wash	6,750	7	6	7	Masonry cribbed	H, Tr
	Spring	10R-78	8.95-15.45	12 SE of Chinle <i>not in park</i>		Bottom of canyon	6,300				None	N
	do.	10R-81	12.70-4.55	4 ENE of Chinle <i>not in park</i>		Head of canyon	6,000				do.	N
✓	Drilled well	10K-200	3.50-1.85	5 N of Chinle	2/39	Terrace	5,580	267	6 5	220 267	Perforated	W, Ta, Tr
	do.	10K-231	2.35-6.85	Chinle		Broad valley	5,510	222				N
	do.	10K-232	2.30-6.85	Chinle	4/48	do.	5,510	280	16 10	84 223	Perforated 118-122	P, Ta
	do.	10K-234	12.45-14.40	13 SW of Chinle		Hillside	5,880	1,862	8 5	1,050 1,782	Open hole	N
	do.	10R-2	3.00-14.45	8 S of Chinle	12/38	Broad valley	5,600	85	6	65	10-foot screen	W, Ta, Tr
	do.	10R-3	2.90-17.05	10 S of Chinle	9/38	do.	5,660	58	6	58	do.	W, Ta, Tr
	do.	10R-54	4.25-9.05	3 SSW of Chinle	9/35	do.	5,520	205	6	190	Perforated 182-189	W, Ta, Tr
	do.	10R-58	7.50-15.10	10 SSW of Chinle	4/35	do.	5,750	117	6	93	Perforated 80-92	W
	do.	10R-135	13.65-10.65	12 WSW of Chinle	4/36	do.	5,770	127	6	86	Perforated 79-82	Ta, Tr
	do.	10R-155	3.75-6.10	1 WNW of Chinle	2/36	do.	5,500	210	4		10-foot screen	W, Ta, Tr
	do.	10R-155A	3.80-5.90	2 WNW of Chinle	1/50	do.	5,480	84	6	84	Gravel packed; perforated 52-58	W
	do.	10R-156	2.35-6.90	Chinle	6/34	do.	5,510	176	8 ft 6 in	41 176	20-foot screen	P
	do.	10R-156A	2.40-6.90	Chinle	5/34	do.	5,510	115	6	115	Perforated 64-66 84-86	W, Tr
	do.	10R-157	1.85-7.15	1 ESE of Chinle	1/36	Small valley	5,530	100	6	100	8-foot screen	P, Ta, Tr
	do.	10R-170	4.15-3.65	4 NNW of Chinle	2/36	Broad valley	5,430	162	6 4	122 162	Perforated 116-119	W, Ta, Tr
	do.	10R-413	8.40-11.15	8 SW of Chinle	10/35	Hillside	5,680	204				N
	do.	10T-242	5.10-6.65	2 W of Chinle	5/54	Broad valley	5,500	216	8	216	Perforated 214-216	W, Ta, Tr
	Dug well	10R-1	2.80-9.55	3 S of Chinle	2/40	Small valley	5,550	6.5	6	6.5	Masonry cribbed	H, Tr
	do.	10R-15	12.95-12.95	12 WSW of Chinle	1/29	Broad valley	5,800	10	2	10	do.	Tr, Ta
	do.	10R-100	12.35-8.85	10 WSW of Chinle	2/29	Bank of wash	5,800	15	3	15	do.	H, Tr, Ta
	do.	10R-131	12.25-2.65	11 WNW of Chinle		Small valley	5,750	8	6	8	do.	H, Tr
	do.	10R-154	4.45-1.50	6 NNW of Chinle		Broad valley	5,420	5	2 x 2	5	Plank cribbed	Tr
	do.	10R-171	3.05-6.85	0.25 W of Chinle		do.	5,500	20	10	20	Rock cribbed	N
	Spring	10B-188	2.35-13.10	6 S of Chinle	no	Small valley	5,590					Tr
	do.	10R-101	12.40-5.55	10 W of Chinle	no 8/29	do.	5,950				Collection gallery	C, Tr
72	Drilled well	10K-237	1.50-5.00	6 ENE of Black Mountain T. P.	9/54	Broad valley	6,070	517	8	353	Perforated 267-352	W, Ta, Tr
	do.	10K-245	0.45-8.90	6 E of Black Mountain T. P.	10/54	Terrace	5,980	483				N
	do.	10R-49	7.50-8.75	1 WSW of Black Mountain T. P.	3/36	Broad valley	6,250	197	6	197	Perforated 94-112	W, Ta, Tr

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Leg	HYDROLOGIC DATA							Use of water	QUALITY		Temperature (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chemical analysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 10—Continued															
140	590 P	De Chelly	LL	298	11/ 6/51	2-3		10	260	2½	S	Yes	Good	56	Chinle Formation dry.
40	589 P	do.	DL	465	6/ 2/54	2-3		8	164	1¾	D, S	Yes	Good		Bailed hole dry; Chinle Formation dry.
		Chinle (lower red)		3.9	6/ 2/54			3 E			D, S	Yes	Good	60	
		De Chelly				2.5 E	6/ 3/54				D, S	Yes	Good	72	
		Chinle (Shinarump)				.1 E	6/ 3/54				D, S	Yes	Good	52	
24	243 P	Chinle (lower red)	DL	97	2/28/54	3-4		15			D, S	Yes	Good		
0	221	Alluvium										No			Abandoned, insufficient yield.
0	223	Alluvium									D, S, PS	Yes	Good		Chinle water supply.
223	57 P	De Chelly	DL	11.5	7/27/54										
1,860	2 P	Chinle (Shinarump)	LL	750 R	2/ 3/54						Un	Yes	Good		Abandoned.
0	45	Alluvium		13	8/28/52	3-4		9			D, S	Yes	Good	60	
0	38	do.	DL	13	8/28/52	3-4		5			D, S	Yes	Good	57	
0	180	do.		23	7/27/54	3-4		33			D, S	Yes	Good		
0	85	do.	DL	30	8/ 3/54			3			D, S	Yes	Bad		
0	82	do.	DL	55	4/15/36			3			Un	No	Bad		Abandoned.
0	159	do.		9	2/ 2/48			3			D, S	Yes	Good	69	
0	84 P	do.		52	1/31/50			6		5	D, S	No			Gorman well.
0	176 P	do.		11.5	7/27/54			135	34		PS	Yes	Good	57	Drilled in caisson; Chinle School well.
0	87	do.		9.4	1/29/48	3-4		45			S	Yes	Good		
0	59	Alluvium													
59	41 P	Chinle (Shinarump)		1.6	2/ 3/48			47		3	D, S	Yes	Good		Canyon de Chelly National Monument headquarters.
0	118	Alluvium	DL	10	7/28/54	3-4		10			D, S	Yes	Good		
24		Wingate (Rock Point)		40	8/12/35			1			Un	No			Abandoned.
0	216 P	Alluvium	LL	44.6	2/17/54			28	30	1	D, S	Yes	Good		
		do.		5.7	8/ 3/54						S	Yes	Good		
		Wingate (Lukachukai)		8.3	8/28/52						S	Yes	Good	65	Windmill removed.
		Alluvium		8.6	8/12/54						Un	Yes	Good	70	Do.
		do.		6.8	8/12/54						D, S	Yes	Good	71	
		do.		3.8	7/28/54						D, S	Yes	Good	69	
		do.		16.8	7/27/54						Un	No	Bad		Abandoned.
		Chinle (lower red)				Dry	8/ 3/54				Un	No			Do.
		Wingate (Lukachukai)				1.5 R	8/ /29				D, S	Yes	Good		
						.2 E	11/30/50								
90	370	Cow Springs and Entrada		245	9/17/54			2		1	S	Yes	Bad	59	
130	340	Wingate (Lukachukai)	LL	125	9/28/54							No			Show of water at 125 feet; abandoned.
0	106	Alluvium													
106	91 P	Cow Springs	DL	83	8/18/54			3			D, S	Yes	Good		

Records of ground-water supplies in the Navajo and Hopi

Quad- range	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 11—Continued												
50	None											
✓	Drilled well	11Y-234	12.60-6.00	Lukachukai D.S.	9/51	Plain	6,470	900	6		Open hole	Ta
	do.	11Y-234A	12.65-5.95	Lukachukai D.S.	4/55	do.	6,470	1,097	6	730	do.	P
	do.	Lukachukai T.P.	13.80-6.25	Lukachukai T.P.		Hillside	6,420	304	5			P, Ta
	Dug well	11Y-18	12.00-13.50	4 SSE of Greasewood T.P.		Small valley	7,020	12	4 x 5	12	Masonry cribbed	H, Tr
	do.	Catholic Mission	12.95-5.85	Lukachukai D.S.		Plain	6,460	15		15	do.	P
	Spring	11K-205	5.70-3.30	8 ENE of Lukachukai T.P.	no	Hillside	9,260				Collection gallery	C, Tr
	do.	11K-259	5.80-5.45	7 E of Lukachukai D.S.	no	Shallow canyon	8,500				None	N
	do.	11K-260	6.10-6.90	6 E of Lukachukai D.S.	no	Deep canyon	8,240				do.	N
	do.	11Y-3	5.00-5.30	8 E of Lukachukai D.S.	no	Hillside	8,530				Collection gallery	Tr
	do.	11Y-35	13.30-9.20	Greasewood T.P.	no 10/30	Bank of wash	6,610				Collection well	P, Tr
	do.	11Y-37	6.10-10.10	8 E of Greasewood T.P.	no	Deep canyon	7,810				None	N
	do.	11Y-37A	6.15-10.80	8 ESE of Greasewood T.P.	no	do.	7,700				do.	N
	do.	11Y-39	12.60-6.30	1 E of Lukachukai T.P.	no 11/30	Bank of wash	6,490				Collection well	C
	do.	11Y-98A	9.20-3.60	4 NE of Lukachukai D.S.	no	Hillside	7,560				None	N
	do.	11Y-101	7.35-15.05	8 SE of Greasewood T.P.	no	do.	7,480				do.	Re
	do.	11Y-107	10.20-14.35	6 SSE of Greasewood T.P.	no	do.	7,140				Collection gallery	C, Tr
	Combination spring	11K-258	6.70-12.50	8 ESE of Greasewood T.P.	no	Bank of wash	7,440				None	N
	do.	11Y-9	5.65-16.60	11 SE of Greasewood T.P.	no	Deep canyon	7,600				do.	N
	Stream	11K-257	6.20-11.70	8 ESE of Greasewood T.P.	no							
	do.	11Y-64	7.10-12.90	8 SE of Greasewood T.P.	no						None	N
	do.	11Y-98	9.90-4.40	3 ENE of Lukachukai D.S.	no							
52	Drilled well	11K-237	9.15-14.70	13 NNE of Chinle	6/53	Stripped plain	6,420	517	8	350	Open hole	W, Tr
	do.	11K-239	7.40-11.90	15 NNE of Chinle	9/54	do.	6,430	540	8	163	do.	W
	do.	11K-243	1.80-1.50	11 ESE of Round Rock T.P.	7/56	Hillside	6,120	430	10	324	do.	W
	do.	11K-249	6.00-4.20	8 SE of Round Rock T.P.	8/56	Stripped plain	6,020	579	8	125	do.	W
	do.	11T-235	7.70-6.70	8 SSE of Round Rock T.P.	9/51	do.	6,200	580	7	180	do.	W
	do.	11Y-58	11.55-2.35	3 SSE of Round Rock T.P.	10/36	Bank of wash	5,450	202	6	140	do.	Tr
	do.	11Y-69	5.20-14.70	15 NE of Chinle	7/35	Hillside	6,780	800	6	703	do.	W, Tr
	do.	11Y-78	8.75-0.45	4 ESE of Round Rock T.P.	11/36	Bank of wash	5,520	280	6	115	do.	W, Tr
	do.	11Y-109	8.85-3.05	5 SE of Round Rock T.P.	3/39	Stripped plain	5,780	500	6	184	do.	Tr
	Drilled well	11GS-52-2	11.5-1.5 A	2 ESE of Round Rock T.P.	9/36	Hillside	5,520 E	233				

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Temperature ('F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chemical analysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 11—Continued															
490 650	160 250 P	Chinle (Shinarump) De Chelly	LL	438	6/26/52			15	51	1	Un	Yes	Good		Abandoned.
650	447 P	De Chelly		444	4/ 4/55			11	20	1½	PS	No	Good		Lukachukai D.S. well.
110	194 P	Chinle (Shinarump)		197 R	3/ 4/54			10-15 R			D, S	Yes	Good	64	Kennedy's Store.
		Alluvium		11.6	8/19/54						Un	No			Abandoned.
		do.				3 E	7/29/49				D, S, Irr	Yes	Good	55	Combination dug well and spring: Catholic Franciscan Mission.
		Chuska				.5 E	8/26/54				D, S	No	Good	50	
		do.				2 E	8/27/54				D, S	No	Good	54	
		do.				7 E	8/27/54				D, S	No	Good	60	
		do.				1 R 6	8/27/54				D, S	Yes	Good	47	
		Chinle (lower red)				1.5 E .2 R	8/ 2/49				D, S, Irr	Yes	Good	60	"Greasewood Spring"; pumped to store.
		Chuska				10	8/27/54				D, S	Yes	Good	49	
		do.				1 R 11/ 30	8/27/54				D, S	No	Good	47	
		Alluvium				.5	8/12/54				D	Yes	Good	62	
		Chuska				20	7/25/56				D, S	No	Good	56	
		Chinle (Sonsela)				1 R 2	8/27/54				D, S	No	Good	65	
		do.				.2 R .5	8/19/54				D, S	Yes	Good	58	
		Chuska				10 E	8/27/54				D, S	No	Good	54	
		do.				69	8/19/54				D, S	No	Good		North tributary of Wheatfields Creek.
						150	8/27/54				D, S	No	Good	64	
						750	8/27/54				D, S, Irr	No	Good		"Tsaille Creek."
						300	8/27/54				D, S, Irr	No	Good		Stream-gaging station; "Lukachukai Creek."
180	337 P	De Chelly	LL	286	6/ 8/53	2-3		6	105	3	D, S	Yes	Good		Chinle Formation dry.
240	300 P	do.		400	9/10/54	2-3		5	140	1	D, S	Yes	Good		Bailed hole dry; Chinle Formation dry.
250	130	Chinle (Sonsela)	DL	112	7/27/56	3-4		25	103		D, S	No	Good		
180	399 P	De Chelly	DL	240	8/ 3/56	2-3		29	230	1	D, S	Yes	Good	64	Chinle Formation dry.
110	470 P	do.		339	9/ 8/51	2-3		19	241	¾	D, S	Yes	Good	62	Bailed hole dry; Chinle Formation dry.
100	102 P	Chinle (Shinarump)	DL	Flow	8/25/54	7 R 4.5	10/22/36 8/25/54				D, S	Yes	Good	61	Not flowing in 1950.
465 14 232	335 P 218 48 P	De Chelly Chinle (Shinarump) De Chelly		512 25 R	9/ 3/54 11/11/36	1-2 3-4		3 50	265		D, S	Yes Yes	Good Good		Chinle Formation dry.
179	321 P	De Chelly		166	4/17/52			15	195		S	Yes	Good		Show of Chinle Formation water; nearby well (280 feet deep) abandoned.
103	130 P	Chinle (Shinarump)		20 R	9/30/36			30			No				Drilled when building Round Rock Dam; casing pulled.

Records of ground-water supplies in the Navajo and Hopi

Quad- angle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		

DISTRICT 11—Continued												
50	Dug well	11Y-53	13.20-1.70	2 SSW of Round Rock T. P.	9/30	Bank of wash	5,360	10.5	5	10.5	Masonry cribbed	H, Tr
	do.	11Y-56	11.85-5.65	6 S of Round Rock T. P.	8/30	Small valley	5,720	12	3	12	do.	H, Tr
	do.	11GS-52-1	12.15-2.35	2 S of Round Rock T. P.		Bed of wash	5,420	4	6	4	Rock cribbed	Tr
	Spring	11Y-41	4.50-1.90	8 ESE of Round Rock T. P.	no	Bank of wash	5,810				None	N
	do.	11Y-55	5.40-2.30	8 ESE of Round Rock T. P.	no	Small valley	5,790				do.	N
	do.	11Y-67	1.90-13.00	4 SSW of Greasewood T. P.	no	Shallow canyon	6,680				do.	N
	do.	11Y-72	11.30-4.10	4 SSE of Round Rock T. P.	no	do.	5,460				do.	N
	do.	11Y-85	3.75-0.25	8 E of Round Rock T. P.	no	Head of canyon	5,930				do.	N
	do.	11Y-93	3.50-0.40	9 E of Round Rock T. P.	no	do.	5,960				do.	Re
53	do.	11Y-74	1.70-0.20	4 WSW of Round Rock T. P.	no 2/34	Bed of wash	5,380				Collection gallery	C, Tr
68	None											
69	Spring	11Y-31	3.75-5.15	16 SE of Greasewood T. P.	not in park	Base of cliff	7,700				None	N
	do.	11Y-95	5.40-1.25	12 SE of Greasewood T. P.	not in park	Small valley	7,360				Collection well	N
	do.	11Y-95A	5.70-0.85	12 SE of Greasewood T. P.	not in park	do.	7,380				None	N
	do.	11Y-96	3.45-3.65	15 SE of Greasewood T. P.	not in park	Deep canyon	7,800				do.	Re
	Combination spring	11Y-29	1.70-2.55	16 SE of Greasewood T. P.	not in park	do.	7,800				do.	N
	do.	11Y-29A	2.20-2.50	15 SE of Greasewood T. P.	not in park	do.	7,800				do.	N
	Stream	11Y-28	2.70-1.20	14 SE of Greasewood T. P.	not in park	do.					do.	N
	do.	11Y-32	2.40-7.45	19 SE of Greasewood T. P.	not in park						do.	N
70	Spring	11Y-32	3.30-6.35	14 E of Chinle in park		Head of canyon	6,800				do.	N
	do.	11Y-32	3.15-6.20	14 E of Chinle in park		do.	6,800				do.	N
Black Rock Spgs? head (2 forks) of Black Rock Canyon												
DISTRICT 12												
1	Drilled well	12K-316	11.30-13.80	6 NNW of Aneth	1/53	Broad valley	4,940	410	10 8	45 410	Perforated 350-390	W
	do.	12T-312	7.25-11.30	9 NNE of Aneth	8/52	Edge of cliff	5,230	1,404	7	1,222	Open hole	Ta, Tr
	do.	12T-326	12.20-8.80	2 E of Ismay	4/56	Broad valley	4,750	685	12 10	61 403	do.	
	Drilled well	12T-327	13.30-11.80	2 SW of Ismay	3/56	Broad valley	4,740	585	10 8	70 355	Open hole	
	Drilled well	12T-332	11.90-8.85	2 E of Ismay	5/56	Hillside	4,760	690	8	507		
	Dug well	12R-209	12.75-8.40	12 NNW of Aneth	8/37	Bank of wash	4,600	9	4	9	Rock cribbed	N
	do.	12R-210	13.10-9.55	10 NNW of Aneth		Bed of wash	4,590	4	3	4	do.	N
	do.	12GS-1-1	2.80-11.55	11 NE of Aneth		do.	4,900	4.5	2 x 4	4.5	do.	N
	Spring	12R-163	3.90-10.00	12 NE of Aneth		Side of mesa	5,050				Collection gallery	C, Tr

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Tem- pera- ture (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chem- ical anal- ysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw- down (feet)	Duration of test (hours)					
DISTRICT 11—Continued															
		Alluvium		10	8/25/54	6 R	9/ /30				S	No			
		do.		10	8/25/54	.2 R	8/ /30				S	Yes	Fair	64	
		do.		Dry	8/25/54						Un	No			Abandoned.
		do.				1 R 1 E	8/26/54				S	Yes	Fair	65	
		Chinle (Shinarump)				.5 E	10/ 7/50				S, Irr	Yes	Bad	56	"Bitter Water Spring."
		do.									D	No			
		De Chelly				10 E	8/25/54				S	Yes	Good	52	
		Chinle (Sonsela)				<.1	8/26/54				S	Yes	Good	62	
		do.				.2 E	8/26/54				S	No	Good	61	
		Chinle (Petrified Forest, upper)				.2 E	8/ 5/54				S	Yes	Good	68	
		Chuska				2	8/18/54				S, Irr	No	Good		"Palisade Creek."
		Chinle (Petrified Forest, upper)				.5	8/18/54				D, S	No	Good	56	
		do.				.5	8/18/54				S	No	Good	56	
		Chuska				1.2 R .5	8/18/54				S	No	Good	56	
		do.				68	8/18/54				S, Irr	No	Good	57	Branch of Wheatfields Creek.
		do.				5	8/18/54				S, Irr	Yes	Good	57	
						750	8/18/54					No			"Wheatfields Creek."
						250						No			"Whiskey Creek"; stream-gaging station.
		Chinle (Shinarump) and De Chelly				10 E	8/19/54				D, S	Yes	Good	63	
		do.				10 E	8/19/54				D, S	No	Good	53	
DISTRICT 12															
300	110 P	Morrison (Salt Wash)		231	1/15/53	2-3		11	26	1	D, S	Yes	Good		
830	574 P	Navajo and others	LL	Flow	3/10/55	1.8	3/10/55	22	116	1	D, S	Yes	Bad	71	See table 6.
32	487	Morrison		Flow	5/10/56	150	5/10/56				D, S	Yes	Good	70	8-inch liner to 526 feet; flow dropped to 75 gpm after 17T-332 started flowing.
519	161	Bluff													
30	100	Morrison (Westwater Canyon)	LL	Flow	3/ 8/56	150	3/ 8/56				D, S	Yes	Fair		Shut-in pressure after 2 hours; 30 psi.
130	240	Morrison (Salt Wash)													
370	150	Bluff													
0	505	Morrison	DL	Flow	5/12/56	50	5/12/56				D, S, Irr	No		66	500 feet southeast of 12T-326.
505	180	Bluff													
		Alluvium		Dry	9/ 8/54						Un	No			Abandoned.
		do.		3.5	9/ 8/54						D	No			
		do.		3.7	9/ 8/54						D	No	Good	72	
		Dakota				.2 R <.1	9/ 8/54				D, S	Yes	Fair	73	

Records of ground-water supplies in the Navajo and Hopi

Quad- angle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 12—Continued												
50 con.	Spring	12R-71	1.95-6.75	0.25 SW of Tocito T. P.	12/26	Broad valley	5,710				Collection well	C, Tr
	do.	12R-71A	1.85-7.15	1 S of Tocito T. P.		do.	5,710				do.	Re
	do.	12R-71B	1.80-6.75	0.25 S of Tocito T. P.		Bank of wash	5,710				Collection gallery	P, C, Ta
	do.	12R-72	0.65-9.05	2 SSE of Tocito T. P.		Sand dune	5,680				Irrigation ditches	
	do.	12R-111	3.00-15.60	9 SSW of Tocito T. P.	4/26	Hillside	5,900				Collection gallery	Tr
	do.	12R-112	3.05-15.70	9 SSW of Tocito T. P.		do.	5,900				None	N
	do.	12R-114	3.65-13.25	7 SSW of Tocito T. P.	7/27	Bank of wash	5,870				Collection gallery	Tr
	do.	12R-115	3.55-11.90	6 SSW of Tocito T. P.	7/27	do.	5,850				do.	Tr, Re
	do.	12R-117	6.95-10.60	6 S of Sanostee D. S.	7/27	Small canyon	6,200				do.	Tr
	do.	12R-119	6.05-13.60	8 S of Sanostee D. S.	7/27	Hillside	6,080				do.	Tr
	do.	12R-120	6.00-13.70	8 S of Sanostee D. S.		Side of cliff	6,070				do.	N
	do.	12R-122	4.65-15.00	8 SSW of Tocito T. P.		Bank of wash	6,020				do.	Tr
	do.	12R-124	3.90-13.90	7 SSW of Tocito T. P.		Bed of wash	5,920				None	Re
	do.	12R-145A	8.75-2.50	4 NNW of Sanostee D. S.		Shallow canyon	6,440				do.	N
	do.	12R-154	2.15-15.45	8 S of Tocito T. P.		Bed of wash	5,750				Collection gallery	Tr
	do.	12R-155	3.15-15.80	9 SSW of Tocito T. P.	5/27	Hillside	5,900				do.	Tr
	do.	12GS-50-1	6.05-17.10	12 S of Sanostee D. S.		Bank of wash	6,300				do.	Tr
	do.	12GS-50-3	13.30-16.35	13 SW of Sanostee D. S.		Small valley	8,430				None	N
	do.	12GS-50-4	6.60-4.70	1 N of Sanostee D. S.		Bank of wash	5,950				do.	N
	do.	12GS-50-5	6.60-4.60	1 N of Sanostee D. S.		do.	5,950				do.	N
	do.	12GS-50-6	6.70-4.60	1 N of Sanostee D. S.		do.	5,950				do.	N
	Oil test	12R-83A	2.15-1.00	6 N of Tocito T. P.		Stripped plain	5,850		14			
51	Spring	12M-8	0.80-12.30	13 ESE of Greasewood T. P.	no 12/34	Shallow canyon	8,990				Collection gallery	Tr
	do.	12M-10	3.85-6.20	9 E of Lukachukai D. S.	no	Small valley	8,640				do.	Tr
	do.	12M-12	4.85-2.85	8 ENE of Lukachukai D. S.	no	Mountainside	8,830				do.	Tr
	do.	12M-14	3.25-12.90	11 ESE of Greasewood T. P.	no	Hillside	9,080				do.	C
	do.	12R-66	1.00-3.00	12 ENE of Lukachukai D. S.	no	Mountainside	8,300				do.	Tr
	do.	12Y-4	2.70-8.30	10 ESE of Lukachukai D. S.	no 11/34	Shallow canyon	8,400				do.	Tr
	do.	12GS-51-1	7.40-2.35	6 NE of Lukachukai D. S.	no	Mountainside	8,560				do.	Tr
	do.	12GS-51-2	5.90-1.90	8 NE of Lukachukai D. S.	no	do.	8,160				None	N
	Combination spring	12M-15A	0.65-15.10	14 ESE of Greasewood T. P.	no	Canyon	8,260				do.	N
	do.	12Y-6A	4.10-10.85	10 E of Greasewood T. P.	no	Head of canyon	8,400				do.	N
	do.	12Y-100	2.00-14.50	13 ESE of Greasewood T. P.	no	Small valley	8,380				do.	N

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA						Use of water	QUALITY		Temperature (°F)	Remarks	
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test			Chemical analysis	Sensory test			
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 12—Continued															
		Gallup				3 R 12/ /26 3 E 11/10/48					D, S	Yes	Good	64	Tocito T. P. Spring.
		do.				5 E 9/16/54					D, S, Irr	No	Good	68	
		do.				5 9/15/54					D, S, Irr	Yes	Good	68	Tocito Trailer School Spring.
		Windblown sands and alluvium				5 E 9/15/54					D, S, Irr	Yes	Good	68	
		Alluvium and terrace(?)				2.8 R 4/ /26 2 9/ 6/54					D, S	No	Good	64	
		do.				13 R 9/ 6/54 1 E 9/ 6/54					D, S	No	Good		
		Gallup				4 R 7/ /27 Dry 9/ 7/54					S	No			Water in wash by spring.
		Alluvium				4 R 7/ /27 4 E 9/ 7/54					D, S	Yes	Good	63	
		do.				3 R 7/ /27 2 9/15/54					D, S	Yes	Good	61	
		Gallup				.8 R 7/ /27 .1 9/ 7/54					D, S	Yes	Good	65	
		do.				< .1 9/ 7/55					D, S	No	Good	62	
		Alluvium				1.5 R .5 9/ 7/54					D, S	Yes	Fair	62	
		Gallup				7 E 9/ 7/54					D, S	No		69	
		Alluvium				6 E 10/ 2/54					S	No	Bad	64	
		Point Lookout				.5 R 9/ 6/54 .1 9/ 6/54					D, S	Yes	Fair	70	
		Alluvium and terrace(?)				8 R 5/ /27 5 9/ 6/54					D, S	No	Good	64	
		Alluvium				.5 9/ 7/54					D, S	Yes	Good	62	
		Volcanic extrusive				10 E 9/11/52					D, S, Irr	Yes	Good		
		Alluvium									S	Yes	Good		
		do.				20 E 8/26/49					S	Yes	Good		
		do.				50 E 8/26/49					S	Yes	Fair		
											Un	No			Oil test.
		Chuska				.5 R 9/ 4/54 < .1 9/ 4/54					D, S	No	Good	60	
		do.				2.5 R 9/ 3/54 .5 9/ 3/54					S	No	Good	52	
		do.				2 R 9/ 3/54 .4 9/ 3/54					D, S	No	Good	54	
		do.				< .1 9/ 4/54					D	No	Good	52	
		do.				5 R 9/16/54 .8 9/16/54					D, S	No	Good	53	
		do.				1 R 9/ 3/54 1 9/ 3/54					D, S	Yes	Good	50	
		do.				3 8/26/54					D, S	No	Good	50	
		Volcanic tuff				2 E 8/26/54					D, S, Irr	No	Good	51	Ditched into orchard.
		Chuska				50 E 9/ 4/54					D, S, Irr	No	Good	55	Wheatfields Creek at head.
		do.				30 E 9/ 3/54					D, S	No	Good		
		do.				50 E 9/ 4/54					D, S	No	Good		

Records of ground-water supplies in the Navajo and Hopi

Quad- range	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 17—Continued												
110 con.	Dug well	17M-258	12.20-8.95	2 NE of Sunrise T. P.		Bed of wash	6,100	22 R	2 1/2	22 R	Masonry cribbed	Tr
	do.	Cornfields D. S.	9.80-6.65	Cornfields	6/38	Broad valley	6,150	36	10	36	Concrete caisson	P, Ta
	Spring	17M-85	1.60-16.90	Klagetoh	8/11/29	Small valley	6,360				Collection well	H, Tr, Re
	do.	17M-257	12.60-6.30	3 W of Cornfields	no	Base of cliff	6,350				Collection gallery	C, Tr
	do.	Sunrise T. P.	13.75-10.10	Sunrise T. P.	no	do.	6,090				do.	C
111	Drilled well	17K-305	7.70-11.65	4 NNW of Greasewood T. P.	2/35	Terrace	6,100	655			None	N
	do.	17K-338	0.75-11.45	6 NE of Greasewood T. P.	6/39	Bank of wash	6,010	101	6	101	Gravel packed and perforated	W, Ta, Tr
	do.	17M-201	9.0-11.0 A	6 NNW of Greasewood T. P.		Terrace	5,940 E	100 R	3			
	do.	17M-203	9.95-13.45	5 WNW of Greasewood T. P.	2/38	Broad valley	5,900	132	6	132	10-foot screen	W, Ta, Tr
	do.	17M-207	7.80-5.05	6 SSW of Steamboat	1/39	Bank of wash	6,180	185	6	155	do.	W, Ta, Tr
	do.	17M-240	7.10-0.30	1 WSW of Steamboat	10/37	Broad valley	6,310	186	6	186	Screen 152-162	W, Ta, Tr
	do.	17M-241	5.90-0.25	0.25 SW of Steamboat	6/22	do.	6,390	348	6			N
	do.	17M-246	3.55-5.90	4 SSE of Steamboat	3/35	Hillside	6,550	363	6	352	Open hole	W
	Dug well	17M-165	5.00-14.95	1 ENE of Greasewood T. P.		Bank of wash	5,900	21.5	6	21.5	Rock cribbed	W, Tr, Re
	do.	17M-166	5.75-15.80	0.25 E of Greasewood D. S.		Alluvial plain	5,870	11	8	11	do.	N
	do.	17M-166A	5.65-15.75	0.25 E of Greasewood D. S.		do.	5,870	16	8	16	Concrete caisson	P, Ta
	do.	17M-167	5.60-15.65	0.25 E of Greasewood D. S.		do.	5,870	8.5	3 x 5	8.5	Rock cribbed	Tr
	do.	17M-168	6.05-15.95	0.25 SSW of Greasewood D. S.		do.	5,860	10.5		10.5		Tr
	do.	17M-169	6.05-16.05	0.25 SSW of Greasewood D. S.		do.	5,860	15 R	7	15 R	Masonry cribbed	N
	do.	17M-169A	6.00-16.05	0.25 SSW of Greasewood D. S.		do.	5,860	7.5	4 x 4	7.5	Rock cribbed	Tr
	do.	17M-188	5.90-16.90	2 S of Greasewood D. S.		do.	5,840	10 E	5	10 E	do.	N
	do.	17M-189	5.90-16.75	1 S of Greasewood D. S.		do.	5,840	15.5	5	15.5	Masonry cribbed	Tr, A
	do.	17M-190	3.90-13.15	3 NNE of Greasewood T. P.		do.	5,940	16		16	Rock cribbed	Tr
	do.	17M-192	2.75-12.15	4 NE of Greasewood T. P.	8/31	do.	5,960	18.5		18.5	Masonry cribbed	Tr
	do.	17M-193	0.10-10.95	7 NE of Greasewood T. P.		Bank of wash	6,040	8		8	Log cribbed	N
	do.	17M-194	1.05-11.80	6 NE of Greasewood T. P.		Alluvial plain	5,990	16		16	do.	Tr
	do.	17M-196	1.25-5.75	10 NNE of Greasewood T. P.	10/31	Dry lakebed	6,350	16	7	16	Masonry cribbed	W, Tr
	do.	17M-196A	1.20-5.60	11 NNE of Greasewood T. P.		do.	6,350	12 E	3 x 6	12 E	Log cribbed	N
	do.	17M-196B	1.40-5.40	11 NNE of Greasewood T. P.		do.	6,350	12	6 x 6	12	do.	Tr
	do.	17M-196C	1.15-5.50	11 NNE of Greasewood T. P.		do.	6,350	12 E	3 x 6	12 E	do.	N
	do.	17M-197	1.10-4.60	12 NNE of Greasewood T. P.		Bank of wash	6,360	12	4 x 4	12	Log and rock cribbed	N
	do.	17M-202	9.55-11.30	6 NW of Greasewood T. P.	4/32	do.	5,930	23 R	6	23 R	Rock cribbed	N
	do.	17M-204	8.00-7.10	8 NNW of Greasewood T. P.		Bed of wash	6,160	9	7	9	do.	Tr

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Temperature (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chemical analysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 17—Continued															
		Alluvium		17	8/30/52						D, S	Yes	Good	68	
		do.		22.5	6/30/49			15			D, S, Irr	Yes	Good		
		do.				< .1	8/30/52				D, S	No	Good		Klagetoh Spring.
		Cow Springs				< .1 E	11/ 9/54				D, S	No	Good	42	Temporary.
		Bidahochi				.5 E	6/30/51				D	Yes	Good		
		Wingate (Lukachukai)		185 R	2/ 2/35						Un	No			Bidahochi Formation dry; abandoned.
0	61	Alluvium		4.3	8/ 9/49	3-4	8/ 9/49	15			D, S	Yes	Good	57	
		do.		79	5/24/24						Un	No			Abandoned.
0	95	do.	DL	80	2/21/38	3-4	8/22/49	35			D, S	Yes	Bad	59	
86	99 P	Cow Springs	DL	38.5	12/ 3/54	3-4	12/ 3/54	6			D, S	Yes	Fair		
145	41 P	Morrison (Westwater Canyon) and Cow Springs		53.5	12/ 3/54	3-4	12/ 3/54	10			D, S	Yes	Good		Nitrate content, 14 ppm.
76	272 P	do.		82.4	4/ 3/52			3			Un	No			Steamboat sheep-dip area.
22	341 P	Bidahochi				2-3	8/23/49	4			D, S	Yes	Good		
		Alluvium		15.9	12/ 2/54	3-4	12/ 2/54				D, S	No	Good		
		do.		7.6	12/ 2/54						Un	No			Old day-school well; abandoned.
		do.		5.8	12/ 2/54			45	4	14	D, S	Yes	Good	57	Greasewood D.S. well.
		do.		4.6	12/ 2/54						D, S	Yes	Good	59	
		do.		5.6	6/30/51						S	Yes	Fair	61	At Greasewood dipping vat.
		do.		4.5	12/ 2/54						S	No			In frame house at Greasewood dipping vat.
		do.		3	12/ 2/54						D, S	No	Fair	61	
		do.		2.5	12/ 2/54						Un	No			Abandoned.
		do.		.4	12/ 2/54						D, S	Yes	Good	50	
		do.		7.7	12/ 2/54						D, S	Yes	Good	59	
		do.		14.1	6/19/53						D, S	Yes	Good	41	
		do.		4	2/ 3/55						D, S	No	Fair		
		do.		11.1	6/30/51						D, S	Yes	Good	61	
		do.		10.5	12/10/54	3-4	12/10/54	53 R			D, S	Yes	Good	48	53 gpm reported by trader to BIA.
		do.		8.5	12/10/54						D, S	No			
		do.		9.5	12/10/54						D, S	No			
		do.		8.5	12/10/54						D, S	No			
		do.		6.5	12/10/54						D, S	Yes	Good	57	
		do.		19.5	3/ 8/54						D, S	No			
		do.		6.2	12/ 3/54						D, S	No	Good	50	Abandoned.

Records of ground-water supplies in the Navajo and Hopi

Quad- rangle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 17—Continued												
127 con.	Dug well	17M-177	3.45-11.75	14 SSE of Greasewood T. P.		Small valley	5,800	9.5	4	9.5	Rock cribbed	H, Tr
	do.	17GS-127-2	6.85-0.70	2 S of Greasewood T. P.		Alluvial plain	5,820	14.5	4 x 5	14.5	Plank cribbed	Tr
	Spring	17M-172	7.35-1.35	3 S of Greasewood T. P.	7/31	Edge of terrace	5,830				Collection gallery	C, Tr
	do.	17M-176	9.05-4.95	8 SSE of Greasewood T. P.		do.	5,810				do.	C
	do.	17GS-127-1	7.55-9.25	11 S of Greasewood T. P.		do.	5,730				do.	C
128	None											
139	do.											
140	Drilled well	17K-352	7.45-1.65	20 S of Greasewood T. P.	10/42	Bank of wash	5,580	78	6	78	Perforated 30-38	W, Ta, Tr
	do.	17M-128	7.55-1.65	21 S of Greasewood T. P.	10/42	do.	5,580	41	6	40	Screen	W
	Dug well	17M-129	12.10-4.90	24 SSW of Greasewood T. P.		do.	5,420					
	do.	17GS-140-1	12.30-5.00	25 SSW of Greasewood T. P.	/53	do.	5,400	10	3 x 2	10	Plank cribbed	H, Tr
141	None											
DISTRICT 18												
68	Spring	18A-2	7.35-11.55	5 ENE of Crystal		Bed of wash	8,360				None	N
	do.	18A-26	12.90-14.65	1 SW of Crystal		Small valley	7,430				do.	N
	do.	Crystal D. S.	10.55-13.00	2 NE of Crystal		Hillside	7,800				Collection gallery	C
	Combination spring	18A-14	11.45-12.05	2 N of Crystal		Bed of wash	7,780				None	N
	do.	18A-14A	11.75-13.00	1 N of Crystal		Small valley	7,610				do.	N
	do.	18A-15	12.60-10.90	3 NNW of Crystal		Bed of wash	7,950				do.	N
	do.	18A-16	13.70-11.50	3 NW of Crystal		do.	7,540				do.	N
	do.	18A-16A	13.40-12.10	2 NW of Crystal		Small valley	7,480				do.	N
	do.	18A-24	10.50-15.20	2 SE of Crystal		Bed of wash	7,700				do.	N
	do.	18A-25	11.10-13.90	1 E of Crystal		do.	7,650				do.	N
	do.	18A-28	11.65-17.10	3 S of Crystal		do.	7,530				do.	N
	Stream	18A-1	10.00-12.00	2 NE of Crystal								
✓ 145	Drilled well	18K-330	9.70-16.55	8 N of Sawmill	5/53	Small valley	7,530	775	8	195	Perforated at 70 and 140	W, Ta, Tr
	do.	Chee Dodge	4.35-13.50	6 W of Crystal			7,220	300 R			None	N
	Dug well	18A-21	4.60-13.30	7 W of Crystal		Hillside	7,230	6.5	4	6.5	Rock cribbed	Tr
	Spring	18A-18	2.35-9.15	6 NW of Crystal	no	Bed of wash	7,600				Collection gallery	Tr
	do.	18A-19	1.80-11.05	4 NW of Crystal	no	do.	7,350				None	N
	do.	18A-19A	3.50-13.30	6 W of Crystal	no	do.	7,260				do.	N
	do.	18A-22	4.80-11.95	7 WNW of Crystal	no	do.	7,280				do.	N
	do.	18A-36	0.25-15.25	3 SSW of Crystal	no	Broad valley	7,270				do.	N

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA							Use of water	QUALITY		Tem- pera- ture (°F)	Remarks
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chem- ical anal- ysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw- down (feet)	Duration of test (hours)					
DISTRICT 17—Continued															
		Chinle (Owl Rock)		6	6/28/51						D, S	Yes	Fair	61	
		Alluvium		12	12/ 1/54						Un	No			Probably abandoned.
		Terrace				.2 E	7/ 6/51				D, S	Yes	Good		
		do.				Dry	11/30/54				Un	No			Appears to be abandoned.
		Windblown sands				.1	11/30/54				D, S	Yes	Good	51	
0	70	Alluvium	DL	6	11/23/54	3-4	11/23/54	12		8	D, S	Yes	Fair	64	
0	41 P	do.		5	11/23/54	3-4	11/23/54	10		4	D, S	No	Good	64	Bottom of casing is welded shut and sits on top of salt water.
		do.									Un	No			Filled with sand, abandoned.
		do.		5.4	11/23/54						D, S	Yes	Good	55	
DISTRICT 18															
		Chuska				0.8 R .1 E	11/10/54				S	No	Good	32	
		Entrada				1 R 1 E	11/10/54				S	No	Good	32	
		Chuska				25	1/27/54				D	No	Good		Piped to school.
		do.				10 R 10 E	11/10/54				D, S	No	Good	34	
		do.				20 R 30 E	11/10/54				D, S	No	Good	34	
		do.				1 E	11/10/54				S	No	Good	34	
		do.				1.5 R 1 E	11/10/54				S	No	Good	35	
		Alluvium				3 E 1 R	11/10/54				S	No	Good	35	
		Chuska				8 E	11/10/54				S	Yes	Good	32	
		do.				15 R 15 E	11/10/54				D, S	No	Good	32	"Little Crystal Creek, "
		do.				15 R 15 E	11/10/54				S	No	Good	32	
		do.				200	11/10/54				D, S, Irr	Yes	Good	32	"Crystal Creek, "
0 60	60 715 P	Chinle (Shinarump) De Chelly	LL	114.5	11/16/54	3-4	11/16/54	10	146	1 1/2	D, S	Yes	Good	51	
		Chinle (Sonsela)		12	6/ 6/56						Un	No	Good		Abandoned.
		Alluvium		Dry	11/16/54						Un	No			Dry and abandoned.
		Wingate (Rock Point)				< .1 5 R	11/16/54				D, S	No	Good	44	
		do.				3 E	11/16/54				S	Yes	Good	41	
		Chinle (Sonsela)				< .1 E 2.5 R	11/16/54				S	No	Good	39	
		do.				10 E	11/16/54				D, S	Yes	Good	47	
		Alluvium				.8 R .5 E	11/16/54				S	No	Good	37	

Records of ground-water supplies in the Navajo and Hopi

Quad- rangle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 18—Continued												
con.	Spring	18A-37	0.35-15.20	3 SSW of Crystal	no	Bed of wash	7,260				None	N
	do.	18A-40	8.30-15.35	8 N of Sawmill	no	Narrow valley	7,350				do.	N
	do.	18A-40A	8.60-15.10	9 N of Sawmill	no	do.	7,330				do.	N
	do.	18A-43	9.40-11.80	12 N of Sawmill	yes	Head of canyon	7,160				do.	N
	do.	18A-44	8.35-12.60	11 N of Sawmill	maybe	Bank of wash	7,150			Yellowhat Sprg?	do.	N
	do.	18A-46	3.20-16.45	10 NE of Sawmill	no	Broad valley	7,400				do.	N
88	do.	18A-71	13.10-14.05	9 W of Mexican Springs		Side of cliff	7,860				Collection gallery	Tr
	do.	18A-84	13.85-9.85	11 WNW of Mexican Springs		Bed of wash	7,300				None	N
89	Drilled well	18K-306	8.10-8.10	2 SSE of Sawmill	3/42	Broad valley	7,630	845	13	16	do.	N
	do.	18K-321	9.05-6.65	Sawmill	2/44	do.	7,680	38	6		Perforated 8-16, gravel packed to 16	P
	Drilled well	18K-326	5.50-16.75	1 NW of Fort Defiance	3/51	Deep canyon	6,910	23	8	21	Perforated 8-21	N
	do.	18K-327	5.50-16.75	1 NW of Fort Defiance	3/51	do.	6,910	30	8	28	Perforated 8-28	P
	do.	18T-337	2.90-0.60	9 NE of Sawmill	10/55		7,200	489	10 8	21 126	Perforated at 115 and 123	W
	do.	18T-343	8.20-9.40	3 SSE of Sawmill	7/55	Small valley	7,510	145	12 8	22 30	Perforated 25-30, gravel packed	P
	do.	18T-344	8.20-9.40	3 SSE of Sawmill	7/55	do.	7,510	225	12 8	22 31	Perforated 22-28, gravel packed	
	Dug well	18A-30	3.15-8.25	9 NNE of Fort Defiance		Broad valley	7,010	15	2 x 4	15	Rock cribbed	Tr
	do.	18A-32	3.05-9.45	8 NNE of Fort Defiance		Bank of wash	6,980	10.5	2	10.5	do.	N
	do.	18A-34	2.35-12.85	5 NNE of Fort Defiance		Small valley	6,900	8	3 x 3	8	Plank cribbed	H, Tr
	do.	18A-38	7.00-1.35	6 NNE of Sawmill		do.	7,650	2.5			None	Tr
	do.	18A-39	8.40-1.35	6 N of Sawmill		Bed of wash	7,800	7	3	7	Rock cribbed	Tr
	do.	18A-53	5.35-13.70	4 NNW of Fort Defiance		Bank of wash	7,250	18.5	4	18.5	do.	H, Tr
	do.	18A-62	9.10-13.60	6 NW of Fort Defiance		Bed of wash	7,570	10.5	3	10.5	do.	N
	do.	18A-66	8.55-6.95	1 ESE of Sawmill		do.	7,610				Collection gallery	P, C
	do.	18A-69	9.20-6.70	Sawmill		Broad valley	7,680	13	5	13	Rock cribbed	W, H, Tr
	do.	Sawmill 1	9.15-6.70	Sawmill	/30	do.	7,690	15.5	10	15.5	do.	N
	do.	Sawmill D.S.	9.30-6.85	0.25 WSW of Sawmill		do.	7,690	20				N
	Infiltration gallery	Fort Defiance caisson 1, 2, 3	5.55-16.80	1 WNW of Fort Defiance	2/47	Deep canyon	6,910	24	8	24	Concrete caisson	P
	do.	Fort Defiance caisson 4	5.45-16.85	1 NW of Fort Defiance		Bed of wash	6,910	27	8	27	Steel caisson	P
	do.	Fort Defiance caisson 5	5.40-16.85	1 NW of Fort Defiance		do.	6,910	29	8	29	do.	P
	Spring	18A-31	4.50-7.45	5 ESE of Sawmill		do.	7,150				None	N
	do.	18A-35	0.85-10.80	8 NNE of Fort Defiance		Head of canyon	7,080				do.	N
	do.	18A-48	7.75-4.70	2 NNE of Sawmill		do.	7,790				do.	N

Indian Reservations, Arizona, New Mexico, and Utah—Continued

WATER-BEARING STRATA			Log	HYDROLOGIC DATA						Use of water	QUALITY			Remarks	
Depth below land surface to top of stratigraphic unit (feet)	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test			Chemical analysis	Sensory test	Temperature (°F)		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)						Duration of test (hours)
DISTRICT 18—Continued															
		Alluvium				.2 R .2 E	11/16/54				S	No	Good	37	
		Chinle (Shinarump)				.8 R 1 E	11/16/54				S	No	Good	40	
		do.				3 E	11/16/54				S	No	Good	40	Continuation of 18A-40.
		do.				.5 R < .1 E	11/16/54				S	No	Good	42	
		do.				1 R 1.5 E	11/16/54				S	No	Good	39	
		Alluvium				1 R < .1 E	11/16/54				S	No	Good	36	
		Gallup				.8 R 2 E	5/11/54				D, S	No	Good	51	White Clay Spring.
		Dakota				.2 R .2 E	11/ 9/54				S	No	Good	45	
0	15	Alluvium	DL	< 1	3/16/42			30 R			Un	No			Completely covered over; abandoned.
0	15	do.		7.5	11/17/54			40 R	12	2	Ind	No			Pumps into 10- by 50-foot infiltration gallery; Navajo Tribal Sawmill.
0	23 P	Alluvium		< 1 R	3/13/51			35 R	18	4	Un	No			Water at surface Mar. 13, 1951; abandoned test hole.
0	26	do.	DL	4.8	3/20/51			150	2	4	PS	Yes	Good		Fort Defiance domestic supply.
0	170	Chinle (Petrified Forest, upper)	LL	Flow	10/ 5/55	3-4		9	125	1	D, S	Yes	Fair	56	Cave catchers at 112, 113, and 114 feet.
170	140	Chinle (Sonsela)													
0	22	Alluvium		16	7/ 7/55			60	120	2	D, Ind	Yes	Good	58	Casings welded together at top; Navajo Tribal Sawmill.
22	123 P	Supai													
0	25	Alluvium	DL	16	7/31/55			225	44	6	D, Ind	Yes			Do.
25	162 P	Supai													
		Alluvium		13.4	11/ 9/54						D, S	No	Fair	50	
		do.		7.5	11/ 9/54						D, S	No	Fair	50	
		do.		1.2	11/ 9/54						D, S	No	Fair	59	
		do.		Dry	11/17/54						Un	No			Dry and abandoned.
		do.		4.8	11/17/54						D, S	Yes	Good	42	
		Supai		12.6	11/18/54						D, S	Yes	Good	51	
		do.		Dry	11/18/54						Un	No			Dry and abandoned.
		Alluvium				3 R 3 E	11/17/54				Un	Yes	Good	40	Buell Park 4, combined dug well and spring.
		do.		Dry	11/17/54						Un	No			Dry and abandoned.
		do.		7.5	11/17/54						Un	No			Abandoned.
		do.		5.5	10/25/48			30 R			Un	Yes	Good	62	Old school well.
		do.		10.5	4/24/50			100 R			PS	Yes	Good		All three have same location, depth, etc.; gravity flow to Fort Defiance.
		do.		7.4	11/18/54						PS	No	Good	35	Standby well for Fort Defiance.
		do.		7.4	11/18/54						PS	Yes	Good	58	In pumphouse; supply well for Fort Defiance.
		Volcanic				15 R 60 E	11/ 9/54				D, S	Yes	Good	42	Buell Park 3.
		Summerville				1.5 R 4 E	11/ 9/54				D, S	Yes	Good	40	
		De Chelly				1.5 R 1.5 E	11/17/54				S	No	Good	40	

Records of ground-water supplies in the Navajo and Hopi

Indian Res

Depth bel.
land surfa
to top of
stratigraphic
unit
(feet)

Quad- angle	Type of water supply or development	Bureau of Indian Affairs field number or name	Quadrangle location number	Approximate location (miles)	Date developed or completed (month, year)	Topography	Altitude above mean sea level (feet)	CONSTRUCTION DATA				
								Depth of well (feet)	Casing or cribbing		Finish	Improvements
									Diameter (drilled well in inches, dug well in feet)	Depth (feet)		
DISTRICT 2—Continued												
41	Drilled well	2A-13	0.20-7.50	1 SE of Inscription House T. P.	8/35	Small valley	6,650	620	6	620	Perforated	W, Tr
	do.	2K-303	8.25-12.05	9 SW of Inscription House T. P.	8/51	Plain	6,590	1,120	6	1,120	Perforated 1.060-1.120	W, Tr
	do.	2K-319	5.60-16.00	10 SSW of Inscription House T. P.	9/54	Stripped plain	6,100	626	8	28	Open hole	W, Tr
	do.	2K-323	5.35-10.20	6 SW of Inscription House T. P.	5/56	Edge of mesa	6,760	1,092	8	135	do.	W, Tr
	do.	2K-323A	6.70-9.65	6 WSW of Inscription House T. P.	5/56	do.	6,760	1,160	8			N
	do.	2T-317	2.80-11.00	5 SSW of Inscription House T. P.	/50	Small valley	6,340	950	6			
	Spring	2A-22	0.7-15.5 A	9 S of Inscription House T. P.		Small canyon	6,000				None	N
	do.	2A-26	2.50-5.95	2 WNW of Inscription House T. P.		Head of canyon	6,490				Masonry wall	Tr
	do.	2A-120	5.5-4.5 A	2 WNW of Inscription House Ruin		do.	6,400				None	N
	do.	2A-121	4.8-0.8 A	4 NNW of Inscription House Ruin		Deep canyon	5,150				do.	N
	do.	2K-451	2.0-11.3 A	6 SSE of Inscription House Ruin		Stripped plain	6,300				Collection gallery	Tr
	Combination spring	2A-124	3.20-5.15	1 N of Inscription House Ruin		Deep canyon	5,500				None	N
	do.	2A-125	3.3-5.8 A	1 S of Inscription House Ruin		do.	5,600				do.	N
	do.	2A-127	4.0-8.6 A	4 S of Inscription House Ruin		Head of canyon	5,700				do.	N
	do.	2K-453	8.0-6.2 A	5 WSW of Inscription House Ruin		Canyon	5,500				do.	N
	Stream	2GS-41-1	4.95-3.65	2 NW of Inscription House Ruin		Canyon bed					do.	N
56	Spring	2A-44	10.65-1.85	14 ESE of Shonto T. P.		Bed of wash	6,250				do.	N
	do.	2A-45	11.45-5.50	16 SE of Shonto T. P.		do.	6,100				do.	N
	do.	2A-47	12.75-6.45	16 SE of Shonto T. P.		do.	6,050				do.	N
57	do.	2A-4	12.60-5.50	13 SSW of Shonto T. P.		Base of cliff	6,360				Collection well	C, Tr
	do.	2A-7	11.65-9.50	16 SSW of Shonto T. P.		Small canyon	6,020				None	N
	do.	2A-8	11.00-10.45	17 SSW of Shonto T. P.		do.	5,900				do.	N
	do.	2A-10	10.00-3.70	10 SSW of Shonto T. P.		Base of cliff	6,400				Masonry wall	N
	do.	2A-11	8.10-2.15	8 S of Shonto T. P.		Hillside	6,500				Collection gallery	Tr
	do.	2A-50	5.60-5.70	12 SSE of Shonto T. P.		Small canyon	6,220				None	N
	do.	2A-52	7.10-7.85	14 S of Shonto T. P.		do.	6,020				do.	N
	do.	2A-54	8.15-8.70	15 S of Shonto T. P.		do.	6,175				do.	N
	do.	2A-55	9.55-11.00	17 S of Shonto T. P.		Bed of wash	5,750				do.	N
	do.	2A-56	9.45-14.15	20 S of Shonto T. P.		Deep canyon	5,280				do.	N
	do.	2A-58	4.95-10.50	17 SSE of Shonto T. P.		Bed of wash	5,770				do.	N
	do.	2A-59	2.70-9.50	17 SSE of Shonto T. P.		do.	5,880				do.	N
	do.	2A-60	1.75-8.30	16 SSE of Shonto T. P.		do.	5,950				do.	N
	do.	2A-61	0.75-7.55	16 SSE of Shonto T. P.		do.	5,980				do.	N

Hopi

ents

r

Indian Reservations, Arizona, New Mexico, and Utah—Continued

Depth below land surface to top of stratigraphic unit (feet)	WATER-BEARING STRATA		Log	HYDROLOGIC DATA							Use of water	QUALITY		Temperature (°F)	Remarks
	Thickness (feet)	Stratigraphic unit (aquifer)		Static water level		Yield		Bail or pump test				Chemical analysis	Sensory test		
				Depth (feet)	Date measured	Rate (gpm)	Date measured	Rate (gpm)	Draw-down (feet)	Duration of test (hours)					
DISTRICT 2—Continued															
0	620 P	Navajo		493	2/17/53	1-2		10			D, S	Yes	Good	62	
120	1,000 P	do.	LL	1,013	1/13/54	1-2		17	10	1	D, S	Yes	Good		
30	596 P	do.		385	8/30/54	2-3		12	10	3	S	Yes	Good	60	
128	964 P	do.		997	5/15/56			6	15	1	D, S	No	Good	58	
178	982 P	do.		Dry								No			Abandoned.
80	870 P	do.	DL	509	2/ 2/54	1-2		70			Ind	Yes	Good		Drilled by Sinclair Oil Co.
		do.				50 R					S	No			
		do.				.5 R	2/27/40					Yes		62	Abandoned.
		do.									S	No			
		do.									S	No			
		do.									S	No			
		do.				700	7/27/54				S	Yes	Good	75	
		do.									S	No			
		do.									S	No			
		do.									S	No			Large flow.
						1,000	7/27/54				S	Yes	Good	74	
		Wepo									S	No			
		Alluvium									S	No			
		do.									S	No			
		Landslide and talus				1.5 E	4/28/55				D, S	Yes	Good	44	
		Wepo									S	No			
		do.									S	No			
		Landslide and talus				.2 E	4/28/55				S	Yes	Good	46	Indian masonry wall.
		do.				.1	4/28/55				S	Yes	Good	51	
		Wepo									S	No			Aerial reconnaissance.
		do.									S	No			Do.
		Toreva									S	No			Do.
		Alluvium									S	No			Do.
		Toreva				3 E	8/11/54				S	Yes	Fair	71	
		Alluvium									S	No			Aerial reconnaissance.
		do.									S	No			Do.
		do.									S	No			Do.
		do.									S	No			Do.

