UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PROGRESS REPORT ON BLACK MESA MONITORING PROGRAM—1977

Open-File Report 78-459

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MONITORING PROGRAM—1977

BY PERSONNEL OF THE
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 78-459
APRIL 1978

Prepared in cooperation with the Arizona Water Commission

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Tucson, Arizona
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Conversion Factors

Factors for converting English units to metric units are shown to four significant figures. In the text, however, the metric equivalents are shown only to the number of significant figures consistent with the values for the English units.

Multiply English unit	By	To obtain metric unit
acres	0.4047	hectares (ha)
acre-feet (acre-ft)	.001233	cubic hectometers (hm^3)
cubic feet per second (ft^3/s)	.02832	cubic meters per second (m^3/s)
feet (ft)	.3048	meters (m)
inches (in)	25.4	millimeters (mm)
miles (mi)	1.609	kilometers (km)
square miles (mi^2)	2.590	square kilometers (km^2)

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Abstract

Monitoring activities of coal mine operations on Black Mesa were started in 1971 for the purpose of monitoring the effects of strip mining on the water resources of the area. Black Mesa is located in northeastern Arizona near the center of the Navajo Indian Reservation and is a prominent topographic high about 500 to 1,000 feet above the surrounding area. Monitoring on and near the mesa consists of measurements of ground-water levels, ground-water quality, and measurements of the quantity, sediment concentration, and chemical quality of surface water.

The surface-water monitoring consists of: (1) rainfall-runoff characteristics in the immediate vicinity of the mine, and (2) surface-flow conditions and water-quality characteristics at a site on Moenkopi Wash at the village of Moenkopi.

Three small watersheds of about 400 acres each are instrumented for the collection of flow data, precipitation data, and water samples for determination of chemical quality and sediment concentration. Each watershed is equipped with a data-collection platform that transmits the data via satellite to a computer that in turn provides near-real time information on rainfall and runoff.

Ground-water monitoring consists of monitoring the effects of ground-water withdrawal on the regional potentiometric surface in the N aquifer. The N aquifer consists of the Navajo Sandstone, Kayenta Formation, Moenave Formation, and the Lukachukai Member of the Wingate Sandstone.[1/] Water samples for chemical analysis also are collected from the wells in this network. Total withdrawals from the N aquifer are monitored on a continuing basis.

1/This report has not been reviewed for conformity with Geological Survey nomenclature.

Available data at this time are insufficient to assess the effects of mining on the quantity, sediment concentration, or chemical quality of surface-water runoff.

Water levels in seven wells, measured annually, have not shown significant declines. The water levels in some of the other wells in the network have declined as much as 7 feet, and others have fluctuated in response to seasonal pumping by nearby wells.

Introduction

Black Mesa, in northeastern Arizona near the center of the Navajo Indian Reservation, is a prominent topographic high that is from 500 to 1,000 ft (150 to 300 m) above the surrounding area. The Black Mesa contains large deposits of strippable coal and Peabody Coal Company presently operates two strip mines in the area. The present emphasis on coal to meet the nation's energy needs may result in more extensive mining of this area in the future.

Coal from the strip mines is used to fire the Navajo electric generating plant at Page, Arizona and the Mohave electric generating plant near Bullhead City, Arizona. The coal is transported to the Mohave powerplant through a 275-mi (442-km) long coal slurry pipeline. Water for the pipeline operation is withdrawn near the coal mine site from the N aquifer underlying Black Mesa. The N aquifer consists of the Navajo Sandstone, the Kayenta Formation, the Moenave Formation and the Lukachukai member of the Wingate Sandstone. About 3,400 acre-ft (4.2 hm^3) of ground water was pumped from the aquifer annually from 1971 to 1976 for mining and pipeline operation.

Purpose

The Black Mesa monitoring program was initiated in 1971 in an attempt to monitor possible effects of strip-mining activities by Peabody Coal Company on the water resources of the Black Mesa. This ongoing project is funded jointly by the Arizona Water Commission with funds received from the Navajo Tribe, the Hopi Tribe, and Peabody Coal Company, and by the U.S. Geological Survey. In addition, Federal funds for energy-related studies have been available from 1975 to 1977 and have been used for construction purposes to expand the data-collection networks. The project is aimed at monitoring three possible problem areas: (1) increased sediment concentration in surface-water runoff as a result of strip-mining activities, (2) changes in the chemical quality of surface-water runoff as a result of strip-mining activities, and (3) regional decline of the potentiometric surface in the N aquifer as a result of ground-water withdrawals associated with the mining and slurry pipeline operation. In addition, sufficient data must be collected to determine whether the

ground-water pumping for mining operations will cause a lowering of the potentiometric surface at the nearby communities, and if so, to be able to differentiate between the decline resulting from pumping by Peabody Coal Company and that resulting from community pumping. This is required because under the coal-lease agreement, if, in the opinion of the Secretary of the Interior, withdrawals from the Peabody wells are adversely affecting the Navajo-Hopi ground-water supplies, then the coal lessee must obtain its water from other sources or replace the Indian sources with water of equal quality.

Area

Black Mesa is a topographically high plateau covering about 2,000 mi^2 (5,200 km^2) near the center of the Navajo-Hopi Indian Reservation in northeastern Arizona. The altitude of the land surface on the mesa ranges from about 6,000 ft (1,800 m) to more than 8,000 ft (2,400 m) above mean sea level. The climate of the area is semiarid; rainfall ranges from 9 to 12 inches (230 to 300 mm) per year. Vegetation includes desert shrub, juniper-pinyon woodlands, and ponderosa pine forest at the higher altitudes.

The area leased for strip mining of coal on Black Mesa includes 64,858 acres (26,248 ha) and is near the headwaters of the surface drainage of Moenkopi Wash (fig. 1). The strip-mine area is drained by Coal Mine Wash, Yellow Water Canyon, and several other small washes, all of which flow southwestward and are tributary to Moenkopi Wash, which is the main stem of the drainage network. Some surface-water runoff in Moenkopi Wash is diverted for flood irrigation near the villages of Moenkopi and Tuba City, about 60 miles (97 km) downstream from the strip-mine area. The soil material of the watershed is sand and clay and high sediment concentrations in the surface-water runoff are common.

The water supply for the strip mining and slurry pipeline operations is withdrawn from the N aquifer, which is the principal fresh-water aquifer for the area. Kayenta, Chilchinbito, Rough Rock, and several other communities also derive their water supplies from this aquifer; present withdrawals, excluding those for the coal operations, are about 1,000 acre-ft (1.2 hm^3) annually. Pumpage for mining acti-

EXPLANATION

- 5 — CONTINUOUS-RECORD GAGING STATION, SEDIMENT-MEASUREMENT AND CHEMICAL-MEASUREMENT SITE--Number, 5, is referenced to table 1
- 4 — DISCONTINUED GAGING STATION--Number, 4, is referenced to table 1
- 10 — PARTIAL-RECORD GAGING STATION--Number, 10, is referenced to table 1
- 2 — CONTINUOUS-RECORD GAGING STATION WITH AUTOMATIC SEDIMENT SAMPLER AND RECORDING RAIN GAGE--Number, 2, is referenced to table 1
- 8 — SEDIMENT-MEASUREMENT SITE WITH CREST-STAGE GAGE--Number, 8, is referenced to table 1
- R BM2 — OBSERVATION WELL EQUIPPED WITH A RECORDER--Number, BM2, is referenced to figure 5
- W5 — WINDMILL MEASURED ANNUALLY--Number, W5, is referenced to figure 5
- PEABODY COAL COMPANY PRODUCTION WELL
- WELL USED FOR PUBLIC WATER SUPPLY--Well is equipped with a flowmeter
- PEABODY LEASE BOUNDARY

See figure 2 for detailed map of this area.

INDEX MAP

BASE FROM U.S. GEOLOGICAL SURVEY
MARBLE CANYON 1:250,000, 1970,
SHIPROCK 1:250,000, 1969

Scale 1:250,000

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION

FIGURE 1.--AREA OF INVESTIGATION AND INSTRUMENTATION SITES.

vities has averaged 3,400 acre-ft (4.2 hm^3) annually from 1971 to 1976. The N aquifer generally is about 2,400 ft (730 m) below land surface at the strip-mine site. The Mancos Shale, Carmel Formation, and other formations lie between the N aquifer and the land surface; these formations are an effective barrier that limits vertical leakage to or from the N aquifer. Several windmills and small springs derive water sufficient in quantity and quality for stock supply from the Toreva and Wepo Formations at or near the land surface on Black Mesa.

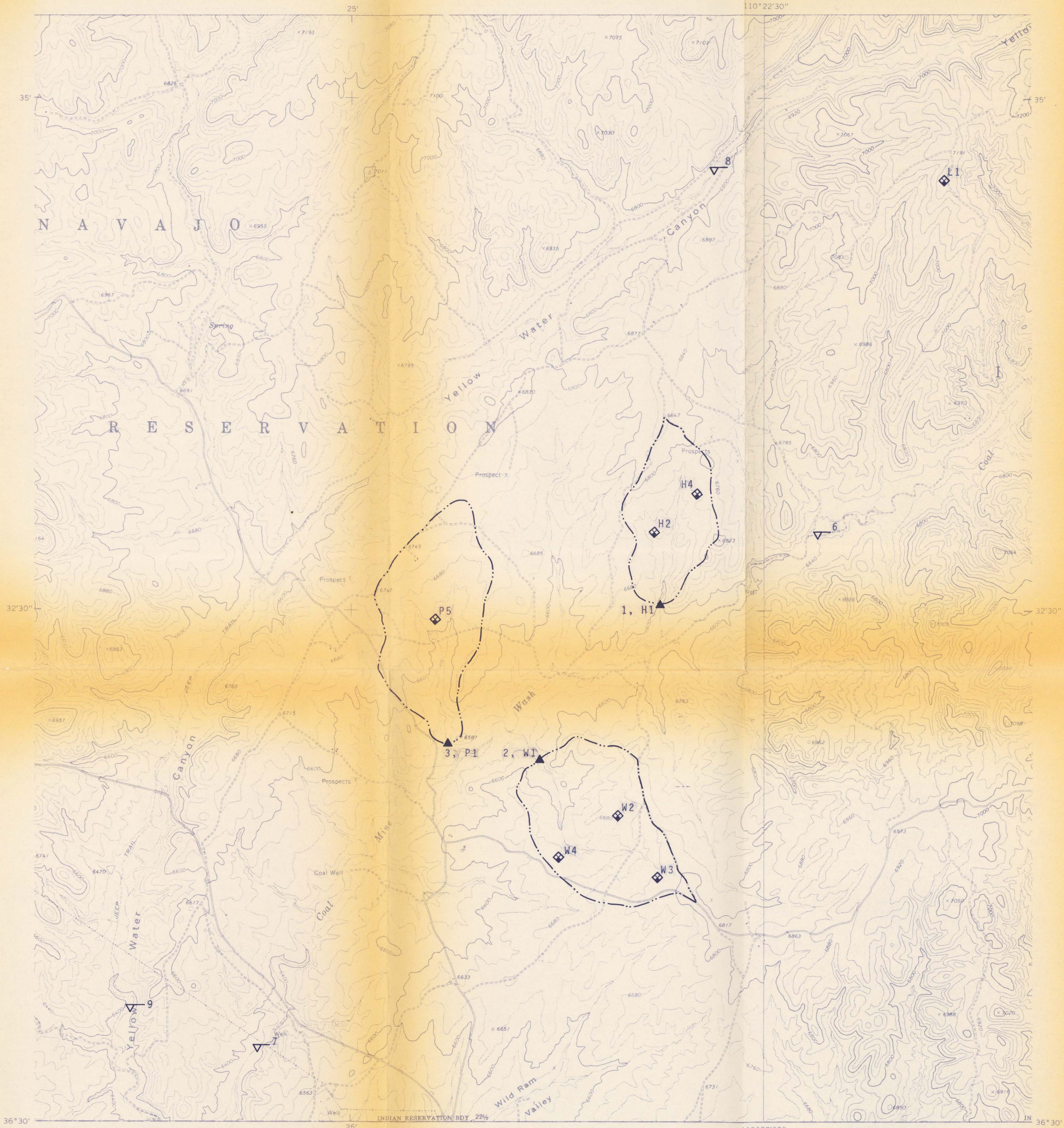
Monitoring Program

Surface Water

The objective of the surface-water activities is to monitor the quantity, sediment concentration, and chemical quality of surface-water runoff from the mined area. The surface-water monitoring is divided into two parts: (1) monitoring the rainfall-runoff characteristics in the immediate vicinity of the strip mine and (2) monitoring the surface-flow conditions and chemical-quality characteristics at a site downstream near the village of Moenkopi where some surface water from Moenkopi Wash is diverted for irrigation. Table 1 lists the streamflow gaging sites being operated as part of the surface-water monitoring program.

Monitoring of surface water in the immediate area of the strip-mine area is being accomplished by studying three intensely instrumented watersheds of about 400 acres (162 ha) each (fig. 2). Two of the watersheds will be disturbed by mining activities and one will remain unmined. Three continuous-record gaging stations with automatic sediment samplers and recording rain gages are in operation in the area. In addition, four peak-flow or crest-stage gages equipped with point sediment samplers are being operated. These are just upstream and just downstream from the strip-mined area on Coal Mine Wash and Yellow Water Canyon; they are designed to indicate whether runoff is originating upstream from or on the strip-mine area.

The three intensively instrumented small watersheds are tributaries to Coal Mine Wash (fig. 2). The gaging stations are near the mouth of each of the three small watersheds and



BASE FROM U.S. GEOLOGICAL SURVEY
LONG HOUSE VALLEY 1:24,000, 1971,
MARSH PASS SOUTHEAST 1:24,000, 1968

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

- ▲2, W1 — CONTINUOUS-RECORD GAGING STATION WITH AUTOMATIC SEDIMENT SAMPLERS AND RECORDING RAIN GAGE--Number, 2, is referenced to table 1; Number, W1, is referenced to table 2
- ▽6 — SEDIMENT-MEASUREMENT SITE WITH CREST-STAGE GAGE--Number, 6, is referenced to table 1
- ◈W4 — RECORDING PRECIPITATION GAGE--Number, W4, is referenced to table 2
- —··— BOUNDARY OF STUDY WATERSHED

FIGURE 2.--LOCATIONS OF HYDROLOGIC INSTRUMENTATION IN THE IMMEDIATE AREA OF THE STRIP MINE.

Table 1. Data from streamflow-gaging stations in the Black Mesa Monitoring Program

Identifying Number on Maps	Station Number	Station Name	Date Record Began	Drainage Area (mi^2)	Water Year	Annual Peak Discharge (ft^3/s)	Date of Occurrence
		Continuous-Record Stations					
1	09401225	Coal Mine Wash tributary No. 3 near Kayenta	May 1975	0.41	1976	0	--
2	09401226	Coal Mine Wash tributary near Kayenta	December 1973	0.62	1974	E 63	08-04-74
					1975	772	07-10-75
					1976	8.4	09-25-76
3	09401229	Coal Mine Wash tributary No. 2 near Kayenta	December 1973	0.62	1974	E 15	07-16-74
					1975	--	--
					1976	0	--
4	09401250	Moenkopi Wash near Moenkopi	October 1973 (Discontinued June 30, 1976)	1,650	1974	E 2,340	07-19-74
					1975	2,380	09-13-75
5	09401260	Moenkopi Wash at Moenkopi	July 1, 1976	1,660	1976	5,400	09-25-76
		Partial-Record Stations					
6	09401224	Coal Mine Wash near Kayenta	November 1973	34.1	1974	E 10	03-02-74
					1975	2,650	07-10-75
					1976	E 30	07-24-76 or 07-25-76
7	09401232	Coal Mine Wash near Shonto	November 1973	44.6	1974	E 12	03-02-74
					1975	1,480	09-08-75
					1976	E 2	09-25-76
8	09401234	Yellow Water Canyon near Kayenta	November 1973	18.6	1974	E 90	07-21-74
					1975	1,500	07-11-75
					1976	E 30	09-25-76
9	09401236	Yellow Water Canyon near Shonto	November 1973	49	1974	--	--
					1975	1,420	07-11-75
					1976	25	09-25-76
Not shown	09401238	Yellow Water Canyon above Coal Mine Wash near Shonto	November 1973 (Discontinued 1975)	--	--	--	--
10	09401240	Moenkopi Wash near Shonto	December 1973	270	1974	E 1,850	08-04-74
					1975	E 900	07-12-75
					1976	E 2,500	07-26-76
11	09401248	Begashibito Wash near Tonalea	August 1973	611	1974	E 280	08-04-74
					1975	E 260	09-13-76
					1976	E 100	09-25-76

E - estimated

are now equipped with primary and backup systems for collecting stream stage, precipitation data, and water samples for analysis of chemical and sediment characteristics. The installation of backup instrumentation at each site was necessitated by the low number and short duration of runoff events and the generally poor access to the gaging stations during runoff events. An instrumentation failure during one flow event of several hours duration may conceivably result in missing the only flow event of the year. Funds for most of this phase of surface-water monitoring are made available from the Federal government for energy-related research projects.

At each site the primary stage data-collection system is a U.S.G.S. STACOM servo-manometer that senses stream stage using gas pressure. A conventional float-well gage serves as a backup. Both stage-measurement systems are equipped with digital recorders and operate independently. A precipitation gage is part of the instrument package at each gaging site and consists of a propane heated snow gage equipped with a tipping-bucket recorder that registers precipitation in 0.1-inch increments. The precipitation from the tipping bucket gage is spilled into a reservoir where it is measured again by a float gage equipped with a digital recorder. An example of the information collected during a flow event on one of the small watersheds is shown in figure 3.

Ten recording precipitation gages are being operated as part of the monitoring program. Nine of the gages are in the three small watersheds and one is upstream from the mine area on the drainage divide between Yellow Water Canyon and Coal Mine Wash (fig. 2). The precipitation and runoff data from the three small watersheds will be used to develop a rainfall-runoff model which will simulate both pre- and post-mining conditions. Precipitation data collected to date (1977) as part of the monitoring program are shown in table 2.

The precipitation recorder on one of the watersheds is incorporated into a data-collection system in which the data are transmitted via radio to a satellite that relays the data into a computer system. With this system operable, a program can be placed into the computer to obtain a readout from the recorder on almost a current basis. This data-collection system is designed to provide real-time information on rainfall and runoff conditions in the area and will ultimately be used as a guide to determine when the instruments need to be serviced, either because of a malfunction

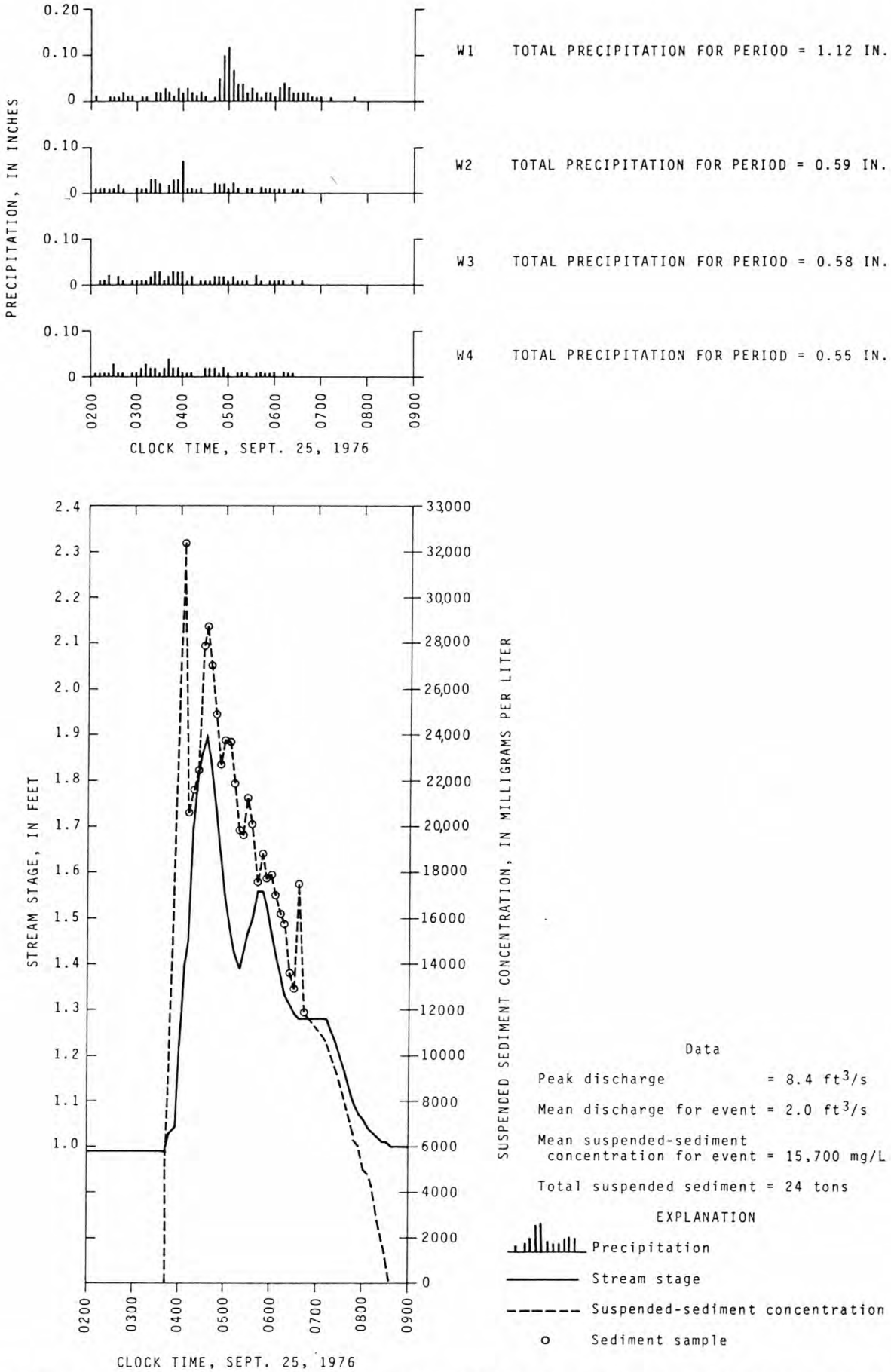


FIGURE 3.--EXAMPLE OF DATA COLLECTED BY INSTRUMENTATION ON THE SMALL WATERSHED STUDY.
[Data are for the peak of September 25, 1976 at station 09401226, Coal Mine Wash tributary near Kayenta, Az.]

Table 2. Monthly and annual precipitation, in inches, for precipitation gages in the Black Mesa Monitoring Program

Station	Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Annual	Remarks
L1	1976	0.47	0.77	0.78	0.08	2.51	0.50	0.82	0.92	0.15	1.14	--	2.98[1]	11.12	[1] Total Aug.-Sep. 1976
	1977	0.15													
H1	1976	0.28	0.28	0.16	0.07	1.73	0.20	0.29	--	0.72	0.80	0.22	2.74	7.49	
	1977	0.63	1.43	0.84	0.65	0.64	0.08	0.29							
H2	1976	--	--	--	--	--	--	--	0.71[1]	--	--	1.76[2]	2.02	--	[1] Record started May 3, 1976
	1977	0	0.24	0.11	0.85	0.03	0.03	0.39							[2] Total Jun.-Aug. 1976
H4	1976	--	--	--	--	--	--	--	0.80[1]	0.11	1.10	0.86	2.11	--	[1] Record started May 5, 1976
	1977	0.10	0.25	0.14	0.86	0.06	0.02	0.40							
W1	1975	--	--	--	--	--	--	--	--	--	1.11[1]	--	0.96[2]	--	[1] Record started Jul. 8, 1975
	1976	0.28	0.47	--	0.51[3]	2.31	0	0.79	0.94	0.07	0.99	0.91	2.91	10.18	[2] Total Aug.-Sep. 1975
	1977	0.40	0.99	0.07	0.79	0	0.02	0.43							[3] Total Dec. 1975-Jan. 1976
W2	1974	--	--	--	--	--	--	--	--	--	1.78[1]	0.98	0.31	--	[1] Record started Jul. 10,1974
	1975	1.33	0.60	0.29	0	--	--	--	--	2.48[2]	2.67	0.11	1.41	8.89	[2] Total Feb.-Jun. 1975
	1976	0.24	--	--	--	--	2.85[3]	0.34	0.89	0.04	1.22	0.62	1.99	7.95	[3] Total Nov. 1975-Mar. 1976
	1977	0.14	0.20	0	0.82	0.02	0	0.45							
W3	1976	--	--	--	--	--	--	--	0.78[1]	0	1.27	0.72	2.01	--	[1] Record started May 3, 1976
	1977	0.16	0.21	0.08	0.80	0	0.11	0.35							
W4	1976	--	--	--	--	--	--	--	--	--	0.60[1]	0.43	2.02	--	[1] Record started Jul.15, 1976
	1977	0.10	0.18	0	0.60	0	0	0.47							
P1	1974	--	--	--	--	--	--	--	--	--	2.39[1]	0.34	0.40	--	[1] Record started Jul.10, 1974
	1975	1.72	0.78	0.29	0.47	0	--	--	--	0.14	2.63	0.39	1.62	--	
	1976	--	--	0.19	0.10	1.78	0.32	0.40	0.94	0.07	0.36	0.11	1.93	--	
	1977	--	--	0.04	0.42	1.42	0.58	0.73							
P5	1974	--	--	--	--	--	--	--	--	--	1.57[1]	0.12	0.32	--	[1] Record started Jul.11, 1974
	1975	--	2.73[2]	--	--	1.56[3]	--	--	--	--	0.72	0.44	1.91	7.36	[2] Total Oct. and Nov 1974
	1976	--	0.92[4]	--	0.42[5]	2.35	0.34	0.60	0.97	--	1.63[6]	1.31	2.42	10.96	[3] Total Dec. 1974-Feb. 1975
	1977	0.10	0.41	0.13	0.83	0.07									[4] Total Oct.-Nov. 1975
															[5] Total Dec. 1975 - Jan. 1976
															[6] Total Jun. - Jul. 1976

or because of extreme flow conditions. In the near future, the stream-stage recorders and a counter giving the number of water samples taken by the automatic samplers also will be incorporated into this data-collection system. The transmitting antennas are installed on the other two watersheds and they will be instrumented in a like manner as the equipment becomes available.

Coal Mine Wash and Yellow Water Canyon are each currently instrumented with two crest-stage stations (table 1); each station is in turn equipped with two single-stage point sediment samplers. At this type of station the crest-stage gage records the highest stream stage that is reached between visits to the station, and the point samplers collect a sample at two different stages. The recorded crest stage is then used to compute the peak discharge rate which, along with the concentration of the sediment sampled, can be used to estimate the suspended-sediment load. One station on each stream is upstream from the strip-mine area and the other is downstream from the strip-mine area; the locations are shown on figure 2. One station, which was on Yellow Water Canyon about 0.5 mi (0.8 km) upstream from the confluence with Coal Mine Wash, was discontinued when an evaluation of the data-collection network indicated the site was not necessary. Annual instantaneous peak discharges are being computed for all continuous-record and partial-record gaging sites and the results to date (through 1976) are shown in table 1.

The key station for the monitoring of possible downstream effects of the strip mine is the streamflow and sediment-sampling gaging station, Moenkopi Wash at Moenkopi on Highway 264 (fig. 1, table 1). An observer who lives at Moenkopi collects sediment samples once daily during periods of low flow and more often during high flows. The discharge measured at the station is related to the concentration of suspended sediment in the samples to compute the total suspended-sediment load. Sediment data have been collected at this site since October 1973 and streamflow since July 1976. From October 1, 1973 to June 30, 1976, discharge was measured at a site 3 mi (4.8 km) upstream from the present site (table 1). This station was abandoned when the new station was built. Data collected at these two stations, except for chemical analyses, are presented in tables 3, 4, and 5. The chemical analyses of the surface water at these stations and several others are shown in table 6.

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1.0	400	1.1	1.8	363	1.8	2.7	1330	9.7
2	.90	390	.95	1.8	744	3.6	3.0	1370	11
3	.80	364	.79	1.6	288	1.2	2.7	581	4.2
4	.70	400	.76	1.6	315	1.4	2.8	856	6.5
5	.70	599	1.1	1.5	536	2.2	2.7	850	6.2
6	.70	600	1.1	1.5	934	3.8	1.9	825	4.2
7	.80	600	1.3	1.5	295	1.2	2.0	811	4.4
8	.90	600	1.5	1.5	286	1.2	2.5	1440	9.7
9	1.0	600	1.6	1.4	197	.74	2.7	918	6.7
10	1.1	600	1.8	1.4	294	1.1	2.4	1190	7.7
11	1.2	588	1.9	1.5	623	2.5	2.7	889	6.5
12	1.2	370	1.2	1.5	273	1.1	2.5	822	5.5
13	1.1	133	.40	1.5	263	1.1	2.4	1040	6.7
14	1.0	292	.79	1.3	257	.90	2.5	1060	7.2
15	1.0	251	.68	1.2	255	.83	1.5	628	2.5
16	.90	251	.61	1.3	773	2.7	1.6	794	3.4
17	.90	278	.68	1.3	445	1.6	1.9	957	4.9
18	1.0	283	.76	1.3	336	1.2	2.2	928	5.5
19	1.1	263	.78	2.2	1320	7.8	2.0	971	5.2
20	1.2	245	.79	2.2	1740	10	1.1	554	1.6
21	1.3	244	.86	2.0	1040	5.6	1.1	453	1.3
22	1.4	230	.87	1.9	504	2.6	1.6	447	1.9
23	1.4	237	.90	2.7	547	4.0	2.0	623	3.4
24	1.4	228	.86	2.0	1320	7.1	1.5	778	3.2
25	1.3	235	.82	1.9	730	3.7	1.6	450	1.9
26	1.4	278	1.1	1.9	654	3.4	1.5	422	1.7
27	1.4	304	1.1	1.4	544	2.1	1.8	473	2.3
28	1.4	623	2.4	1.3	722	2.5	2.4	967	6.3
29	1.4	283	1.1	1.4	445	1.7	3.5	966	9.1
30	1.8	366	1.8	2.0	1010	5.4	3.9	1850	19
31	1.8	496	2.4	---	---	---	.86	790	1.8
TOTAL	35.20	---	34.80	49.4	---	86.07	67.56	---	171.2

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1.3	256	.90	3.0	846	6.9	16	30700	2260
2	1.8	482	2.3	3.0	936	7.6	53	81900	12300
3	2.4	506	3.3	2.3	962	6.0	54	58300	7900
4	3.7	518	5.2	2.8	749	5.7	24	25400	1650
5	3.0	363	2.9	3.0	821	6.6	6.9	18000	335
6	2.8	394	3.0	2.4	660	4.3	3.9	5700	60
7	3.9	960	10	2.3	660	4.1	2.2	3420	20
8	3.0	966	7.8	2.4	749	4.8	1.9	1410	7.2
9	3.0	1740	14	2.7	1130	8.2	2.2	1410	8.4
10	3.0	1840	15	3.2	1110	9.6	2.8	1420	11
11	3.0	1820	15	3.7	1900	19	2.7	1860	14
12	3.0	1800	15	3.7	1430	14	2.8	1450	11
13	3.9	823	8.7	3.0	996	8.1	2.8	1310	9.9
14	3.5	820	7.7	3.0	981	7.9	2.8	1260	9.5
15	3.5	863	8.2	3.9	1070	11	2.7	926	6.8
16	3.7	787	7.9	3.9	966	10	2.4	750	4.9
17	4.1	913	10	3.2	770	6.7	2.0	696	3.8
18	3.9	897	9.4	4.1	751	8.3	1.9	554	2.8
19	3.9	902	9.5	3.9	786	8.3	1.8	476	2.3
20	4.1	972	11	2.8	706	5.3	2.0	538	2.9
21	3.7	803	8.0	2.7	571	4.2	2.0	489	2.6
22	2.7	885	6.5	3.5	567	5.4	1.8	548	2.7
23	2.4	775	5.0	2.7	542	4.0	1.8	413	2.0
24	2.4	810	5.2	2.0	719	3.9	1.8	413	2.0
25	3.0	880	7.1	2.2	691	4.1	1.8	360	1.7
26	3.0	1220	9.9	2.8	452	3.4	1.8	378	1.8
27	3.0	858	6.9	2.7	664	4.8	1.8	316	1.5
28	3.0	749	6.1	2.4	460	3.0	1.8	453	2.2
29	2.8	1020	7.7	---	---	---	1.8	382	1.9
30	2.1	953	5.4	---	---	---	1.6	449	1.9
31	3.0	1900	15	---	---	---	1.4	311	1.2
TOTAL	95.6	---	249.60	83.3	---	195.2	210.2	---	24641.0

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona--Continued

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1.4	398	1.5	1.3	226	.79			
2	2.2	1150	6.8	1.3	174	.61			
3	2.5	1460	9.9	1.1	172	.51			
4	2.0	540	2.9	.94	189	.48			
5	1.6	394	1.7	.94	225	.57			
6	1.8	423	2.1	.94	229	.58			
7	1.6	361	1.6	.86	185	.43			
8	1.4	337	1.3	.94	186	.47			
9	1.4	966	3.7	.86	198	.46			
10	1.3	494	1.7	.61	182	.30			
11	1.4	370	1.4	.57	164	.25			
12	1.4	802	3.0	.53	317	.45			
13	1.3	386	1.4	.44	178	.21			
14	1.3	340	1.2	.27	218	.16			
15	1.4	620	2.3	.23	219	.14			
16	1.5	340	1.4	.12	314	.10			
17	1.6	296	1.3	.07	310	.06			
18	1.8	308	1.5	.25	299	.20			
19	1.6	294	1.3	.40	279	.30			
20	1.4	275	1.0	.27	511	.37			
21	1.4	253	.96	.31	472	.40			
22	1.5	271	1.1	.53	403	.58			
23	1.5	250	1.0	.57	262	.40			
24	1.4	256	.97	.61	222	.37			
25	1.5	247	1.0	.53	167	.24			
26	1.5	317	1.3	.40	195	.21			
27	1.3	326	1.1	.31	177	.15			
28	1.3	218	.77	.17	162	.07			
29	1.3	197	.69	0	0	0			
30	1.3	194	.68	0	0	0			
31	---	---	---	0	0	0			
TOTAL	45.9	---	58.57	16.37	---	9.86			

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	0	0	0	.07	34	.01	.17	25	.01
2	0	0	0	.05	31	0	.17	25	.01
3	0	0	0	8.5	40300	3150	.15	20	.01
4	0	0	0	16	91000	4850	.07	10	0
5	0	0	0	22	114000	7210	.17	25	.01
6	0	0	0	4.3	54000	627	10	70800	2860
7	0	0	0	2.3	33000	205	1.5	37500	152
8	0	0	0	1.2	3500	11	.70	858	1.6
9	0	0	0	.57	565	.87	.50	472	.64
10	0	0	0	.27	351	.26	.40	399	.43
11	0	0	0	.19	43	.02	.20	433	.23
12	0	0	0	.21	28	.02	.10	410	.11
13	0	0	0	.04	24	0	0	0	0
14	0	0	0	.01	21	0	.20	450	.24
15	0	0	0	.04	20	0	.40	450	.49
16	0	0	0	.15	40	.02	1.1	450	1.3
17	0	0	0	.11	20	.01	1.2	575	1.9
18	0	0	0	.07	10	0	2.0	700	3.8
19	240	131000	152000.0	.05	10	0	1.2	576	1.9
20	35	85000	8030	.11	20	.01	6.5	52600	1160
21	30	189000	15300	.02	10	0	4.1	33500	371
22	26	66000	4630	0	0	0	3.9	6320	67
23	23	65000	4040	.05	10	0	9.0	39000	948
24	18	85000	4130	.13	20	.01	3.0	23000	186
25	2.7	55000	401	.13	20	.01	1.8	2580	13
26	.94	31000	79	.17	25	.01	1.4	1580	6.0
27	.40	4080	4.4	.09	10	0	1.4	1020	3.9
28	.25	330	.22	.13	20	.01	1.2	741	2.4
29	1.2	307	.99	.13	20	.01	1.3	526	1.8
30	.40	400	.43	.15	25	.01	1.4	697	2.6
31	.17	419	.19	.19	30	.02	---	---	---
TOTAL	378.06	---	188616.2	57.43	---	16054.30	55.23	---	5786.38
YEAR	1094.25		235903.2						

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona--Continued

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1.0	700	1.9	3.0	10000	81	2.0	455	2.5
2	1.0	670	1.8	2.0	26000	140	2.0	542	2.9
3	1.0	630	1.7	15	44500	1800	2.0	660	3.6
4	.90	540	1.3	5.0	16000	216	2.0	643	3.5
5	1.0	520	1.4	2.0	4000	22	2.0	1130	6.1
6	2.0	625	3.4	2.0	1900	10	2.0	395	2.1
7	2.0	790	4.3	2.0	810	4.4	2.0	381	2.1
8	2.0	980	5.3	1.8	750	3.6	2.0	464	2.5
9	2.0	900	4.9	2.5	1100	7.4	2.0	610	3.3
10	2.0	850	4.6	2.2	1230	7.3	2.0	606	3.3
11	2.0	810	4.4	1.9	720	3.7	2.0	533	2.9
12	2.0	710	3.8	1.9	570	2.9	2.0	428	2.3
13	2.0	920	5.0	1.9	630	3.2	3.0	567	4.6
14	2.0	1340	7.2	1.9	670	3.4	2.0	349	1.9
15	2.0	1030	5.6	1.9	570	2.9	2.0	501	2.7
16	2.0	850	4.6	2.0	560	3.0	3.0	578	4.7
17	2.0	750	4.0	2.0	520	2.8	3.0	542	4.4
18	2.0	670	3.6	2.0	480	2.6	3.0	606	4.9
19	2.0	630	3.4	2.0	470	2.5	3.0	495	4.0
20	2.0	610	3.3	2.0	463	2.5	2.0	615	3.3
21	2.0	890	4.8	2.0	414	2.2	2.0	797	4.3
22	3.0	7000	57	2.0	528	2.9	2.0	740	4.0
23	18	55600	3210	2.0	553	3.0	2.0	513	2.8
24	8.6	40800	996	2.0	435	2.3	2.0	509	2.7
25	3.5	31000	293	2.0	438	2.4	2.0	152	.82
26	1.5	10000	41	2.0	663	3.6	6.0	258	4.2
27	1.9	10700	55	2.0	978	5.3	4.0	154	1.7
28	38	87000	11400	2.0	560	3.0	5.0	240	3.2
29	20	55900	3200	2.0	540	2.9	4.0	263	2.8
30	15	31600	1330	2.0	426	2.3	4.0	309	3.3
31	9.2	22500	559	---	---	---	3.0	292	2.4
TOTAL	155.60	---	21221.3	77.0	---	2351.1	81.0	---	99.82

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	3.0	225	1.8	3.0	696	5.6	2.0	380	2.1
2	6.0	228	3.7	2.0	912	4.9	2.0	3110	17
3	4.0	297	3.2	3.0	515	4.2	2.0	2550	14
4	4.0	389	4.2	3.0	494	4.0	2.0	2520	14
5	4.0	286	3.1	3.0	523	4.2	2.0	2400	13
6	3.0	163	1.3	2.0	407	2.2	2.0	1200	6.5
7	3.0	165	1.3	2.0	508	2.7	2.5	900	6.1
8	3.0	320	2.6	2.0	485	2.6	2.5	890	6.0
9	3.0	277	2.2	2.0	455	2.5	2.8	840	6.4
10	3.0	509	4.1	2.0	535	2.9	2.5	790	5.3
11	3.0	331	2.7	2.0	514	2.8	2.5	700	4.7
12	4.0	318	3.4	2.0	337	1.8	3.2	610	5.3
13	3.0	391	3.2	2.0	422	2.3	3.5	850	8.0
14	5.0	306	4.1	2.0	432	2.3	3.5	1020	9.6
15	6.0	344	5.6	2.0	457	2.5	3.7	1100	11
16	6.0	202	3.3	2.0	332	1.8	4.3	2370	28
17	5.0	239	3.2	2.0	339	1.8	4.1	4480	50
18	5.0	364	4.9	2.0	340	1.8	2.8	2410	18
19	3.0	261	2.1	2.0	230	1.2	2.5	1120	7.6
20	2.0	350	1.9	2.0	238	1.3	2.2	900	5.3
21	2.0	352	1.9	2.0	218	1.2	1.8	636	3.1
22	2.0	343	1.9	2.0	214	1.2	1.6	492	2.1
23	2.0	385	2.1	2.0	372	2.0	1.6	509	2.2
24	2.0	460	2.5	2.0	358	1.9	1.5	370	1.5
25	3.0	691	5.6	2.0	261	1.4	1.5	415	1.7
26	4.0	1440	16	2.0	356	1.9	1.8	408	2.0
27	3.0	1200	9.7	2.0	237	1.3	2.2	426	2.5
28	2.0	687	3.7	2.0	393	2.1	2.5	567	3.8
29	2.0	758	4.1	---	---	---	2.8	577	4.4
30	2.0	749	4.0	---	---	---	2.3	578	3.6
31	3.0	796	6.4	---	---	---	2.3	364	2.3
TOTAL	105.0	---	119.8	60.0	---	68.4	76.5	---	267.1

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona--Continued

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	2.3	399	2.5	1.4	126	.48	1.3	102	.36
2	2.2	362	2.2	1.4	202	.76	2.0	84	.45
3	2.0	444	2.4	1.4	189	.71	1.0	123	.33
4	2.0	374	2.0	1.3	205	.72	1.0	135	.36
5	2.0	366	2.0	1.4	226	.85	1.0	118	.32
6	2.0	333	1.8	1.8	287	1.4	1.0	144	.39
7	2.0	320	1.7	1.5	204	.83	.90	124	.30
8	2.0	317	1.7	1.5	129	.52	.80	139	.30
9	2.0	328	1.8	2.0	114	.62	.70	124	.23
10	2.0	276	1.5	2.0	130	.70	.70	108	.20
11	2.0	304	1.6	2.0	242	1.3	.48	131	.17
12	2.0	438	2.4	2.0	134	.72	.53	124	.18
13	2.0	446	2.4	2.0	134	.72	.53	87	.12
14	2.0	502	2.7	2.0	127	.69	.44	147	.17
15	2.0	293	1.6	2.0	104	.56	.25	95	.06
16	2.0	243	1.3	3.0	148	1.2	.11	136	.04
17	2.0	260	1.4	3.0	150	1.2	0	0	0
18	2.0	268	1.4	3.0	133	1.1	0	0	0
19	2.0	307	1.7	3.0	144	1.2	.07	10	0
20	2.0	315	1.7	2.0	141	.76	.53	85	.12
21	2.0	270	1.5	2.0	193	1.0	.31	50	.04
22	2.0	310	1.7	1.4	304	1.1	.05	10	0
23	2.0	153	.83	1.5	162	.66	0	0	0
24	2.0	172	.93	1.4	157	.59	0	0	0
25	2.0	173	.93	1.3	136	.48	0	0	0
26	1.0	177	.48	1.3	167	.59	0	0	0
27	1.0	156	.42	1.2	110	.36	0	0	0
28	2.0	180	.97	1.3	133	.47	0	0	0
29	2.0	159	.86	1.4	105	.40	0	0	0
30	1.5	260	1.1	1.4	149	.56	0	0	0
31	---	---	---	1.3	185	.65	---	---	---
TOTAL	58.0	---	47.52	55.2	---	23.90	13.70	---	4.14

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	0	0	0	3.0	68	.55	.13	10	0
2	0	0	0	2.0	36	.19	.21	20	.01
3	0	0	0	2.0	24	.13	.27	22	.02
4	0	0	0	2.0	132	.71	.53	40	.06
5	.15	50	.02	2.0	66	.36	.53	40	.06
6	3.0	2000	16	1.0	37	.10	.44	50	.06
7	.86	502	1.2	.80	40	.09	.57	188	.29
8	.66	418	.74	.50	52	.07	6.3	11700	788
9	1.0	861	2.3	.50	45	.06	50	93400	12800
10	.44	495	.59	.50	30	.04	46	74900	9270
11	44	61200	12800	.20	10	.01	8.7	66000	1550
12	300	188000	169000.0	2.8	80	.60	35	66300	9430
13	500	179000	242000.0	1.0	102	.28	595	108000	200000.0
14	52	143000	23000	.48	38	.05	179	93000	44900
15	460	130000	161000.0	.31	70	.06	20	55000	2970
16	10	86000	2320	.27	36	.03	6.3	28000	476
17	130	97000	34000	.27	67	.05	2.5	5000	34
18	10	80000	2160	.27	75	.05	102	15400	49000
19	6.0	37000	599	.19	52	.03	260	137000	105000.0
20	4.0	6000	65	.05	20	0	30	89000	7210
21	3.0	1240	10	.43	50	.06	90	105000	25500
22	2.0	100	.54	.96	76	.20	6.0	45000	729
23	2.0	46	.25	.57	50	.08	3.5	14000	132
24	2.0	38	.21	.31	42	.04	1.6	2700	12
25	2.0	118	.64	.17	42	.02	1.4	436	1.6
26	1.0	149	.40	.09	42	.01	1.1	321	.95
27	4.0	153	1.7	.09	40	.01	.86	111	.26
28	3.0	66	.53	.13	30	.01	.86	103	.24
29	150	104000	72000	.09	30	.01	.86	72	.17
30	6.0	31000	502	.07	10	0	.86	22	.05
31	4.0	3910	42	.09	5	0	---	---	---
TOTAL	1701.11	---	719523.1	23.14	---	3.90	1450.52	---	469804.8
YEAR	3856.77		1213535						

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona--Continued

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	.86	35	.08	2.3	272	1.7	3.0	438	3.5
2	.78	10	.02	2.4	291	1.9	3.0	490	4.0
3	.78	15	.03	2.4	300	1.9	3.0	363	2.9
4	.78	17	.04	2.4	296	1.9	3.0	456	3.7
5	.86	21	.05	2.4	316	2.0	3.0	646	5.2
6	.86	19	.04	2.4	280	1.8	3.0	538	4.4
7	1.0	24	.06	2.3	408	2.5	3.0	558	4.5
8	1.0	124	.33	2.4	330	2.1	3.0	402	3.3
9	1.0	40	.11	2.3	311	1.9	3.0	402	3.3
10	1.0	27	.07	2.3	285	1.8	3.0	388	3.1
11	1.0	50	.14	2.2	250	1.5	3.0	460	3.7
12	1.0	42	.11	1.9	266	1.4	3.0	393	3.2
13	1.0	46	.12	1.8	272	1.3	3.5	289	2.7
14	1.1	60	.18	1.9	399	2.0	3.5	280	2.6
15	.94	55	.14	2.2	389	2.3	1.2	286	.93
16	1.4	369	1.4	2.3	384	2.4	1.3	279	.98
17	1.6	140	.60	2.3	336	2.1	1.6	258	1.1
18	1.8	104	.50	2.3	341	2.1	1.6	284	1.2
19	1.8	106	.51	2.3	363	2.3	1.6	266	1.1
20	1.6	106	.46	2.0	489	2.6	2.0	260	1.4
21	1.8	93	.45	2.2	334	2.0	2.7	229	1.7
22	1.8	106	.52	2.2	339	2.0	4.3	444	5.2
23	1.6	116	.50	2.0	350	1.9	5.0	792	11
24	1.5	87	.35	2.0	476	2.6	2.8	454	3.4
25	1.5	88	.36	2.0	608	3.3	1.8	375	1.8
26	1.8	116	.56	2.0	550	3.0	1.4	365	1.4
27	1.9	141	.72	3.0	470	3.8	1.6	367	1.6
28	2.0	125	.68	4.0	1290	14	2.3	365	2.3
29	1.9	109	.56	4.0	1340	14	1.2	375	1.2
30	1.9	115	.59	3.0	620	5.0	2.5	195	1.3
31	2.2	114	.68	---	---	---	2.2	273	1.6
TOTAL	42.06	---	10.96	71.2	---	91.1	80.1	---	89.31

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	2.4	277	1.8	2.0	390	2.1	2.0	272	1.5
2	1.4	371	1.4	3.0	700	5.7	2.0	292	1.6
3	1.0	246	.66	4.0	942	10	2.0	283	1.5
4	1.0	192	.52	5.0	1450	20	2.0	282	1.5
5	2.0	209	1.1	10	980	26	2.0	342	1.8
6	2.0	248	1.3	6.0	625	10	2.0	376	2.0
7	2.0	253	1.4	4.0	734	7.9	2.0	327	1.8
8	2.0	251	1.4	2.0	383	2.1	2.0	315	1.7
9	2.0	268	1.4	2.0	337	1.8	2.0	287	1.5
10	2.0	316	1.7	2.0	330	1.8	2.0	250	1.4
11	2.0	477	2.6	2.0	315	1.7	2.0	223	1.2
12	2.0	376	2.0	2.0	198	1.1	2.0	208	1.1
13	2.0	381	2.1	2.0	203	1.1	2.0	221	1.2
14	2.0	390	2.1	2.0	191	1.0	2.0	179	.97
15	2.0	479	2.6	2.0	179	.97	2.0	216	1.2
16	2.0	426	2.3	2.0	195	1.1	2.0	228	1.2
17	2.0	552	3.0	2.0	218	1.2	2.0	214	1.2
18	2.0	485	2.6	2.0	258	1.4	2.0	352	1.9
19	2.0	508	2.7	2.0	158	.85	1.9	355	1.8
20	2.0	525	2.8	2.0	134	.72	1.8	310	1.5
21	2.0	456	2.5	2.0	152	.82	2.0	178	.96
22	2.0	510	2.8	2.0	127	.69	2.2	152	.90
23	2.0	498	2.7	2.0	306	1.7	2.2	246	1.5
24	2.0	450	2.4	2.0	251	1.4	1.9	321	1.6
25	2.0	413	2.2	2.0	270	1.5	1.8	266	1.3
26	2.0	351	1.9	2.0	236	1.3	1.5	200	.81
27	2.0	597	3.2	2.0	240	1.3	1.6	300	1.3
28	2.0	424	2.3	2.0	178	.96	1.8	282	1.4
29	2.0	367	2.0	2.0	166	.90	1.9	207	1.1
30	2.0	414	2.2	---	---	---	1.8	182	.88
31	2.0	459	2.5	---	---	---	1.9	191	.98
TOTAL	59.8	---	64.18	78.0	---	109.11	60.3	---	42.30

Table 3.--Stream and suspended-sediment discharge, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona--Continued

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1.9	177	.91	1.3	760	2.7	.48	182	.24
2	1.8	167	.81	1.4	746	2.8	.31	175	.15
3	1.9	168	.86	1.6	197	.85	.25	196	.13
4	2.0	164	.89	1.8	210	1.0	.17	181	.08
5	2.0	184	.99	2.0	218	1.2	.13	180	.06
6	2.3	193	1.2	1.8	166	.81	.11	180	.05
7	2.3	231	1.4	1.9	195	1.0	.05	180	.02
8	2.0	193	1.0	1.9	218	1.1	.05	180	.02
9	1.8	195	.95	2.0	224	1.2	.01	68	.01
10	1.8	254	1.2	2.0	185	1.0	0	0	0
11	1.8	166	.81	2.0	192	1.0	0	0	0
12	1.5	167	.68	1.9	206	1.1	0	0	0
13	1.4	176	.67	1.8	174	.84	0	0	0
14	1.9	214	1.1	1.3	158	.55	0	0	0
15	2.5	262	1.8	1.3	160	.56	0	0	0
16	3.0	269	2.2	1.2	185	.60	0	0	0
17	2.5	258	1.7	1.1	140	.42	0	0	0
18	2.0	185	1.0	1.2	156	.51	0	0	0
19	2.0	178	.96	1.3	186	.65	0	0	0
20	2.0	175	.94	1.4	166	.63	0	0	0
21	1.9	176	.90	5.0	30000	405	0	0	0
22	1.8	187	.91	3.0	6670	54	0	0	0
23	1.7	196	.90	1.5	610	2.5	0	0	0
24	1.6	179	.77	1.4	760	2.9	0	0	0
25	1.5	230	.93	1.3	250	.88	0	0	0
26	1.4	201	.76	1.2	220	.71	0	0	0
27	1.3	185	.65	1.0	204	.55	0	0	0
28	1.4	212	.80	.44	294	.35	0	0	0
29	1.5	198	.80	.40	158	.17	0	0	0
30	1.4	198	.75	.36	164	.16	0	0	0
31	---	---	---	.44	188	.22	---	---	---
TOTAL	55.9	---	30.24	48.24	---	487.96	1.56	---	.76

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	0	0	0	14	88800	3840	0	0	0
2	0	0	0	4.0	39000	421	0	0	0
3	0	0	0	2.8	14500	110	0	0	0
4	0	0	0	1.3	850	3.0	0	0	0
5	0	0	0	.10	193	.05	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	3.2	765	6.7
8	0	0	0	20	95300	7720	4.9	811	11
9	0	0	0	7.8	107000	2250	1.8	97	.47
10	0	0	0	2.8	75500	571	1.8	131	.64
11	0	0	0	.90	64000	156	1.5	451	1.8
12	0	0	0	.30	10000	8.1	1.8	380	1.8
13	0	0	0	.10	1000	.27	.90	301	.73
14	0	0	0	0	0	0	.70	136	.26
15	0	0	0	0	0	0	.40	75	.08
16	0	0	0	0	0	0	.20	139	.08
17	0	0	0	0	0	0	.10	101	.03
18	0	0	0	0	0	0	0	585	0
19	0	0	0	0	0	0	0	121	0
20	3.2	32500	527	46	73900	16300	.10	165	.04
21	1.9	5000	26	4.4	41000	487	.60	254	.41
22	0	0	0	1.1	154	.46	3.6	5500	54
23	0	0	0	.30	89	.07	3.6	25800	251
24	0	0	0	.40	276	.30	2.8	108000	816
25	0	0	0	.10	100	.03	1600	262000	1600000
26	66	150000	26700	0	0	0	600	60000	97200
27	52	147000	23300	0	0	0	100	36000	9720
28	27	174000	13200	0	0	0	11	21000	624
29	40	215000	23200	0	0	0	4.0	920	9.9
30	4.0	74000	799	0	0	0	2.8	206	1.6
31	238	208000	252000.0	0	0	0	---	---	---
TOTAL	432.10	---	339752.0	106.40	---	31867.28	2345.80	---	1708701
YEAR	3381.46		2081246						

Table 4.--Specific conductance, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	1000	990	1010	920	1800	1090	1000		---	3200	---
2	---	1000	990	1180	980	3000	1440	1100		---	3600	---
3	960	1000	900	1200	950	3000	1250	1110		---	3400	---
4	---	1000	900	1250	950	2500	1220	1160		---	2600	---
5	1080	1010	---	1320	950	2500	1200	1150		---	3500	---
6	---	1030	---	1200	950	2000	1050	1100		---	4000	4000
7	---	1050	1000	1090	950	1900	1020	1100		---	2900	3500
8	---	1000	920	1050	980	1600	1000	1100		---	2200	3500
9	---	990	890	1190	1000	1400	1470	1080		---	2300	3200
10	---	990	900	1200	1000	1280	1600	1120		---	2300	3000
11	1070	990	980	1200	910	1220	1400	1180		---	2500	3000
12	1000	990	905	1200	910	1200	1350	2200		---	2500	3500
13	1100	1000	850	1050	960	1450	1250	1580		---	2500	---
14	1000	1000	850	1050	990	1190	1180	1750		---	2900	---
15	1000	1000	860	1020	1000	1120	1050	1750		---	---	---
16	1000	1000	860	1000	1000	1150	1000	2200		---	---	---
17	990	1010	900	1020	1000	1120	990	2200		---	---	---
18	990	1000	880	1020	1010	1120	1000	1900		---	---	---
19	980	2200	950	1020	1000	1100	1100	1900		3780	---	1430
20	980	1600	1070	1050	1000	1100	1100	3900		3170	---	2600
21	980	1100	1120	1110	980	1100	1100	4000		2830	---	2900
22	980	1190	1150	1120	980	1100	1100	2990		2210	---	2300
23	1150	1070	1100	1100	950	1100	1000	2100		2080	---	---
24	1220	1030	1050	1150	950	1100	1020	1450		2600	---	2080
25	1150	1110	1050	1150	950	1070	1020	1400		2500	---	1480
26	1050	1100	1000	1030	950	1070	1200	1450		---	---	1350
27	1000	1100	1050	1150	950	1000	1350	1470		2220	---	1180
28	950	1120	980	1150	900	1050	1220	1550[e]		2250	---	1200
29	920	1180	990	1150	---	1000	1170	---		2200	---	1200
30	1300	1090	900	1150	---	1350	1100	---		2900	---	1060
31	1100	---	1000	950	---	1350	---	---		3200	---	---
MONTH	---	1100	965	1110	965	1450	1170	1720		---	---	---

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1050	1750	1050	1010	1000	1100	1150	990	1000	---	1570	---
2	1000	1550	1010	1000	1000	2500	1180	980	1010	---	1650	---
3	1050	1930	1000	890	1000	2200	1150	1200	1020	---	1790	1200
4	1100	1480	990	1020	1010	2200	1120	1200	1110	---	1800	---
5	1080	1350	990	1050	980	2200	1300	1110	1100	---	1820	---
6	1050	1300	990	1010	1000	1500	1300	1040	1150	---	2000	---
7	1000	1210	990	1040	980	1200	1300	1020	1180	2600	2000	1420
8	1020	1200	1000	950	990	1250	1300	990	1190	2800	2050	1210
9	1000	1180	980	890	980	1240	1380	980	1080	2350	2150	1900
10	1000	1190	1150	1000	1020	1240	1200	940	1100	3200	---	2600
11	980	1200	1190	1070	1000	1310	1190	960	1150	2320	---	2600
12	1000	1100	1180	1150	1010	1210	1200	960	1190	3930	1950	2400
13	1000	1100	1050	1100	1010	1150	1190	980	1190	2690	2100	1340
14	1020	1080	1190	1180	1010	1650	1190	1020	1150	4070	2000	1350
15	1150	1080	1180	1140	1000	1800	1270	980	1220	2080	2000	1780
16	1150	1090	1200	1000	1010	1590	1320	1070	1400	2130	2050	1800
17	980	1080	1010	990	1070	2100	1320	1070	1580	1480	2000	1750
18	950	1050	1000	990	1070	2500	1320	1070	---	1850	2050	1650
19	950	1100	1000	890	1100	2100	1140	980	---	1950	2100	2400
20	950	1100	990	890	1050	1960	1200	950	---	1950	---	1480
21	960	1080	950	900	1010	1700	1160	1150	---	1900	---	1980
22	1700	1080	910	900	1020	1450	1160	1100	---	1900	1570	1800
23	2100	1080	1090	920	1190	1400	1160	1000	---	1900	---	1650
24	2250	1070	1090	920	1150	1300	1180	970	---	1900	1950	1600
25	2450	1100	1200	870	1010	1300	1180	970	---	1900	1950	1770
26	1650	1020	1300	830	1000	1300	1500	1010	---	2000	1970	1500
27	1460	1020	1250	810	1070	1280	1350	1010	---	1850	---	1420
28	2930	1020	1250	890	1130	1210	1220	1010	---	1600	---	1390
29	2070	1020	1100	890	---	1210	1200	1010	---	1980	---	1300
30	1800	1150	1100	940	---	1210	1150	1050	---	1770	---	1250
31	1600	---	1010	950	---	1200	---	1010	---	1600	---	---
MONTH	1340	1190	1080	970	1030	1570	1230	1030	---	2230	---	1700

YEAR MAX 4070 MIN 810 MEAN 1350

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1390	860	1300	860	870	940	1030	1040	1150	---	2550	---
2	1380	870	1300	1060	---	950	1070	1040	1180	---	2400	---
3	---	850	960	1090	970	1040	955	1040	1200	---	2400	---
4	1300	830	810	990	975	1040	1140	1080	1200	---	2300	1480
5	1220	790	850	1010	980	1000	1140	1040	---	---	2300	1180
6	1210	810	800	890	975	1020	1120	1070	---	---	2400	1460
7	1210	830	800	885	965	940	980	1090	---	---	---	1450
8	1250	800	800	870	990	925	1000	1070	---	---	2000	982
9	1250	800	800	860	1010	940	980	1060	---	---	2600	1740
10	1250	820	780	820	1090	950	965	1030	---	---	2500	1760
11	1210	800	850	840	1070	935	1100	1020	---	---	2400	1500
12	1210	880	800	770	1040	990	1030	1010	---	---	---	1280
13	1210	890	700	820	1010	965	1080	1080	---	---	---	1150
14	1200	920	890	855	1060	1000	1110	1090	---	---	---	1290
15	1200	880	900	875	1040	920	1140	1100	---	---	---	1550
16	1180	880	1050	790	975	935	1360	1070	---	---	---	1550
17	1220	820	1150	780	1060	940	1120	1040	---	---	---	1450
18	1100	820	1150	815	925	900	1100	1060	---	---	---	1410
19	1070	850	770	830	1050	960	970	1040	---	---	---	1370
20	1070	920	860	815	1050	1010	970	1060	---	---	1690	1180
21	1150	900	950	855	1090	975	930	1320	---	---	1600	1160
22	1150	910	750	770	1050	950	915	1100	---	---	1520	1310
23	1120	890	730	790	1030	925	915	1120	---	---	1410	1170
24	1120	950	740	710	980	1110	940	1060	---	---	1440	2600
25	1100	890	780	805	1030	1130	975	1040	---	---	1460	2090
26	1090	900	820	800	1010	1080	930	1070	---	---	---	1360
27	1050	900	820	800	965	1010	955	1060	---	3000	---	1400
28	1060	920	900	920	990	1030	930	1040	---	2700	885	1320
29	1040	930	880	870	940	950	930	1100	---	2700	---	1210
30	1020	1220	900	850	---	990	965	1160	---	3000	1990	1260
31	1020	---	880	890	---	---	---	1240	---	2600	2400	---
MONTH	1170	878	886	858	1010	984	1020	1080	---	---	---	1430

YEAR MAX 3000 MIN 700 MEAN 1130

Table 5.--Water temperature, water years 1974-76, for gaging station 09401260, Moenkopi Wash at Moenkopi, Arizona

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	12.0	5.0	0.0	---	---	12.0	27.0		---	22.0	---
2	---	14.0	4.0	0.0	---	---	15.0	22.0		---	21.0	---
3	11.0	10.0	4.0	0.0	---	---	14.0	26.0		---	25.0	---
4	---	11.0	3.0	0.0	---	---	14.0	28.0		---	21.0	---
5	---	3.5	---	0.0	---	---	16.0	29.0		---	22.5	---
6	---	3.5	---	0.0	---	---	19.0	18.5		---	20.0	24.0
7	---	15.0	7.0	0.0	---	---	11.0	30.0		---	18.0	18.0
8	---	15.0	2.0	0.0	---	---	8.0	31.0		---	19.0	21.0
9	---	14.0	8.0	0.0	---	---	9.0	14.0		---	18.0	25.0
10	---	15.0	1.0	1.0	---	---	11.0	12.0		---	19.0	25.0
11	19.5	15.0	2.0	1.0	---	17.0	11.0	13.0		---	18.0	22.0
12	11.0	14.0	4.0	2.0	---	---	15.0	17.0		---	16.0	13.0
13	15.0	---	4.0	0.0	---	---	5.0	12.0		---	17.0	---
14	16.0	---	5.0	---	---	10.0	9.0	14.0		---	16.0	---
15	14.0	---	1.0	---	---	13.0	18.0	14.0		---	---	---
16	18.0	---	1.0	---	---	13.0	19.0	12.0		---	---	---
17	18.0	---	4.0	---	---	14.0	9.0	19.0		---	---	---
18	12.0	---	4.0	---	---	9.0	---	16.0		---	---	---
19	17.0	---	0.0	---	---	10.0	14.0	16.0		22.0	---	22.0
20	18.0	---	0.0	---	9.5	13.0	7.0	14.0		25.0	---	24.0
21	8.0	2.0	0.0	---	---	19.0	19.0	---		23.0	---	20.0
22	10.0	3.0	0.0	---	---	14.5	11.0	13.0		26.0	---	19.0
23	16.0	8.0	0.0	---	---	9.0	14.0	15.0		26.0	---	---
24	17.0	8.0	0.0	---	---	20.0	14.0	11.0		20.0	---	18.0
25	18.0	4.0	0.0	---	---	19.0	12.0	12.0		22.0	---	15.0
26	13.0	4.0	0.0	---	---	10.0	20.0	20.0		---	---	13.0
27	10.0	3.0	0.0	---	---	20.0	13.0	19.0		29.5	---	17.0
28	12.0	3.0	0.0	---	---	16.0	21.0	18.0		22.0	---	7.0
29	11.0	4.0	0.0	---	---	21.0	25.0	---		26.0	---	8.0
30	13.0	4.0	4.0	---	---	16.0	16.0	---		25.0	---	8.0
31	15.0	---	0.0	---	---	16.0	---	---		21.0	---	---
MONTH	---	---	2.0	---	---	---	14.0	18.5		---	---	---

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.0	9.5	5.0	2.0	6.0	14.0	5.0	18.0	30.0	---	21.0	---
2	10.0	6.0	5.0	2.0	6.0	10.0	2.0	25.0	16.0	---	23.0	---
3	13.0	8.5	5.0	1.0	4.0	4.0	7.0	12.0	12.0	---	18.0	11.0
4	9.0	7.5	7.0	2.0	5.0	10.0	12.0	16.0	12.0	---	19.0	---
5	11.0	7.0	8.0	2.0	8.0	11.0	6.0	8.0	14.0	---	20.0	---
6	10.0	3.0	6.0	3.0	6.0	11.0	10.0	12.5	14.0	---	21.0	---
7	13.0	10.0	6.0	3.0	7.0	13.0	11.0	7.0	15.0	28.0	20.0	22.0
8	13.0	11.0	6.0	3.0	8.0	11.0	7.0	26.0	25.0	19.0	20.0	22.0
9	12.0	5.0	5.0	3.0	7.0	11.0	9.0	24.0	28.0	33.0	20.0	16.0
10	12.0	9.0	5.0	1.0	9.0	10.0	20.0	10.0	18.0	27.0	---	20.0
11	17.0	5.0	7.0	1.0	10.0	10.0	19.0	22.0	26.0	24.5	---	18.0
12	13.0	11.0	8.0	2.0	9.0	11.0	16.0	26.0	24.0	23.5	21.0	16.0
13	11.0	5.0	3.0	2.0	8.0	13.0	18.0	29.0	28.0	25.0	19.0	12.0
14	9.0	5.0	1.0	3.0	10.0	10.0	21.0	11.0	29.0	24.0	20.0	15.0
15	7.0	6.0	3.0	2.0	8.0	15.0	20.0	14.0	19.0	22.5	19.0	16.0
16	7.0	4.0	4.0	3.0	10.0	6.0	18.0	22.0	14.0	22.5	28.0	17.0
17	8.0	8.0	3.0	2.0	8.0	14.0	10.0	12.0	14.0	23.0	17.0	18.0
18	9.0	4.0	3.0	2.0	8.0	17.0	7.0	30.0	---	19.0	16.0	17.0
19	9.0	5.0	3.0	2.0	10.0	12.0	20.0	14.0	---	19.0	16.0	17.0
20	12.0	3.0	3.0	2.0	8.0	16.0	19.0	11.0	---	20.0	---	18.0
21	11.0	4.0	3.0	2.0	6.0	17.0	26.0	8.0	---	20.0	---	14.0
22	12.0	12.0	4.0	2.0	7.0	7.0	20.0	8.0	---	28.0	33.0	12.0
23	11.5	5.0	4.0	3.0	8.0	15.0	18.0	10.0	---	29.0	---	12.0
24	12.5	2.0	3.0	4.0	7.0	15.0	22.0	29.0	---	22.0	16.0	13.0
25	13.0	6.5	1.0	2.0	10.0	11.0	10.0	19.0	---	22.0	15.0	12.0
26	12.5	8.0	2.0	4.0	12.0	12.0	18.0	14.0	---	25.0	15.0	12.0
27	12.5	7.0	2.0	2.0	12.0	7.0	19.0	22.0	---	20.0	---	13.0
28	11.5	6.0	2.0	3.0	11.0	6.0	22.0	24.0	---	28.0	---	14.0
29	9.0	5.0	2.0	4.0	---	6.0	19.0	12.0	---	21.5	---	14.0
30	8.5	1.0	2.0	3.0	---	2.0	11.0	18.0	---	19.0	---	23.0
31	10.0	---	1.0	3.0	---	6.0	---	16.0	---	21.0	---	---
MONTH	11.0	6.5	4.0	2.5	8.0	10.5	14.5	17.0	---	23.5	---	16.0
YEAR	MAX	33.0	MIN	1.0	MEAN	12.0						

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.0	9.0	4.0	2.0	8.0	10.0	14.0	20.0	26.0	---	20.0	---
2	12.0	5.0	4.0	4.0	---	8.0	15.0	22.0	28.0	---	22.0	---
3	---	6.0	2.0	1.0	8.0	6.0	19.0	12.0	26.0	---	22.0	---
4	13.0	5.0	4.0	1.0	7.0	---	19.0	18.0	14.0	---	19.0	17.0
5	14.0	5.0	4.0	2.0	6.0	9.0	11.0	19.0	---	---	24.0	24.0
6	11.0	7.5	4.0	3.0	5.0	10.0	16.0	16.0	---	---	22.0	19.0
7	13.0	12.0	4.0	2.0	8.0	5.0	6.0	17.0	---	---	---	18.0
8	9.0	6.0	6.0	2.0	9.0	10.0	6.0	18.0	---	---	18.0	19.0
9	8.0	5.0	7.0	2.0	10.0	12.0	6.0	12.0	---	---	14.0	22.0
10	10.0	5.0	7.0	3.0	8.0	10.0	18.0	24.0	---	---	16.0	26.0
11	13.0	11.0	6.0	2.0	6.0	10.0	16.0	26.0	---	---	14.0	22.0
12	12.0	2.0	5.0	3.0	12.0	9.0	15.0	24.0	---	---	---	20.0
13	10.0	10.0	5.0	4.0	10.0	6.0	15.0	26.0	---	---	---	18.0
14	9.0	3.0	3.0	3.0	10.0	12.0	12.0	28.0	---	---	---	12.0
15	12.0	3.0	2.0	1.0	9.0	14.0	11.0	14.0	---	---	---	17.0
16	7.0	4.0	4.0	4.0	11.0	10.0	10.0	24.0	---	---	---	15.0
17	8.0	2.0	4.0	4.0	10.0	14.0	15.0	26.0	---	---	---	15.0
18	9.0	8.0	2.0	2.0	12.0	12.0	12.0	16.0	---	---	---	13.0
19	10.0	2.0	3.0	4.0	12.0	6.0	6.0	19.0	---	---	---	12.0
20	10.0	3.0	3.0	4.0	10.0	4.0	7.0	22.0	---	---	24.0	11.0
21	10.0	1.0	4.0	4.0	10.0	13.0	18.0	18.0	---	---	19.0	15.0
22	9.0	6.0	3.0	4.0	10.0	12.0	11.0	19.0	---	---	22.0	18.0
23	8.0	5.0	2.0	3.0	9.0	14.0	12.0	24.0	---	---	19.0	16.0
24	4.0	6.0	5.0	1.0	9.0	15.0	10.0	17.0	---	---	20.0	16.0
25	3.0	3.0	4.0	4.0	10.0	16.0	8.0	19.0	---	---	26.0	14.0
26	4.0	5.0	2.0	3.0	12.0	15.0	6.0	22.0	---	---	---	15.0
27	9.0	3.0	3.0	3.0	10.0	12.0	5.0	25.0	---	24.0	---	19.0
28	6.0	2.0	3.0	5.0	12.0	7.0	8.0	24.0	---	24.0	24.0	15.0
29	16.0	3.0	3.0	10.0	10.0	---	10.0	22.0	---	27.0	---	15.0
30	6.0	3.0	3.0	10.0	---	---	12.0	23.0	---	33.0	24.0	19.0
31	8.0	---	2.0	5.0	---	---	---	15.0	---	21.0	12.0	---
MONTH	9.5	5.0	4.0	3.5	9.5	10.5	11.5	20.5	---	---	---	17.0
YEAR	MAX	33.0	MIN	1.0	MEAN	11.0						

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program

If the name of the site is preceeded by an 8-digit number starting with 09, the site is one where systematic observations are being or have been made. The 8-digit number is called a downstream order number. If the name of the site is preceeded by a 15-digit number of which the first 13 digits are identical to the latitude and longitude of the site, then the site is a miscellaneous site where only random observations are made.

Code for agency analyzing sample: 1028 is U. S. G. S.

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
09401236 - YELLOW WATER CANYON NR SHONTO (LAT 36 30 33 LONG 110 26 20)												
JUL , 1975												
15...	0800	.50	15	60	39	39	10	159	0	380	13	.9
09401240 - MOENKOPI WASH NR SHONTO (LAT 36 24 51 LONG 110 27 28)												
DEC , 1973												
13...	1100	1.5	15	20	170	220	8.3	295	0	1700	26	.5
MAR , 1974												
13...	1220	1.2	15	170	170	220	11	284	0	1700	26	.5
MAY												
08...	1200	.08	15	80	170	260	14	244	0	1700	26	.6
JUL												
25...	1200	E1.0	20	40	160	220	12	265	0	1700	26	.5
SEP												
18...	1100	.91	11	50	140	170	10	223	--	1400	22	.8
FEB , 1975												
27...	0950	.27	11	40	150	190	7.7	250	--	1500	24	.6
JUN												
11...	1100	.10	16	50	170	240	12	274	0	1700	29	.7
MAR , 1977												
17...	0815	--	13	50	150	240	9.2	345	0	1400	28	.4
09401248 - BEGASHIBITO WASH NEAR TONALEA ARIZ (LAT 36 12 58 LONG 110 58 36)												
JAN , 1975												
21...	1400	--	11	10	34	110	3.2	257	--	450	25	.5
JUN												
09...	1330	.05	10	30	34	120	4.5	158	0	480	31	.8
DEC												
11...	1430	E.10	7.5	20	32	110	4.7	256	0	410	28	.4
DEC , 1976												
10...	0930	.02	9.3	30	31	97	2.7	263	0	390	25	.5

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
09401236 - YELLOW WATER CANYON NR SHONTO (LAT 36 30 33 LONG 110 26 20)												
JUL , 1975												
15...	.96	.00	729	.99	460	330	.8	940	7.8	21.0	120	1028
09401240 - MOENKOPI WASH NR SHONTO (LAT 36 24 51 LONG 110 27 28)												
DEC , 1973												
13...	1.8	.04	2810	3.82	1500	1300	2.5	3032	7.9	.0	130	1028
MAR , 1974												
13...	2.4	.02	2840	3.86	1600	1300	2.4	3090	7.9	17.0	120	1028
MAY												
08...	.05	.01	2820	3.84	1400	1200	3.0	3050	8.1	25.0	160	1028
JUL												
25...	1.3	.01	2840	3.86	1500	1300	2.5	3010	7.9	--	200	1028
SEP												
18...	2.7	.04	2360	3.21	1300	1100	2.1	2500	7.7	20.0	140	1028
FEB , 1975												
27...	3.1	.01	2500	3.40	1400	1200	2.2	2750	8.0	--	120	1028
JUN												
11...	.11	.01	2710	3.69	1400	1200	2.8	3000	8.1	27.5	170	1028
MAR , 1977												
17...	.80	.01	2650	3.60	1300	1000	2.9	2800	8.0	.0	110	1028
09401248 - BEGASHIBITO WASH NEAR TONALEA ARIZ (LAT 36 12 58 LONG 110 58 36)												
JAN , 1975												
21...	.14	.01	907	1.23	460	250	2.2	1120	8.0	1.0	120	1028
JUN												
09...	.00	.00	922	1.25	380	250	2.7	1240	8.5	29.0	190	1028
DEC												
11...	.02	.00	881	1.20	430	220	2.3	1100	8.4	12.0	130	1028
DEC , 1976												
10...	.01	.02	854	1.16	430	210	2.0	1100	7.8	.5	130	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
09401250 - MOENKOPI WASH NR MOENKOPI, ARIZ. (LAT 36 06 36 LONG 111 09 19)												
JUN , 1972												
22...	1330	E200	14	70	79	200	15	196	0	1500	25	.7
SEP												
26...	--	E2.5	10	30	23	100	5.5	243	0	320	10	.7
OCT												
26...	1430	E400	6.3	60	32	64	5.4	78	0	650	8.0	.7
JUL , 1973												
20...	1325	E15	8.3	60	170	630	15	248	0	2700	64	1.2
SEP												
12...	1030	3.7	8.9	100	73	160	9.6	137	0	1100	20	.9
OCT												
03...	0930	1.1	7.9	50	24	140	4.7	231	7	380	14	.8
DEC												
12...	1145	1.7	7.9	30	21	110	4.0	230	0	290	12	.5
MAR , 1974												
11...	1400	3.0	8.6	50	32	110	5.7	219	0	440	12	.7
JUL												
19...	1315	270	15	50	150	240	15	248	0	2300	24	.5
22...	1300	47	14	50	72	120	10	168	0	1100	13	.6
23...	1330	5.8	13	30	66	110	9.6	153	0	1000	13	.6
SEP												
03...	1040	.14	8.3	50	46	190	6.9	208	--	680	22	.8
19...	1030	1.2	8.4	50	36	150	7.6	187	--	580	14	.7
OCT												
31...	1300	8.5	6.8	10	34	120	7.7	136	--	660	9.9	.5
NOV												
25...	1330	2.0	8.2	40	19	110	4.1	245	--	290	10	.5
JAN , 1975												
15...	1215	1.2	13	10	24	120	4.3	314	--	310	15	.5
FEB												
28...	1430	2.3	7.0	30	18	100	3.5	218	--	260	11	.5
MAR												
20...	1330	2.1	9.1	20	53	150	6.3	228	0	610	15	.5
MAY												
06...	1305	2.4	6.7	20	26	130	4.7	247	--	350	19	.6
JUN												
09...	1220	.78	4.1	10	22	140	6.2	216	0	310	17	.7

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
09401250 - MOENKOPI WASH NR MOENKOPI, ARIZ. (LAT 36 06 36 LONG 111 09 19)												
JUN , 1972												
22...	2.4	.01	--	3.20	1300	1200	2.4	2780	7.9	22.0	--	1028
SEP												
26...	.03	--	--	.92	320	120	2.4	950	8.2	21.0	130	1028
OCT												
26...	1.7	.01	1090	1.48	630	570	1.1	1350	7.4	12.0	70	1028
JUL , 1973												
20...	.24	.02	4300	5.85	1600	1400	6.8	4860	7.7	32.0	460	1028
SEP												
12...	3.4	.07	1910	2.60	930	810	2.3	2130	7.4	19.5	60	1028
OCT												
03...	.03	.02	824	1.12	280	80	3.6	1130	8.4	11.0	120	1028
DEC												
12...	.23	.02	640	.87	270	85	2.9	943	8.3	4.0	90	1028
MAR , 1974												
11...	.38	.01	865	1.18	410	230	2.4	1200	8.2	17.0	80	1028
JUL												
19...	.65	.02	3640	4.95	1900	1700	2.4	2250	7.1	25.5	230	1028
22...	1.7	.02	1850	2.52	1000	910	1.6	1900	7.3	28.8	160	1028
23...	.62	.01	1760	2.39	950	820	1.6	1600	7.4	31.0	160	1028
SEP												
03...	.10	.01	1330	1.63	540	370	3.6	1600	8.1	22.5	200	1028
19...	.15	.00	1080	1.47	450	290	3.1	1400	8.1	19.0	130	1028
OCT												
31...	1.7	.02	1140	1.55	510	400	2.3	1490	7.8	11.0	40	1028
NOV												
25...	.03	.00	667	.91	290	90	2.8	950	8.3	9.0	100	1028
JAN , 1975												
15...	.43	.00	747	1.02	330	76	2.9	1100	8.1	1.0	80	1028
FEB												
28...	.04	.01	614	.84	250	70	2.8	901	8.5	18.0	80	1028
MAR												
20...	.39	.01	1190	1.62	570	380	2.7	1580	8.8	17.0	90	1028
MAY												
06...	.00	.00	749	1.02	280	82	3.4	950	--	17.0	130	1028
JUN												
09...	.03	.01	679	.92	220	38	4.2	900	8.7	31.0	120	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
09401250 - MOENKOPI WASH NR MOENKOPI, ARIZ. (LAT 36 06 36 LONG 111 09 19)												
JUL , 1975												
09...	1330	.86	12	10	50	300	15	163	0	1100	22	.9
11...	1230	86	13	10	59	150	15	222	0	910	22	.7
13...	1215	205	13	10	72	130	12	194	0	1100	14	.6
AUG												
11...	1130	.21	7.8	10	49	190	11	146	0	880	22	.7
12...	1415	4.3	9.3	20	44	190	11	183	0	820	14	.8
22...	1415	1.2	7.8	0	29	170	8.0	195	0	590	15	.7
SEP												
23...	1130	3.9	8.3	30	51	85	9.3	103	0	880	21	.6
OCT												
07...	1030	.86	8.6	40	26	110	8.6	165	0	510	9.7	.5
NOV												
06...	1100	2.4	9.2	10	19	110	4.8	247	0	340	10	.5
DEC												
11...	1300	3.3	8.3	10	19	110	3.9	235	0	320	12	.5
FEB , 1976												
18...	1345	2.5	7.3	10	18	110	3.6	226	5	300	12	.5
MAR												
18...	1650	2.3	7.9	0	19	120	4.6	228	6	300	12	.7
APR												
23...	1250	1.8	6.3	370	21	130	4.9	234	0	300	18	.6
MAY												
28...	1530	.50	4.7	10	18	150	6.8	194	12	310	17	.8

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
09401250 - MOENKOPI WASH NR MOENKOPI, ARIZ. (LAT 36 06 36 LONG 111 09 19)												
JUL , 1975												
09...	4.5	.00	1940	2.64	680	550	5.0	2420	8.2	34.0	180	1028
11...	.68	.00	1670	2.27	870	690	2.2	1700	7.3	29.0	190	1028
13...	.42	.00	1900	2.58	1100	910	1.7	2120	7.3	22.5	160	1028
AUG												
11...	.04	.00	1490	2.03	630	510	3.3	1800	7.9	28.0	190	1028
12...	.31	.01	1420	1.93	630	480	3.3	1650	7.9	29.0	150	1028
22...	.05	.00	1090	1.48	390	230	3.7	1400	8.0	33.0	130	1028
SEP												
23...	1.5	.01	1510	2.05	810	720	1.3	1625	7.2	18.0	90	1028
OCT												
07...	.00	.00	861	1.17	410	270	2.4	1200	8.4	15.0	100	1028
NOV												
06...	.27	.00	694	.94	310	110	2.7	1000	8.3	9.0	70	1028
DEC												
11...	.18	.01	677	.92	300	110	2.8	984	8.3	7.0	30	1028
FEB , 1976												
18...	.15	.00	668	.91	270	78	2.9	960	8.4	13.0	70	1028
MAR												
18...	.00	.00	652	.89	260	64	3.2	940	9.0	17.0	160	1028
APR												
23...	.06	.00	669	.91	300	100	3.3	1200	8.4	26.0	100	1028
MAY												
28...	.03	.00	657	.89	200	25	4.6	980	8.7	26.0	130	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
09401260 - MOENKOPI WASH AT MOENKOPI (LAT 36 06 18 LONG 111 12 04)												
JAN . 1976												
24...	1000	E2.0	--	--	--	--	--	--	--	--	--	--
FEB												
10...	1600	E2.0	--	--	--	--	--	--	--	--	--	--
MAY												
21...	1900	E5.0	--	--	--	--	--	--	--	--	--	--
JUL												
27...	1515	139	13	30	160	330	19	234	0	2300	31	.6
30...	1500	2.4	11	30	86	230	19	87	0	1800	12	.7
31...	1000	640	--	--	--	--	--	--	--	--	--	--
AUG												
08...	0800	45	--	--	--	--	--	--	--	--	--	--
20...	1430	26	--	--	--	--	--	--	--	--	--	--
NOV												
11...	1320	2.5	7.8	10	20	110	4.5	217	0	350	12	.5
DEC												
10...	1240	4.6	8.7	30	20	110	3.8	226	0	320	15	.5
JAN . 1977												
19...	1300	3.3	8.8	80	16	99	3.3	217	0	260	16	.4
MAR												
15...	1430	1.5	6.3	20	19	120	4.4	220	2	310	18	.6
360849111015801 - LOWER COAL MINE WASH AT MOENKOPI (LAT 36 08 49 LONG 111 01 58.01)												
DEC . 1973												
12...	1415	.20	11	40	27	380	6.0	516	0	700	19	1.0
JAN . 1975												
21...	1130	.10	13	10	30	500	6.8	588	--	930	24	2.9

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
09401260 - MOENKOPI WASH AT MOENKOPI (LAT 36 06 18 LONG 111 12 04)												
JAN . 1976												
24...	--	--	--	--	--	--	--	--	--	1.0	--	--
FEB												
10...	--	--	--	--	--	--	--	--	--	8.0	--	--
MAY												
21...	--	--	--	--	--	--	--	--	--	18.0	--	--
JUL												
27...	.77	.03	3790	5.15	2000	1800	3.2	3100	7.1	26.0	260	1028
30...	11	.03	2750	3.74	1500	1400	2.6	2700	7.7	33.0	140	1028
31...	--	--	--	--	--	--	--	--	--	20.0	--	--
AUG												
08...	--	--	--	--	--	--	--	--	--	14.0	--	--
20...	--	--	--	--	--	--	--	--	--	26.0	--	--
NOV												
11...	.11	.00	682	.93	320	140	2.7	760	8.0	10.0	80	1028
DEC												
10...	.33	.02	707	.96	300	120	2.8	820	8.1	1.5	70	1028
JAN . 1977												
19...	.53	.02	619	.84	250	75	2.7	720	8.3	--	70	1028
MAR												
15...	.05	.09	668	.91	260	79	3.2	920	8.4	8.5	80	1028
360849111015801 - LOWER COAL MINE WASH AT MOENKOPI (LAT 36 08 49 LONG 111 01 58.01)												
DEC . 1973												
12...	.16	.02	1460	1.99	320	0	9.3	2112	8.1	4.0	180	1028
JAN . 1975												
21...	.12	.01	1880	2.56	340	0	12	2500	8.0	1.0	180	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
360907110593600 - BEGASHIBITO WASH AT MOUTH NR TONALEA AZ (LAT 36 09 07 LONG 110 59 36)												
DEC , 1973												
12...	1515	.50	9.3	80	18	56	3.0	270	0	130	15	.4
JAN , 1975												
21...	1300	--	11	40	16	53	3.3	267	--	130	12	.0
362541110233000 - PEABODY RESERVOIR ON BLACK MESA (LAT 36 25 41 LONG 110 23 30)												
JAN , 1975												
22...	1530	--	8.9	10	27	53	6.9	217	--	270	13	.6
NOV												
06...	0930	--	.0	0	41	85	8.3	115	8	390	18	.6
MAR , 1977												
17...	1035	--	.6	30	26	56	6.4	148	0	270	14	.7
362622110233300 - BLACK MESA PUMPING STATION RESERVOIR (LAT 36 26 22 LONG 110 23 33)												
NOV , 1971												
10...	--	--	20	--	3.6	87	1.5	182	0	58	7.5	1.2
362728110234200 - MOENKOPI WASH AT HAUL ROAD (LAT 36 27 28 LONG 110 23 42)												
NOV , 1971												
10...	--	--	7.8	--	160	180	7.7	144	0	1600	24	1.8
362738110250000 - BLACK MESA MINE, STRIP J-3 (LAT 36 27 38 LONG 110 25 00)												
NOV , 1971												
10...	--	--	3.8	--	7.8	160	2.0	218	8	190	16	1.2

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO, PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
360907110593600 - BEGASHIBITO WASH AT MOUTH NR TONALEA AZ (LAT 36 09 07 LONG 110 59 36)												
DEC , 1973												
12...	.12	.02	432	.59	240	20	1.6	675	8.3	1.5	80	1028
JAN , 1975												
21...	.31	.00	431	.59	240	22	1.5	640	8.2	1.0	70	1028
362541110233000 - PEABODY RESERVOIR ON BLACK MESA (LAT 36 25 41 LONG 110 23 30)												
JAN , 1975												
22...	.12	.00	622	.85	360	180	1.2	876	8.2	.0	50	1028
NOV												
06...	.01	.00	765	1.04	330	220	2.0	1060	8.8	9.0	120	1028
MAR , 1977												
17...	.01	.00	546	.74	290	170	1.4	560	8.3	5.0	100	1028
362622110233300 - BLACK MESA PUMPING STATION RESERVOIR (LAT 36 26 22 LONG 110 23 33)												
NOV , 1971												
10...	--	--	--	.38	40	0	6.0	445	7.9	--	--	1028
362728110234200 - MOENKOPI WASH AT HAUL ROAD (LAT 36 27 28 LONG 110 23 42)												
NOV , 1971												
10...	--	--	--	3.25	1500	1400	2.0	2650	8.1	--	--	1028
362738110250000 - BLACK MESA MINE, STRIP J-3 (LAT 36 27 38 LONG 110 25 00)												
NOV , 1971												
10...	--	--	--	--	42	0	8.2	846	8.5	--	--	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
363040110252501 - SITE 3, COAL MINE WASH ON BLACK MESA (LAT 36 30 40 LONG 110 25 25.01)												
APR , 1973												
12...	1145	1.0	12	30	150	130	5.0	236	0	1300	23	.7
363142110243200 - COAL MINE WASH NEAR 09401229 (LAT 36 31 42 LONG 110 24 32)												
JAN , 1975												
21...	1700	--	16	10	160	93	2.7	216	--	1400	21	.5
NOV												
06...	1100	--	11	0	190	110	4.8	148	0	1800	27	.5
363213110242800 - COAL MINE WASH TRIB NO.2 AB 09401229 (LAT 36 32 13 LONG 110 24 28)												
JAN , 1975												
21...	1620	--	9.4	80	660	770	5.7	248	--	4100	100	.5
363223110242700 - COAL MINE WASH TRIB 2, SITE A-4 (LAT 36 32 23 LONG 110 24 27)												
MAY , 1973												
17...	1030	<.01	20	40	480	410	4.0	287	0	3100	84	1.5
NOV , 1975												
06...	1145	--	15	0	540	630	5.2	256	0	3900	85	1.8
363237110250000 - PROSPECT PIT NO. 1 (LAT 36 32 37 LONG 110 25 00)												
SEP , 1973												
25...	1130	--	3.0	80	350	120	22	229	0	2000	120	.8

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
363040110252501 - SITE 3, COAL MINE WASH ON BLACK MESA (LAT 36 30 40 LONG 110 25 25.01)												
APR , 1973												
12...	10	.01	2200	2.99	1300	1100	1.6	1900	8.1	11.5	130	1028
363142110243200 - COAL MINE WASH NEAR 09401229 (LAT 36 31 42 LONG 110 24 32)												
JAN , 1975												
21...	6.0	.01	2320	3.16	1400	1300	1.1	2520	8.1	--	120	1028
NOV												
06...	5.0	.00	2870	3.90	1800	1600	1.1	2690	8.6	10.0	150	1028
363213110242800 - COAL MINE WASH TRIB NO.2 AB 09401229 (LAT 36 32 13 LONG 110 24 28)												
JAN , 1975												
21...	270	.01	7990	10.9	3900	3700	5.4	8000	7.0	--	900	1028
363223110242700 - COAL MINE WASH TRIB 2, SITE A-4 (LAT 36 32 23 LONG 110 24 27)												
MAY , 1973												
17...	300	.03	6630	9.02	3800	3600	2.9	5500	6.7	11.0	760	1028
NOV , 1975												
06...	220	.00	7290	9.91	3800	3600	4.4	6910	8.4	12.0	670	1028
363237110250000 - PROSPECT PIT NO. 1 (LAT 36 32 37 LONG 110 25 00)												
SEP , 1973												
25...	1.2	.02	3430	4.66	2200	2100	1.1	3650	7.9	13.0	220	1028

Table 6.--Chemical analyses of surface waters sampled as a part of the Black Mesa monitoring program--Continued

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
363243110252200 - YELLOW WATER CANYON AT ROAD CROSSING (LAT 36 32 43 LONG 110 25 22)												
JAN . 1975												
22...	1700	--	2.2	10	45	37	2.6	45	--	570	5.0	.3
JUL												
29...	1730	E30	11	310	12	9.6	7.6	176	0	110	7.6	.6

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED BORON (B) (UG/L)	CODE FOR AGENCY ANALYZING SAMPLE
363243110252200 - YELLOW WATER CANYON AT ROAD CROSSING (LAT 36 32 43 LONG 110 25 22)												
JAN . 1975												
22...	1.7	.01	874	1.19	540	500	.7	1120	7.2	--	30	1028
JUL												
29...	.01	.00	379	.52	230	90	.3	400	7.7	17.5	130	1028

The area leased for strip mining on Black Mesa is about 100 mi^2 (259 km^2) whereas, the drainage area for the station Moenkopi Wash at Moenkopi is 1,660 mi^2 (430 km^2). Therefore, because most of the surface flow at the Moenkopi gaging station could originate in areas other than the strip mine, two additional gaging stations were installed. One station--Moenkopi Wash near Shonto--is about 1.2 mi (1.9 km) downstream from the mouth of Coal Mine Wash. The drainage area for this station is 270 mi^2 (700 km^2) including the mined area. The other station is on Begashibito Wash near Tonalea, 5.7 mi (9.2 km) upstream from its confluence with Moenkopi Wash. The drainage area for this station is 611 mi^2 (1,580 km^2), which is west of the mined area.

Ground Water

The objective of the ground-water activities is to monitor the effects of ground-water withdrawals on the regional potentiometric surface in the N aquifer. In order to accomplish this a network of 14 observation wells was established in 1972; six of these wells were equipped with continuous recorders and eight were measured annually. One of the sites measured annually has since been discontinued because of an obstruction in the well. Recorders were installed on five wells in late 1972, four drilled by the Geological Survey (BM1, BM2, BM4, and BM5) and an existing well belonging to the Navajo Tribe (BM3); the locations of the wells are shown in figure 1. In the fall of 1973 a recorder was installed on the well P1, which was the original Peabody test hole drilled on the mesa.

Six windmills that penetrate the N aquifer, along the northeast and northwest edge of Black Mesa, are measured annually; these have been designated W1, W2, W3, W4, W5, and W6 and also are shown in figure 1. Data from these wells represent the only predevelopment water-level data available in the N aquifer in the area. Data from several wells were collected as early as 1967.

Two windmills that penetrate the Wepo and Toreva Formations are in the strip-mined area; W7 (fig. 1) has been measured periodically since 1973 and W8 (not shown in fig. 1) was measured during 1974 until it became inoperative and water-level measurements could no longer be made. The Wepo

and Toreva Formations locally yield water for stock supplies and lie above the N aquifer. Water levels in the Wepo and Toreva Formations will not be affected by pumping from the N aquifer. The object of monitoring the water level in these wells is to detect the effects, if any, of the mine operation on the shallow aquifers.

A new well--BM6--was completed in January 1977. The well is about 18 mi (29 km) south of the Peabody well field (fig. 1). This well was added to the monitoring network in an attempt to improve the network and to enhance the possibility of differentiating the amount of lowering of the potentiometric surface attributable to either mine or community withdrawals. The well is 2,506 ft (764 m) deep and is now open only to the N aquifer from 1,954 to 2,506 ft (596 to 764 m) below land surface. Water levels monitored in this well will reflect only the fluctuations of the potentiometric surface in the N aquifer. The formations penetrated during drilling, their depths, and the physical dimensions of the well are shown in figure 4.

Ground-water samples from the Peabody production wells are being collected and analyzed annually to detect any changes in quality that may be attributed to leakage of poorer quality water from the overlying formations into the N aquifer. To date (1977), no changes have been observed. The chemical analyses of the water samples from the Peabody wells are shown in table 7.

Total withdrawals from the N aquifer are monitored on a continuing basis. Pumpage records for Peabody production wells are obtained from Peabody Coal Company on a quarterly basis; records of the amount of ground water pumped from the Navajo Tribal Utility Authority wells in Kayenta are obtained on a yearly basis. In order to determine pumpage for the Bureau of Indian Affairs' wells at the schools in Kayenta, Chilchinbito, and Rough Rock, water meters have been installed on six wells. The Indian Health Service also meters the amount of water pumped from a well at Chilchinbito and one at Rough Rock. Annual pumpage for 1974-76 for the communities of Kayenta, Chilchinbito, and Rough Rock are summarized in table 8.

BLACK MESA OBSERVATION WELL NUMBER 6 (BM6)

Location: District 4, Quadrangle 74, 08.95 x 02.95

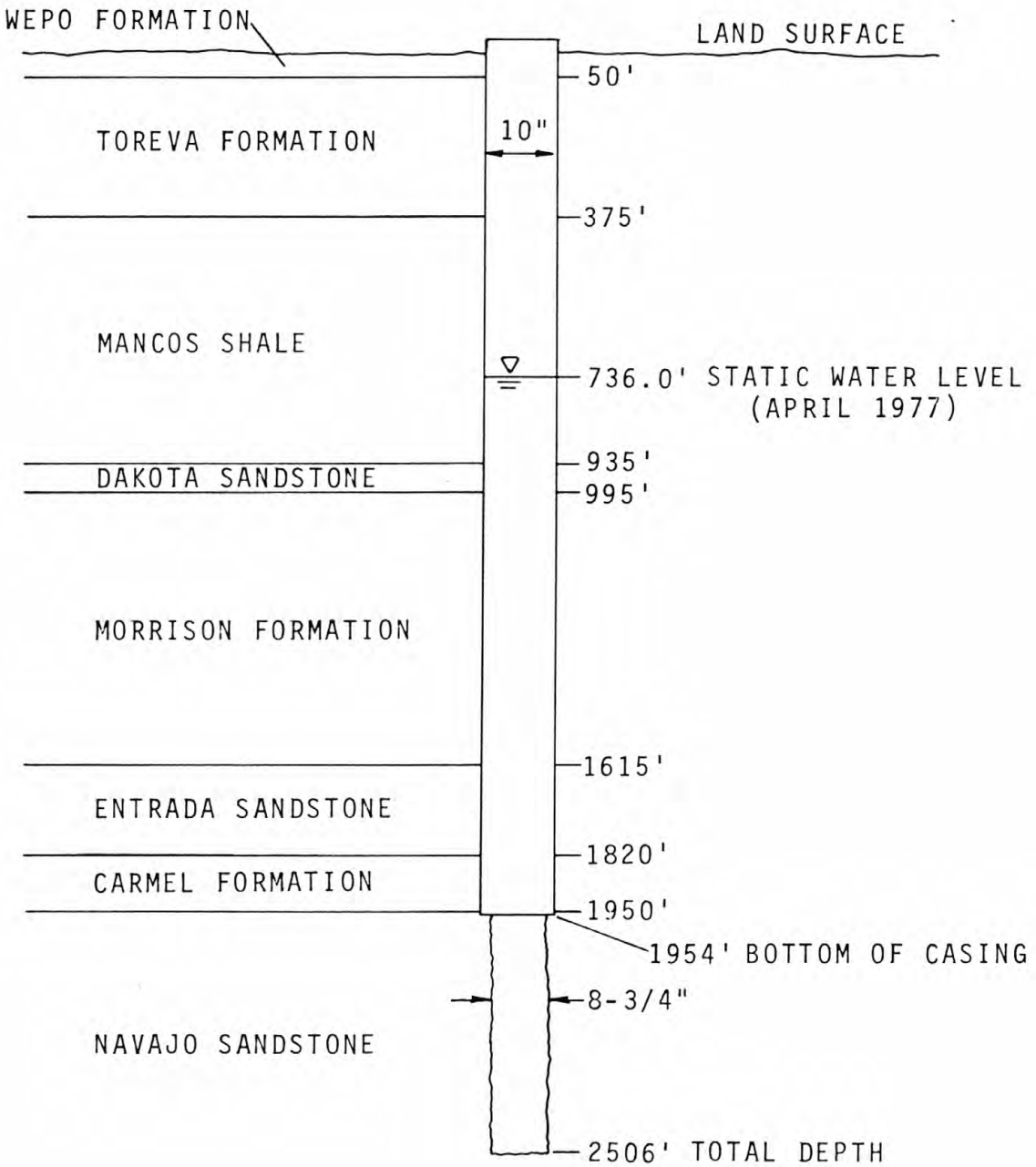


FIGURE 4.--DEPTHS OF FORMATIONS PENETRATED AND PHYSICAL DIMENSIONS OF WELL BM6.

Table 7.--Chemical analyses of water from the Peabody wells

Local Identifier: Includes well number and location. The first two numbers of the location are the district, the next three numbers are the quadrangle, the next four numbers are the distance in miles west from the northeast corner of the quadrangle, and the last four numbers are the distance south from the northeast corner of the quadrangle.

Code for agency analyzing sample: 9801 is private laboratory, 1028 is U. S. G. S.

	LOCAL IDENTIFIER	LATITUDE	LONGITUDE	SEQ. NO.	DATE OF SAMPLE	GEOLOGIC UNIT	TEMPERATURE (DEG C)	CODE FOR AGENCY ANALYZING SAMPLE	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)
PEABODY 1	0803909741675	36 30 26	110 25 28	01	65-10-12	231KYNT	30.0	--	436	9.1	.1
					65-12-15	220NVJD	30.0	--	204	8.1	1.2
					65-12-19	211DKOT	26.0	--	1400	7.9	6.0
PEABODY 2	0803909441718	36 30 05	110 25 09	01	67-08-17	--	29.0	9801	221	8.8	1.0
					71-10-19	--	--	1028	211	8.7	.3
					74-11-13	--	30.0	--	210	--	--
					75-09-10	220NVJD	31.0	--	230	8.2	1.0
					76-11-17	--	30.0	1028	260	8.6	.4
PEABODY 3	0405607110413	36 26 25	110 22 37	01	68-04-29	--	31.0	9801	236	8.2	1.3
					71-10-19	--	--	1028	247	9.2	.1
					73-08-23	--	--	9801	--	8.2	--
					74-11-13	--	33.0	--	230	--	--
					75-09-10	220NVJD	31.0	--	240	8.5	.6
					76-11-18	--	32.0	1028	250	9.2	.1
PEABODY 4	0405609000373	36 26 47	110 24 35	01	73-08-23	--	--	9801	--	8.3	--
					74-11-13	--	33.0	--	200	--	--
					75-09-10	220NVJD	34.0	--	220	8.4	.7
					76-11-17	--	32.0	1028	240	9.1	.1
PEABODY 5	0405608110115	36 29 01	110 23 41	01	68-06-12	--	31.5	9801	224	9.2	.1
					71-08-18	--	--	1028	226	9.0	.2
					73-08-22	--	--	9801	--	9.0	--
					74-11-13	--	33.0	--	210	--	--
					75-09-10	220NVJD	34.0	--	240	8.5	.6
					77-01-18	--	32.0	1028	220	9.2	.1
PEABODY 6	0803906681711	36 30 07	110 22 12	01	68-06-29	--	34.0	9801	201	9.0	.2
					74-11-13	--	33.0	--	500	--	--
PEABODY 7	0405608800585	36 24 56	110 24 23	01	72-06-30	--	31.0	9801	222	9.0	.2
					73-08-22	--	--	9801	--	9.1	--
					74-11-13	--	33.0	--	210	--	--
					75-09-10	220NVJD	33.0	--	220	8.5	.5
					76-11-18	--	32.0	1028	240	9.2	.1

Table 7.--Chemical analyses of water from the Peabody wells--Continued

	LOCAL IDENTIFIER	DATE OF SAMPLE	ALKALINITY AS CACO3 (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	PHOSPHATE (PO4) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
PEABODY 1	0803909741675	65-10-12	96	117	18	--	--	--	--	28	0	10	.7	--
		65-12-15	80	97	0	--	--	--	--	31	0	12	.2	--
		65-12-19	244	298	0	--	--	--	--	94	0	22	9.5	--
PEABODY 2	0803909441718	67-08-17	99	76	22	--	--	--	--	22	0	7.0	1.0	42
		71-10-19	81	84	7	--	--	--	--	19	0	7.5	.1	40
		74-11-13	89	96	6	.95	--	.03	.01	22	0	8.2	.3	40
		75-09-10	84	102	0	.86	--	.00	.00	20	0	7.8	.2	41
		76-11-17	79	78	9	1.2	--	.03	.01	12	0	4.9	.0	41
PEABODY 3	0405607110413	68-04-29	104	127	0	--	--	--	--	11	0	2.4	1.2	55
		71-10-19	99	88	16	--	--	--	--	7	0	3.0	.0	53
		73-08-23	--	--	--	--	--	--	--	--	--	--	--	--
		74-11-13	101	99	12	.79	--	.03	.01	14	0	5.5	.1	51
		75-09-10	99	88	16	.74	--	.00	.00	9	0	3.3	.2	52
		76-11-18	101	38	42	1.6	--	.03	.01	9	0	3.5	.0	50
PEABODY 4	0405609000373	73-08-23	--	--	--	--	--	--	--	--	--	--	--	--
		74-11-13	86	91	7	1.1	--	.03	.01	15	0	5.8	.2	42
		75-09-10	84	70	16	.95	--	.00	.00	13	0	4.9	.2	41
		76-11-17	76	78	7	1.2	--	.03	.01	18	0	7.0	.1	40
PEABODY 5	0405608110115	68-06-12	103	81	22	--	--	--	--	11	0	2.8	1.0	51
		71-08-18	94	90	12	--	--	--	--	10	0	3.9	.0	45
		73-08-22	--	--	--	--	--	--	--	--	--	--	--	--
		74-11-13	104	103	12	.80	--	.03	.01	11	0	4.0	.2	49
		75-09-10	99	100	10	.88	--	.00	.00	9	0	3.5	.1	52
		77-01-18	95	87	14	3.2	--	.09	.03	10	0	3.5	.4	45
PEABODY 6	0803906681711	68-06-29	108	81	25	--	.50	--	--	9	0	2.8	.5	52
		74-11-13	213	201	29	1.4	--	.09	.03	4	0	1.3	.1	120
PEABODY 7	0405608800585	72-06-30	89	70	19	--	--	--	--	14	0	4.4	.7	54
		73-08-22	--	--	--	--	--	--	--	--	--	--	--	--
		74-11-13	87	92	7	.80	--	.06	.02	11	0	4.2	.1	44
		75-09-10	88	85	11	.77	--	.00	.00	11	0	3.8	.3	46
		76-11-18	86	14	45	1.4	--	.03	.01	11	0	4.2	.1	45

Table 7.--Chemical analyses of water from the Peabody wells--Continued

LOCAL IDENTIFIER	DATE OF SAMPLE	SODIUM ADSORPTION RATIO	PERCENT SODIUM	DISSOLVED SODIUM PLUS POTASSIUM (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED ARSENIC (AS) (UG/L)	DISSOLVED BORON (B) (UG/L)	DISSOLVED CADMIUM (CD) (UG/L)	HEXAVALENT CHROMIUM (CR6) (UG/L)
PEABODY 1 0803909741675	65-10-12	--	--	90	--	6.0	85	.6	--	--	--	--	--
	65-12-15	--	--	33	--	3.5	17	.2	--	--	--	--	--
	65-12-19	--	--	290	--	19	430	.3	--	--	--	--	--
PEABODY 2 0803909441718	67-08-17	3.9	80	--	1.2	5.0	21	.1	18	--	--	--	--
	71-10-19	4.0	81	--	1.1	2.8	18	.2	20	--	--	--	--
	74-11-13	3.7	79	--	1.2	2.8	17	.1	21	--	40	--	--
	75-09-10	4.0	81	--	.8	5.0	20	.2	20	--	30	--	--
	76-11-17	5.1	87	--	.7	3.6	16	.2	22	3	30	0	0
PEABODY 3 0405607110413	68-04-29	7.2	91	--	.9	4.0	17	.6	30	--	--	--	--
	71-10-19	8.4	93	--	.8	3.5	17	.2	19	--	--	--	--
	73-08-23	--	--	--	--	--	--	--	--	--	--	--	--
	74-11-13	5.9	88	--	1.1	3.2	13	.4	20	--	70	--	--
	75-09-10	7.5	92	--	.7	2.8	14	.5	19	--	50	--	--
	76-11-18	7.4	92	--	.7	3.0	11	.4	17	--	50	--	--
PEABODY 4 0405609000373	73-08-23	--	--	--	--	--	--	--	--	--	--	--	--
	74-11-13	4.7	85	--	1.1	3.8	13	.1	22	--	50	--	--
	75-09-10	4.9	86	--	.7	3.4	13	.2	21	--	30	--	--
	76-11-17	4.1	82	--	.8	2.9	19	.2	21	3	30	0	0
PEABODY 5 0405608110115	68-06-12	6.7	90	--	.9	3.5	16	--	--	--	--	--	--
	71-08-18	6.3	89	--	1.8	2.1	12	.2	21	--	--	--	--
	73-08-22	--	--	--	--	--	--	--	--	--	--	--	--
	74-11-13	6.5	89	--	1.4	2.7	12	.2	21	--	50	--	--
	75-09-10	7.5	92	--	.7	4.0	18	.2	20	--	30	--	--
	77-01-18	6.1	90	--	.6	3.0	13	.2	21	--	30	--	--
PEABODY 6 0803906681711	68-06-29	7.5	92	--	.9	3.0	13	.4	34	--	300	--	--
	74-11-13	27	98	--	1.3	11	40	.2	22	--	100	--	--
PEABODY 7 0405608800585	72-06-30	6.3	88	--	1.2	2.5	20	.3	30	--	--	--	--
	73-08-22	--	--	--	--	--	--	--	--	--	--	--	--
	74-11-13	5.8	89	--	.9	3.3	14	.2	21	--	30	--	--
	75-09-10	6.1	90	--	.7	3.0	15	.2	20	--	30	--	--
	76-11-18	5.9	89	--	.7	3.2	13	.2	21	--	30	--	--

Table 7.--Chemical analyses of water from the Peabody wells--Continued

	LOCAL IDENT-I-FIER	DATE OF SAMPLE	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MOLYB-DENUM (MO) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRATE (NO3) (MG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL DEPTH OF WELL (FT)
PEABODY 1	0803909741675	65-10-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5735
		65-12-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5735
		65-12-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5735
PEABODY 2	0803909441718	67-08-17	--	--	50	--	--	40	--	--	--	--	147	--	1.0	--	3636
		71-10-19	--	--	20	--	M0	0	--	--	--	--	141	--	3.4	--	3636
		74-11-13	--	--	10	--	--	--	--	--	--	144	148	.20	--	--	3636
		75-09-10	--	--	10	--	--	--	--	--	--	163	149	.22	--	--	3636
		76-11-17	1	1	60	6	--	--	0	20	1	133	141	.18	--	.0	3636
PEABODY 3	0405607110413	68-04-29	--	--	20	--	--	M0	--	--	--	--	171	--	4.0	--	3596
		71-10-19	--	--	10	--	--	M0	--	--	--	--	159	--	3.0	--	3596
		73-08-23	--	--	--	--	--	--	--	--	--	--	213	--	--	--	3596
		74-11-13	--	--	10	--	--	--	--	--	--	154	159	.21	--	--	3596
		75-09-10	--	--	10	--	--	--	--	--	--	157	155	.21	--	--	3596
		76-11-18	--	--	30	--	--	--	--	--	--	145	154	.20	--	--	3596
PEABODY 4	0405609000373	73-08-23	--	--	--	--	--	--	--	--	--	--	157	--	--	--	3535
		74-11-13	--	--	20	--	--	--	--	--	--	140	145	.19	--	--	3535
		75-09-10	--	--	30	--	--	--	--	--	--	144	139	.20	--	--	3535
		76-11-17	1	2	30	12	--	--	0	20	1	138	142	.19	--	.0	3535
PEABODY 5	0405608110115	68-06-12	--	--	20	--	--	M0	--	--	--	--	168	--	--	--	3737
		71-08-18	--	--	0	--	--	10	--	--	--	--	145	--	2.9	--	3737
		73-08-22	--	--	--	--	--	--	--	--	--	--	162	--	--	--	3737
		74-11-13	--	--	10	--	--	--	--	--	--	149	157	.20	--	--	3737
		75-09-10	--	--	30	--	--	--	--	--	--	161	162	.22	--	--	3737
		77-01-18	--	--	20	--	--	0	--	--	--	--	158	.21	--	--	3737
PEABODY 6	0803906681711	68-06-29	--	--	70	--	--	<20	--	--	--	--	170	--	2.6	--	3559
		74-11-13	--	--	40	--	--	--	--	--	--	333	330	.45	--	--	3559
PEABODY 7	0405608800585	72-06-30	--	--	160	--	--	20	--	--	--	--	157	--	.84	--	3538
		73-08-22	--	--	--	--	--	--	--	--	--	--	151	--	--	--	3538
		74-11-13	--	--	10	--	--	--	--	--	--	141	144	.19	--	--	3538
		75-09-10	--	--	20	--	--	--	--	--	--	146	145	.20	--	--	3538
		76-11-18	--	--	10	--	--	--	--	--	--	140	146	.19	--	--	3538

Table 8. Annual ground-water pumpage for communities of Kayenta, Chilchinbito, and Rough Rock

A. Pumpage, in acre-feet, in individual wells, 1974-76.

	1974	1975	1976
Kayenta P.M. 2	-	46.9*	137.7
Kayenta P.M. 3	-	20.5*	47.3
Rough Rock P.M. 5	28	10 Est.	10.4
Rough Rock P.M. 6	9	29	28.1
Rough Rock P.M. 7	-	0.5	0.5
Rough Rock Community Well	8	7.3	5.8
Chilchinbito P.M. 3	21	20	14.6 Est.
Chilchinbito P.H.S. (8T-540)	-	-	6

B. Pumpage, in acre-feet, in three N.T.U.A. wells at Kayenta, 1965-76.

1965 - 44	1971 - 195.9
1966 - 98.5	1972 - 171.9
1967 - 99.7	1973 - 298.2
1968 - 127.5	1974 - 300.7
1969 - 145	1975 - 281
1970 - 169.8	1976 - 303.4

*Meters installed May 1975

Results of Monitoring Program to Date

Ten streamflow-gaging sites (fig. 1, table 1) and ten recording rain gages (fig. 2, table 2) are currently in operation; two of the original streamflow stations have been discontinued (table 1). Few samples for sediment concentration and chemical analysis have been collected except at the stations Moenkopi Wash near Moenkopi and Moenkopi Wash at Moenkopi owing to a relative lack of precipitation during the period of record. Available data are insufficient at this time (1977) to make any statement regarding the effects of strip mining on the quantity, sediment concentration, or chemical quality of surface-water runoff.

Water-level declines of about 7 ft (2.1 m) have occurred in wells BM2 and BM5; water levels have not declined in wells BM1 and BM4 (fig. 5). The water level in well BM3 fluctuates as much as 10 ft (3 m) in response to the seasonal pumping of the nearby community and school wells at Kayenta (fig. 5). The water level in this well has declined 45 ft (14 m) since 1959. The static water level in well P1 has risen about 15 ft (4.6 m) since the recorder was installed in the fall of 1973. The water level in the well is not affected by pumping of the nearby Peabody production wells and it is very doubtful that it represents the static water level in the N aquifer; the water level in this well may reflect conditions in the shallow aquifer. To date (1977) the water levels in the seven wells that are measured annually have not shown any significant long-term declines. Graphs showing the depth to water in the 13 observation wells for the period of record are given in figure 5.

Future Plans

The plans for future work on the monitoring program include the continuation of all the present activities, a pumping test on BM6 to obtain additional data on the characteristics of the N aquifer, and the development of a model of the N aquifer to be used in predicting aquifer response to pumping stresses applied to the system. Expanded use of the satellite relay telemetry system is planned for the three small watersheds currently under study. Eventually a data transmitter with the ability to relay rainfall, stage, and

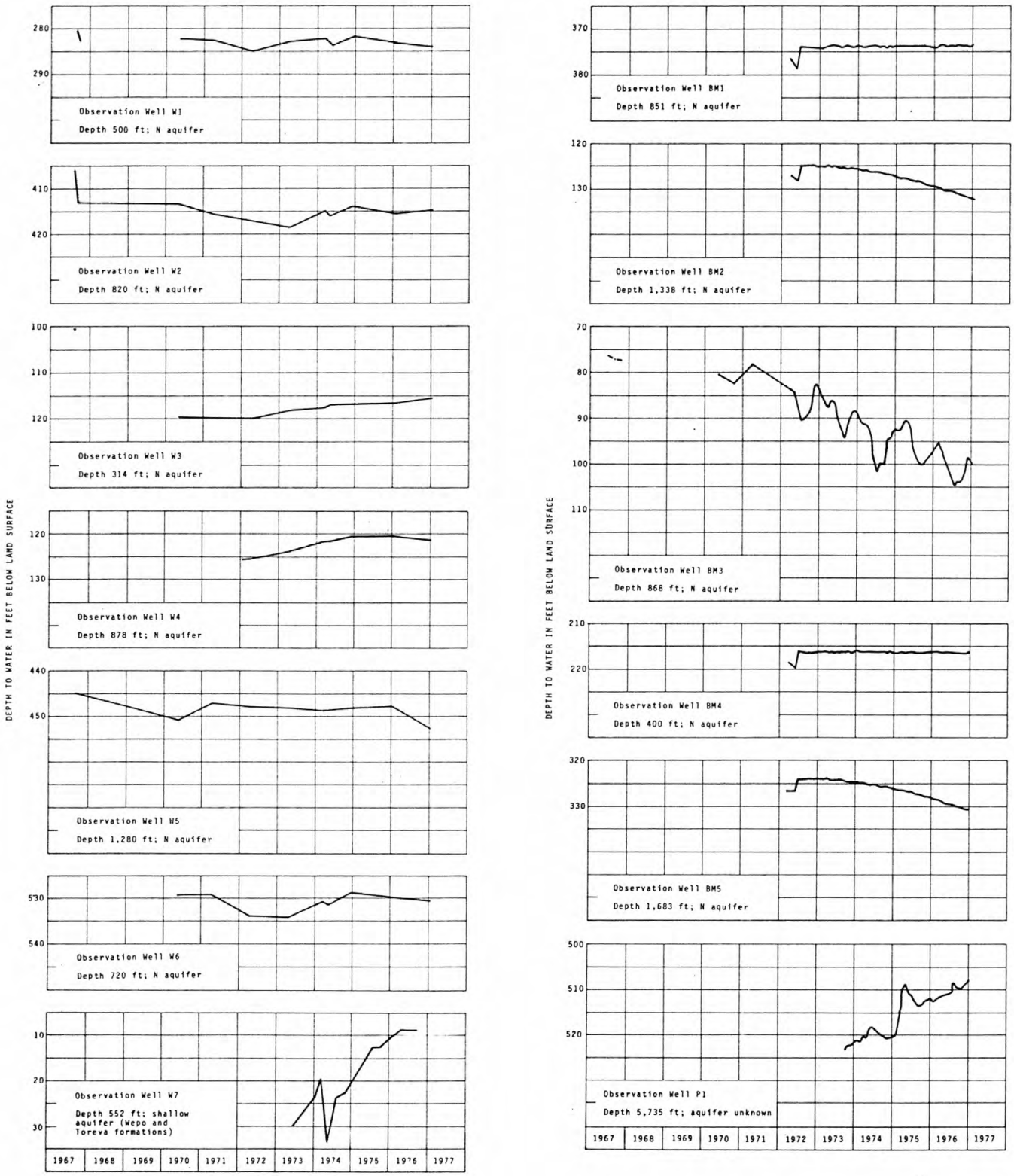


FIGURE 5.--DEPTH TO WATER IN OBSERVATION WELLS

sample frequency data will be installed at each of the three gaging stations at the mouths of the small watersheds. The data relay system hopefully will provide a means of alerting project personnel in Flagstaff, Arizona to equipment malfunctions and extreme hydrologic events.