Piceance Basin
Spring Hydraulics Investigation

By
Office of the State Engineer
Division of Water Resources
State of Colorado
1978

PICEANCE BASIN SPRING HYDRAULICS INVESTIGATION

FINAL TECHNICAL REPORT
U. S. GEOLOGICAL SURVEY
GRANT NO. 14-08-0001-G-154
GRANT NO. 14-08-0001-G-314

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PICEANCE BASIN SPRING HYDRAULICS INVESTIGATION

INTRODUCTION

Background

The numerous springs in the Piceance Basin of northwestern Colorado, which is defined in this report as the Piceance Creek and Yellow Creek watersheds as shown on Figure 1, have long been considered an important factor in the streamflows of these drainage basins. Ever since the ranches of the area were homesteaded in the early 1880's, ranchers have realized that these springs contribute a considerable portion of the annual runoff from these watersheds and greatly enhance the value of irrigated hay and pasture land in the alluvial valleys of these streams.

More recently through hydrologic investigations, the springs of the Piceance Basin have been verified to be an important part of the ground water discharge to base flow that contributes an estimated 80 percent of the annual runoff volume for the Piceance Creek watershed (Weeks, et al, 1974). With such a large part of the annual runoff being provided by springs and related ground water discharge, considerable interest has been generated toward quantifying the spring discharges within the Piceance Basin in order to more accurately determine the importance of these discharges in the water budget and develop a data

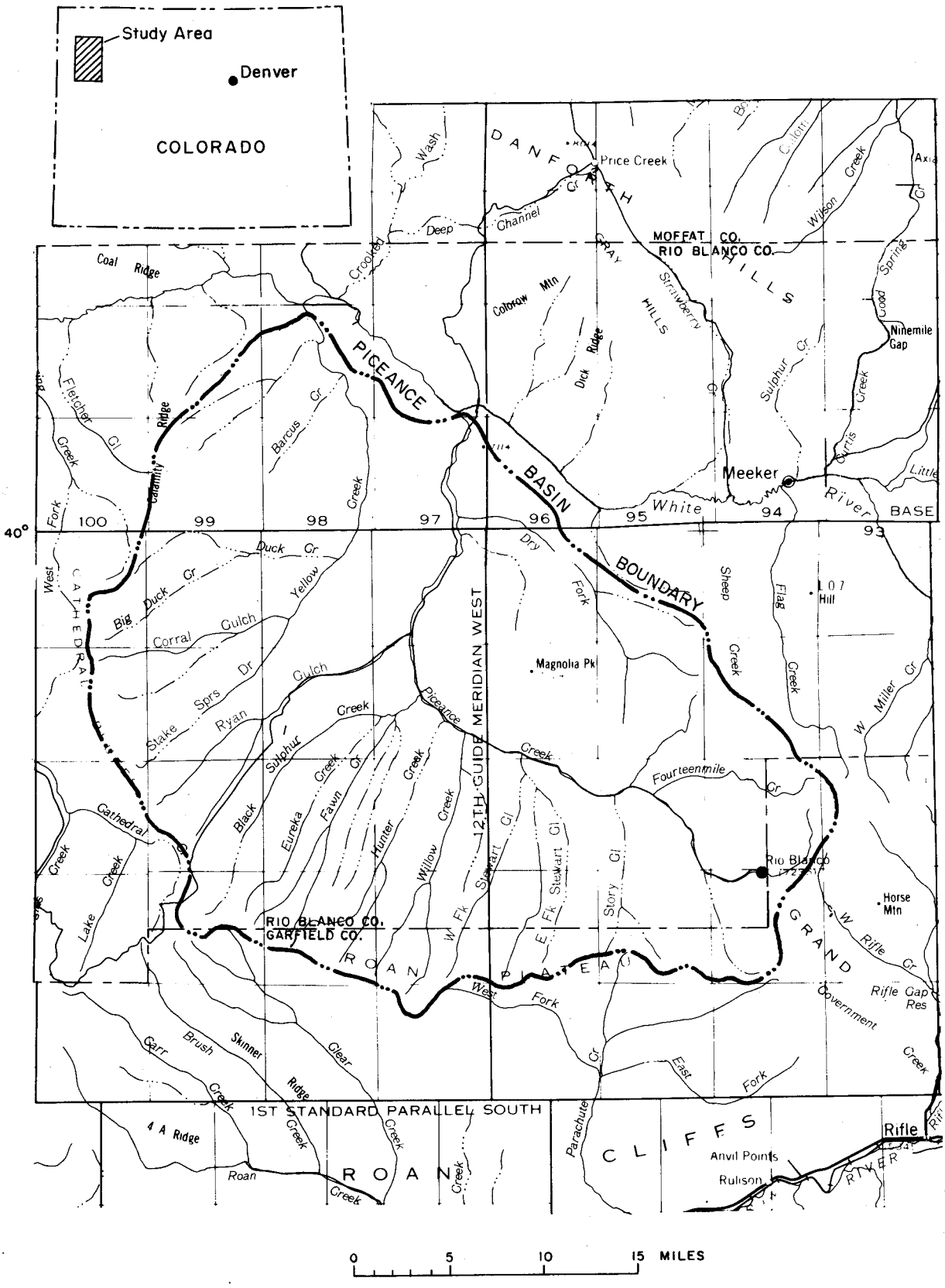

Figure 1. Location of Piceance Basin

base for spring discharges prior to any potential oil shale development involving mine dewatering.

The potential effects of oil shale development upon the water resources of the Piceance Basin have been projected for the situation where both Federal Oil Shale leases are developed over a 30-year period in accordance with mine dewatering plans in existence in 1974 (Weeks, et al, 1974). The results of this study indicated a complete cessation in ground water discharge from the confined aquifer system in a 10-mile reach of Piceance Creek above its confluence with Hunter Creek. There are numerous springs in this reach near Federal Oil Shale Tract C-b which could be affected if they obtain their flow from the upper aquifer which is defined as the aquifer above the rich oil shale bearing Mahogany Zone. Thus, in addition to quantifying spring discharges, the determination of the source of flow for the many springs in the Piceance Basin was also necessary if the impact of oil shale development upon the basin's water resources was to be accurately predicted.

It should be pointed out that a spring discharge monitoring program for 27 selected springs in the Piceance Creek watershed was initiated in 1968 to obtain a data base prior to the Rio Blanco underground nuclear blast on May 17, 1973. This spring discharge monitoring program was a joint effort of the Office of the State Engineer and various private groups with interests in oil shale development and natural gas stimulation. This earlier monitoring program was assimilated into the present monitoring program developed as a result of this study. The data from

the earlier monitoring program have been published in two publications by the U. S. Geological Survey, "Hydrologic Data from the Piceance Basin, Colorado", Basic Data Release No. 31 and "Hydrologic and Geophysical Data from the Piceance Basin, Colorado", Basic Data Release No. 35.

A most complete and thorough presentation of the complex surface water and ground water hydrologic systems of the Piceance Basin as it is presently known has been published by the U. S. Geological Survey in Professional Paper 908, "Simulated Effects of Oil-Shale Development on the Hydrology of the Piceance Basin, Colorado", by John B. Weeks, George H. Leavesley, Frank A. Welder, and George J. Saulnier, Jr. Any reader who wishes to obtain a description of these hydrologic systems which are discussed briefly in this report should obtain a copy of Professional Paper 908.

Purpose and Scope of this Investigation

In July of 1974, the Office of the State Engineer submitted a research grant proposal entitled, "Piceance Basin Spring Hydraulics Research" to the U. S. Geological Survey, Colorado District office. The research grant proposal was accepted by the U. S. Geological Survey and was funded in the amount of $60,000 for a 12 month period commencing November 1, 1974 (Grant No. 14-08-0001-G-154). This original proposal envisioned a two-year investigation of the springs and water resources of the Piceance Basin. A second year of the investigation

was funded for $40,000 commencing November 1, 1975 and was extended to June 30, 1977 when all funds were not expended in the second 12 month period.

The purpose of this investigation was to provide pre-development base data on spring flows and hydraulics in the Piceance Basin in order to permit evaluation and prediction of the impact of oil shale development on the water resources of the area. To accomplish this purpose, the scope of work with the following objectives was developed:

1. Design and install a spring flow monitoring network to obtain discharge and water quality data.
2. Obtain large scale thermal infra-red and color infra-red aerial photography of the Piceance Basin for identification and location of existing springs and seeps.
3. Collect and collate all available surface and ground water data in the Piceance Basin.
4. Obtain laboratory analyses of water samples from springs on a periodic basis using the U. S. Geological Survey lab facilities.
5. Determine the source of supply for the springs in the Piceance Basin as identified and located in this investigation.
6. Develop or modify predictive models for analyzing the impact of mine dewatering on spring flows.

On April 1, 1976, another aspect of the initial research grant proposal was funded under a separate grant (Grant No. 14-08-0001-G-314) in the amount of $20,000. The purpose of this additional study was to expand the scope of work of the original investigation by including the following:

1. Conduct field investigations of localized geology and topography utilizing a seisomograph to obtain alluvial ground water and bedrock data.
2. Expand the area of study to include the location and periodic measurement of numerous small springs located in the Roan Creek and Parachute Creek drainages in order to provide data for calibration of the expanded ground water model of the Piceance Creek structural basin being developed by the U. S. Geological Survey in conjunction with the Piceance Basin Ground Water Advisory Committee.

Since the U. S. Geological Survey was modifying its model of the Piceance Basin to include the area to the south of the Roan Plateau, a decision was made to utilize this investigation to provide additional data for the model development rather than attempt to develop or modify a separate model as was originally planned. The expanded model is scheduled to be operational by the summer of 1979 and will be used by various entities in the Piceance Creek structural basin to predict the impact of various mine dewatering plans related to oil shale development

and to provide an administrative tool for this office in water rights administration.

The spring discharge data will be used to estimate the amount of discharge from the aquifers of the Piceance Creek structural basin where they outcrop in the Roan and Parachute Creek drainages. These drainages are the southern boundaries of the grid for the full three dimensional multiple aquifer finite difference model under development.

A GENERAL DESCRIPTION OF THE WATER RESOURCES OF THE PICEANCE BASIN

In order for the reader of this report to understand the results and conclusions of this investigation, some knowledge of the complex and interrelated surface and ground water systems of the Piceance Basin is necessary.

Surface Water Hydrology

Both Piceance Creek and Yellow Creek are tributaries of the White River, a major stream of northwestern Colorado. The White River has a drainage area of 4,020 square miles above the gage near the Colorado-Utah state line at Watson, Utah and has an average annual discharge of 502,100 acre-feet with a period of record of 53 years.

Piceance Creek has a drainage area of 630 square miles above the gage near its confluence with the White River and has an average discharge for 9 years of record of 16,590 acre-feet. The streamflow gage on Piceance Creek below Ryan Gulch has a longer period of record (13 years) and is more commonly used in hydrologic investigations of Piceance Creek since it has the best period of record.

Yellow Creek has a drainage area of 262 square miles above the gage near its confluence with the White River and has an average annual discharge of 1,200 acre-feet for 5 years of record.

The surface water hydrology of the Piceance Basin has been

described in detail by Wymore (1974) and a mean annual water budget for the 1965-1972 study period was estimated and is shown in Table 1.

The annual precipitation is estimated to vary from 10 inches to 25 inches between altitudes of 5,500 feet and 8,500 feet which is indicative of a semiarid climate. Unfortunately, only one long term precipitation station exists in the Piceance Basin which is located at an elevation of 6,148 feet near the Little Hills Game Experiment Station. The long-term average annual precipitation for this station is 12.90 inches.

The runoff characteristics of both Yellow Creek and Piceance Creek can be described using available gaging station records and irrigation diversion records. Both streams appear to be perennial with the base flow being provided by ground water discharge primarily through springs along the alluvial valley floors. These springs are numerous and at present 78 are being monitored by this office with the discharges varying between 0 and about 7.3 cfs.

While the runoff distribution is somewhat similar to most streams in northwestern Colorado, it does differ in that the runoff peaks earlier than most regional streams due to lower elevations in most of the basin. The snowmelt runoff starts sometimes as early as February and by June the runoff has receded to near the base flow conditions that exist throughout the winter months (November through January). The runoff distribution is affected by irrigation especially in April or even late March when irrigation diversions reduce streamflows considerably while soil moisture is

TABLE 1

ESTIMATED AVERAGE ANNUAL WATER BALANCE FOR
PICEANCE BASIN (ACRE-FEET)

	Piceance Creek	Yellow Creek	Piceance and Yellow Creeks
Surface Runoff and Deep Percolation	23,883	5,389	29,272
Consumptive Use			
Irrigation	5,902	213	6,115
Phreatophyte run-in use	4,879	2,598	7,477
Net outflow or discharge to White River	13,102	2,578	15,680

being restored. After the soil profile is saturated, return flows begin and streamflows usually increase in May. The average annual streamflow depletions resulting from irrigation practices have been estimated to be 4,902 acre-feet in Piceance Creek and 213 acre-feet in Yellow Creek (Wymore, 1974).

The base flow component of runoff at the gage on Piceance Creek below Ryan Gulch prior to the Rio Blanco underground nuclear detonation (May 17, 1973) averaged approximately 15.6 cfs assuming the base flow can be determined by using the November through January average discharge. This base flow component if projected for a year slightly exceeds the average annual discharge of 10,970 acre-feet at the gage prior to 1973 and indicates the importance of ground water discharge in the water budget. The Piceance Creek below Ryan Gulch gage is used in this analysis because it has the best period of record and nearly all irrigation in the basin occurs above it.

After the nuclear detonation, ground water discharge immediately increased a significant amount as shown in Basic-Data Release No. 35 (1974) which published the data obtained from the spring flow monitoring network established in 1968. The base flow component of runoff for the Piceance Creek below Ryan Gulch gage increased to about 32 cfs for 1973-74 and the average annual discharge for the post-detonation period (1973-1977) has increased to 17,947 acre-feet. Presently, it appears that the complex hydrologic system is returning to its original pre-detonation condition but it will take additional years of data collection

and evaluation to determine if this is true. The reasons for the nuclear detonation causing the sudden increase in ground water discharge have been discussed and speculated upon by many individuals and many hypotheses have been offered but a universally acceptable and supportable conclusion has not been reached.

Ground Water Hydrology

The Piceance Creek structural basin is the result of considerable sediment deposition in a huge lake referred to as Lake Uinta which was created during the Eocene Epoch by crustal warping. Lake Uinta covered a large area of northwestern Colorado and northeastern Utah and contained, during periods of its existence, considerable plant and animal life. When these organisms died and settled to the bottom of the lake, layers of organic-rich sediments were deposited. Eventually, the lake was filled with sand, silt and sediments resulting from surface erosion carried in by streams. The weight of the overlying sediments consolidated the lake deposits forming the sandstones, shales and mudstones of the Green River and Uinta Formations. The marlstone contains the organic material which was converted to a solid hydrocarbon called kerogen with marlstone rich in kerogen being called oil shale.

The Green River and Uinta Formations contain the principal water bearing zones of the Piceance Creek structural basin with the amount of water in storage being estimated to be as high as 25 million acre-feet (U. S. Department of the Interior, 1973).

The principal aquifer system consists of two aquifers separated by a confining layer known as the Mahogany Zone which is a rich oil shale layer 100 to 200 feet thick. A diagramatic section of the Piceance Creek structural basin showing the relationship of the aquifer system to the basin geology is shown on Figure 2. The aquifer above the Mahogany Zone is referred to as the upper aquifer and consists of the upper part of the Parachute Creek Member and the Uinta Formation. The aquifer below the Mahogany Zone is referred to as the lower aquifer and consists of the lower part of the Parachute Creek Member.

In addition to these principal aquifers, the alluvium of the streams of the Piceance Basin contain ground water but due to limited areal extent, it does not contain nearly as much water in storage as do the upper and lower aquifers. The alluvial aquifers have reported yields as high as 1500 gpm (although for limited periods of time due to the boundaries of the alluvium affecting drawdown). The transmissivities vary from 2,700 ft^2/day to 20,000 ft^2/day and the storage coefficients average 0.20 (Coffin, Welder and Glonzman, 1971).

The upper aquifer consists of the fractured lean marlstone of the Parachute Creek Member and the fractured marlstone, siltstone and sandstone of the Uinta Formation. Primary porosity is low due to cementation of the sandstones resulting from percolating ground water. Thus, permeability of the aquifer is due to fracture porosity primarily in the marlstone beds which are more highly fractured than the sandstone beds.

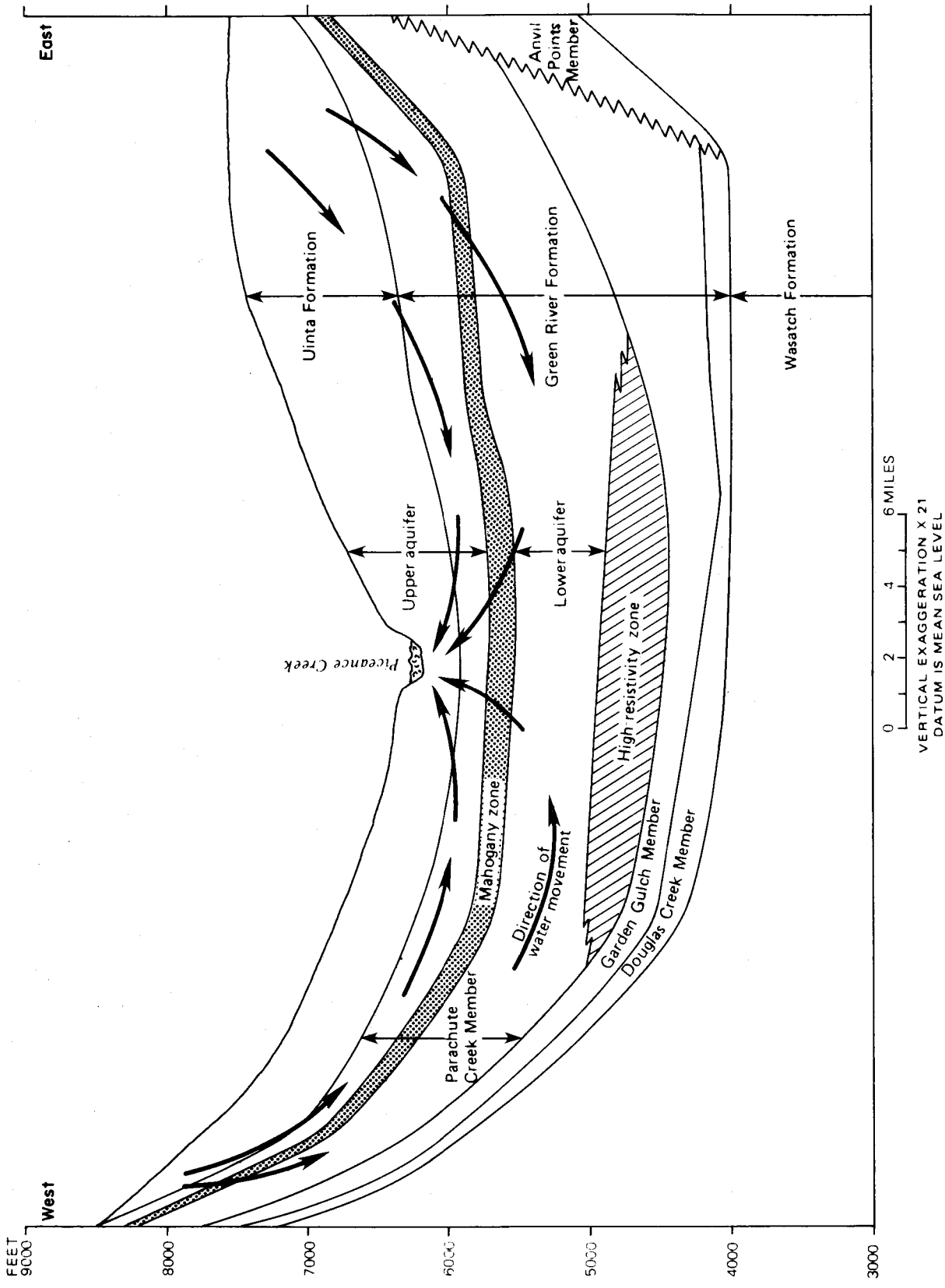

Figure 2. Diagrammatic Section Across Piceance Basin

The upper aquifer is considered to be confined by the low permeability sandstone beds except near outcrop areas. The storage coefficient of the upper aquifer is estimated to be on the order of 10^{-3} based upon limited aquifer test data (Weeks, et al, 1974). The configuration of the potentiometric surface of the upper aquifer has been delineated by Welder and Saulnier (1975-76). This configuration was based upon data from 24 test holes drilled for the specific purpose of obtaining geohydrologic data from the Uinta and Green River Formations. The configuration generally agrees with the potentiometric map of the upper aquifer developed by Weeks, et al (1974), using a digital ground water model. In the central part of the Piceance Basin along streams, the potentiometric surface is at a higher elevation than the land surface indicating a fairly high degree of confinement.

The transmissivity of the upper aquifer varies considerably which would be expected due to it being a function of fracture permeability and formation thickness. Weeks, et al (1974), used values from 70 ft^2/day in the western part of the basin to 270 ft^2/day in the eastern part of the basin in the digital ground water model.

The lower aquifer consists of the fractured marlstone of the Parachute Creek Member below the Mahogany Zone. The primary porosity is also low and permeability of the aquifer is due to fractured porosity and to leaching of soluble minerals by ground water.

The lower aquifer is confined by the low permeability Mahogany Zone which has an estimated leakance value of 1.35×10^{-5} per day

(Weeks, et al, 1974). The configuration of the potentiometric surface of the lower aquifer has been shown by Welder and Saulnier (1978) and by Weeks, et al (1974). The elevation of the potentiometric surface exceeds the elevation of the Mahogany Zone throughout a large part of the Piceance Basin and exceeds the land surface elevation along valley bottoms near the central part of the basin. The storage coefficient is estimated to be approximately 10^{-4} for the lower aquifer.

The transmissivity of the lower aquifer varies throughout the basin and, due to development of the leached zone in the direction of ground water movement, is greatest in the north-central part of the basin. Weeks, et al (1974), used values from 130 ft^2/day in the southern part of the basin to 670 ft^2/day in the northern part of the basin.

The upper and lower aquifers are recharged primarily in areas of the Piceance Basin where winter snowpack accumulates to a sufficient depth to allow storage of several inches of water. These areas are above altitudes of 7,500 feet and are on the perimeter of the basin. The spring snowmelt allows the water to be released slowly and to percolate to the saturated zone where upper aquifer recharge can occur. Since the hydraulic head is greater in the upper aquifer due to its elevation, water in the upper aquifer moves downward through the Mahogany Zone to recharge the lower aquifer.

Water movement in both aquifers is down gradient toward the lower part of the structural basin which is in the north-central part of the Piceance Basin. The potentiometric surfaces of both aquifers, as stated

previously, have been shown on maps of the Piceance Basin and generally follow the configuration of the structural basin.

In the north-central part of the basin, ground water is discharged to the alluvium through valley floors and springs from the upper aquifer where the elevation of the potentiometric surface exceeds the elevation of the valley floors. In this area, the elevation of the potentiometric surface of the lower aquifer exceeds the elevation of the upper aquifer's potentiometric surface, although by less than 100 feet. Thus, water moves from the lower aquifer through the Mahogany Zone to the upper aquifer. Weeks, et al (1974), has postulated that the head difference between the two aquifers would be considerably more if the Mahogany Zone were impermeable. While the vertical permeability may be very low, the cross-sectional area of flow in the vertical direction is extensive, permitting large volumes of water to move through the Mahogany Zone.

Using a mountain watershed simulation model, Weeks, et al (1974), has estimated that 82 percent of the annual streamflow is provided by ground water discharge from the upper aquifer. The actual volume discharged would be greater because some of this water is consumed by evapotranspiration in the alluvial valley bottoms. Weeks, et al (1974), using the evapotranspiration data developed by Wymore (1974), evaluated the ground water budget for the Piceance Basin and estimated the ground water discharge to be 26,100 acre-feet per year or 36.1 cfs. It should be pointed out that this analysis was based primarily upon data prior to the 1973 underground nuclear detonation (Rio Blanco) and subsequently, the

ground water discharge increased significantly as mentioned previously.

Water Resource Development

Historical Water Resource Development

Water resource development in the Piceance Basin started in the early 1880's when ranchers developed the irrigable lands of the valley bottoms. The oldest adjudicated ditch in the Piceance Basin is the Morgan No. 1 Ditch with an appropriation date of April 15, 1883 for 1.0 cfs for irrigation purposes. By the end of the 1880's, it appears that all the major surface water development had been completed and even by then the demand appeared to exceed the supply in that the adjudicated water rights totaled 92.0 cfs on Piceance Creek alone. Fortunately, the valley bottoms are narrow and return flow from upstream diversions provided considerable water to downstream water rights.

Wymore (1974), using data from the State Engineer's Office (Water Division No. 6 diversion records) and U. S. Department of Agriculture data, estimated the irrigated area in the Piceance Basin to be 5,300 acres and the annual consumptive use of irrigation water to be 5,902 acre-feet using the Jensen-Haise method. In a later report (Federal Energy Administration, 1977), the irrigated area of the Piceance Basin in 1975 was estimated to be 4,857 acres (using large scale aerial photography). The irrigation water consumptive use was projected to be 19.74 inches for the White River basin as a whole using the Blaney-Criddle method. The

annual consumptive use assuming a full water supply would be 7,990 acre-feet.

For comparative purposes, it was decided to use the color infrared photographic data for the Piceance Basin flown in August of 1975 as part of this investigation to estimate irrigated area. The photographic film was interpreted on a light table using optical magnifiers and the irrigated areas were delineated on U. S. Geological Survey 7 1/2 minute quad maps. The total irrigated area using this technique is approximately 4,669 acres which is within 3.9 percent of the 1975 estimate by the Federal Energy Administration (1977). According to the Water Commissioner for former Water District 43, there were several fields that were not irrigated in 1975 which could be a reason for the difference between the two methods.

The types of irrigated crops grown in the Piceance Basin are nearly all related to livestock production and in 1975 the irrigated area in the Piceance Creek watershed totaled 690 acres of alfalfa, 970 acres of meadow hay, 1,699 acres of native hay, 1,371 acres of pasture, and 37 acres of small grains (Federal Energy Administration, 1977).

To determine the amounts of water diverted in the Piceance Basin under varying streamflow conditions, the diversion records of former Water District 43 were analyzed from 1950 to 1977. The results of this analysis are shown in Table 2 which contains the average diversions for the 1950-1977 period for each ditch and the diversions for 1977. The average diversions for the study period were 33,790 acre-feet per year

TABLE 2

PICEANCE BASIN DIVERSION DATA SUMMARY

Tributary	Name of Ditch	Acres Irrigated in 1977	Average Diversion	Period of Record	1977 Diversion
Black Sulphur Cr.	Bainbrick Mikhelson #1	30	221.8	1966-1977	0
	Bainbrick Mikhelson #2	26	258.8	1973-1977	0
	Black Eagle #1 & 2	104	432.2	1954-1977	103.4
	Boise	31.8	350.4	1950-1977	378.2
	D. D. Taylor	74	361.7	1950-1977	89.3
	Duckett	30	202.04	1950-1977	137.8
	Hillside	18	165.46	1966-1977	53.5
	J. W. Bainbrick #1	13	259.73	1967-1977	202.0
	J. W. Bainbrick #2	12	183.43	1967-1977	N/R
	McKee	160	330.11	1950-1977	177.2
	Schwizer	101	468.31	1965-1977	113.9
Cow Creek	Cow Creek Ditch	13.0	16.33	1950-1977	0
Davis Creek	Davis	4.0	26.93	1967-1977	10.3
Fawn Creek	Desert	-	134.0	1967-1977	N/R
	Fawn Creek	-	100.7	1950-1977	0
	Hutchinson Spg.	30	159.66	1953-1977	44.6
	McGee	25	143.03	1953-1977	0
	N & L	27	173.25	1950-1977	80.2
	No Name	16	114.45	1950-1977	0
	O. I. See	39	188.12	1950-1977	116.3
Fourteen Mile Cr.	Dog Town	40	65.93	1968-1977	2.4
	Engstrand	36	82.21	1968-1977	6.9
	Fourteen Mile #2	-	1.46	1968-1977	2.2
	Gordon	12	94.97	1968-1977	23.8
	Leonard Spring	67	247.7	1960-1977	75.7
Hunter Cr.	B. L. Taylor 1 & 2	16.8	297.6	1967-1977	152.2
	Gilmore	49	289.2	1967-1977	31.0
	Hunter	17	215.2	1967-1977	41.4
	Last Chance (Left)	30	241.0	1953-1977	230.1
	Last Chance (Right)	-	42.0	1964	N/R
	Sawyer	30	290.27	1968-1977	75.7
Miller Cr.	West Miller Res. Ditch	-	83.93	1973-1977	17.8
Nineteen Mile Cr.	Home Supply	14	63.04	1968-1977	58.3
Piceance Cr.	B & M	161	1252.11	1950-1977	776.2
	BM&H (Right)	146	814.9	1950-1977	449.1
	BM&H (Left)	29	243.7	1960-1977	173.4
	Burch No. 1	50	135.99	1953-1977	158.9
	Burch No. 2	19	255.5	1965-1977	151.5
	Case & Story	148	1199.09	1950-1977	421.5

TABLE 2 (CONT'D)

Piceance Cr. (cont'd)	Cook	-	17.1	1961-1977	0
	Cox	38	735.73	1950-1977	1341.5
	Cox West	-	1023	1960-1963	N/R
	Emily	96	684.19	1950-1977	888
	Gardenheir	26	294.7	1950-1977	141
	German	30	708.68	1960-1977	246.5
	Gordon	14	138.6	1967-1977	0
	Hanrahen No. 1	18	53.5	1967-1977	0
	Hanrahen No. 2	-	3.67	1967-1977	33
	Herwick 1 & 2	28	271.83	1960-1977	0
	Home	42	608.23	1950-1977	272.5
	J. M. Cole	79	536.26	1954-1977	424.1
	King 1 & 2	19	258.35	1953-1977	0
	Larson	115	140.8	1965-1977	77.9
	MH&M	74	732.78	1950-1977	582.7
	Metz	72	818.56	1950-1977	940.6
	Metz & Reigan	60	843	1950-1977	1270
	Metz Reigan & Pat Reigan	30	151.3	1968-1977	65.3
	Mooney No. 1	10	356.76	1965-1977	29.7
	Mooney No. 2	25	344.07	1965-1977	23.8
	Morgan No. 1	80	143.39	1950-1977	42.5
	Morgan No. 2	46	66.16	1961-1977	16.3
	Oldland #1 & 2	211	1631.45	1950-1977	940.8
	Oldland #3	20	218.83	1965-1977	175.4
	Oldland Major	44	343.2	1950-1977	358.9
	P & L	35	163.96	1953-1977	210.3
	Pat Reigan	14	242.34	1965-1977	228.3
	Pat Reigan	-	181	1964-1965	N/R
	Piceance	62	758.81	1950-1977	879.6
	Robert McKee Dixon	129	1375.94	1950-1977	1563.4
	Ryan	151	756.38	1950-1977	470.2
	Ryan West	-	333.67	1960-1963	N/R
	Rye Grass	138	942.22	1960-1977	741.5
	Sayer	102	469.93	1964-1977	778.1
	Sayer Springs	7	146.27	1967-1977	42
	Schutte	36	535.13	1950-1977	288.2
	Spaulding (North)	31	293.3	1950-1977	N/R
	Spaulding (South)	18	285.44	1965-1977	N/R
	Upper Ditch	-	54.67	1962-1977	0
	Upper Wallace #1	-	98.75	1968-1977	0
	Upper Wallace #2	16	50.68	1967-1977	29.7
	Wallace	8	186.67	1950-1977	0
	Wallace No. 2	-	22.8	1970-1977	0
	White River City (Diverts out of Basin)	-	91.00	1962-1977	0
	White River Mesa	128	824.21	1950-1977	332.6
Ryan Gulch	Bar D	-	26.6	1950-1977	0
	Miller	74	76.24	1950-1977	12.8

TABLE 2 (CONT'D)

Stewart Gulch	Blue Grass	12	243.2	1950-1977	279.7
	East Stewart #1 & 2	11	9.3	1961-1977	3.2
	Florence	12	21.6	1967-1977	0
	Jessup #1	17	102.51	1950-1977	241.1
	Jessup #2	5	76.93	1967-1977	56.4
	Piggot #1	23	213.3	1967-1977	401
	Piggot #2	16	216.29	1967-1977	41.6
	Watson-Thompson	14	177.52	1967-1977	78.2
	West Stewart Res. Ditch	33	125.4	1967-1977	N/R
Spring Cr.	Walsh	4	102.0	1965-1977	0
Thirteen Mile Cr.	Thirteen Mile Ranch	35	109.37	1964-1977	63.4
Thurman Cr.	George Howard	25	299.38	1965-1977	217
	Hay	-	8.7	1966-1977	0
	Hayes	32	279.31	1960-1977	87.3
	Howard	16	156.19	1961-1977	106.1
	Hughes #1	-	61.2	1966-1977	0
	Hughes #2	-	30.9	1966-1977	N/R
	Reigan No. 1	10	137.42	1965-1977	0
Willow Cr.	Ebler	44	115.2	1967-1977	89.7
	Limberg Sp.	32	290.49	1965-1977	241.6
	Pile	56	305.18	1954-1977	305.18
	Taylor	20	208.78	1954-1977	117.4
	Willow Creek #1	28	374.07	1954-1977	700.9
	Willow Creek #2	33	193.68	1954-1977	181.9
	Willow Creek #3	22	146.44	1954-1977	91.7
Yellow Cr.	Lathum	60	79.96	1968-1977	16.7
	Sawyer #2	-	14.0	1968-1977	0
	W. H. Violet	30	132.10	1968-1977	103.8
	Wilson	-	60.83	1968-1977	0
	Duck Creek Ditch	-	38.75	1968-1977	0
		4,384.6	33,576.4		21,225.88

and the 1977 diversions totaled 21,131 acre-feet.

Based upon streamflows and precipitation data for the winter of 1976-77, it was expected that 1977 would be the year of lowest streamflows on record in northwestern Colorado. While this was true for nearly all streams in the area, it was not totally true for Piceance Creek if the records for the gage below Ryan Gulch are evaluated. On a calendar year basis, 1977 ranked as the third driest year since 1965 when the gage was installed. The increased base flow resulting from the Rio Blanco underground nuclear detonation has altered the hydrologic system sufficiently to affect the analysis if historic streamflow records only are used.

The 1977 diversion records do indicate for some ditches in the Piceance Basin that 1977 was the year with the least irrigation diversions during the 1950-1977 period and it was decided to use this year as being representative of drought year flow conditions under the present hydrologic regime. It should be pointed out that the total recorded diversions for some previous dry years in the basin are considerably less than those shown for 1977, but prior to 1967, diversion records on the tributaries were not recorded for most ditches which considerably complicates any low flow analysis. Table 3 indicates the year and the total volume of recorded diversions for those years in the study period having well below average irrigation diversions.

TABLE 3

Piceance Basin
Low Streamflow Irrigation Diversions

Year	Number of Ditches Observed	Recorded Diversions Acre-Feet
1955	39	13,811
1956	39	10,154
1963	31	12,656
1964	38	10,547
1966	46	19,879
1967	86	19,802
1977	107	21,226

It is interesting to note that while the annual average yield of the Piceance Basin is estimated to be 25,813 acre-feet (1965-1977), the annual average diversions are 33,790 acre-feet (1950-1977) which discloses the importance of reuse due to irrigation return flows. The average yield of the basin was determined using the streamflow records of Yellow Creek at the White River gage and Piceance Creek at the White River gage (adjusted for diversions around the gage) and adding to these values the estimated annual irrigation consumptive use above the gages (approximately 135 acre-feet for Yellow Creek and 7,990 acre-feet for Piceance Creek).

There has been very little ground water development in the Piceance Basin other than small production wells related to stockwatering and some domestic use. (Obviously, numerous surface water rights in the basin are dependent upon the large ground water contribution to streamflow.) However, it cannot be stated that the complex hydrologic system is presently

in a state of equilibrium due to the lack of ground water development through wells because of the stress placed upon the system by the Rio Blanco underground nuclear detonation. It does appear that the system is returning to pre-detonation conditions; however, this evaluation was influenced by the drought conditions and very low snowpack during the winter of 1976-77. As future additional data become available from stream-flow records and the spring monitoring network, the return to historic equilibrium conditions can be evaluated.

Future Water Resource Development

The potential for additional water resource development in the Piceance Basin and surrounding river basins is great due to the huge quantity of petroleum resources contained in the oil shale deposits of the Green River Formation. Depending upon the location of oil shale mining and the method of processing oil shale, water requirements can vary significantly. The environmental impact statement for oil shale leasing prepared by the Department of the Interior (1973) projects water requirements for a million barrels per day oil shale industry to be in the range of 121,000 to 189,000 acre-feet per year. This projection was based upon primarily surface disposal of spent shale with higher water requirements. With the potential development of in-situ mining, the water requirements could be less, possibly on the order of 40,000 to 50,000 acre-feet per year for the same oil production, if water requirements for oil shale Tract C-b are projected.

While ground water from mine dewatering will be used for some of the initial stages of production, any extensive oil shale industry will require considerable amounts of water imported from the Colorado and White River basins. Furthermore, any additional depletion of streamflows in the Piceance Basin resulting from mine dewatering and consumptive use will require augmentation to remedy injury to vested water rights. Both operators of oil shale Tracts C-a and C-b have submitted plans for augmentation to the District Water Court for Water Division No. 5 in Glenwood Springs which has jurisdiction over the White River basin (former Water District 43) even though the White River Basin is located in Water Division No. 6. A plan for augmentation is a comprehensive plan presented to the Water Court ensuring that any injurious effects of increased use upon existing vested water rights is remedied.

Water Rights

In order to indicate the water rights related to historic use as well as future potential use, the numerous absolute and conditional water rights along with registered wells in the Piceance Basin and nearby reaches of the White and Colorado Rivers have been depicted on four maps entitled, "Water Rights Inventory Map for the Oil Shale Development Area of Northwestern Colorado". These maps are enclosed in the map pocket at the back of this report.

These color keyed maps have been produced from USGS 7 1/2 minute topographic quad maps reduced in scale so that the area of

interest could be covered on four standard 24-inch by 36-inch sheets. In addition to depicting the location of water rights, these maps show in light green the location of irrigated lands as obtained from analysis of color infrared imagery flown in August of 1975. Also shown on these maps are the location of the 78 springs presently being monitored for discharge and water quality data.

The water rights data are current through December 31, 1977 and based upon the review of the July 1978 Water Rights Tabulation published by the State Engineer and the listing of registered wells on file in this office. These maps were in final format when the July 1978 Water Rights Tabulation was published and the basin ranks shown on the maps are for the previous 1974 tabulation. For those applications decreed between the 1974 tabulation and the 1978 tabulation, the Water Court case number is shown on the map. The new basin ranks can be obtained easily from the new tabulation by using the alphabetical listing of water rights available in this office for each former water district in which the water right is located.

The information provided on the maps for decreed (adjudicated) water rights besides the location include the name of the water right, the type of structure, the appropriation date, basin rank of Water Court case number, the amount of the diversion in cubic feet per second (cfs) or volume in acre-feet (a-f) if it is a reservoir. If the water right is a conditional water right, this is indicated by (c) following the amount of diversion or storage volume.

The information concerning wells is somewhat different. The Water Court case number is shown if the well has been adjudicated and the well permit number shown if it is registered but not adjudicated as of December 31, 1977 (Water Court case numbers can be identified by a series of numbers following the letter W). Additional well data shown includes the depth in feet, the yield or production in gallons per minute, and the specified use of the ground water.

The water rights situation will become even more complex if the numerous water rights for which adjudication has been sought (Case No. W-467) by the Federal agencies, having control of Federally owned lands in the Piceance Basin, are decreed by the Water Court. The application has been ruled upon by the Referee of the Water Court but due to protests to this ruling by water users, a decree has not been issued.

It is interesting to note the number and size of diversions or storage for the conditional water rights in the oil shale region along the Colorado and White Rivers. These conditional water rights have been in most cases decreed for several beneficial uses to allow for various types of utilization related to oil shale development. If these conditional water rights are perfected, both rivers could become over-appropriated throughout most of the year in and above these reaches, with considerable potential impact upon additional upstream development.

SPRINGS MONITORING NETWORK AND DATA

Development of Springs Monitoring Network

As indicated in the introduction, the major purpose of this investigation was to obtain a data base on spring flows and hydraulics prior to development of an oil shale industry in the Piceance Basin. The Piceance Basin was selected as the area of primary emphasis since spring flows were considerable, based upon previous monitoring, and because mine dewatering would be required in the rich oil shale Mahogany Zone occurring between two significant aquifers.

The previous monitoring program established in 1968 prior to the Rio Blanco underground nuclear detonation was being operated by the Water Commissioner for former Water District 43. Upon commencement of this study, he became responsible on a full-time basis for all data collection aspects of the field program in the Piceance Basin including the expansion of the previous monitoring network to include at present 80 springs being monitored with Parshall flumes.

In order to locate and identify existing springs and seeps throughout the Piceance Basin, it was decided to utilize the advantages of remote sensing through color infrared and thermal infrared low altitude techniques. The data obtained from remote sensing would be extremely useful in identifying springs and seeps over this large (over 900 square miles) and relatively remote area. It would also provide a pre-development data

base useful in other studies such as the magnitude of naturally occurring phreatophyte areas supporting wildlife populations.

The thermal infrared data collection was conducted by Colorado State University under contract with the State Engineer. The flights were flown over the basin from November 19 through 22, 1974 at an altitude of 5,000 feet. The flight lines were north to south with data collection between three hours before sunrise to three hours after sunrise. The data obtained included the original negative transparency of the thermal infrared imagery in the 8 to 11 micrometer band, a magnetic tape recording of the data detected in the 8 to 11 micrometer band and the 3 to 4.1 micrometer band plus the gate and synchronization pulse signals.

The negative transparency was carefully evaluated using optical magnifiers. Possible spring locations were indicated on the transparency and on USGS 7 1/2 minute topographic quad maps for field checking during the summer of 1975. On the black and white negative transparency, sources of heat are indicated by a darker shading. A photo positive print of two of these negatives for the area from Spring B-1 on Black Sulphur Creek northeastward to Piceance Creek including the lower portions of Fawn Creek and Hunter Creek are shown on Figure 3. Potential spring locations and existing known locations are shown in lighter shading since it is a positive print.

The thermal infrared imagery also indicated other sources of heat such as buildings, stock ponds and automobiles which required considerable field verification. The thermal infrared imagery was very useful

Figure 3.--Thermal Infrared Image

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and indicated the location of many of the springs now being monitored.

The color infrared data collection was also performed by Colorado State University through a contract with the State Engineer. The flights were flown over the basin on August 25 and 26, 1975 at an altitude of 18,000 feet above mean sea level. The flight lines were north to south with the photography taken between the hours of 10:00 a.m. and 2:00 p.m. The data obtained were color infrared positive transparencies consisting of 782 nine-inch square photographs of the area from the White River Valley south to the Colorado River Valley including the entire Piceance Basin. The scale of these photographs was approximately 1:20,500.

The color infrared transparencies were interpreted on a light table with optical magnifiers. Areas of phreatophytic vegetation around seeps and springs, other phreatophyte areas, and irrigated areas were easily identified. Additional potential springs not located from the thermal infrared imagery were noted and their locations provided to the field staff for verification. A color infrared photograph for the same general area as shown for the thermal imagery is shown on Figure 4.

The irrigated areas were mapped on USGS 7 1/2 minute topographic quad maps using visual transfer techniques with an occasional check using a Bausch and Lomb zoom transfer scope. The irrigated areas were measured three times using a planimeter. This was occasionally checked using an electronic digital planimeter. The total irrigated area from color infrared photographs was measured to be 4,669 acres.

Figure 4.--Color Infrared Photograph

After a spring was located in the field, the discharge was measured and if it exceeded approximately 20 gpm, a Parshall flume was installed as near as possible to the spring. The flume was given an identification number based upon the stream or tributary it was located in and this identification number was painted on the flume.

In some cases, the flumes had to be installed up to several hundred feet downstream of the points of discharge from seepy areas containing several small springs in order to economically measure the discharge with one flume. Some springs are in the center of relatively large seep areas and small ponds which required that the flume be located below these areas. For at least 5 springs, irrigation water is diverted between the spring and the measuring flume by the landowner who must permit the flume to be located on his property. Measurements were corrected to reflect these diversions, if possible.

The location and identification numbers of the 78 springs presently being monitored by this office are shown on the black and white map, Figure 5, in the map pocket at the back of this report.

Spring Discharge Data

The spring discharge data collected since the beginning of this study through the end of 1977 are contained in Appendix A at the back of this report. The data are presented in both tabular and hydrographical formats for ease of study. Figures A1 - A80 are hydrographs of the discharges of each spring from January 1974 (or date installed, if later than

January 1974) to December 1977. Tables A1 - A80 contain the actual data recorded in the field from July 1974 to December 1977 plus information on the size and type of measuring device, period of record, and location by section, township and range as well as by latitude and longitude.

The hydrographs are extremely helpful in indicating long term trends, seasonal fluctuations and the effects of the 1977 drought. They also can be used to estimate the portion of ground water discharge to the stream system attributable to spring flows. As an example, the area below each of the hydrographs for 1976, which appears to be an average year based upon the data available, was measured using a digital electronic planimeter and converted to an annual discharge volume in acre-feet. The results of this analysis indicate that a total of 34,414 acre-feet of spring discharge was measured in 1976 with 31,678 acre-feet occurring in the Piceance Creek watershed and 2,736 acre-feet in the Yellow Creek watershed.

The hydrographs of those springs near the Rio Blanco underground nuclear detonation which showed the greatest increase in discharge immediately after the detonation also indicate that the ground water system may be returning to its original state of equilibrium. In particular, the November through January discharges for springs F-3, H-2, H-3 and H-4 have been declining with each successive year after the detonation.

The hydrographs of several springs indicate uniform discharge characteristics which with continued monitoring and data collection could be incorporated into a monitoring program to aid in the evaluation of the

effects of oil shale mine dewatering. In particular, springs R-2, B-4, F-3, H-3, W-2, W-3, W-4, S-2, P-6, DC-2, Y-2 and SS-1 have uniform discharge characteristics.

The effects of the 1977 drought resulting primarily from unusually low snowfall during the winter of 1976-77 are also very obvious from the hydrographs. It is apparent that the ground water discharge from the upper aquifer via the springs is directly related to the previous season's snowpack which is the major source of recharge for the aquifers of the Piceance Basin. Those springs near the source of recharge in the higher elevations of the basin show a greater impact than those springs near the center of the basin and more distant from the source of recharge.

The hydrographs of certain springs contain irregularities which in some cases can be explained as surface runoff reaching the measuring station as a result of the station being located some distance below the spring being monitored. For example, the high discharge readings for the springs located in the upper reaches of Ryan Gulch, Black Sulphur Creek, Hunter Creek and Fawn Creek during May and June, 1976 appear to be surface runoff from a high precipitation period as indicated by precipitation gages monitored by our field staff in the Black Sulphur Creek and Ryan Gulch watersheds. In May, the Ryan Gulch gage indicated 0.54 inches of precipitation and the Black Sulphur Creek gage indicated 1.48 inches. In June, the Ryan Gulch gage indicated 2.52 inches of precipitation and the Black Sulphur Creek gage indicated 1.40 inches of precipitation. This was well above normal precipitation for this period when compared to other years.

The high discharge for some springs for September through November of 1974 cannot be explained by comparing them with local precipitation data. Furthermore, those springs indicating this anomaly, R-1, R-3 and CER-7, are situated so that little surface runoff could enter the measuring station.

Data for Calibrating an Expanded Ground Water Model

As stated in the introduction, the scope of work of this study was revised to include the location and periodic measurement (usually one time) of numerous small springs located primarily south of the Piceance Basin in the Roan and Parachute Creek watersheds. These additional data are to be utilized to aid in the calibration of the expanded digital ground water model of Piceance Creek structural basin being developed by the U. S. Geological Survey in cooperation with the Piceance Basin Ground Water Advisory Committee.

The springs in this area are numerous with small discharges and with perched aquifer characteristics. They are for the most part located in extremely rough terrain in the ravines and gulches at the upper end of the Roan and Parachute Creek watersheds along the Roan Plateau.

The 508 springs relating to this aspect of the study are shown in Appendix B along with their locations and estimated discharge. These data were collected during the summer and fall of 1976 and early 1977 when field conditions due to the low snowpack allowed good access. The tabulation does not cover all springs in the area since, because of

funding limitations, not all the USGS 7 1/2 minute quad maps have been reconnoitered; however, the U. S. Geological Survey has continued the work of locating the remaining springs in this area using its field staff and the remaining data are available in its Grand Junction office.

Spring Water Quality Data

The collection and analysis of water quality data from the springs monitoring network was also an important part of this study. The data could be utilized by others to calibrate digital ground water quality models of the Piceance Basin. A report on one of these models is in preparation by the U. S. Geological Survey, Colorado District Office.

The data could also be used to indicate whether the spring sources are from the upper or lower aquifer due to differences in concentration of certain constituents such as barium, boron, lithium and strontium (Welder and Saulnier, 1978).

The majority of springs presently being monitored (Figure 5) have been sampled and analyzed for major ions and trace constituents by the U. S. Geological Survey's Central Laboratory in Salt Lake City, Utah. Table 4 contains an example of the laboratory analysis for spring F-3. This report will not publish all the water quality data obtained as part of this study since it has been provided to the U. S. Geological Survey's Meeker Office for inclusion in a forthcoming comprehensive report on ground water quality in the Piceance Basin.

TABLE 4
Water Quality Analysis
Spring F-3

Alk. Tot (As CACO3)	MG/L	464	Manganese Dissolved	UG/L	0
Aluminum Dissolved	UG/L	10	NO2 + NO3 As N Diss	MG/L	1.2
Arsenic Dissolved	UG/L	0	PH		7.7
Barium Dissolved	UG/L	0	PHOS Ortho Dis As P	MG/L	0.0
Bicarbonate	MG/L	566	Phosphate DIS Ortho	MG/L	0.0
Boron Dissolved	UG/L	100	Potassium Dissolved	MG/L	1.0
Bromide	MG/L	0.0	Residue Dis Calc Sum	MG/L	1020
Calcium Dissolved	MG/L	110	Residue Dis Ton/AFT		1.39
Carbonate	MG/L	0	Residue Dis Ton/Day		5.15
Chloride Dissolved	MG/L	5.9	Sar		2.3
Conductivity		1525	Selenium Dissolved	UG/L	1
Fluoride Dissolved	MG/L	0.4	Silica Dissolved	MG/L	18
Hardness Noncarb	MG/L	150	Sodium Dissolved	MG/L	130
Hardness Total	MG/L	610	Sodium Percent		32
Iron Dissolved	UG/L	30	Streamflow (cfs)-Inst		1.9
Lead Dissolved	UG/L	1	Strontium Dissolved	UG/L	4600
Lithium Dissolved	UG/L	20	Sulfate Dissolved	MG/L	380
Magnesium Dissolved	MG/L	81	Water Temp (Deg C)		9.0
			Zinc Dissolved	UG/L	0

CATIONS	(MG/L)	(MEQ/L)
Calcium Dissolved	110	5.489
Magnesium Dissolved	81	6.664
Potassium Dissolved	1.0	0.026
Sodium Dissolved	130	5.655
Total		17.833

ANIONS	(MG/L)	(MEQ/L)
Bicarbonate	566	9.277
Carbonate	0	0.000
Chloride Dissolved	5.9	0.167
Fluoride Dissolved	0.4	0.022
Sulfate Dissolved	380	7.912
NO2 + NO3 As N D	1.2	0.086
Total		17.461

Notes:

1. Date of collection June 17, 1975
2. Sample analyzed by USGS Central Laboratory, Salt Lake City, Utah

The field sampling procedures were quite detailed in order to provide highly reliable data for analytical procedures. For each spring sampled, a two gallon container was rinsed and filled with the spring water. The temperature was immediately taken and used to obtain temperature adjusted conductivity and pH values using battery operated meters. The water from the two gallon container was then carried to the truck where a portion of this water was filtered and acidified and stored in two 1 liter bottles and one 250 ml bottle. One 250 ml bottle was filled with filtered water only at ambient temperature and another 250 ml bottle was filled with filtered water and chilled in an ice filled portable chest. All bottles were labeled with the spring identification number, temperature, conductivity, pH, and time collected.

The original goal was to sample the springs semi-annually but it was determined that the variation in water quality with time was minimal and sampling on this basis was not necessary. At present, certain springs are being sampled annually to determine if any significant variations do occur. If this does happen, additional sampling of all springs may be initiated.

EVALUATION OF SPRING SOURCES

From the beginning of this study, it was believed by individuals familiar with the Piceance Basin that most of the larger springs in the basin were related to the high hydraulic heads in the upper and lower aquifers where the elevations of the potentiometric surfaces exceed the land surface elevation along the stream valleys. However, the reasons why these springs are located where they are and whether they are supplied from the upper or lower aquifer were not known. Thus, data available from water quality analysis, spring hydrograph characteristics and localized geology were evaluated to explain and, if possible, to determine spring sources. In some instances, spring locations were evaluated using geophysical techniques to obtain additional geological data.

The water quality data obtained from this investigation have been analyzed to determine from which aquifer the spring may be obtaining its supply. In all springs in this monitoring program the source appears to be the upper aquifer based upon total dissolved solids, fluoride, barium, boron, lithium and strontium. In general, the lower aquifer has higher concentrations of dissolved solids, fluoride, barium, boron, lithium, and has a lower concentration of strontium (Welder and Saulnier, 1978). The concentrations measured in the springs being monitored are generally within the range of the concentrations measured for the upper aquifer by Welder and Saulnier (1975-76). The concentrations for specific

constituents do increase in the direction of ground water flow, which is toward the north-central part of the basin. This would tend to confirm the generally accepted theory that the poorer quality water from the lower aquifer does move upward through the Mahogany Zone in the northern part of the basin where its hydraulic head is greater than the upper aquifer resulting in poorer quality water in that part of the upper aquifer. The spring with the poorest quality water is Y-1 which is the northernmost spring being monitored. Chemical analyses for this spring are shown in Table 5.

Reaches capable of receiving ground water discharge from the upper aquifer are shown on Figure 5, which is the map of the Piceance Basin showing monitored spring locations. These gaining reaches were defined by drawing the potentiometric contours of the upper aquifer from Weeks, et al (1974), on the Water Rights Inventory Maps which have topographic contours on them. Reaches where the potentiometric surface of the upper aquifer exceed the land surface elevation were delineated and designated as gaining reaches for this study.

It can be seen from Figure 5 that a majority of the springs being monitored are in gaining reaches and could be obtaining their supply from the upper confined artesian aquifer. In general, the hydrographs of springs in these reaches are different from the hydrographs in reaches not considered to be gaining as designated in this report. The flow characteristics from springs in the gaining reaches generally indicate a more uniform and greater discharge. Most springs in the head waters where

TABLE 5
Water Quality Analysis
Spring Y-1

Alk. Tot (As CACO3)	MG/L	719	NO2 + NO3 As N Diss	MG/L	0.02
Aluminum Dissolved	UG/L	20	PH		7.4
Arsenic Dissolved	UG/L	4	Phos Ortho Dis As P	MG/L	0.01
Barium Dissolved	UG/L	0	Phosphate Dis Ortho	MG/L	0.03
Bicarbonate	MG/L	877	Potassium Dissolved	MG/L	3.0
Boron Dissolved	UG/L	300	Residue Dis Calc Sum	MG/L	1930
Bromide	MG/L	0.2	Residue Dis Ton/AFT		2.62
Calcium Dissolved	MG/L	47	Residue Dis Ton/Day		1.45
Carbonate	MG/L	0	Sar		5.3
Chloride Dissolved	MG/L	28	Selenium Dissolved	UG/L	0
Copper Dissolved	UG/L	1	Silica Dissolved	MG/L	15
Fluoride Dissolved	MG/L	0.6	Sodium Dissolved	MG/L	360
Hardness Noncarb	MG/L	140	Sodium Percent		48
Hardness Total	MG/L	860	Sp. Conductance Lab		2650
Iron Dissolved	UG/L	40	Streamflow (cfs)-Inst		0.28
Lead Dissolved	UG/L	0	Strontium Dissolved	UG/L	4000
Lithium Dissolved	UG/L	30	Sulfate Dissolved	MG/L	860
Magnesium Dissolved	MG/L	180	Water Temp (Deg C)		12.0
Manganese Dissolved	UG/L	20	Zinc Dissolved	UG/L	0

CATIONS			ANIONS		
	(MG/L)	(MEQ/L)		(MG/L)	(MEQ/L)
Calcium Dissolved	47	2.346	Bicarbonate	877	14.375
Magnesium Dissolved	180	14.807	Carbonate	0	0.000
Potassium Dissolved	3.0	0.077	Chloride Dissolved	28	0.790
Sodium Dissolved	360	15.660	Fluoride Dissolved	0.6	0.032
			Sulfate Dissolved	860	17.906
			NO2 + NO3 As N D	0.02	0.002
	Total	32.889		Total	33.102

Notes:

1. Date of collection July 28, 1975
2. Sample analyzed by USGS Central Laboratory, Salt Lake City, Utah

the valley bottom elevations exceed the elevation of the potentiometric surface of the upper aquifer have hydrographs with considerable seasonal variation with peaks occurring during and immediately after the snowmelt season and with smaller discharges indicating supply from a perched aquifer with a nearby source of recharge.

There are two springs on the Middle Fork of Stewart Gulch which do not follow this pattern. In particular, CER-7 and to a lesser degree S-12 appear to be supplied by the upper aquifer through discharge from the confined artesian aquifer rather than from a spring supplied from a perched aquifer. It appears in this area that the potentiometric contours are not in agreement with actual conditions; this, however, cannot be readily determined since so little water level data are available from the two wells located in this area. If contours of the potentiometric surface of the upper aquifer as drawn by Welder and Saulnier (1978) are observed in this area, they show a more pronounced curve toward the north following the shape of the structural basin. If the projected 7,000 foot contour and projected 7,200 foot contour are drawn following the shape of the 6,800 foot contour, then the springs in question, CER-7 and S-12, would be in an area where they could obtain their supply from the confined artesian upper aquifer.

The method of interconnection between the confined artesian aquifer at considerable depth below the land surface and the points of discharge appear to the authors of this report to be related to the regional set of west-northwest trending faults of the Piceance basin. These faults

are particularly numerous on both the north and south flanks of the central basin anticline which is shown on structural contour maps of the Mahogany Zone (Weeks, et al, 1974).

If the numerous faults, which have been recently located on geologic maps of the various quadrangles of the Piceance Basin by Cashion (1969), Duncan (1976), Hail (1972), Hail (1973), Hail (1974), Hail (1975), Hail (1977), O'Sullivan (1974), Pipiringos and Johnson (1975), Pipiringos and Johnson (1976), and Roehler (1972), are mapped on overlays of the Water Rights Inventory Maps, a high degree of correlation between faults and spring locations is apparent.

To further confirm this hypothesis, the State Engineer contracted with the Colorado School of Mines, Geophysics Fund Inc., to conduct geophysical investigations of five locations near springs in the Piceance Basin. These investigations consisted of seismic refraction and Schlumberger resistivity profiles along selected lines near the following springs:

1. A line approximately one mile in length on Willow Creek encompassing springs W-4, W-5, W-6 and W-11.
2. A line one-half mile in length on the Middle Fork of Stewart Gulch with spring CER-7 near its center.
3. A line approximately three-fourths mile in length on Black Sulphur Creek extending on either side of springs B-2 and B-3.
4. A line one-half mile in length on Black Sulphur Creek

with spring B-1 near its center.

5. A line one-half mile in length on Corral Gulch with spring C-1 near its center.

This office participated in the investigations by aiding the Geophysics Fund field staff and by conducting local geologic mapping in the area of each profile. The results of the geophysical investigations, while not completely conclusive due to narrow valley widths, indicated that northwest trending eroded fault scarps were probably situated at the location of the springs in Willow Creek, Middle Fork of Stewart Gulch, and Black Sulphur Creek (west line). The large spring, B-1, on Black Sulphur Creek (east line) appears to be related to a horst bounded by faults which parallel the regional fault trend.

The spring, C-1, on Corral Gulch does not appear to be related to faulting based upon the geophysical data obtained or upon local geology. The geophysical data indicates that the alluvium is possibly only three feet thick in this area and is over a saturated sandstone or marlstone approximately 192 feet thick. This spring could be supplied by a perched aquifer being recharged from the precipitation falling on the higher elevation land surfaces to the northwest. The characteristic of this spring's hydrograph is a somewhat variable discharge indicating a possibility of being related to a perched aquifer but with the source of recharge being a greater distance from the spring than some of the other springs being supplied by perched aquifers.

Those springs located in the upper reaches of the stream valleys where the potentiometric surface is below the elevation of the valley bottoms also appear to be generally related to faulting or related fracturing when the locations of the springs are compared with mapped faults. In these areas the springs exhibit characteristics of being supplied by perched aquifers near the source of recharge with definite seasonal trends such as peak discharges occurring during the snowmelt season or immediately after. In a dry year such as 1977 when the snowpack was minimal, the discharges of these springs declined significantly with no peak during the snowmelt season and several springs actually dried up.

SUMMARY AND CONCLUSIONS

The purpose of this investigation was to provide baseline data on spring flows and hydraulics in the Piceance Basin in order to assure proper evaluation and prediction of the impact of oil shale development on the water resources of the basin.

To meet the objectives of the investigation, data were collected on spring discharge and water quality by establishing a permanent monitoring network. To assure that all springs were monitored, remote sensing techniques were utilized to locate springs throughout remote areas of the 900 square mile basin. Data were also collected on water diversions in the basin for both surface and ground water. Water rights and registered wells related to these water uses were inventoried and located on four color keyed maps of the oil shale development region including the Colorado River and White River near the Piceance Basin.

The above data were used to determine the source of supply for the 78 springs included in the monitoring network. Additional geological and ground water field data were obtained using geophysical techniques to aid in the determination of spring sources.

The majority of the springs in the basin receive their supply from the upper aquifer in areas where the elevation of the potentiometric surface of the upper aquifer exceeds the elevation of stream valley bottoms. The method of interconnection between the aquifer which may be several

hundred feet below the stream and the points of discharge appear to be along numerous faults in the basin which have a regional trend of west-northwest. These springs can be located on Figure 5 where reaches of the streams capable of receiving ground water discharge from the upper aquifer due to its artesian characteristics have been identified.

The remaining springs on Figure 5 appear to have as a source of supply perched aquifers created by erosion or faulting. These springs have smaller discharges with seasonal variations directly related to recharge from snowmelt in the immediate vicinity of the springs.

It is quite apparent that the ground water and surface water systems of the Piceance Basin are intrinsically related with ground water discharge providing at least 80 percent of the annual volume of streamflow. The numerous springs appear to be the primary means of ground water discharge reaching the streams. The volume of ground water discharged by the springs monitored during this investigation amounted to approximately 34,414 acre-feet in 1976 which is nearly double the annual streamflow volume of 18,071 acre-feet recorded during 1976 for Piceance and Yellow Creeks at the confluences with the White River. This ground water discharge is greater than the 26,100 acre-feet predicted by Weeks, et al (1974); however, the 26,100 acre-feet was based primarily upon data collected prior to the 1973 Rio Blanco underground nuclear detonation. The increased ground water discharge has resulted in increased evapotranspiration of water by valley bottom vegetation and increased streamflows as mentioned earlier.

The springs discharging ground water from the upper aquifer where the elevation of its potentiometric surface is greater than the elevation of stream valley bottoms are the primary contributors to the streamflow. In these areas, the elevation difference is 100 feet or less which also indicates that the spring discharges will be sensitive to fluctuations in the configuration of the potentiometric surface.

The digital ground water model developed by Weeks, et al (1974), was used to predict the effects of mine dewatering upon the potentiometric surface of the upper and lower aquifers as a result of hypothetical 30-year mining plans for oil shale tracts C-a and C-b. At the end of 30 years, the drawdown in the upper aquifer exceeds 100 feet for a radius of three miles around tract C-a and approximately four miles around tract C-b. The springs within these areas could cease flowing altogether and the impact upon streamflows and senior vested water rights would be significant.

Also, at the end of 30 years, it is predicted by the model that the upper aquifer will experience some drawdown for a minimum distance of nine miles around tract C-a and for a minimum distance of seven miles around tract C-b. Within these areas, spring discharges would decline due to the reduced hydraulic head and would result in additional reduction in streamflows and injury to vested water rights.

It is apparent that the potential effects of oil shale development upon the hydrologic system of the Piceance Basin are significant and could result in reduced streamflows with less water being available for

water users and stream bottom vegetation dependent upon streamflows. In addition, the reduced spring discharges could affect wildlife habitat by reducing the number of locations where wildlife can water.

It may be possible to mitigate some of the impacts of mine dewatering by utilizing the excess ground water from mine dewatering to augment streamflows if this ground water can meet discharge standards. The excess ground water could also be reinjected around the mine in order to minimize declines in the potentiometric surface of both aquifers. Both of these techniques are being evaluated by the operators of both oil shale lease tracts.

Both oil shale tract operators have filed plans for augmentation with the Water Court and, if approved, will satisfy the legal responsibility to remedy injury to vested water rights. Other potential oil shale mine operators will also have to develop plans for augmentation to protect vested water rights prior to commencing mine dewatering.

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APPENDIX A

SPRING DISCHARGE DATA AND HYDROGRAPHS

FIGURE A-1

P-1

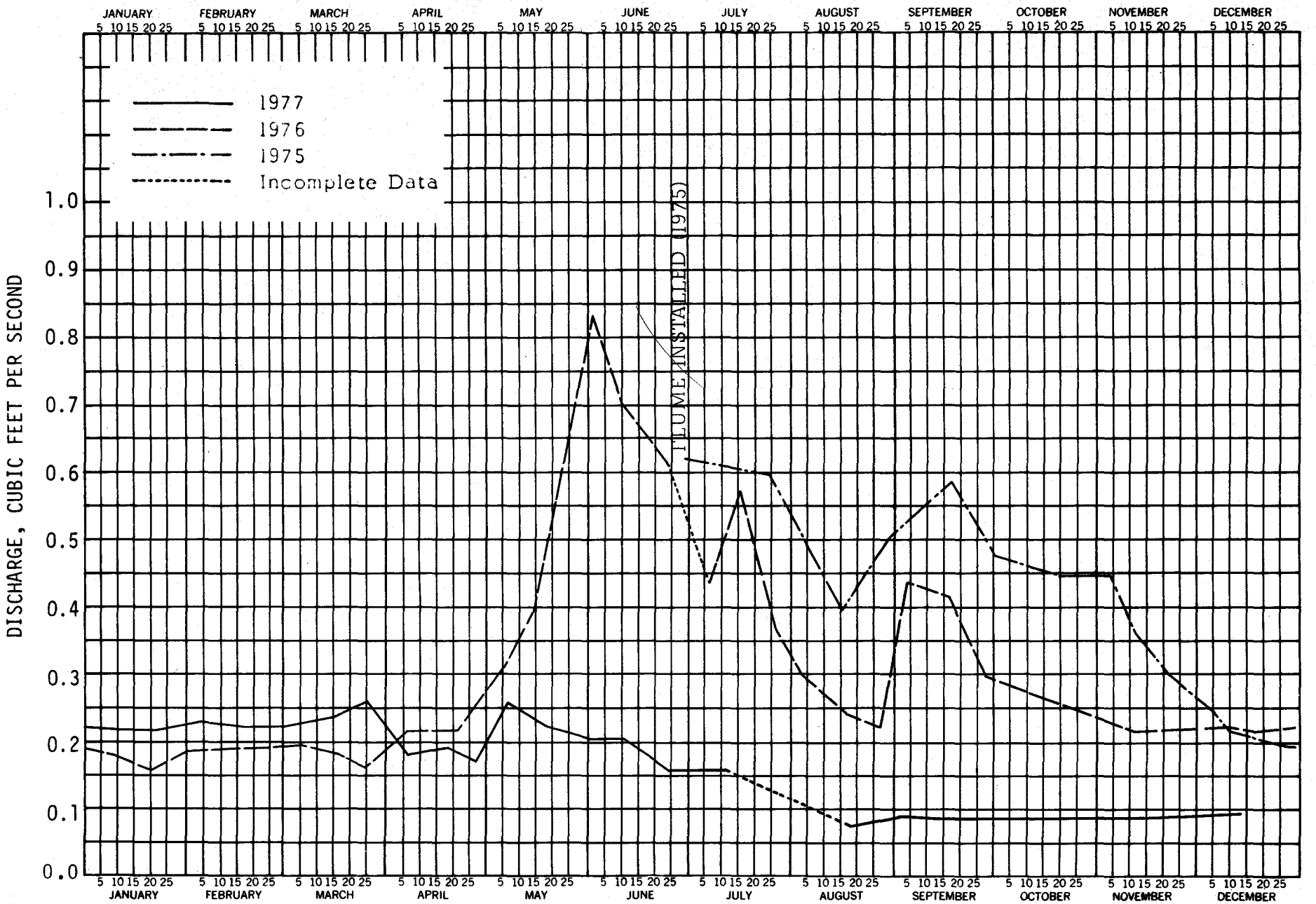

JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED (1975)
DISCHARGE, CUBIC FEET PER SECOND
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-1 DISCHARGE AT P-1, SPRING ON PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 39° 47' 46", Longitude: 108° 06' 57"
NE1/4, NW1/4, Sec. 13, T3S, R96W, Rio Blanco County

1975											
	JUN	30 - 0.623	JULY	14 - 0.610	AUG	15 - 0.393	SEP	17 - 0.584	OCT	20 - 0.497	NOV	4 - 0.497
				24 - 0.597		29 - 0.509		30 - 0.474				12 - 0.361
												21 - 0.299
	DEC	5 - 0.241										
		9 - 0.222										
		26 - 0.196										
1976												
	JAN	9 - 0.179	FEB	12 - 0.187	MAR	5 - 0.196	APR	7 - 0.222	MAY	6 - 0.319	JUN	1 - 0.828
		20 - 0.154		25 - 0.187		16 - 0.179		22 - 0.222		14 - 0.393		10 - 0.702
		29 - 0.179				25 - 0.162						24 - 0.610
	JULY	6 - 0.438	AUG	3 - 0.299	SEPT	3 - 0.438	OCT	- N	NOV	10 - 0.213	DEC	8 - 0.222
		15 - 0.571		16 - 0.241		16 - 0.415						17 - 0.213
		26 - 0.361		26 - 0.222		27 - 0.299						29 - 0.222
1977												
	JAN	10 - 0.222	FEB	4 - 0.231	MAR	15 - 0.241	APR	6 - 0.179	MAY	6 - 0.260	JUN	10 - 0.205
		21 - 0.222		17 - 0.222		25 - 0.260		18 - 0.187		18 - 0.231		24 - 0.154
				28 - 0.222				27 - 0.170		31 - 0.205		
	JULY	12 - 0.162	AUG	18 - 0.076	SEPT	1 - 0.089	OCT	19 - 0.082	NOV	15 - 0.082	DEC	13 - 0.089
		29 - N				14 - 0.082						
						24 - 0.082						

N - No Reading

FIGURE A-2

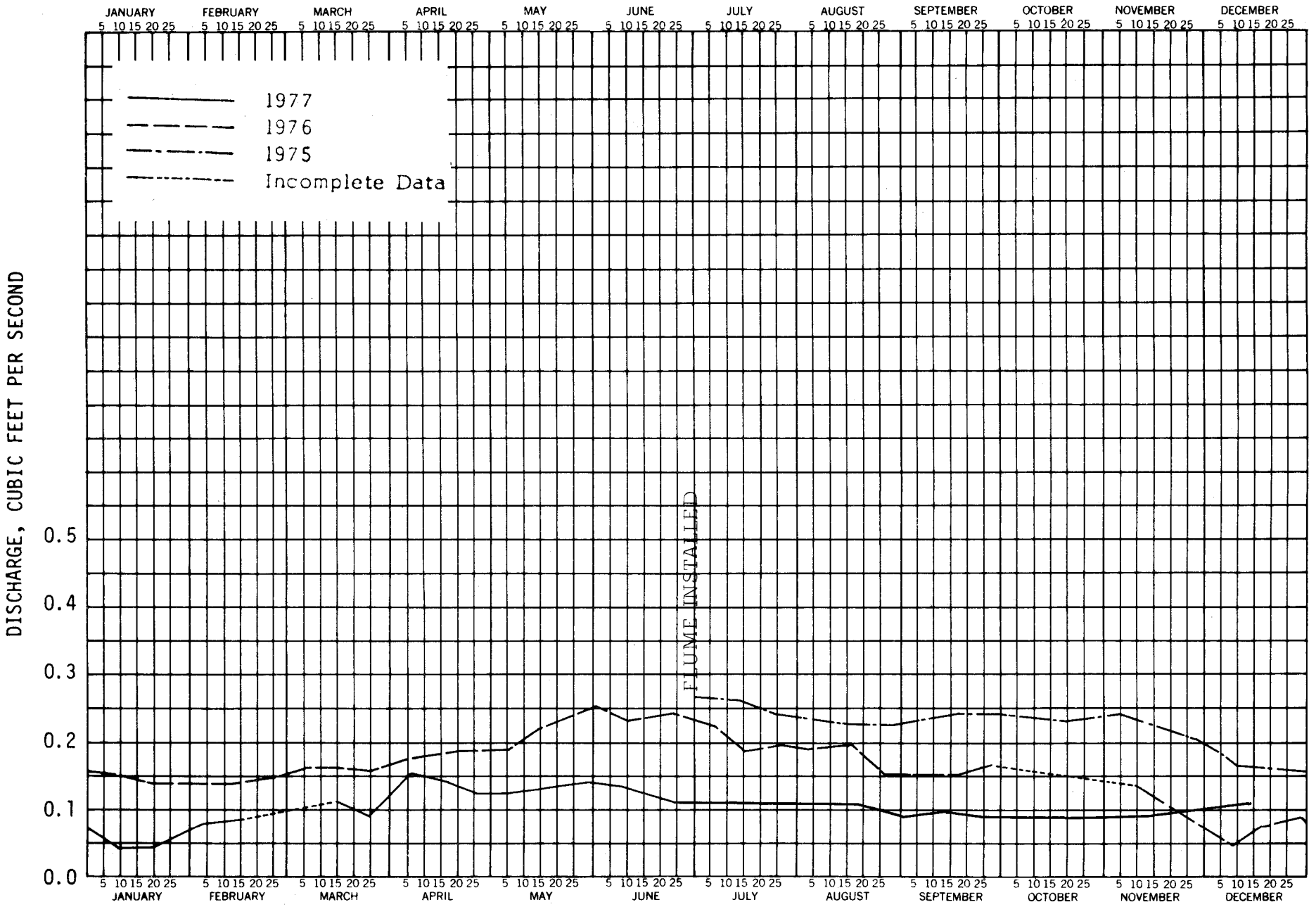

P-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5

TABLE A-2 DISCHARGE AT P-2, SPRING ON PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 39° 48' 00", Longitude: 108° 07' 26"
SW1/4, SW1/4, Sec. 12, T3S, R96W, Rio Blanco County

1975											
	JUN	30 - 0.269	JULY	14 - 0.260	AUG	15 - 0.222	SEP	17 - 0.241	OCT	20 - 0.231	NOV	4 - 0.241
				24 - 0.241		29 - 0.222		30 - 0.241				12 - 0.231
												21 - 0.205
	DEC	5 - 0.170										
		9 - 0.162										
		26 - 0.154										
1976												
	JAN	9 - 0.154	FEB	12 - 0.138	MAR	5 - 0.162	APR	7 - 0.170	MAY	6 - 0.187	JUN	1 - 0.250
		20 - 0.138		25 - 0.146		16 - 0.162		22 - 0.187		14 - 0.213		10 - 0.231
		29 - 0.138				25 - 0.154						24 - 0.241
	JULY	6 - 0.222	AUG	3 - 0.187	SEPT	3 - 0.154	OCT	- N	NOV	10 - 0.138	DEC	8 - 0.042
		15 - 0.187		16 - 0.196		16 - 0.154						17 - 0.076
		26 - 0.196		26 - 0.154		27 - 0.162						29 - 0.089
1977												
	JAN	10 - 0.042	FEB	4 - 0.076	MAR	15 - 0.109	APR	6 - 0.154	MAY	6 - 0.124	JUN	9 - 0.131
		21 - 0.042		17 - 0.082		25 - 0.089		18 - 0.138		18 - 0.131		24 - 0.109
				28 - N				27 - 0.124		31 - 0.138		
	JULY	12 - 0.109	AUG	18 - 0.109	SEPT	1 - 0.089	OCT	19 - 0.082	NOV	15 - 0.089	DEC	13 - 0.117
		29 - 0.109				14 - 0.095						
						24 - 0.089						

N - No Reading

FIGURE A-3

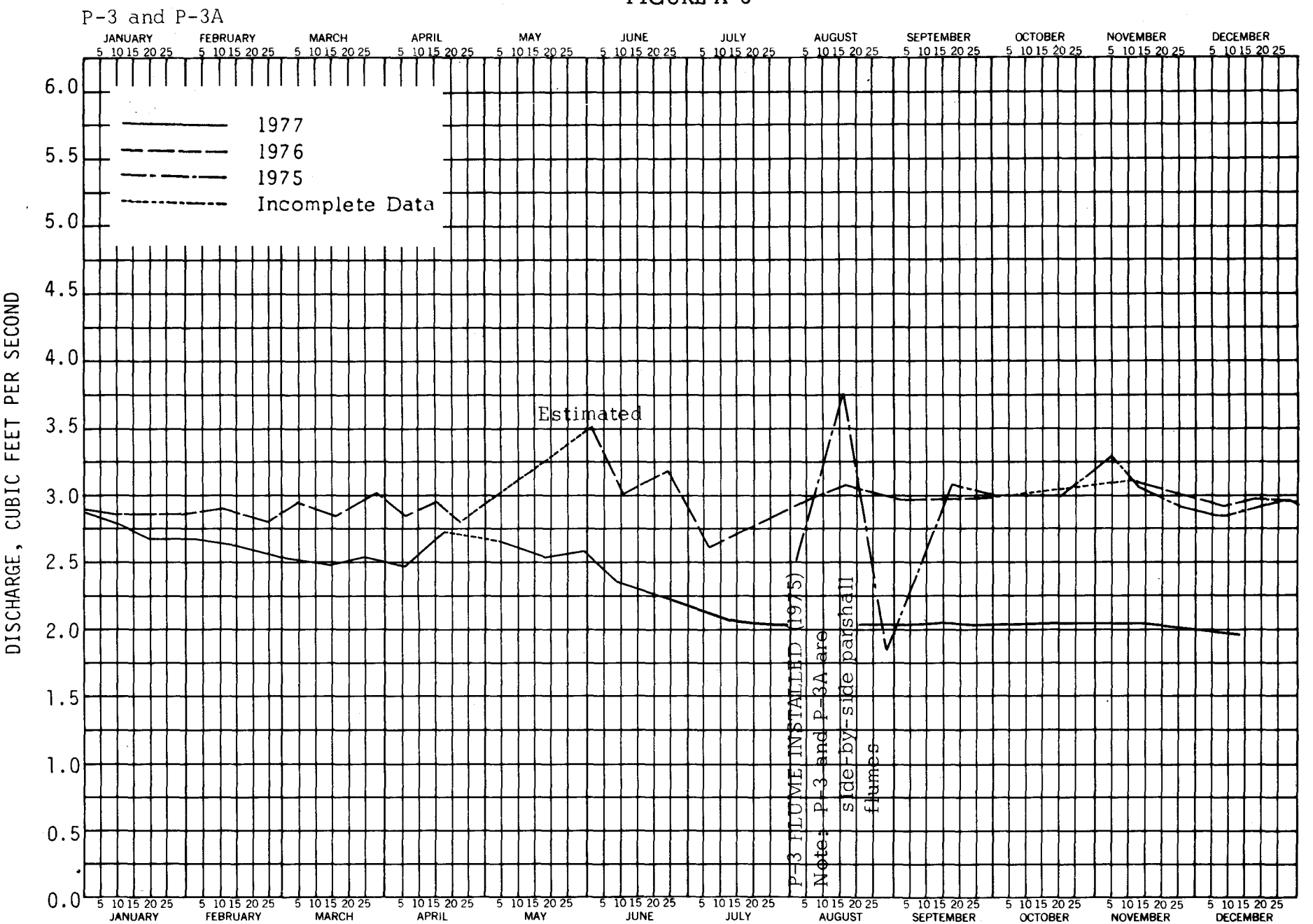

P-3 and P-3A
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
Estimated
P-3 FLUME INSTALLED (1975)
Note: P-3 and P-3A are side-by-side parshall flumes
DISCHARGE, CUBIC FEET PER SECOND
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0

TABLE A-3 DISCHARGE AT P-3, SPRING ON PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

2-12" Parshall Flumes
Period of Record: August 1975 to current year
Latitude: 39° 47' 42", Longitude: 108° 06' 09"
NW1/4, NW1/4, Sec. 18, T3S, R95W, Rio Blanco County

1975

AUG	1 - 2.53	SEPT	17 - 3.08 (P3-A)	OCT	20 - 3.00(C)	NOV	4 - 3.32 (C)	DEC	5 - 2.85 (C)		
	15 - 3.75 (P3-A)		30 - 3.00 (C)				12 - 3.07 (C)		9 - 2.85 (C)		
	29 - 1.88						21 - 2.96 (C)		26 - 2.96 (C)		

1976

JAN	9 - 2.85	FEB	12 - 2.90	MAR	5 - 2.96	APR	7 - 2.85	MAY	- N	JUN	1 - 3.53
	20 - 2.85		25 - 2.80		16 - 2.85		15 - 2.96				10 - 3.00 (est.)
	29 - 2.85				29 - 3.02		22 - 2.80				24 - 3.18
JULY	6 - 2.57	AUG	3 - 2.96	SEPT	3 - 2.96	OCT	- N	NOV	10 - 3.12	DEC	8 - 2.90
	26 - 2.86		16 - 3.07		16 - 2.93						17 - 2.96
			26 - N		27 - 2.96						29 - 2.96

1977

JAN	10 - 2.80	FEB	4 - 2.68	MAR	15 - 2.48	APR	6 - 2.48	MAY	6 - 2.63	JUN	9 - 2.33
	21 - 2.68		17 - 2.63		25 - 2.53		18 - 2.74		18 - 2.53		24 - 2.23
			28 - 2.53				27 - N		31 - 2.58		
JULY	12 - 2.13	AUG	18 - 2.08	SEPT	1 - 2.03	OCT	19 - 2.08	NOV	15 - 2.08	DEC	13 - 1.93
	29 - 2.08				14 - 2.08						
					24 - 2.03						

N - No Reading
P3-A - Flowing Through P3-A (this date only)
C - Combined with P3-A

FIGURE A-4

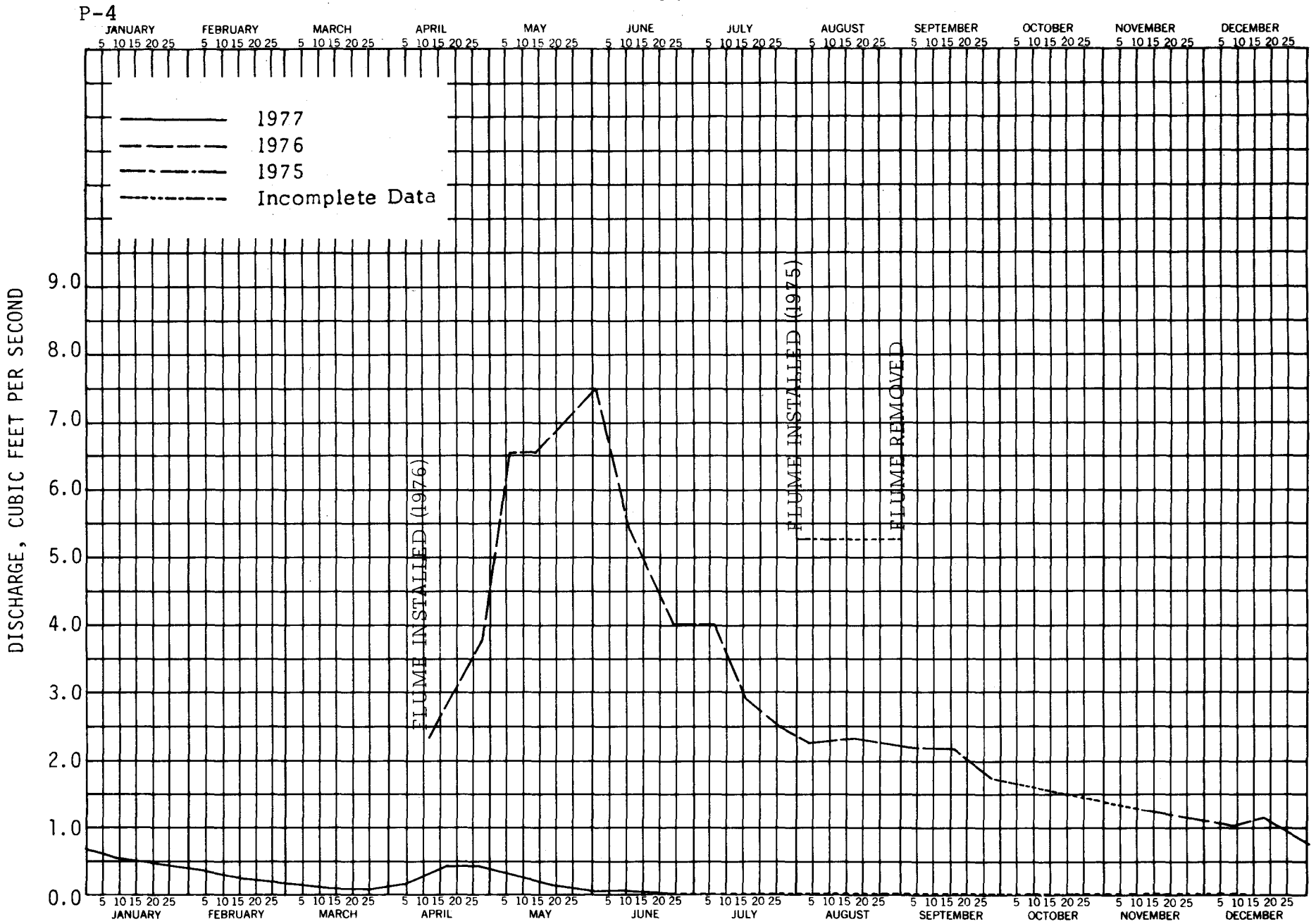

P-4
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED (1976)
FLUME INSTALLED (1975)
FLUME REMOVED
DISCHARGE, CUBIC FEET PER SECOND
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0

TABLE A-4 DISCHARGE AT P-4, SPRING ON PICEANCE CREEK AT STORY GULCH
READINGS IN CUBIC FEET PER SECOND

24" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 47' 33", Longitude: 108° 05' 39"

1975											
	JULY	31 - 5.28	AUG	11 - 5.28	SEPT	- N	OCT	- N	NOV	- N	DEC	- N
				29 - R								
1976												
	JAN	- N	FEB	- N	MAR	- N	APR	12 - 2.32	MAY	6 - 6.56	JUN	1 - 7.51
								28 - 3.81		14 - 6.56		10 - 5.44
												24 - 4.01
	JULY	6 - 4.01	AUG	3 - 2.24	SEPT	3 - 2.16	OCT	- N	NOV	10 - 1.25	DEC	8 - 0.99
		15 - 2.99		16 - 2.32		16 - 2.09						17 - 1.11
		26 - 2.48		26 - 2.24		27 - 1.72						29 - 0.77
1977												
	JAN	10 - 0.56	FEB	4 - 0.38	MAR	15 - 0.07	APR	6 - 0.16	MAY	6 - 0.30	JUN	9 - 0.05
		21 - 0.47		17 - 0.23		25 - 0.08		18 - 0.42		18 - 0.16		24 - T
				28 - 0.19				27 - 0.42		31 - 0.05		
	JULY	12 - T	AUG	18 - D	SEPT	1 - D	OCT	19 - 0.0	NOV	15 - D	DEC	13 - D
		29 - T										

N - No Reading
T - Trickle
R - Flume Removed

FIGURE A-5

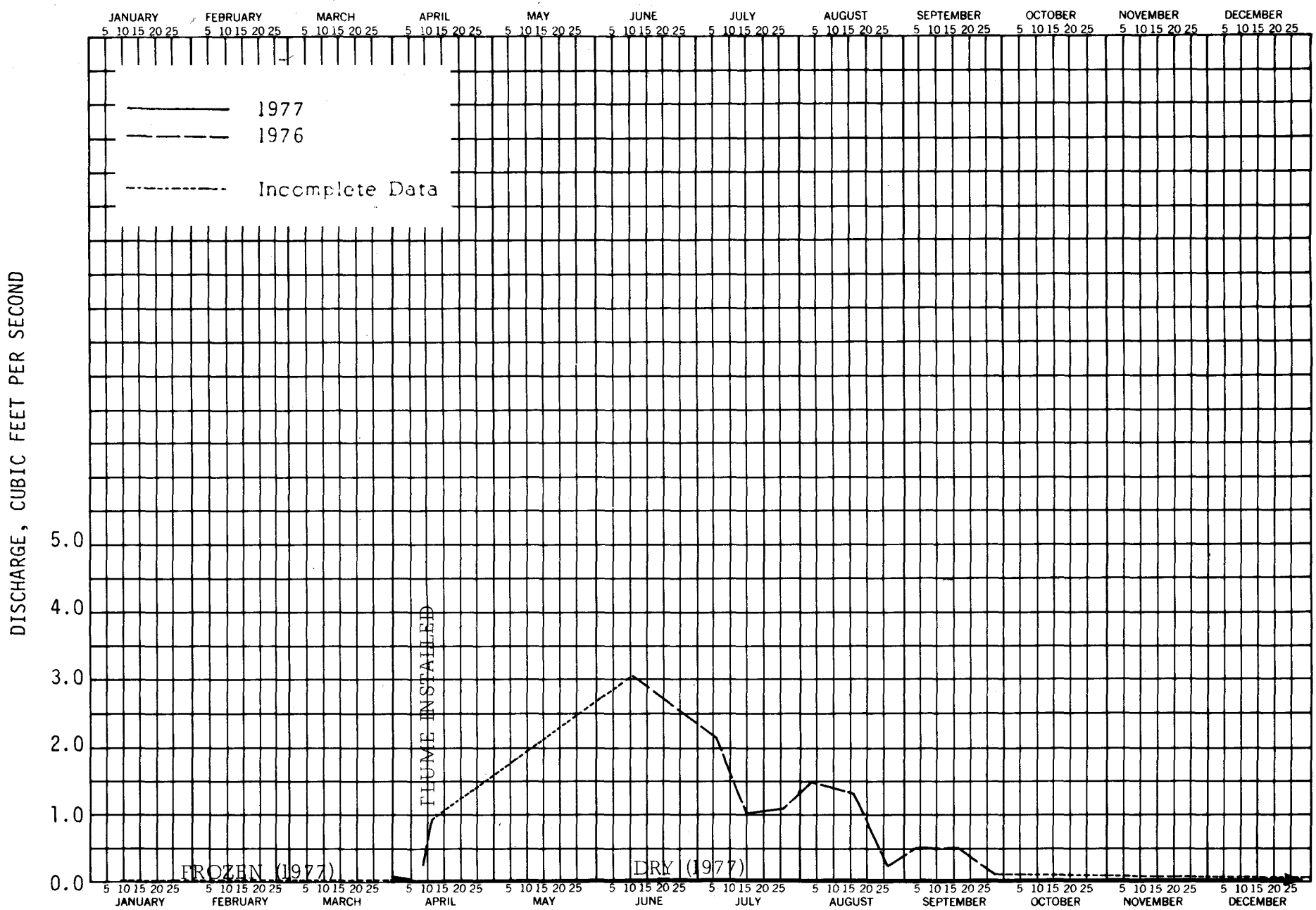

P-5
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
5.0
4.0
3.0
2.0
1.0
0.0
FLUME INSTALLED
FROZEN (1977)
DRY (1977)

TABLE A-5 DISCHARGE AT P-5, SPRING ON PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

24" Parshall Flume
Period of Record: April 1976 to current year
Latitude: 39° 48' 08", Longitude: 108° 04' 32"

1976

APR	9 - 0.19	MAY	- I	JUN	1 - N	JULY	6 - 2.01	AUG	3 - 1.44	SEPT	3 - 0.42
	12 - 0.93				10 - 3.08		15 - 0.93		16 - 1.24		16 - 0.42
					24 - 2.57		26 - 1.05		26 - 0.19		27 - 0.02
OCT	- N	NOV	10 - 0.05	DEC	- F						

1977

JAN	- F	FEB	- F	MAR	- F	APR	- D	MAY	- D	JUN	- D
JULY	12 - D	AUG	18 - D	SEPT	1 - D	OCT	19 - 0.0	NOV	15 - D	DEC	13 - D
	29 - D				14 - D						
					24 - D						

N - No Reading
F - Frozen
D - Dry
I - Irrigating Above Flume

FIGURE A-6

P-6

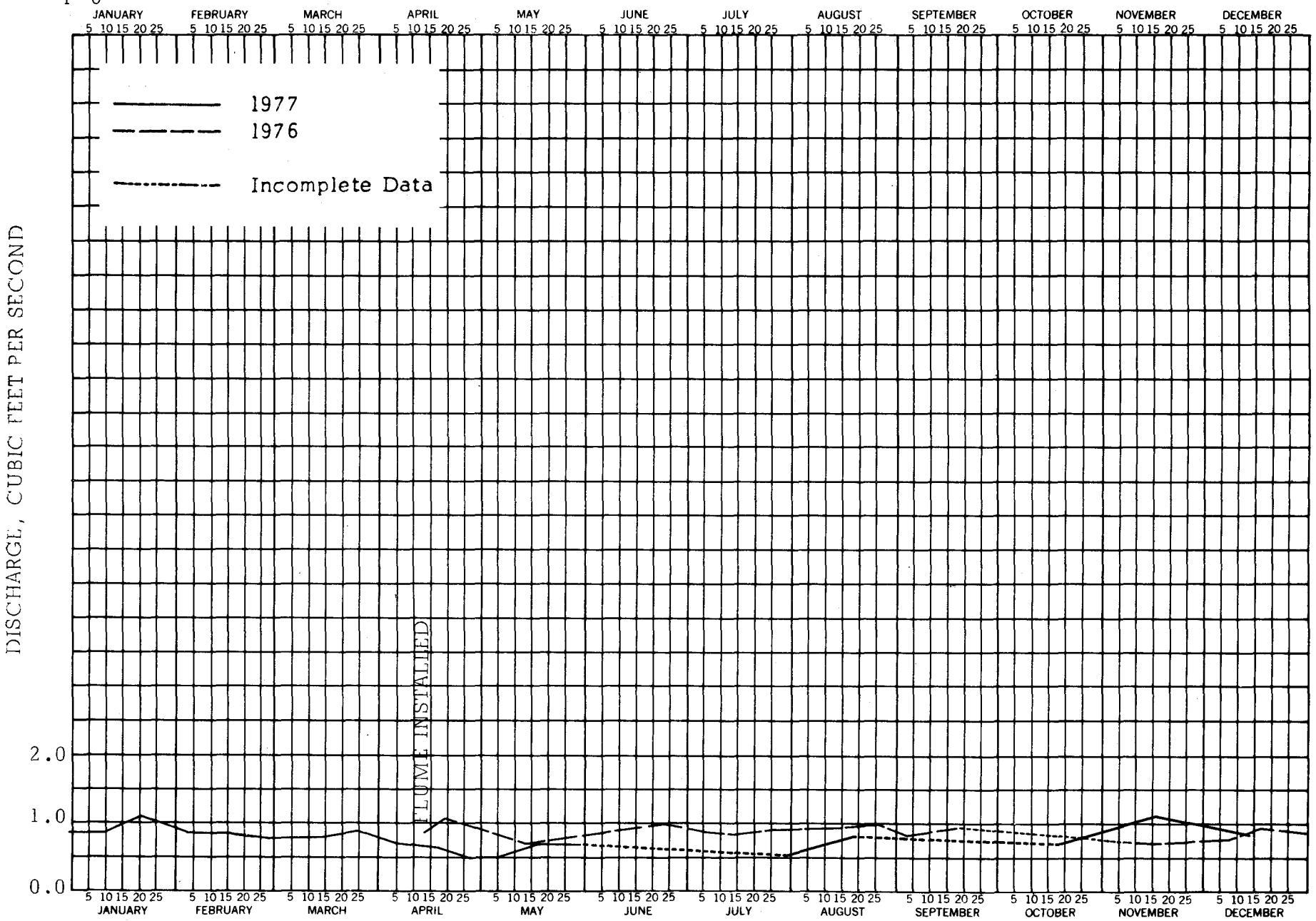

JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
FLUME INSTALLED
2.0
1.0
0.0

TABLE A-6 DISCHARGE AT P-6, SPRING ON PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

12" Parshall Flume
Period of Record: April 1976 to current year
Latitude: 40° 00' 37", Longitude: 108° 14' 46"
T1N, R97W, Sec. 35, SE NE SW

1976

APR	14 - 0.88	MAY	14 - 0.71	JUN	1 - 0.88	JULY	6 - 0.88	AUG	3 - 0.92	SEPT	3 - 0.84
	20 - 1.11				24 - 0.99		15 - 0.84		16 - 0.95		16 - 0.99
							26 - 0.92		26 - 0.99		
OCT	- N	NOV	9 - 0.74	DEC	8 - 0.80						
					17 - 0.95						
					29 - 0.92						

1977

JAN	10 - 0.92	FEB	4 - 0.88	MAR	15 - 0.84	APR	6 - 0.74	MAY	6 - 0.54	JUN	9 - N
	21 - 1.15		17 - 0.88		25 - 0.92		18 - 0.58		18 - 0.74		24 - N
			28 - 0.80				27 - 0.54		31 - 0.71		
JULY	12 - I	AUG	18 - 0.80	SEPT	1 - N	OCT	19 - 0.74	NOV	16 - 1.15	DEC	13 - 0.84
	29 - 0.51				14 - N						
					24 - N						

N - No Reading

FIGURE A-7

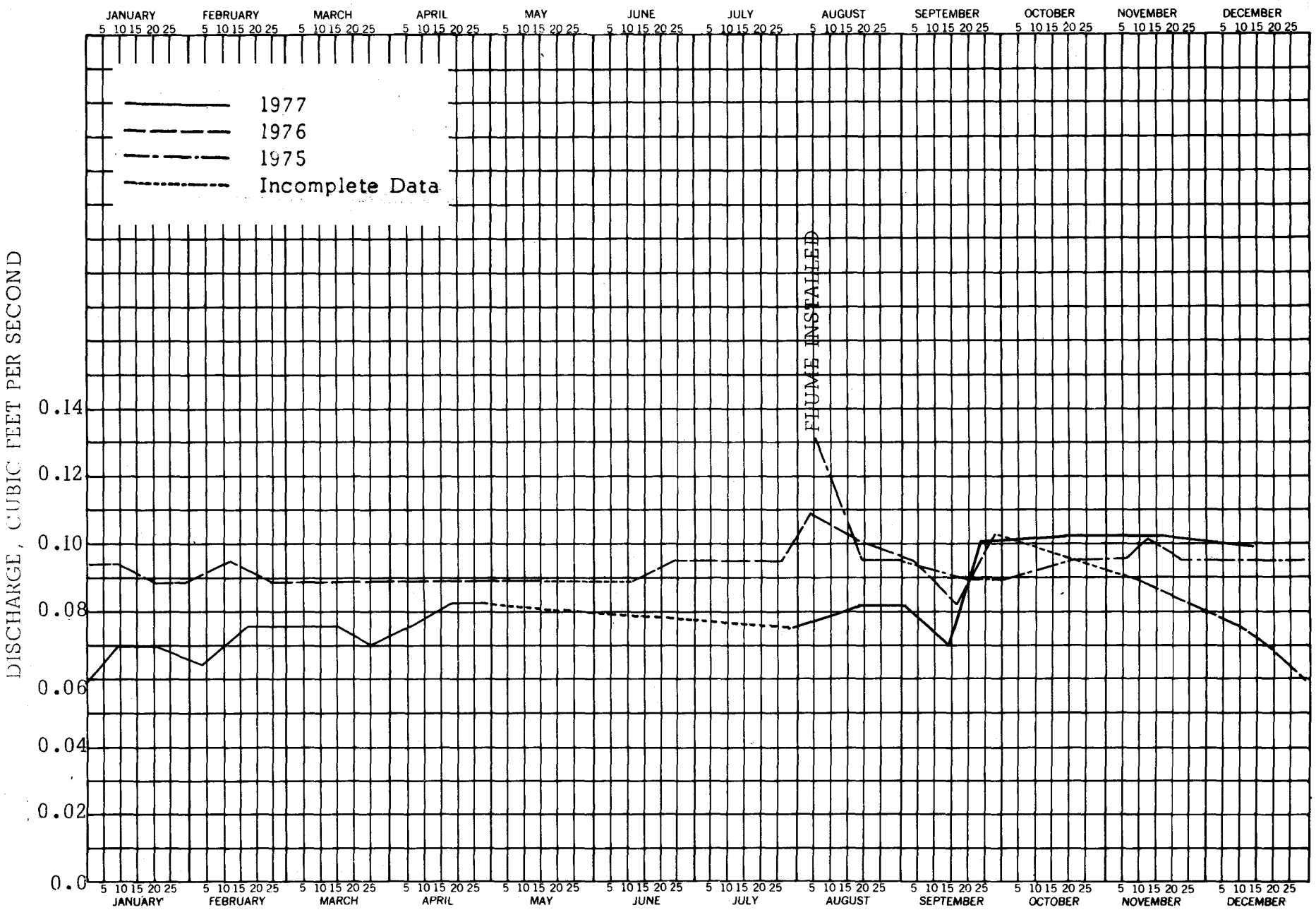

DC-1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.0

TABLE A-7 DISCHARGE AT DC-1, SPRING ON DRY FORK PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 40° 00' 17", Longitude: 108° 11' 26"
NE1/4, NW1/4, Sec. 5, T1S, R96W, Rio Blanco County

1975											
	AUG	5 - 0.131	SEPT	19 - 0.089	OCT	20 - 0.095	NOV	4 - 0.095	DEC	5 - 0.095	
		19 - 0.095		30 - 0.089				12 - 0.102		26 - 0.095	
		29 - 0.095						21 - 0.095			
1976											
	JAN	9 - 0.095	FEB	12 - 0.095	MAR	5 - 0.089	APR	7 - 0.089	MAY	6 - 0.089	JUN 1 - N
		20 - 0.089		25 - 0.089		16 - 0.089		28 - 0.089		14 - 0.089	10 - 0.089
		29 - 0.089				25 - 0.089					24 - 0.095
	JULY	6 - 0.095	AUG	3 - 0.109	SEPT	3 - 0.095	OCT	- N	NOV	9 - 0.089	DEC 8 - 0.076
		26 - 0.095		16 - 0.102		16 - 0.082					17 - 0.070
						27 - 0.102					29 - 0.058
1977											
	JAN	10 - 0.070	FEB	4 - 0.064	MAR	15 - 0.76	APR	6 - 0.076	MAY	6 - I	JUN - I
		21 - 0.070		17 - 0.076		25 - 0.070		18 - 0.082			
				28 - 0.076				27 - 0.082			
	JULY	29 - 0.076	AUG	18 - 0.082	SEPT	1 - 0.082	OCT	19 - 0.102	NOV	16 - 0.109	DEC 13 - 0.095
						14 - 0.070					
						24 - 0.102					

N - No Reading
I - Irrigating Above Flume

FIGURE A-8

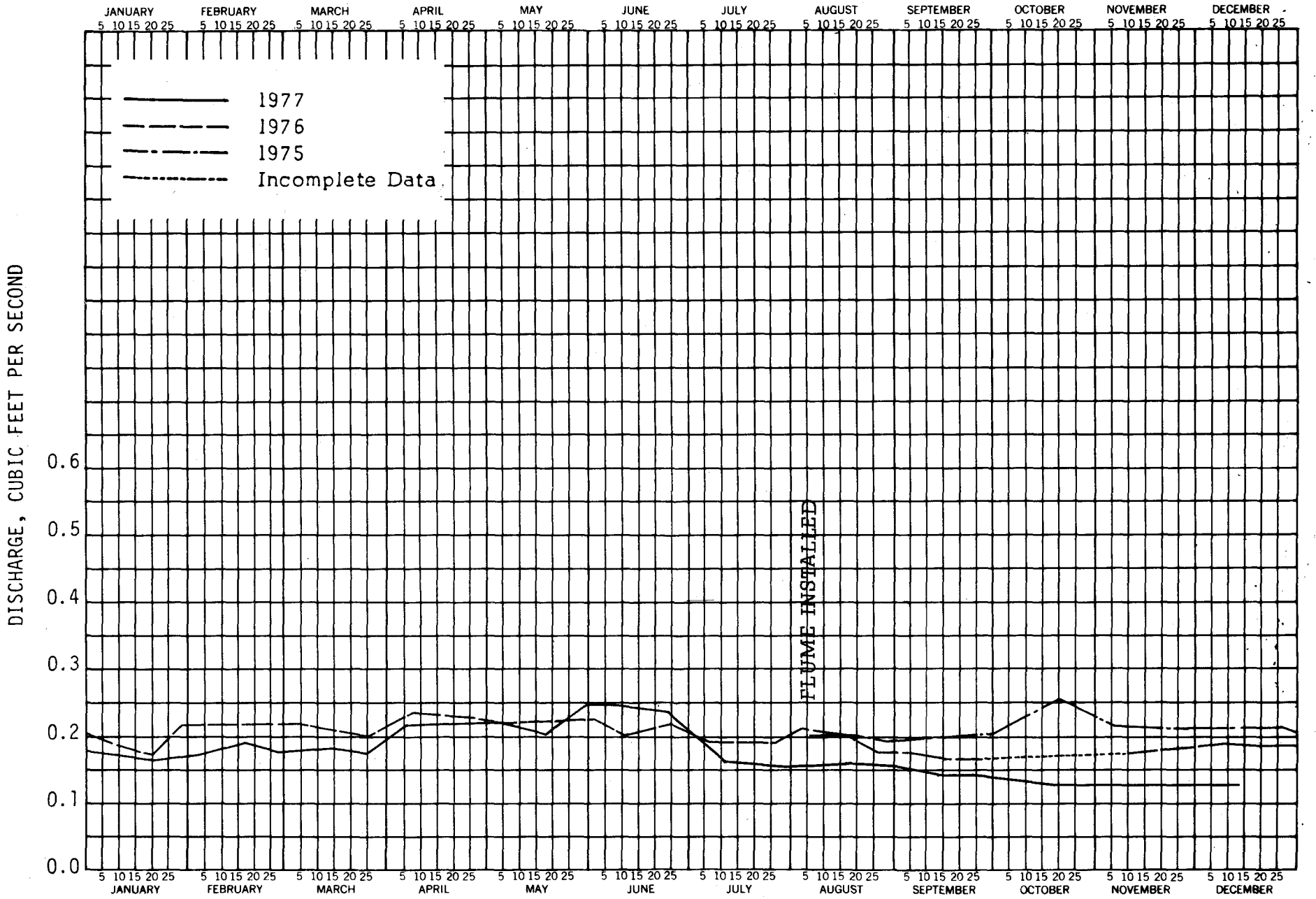

DC-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5
0.6
FLUME INSTALLED

TABLE A-8 DISCHARGE AT DC-2, SPRING ON DRY FORK PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 40° 00' 04", Longitude: 108° 10' 55"
SE1/4, NE1/4, Sec. 5, T1S, R96W, Rio Blanco County

1975											
	AUG	5 - 0.196	SEPT	19 - 0.196	OCT	20 - 0.250	NOV	4 - 0.213	DEC	5 - 0.205	
		19 - 0.196		30 - 0.196				12 - 0.205		26 - 0.205	
		29 - 0.187						21 - 0.205			
1976											
	JAN	9 - 0.187	FEB	12 - 0.213	MAR	5 - 0.213	APR	7 - 0.231	MAY	6 - 0.213	JUN 1 - 0.222
		20 - 0.170		25 - 0.213		16 - 0.205		28 - 0.222		14 - 0.213	10 - 0.196
		29 - 0.213				25 - 0.196					24 - 0.213
	JULY	6 - 0.187	AUG	3 - 0.205	SEPT	3 - 0.170	OCT	- N	NOV	9 - 0.170	DEC 8 - 0.187
		15 - 0.187		16 - 0.196		16 - 0.162					17 - 0.179
		26 - 0.187		26 - 0.170		27 - 0.162					29 - 0.179
1977											
	JAN	10 - 0.170	FEB	4 - 0.170	MAR	15 - 0.179	APR	6 - 0.213	MAY	6 - 0.213	JUN 9 - 0.241
		21 - 0.162		17 - 0.187		25 - 0.170		18 - 0.213		18 - 0.196	24 - 0.231
				28 - 0.170				27 - 0.213		31 - 0.241	
	JULY	12 - 0.162	AUG	18 - 0.162	SEPT	1 - 0.154	OCT	19 - 0.138	NOV	16 - 0.138	DEC 13 - 0.138
		29 - 0.154				14 - 0.146					
						24 - 0.146					

N - No Reading

FIGURE A-9

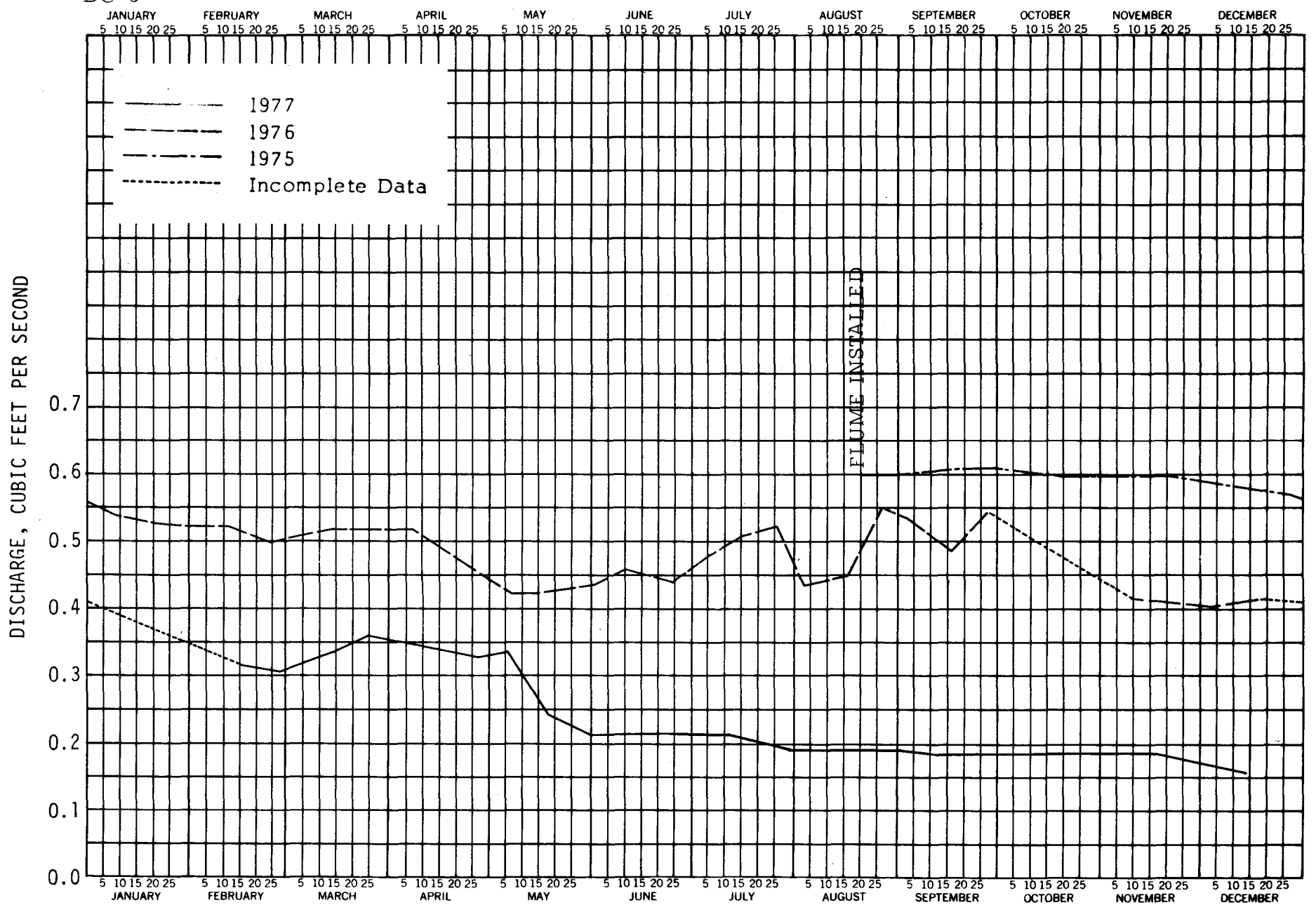

DC-3
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

TABLE A-9 DISCHARGE AT DC-3, SPRING ON DRY FORK PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 39° 57' 29", Longitude: 108° 06' 53"
SE1/4, NW1/4, Sec. 24, T1S, R96W, Rio Blanco County

1975											
	AUG	19 - 0.597	SEPT	19 - 0.610	OCT	20 - 0.597	NOV	4 - 0.597	DEC	5 - 0.584	
		29 - 0.597		30 - 0.610				12 - 0.597		26 - 0.571	
								21 - 0.597			
1976											
	JAN	9 - 0.546	FEB	12 - 0.522	MAR	5 - 0.509	APR	7 - 0.522	MAY	6 - 0.427	JUN 1 - 0.438
		20 - 0.534		25 - 0.497		16 - 0.522		28 - 0.450		14 - 0.427	10 - 0.462
		29 - 0.522				25 - 0.522					24 - 0.438
	JULY	6 - 0.485	AUG	3 - 0.438	SEPT	3 - 0.534	OCT	- N	NOV	9 - 0.415	DEC 8 - 0.404
		15 - 0.509		16 - 0.450		16 - 0.485					17 - 0.415
		26 - 0.522		26 - 0.546		27 - 0.546					29 - W
1977											
	JAN	- W	FEB	4 - W	MAR	15 - 0.339	APR	6 - 0.350	MAY	6 - 0.339	JUN 9 - 0.213
				17 - 0.319		25 - 0.361		18 - 0.339		18 - 0.241	24 - 0.213
				28 - 0.309				27 - 0.329		31 - 0.213	
	JULY	12 - 0.213	AUG	18 - 0.187	SEPT	1 - 0.187	OCT	19 - 0.179	NOV	16 - 0.187	DEC 13 - 0.154
		29 - 0.187				14 - 0.179					
						24 - 0.179					

N - No Reading
W - Washed Out

FIGURE A-10

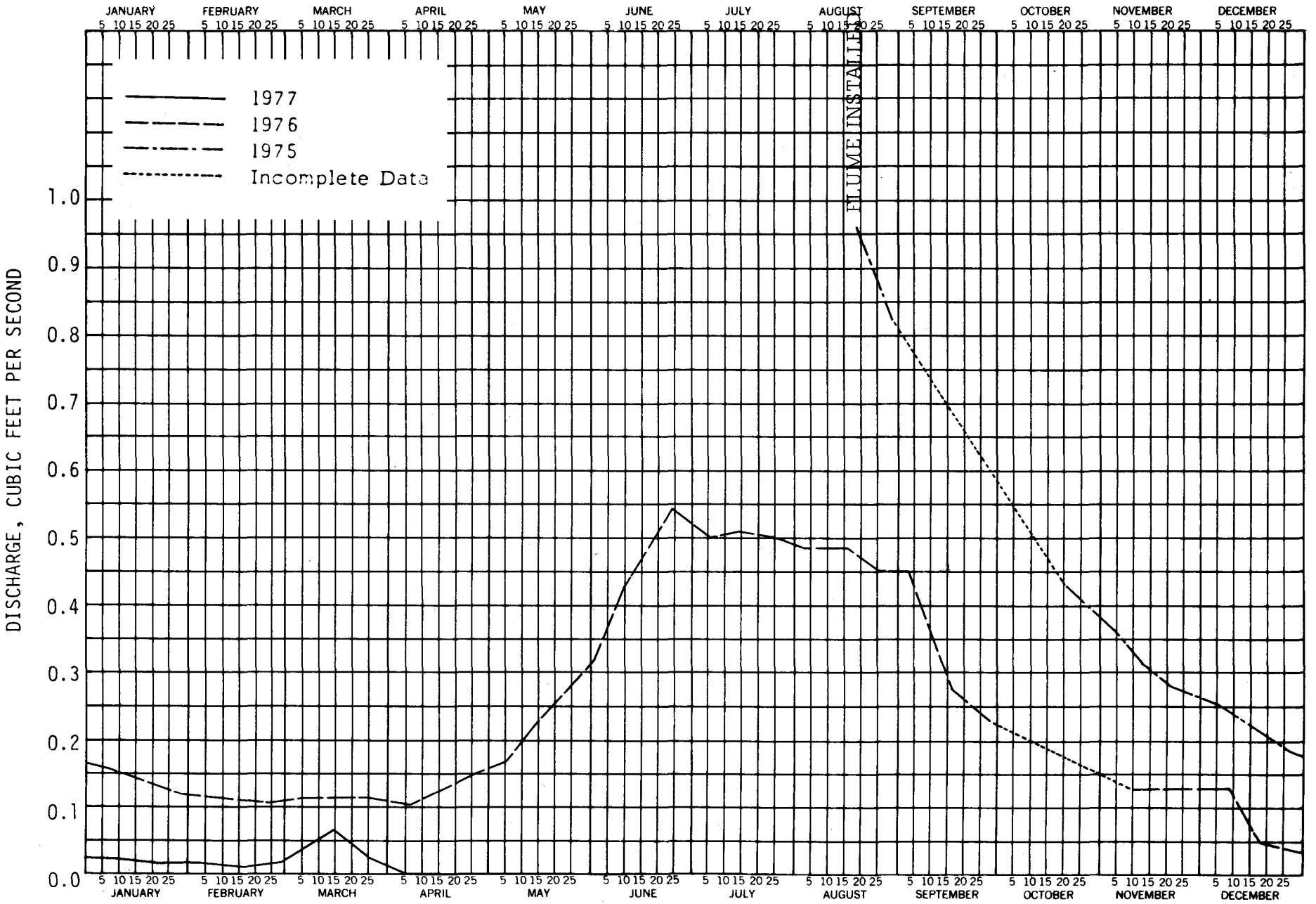

DC-4
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-10 DISCHARGE AT DC-4, SPRING ON DRY FORK PICEANCE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 39° 56' 41", Longitude: 108° 06' 28"
NE1/4, NE1/4, Sec. 25, T1S, R96W, Rio Blanco County

1975												
	AUG	19 - 0.961	SEPT	- N	OCT	20 - 0.427	NOV	4 - 0.361	DEC	5 - 0.250		
		29 - 0.828						12 - 0.319		26 - 0.179		
								21 - 0.279				
1976												
	JAN	9 - 0.162	FEB	12 - 0.117	MAR	5 - 0.117	APR	7 - 0.102	MAY	6 - 0.170	JUN	1 - 0.319
		20 - 0.138		25 - 0.109		16 - 0.117		28 - 0.154		14 - 0.222		10 - 0.427
		29 - 0.124				25 - 0.117						24 - 0.546
	JULY	6 - 0.497	AUG	3 - 0.485	SEPT	3 - 0.450	OCT	- N	NOV	9 - 0.124	DEC	8 - 0.124
		15 - 0.509		16 - 0.485		16 - 0.279						17 - 0.047
		26 - 0.497		26 - 0.450		27 - 0.231						29 - 0.028
1977												
	JAN	10 - 0.028	FEB	4 - 0.020	MAR	15 - 0.070	APR	6 - T	MAY	- T	JUN	- D
		21 - 0.020		17 - 0.013		25 - 0.030						
				28 - 0.020								
	JULY	12 - D	AUG	18 - D	SEPT	1 - D	OCT	19 - 0.0	NOV	16 - D	DEC	13 - D
		29 - D				14 - D						
						24 - D						

N - No Reading
T - Trickle
D - Dry

FIGURE A-11

R-1 (USGS STATION NO. 108)

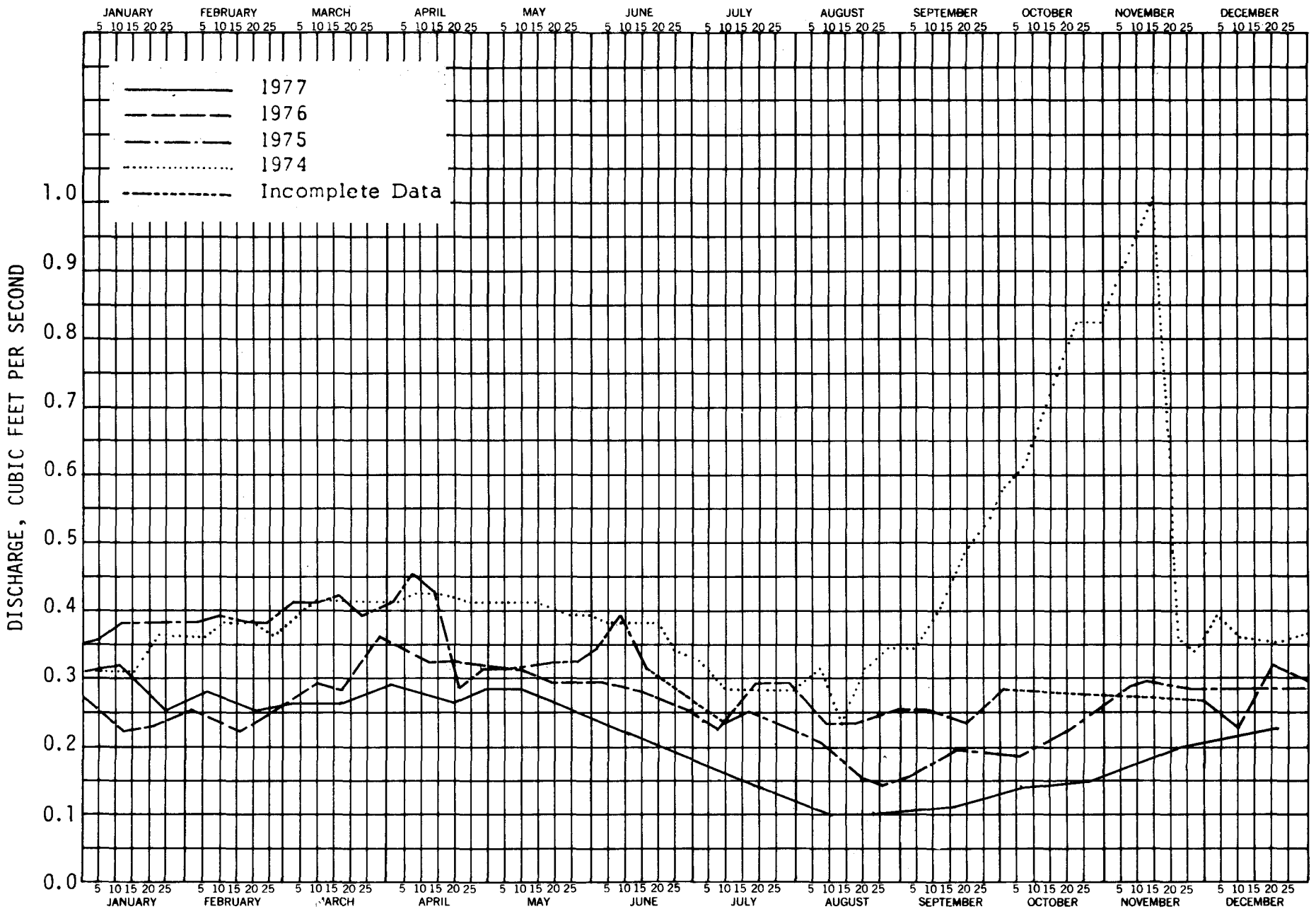


TABLE A-11 DISCHARGE AT R-1 (USGS STATION NO. 108), SPRING ON RYAN GULCH
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 55' 11", Longitude: 108° 17' 55"
NE1/4, SE1/4, Sec. 32, T1S, R97W, Rio Blanco County

1974						
JULY 3 - 0.32	AUG 7 - 0.31	SEPT 4 - 0.34	OCT 2 - 0.58	NOV 7 - 0.92	DEC 4 - 0.39	
10 - 0.28	14 - 0.23	11 - 0.39	7 - 0.61	15 - 1.04	10 - 0.36	
17 - 0.28	21 - 0.31	19 - 0.48	23 - 0.82	22 - 0.36	17 - 0.35	
31 - 0.28	28 - 0.34	25 - 0.52	30 - 0.82	27 - 0.34	23 - 0.35	
					30 - 0.36	
1975						
JAN 6 - 0.36	FEB 4 - 0.38	MAR 4 - 0.41	APR 1 - 0.41	MAY 7 - 0.31	JUN 2 - 0.34	
13 - 0.38	11 - 0.39	11 - 0.41	8 - 0.45	19 - 0.32	9 - 0.39	
21 - 0.38	18 - 0.38	17 - 0.42	15 - 0.42	27 - 0.32	17 - 0.31	
28 - 0.38	25 - 0.38	24 - 0.39	22 - 0.28		26 - N	
			29 - 0.31			
JULY 10 - 0.23	AUG 8 - 0.20	SEPT 3 - 0.15	OCT 6 - 0.18	NOV 6 - 0.28	DEC 8 - 0.28	
17 - 0.25	19 - 0.15	17 - 0.19	21 - 0.22	13 - 0.29	30 - 0.28	
	26 - 0.14			25 - 0.28		
1976						
JAN 13 - 0.22	FEB 2 - 0.25	MAR 10 - 0.29	APR 13 - 0.32	MAY 10 - 0.31	JUN 3 - 0.29	
22 - 0.23	17 - 0.22	18 - 0.28	20 - 0.32	19 - 0.29	14 - 0.28	
	26 - 0.25	29 - 0.36			28 - 0.25	
JULY 8 - 0.22	AUG 9 - 0.23	SEPT 9 - 0.25	OCT 1 - 0.28	NOV 9 - S	DEC 10 - 0.22	
19 - 0.29	18 - 0.23	20 - 0.23		30 - 0.26	21 - 0.32	
28 - 0.29	30 - 0.25					
1977						
JAN 3 - 0.31	FEB 7 - 0.28	MAR 3 - 0.26	APR 1 - 0.29	MAY 10 - 0.28	JUN 10 - 0.22	
12 - 0.32	21 - 0.25	17 - 0.26	8 - 0.28	20 - 0.26		
25 - 0.25			20 - 0.26			
			29 - 0.28			
JULY 20 - 0.14	AUG 10 - 0.10	SEPT 16 - 0.12	OCT 6 - 0.14	NOV 22 - 0.20	DEC 22 - 0.23	
	23 - 0.10		26 - 0.15			

N - No Reading
S - Submerged

FIGURE A-12

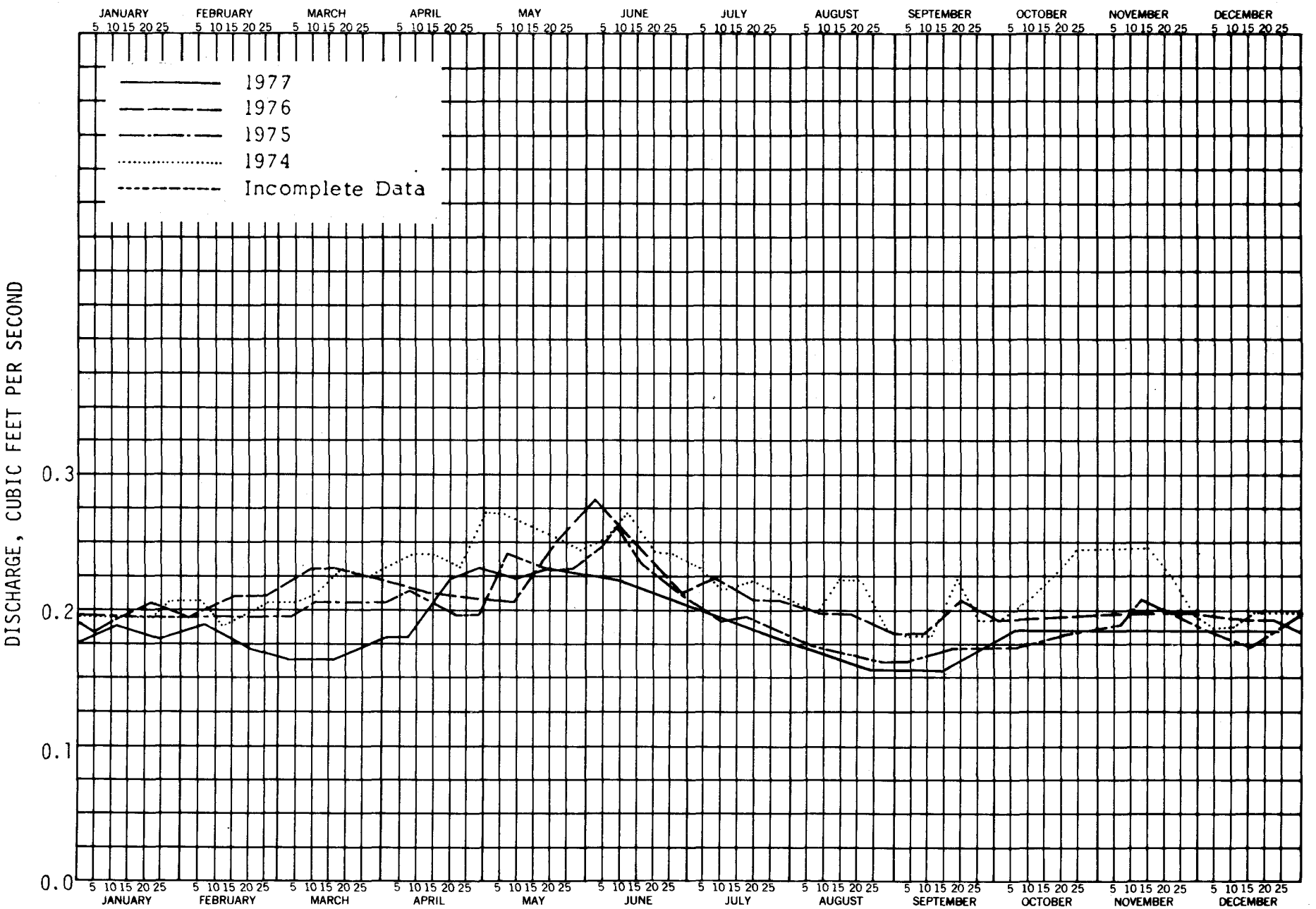

R-2 (USGS STATION NO. 109)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.3
0.2
0.1
0.0

TABLE A-12 DISCHARGE AT R-2 (USGS STATION NO. 109), SPRING ON RYAN GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 51' 41", Longitude: 108° 25' 58"
NE1/4, SW1/4, Sec. 19, T2S, R98W, Rio Blanco County

1974											
	JULY	3 - 0.222	AUG	7 - 0.196	SEPT	4 - 0.179	OCT	2 - 0.187	NOV	7 - 0.241	DEC 4 - 0.187
		10 - 0.213		14 - 0.222		11 - 0.179		7 - 0.196		15 - 0.241	10 - 0.187
		19 - 0.222		21 - 0.222		19 - 0.222		15 - 0.222		22 - 0.222	17 - 0.196
		31 - 0.205		28 - 0.187		25 - 0.187		23 - 0.241		27 - 0.196	23 - 0.196
								30 - 0.241			30 - 0.196
1975											
	JAN	6 - 0.187	FEB	4 - 0.196	MAR	4 - 0.196	APR	1 - 0.205	MAY	7 - 0.241	JUN 2 - 0.241
		13 - 0.196		11 - 0.196		11 - 0.205		8 - 0.213		19 - 0.231	9 - 0.260
		21 - 0.196		18 - 0.196		17 - 0.205		15 - 0.205		27 - 0.231	17 - 0.231
		28 - 0.196		25 - 0.196		24 - 0.205		22 - 0.196			26 - 0.213
								29 - 0.196			
	JULY	10 - 0.187	AUG	8 - 0.170	SEPT	4 - 0.162	OCT	6 - 0.170	NOV	6 - 0.187	DEC 15 - 0.170
		17 - 0.196		19 - 0.169		17 - 0.170		21 - 0.179		13 - 0.205	30 - 0.196
				26 - 0.162						25 - 0.187	
1976											
	JAN	13 - 0.196	FEB	2 - 0.196	MAR	10 - 0.231	APR	13 - 0.213	MAY	10 - 0.205	JUN 3 - 0.279
		22 - 0.205		17 - 0.213		18 - 0.231		29 - 0.205		19 - 0.241	14 - 0.250
				26 - 0.213		29 - 0.222					28 - 0.213
	JULY	8 - 0.222	AUG	9 - 0.196	SEPT	9 - 0.179	OCT	1 - 0.187	NOV	4 - 0.196	DEC 10 - 0.187
		19 - 0.205		18 - 0.196		20 - 0.205				26 - 0.196	21 - 0.187
		28 - 0.205		30 - 0.179							
1977											
	JAN	3 - 0.179	FEB	7 - 0.187	MAR	3 - 0.162	APR	1 - 0.179	MAY	10 - 0.222	JUN 10 - 0.196
		12 - 0.187		21 - 0.170		17 - 0.162		8 - 0.179		20 - 0.231	
		25 - 0.179						20 - 0.222			
								29 - 0.231			
	JULY	20 - 0.187	AUG	10 - 0.170	SEPT	7 - 0.154	OCT	6 - 0.187	NOV	22 - 0.187	DEC 22 - 0.187
				23 - 0.154		15 - 0.162		26 - 0.187			

FIGURE A-13

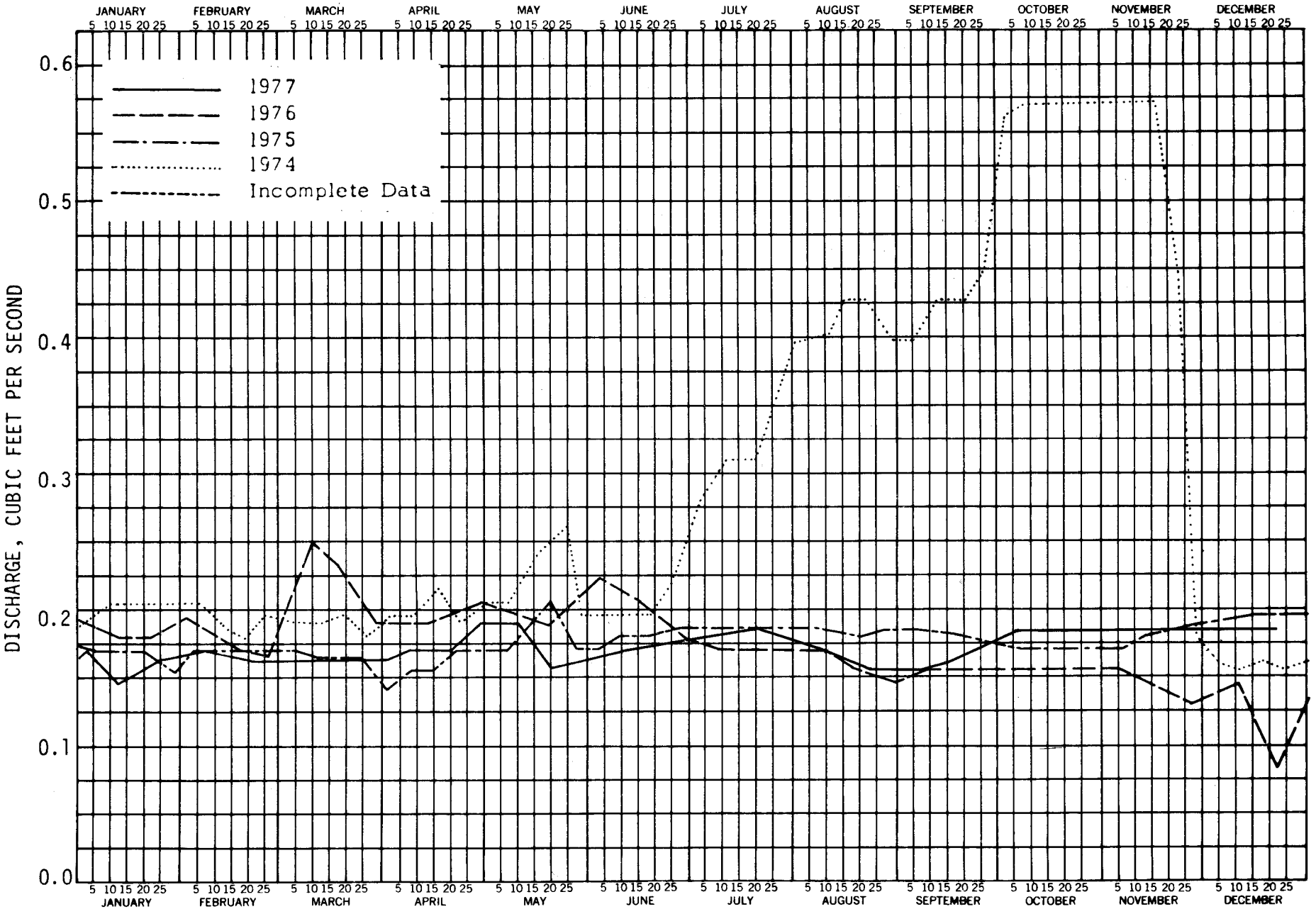

R-3 (USGS STATION NO. 110)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5
0.6

TABLE A-13 DISCHARGE AT R-3 (USGS STATION NO. 110), SPRING ON RYAN GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 51' 12", Longitude: 108° 27' 34"
NW1/4, NW1/4, Sec. 25, T2S, R99W, Rio Blanco County

1974											
	JULY	3 - 0.289	AUG	7 - 0.404	SEPT	4 - 0.393	OCT	2 - 0.56	NOV	7 - 0.571	DEC 4 - 0.162
		10 - 0.309		14 - 0.427		11 - 0.427		7 - 0.57		15 - 0.571	10 - 0.154
		19 - W		21 - 0.427		19 - 0.427		23 - 0.57		22 - 0.450	17 - 0.162
		31 - 0.393		28 - 0.393		25 - 0.450		30 - 0.57		27 - 0.179	23 - 0.154
											30 - 0.162
1975											
	JAN	6 - 0.170	FEB	4 - 0.170	MAR	4 - 0.170	APR	1 - 0.138	MAY	7 - 0.170	JUN 2 - 0.170
		13 - 0.170		11 - 0.170		11 - 0.162		8 - 0.154		19 - 0.205	9 - 0.179
		21 - 0.170		18 - 0.170		17 - 0.162		15 - 0.154		27 - 0.170	17 - 0.179
		28 - 0.154		25 - 0.170		24 - 0.162		22 - 0.170			26 - 0.187
								29 - 0.170			
	JULY	10 - 0.187	AUG	8 - 0.187	SEPT	4 - 0.187	OCT	6 - 0.170	NOV	6 - 0.170	DEC 15 - 0.196
		17 - 0.187		19 - 0.179		17 - 0.179		21 - 0.170		13 - 0.179	30 - 0.196
				26 - 0.187						25 - 0.187	
1976											
	JAN	13 - 0.179	FEB	2 - 0.187	MAR	10 - 0.250	APR	13 - 0.187	MAY	10 - 0.196	JUN 3 - 0.222
		22 - 0.179		17 - 0.170		18 - 0.231		29 - 0.205		19 - 0.187	14 - 0.205
				26 - 0.162		29 - 0.187					28 - 0.179
	JULY	8 - 0.170	AUG	9 - 0.170	SEPT	9 - 0.154	OCT	1 - 0.154	NOV	26 - 0.138	DEC 10 - 0.146
		19 - 0.170		18 - 0.154		20 - 0.154		4 - 0.154			21 - 0.082
		28 - 0.170		30 - 0.146							
1977											
	JAN	3 - 0.170	FEB	7 - 0.170	MAR	3 - 0.162	APR	1 - 0.162	MAY	10 - 0.187	JUN 10 - 0.170
		12 - 0.146		21 - 0.162		17 - 0.162		8 - 0.170		20 - 0.154	
		25 - 0.162						20 - 0.170			
								29 - 0.187			
	JULY	20 - 0.187	AUG	10 - 0.109	SEPT	7 - 0.146	OCT	6 - 0.162	NOV	22 - 0.131	DEC 22 - 0.131
				23 - 0.138		15 - 0.154		26 - 0.131			

W - Flume washed out

FIGURE A-14

R-4

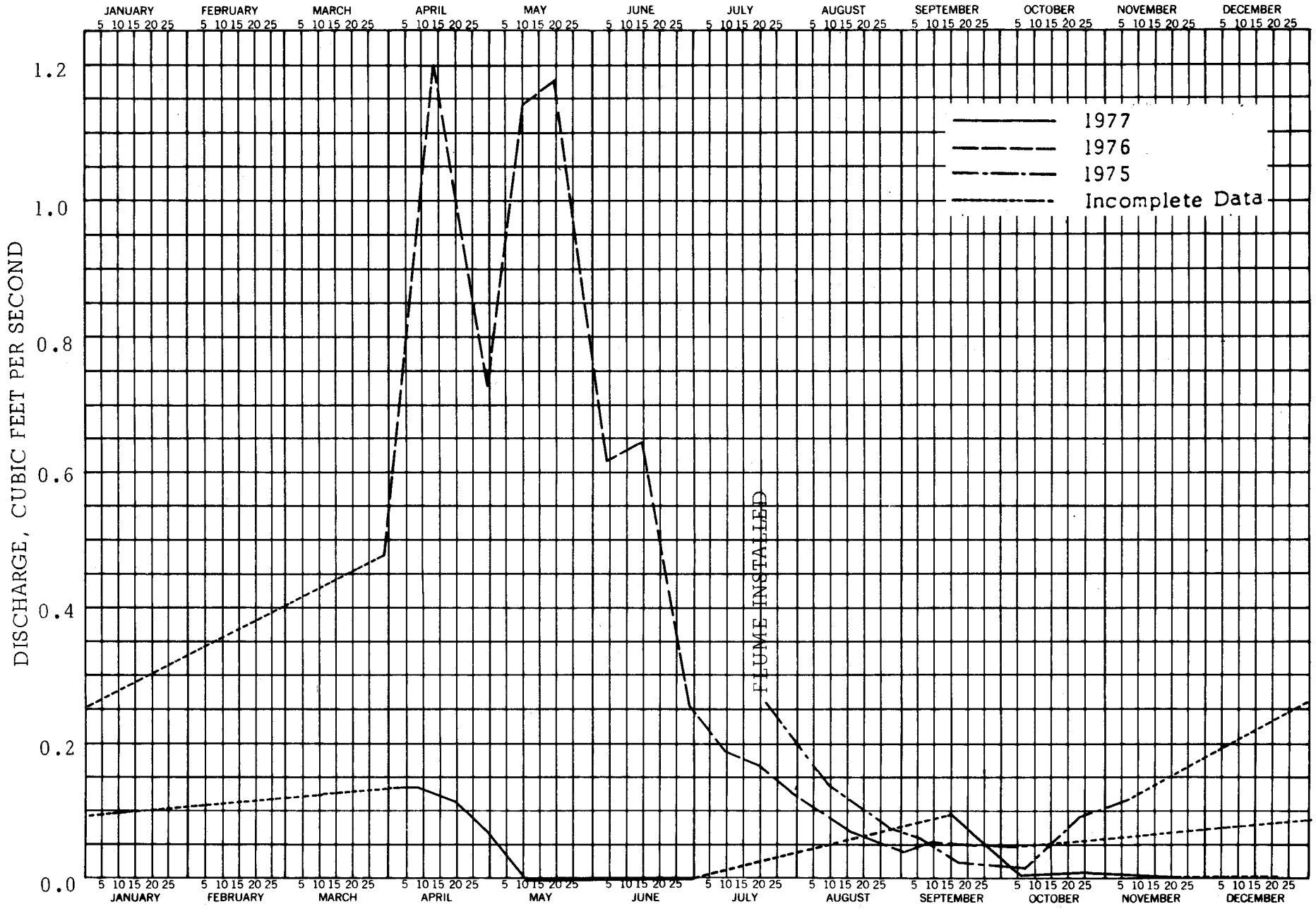


TABLE A-14 DISCHARGE AT R-4, SPRING ON RYAN GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 49' 01", Longitude: 108° 30' 47"
NW 1/4, SW1/4, Sec. 4, T3S, R99W, Rio Blanco County

1975						
JULY 21 - 0.260	AUG 8 - 0.137	SEPT 4 - 0.064	OCT 6 - 0.016	NOV 6 - 0.117	DEC 15 - F	
	19 - 0.117	17 - 0.028	21 - 0.089	13 - F		
	26 - 0.076			25 - F		
1976						
JAN 13 - F	FEB 2 - F	MAR 10 - F	APR 13 - 1.21	MAY 10 - 1.15	JUN 3 - 0.623	
22 - F	17 - F	18 - F	29 - 0.73	19 - 1.18	14 - 0.649	
	26 - F	29 - 0.485			28 - 0.260	
JULY 8 - 0.196	AUG 9 - 0.95	SEPT 9 - 0.58	OCT 1 - 0.47	NOV 26 - F	DEC - F	
19 - 0.170	18 - 0.64	20 - 0.47				
28 - 0.131	30 - 0.42					
1977						
JAN - N	FEB 7 - F	MAR 3 - F	APR 1 - 0.138	MAY 10 - D	JUN 10 - D	
	21 - F	17 - F	8 - 0.138	20 - D		
			20 - 0.117			
			29 - 0.007			
JULY 20 - D	AUG 10 - D	SEPT 15 - 0.095	OCT 6 - 0.004	NOV 22 - 0.0	DEC 22 - D	
	23 - D		26 - 0.010			

N - No Reading
D - Dry
F - Frozen

FIGURE A-15

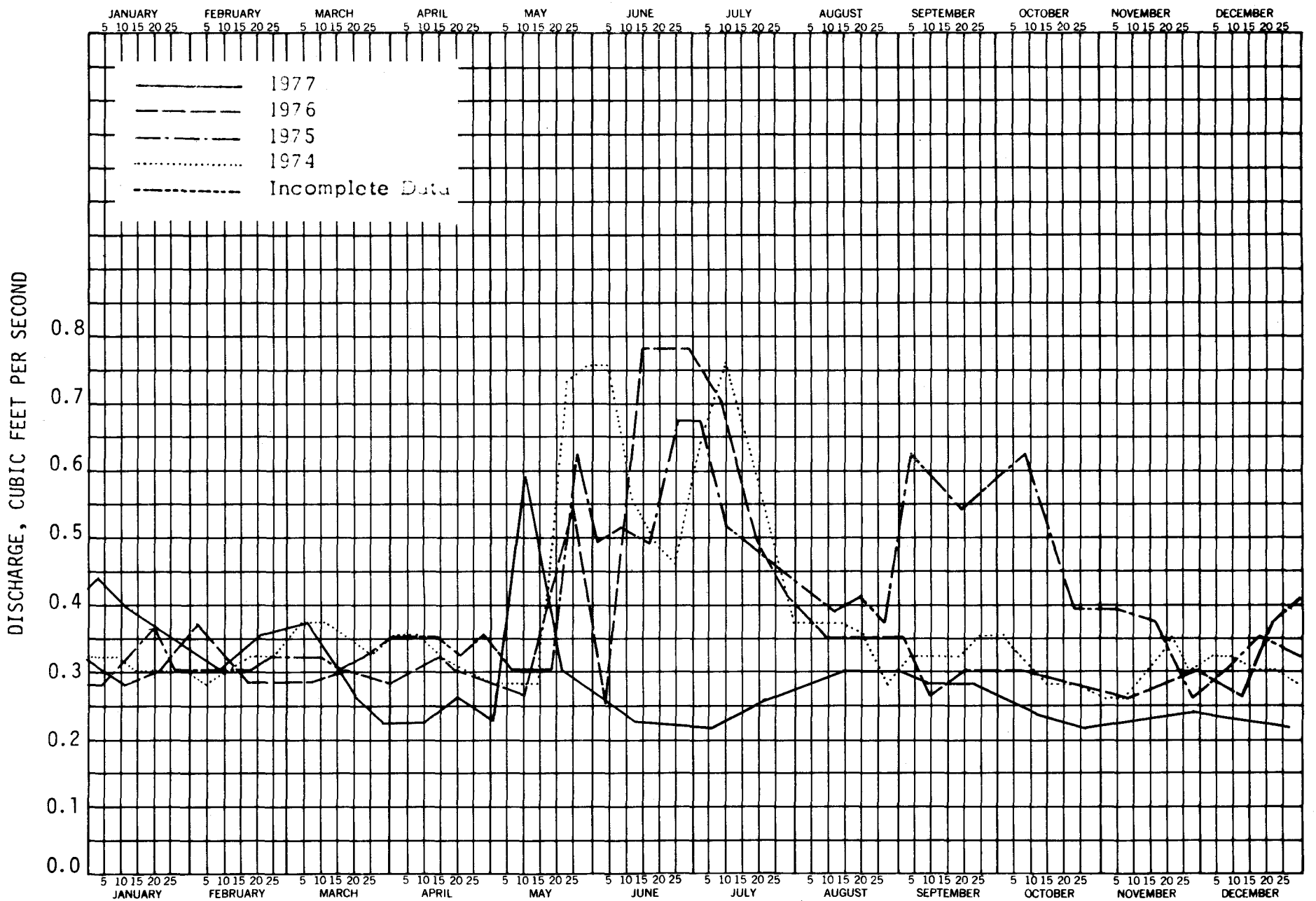

ARCO-1 (USGS STATION NO. 111)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-15 DISCHARGE AT ARCO-1 (USGS STATION NO. 111), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: August 1971 to current year
Latitude: 39° 52' 15", Longitude: 108° 17' 18"
SW1/4, SW1/4, Sec. 16, T2S, R97W, Rio Blanco County

1974												
	JULY	3 - 0.64	AUG	7 - 0.37	SEPT	4 - 0.32	OCT	2 - 0.35	NOV	2 - 0.26	DEC	4 - 0.32
		10 - 0.76		14 - 0.37		11 - 0.32		7 - 0.32		6 - 0.26		10 - 0.32
		17 - 0.64		21 - 0.35		19 - 0.32		15 - 0.28		15 - 0.30		17 - 0.30
		31 - 0.37		28 - 0.28		25 - 0.35		23 - 0.28		22 - 0.35		23 - 0.30
										27 - 0.30		30 - 0.28
1975												
	JAN	6 - 0.28	FEB	4 - 0.30	MAR	4 - 0.32	APR	2 - 0.35	MAY	7 - 0.30	JUN	2 - 0.49
		13 - 0.32		11 - 0.30		11 - 0.32		8 - 0.35		19 - 0.30		9 - 0.51
		21 - 0.37		18 - 0.30		17 - 0.30		15 - 0.35		27 - 0.62		18 - 0.49
		28 - 0.30		25 - 0.32		24 - 0.32		22 - 0.32				26 - 0.67
								29 - 0.35				
	JULY	3 - 0.67	AUG	13 - 0.39	SEPT	4 - 0.62	OCT	8 - 0.62	NOV	6 - 0.39	DEC	8 - 0.30
		11 - 0.51		20 - 0.41		19 - 0.54		24 - 0.39		17 - 0.37		19 - 0.35
				27 - 0.37						28 - 0.26		31 - 0.32
1976												
	JAN	13 - 0.28	FEB	3 - 0.37	MAR	1 - 0.28	APR	1 - 0.28	MAY	11 - 0.26	JUN	4 - 0.25
		23 - 0.30		18 - 0.28		9 - 0.28		16 - 0.32		25 - 0.54		15 - 0.78
						19 - 0.30		20 - 0.30				29 - 0.78
	JULY	9 - 0.70	AUG	10 - 0.35	SEPT	2 - 0.35	OCT	8 - 0.30	NOV	8 - 0.26	DEC	13 - 0.26
		20 - 0.49		19 - 0.35		10 - 0.26				29 - 0.30		22 - 0.37
		29 - 0.41				21 - 0.30						
1977												
	JAN	4 - 0.44	FEB	10 - 0.30	MAR	7 - 0.37	APR	11 - 0.22	MAY	2 - 0.22	JUN	14 - 0.22
		13 - 0.39		22 - 0.35		21 - 0.26		21 - 0.26		11 - 0.59		
		26 - 0.35				30 - 0.22				22 - 0.30		
	JULY	6 - 0.22	AUG	15 - 0.30	SEPT	8 - 0.28	OCT	11 - 0.24	NOV	28 - 0.24	DEC	27 - 0.22
		21 - 0.26		25 - 0.30		23 - 0.28		26 - 0.22				

FIGURE A-16

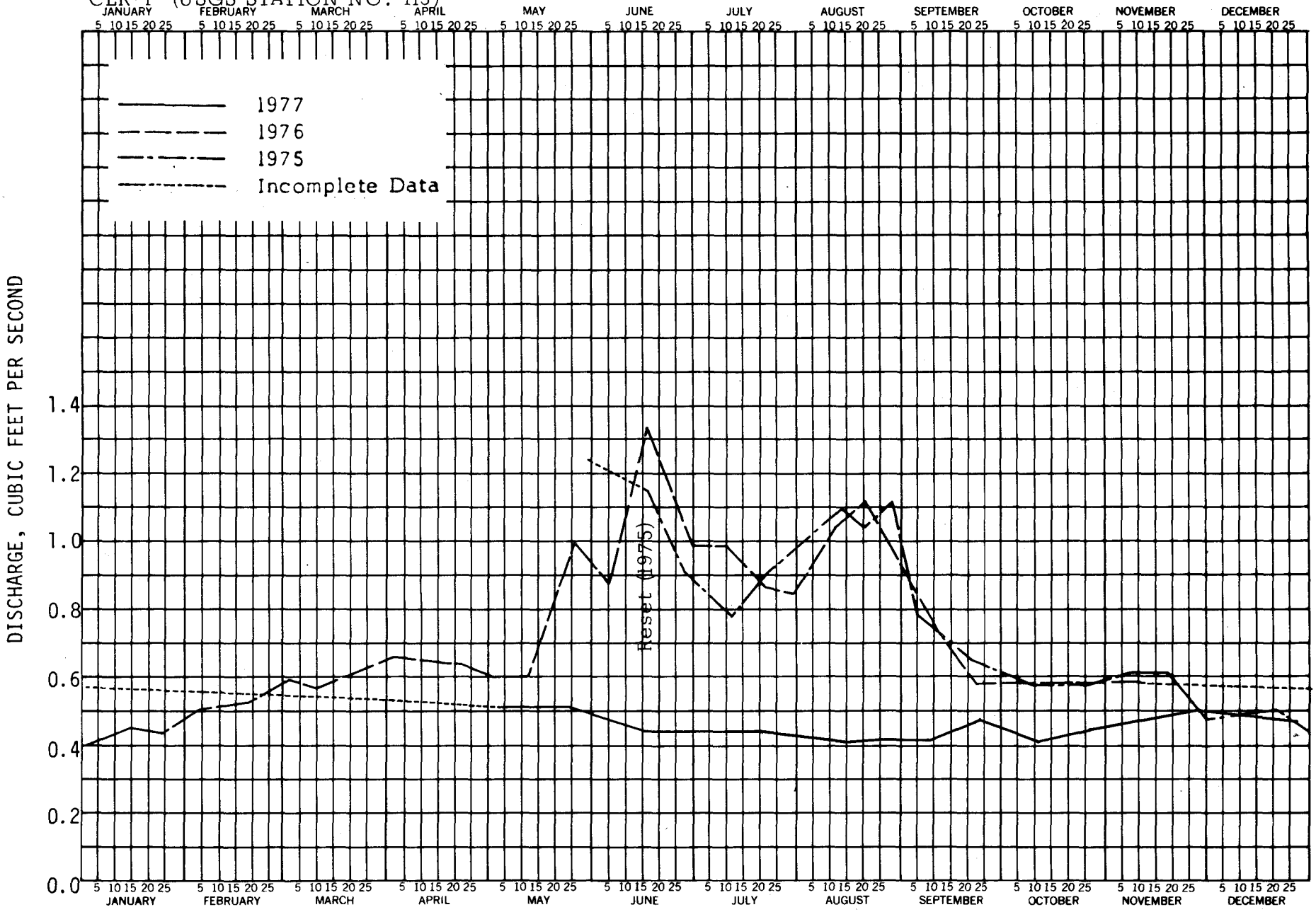

CER-1 (USGS STATION NO. 113)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
Reset (1975)
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

TABLE A-16 DISCHARGE AT CER-1 (USGS STATION NO. 113), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 51' 20", Longitude 108° 19' 15"
SW1/4, SE1/4, Sec. 19, T2S, R97W, Rio Blanco County

1974												
	JULY	- W	AUG	- W	SEPT	- W	OCT	- W	NOV	- W	DEC	- W
1975												
	JAN	- W	FEB	- W	MAR	- W	APR	- W	MAY	- W	JUN	16 - 1.15
												26 - 0.94
	JULY	10 - 0.78	AUG	12 - 1.10	SEPT	4 - 0.78	OCT	7 - 0.58	NOV	6 - 0.61	DEC	19 - 0.50
		21 - 0.92		19 - 1.04		19 - 0.65		24 - 0.58		17 - 0.61		31 - 0.42
				27 - 1.12						28 - 0.47		
1976												
	JAN	14 - 0.47	FEB	3 - 0.52	MAR	1 - 0.61	APR	1 - 0.67	MAY	11 - 0.61	JUN	4 - 0.87
		23 - 0.45		18 - 0.54		9 - 0.58		16 - 0.65		25 - 1.04		15 - 1.34
						19 - 0.63		21 - 0.65				29 - 0.99
								30 - 0.61				
	JULY	9 - 0.99	AUG	10 - 1.04	SEPT	2 - 0.87	OCT	8 - 0.58	NOV	8 - 0.58	DEC	13 - N
		20 - 0.87		19 - 1.12		10 - 0.73				29 - W		22 - N
		29 - 0.85				21 - 0.58						
1977												
	JAN	4 - N	FEB	7 - N	MAR	3 - N	APR	1 - N	MAY	2 - 0.52	JUN	14 - 0.45
		13 - N		21 - N		11 - N		8 - N		11 - 0.52		
		26 - N						20 - N		23 - 0.52		
								29 - N				
	JULY	6 - 0.45	AUG	15 - 0.41	SEPT	8 - 0.42	OCT	11 - 0.41	NOV	28 - 0.50	DEC	27 - 0.47
		21 - 0.45		25 - 0.42		23 - 0.48		26 - 0.45				

N - No Reading
W - Washed Out

CER-2

FIGURE A-17

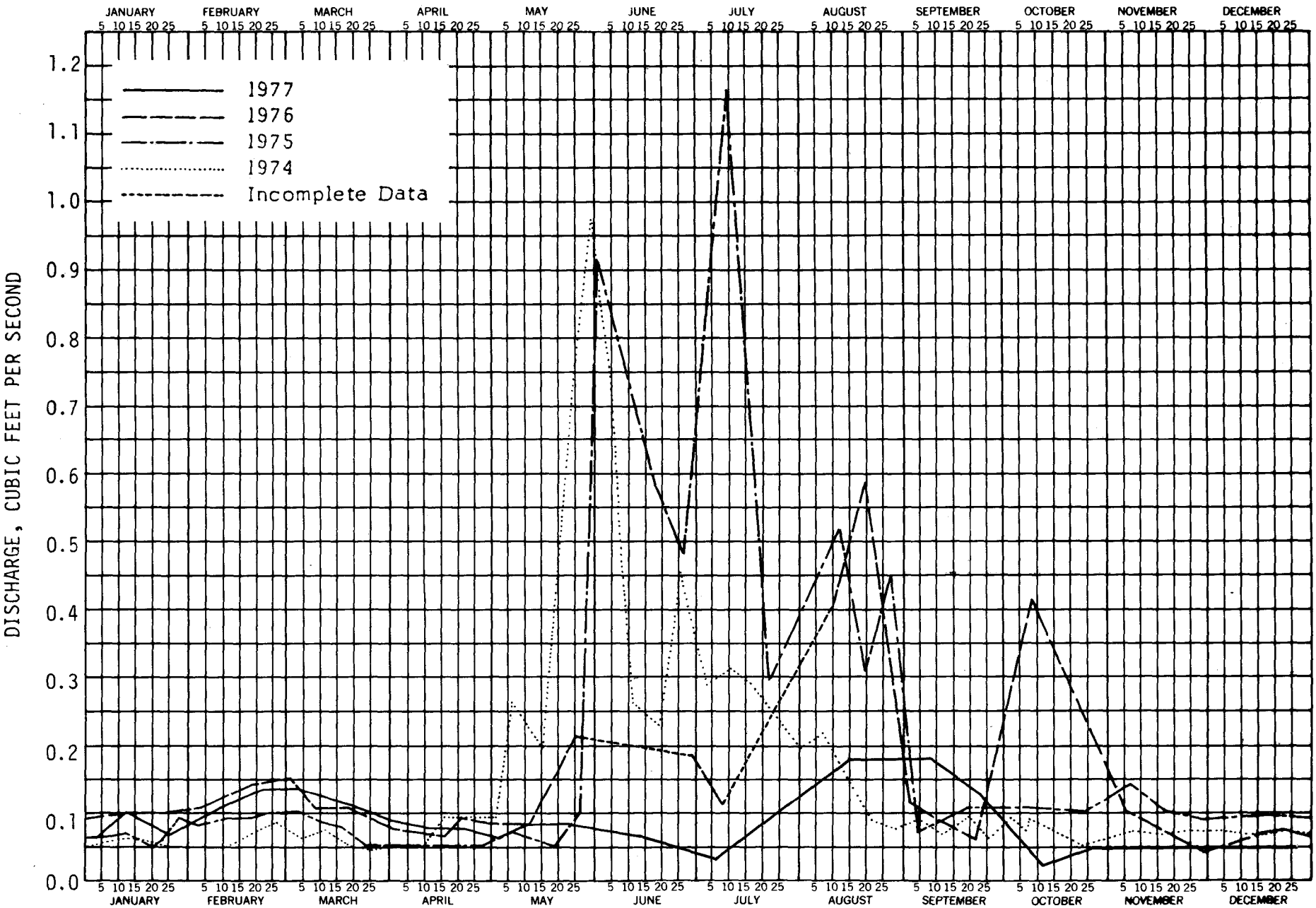


TABLE A-17 DISCHARGE AT CER-2 (USGS STATION NO. 114), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 51' 22", Longitude: 108° 19' 57"
SW1/4, SW1/4, Sec. 19, T2S, R97W, Rio Blanco County

1974											
JULY	3 - 0.28	AUG	7 - 0.23	SEPT	4 - 0.08	OCT	2 - 0.09	NOV	7 - 0.07	DEC	4 - 0.07
	10 - 0.32		14 - 0.16		11 - 0.06		7 - 0.07		15 - 0.06		10 - 0.06
	17 - 0.28		21 - 0.08		19 - 0.09		8 - 0.09		22 - 0.07		17 - 0.06
	31 - 0.19		28 - 0.07		25 - 0.06		15 - 0.07		27 - 0.07		23 - 0.07
							23 - 0.05				30 - 0.06
1975											
JAN	6 - 0.06	FEB	4 - 0.08	MAR	4 - 0.10	APR	1 - 0.05	MAY	7 - 0.07	JUN	2 - 0.92
	13 - 0.07		11 - 0.09		11 - 0.08		8 - 0.05		19 - 0.05		18 - 0.58
	21 - 0.05		18 - 0.09		17 - 0.07		15 - 0.05		27 - 0.10		26 - 0.48
	28 - 0.09		25 - 0.10		24 - 0.05		22 - 0.05				
							29 - 0.05				
JULY	10 - 1.17	AUG	12 - 0.52	SEPT	4 - 0.07	OCT	7 - 0.11	NOV	6 - 0.14	DEC	19 - 0.09
	21 - 0.29		19 - 0.31		19 - 0.11		24 - 0.10		17 - 0.10		31 - 0.08
			27 - 0.45						28 - 0.08		
1976											
JAN	14 - 0.10	FEB	3 - 0.11	MAR	1 - 0.15	APR	1 - 0.07	MAY	11 - 0.07	JUN	4 - N
	23 - 0.10		18 - 0.14		9 - 0.11		16 - 0.06		25 - 0.22		15 - N
					19 - 0.11		21 - 0.09				29 - 0.19
							30 - 0.08				
JULY	9 - 0.12	AUG	10 - 0.41	SEPT	2 - 0.12	OCT	8 - 0.42	NOV	5 - 0.10	DEC	13 - 0.06
	20 - 0.92(P)		19 - 0.58		10 - 0.08				29 - 0.046		22 - 0.07
	29 - 0.80(P)				21 - 0.06						
1977											
JAN	4 - 0.06	FEB	10 - 0.11	MAR	3 - 0.14	APR	11 - 0.07	MAY	2 - 0.06	JUN	14 - 0.06
	13 - 0.10		22 - 0.14		21 - 0.11		21 - 0.07		11 - 0.08		
	26 - 0.07				30 - 0.08				23 - 0.08		
JULY	6 - 0.038	AUG	15 - 0.018	SEPT	8 - 0.018	OCT	11 - 0.031	NOV	28 - 0.05	DEC	27 - 0.05
			25 - 0.018		23 - 0.013		26 - 0.05				

N - No Reading
P - Poor Reading

FIGURE A-18

CER-3 (USGS STATION NO. 115)

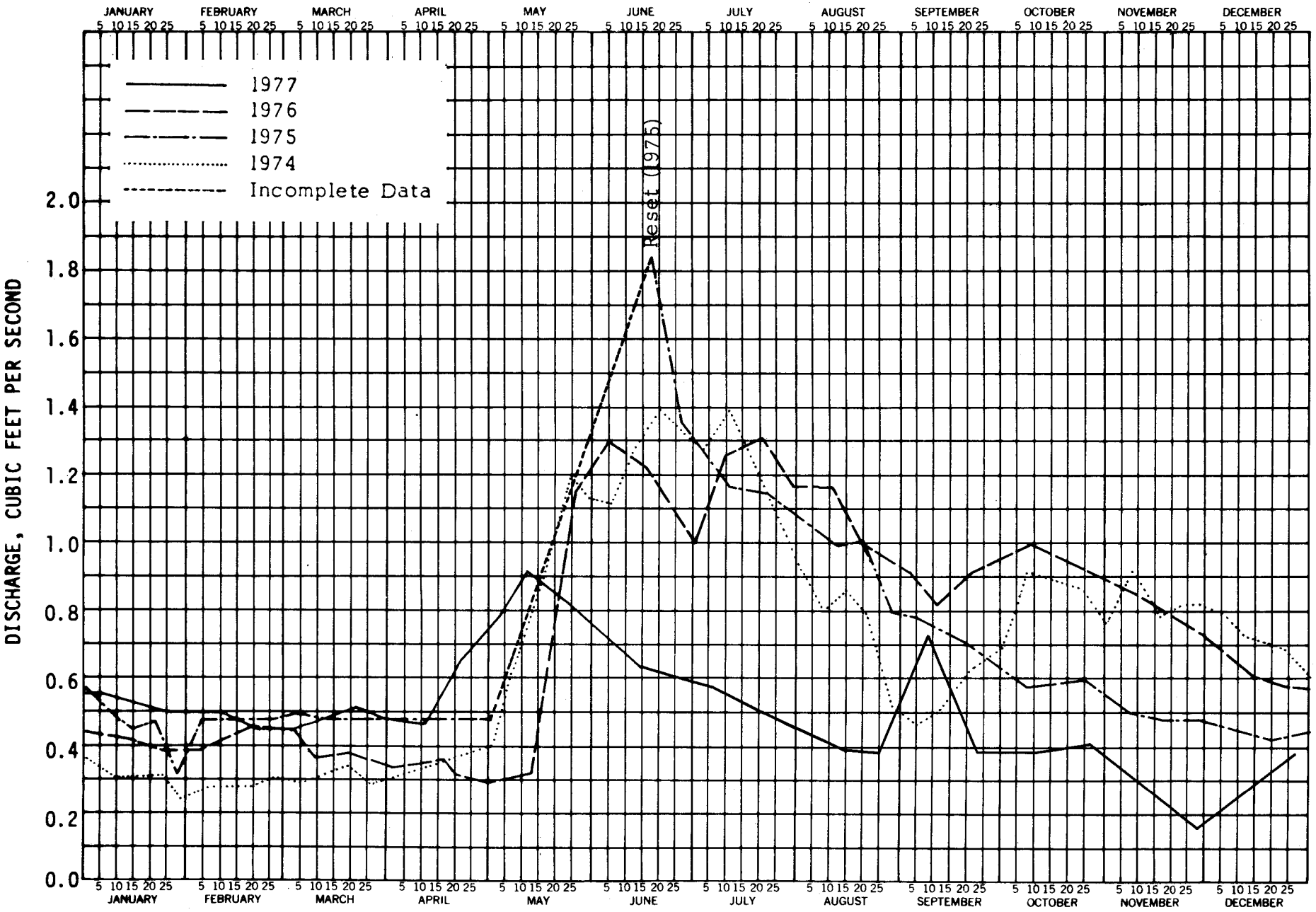


TABLE A-18 DISCHARGE AT CER-3 (USGS STATION NO. 115), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 51' 25", Longitude: 108° 20' 08"
SE1/4, SW1/4, Sec. 24, T2S, R98W, Rio Blanco County

1974											
JULY	3 - 1.28	AUG	7 - 0.80	SEPT	4 - 0.47	OCT	2 - 0.76	NOV	7 - 0.92	DEC	4 - 0.80
	10 - 1.39		14 - 0.87		11 - 0.50		7 - 0.92		15 - 0.78		10 - 0.73
	17 - 1.26		21 - 0.78		19 - 0.63		23 - 0.87		22 - 0.82		17 - 0.71
	31 - 0.94		28 - 0.52		29 - 0.69		30 - 0.76		27 - 0.82		23 - 0.69
											30 - 0.61
1975											
JAN	6 - 0.52	FEB	4 - 0.48	MAR	4 - 0.50	APR	1 - 0.48	MAY	- W	JUN	2 - W
	13 - 0.47		11 - 0.48		11 - 0.48		8 - 0.48				9 - W
	21 - 0.48		18 - 0.48		17 - 0.48		15 - 0.48				17 - 1.84
	28 - 0.32		25 - 0.48		24 - 0.48		22 - 0.48				26 - 1.36
							29 - 0.48				
JULY	10 - 1.17	AUG	12 - 0.94	SEPT	4 - 0.78	OCT	7 - 0.58	NOV	6 - 0.50	DEC	19 - 0.42
	21 - 1.15		19 - 1.02		19 - 0.71		24 - 0.61		17 - 0.48		31 - 0.45
			27 - 0.80						28 - 0.48		
1976											
JAN	14 - 0.42	FEB	3 - 0.39	MAR	1 - 0.45	APR	1 - 0.34	MAY	11 - 0.32	JUN	4 - 1.31
	23 - 0.39		18 - 0.47		9 - 0.36		16 - 0.36		25 - 1.15		15 - 1.23
					19 - 0.38		21 - 0.31				29 - 1.04
							30 - 0.29				
JULY	9 - 1.26	AUG	10 - 1.17	SEPT	2 - 0.92	OCT	8 - 1.04	NOV	5 - 0.87	DEC	13 - 0.61
	20 - 1.31		19 - 1.02		10 - 0.82				29 - 0.73		22 - 0.58
	29 - 1.17				21 - 0.92						
1977											
JAN	4 - 0.56	FEB	10 - 0.50	MAR	3 - 0.45	APR	10 - 0.47	MAY	2 - 0.78	JUN	14 - 0.63
	13 - 0.54		22 - 0.45		21 - 0.52		21 - 0.65		11 - 0.92		
	26 - 0.50				30 - 0.48				23 - 0.82		
JULY	6 - 0.58	AUG	15 - 0.39	SEPT	8 - 0.73	OCT	11 - 0.38	NOV	28 - 0.162	DEC	27 - 0.38
	21 - 0.50		25 - 0.38		23 - 0.38		26 - 0.41				

W - Washed Out

FIGURE A-19

CER-4 (USGS STATION NO. 116)

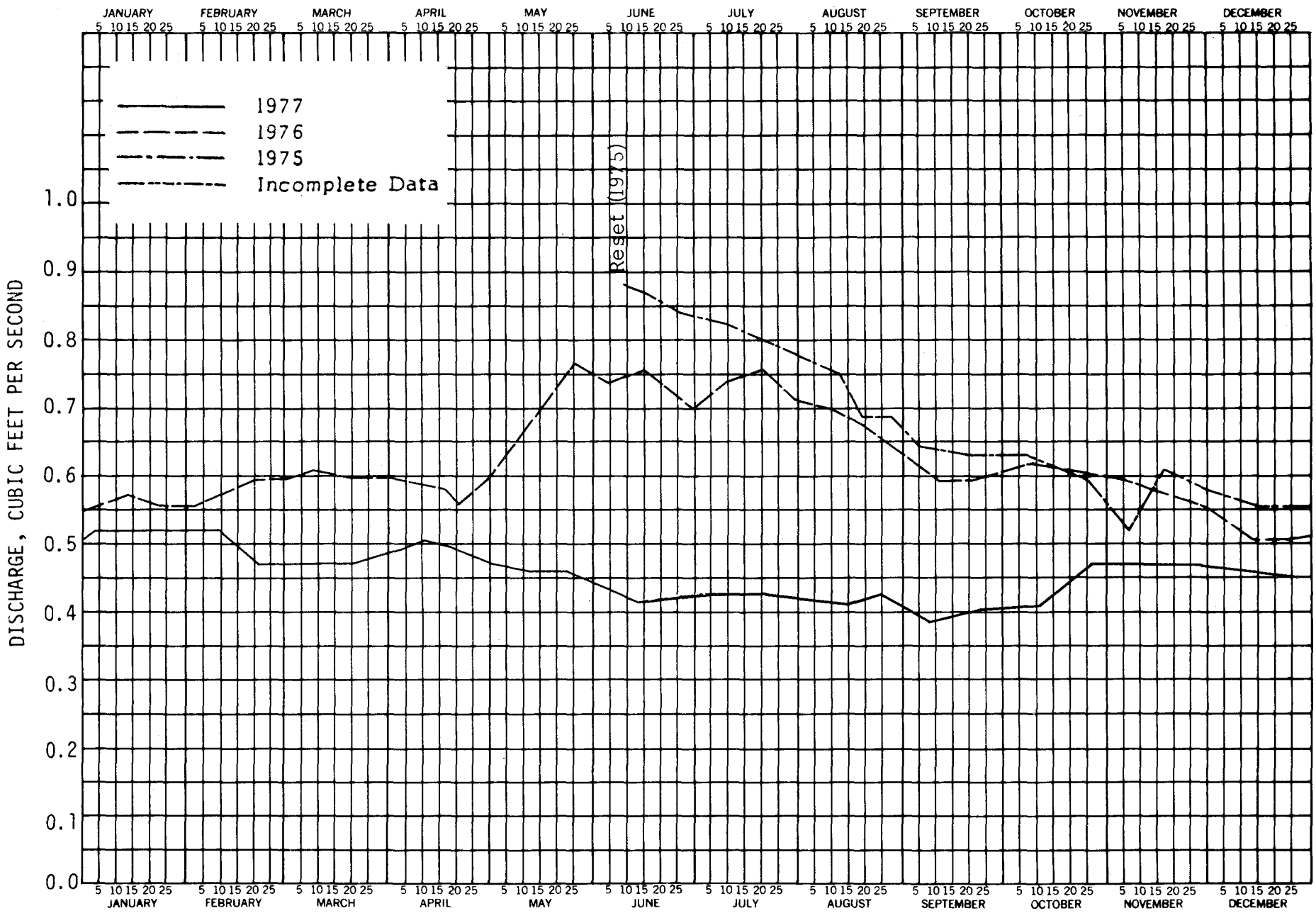


TABLE A-19 DISCHARGE AT CER-4 (USGS STATION NO. 116), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 51' 13", Longitude: 108° 22' 10"
NW1/4, NW1/4, Sec. 26, T2S, R98W, Rio Blanco County

1974											
	JULY	- W	AUG	- W	SEPT	- W	OCT	- W	NOV	- W	DEC	- W
1975												
	JAN	- W	FEB	- W	MAR	- W	APR	- W	MAY	- W	JUN	2 - N
												9 - 0.887
												16 - 0.872
												26 - 0.843
	JULY	10 - 0.828	AUG	12 - 0.757	SEPT	4 - 0.649	OCT	7 - 0.636	NOV	6 - 0.522	DEC	15 - 0.558
		21 - 0.800		19 - 0.689		19 - 0.636		24 - 0.597		17 - 0.610		19 - 0.558
				27 - 0.689						28 - 0.584		31 - 0.558
1976												
	JAN	14 - 0.571	FEB	3 - 0.558	MAR	1 - 0.597	APR	1 - 0.597	MAY	11 - 0.675	JUN	4 - 0.744
		23 - 0.558		18 - 0.597		9 - 0.610		16 - 0.584		25 - 0.771		15 - 0.757
						19 - 0.597		21 - 0.558				29 - 0.702
								30 - 0.597				
	JULY	9 - 0.744	AUG	10 - 0.702	SEPT	2 - 0.623	OCT	8 - 0.623	NOV	5 - 0.597	DEC	13 - 0.509
		20 - 0.757		19 - 0.675		10 - 0.597				29 - 0.558		22 - 0.509
		29 - 0.716				21 - 0.597						
1977												
	JAN	4 - 0.52	FEB	10 - 0.52	MAR	3 - 0.47	APR	11 - 0.509	MAY	2 - 0.474	JUN	14 - 0.415
		13 - 0.52		22 - 0.47		21 - 0.47		20 - 0.497		11 - 0.462		
		26 - 0.52				30 - 0.49				23 - 0.462		
	JULY	6 - 0.427	AUG	15 - 0.415	SEPT	8 - 0.382	OCT	11 - 0.415	NOV	28 - 0.474	DEC	27 - 0.450
		21 - 0.427		25 - 0.427		23 - 0.404		26 - 0.474				

N - No Reading
W - Washed Out

FIGURE A-20

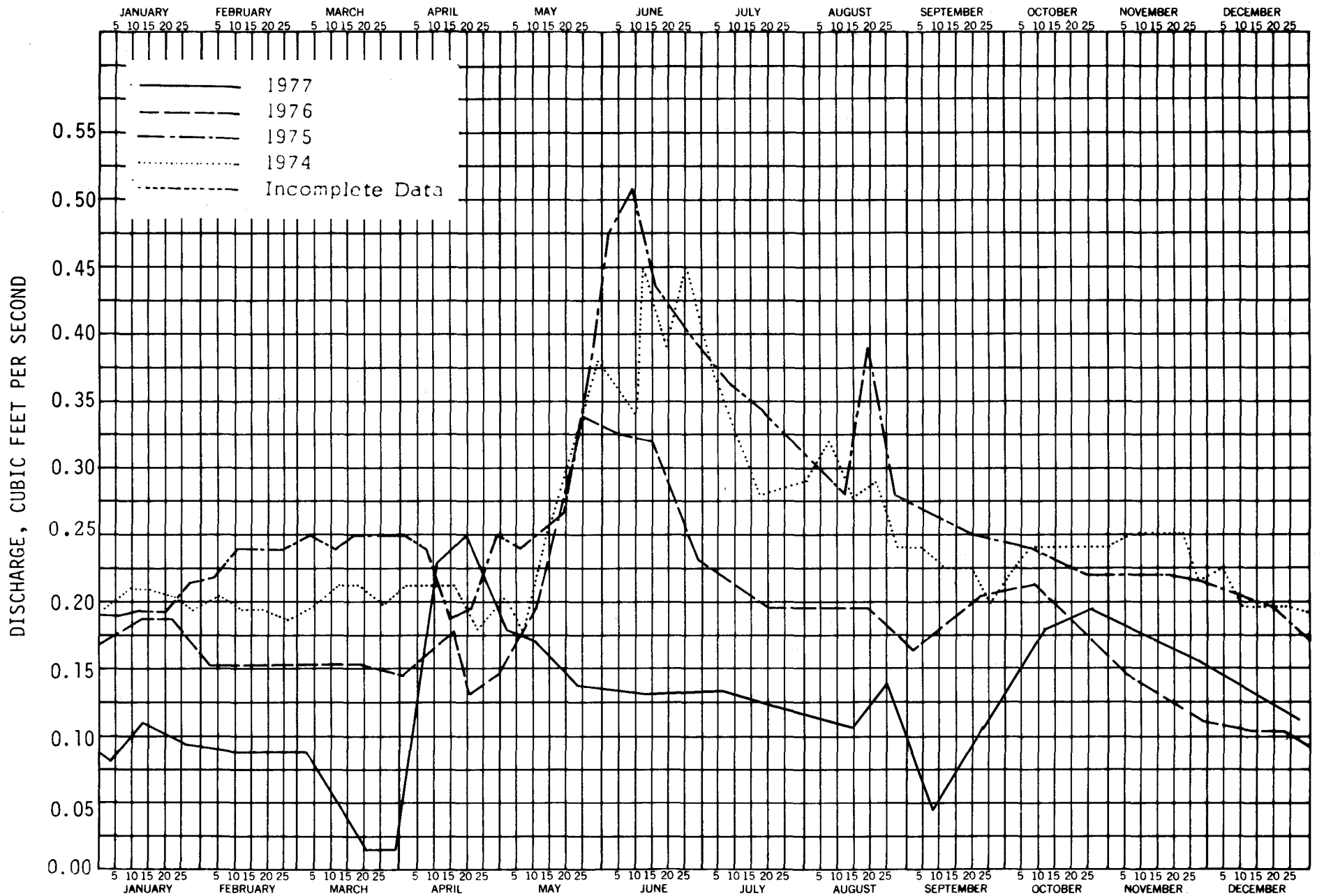

CER-5 (USGS STATION NO. 117)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00

TABLE A-20 DISCHARGE AT CER-5 (USGS STATION NO. 117), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1972 to current year
Latitude: 39° 50' 57", Longitude: 108° 22' 28"
SW1/4, NE1/4, Sec. 27, T2S, R98W, Rio Blanco County

1974												
	JULY	3 - 0.371	AUG	7 - 0.319	SEPT	4 - 0.241	OCT	2 - 0.220	NOV	7 - 0.250	DEC	4 - 0.222
		10 - 0.319		14 - 0.279		11 - 0.222		7 - 0.240		15 - 0.250		10 - 0.196
		17 - 0.279		21 - 0.289		19 - 0.222		23 - 0.240		22 - 0.250		17 - 0.196
		31 - 0.289		28 - 0.241		25 - 0.196		30 - 0.240		27 - 0.213		23 - 0.196
												30 - 0.187
1975												
	JAN	6 - 0.187	FEB	4 - 0.222	MAR	4 - 0.250	APR	1 - 0.250	MAY	7 - 0.241	JUN	2 - 0.474
		13 - 0.196		11 - 0.241		11 - 0.241		8 - 0.241		19 - 0.269		9 - 0.509
		21 - 0.196		18 - 0.241		17 - 0.250		15 - 0.187		27 - 0.371		16 - 0.438
		28 - 0.213		25 - 0.241		24 - 0.250		22 - 0.196				26 - 0.404
								29 - 0.250				
	JULY	10 - 0.361	AUG	12 - 0.279	SEPT	4 - 0.269	OCT	7 - 0.241	NOV	6 - 0.222	DEC	19 - 0.196
		21 - 0.339		19 - 0.393		19 - 0.250		24 - 0.222		17 - 0.222		31 - 0.170
				27 - 0.279						28 - 0.213		
1976												
	JAN	14 - 0.187	FEB	3 - 0.154	MAR	1 - 0.154	APR	1 - 0.146	MAY	11 - 0.196	JUN	4 - 0.329
		23 - 0.187		18 - 0.154		9 - 0.154		16 - 0.179		25 - 0.339		15 - 0.319
						19 - 0.154		21 - 0.131				29 - 0.231
								30 - 0.146				
	JULY	9 - 0.213	AUG	10 - 0.196	SEPT	2 - 0.162	OCT	8 - 0.213	NOV	5 - 0.146	DEC	13 - 0.102
		20 - 0.196		19 - 0.196		10 - 0.179				29 - 0.109		22 - 0.102
		29 - 0.196				21 - 0.205						
1977												
	JAN	4 - 0.082	FEB	10 - 0.089	MAR	3 - 0.089	APR	11 - 0.231	MAY	2 - 0.179	JUN	14 - 0.131
		13 - 0.109		22 - 0.089		21 - 0.138		20 - 0.250		11 - 0.170		
		26 - 0.095				30 - 0.131				23 - 0.138		
	JULY	6 - 0.131	AUG	15 - 0.109	SEPT	8 - 0.047	OCT	11 - 0.179	NOV	28 - 0.154	DEC	27 - 0.117
		21 - 0.124		25 - 0.138		23 - 0.109		26 - 0.170				

FIGURE A-21(a)

B-1 (USGS STATION NO. 118)

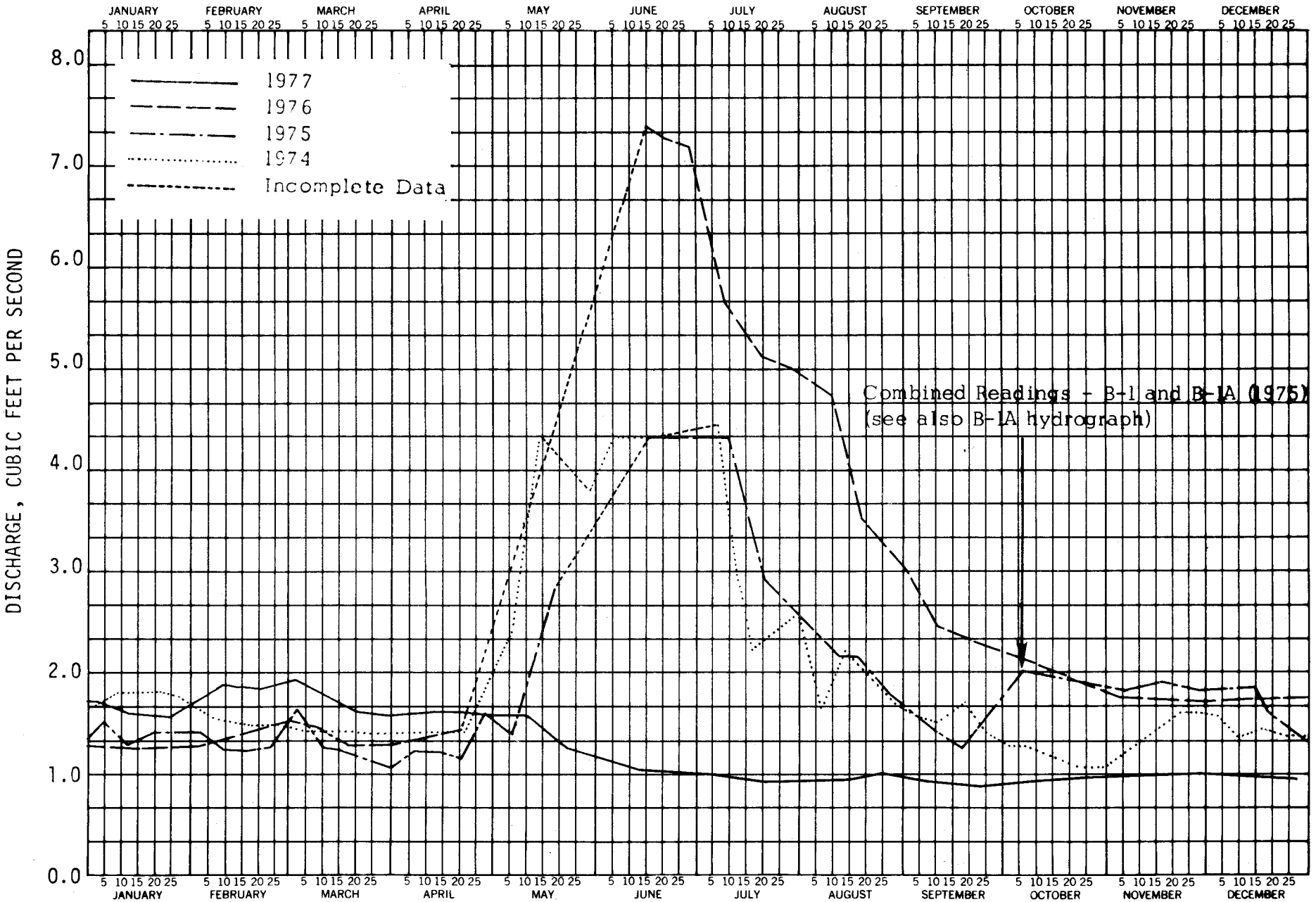


TABLE A-21(a) DISCHARGE AT B-1 (USGS STATION NO. 118), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 50' 26", Longitude: 108° 23' 25"
SE1/4, SE1/4, Sec. 28, T2S, R98W, Rio Blanco County

1974												
	JULY	7 - 4.32	AUG	7 - 1.62	SEPT	4 - 1.55	OCT	2 - 1.26	NOV	7 - 1.23	DEC	4 - 1.55
		17 - 2.18		14 - 2.22		11 - 1.48		7 - 1.26		15 - 1.40		10 - 1.33
		31 - 2.61		21 - 1.94		19 - 1.70		23 - 1.06		22 - 1.59		17 - 1.44
				28 - 1.70		25 - 1.40		30 - 1.06		27 - 1.59		23 - 1.37
												30 - 1.33
1975												
	JAN	6 - 1.51	FEB	4 - 1.40	MAR	4 - 1.63	APR	1 - 1.06	MAY	7 - 1.37	JUN	2 - N
		13 - 1.26		11 - 1.23		11 - 1.26		8 - 1.20		19 - 2.79		9 - N
		21 - 1.40		18 - 1.23		17 - 1.23		15 - 1.20		27 - N		16 - 4.32
		28 - 1.40		25 - 1.26		24 - 1.16		22 - 1.13				26 - 4.32
								29 - 1.55				
	JULY	10 - 4.32	AUG	12 - 2.18	SEPT	4 - 1.59	OCT	7 - 2.03(C)	NOV	6 - 1.82	DEC	15 - 1.82
		21 - 2.88		19 - 2.18		19 - 1.26		24 - 1.89		17 - 1.87		19 - 1.60
				27 - 1.82						28 - 1.79		31 - 1.32
1976												
	JAN	14 - 1.23	FEB	3 - 1.23	MAR	1 - 1.52	APR	1 - 1.26	MAY	- N	JUN	4 - N
		23 - 1.23		18 - 1.40		9 - 1.43		21 - 1.43				15 - 7.49
						19 - 1.28						29 - 7.20
	JULY	9 - 5.66	AUG	10 - 4.74	SEPT	2 - 2.98	OCT	8 - 2.11	NOV	5 - 1.74	DEC	13 - 1.74
		20 - 5.09		19 - 3.48		10 - 2.44				29 - 1.70		22 - 1.74
		29 - 5.00				21 - 2.31						
1977												
	JAN	4 - 1.70	FEB	10 - 1.86	MAR	3 - 1.91	APR	11 - 1.59	MAY	2 - 1.55	JUN	14 - 1.00
		13 - 1.59		22 - 1.82		21 - 1.59		21 - 1.59		11 - 1.55		
		26 - 1.55				30 - 1.55				23 - 1.23		
	JULY	6 - 1.00	AUG	15 - 0.94	SEPT	8 - 0.87	OCT	11 - 0.84	NOV	28 - 1.00	DEC	27 - 0.90
		21 - 0.87		25 - 1.00		23 - 0.78		26 - 0.90				

N - No Reading
c - Start combined readings, B-1 and B-1A (See B-1A)

FIGURE A-21(b)

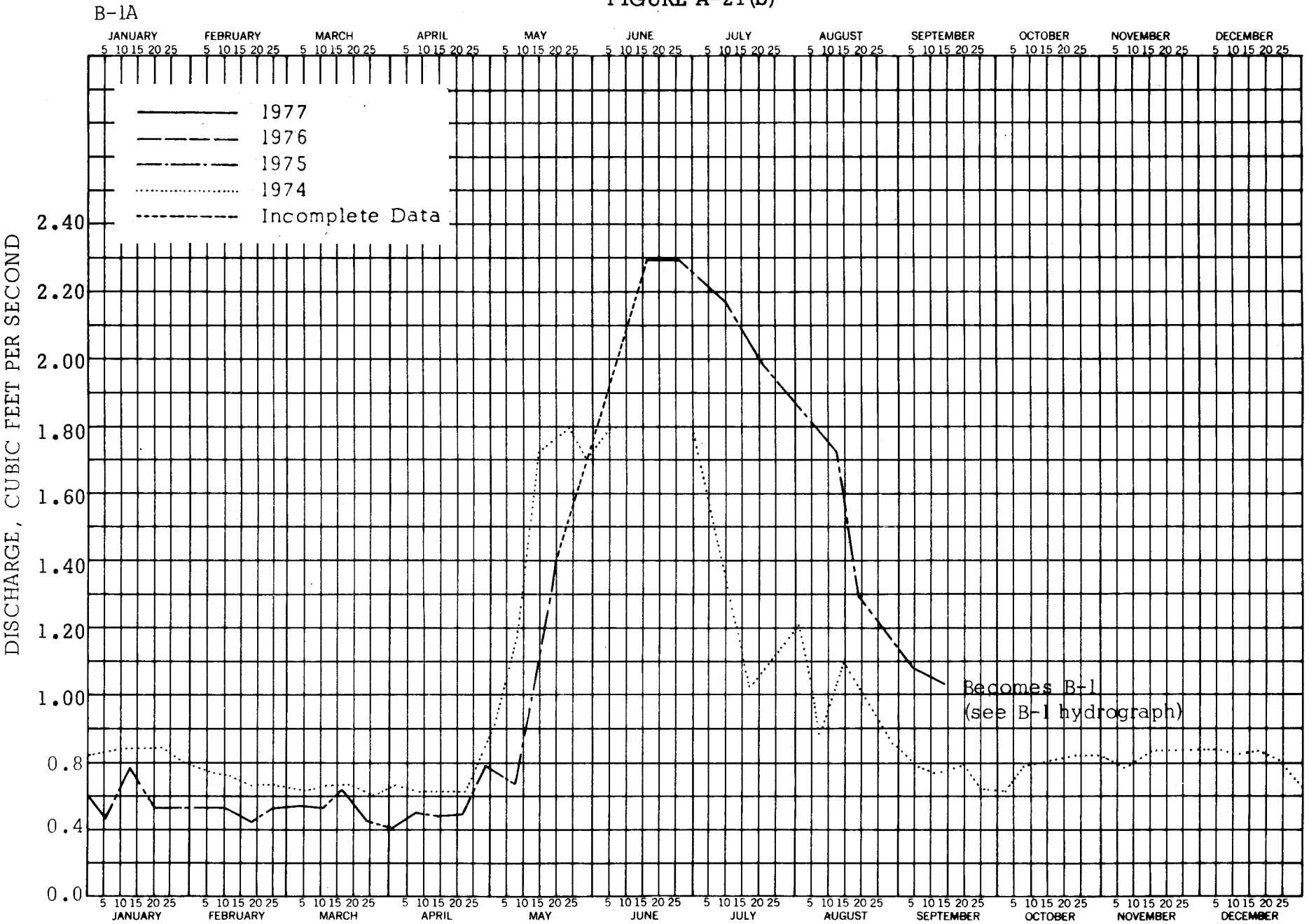

B-1A
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.8
0.4
0.0
Becomes B-1
(see B-1 hydrograph)

TABLE A-21(b) DISCHARGE AT B-1A, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: 1968 to current year
Latitude: 39° 50' 26", Longitude: 108° 23' 25"
SE1/4, SE1/4, Sec. 28, T2S, R98W, Rio Blanco County

1974						
JULY 17 - 1.23	AUG 7 - 0.97	SEPT 4 - 0.78	OCT 2 - 0.62	NOV 7 - 0.76	DEC 4 - 0.87	
31 - 1.63	14 - 1.40	11 - 0.73	7 - 0.76	15 - 0.87	10 - 0.84	
	22 - 1.13	19 - 0.78	23 - 0.84	22 - 0.87	17 - 0.87	
	28 - 0.94	25 - 0.62	30 - 0.84	27 - 0.87	23 - 0.81	
					30 - 0.64	
1975						
JAN 6 - 0.49	FEB 4 - 0.54	MAR 4 - 0.56	APR 1 - 0.41	MAY 7 - 0.67	JUN 2 - N	
13 - 0.78	11 - 0.54	11 - 0.54	8 - 0.51	19 - 1.86	9 - N	
21 - 0.54	18 - 0.46	17 - 0.64	15 - 0.49	27 - N	16 - 3.80	
28 - 0.54	25 - 0.54	24 - 0.46	22 - 0.51		26 - 3.80	
			29 - 0.78			
JULY 10 - 3.55	AUG 12 - 2.66	SEPT 4 - 1.37	OCT - C			
21 - 3.17	19 - 1.78	19 - 1.26				
	27 - 1.59					

N - No Reading
C - Start combined readings, B-1 and B-1A (See B-1)

FIGURE A-22

B-2 (USGS STATION NO. 119)

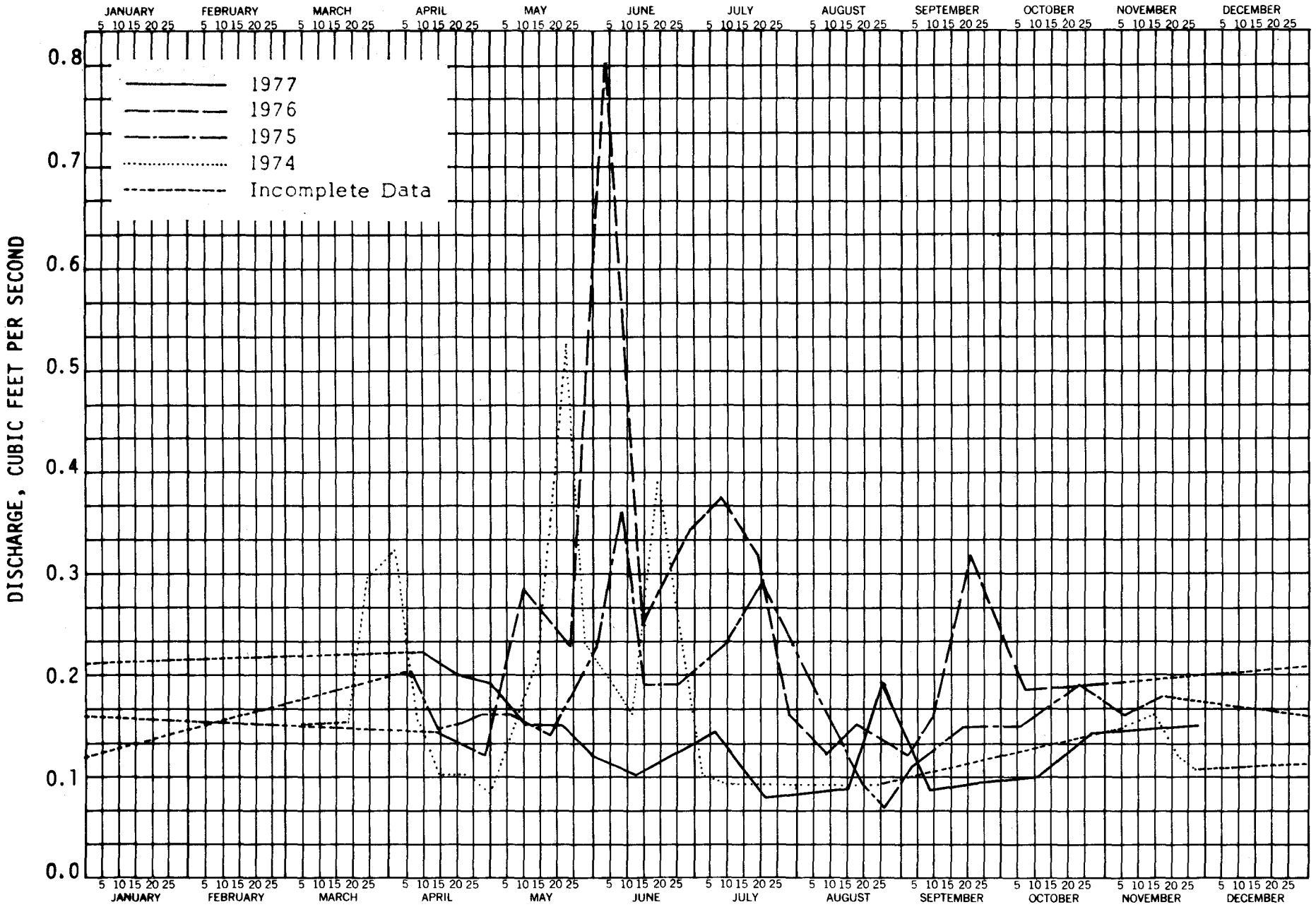


TABLE A-22 DISCHARGE AT B-2 (USGS STATION NO. 119), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 49' 33", Longitude: 108° 24' 54"
SW1/4, SE1/4, Sec. 32, T2S, R98W, Rio Blanco County

1974											
JULY	3 - 0.10	AUG	7 - 0.09	SEPT	- W	OCT	- W	NOV	7 - 0.15	DEC	- F
	10 - 0.09		14 - 0.09						15 - 0.16		
	17 - 0.09		21 - 0.09						22 - 0.12		
	31 - 0.09		24 - 0.09						27 - 0.11		
1975											
JAN	- F	FEB	- F	MAR	4 - F	APR	1 - N	MAY	7 - 0.16	JUN	2 - 0.23
					11 - F		8 - 0.20		19 - 0.14		9 - 0.36
					17 - W		15 - 0.14		27 - 0.19		16 - 0.19
					24 - W		22 - 0.15				26 - 0.19
							29 - 0.16				
JULY	10 - 0.23	AUG	12 - 0.15	SEPT	4 - 0.11	OCT	7 - 0.15	NOV	6 - 0.16	DEC	19 - F
	21 - 0.29		19 - 0.10		19 - 0.15		24 - 0.19		17 - 0.18		
			27 - 0.07						28 - F		
1976											
JAN	- F	FEB	- F	MAR	- F	APR	1 - F	MAY	11 - 0.28	JUN	4 - 0.80
							16 - 0.14		25 - 0.23		15 - 0.25
							30 - 0.12				29 - 0.34
JULY	9 - 0.38	AUG	10 - 0.12	SEPT	2 - 0.12	OCT	8 - 0.18	NOV	5 - 0.19	DEC	- F
	20 - 0.31		19 - 0.15		10 - 0.18				29 - F		
	29 - 0.16				21 - 0.31						
1977											
JAN	- F	FEB	- F	MAR	- F	APR	11 - 0.22	MAY	2 - 0.19	JUN	1 - 0.12
							21 - 0.20		11 - 0.15		14 - 0.10
									23 - 0.15		
JULY	6 - 0.14	AUG	15 - 0.09	SEPT	8 - 0.08	OCT	11 - 0.10	NOV	28 - 0.15	DEC	27 - F
	21 - 0.08		25 - 0.19		23 - 0.09		26 - 0.14				

N - No Reading
F - Frozen
W - Washed Out

B-3 (USGS STATION NO. 120)

FIGURE A-23

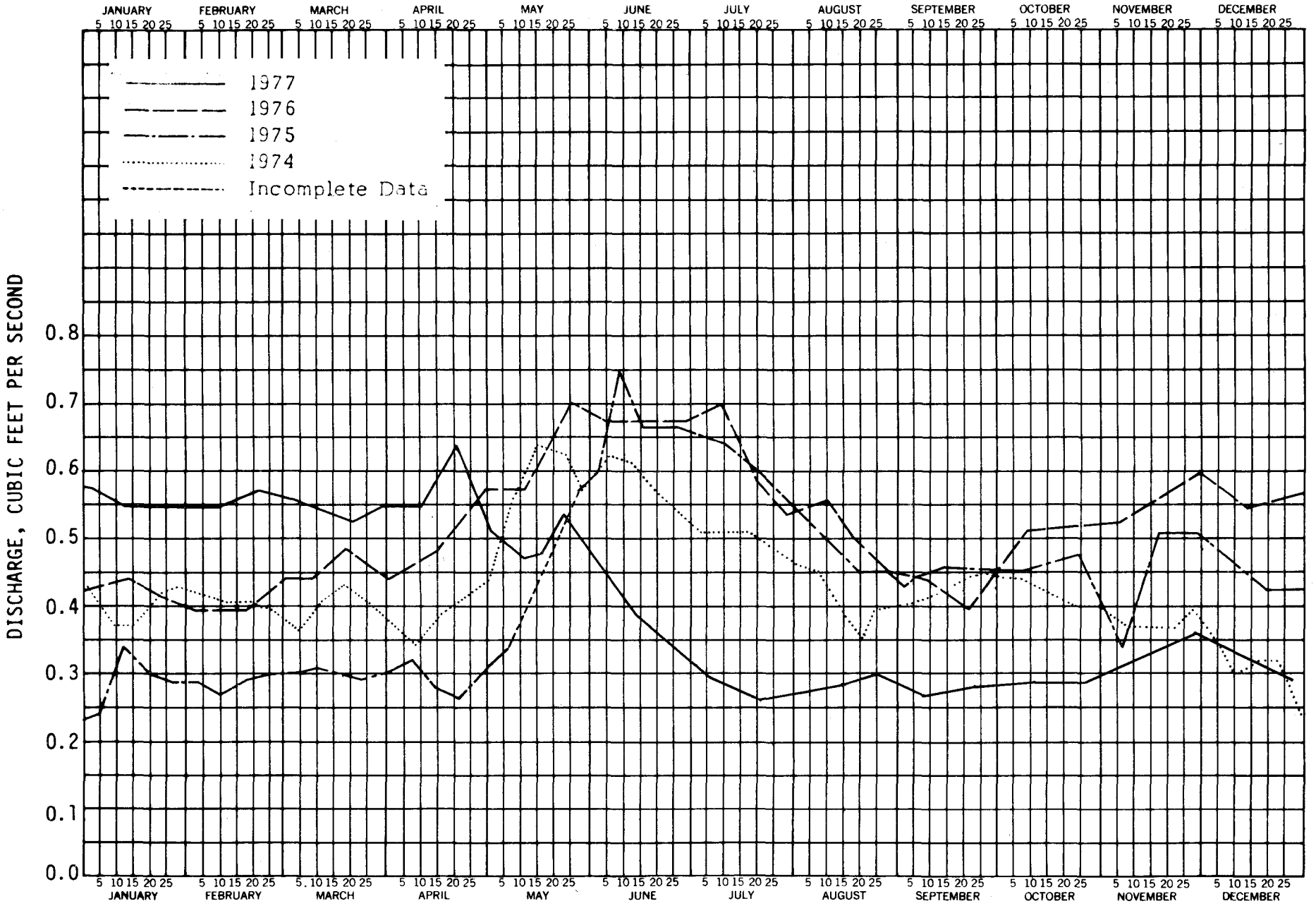


TABLE A-23 DISCHARGE AT B-3 (USGS STATION NO. 120), SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 49' 29", Longitude: 108° 24' 56"
SW1/4, SE1/4, Sec. 32, T2S, R98W, Rio Blanco County

1974												
	JULY	3 - 0.509	AUG	7 - 0.450	SEPT	4 - 0.404	OCT	2 - 0.44	NOV	7 - 0.371	DEC	4 - 0.350
		10 - 0.509		14 - 0.393		11 - 0.415		7 - 0.44		15 - 0.371		10 - 0.299
		17 - 0.509		21 - 0.350		19 - 0.438		23 - 0.40		22 - 0.371		17 - 0.319
		31 - 0.462		24 - 0.393		25 - 0.450		30 - 0.40		27 - 0.393		23 - 0.319
												30 - 0.241
1975												
	JAN	6 - 0.241	FEB	4 - 0.289	MAR	4 - 0.299	APR	1 - 0.299	MAY	7 - 0.339	JUN	2 - 0.597
		13 - 0.339		11 - 0.269		11 - 0.309		8 - 0.319		19 - N		9 - 0.757
		21 - 0.299		18 - 0.289		17 - 0.299		15 - 0.279		27 - 0.571		16 - 0.662
		28 - 0.289		25 - 0.299		24 - 0.289		22 - 0.260				26 - 0.662
								29 - 0.299				
	JULY	10 - 0.636	AUG	12 - 0.485	SEPT	4 - 0.438	OCT	7 - 0.450	NOV	6 - 0.339	DEC	19 - 0.427
		21 - 0.597		19 - 0.450		19 - 0.462		24 - 0.474		17 - 0.509		31 - 0.427
				27 - 0.450						28 - 0.509		
1976												
	JAN	14 - 0.438	FEB	3 - 0.393	MAR	1 - 0.438	APR	1 - 0.438	MAY	11 - 0.571	JUN	4 - 0.675
		23 - 0.415		18 - 0.393		9 - 0.438		16 - 0.485		25 - 0.702		15 - 0.675
						19 - 0.485		30 - 0.571				29 - 0.675
	JULY	9 - 0.702	AUG	10 - 0.558	SEPT	2 - 0.427	OCT	8 - 0.509	NOV	5 - 0.522	DEC	13 - 0.546
		20 - 0.584		19 - 0.497		10 - 0.438				29 - 0.597		22 - 0.558
		29 - 0.534				21 - 0.393						
1977												
	JAN	4 - 0.571	FEB	10 - 0.546	MAR	3 - 0.558	APR	11 - 0.546	MAY	2 - 0.509	JUN	14 - 0.382
		13 - 0.546		22 - 0.571		21 - 0.522		21 - 0.636		11 - 0.474		
		26 - 0.546				30 - 0.546				23 - 0.534		
	JULY	6 - 0.299	AUG	15 - 0.279	SEPT	8 - 0.269	OCT	11 - 0.289	NOV	28 - 0.361	DEC	27 - 0.289
		21 - 0.260		25 - 0.299		23 - 0.279		26 - 0.289				

N - No Reading

B-4

FIGURE A-24

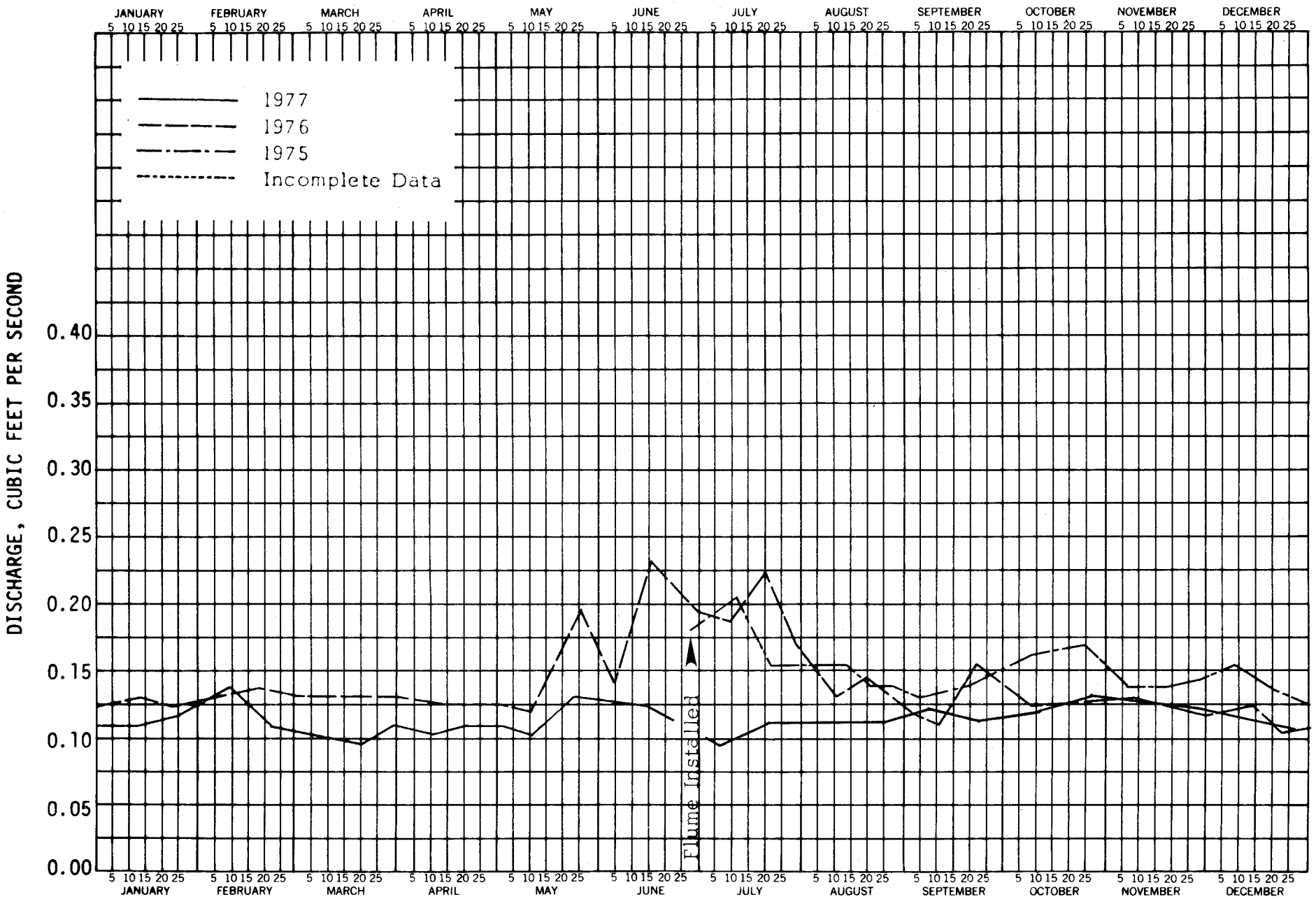


TABLE A-24 DISCHARGE AT B-4, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 39° 52' 20", Longitude: 108° 17' 26"
SE1/4, SW1/4, Sec. 16, T2S, R97W, Rio Blanco County

1975												
	JUN	27 - 0.179	JULY	11 - 0.205	AUG	13 - 0.154	SEPT	4 - 0.131	OCT	8 - 0.162	NOV	6 - 0.138
				21 - 0.154		20 - 0.138		19 - 0.138		24 - 0.170		17 - 0.138
						27 - 0.138						28 - 0.146
	DEC	8 - 0.154										
		19 - 0.138										
		31 - 0.124										
1976												
	JAN	14 - 0.131	FEB	3 - 0.131	MAR	1 - 0.131	APR	1 - 0.131	MAY	10 - 0.117	JUN	4 - 0.138
		23 - 0.124		18 - 0.138		9 - 0.131		16 - 0.124		25 - 0.196		15 - 0.231
						19 - 0.131		30 - 0.124				29 - 0.196
	JULY	9 - 0.187	AUG	10 - 0.131	SEPT	2 - 0.117	OCT	8 - 0.124	NOV	8 - 0.131	DEC	13 - 0.124
		20 - 0.222		19 - 0.146		10 - 0.109				29 - 0.117		22 - 0.109
		29 - 0.170				21 - 0.154						
1977												
	JAN	4 - 0.109	FEB	10 - 0.138	MAR	7 - 0.102	APR	11 - 0.102	MAY	2 - 0.109	JUN	14 - 0.124
		13 - 0.109		22 - 0.109		21 - 0.095		21 - 0.109		11 - 0.102		
		26 - 0.117				30 - 0.109				23 - 0.131		
	JULY	6 - 0.095	AUG	15 - 0.117	SEPT	8 - 0.124	OCT	11 - 0.124	NOV	28 - 0.124	DEC	27 - 0.109
		21 - 0.117		25 - 0.117		23 - 0.117		26 - 0.131				

B-5

FIGURE A-25

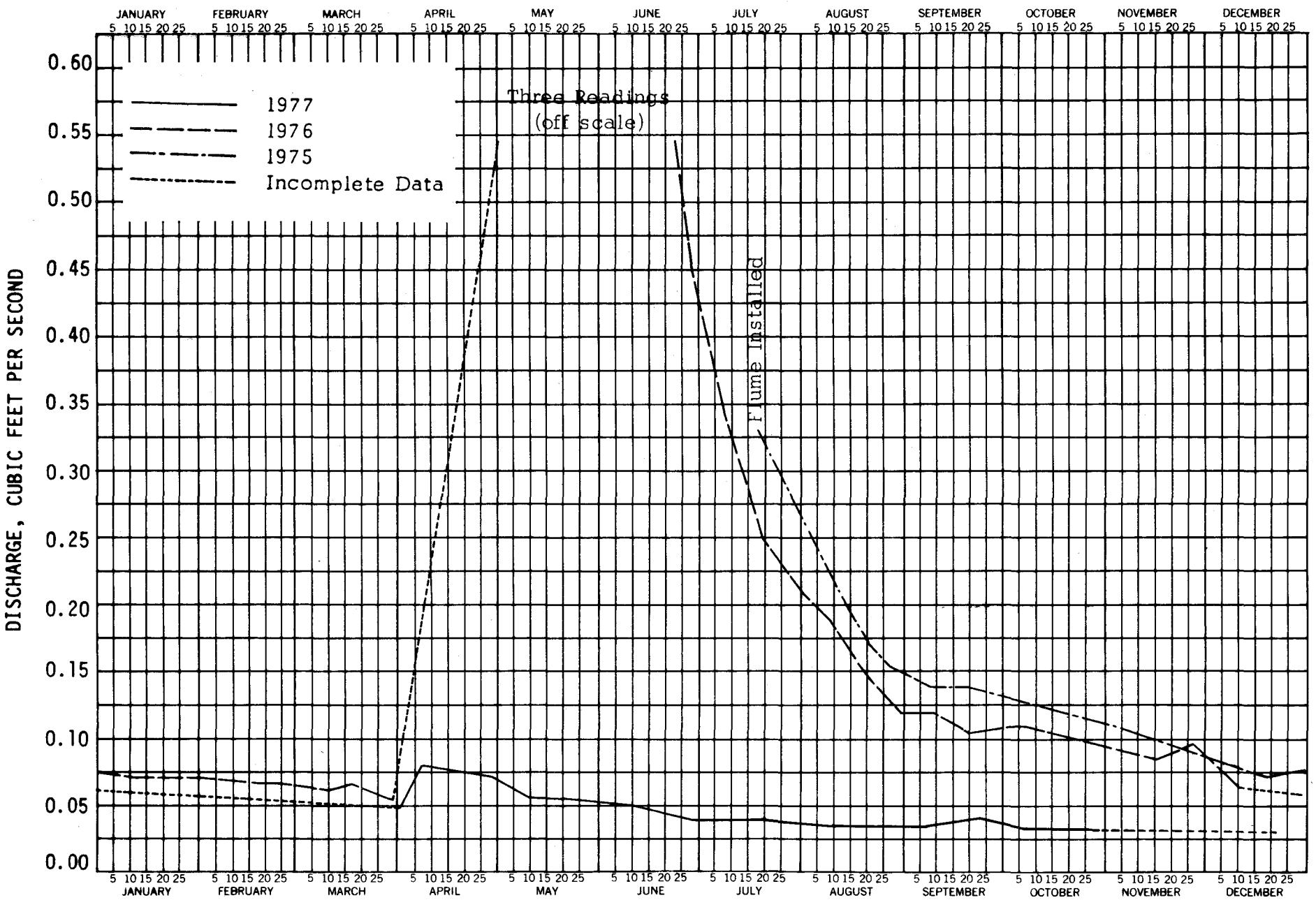


TABLE A-25 DISCHARGE AT B-5, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 42' 18", Longitude: 108° 29' 50"
NE1/4, NE1/4, Sec. 16, T4S, R99W, Rio Blanco County

1975											
	JULY 18 - 0.329	AUG	8 - 0.222	SEPT	8 - 0.138	OCT	7 - 0.124	NOV	3 - 0.109	DEC	18 - 0.070
			20 - 0.170		19 - 0.138				17 - 0.095		30 - 0.076
			27 - 0.154						26 - 0.089		
1976											
	JAN 13 - 0.070	FEB	2 - 0.070	MAR	10 - 0.058	APR	- N	MAY	20 - 3.0 (est.)	JUN	3 - 0.992
	22 - 0.070		17 - 0.064		18 - 0.064						14 - 0.689
			26 - 0.064		30 - 0.053						28 - 0.450
	JULY 8 - 0.339	AUG	9 - 0.187	SEPT	9 - 0.117	OCT	1 - 0.109	NOV	15 - 0.082	DEC	10 - 0.064
	19 - 0.250		18 - 0.154		20 - 0.102		7 - 0.109		26 - 0.095		21 - F
	28 - 0.222		30 - 0.117								
1977											
	JAN - F	FEB	- F	MAR	- F	APR	1 - 0.047	MAY	10 - 0.053	JUN	10 - 0.047
							8 - 0.082		20 - 0.053		29 - 0.037
							29 - 0.070				
	JULY 20 - 0.037	AUG	10 - 0.033	SEPT	7 - 0.033	OCT	6 - 0.033	NOV	N	DEC	22 - 0.028
			23 - 0.033		23 - 0.037		26 - 0.033				

N - No Reading
F - Frozen

FIGURE A-26

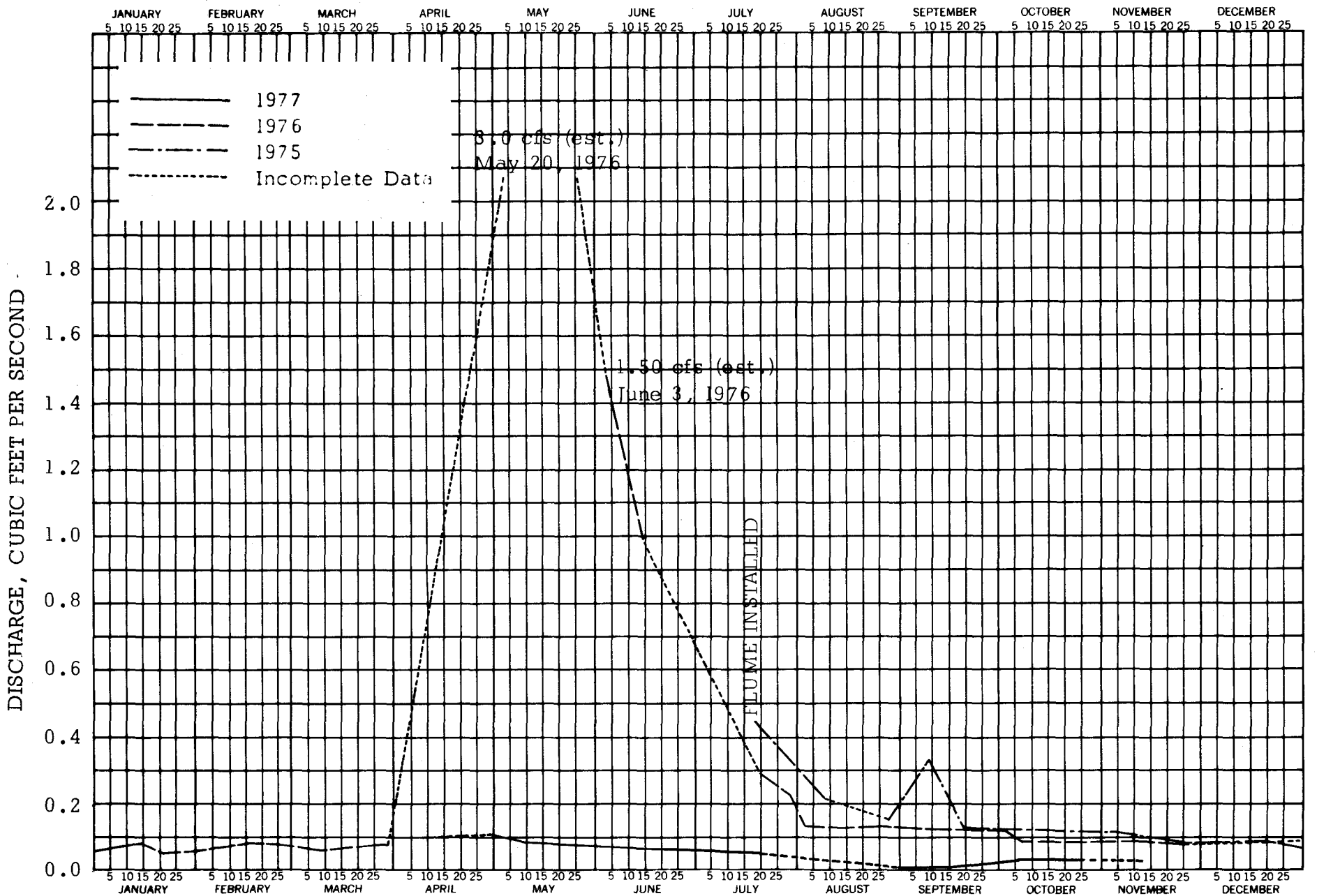

JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
8.0 cfs (est.)
May 20, 1976
1.50 cfs (est.)
June 3, 1976
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0

TABLE A-26 DISCHARGE AT B-6, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 41' 42", Longitude: 108° 31' 12"
SE1/4, SE1/4, Sec. 17, T4S, R99W, Rio Blanco County

1975												
	JULY	18 - 0.450	AUG	8 - 0.222	SEPT	8 - 0.339	OCT	7 - 0.115	NOV	3 - 0.102	DEC	18 - 0.089
				20 - N		19 - 0.124				17 - 0.095		30 - 0.058
				27 - 0.154						26 - 0.082		
1976												
	JAN	13 - 0.095	FEB	2 - 0.064	MAR	10 - 0.064	APR	- N	MAY	20 - 3.0 (est.)	JUN	3 - 1.50 (est.
		22 - 0.058		17 - 0.089		18 - 0.076						14 - 0.992
				26 - 0.082		30 - 0.089						28 - N
	JULY	8 - N	AUG	2 - 0.138	SEPT	9 - 0.124	OCT	1 - 0.117	NOV	15 - 0.082	DEC	- F
		19 - 0.299		13 - 0.131		20 - 0.124		7 - 0.082		26 - 0.076		
		28 - 0.231		25 - 0.138								
1977												
	JAN	- F	FEB	- F	MAR	- F	APR	1 - F	MAY	10 - 0.089	JUN	10 - 0.070
								8 - F		20 - 0.082		
								29 - 0.102				
	JULY	20 - 0.047	AUG	10 - D	SEPT	7 - 0.002	OCT	6 - 0.047	NOV	N	DEC	22 - F
						15 - 0.002		26 - 0.047				

N - No Reading
F - Frozen
D - Dry

FIGURE A-27

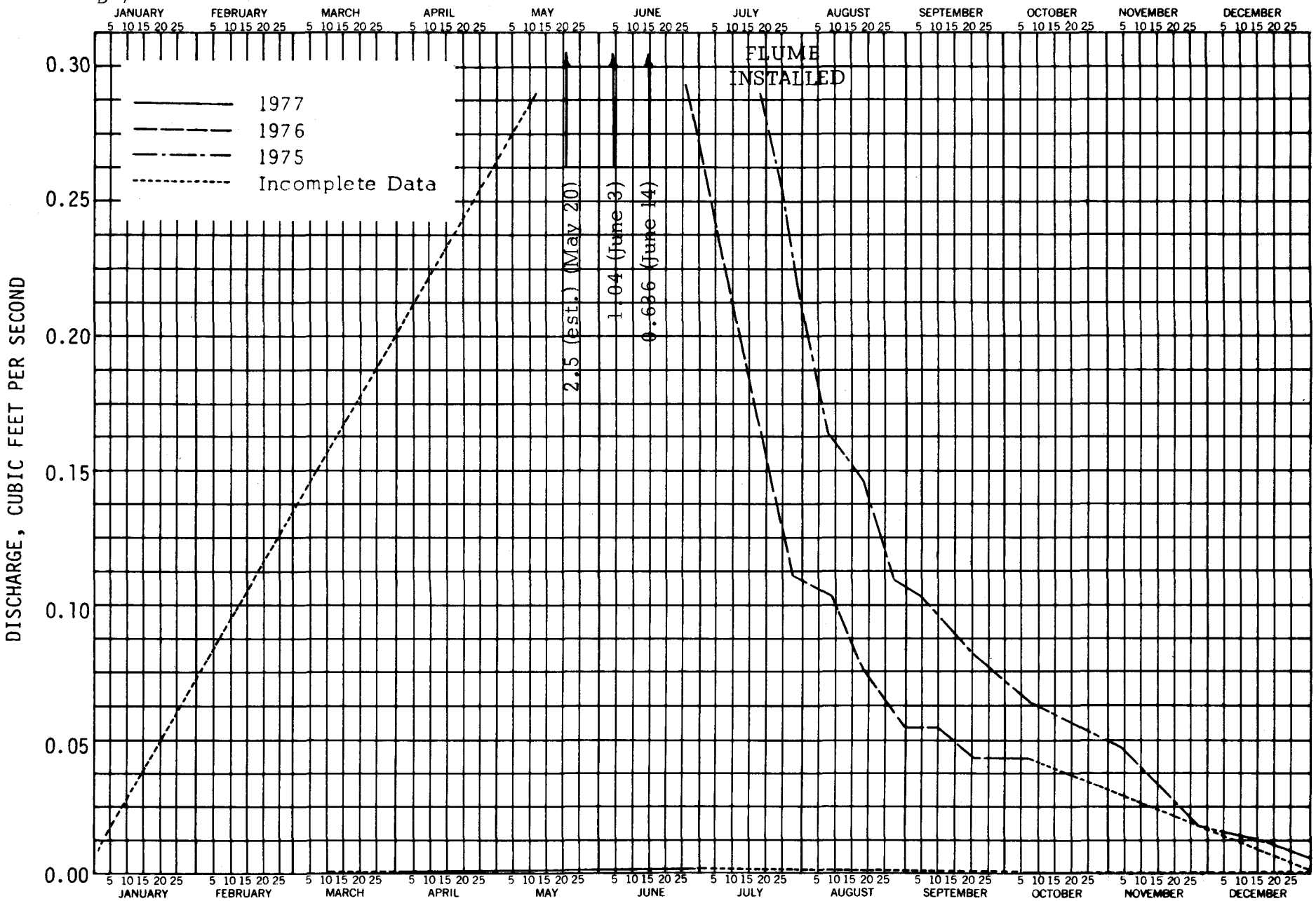

B-7
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
0.30
0.25
0.20
0.15
0.10
0.05
0.00
DISCHARGE, CUBIC FEET PER SECOND
1977
1976
1975
Incomplete Data
FLUME INSTALLED
2.5 (est.) (May 20)
1.04 (June 3)
0.686 (June 14)

TABLE A-27 DISCHARGE AT B-7, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 42' 49", Longitude: 108° 30' 53"
NW1/4, SW1/4, Sec. 9, T4S, R99W, Rio Blanco County

1975											
	JULY 18 - 0.289	AUG	8 - 0.162	SEPT	5 - 0.102	OCT	7 - 0.064	NOV	3 - 0.047	DEC	18 - 0.010
			20 - 0.138		19 - 0.082				17 - 0.028		30 - 0.004
			27 - 0.109						26 - 0.016		
1976											
	JAN - N	FEB	- N	MAR	- N	APR	- N	MAY	20 - 2.5 (est.)	JUN	3 - 1.04
											14 - 0.636
											28 - 0.279
	JULY 8 - 0.213	AUG	9 - 0.102	SEPT	9 - 0.053	OCT	1 - 0.042	NOV	- F	DEC	- F
	19 - 0.154		18 - 0.076		20 - 0.042		6 - 0.042				
	28 - 0.109		30 - 0.053								
1977											
	JAN - F	FEB	- F	MAR	- F	APR	- D	MAY	- D	JUN	- D
	JULY 20 - D	AUG	10 - D	SEPT	7 - D	OCT	6 - 0.0	NOV	N	DEC	22 - D
			23 - D		15 - D		26 - 0.0				

N - No Reading
F - Frozen
D - Dry

FIGURE A-28

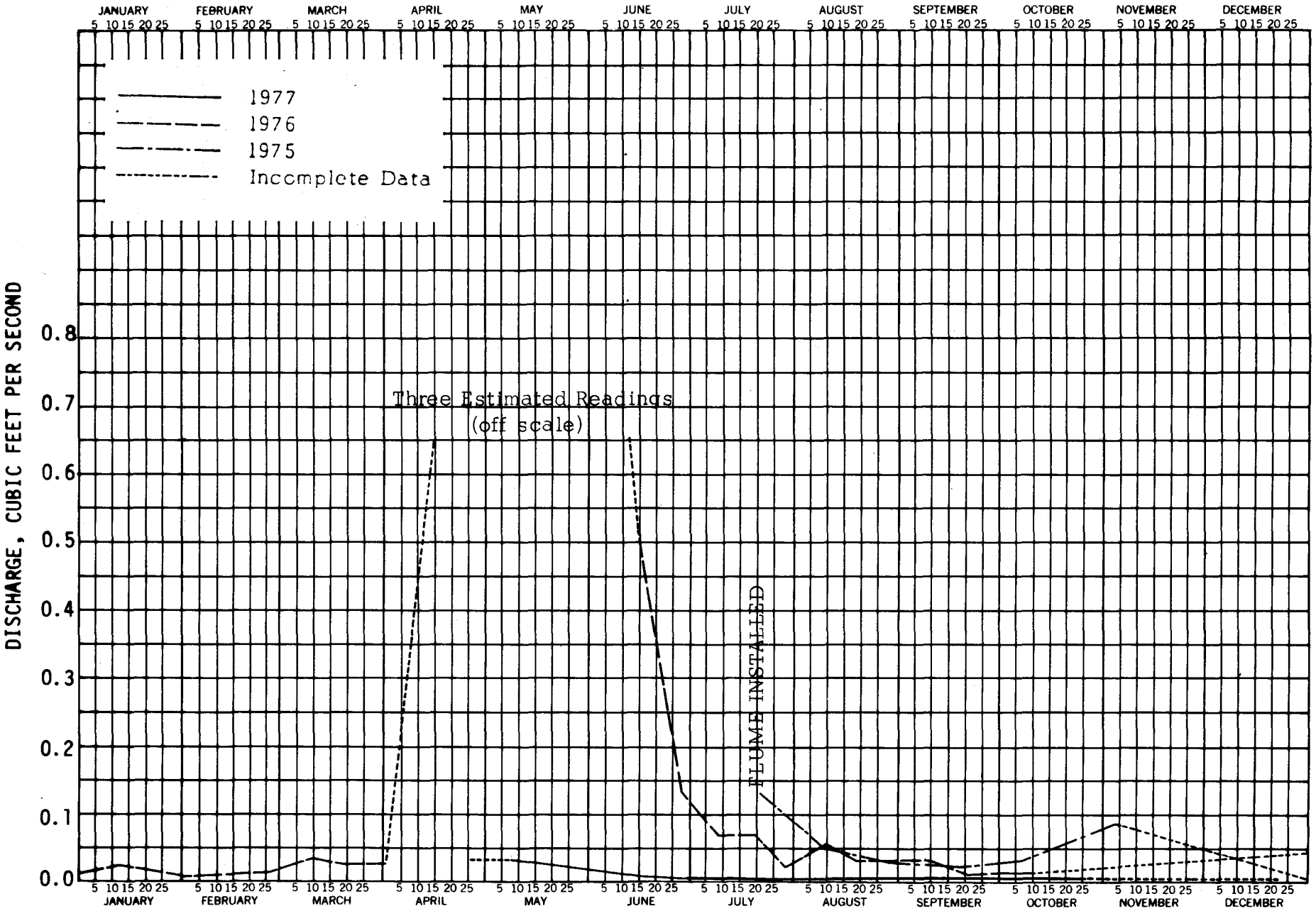

JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Three Estimated Readings
(off scale)
FLUME INSTALLED

TABLE A-28 DISCHARGE AT B-8, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 43' 45", Longitude: 108° 30' 30"
NE1/4, SW1/4, Sec. 4, T4S, R99W, Rio Blanco County

1975											
	JULY 21 - 0.138	AUG	8 - 0.053	SEPT	5 - 0.028	OCT	7 - 0.028	NOV	3 - 0.089	DEC	18 - F
			20 - 0.033		19 - 0.024				17 - F		30 - 0.007
			27 - 0.028						26 - F		
1976											
	JAN 13 - 0.028	FEB	2 - 0.004	MAR	10 - 0.033	APR	- N	MAY	10 - 4.0 (est.)	JUN	3 - 2.0 (est.)
	22 - 0.013		17 - 0.010		18 - 0.024				20 - 3.0 (est.)		14 - 0.509
			26 - 0.010		30 - 0.024						28 - 0.131
	JULY 8 - 0.070	AUG	9 - 0.053	SEPT	9 - 0.028	OCT	1 - 0.013	NOV	- F	DEC	- F
	19 - 0.070		18 - 0.028		20 - 0.010		11 - 0.013				
	28 - 0.020		30 - 0.028								
1977											
	JAN - F	FEB	- F	MAR	- F	APR	- F	MAY	10 - 0.033	JUN	10 - 0.010
									20 - 0.024		29 - 0.002
	JULY 20 - 0.002	AUG	10 - 0.002	SEPT	7 - 0.002	OCT	6 - 0.004	NOV	N	DEC	22 - F
			23 - 0.002		15 - 0.002		26 - 0.004				

N - No Reading
F - Frozen

FIGURE A-29

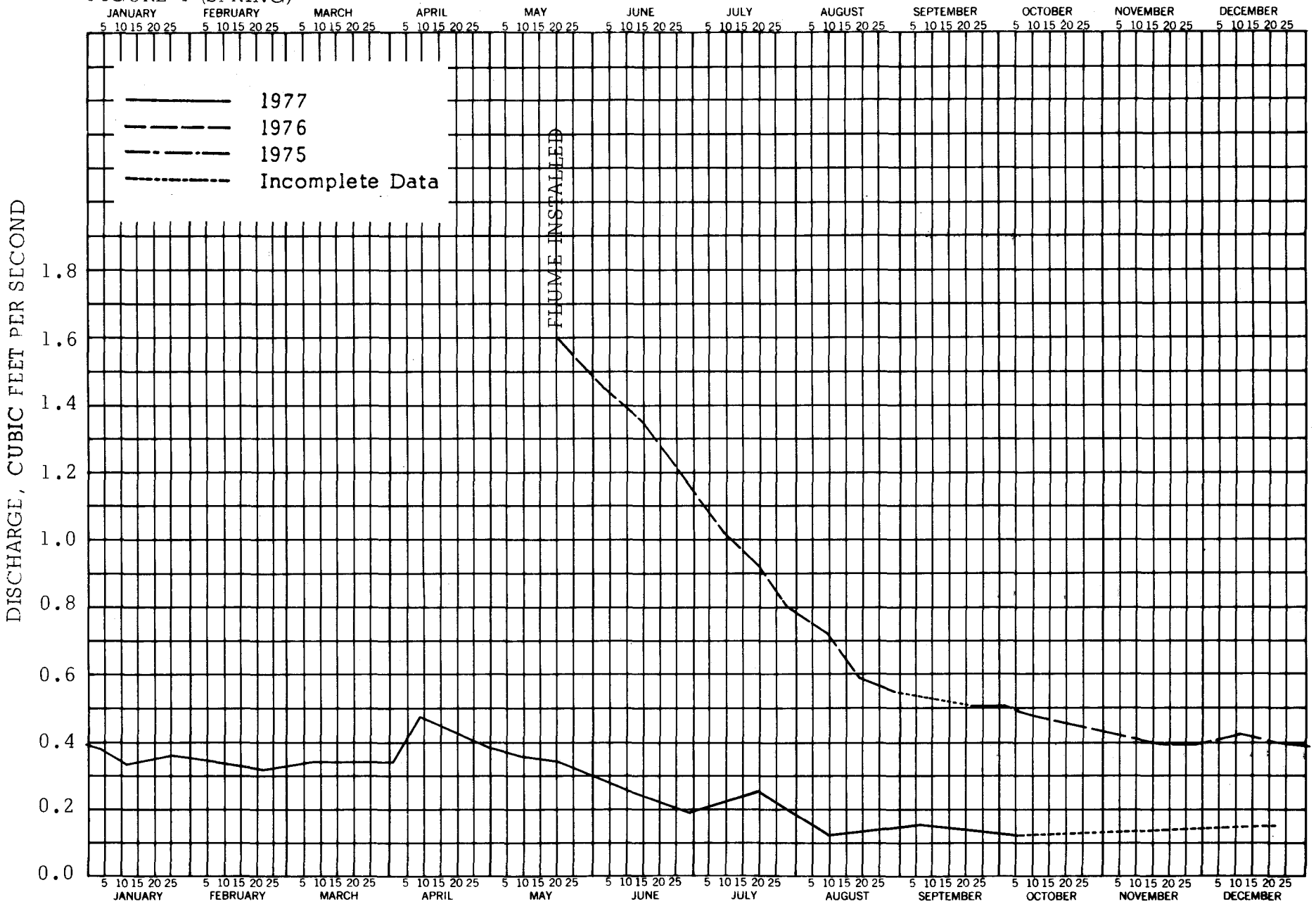


FIGURE 4 (SPRING)
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0

TABLE A-29 DISCHARGE AT FIG. 4, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: May 1976 to current year
Latitude: 39° 42' 56", Longitude: 108° 29' 03"
NE1/4, SE1/4, Sec. 10, T4S, R99W, Rio Blanco County

1976

MAY	20 - 1.59	JUN	3 - 1.45	JULY	8 - 1.02	AUG	9 - 0.71	SEPT	9 - N	OCT	1 - 0.50
			14 - 1.34		19 - 0.92		18 - 0.58		20 - 0.50		7 - 0.48
			28 - 1.17		28 - 0.80		30 - 0.54				
NOV	15 - 0.39	DEC	10 - 0.42								
	26 - 0.38		21 - 0.39								

1977

JAN	3 - 0.38	FEB	7 - 0.34	MAR	7 - 0.34	APR	1 - 0.34	MAY	10 - 0.36	JUN	10 - 0.25
	12 - 0.34		21 - 0.32		16 - 0.34		8 - 0.48		20 - 0.34		29 - 0.19
	25 - 0.36						29 - 0.39				
JULY	20 - 0.26	AUG	10 - 0.12	SEPT	7 - 0.16	OCT	6 - 0.12	NOV	N	DEC	22 - 0.16

N - No Reading

FIGURE A-30

FIGURE 4A (SPRING)

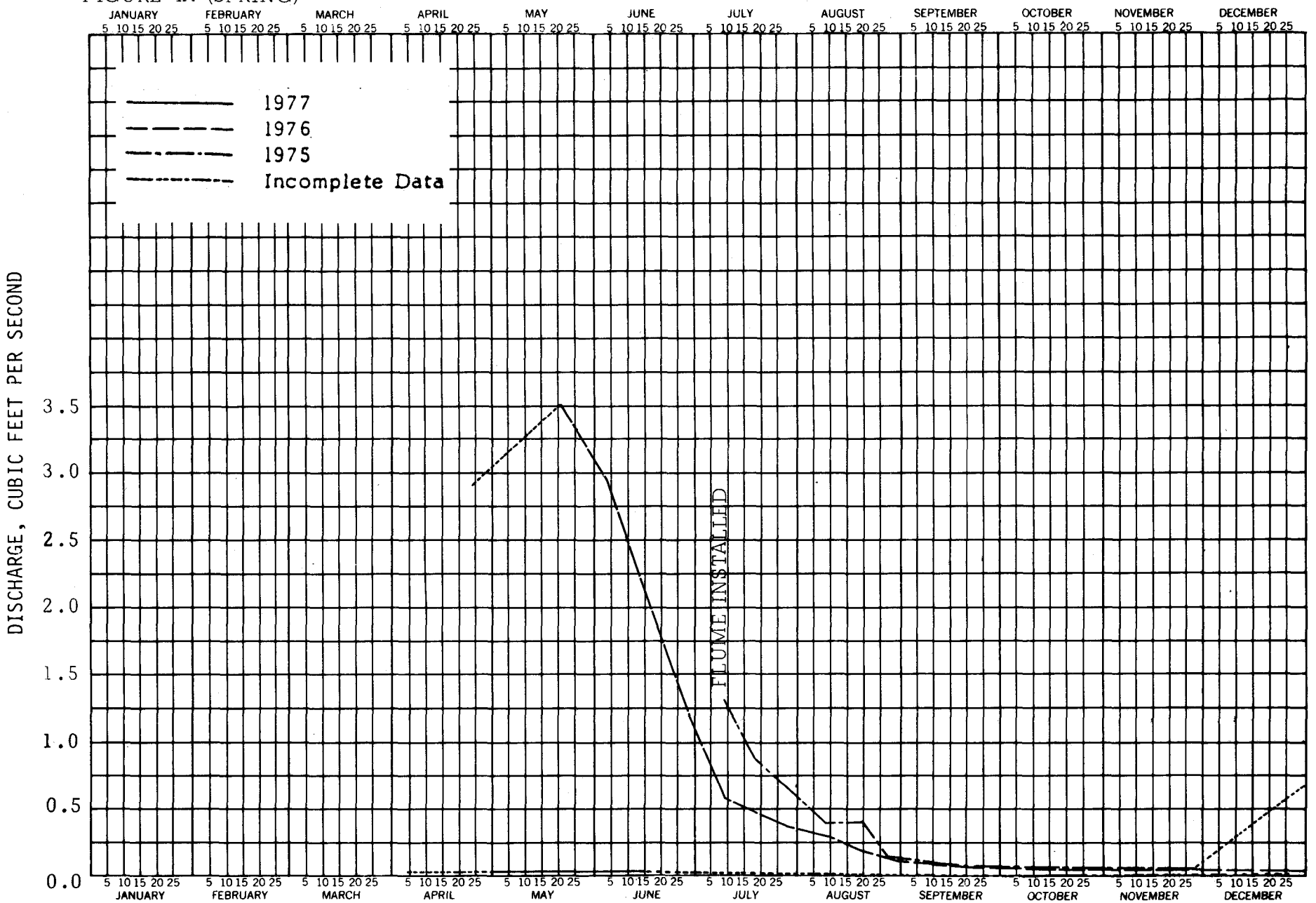


TABLE A-30 DISCHARGE AT FIG. 4A, SPRING ON BLACK SULPHUR CREEK
READINGS IN CUBIC FEET PER SECOND (EXCEPT WHERE NOTED)

6" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 42' 56", Longitude: 108° 29' 03"
NE1/4, SE1/4, Sec. 10, T4S, R99W, Rio Blanco County

1975											
	JULY	9 - 1.31	AUG	8 - 0.36	SEPT	8 - 0.14	OCT	7 - 0.05	NOV	3 - 0.038	DEC - N
		18 - 0.82		20 - 0.38		19 - 0.10				17 - 0.013	
				27 - 0.16						26 - 0.013	
1976											
	JAN	- N	FEB	- N	MAR	- N	APR	- N	MAY	20 - 3.50 (est.)	JUN 3 - 2.93
											14 - 2.19
											28 - 1.20
	JULY	8 - 0.58	AUG	9 - 0.28	SEPT	9 - 0.09	OCT	1 - 0.05	NOV	15 - 0.024	DEC - F
		19 - 0.48		18 - 0.19		20 - 0.06		7 - 0.05		26 - 0.018	
		28 - 0.39		30 - 0.10							
1977											
	JAN	- F	FEB	- F	MAR	- N	APR	1 - F	MAY	6 - 2 gpm	JUN - D
								8 - F			
								29 - 2 gpm			
	JULY	20 - D	AUG	10 - D	SEPT	7 - D	OCT	6 - 0.0	NOV	N	DEC 22 - D
								26 - 0.0			

N - No Reading
F - Frozen
D - Dry

FIGURE A-31

F-1 (USGS STATION NO. 122)

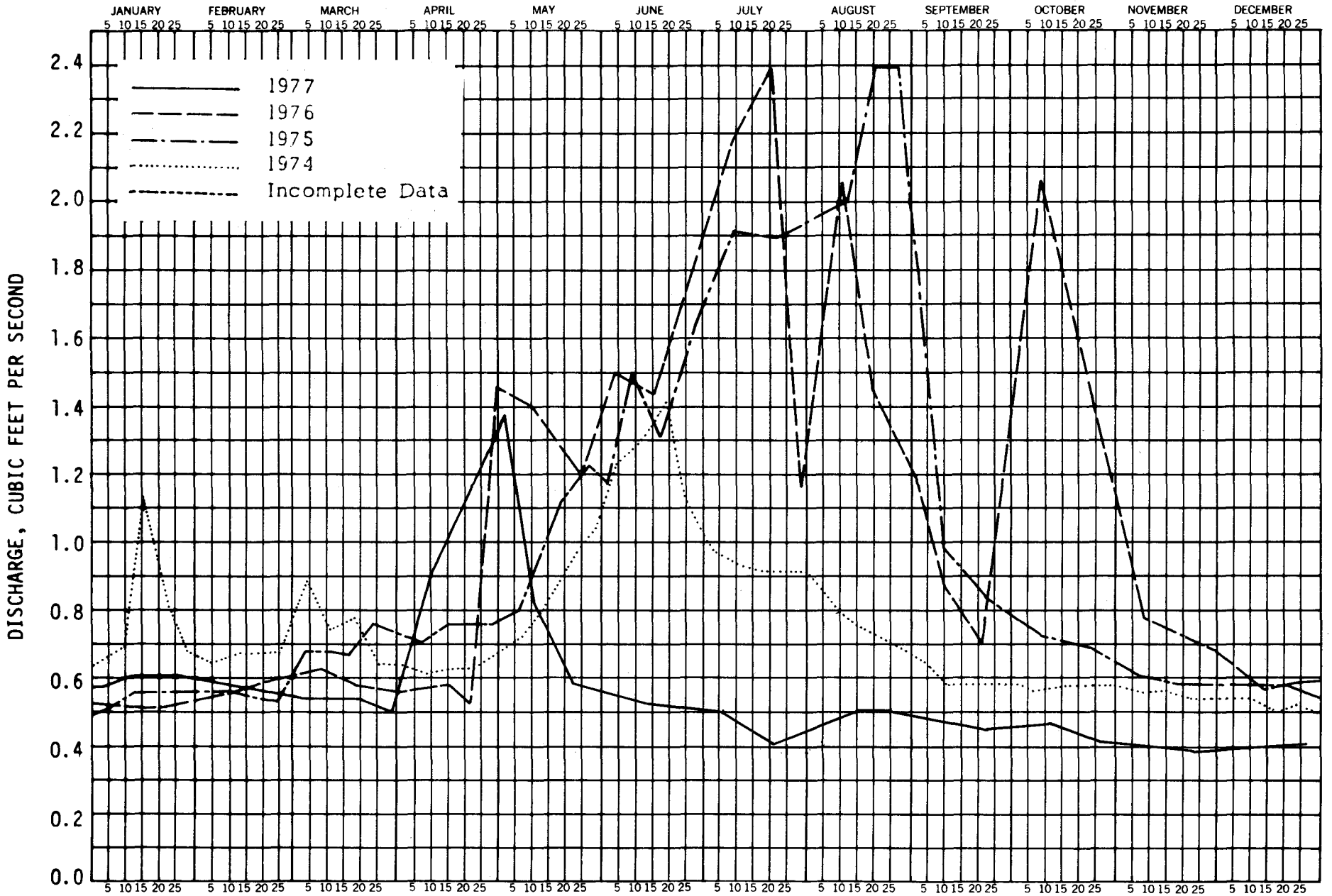


TABLE A-31 DISCHARGE AT F-1 (USGS STATION NO. 122), SPRING ON FAWN CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 51' 10", Longitude: 108° 18' 52"
SE1/4, NE1/4, Sec. 30, T2S, R97W, Rio Blanco County

1974						
JULY 3 - 0.97	AUG 7 - 0.82	SEPT 4 - 0.65	OCT 2 - 0.58	NOV 7 - 0.56	DEC 4 - 0.54	
10 - 0.94	14 - 0.76	11 - 0.58	7 - 0.56	15 - 0.56	10 - 0.54	
17 - 0.92	21 - 0.73	19 - 0.58	15 - 0.58	22 - 0.54	17 - 0.50	
31 - 0.92	28 - 0.69	25 - 0.58	23 - 0.58	27 - 0.54	23 - 0.52	
			30 - 0.58		30 - 0.50	
1975						
JAN 6 - 0.52	FEB 4 - 0.56	MAR 4 - 0.69	APR 1 - 0.73	MAY 7 - 0.80	JUN 2 - 1.17	
13 - 0.56	11 - 0.56	11 - 0.69	8 - 0.71	19 - 1.12	9 - 1.50	
21 - 0.56	18 - 0.54	17 - 0.67	15 - 0.76	27 - 1.23	17 - 1.31	
28 - 0.56	25 - 0.53	24 - 0.76	22 - 0.76		27 - 1.62	
			29 - 0.76			
JULY 9 - 1.93	AUG 12 - 2.03	SEPT 9 - 0.99	OCT 8 - 0.73	NOV 6 - 0.61	DEC 15 - 0.58	
22 - 1.90	20 - 2.40	22 - 0.82	23 - 0.69	18 - 0.58	19 - 0.58	
	27 - 2.40			28 - 0.58	31 - 0.54	
1976						
JAN 14 - 0.52	FEB 3 - 0.54	MAR 1 - 0.61	APR 1 - 0.56	MAY 11 - 1.39	JUN 4 - 1.50	
23 - 0.52	18 - 0.58	9 - 0.63	16 - 0.58	25 - 1.20	15 - 1.45	
		19 - 0.58	22 - 0.52		29 - 1.81	
			30 - 1.45			
JULY 9 - 2.19	AUG 10 - 2.06	SEPT 2 - 1.17	OCT 8 - 2.06	NOV 8 - 0.78	DEC 13 - 0.56	
20 - 2.40	19 - 1.45	10 - 0.87		29 - 0.69	22 - 0.58	
29 - 1.17		21 - 0.71				
1977						
JAN 4 - 0.58	FEB 10 - 0.58	MAR 3 - 0.54	APR 11 - 0.92	MAY 2 - 1.39	JUN 14 - 0.52	
13 - 0.61	22 - 0.56	21 - 0.54	21 - 1.12	11 - 0.82		
26 - 0.61		30 - 0.50		23 - 0.58		
JULY 6 - 0.50	AUG 15 - 0.50	SEPT 8 - 0.41	OCT 11 - 0.47	NOV 23 - 0.39	DEC 27 - 0.41	
21 - 0.41	25 - 0.50	23 - 0.45	26 - 0.42			

F-2 (USGS STATION NO. 123)

FIGURE A-32

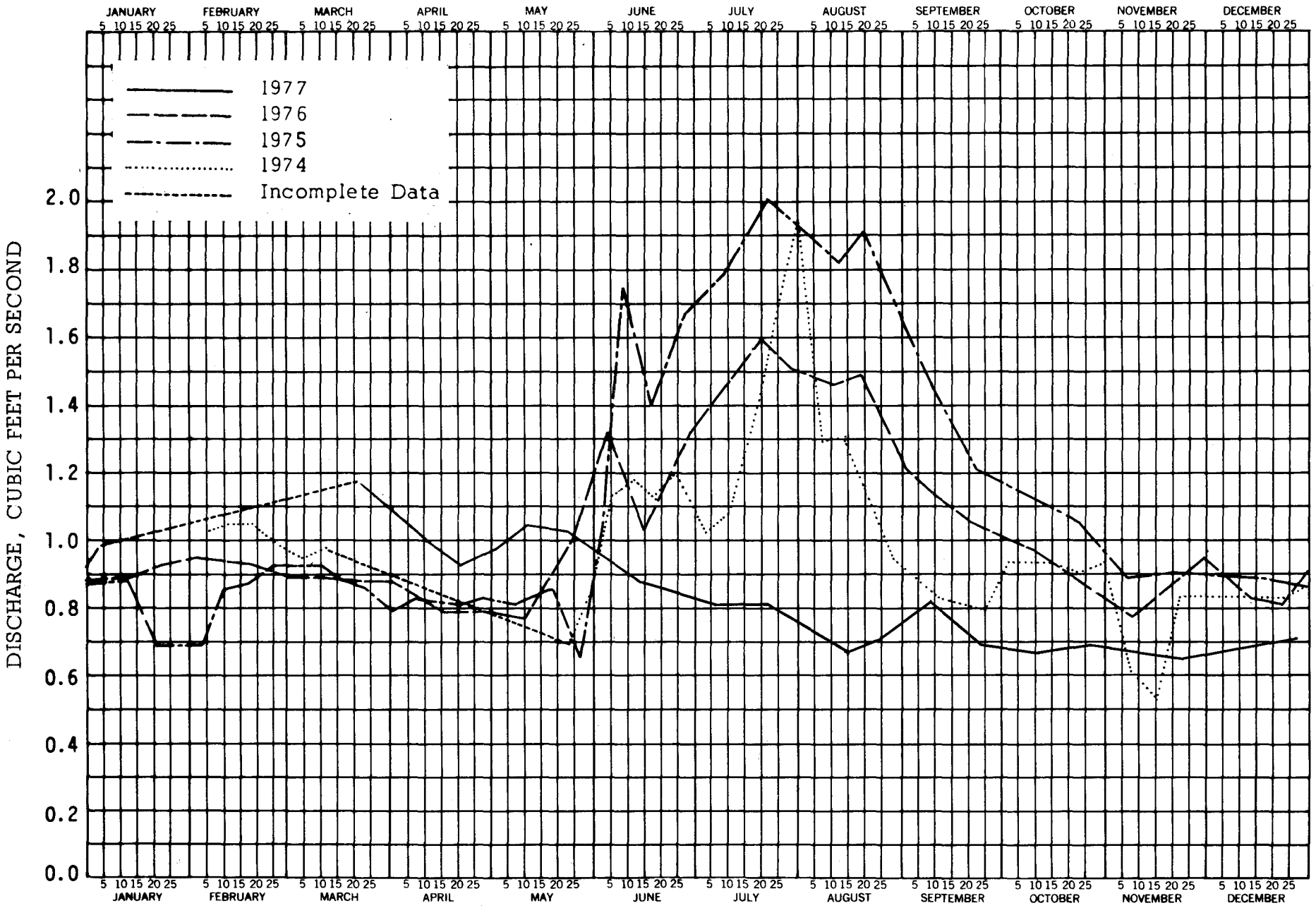


TABLE A-32 DISCHARGE AT F-2 (USGS STATION NO. 123) SPRING ON FAWN CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 50' 00", Longitude: 108° 20' 00"
SW1/4, NW1/4, Sec. 31, T2S, R97W, Rio Blanco County

1974											
	JULY	3 - 1.02	AUG	7 - 1.28	SEPT	4 - 0.89	OCT	2 - 0.92	NOV	7 - 0.61	DEC 4 - 0.82
		10 - 1.07		14 - 1.31		11 - 0.82		7 - 0.92		15 - 0.52	10 - 0.82
		17 - 1.31		21 - 1.10		19 - 0.80		15 - 0.92		22 - 0.82	17 - 0.82
		31 - 1.93		28 - 0.94		25 - 0.78		23 - 0.89		27 - 0.82	23 - 0.82
								30 - 0.92			30 - 0.87
1975											
	JAN	6 - 0.87	FEB	4 - 0.69	MAR	4 - 0.92	APR	1 - 0.78	MAY	7 - 0.80	JUN 2 - 1.10
		13 - 0.87		11 - 0.85		11 - 0.92		8 - 0.82		19 - 0.85	9 - 1.74
		21 - 0.69		18 - 0.87		17 - 0.87		15 - 0.80		27 - 0.63	17 - 1.39
		28 - 0.69		25 - 0.92		24 - 0.85		22 - 0.80			27 - 1.68
								29 - 0.82			
	JULY	9 - 1.77	AUG	12 - 1.81	SEPT	9 - 1.45	OCT	8 - 1.12	NOV	6 - 0.87	DEC 19 - 0.87
		22 - 2.03		20 - 1.90		22 - 1.20		23 - 1.04		18 - 0.89	31 - 0.85
				27 - 1.74						28 - 0.89	
1976											
	JAN	13 - 0.89	FEB	3 - 0.94	MAR	1 - 0.89	APR	1 - 0.87	MAY	11 - 0.76	JUN 4 - 1.31
		23 - 0.92		18 - 0.92		9 - 0.89		16 - 0.78		25 - 0.99	15 - 1.02
						19 - 0.87		30 - 0.78			29 - 1.31
	JULY	20 - 1.59	AUG	10 - 1.45	SEPT	2 - 1.20	OCT	8 - 0.97	NOV	8 - 0.76	DEC 13 - 0.82
		29 - 1.50		19 - 1.48		10 - 1.12				29 - 0.94	22 - 0.80
						21 - 1.04					
1977											
	JAN	4 - 0.97	FEB	- W	MAR	7 - W	APR	11 - 0.99	MAY	2 - 0.97	JUN 14 - 0.87
		13 - W				21 - 1.17		21 - 0.92		11 - 1.04	
		26 - W				30 - 1.10				23 - 1.02	
	JULY	6 - 0.82	AUG	15 - 0.67	SEPT	8 - 0.82	OCT	11 - 0.67	NOV	23 - 0.65	DEC 27 - 0.71
		21 - 0.82		25 - 0.71		23 - 0.69		26 - 0.69			

W - Washed Out

FIGURE A-33

F-3 (USGS STATION NO. 124)

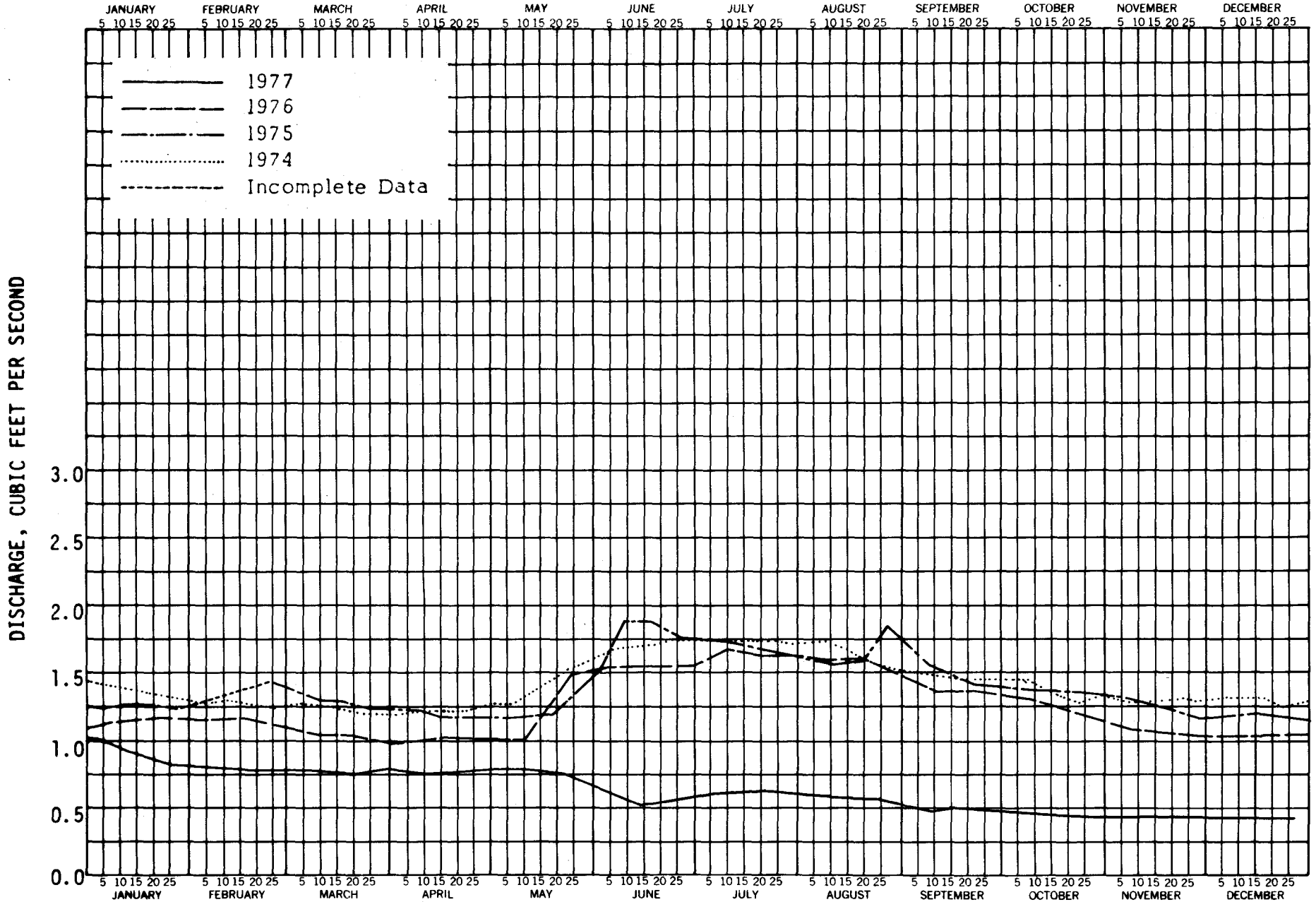


TABLE A-33 DISCHARGE AT F-3 (USGS STATION NO. 124), SPRING ON FAWN CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 46' 27", Longitude: 108° 22' 43"
NW1/4, SE1/4, Sec. 22, T3S, R98W, Rio Blanco County

1974												
JULY	3 - 1.74	AUG	8 - 1.71	SEPT	4 - 1.50	OCT	2 - 1.45	NOV	7 - 1.28	DEC	4 - 1.31
	10 - 1.74		14 - 1.68		11 - 1.48		7 - 1.45		15 - 1.28		10 - 1.31
	17 - 1.74		21 - 1.59		19 - 1.45		15 - 1.34		22 - 1.31		17 - 1.31
	31 - 1.71		28 - 1.53		25 - 1.45		23 - 1.28		27 - 1.28		23 - 1.23
							30 - 1.34				30 - 1.28
1975												
JAN	6 - 1.26	FEB	4 - N	MAR	4 - 1.34	APR	1 - 1.23	MAY	7 - 1.17	JUN	2 - 1.56
	13 - 1.28		11 - N		11 - 1.28		8 - 1.23		19 - 1.20		9 - 1.87
	21 - 1.28		18 - N		17 - 1.28		15 - 1.17		27 - 1.39		17 - 1.87
	28 - 1.26		25 - 1.45		24 - 1.26		22 - 1.17				27 - 1.77
							29 - 1.17				
JULY	9 - 1.74	AUG	12 - 1.56	SEPT	9 - 1.56	OCT	8 - 1.39	NOV	6 - 1.31	DEC	15 - 1.20
	22 - 1.68		20 - 1.59		22 - 1.45		23 - 1.34		18 - 1.23		19 - 1.17
			27 - 1.87						28 - 1.17		
1976												
JAN	2 - 1.12	FEB	3 - 1.15	MAR	1 - 1.10	APR	1 - 0.97	MAY	11 - 1.04	JUN	4 - 1.59
	13 - 1.15		18 - 1.15		9 - 1.04		16 - 1.04		25 - 1.53		15 - 1.56
	23 - 1.17				19 - 1.04		30 - 0.97				29 - 1.59
JULY	9 - 1.68	AUG	10 - 1.59	SEPT	2 - 1.45	OCT	8 - 1.31	NOV	8 - 1.07	DEC	13 - 1.02
	20 - 1.62		19 - 1.59		10 - 1.39				29 - 1.02		22 - 1.02
	29 - 1.62				21 - 1.39						
1977												
JAN	4 - 1.04	FEB	10 - 0.82	MAR	3 - 0.80	APR	11 - 0.76	MAY	2 - 0.80	JUN	14 - 0.65
	13 - 0.94		22 - 0.80		21 - 0.78		21 - 0.78		11 - 0.80		
	26 - 0.87				30 - 0.80				23 - 0.76		
JULY	6 - 0.65	AUG	10 - 0.58	SEPT	8 - 0.48	OCT	6 - 0.47	NOV	23 - 0.39	DEC	27 - 0.36
	21 - 0.67		25 - 0.54		15 - 0.50		26 - 0.41				

N - No Reading

FIGURE A-34

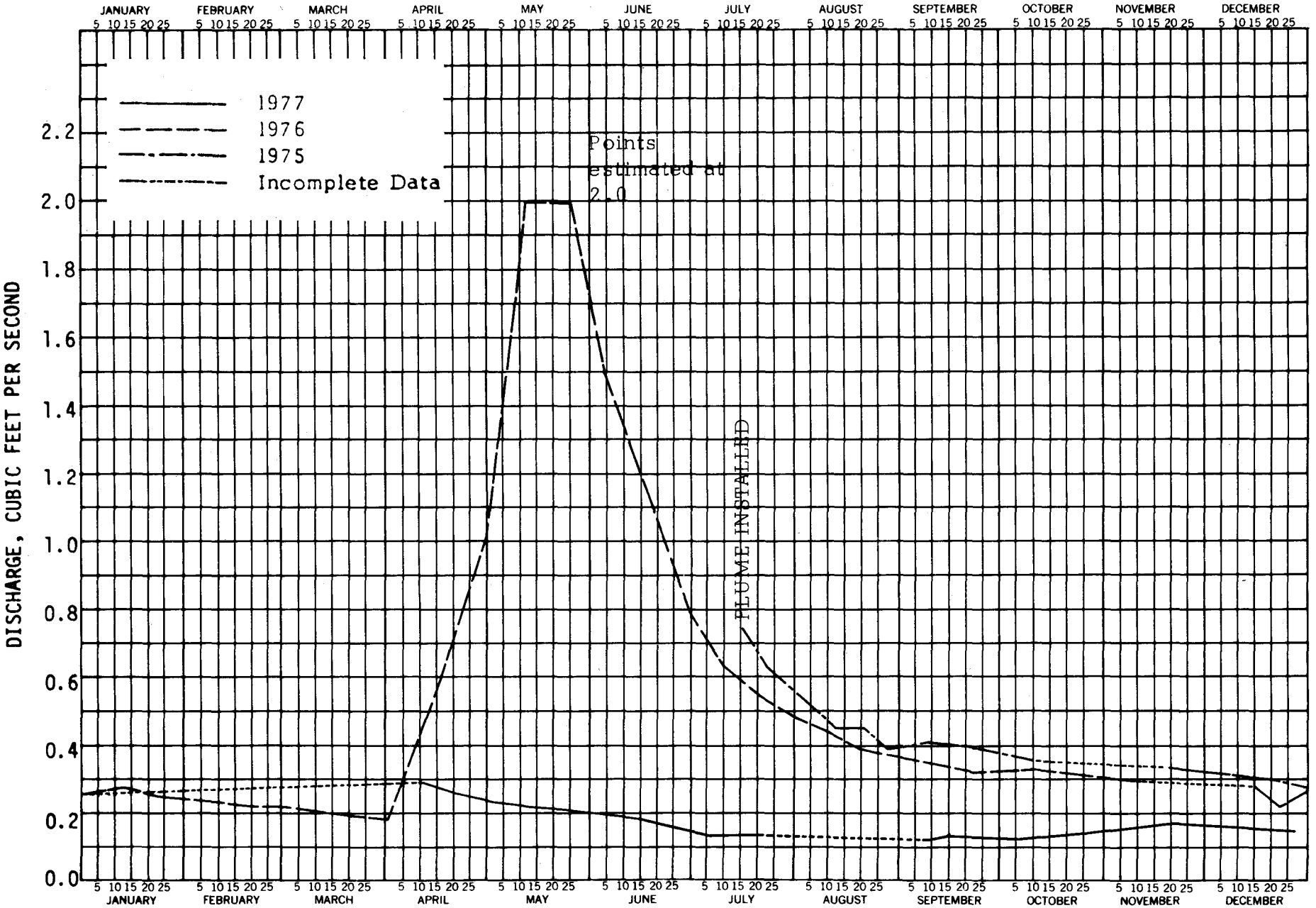

JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
Points estimated at 2.0
PLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2

TABLE A-34 DISCHARGE AT F-4, SPRING ON FAWN CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 43' 04", Longitude: 108° 24' 06"
SW1/4, NW1/4, Sec. 9, T4S, R98W, Rio Blanco County

1975											
	JULY	15 - 0.744	AUG	12 - 0.450	SEPT	9 - 0.404	OCT	8 - 0.350	NOV	6 - N	DEC 19 - 0.299
		22 - 0.636		20 - 0.450		22 - 0.393		23 - N		13 - 0.329	
				27 - 0.393							
1976											
	JAN	2 - 0.260	FEB	3 - 0.241	MAR	1 - 0.222	APR	1 - 0.187	MAY	11 - 2.00 (est.)	JUN 4 - 1.50 (est.)
		13 - 0.279		18 - 0.222		9 - 0.205		16 - 0.610		25 - 2.00 (est.)	15 - 1.21
		23 - 0.260						30 - 1.050			29 - 0.786
	JULY	9 - 0.623	AUG	10 - 0.438	SEPT	2 - 0.361	OCT	8 - 0.329	NOV	8 - 0.289	DEC 13 - 0.279
		20 - 0.546		19 - 0.393		10 - 0.339				29 - F	22 - 0.205
		29 - 0.485				21 - 0.309					
1977											
	JAN	- F	FEB	- F	MAR	- F	APR	11 - 0.289	MAY	2 - 0.231	JUN 14 - 0.179
								21 - 0.269		11 - 0.222	
										23 - 0.213	
	JULY	6 - 0.131	AUG	10 - N	SEPT	8 - 0.117	OCT	6 - 0.124	NOV	22 - 0.170	DEC 27 - 0.146
		21 - 0.131		25 - N		15 - 0.138		26 - 0.146			

N - No Reading
F - Frozen

F-5

FIGURE A-35

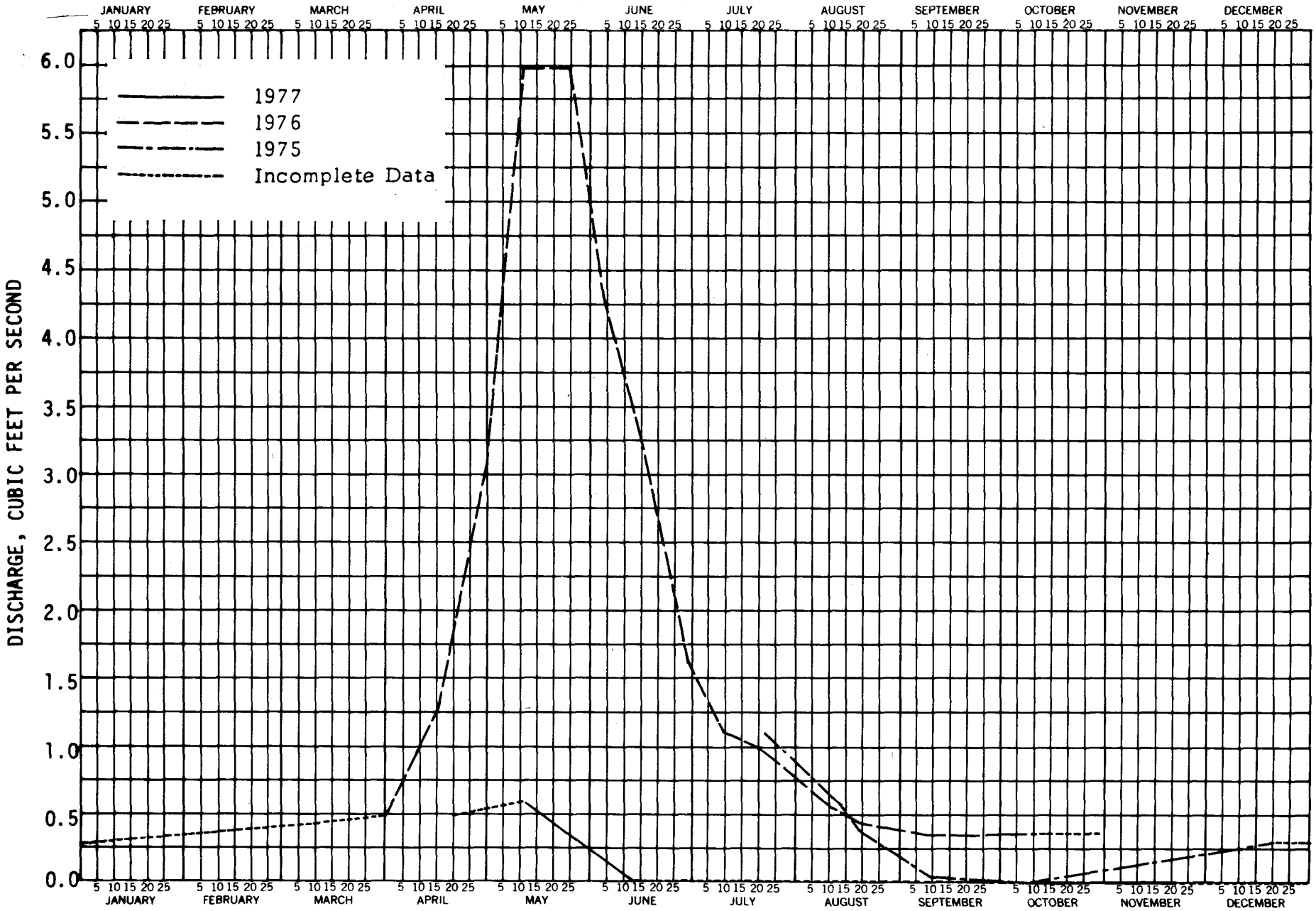


TABLE A-35 DISCHARGE AT F-5, SPRING ON FAWN CREEK
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 44' 52", Longitude: 108° 23' 57"
SE1/4, NW1/4, Sec. 33, T3S, R98W, Rio Blanco County

1975											
	JULY 22 - 1.13	AUG	12 - 0.62	SEPT	9 - 0.03	OCT	8 - D	NOV	18 - 0.17	DEC	19 - 0.30
			20 - 0.37								
			27 - 0.26								
1976											
	JAN - F	FEB	- F	MAR	- F	APR	1 - 0.51	MAY	11 - 6.00 (est.)	JUN	4 - 4.32
							16 - 1.30		25 - 6.00 (est.)		15 - 3.26
							30 - 3.07				29 - 1.63
	JULY 9 - 1.13	AUG	10 - 0.59	SEPT	2 - 0.39	OCT	8 - 0.35	NOV	29 - F	DEC	- F
	20 - 1.00		19 - 0.44		10 - 0.32						
	29 - 0.84				21 - 0.32						
1977											
	JAN - F	FEB	- F	MAR	- F	APR	- F	MAY	11 - 0.60	JUN	14 - D
	JULY 6 - D	AUG	10 - D	SEPT	8 - D	OCT	11 - 0.0	NOV	22 - D	DEC	27 - D
	21 - D		25 - D				26 - 0.0				

N - No Reading
F - Frozen
D - Dry

H-1

FIGURE A-36

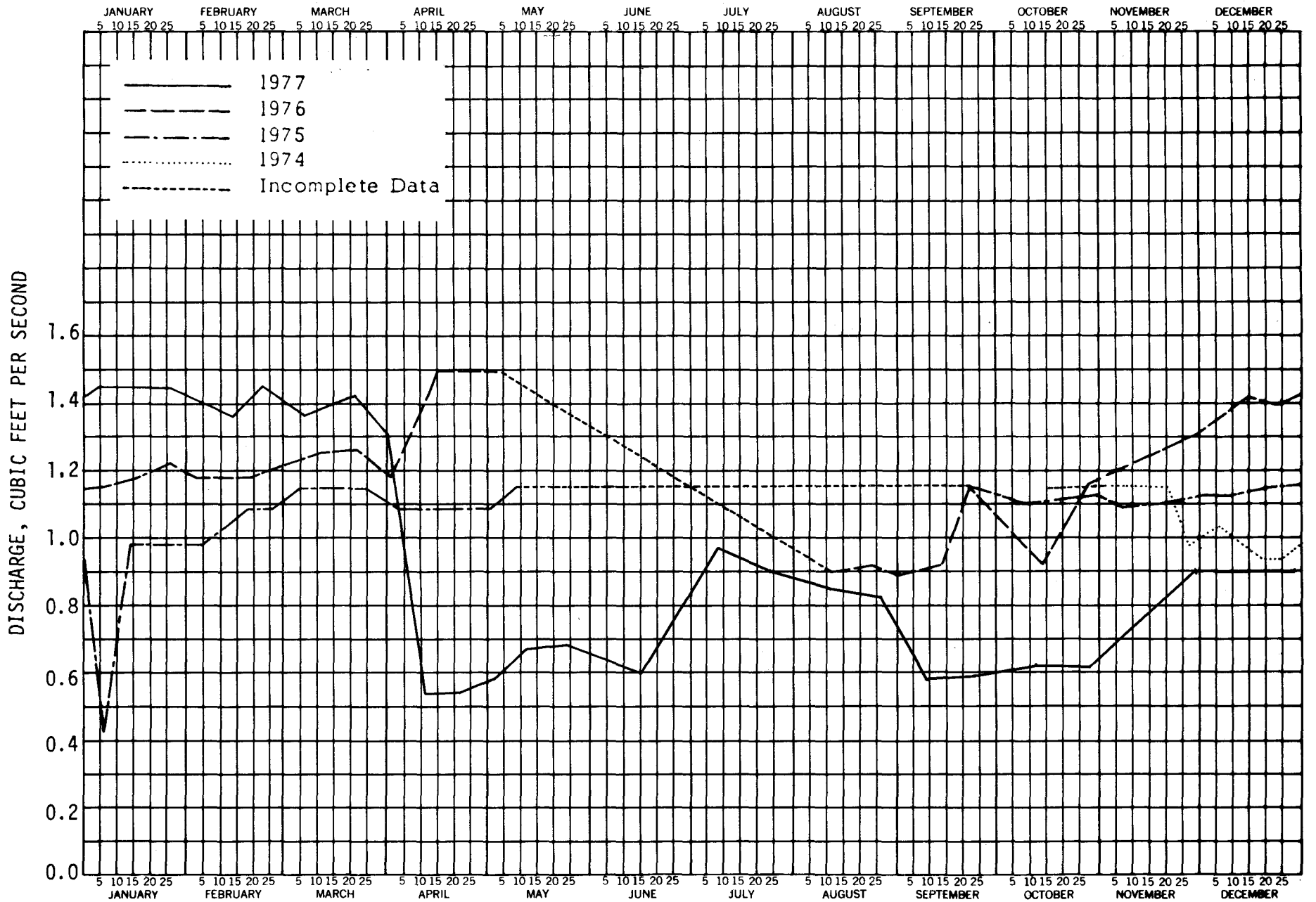


TABLE A-36 DISCHARGE AT H-1 AND H1-A (USGS STATIONS 126 AND 130), SPRINGS ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

24" Rectangular Flume H1-A
6" Parshall Flume H-1
Period of Record: March 1968 to current year
Latitude: 39° 51' 02", Longitude: 108° 15' 50"
NE1/4, SW1/4, Sec. 27, T2S, R97W, Rio Blanco County

1974												
APR	- N	MAY	15 - 0.74 (a)	JUN	3 - 0.70 (a)	JULY	3 - 0.65 (a)	AUG	7 - 0.85 (a)	SEPT	4 - 0.75 (a)	
			24 - 0.72 (a)		11 - 0.70 (a)		10 - 0.64 (a)		14 - 0.85 (a)		11 - 0.92 (a)	
			29 - 0.70 (a)		19 - 0.66 (a)		17 - 0.68 (a)		22 - 0.95 (a)		20 - 0.92 (a)	
					28 - 0.65 (a)		31 - 0.80 (a)		30 - 0.75 (a)		24 - 0.92 (a)	
OCT	1 - 0.92 (a)	NOV	2 - 1.15	DEC	5 - 1.03							
	8 - 0.93 (a)		6 - 1.15		11 - 0.98							
	16 - 0.95 (a)		13 - 1.15		18 - 0.93							
	24 - 0.96 (a)		20 - 1.15		24 - 0.93							
			26 - 0.98		31 - 0.98							
1975												
JAN	7 - 0.93	FEB	5 - 0.98	MAR	5 - 1.15	APR	3 - 1.09	MAY	1 - 1.09	JUN	4 - 0.60 (a)	
	14 - 0.98		12 - 1.03		12 - 1.15		10 - 1.09		9 - 1.15		10 - 0.57 (a)	
	22 - 0.98		19 - 1.09		18 - 1.15		18 - 1.09		21 - 0.60 (a)		18 - 0.58 (a)	
	29 - 0.98		26 - 1.09		25 - 1.15		25 - 1.09		29 - 0.60 (a)		27 - 0.54 (a)	
JULY	11 - 0.72 (a)	AUG	13 - 0.92 (a)	SEPT	9 - 0.98 (a)	OCT	9 - 1.10	NOV	7 - 1.09	DEC	1 - 1.12	
	22 - 0.80 (a)		22 - 0.99 (a)		22 - 1.15		29 - 1.13		13 - 1.10		8 - 1.12	
			28 - 0.98 (a)								22 - 1.15	
1976												
JAN	6 - 1.15	FEB	4 - 1.18	MAR	2 - 1.22	APR	2 - 1.18	MAY	3 - 1.50	JUN	7 - 0.59 (a)	
	15 - 1.18		19 - 1.18		11 - 1.25		15 - 1.50		12 - 0.64 (a)		16 - 0.59 (a)	
	26 - 1.22				22 - 1.26				26 - 0.65 (a)		30 - 0.59 (a)	
JULY	12 - 0.60 (a)	AUG	11 - 0.90	SEPT	13 - 0.92	OCT	13 - 0.92	NOV	30 - 1.31	DEC	14 - 1.42	
	21 - 0.82 (a)		23 - 0.92		22 - 1.15		26 - 1.15				23 - 1.39	
	30 - 0.83 (a)		31 - 0.89									
1977												
JAN	5 - 1.45	FEB	14 - 1.36	MAR	7 - 1.36	APR	12 - 0.53	MAY	3 - 0.58	JUN	15 - 0.60	
	18 - 1.45		23 - 1.45		22 - 1.42		22 - 0.53		12 - 0.67			
	27 - 1.45				31 - 1.31				24 - 0.68			
JULY	8 - 0.97	AUG	11 - 0.85	SEPT	9 - 0.58	OCT	12 - 0.62	NOV	29 - 0.90	DEC	28 - 0.90	
	24 - 0.90		26 - 0.82		23 - 0.59		28 - 0.61					

a - Flowing through H1-A with measurement in inches from top of pipe to water surface - no discharge available
N - No Reading

FIGURE A-37

H-2 (USGS STATION NO. 127)

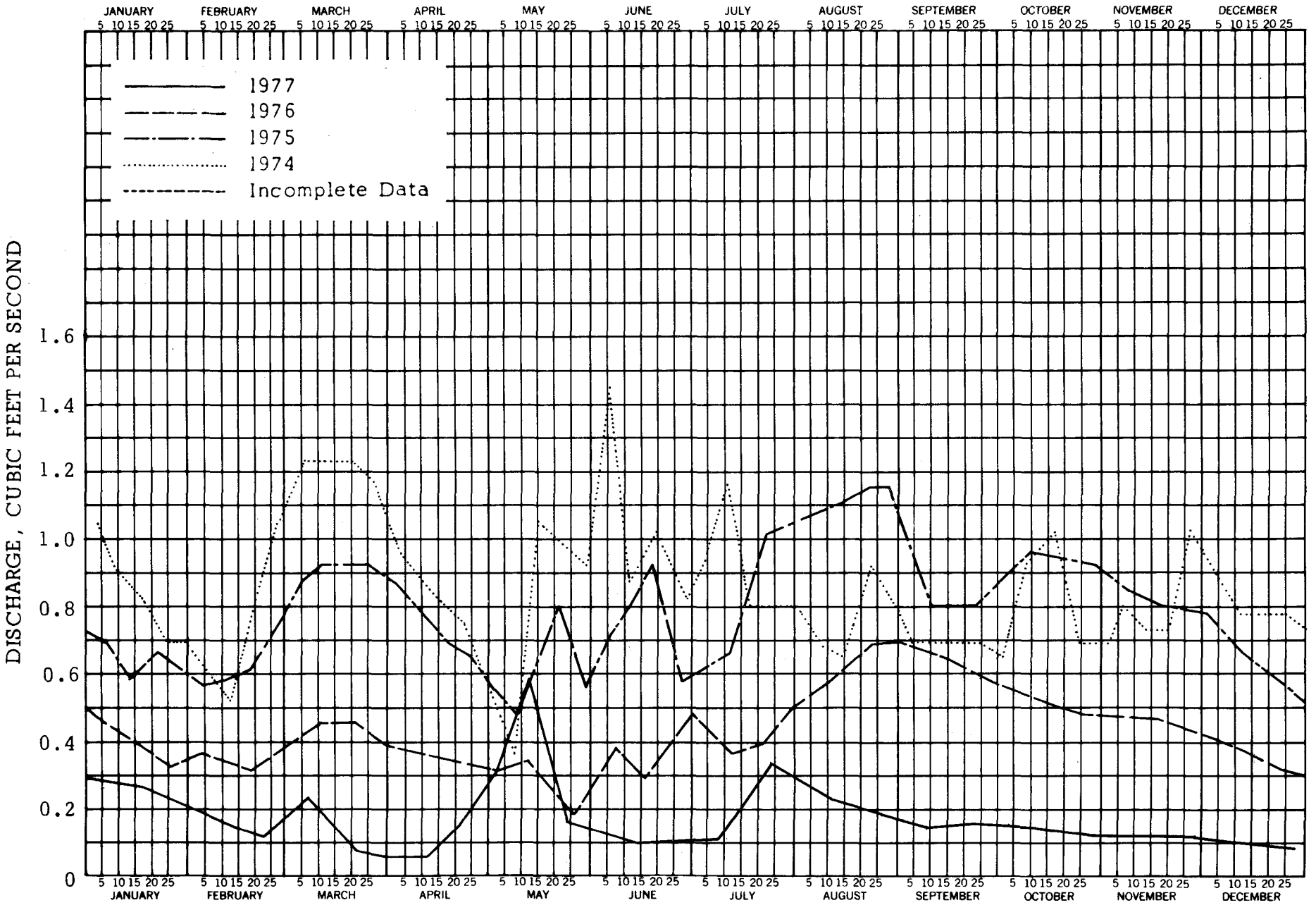


TABLE A-37 DISCHARGE AT H-2 (USGS STATION NO. 127), SPRING ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 48' 15", Longitude: 108° 17' 32"
SW1/4, NW1/4, Sec. 9, T3S, R97W, Rio Blanco County

1974						
JULY 3 - 0.92	AUG 7 - 0.69	SEPT 4 - 0.69	OCT 1 - 0.65	NOV 2 - 0.69	DEC 11 - 0.78
10 - 1.17	14 - 0.65	11 - 0.69	8 - 0.92	6 - 0.80	18 - 0.78
17 - 0.80	22 - 0.92	20 - 0.69	16 - 1.02	13 - 0.73	24 - 0.78
31 - 0.80	30 - 0.80	24 - 0.69	24 - 0.69	20 - 0.73	31 - 0.73
				26 - 1.02	
1975					
JAN 7 - 0.69	FEB 5 - 0.56	MAR 5 - 0.87	APR 3 - 0.87	MAY 1 - 0.56	JUN 4 - 0.69
14 - 0.58	12 - 0.58	11 - 0.92	10 - 0.78	9 - 0.48	10 - 0.78
22 - 0.67	19 - 0.61	18 - 0.92	18 - 0.69	21 - 0.80	18 - 0.92
29 - 0.61	26 - 0.73	25 - 0.92	25 - 0.65	29 - 0.56	27 - 0.58
JULY 11 - 0.65	AUG 13 - 1.10	SEPT 9 - 0.80	OCT 9 - 0.97	NOV 7 - 0.85	DEC 1 - 0.78
22 - 1.04	22 - 1.15	22 - 0.80	29 - 0.92	18 - 0.80	12 - 0.65
	28 - 1.15				22 - 0.58
1976					
JAN 6 - 0.45	FEB 4 - 0.36	MAR 2 - 0.39	APR 2 - 0.38	MAY 3 - 0.31	JUN 7 - 0.39
15 - 0.39	19 - 0.31	11 - 0.45	19 - 0.34	12 - 0.34	16 - 0.29
26 - 0.32		22 - 0.45		26 - 0.18	30 - 0.48
JULY 12 - 0.36	AUG 11 - 0.58	SEPT 13 - 0.65	OCT 13 - 0.52	NOV 16 - 0.47	DEC 14 - 0.36
21 - 0.39	23 - 0.69	22 - 0.58	26 - 0.48		23 - 0.32
30 - 0.50	31 - 0.69				
1977					
JAN 5 - 0.28	FEB 14 - 0.14	MAR 7 - 0.23	APR 12 - 0.05	MAY 3 - 0.31	JUN 15 - 0.09
18 - 0.26	23 - 0.11	22 - 0.07	22 - 0.15	12 - 0.58	
27 - 0.22		31 - 0.05		24 - 0.16	
JULY 8 - 0.11	AUG 11 - 0.23	SEPT 9 - 0.14	OCT 12 - 0.14	NOV 29 - 0.12	DEC 28 - 0.09
24 - 0.34	26 - 0.19	23 - 0.16	28 - 0.12		

FIGURE A-38

H-3 (USGS STATION NO. 128)

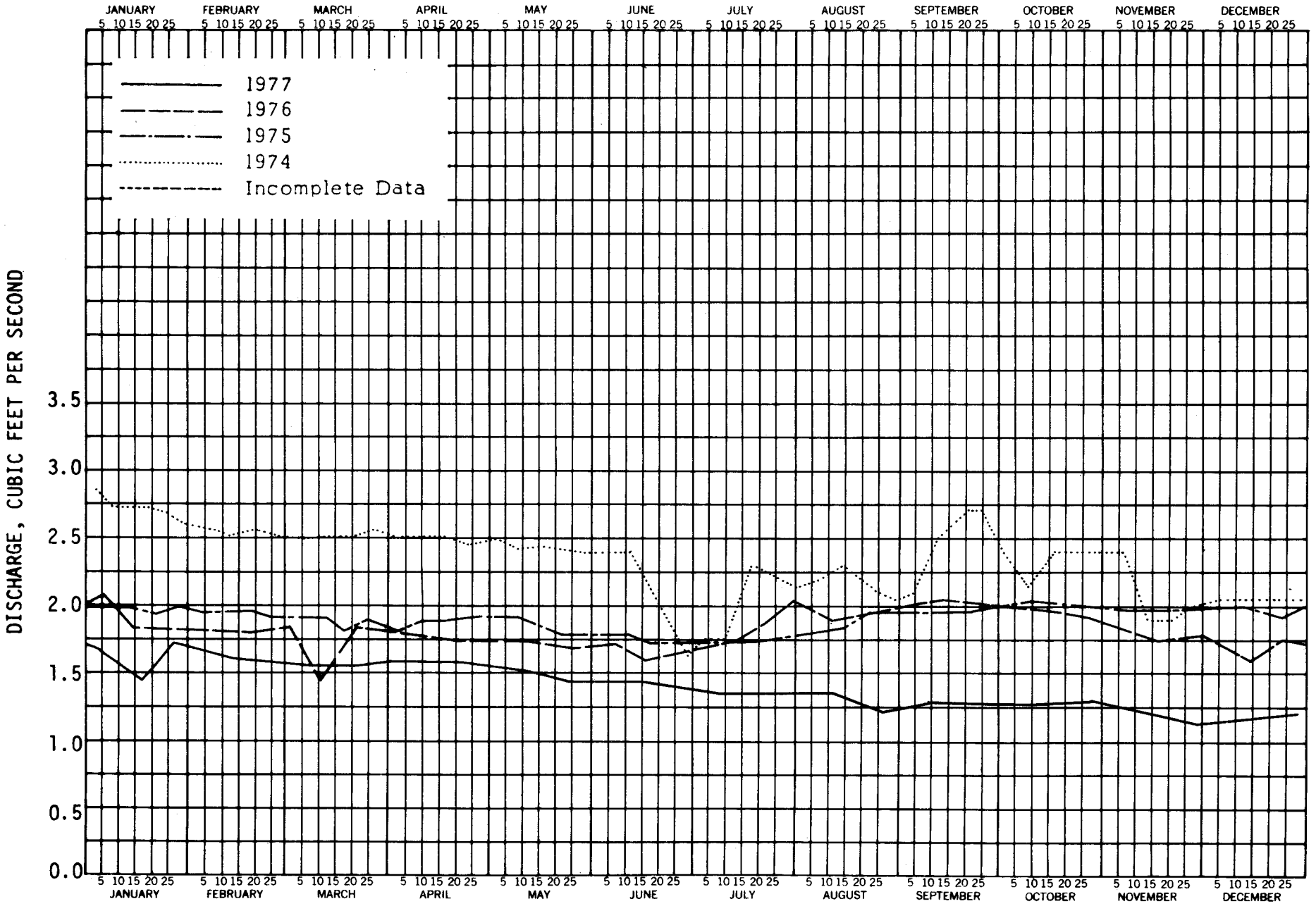


TABLE A-38 DISCHARGE AT H-3 (USGS STATION NO. 128), SPRING ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 47' 22", Longitude: 108° 17' 57"
NW1/4, SE1/4, Sec. 17, T3S, R97W, Rio Blanco County

1974											
	JULY	3 - 1.74	AUG	7 - 2.22	SEPT	4 - 2.22	OCT	1 - 2.40	NOV	2 - 2.40	DEC 5 - 2.06
		10 - 1.74		14 - 2.32		11 - 2.50		8 - 2.16		6 - 2.40	11 - 2.06
		17 - 2.32		22 - 2.16		20 - 2.71		16 - 2.40		13 - 1.90	18 - 2.06
		31 - 2.16		30 - 2.06		24 - 2.71		24 - 2.40		20 - 1.90	24 - 2.06
										26 - 2.00	31 - 2.06
1975											
	JAN	7 - 2.00	FEB	5 - 1.97	MAR	5 - 1.93	APR	3 - 1.81	MAY	1 - 1.93	JUN 4 - 1.81
		14 - 2.00		12 - 1.97		12 - 1.93		10 - 1.87		9 - 1.93	10 - 1.81
		22 - 1.97		19 - 1.97		18 - 1.81		18 - 1.90		21 - 1.81	18 - 1.74
		29 - 2.00		26 - 1.93		25 - 1.90		25 - 1.93		29 - 1.81	27 - 1.74
	JULY	11 - 1.77	AUG	13 - 1.87	SEPT	9 - 1.97	OCT	9 - 2.06	NOV	7 - 1.97	DEC 1 - 2.00
		22 - 1.77		22 - 1.97		22 - 1.97		29 - 2.03		18 - 1.97	12 - 2.00
				28 - 1.97							22 - 1.93
1976											
	JAN	6 - 2.09	FEB	4 - 1.84	MAR	2 - 1.84	APR	2 - 1.81	MAY	3 - 1.74	JUN 7 - 1.74
		15 - 1.84		19 - 1.81		11 - 1.45		19 - 1.77		12 - 1.74	16 - 1.59
		26 - 1.84				22 - 1.84				26 - 1.68	30 - 1.68
	JULY	12 - 1.74	AUG	11 - 1.87	SEPT	13 - 2.06	OCT	13 - 1.97	NOV	16 - 1.74	DEC 14 - 1.62
		21 - 1.87		23 - 1.97		22 - 2.03		26 - 1.93		30 - 1.81	23 - 1.74
		30 - 2.06		31 - 2.00							
1977											
	JAN	5 - 1.68	FEB	14 - 1.62	MAR	7 - 1.56	APR	12 - 1.59	MAY	3 - 1.56	JUN 15 - 1.45
		18 - 1.45		23 - 1.59		22 - 1.56		22 - 1.59		12 - 1.53	
		27 - 1.74				31 - 1.59				24 - 1.45	
	JULY	8 - 1.34	AUG	11 - 1.34	SEPT	9 - 1.28	OCT	12 - 1.26	NOV	29 - 1.17	DEC 28 - 1.23
		24 - 1.34		26 - 1.23		23 - 1.26		28 - 1.28			

FIGURE A-39

H-4 (USGS STATION NO. 129)

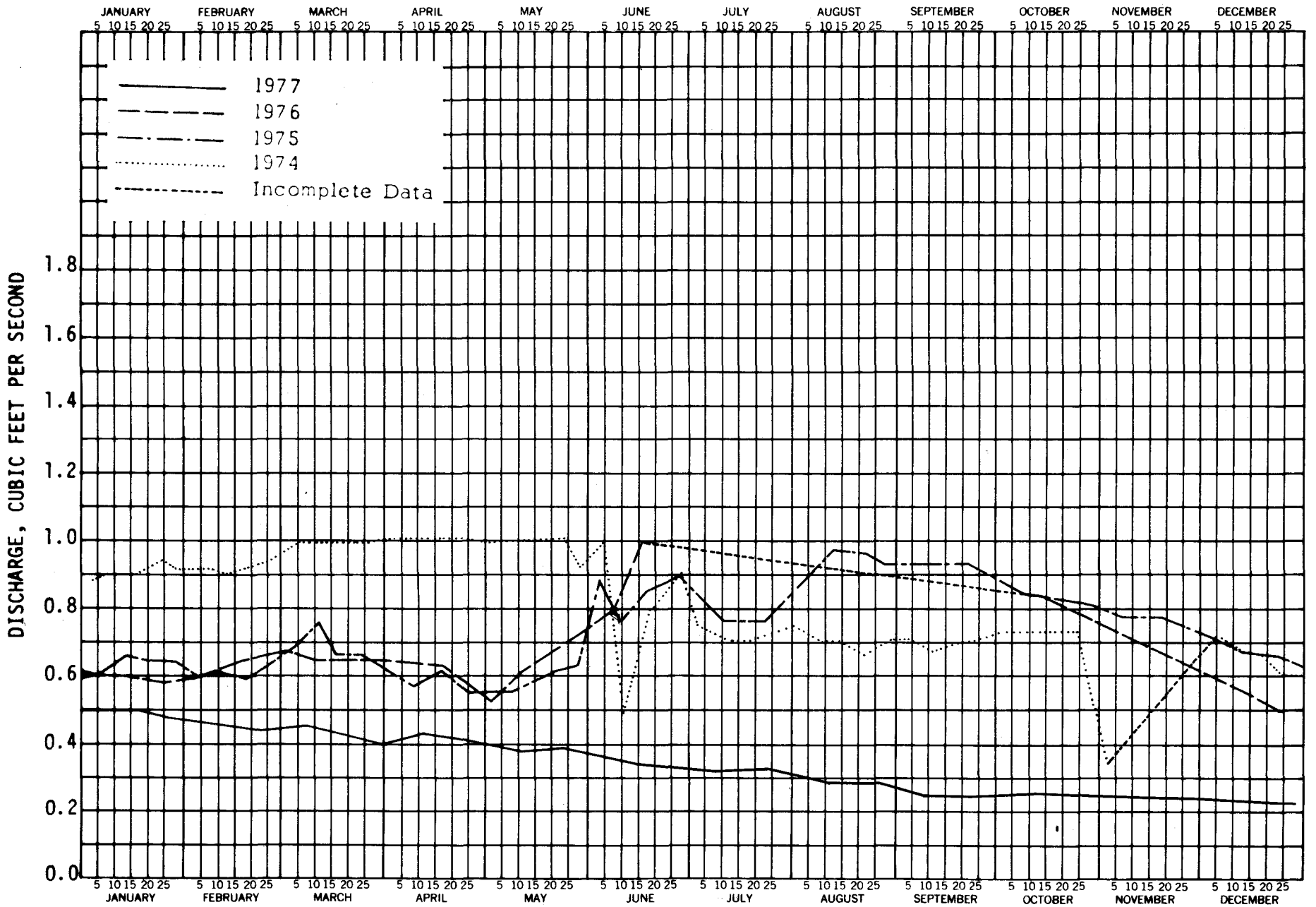


TABLE A-39 DISCHARGE AT H-4 (USGS STATION NO. 129), SPRING ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 45' 50", Longitude: 108° 18' 55"
SW1/4, NE1/4, Sec. 30, T3S, R97W, Rio Blanco County

1974												
	JULY	3 - 0.757	AUG	7 - 0.702	SEPT	4 - 0.702	OCT	1 - 0.73	NOV	2 - 0.339	DEC	5 - 0.702
		10 - 0.716		14 - 0.702		11 - 0.675		8 - 0.73		6 - N		11 - 0.675
		17 - 0.702		22 - 0.662		20 - 0.702		16 - 0.73		13 - N		18 - 0.649
		31 - 0.757		30 - 0.702		24 - 0.702		24 - 0.73		20 - N		24 - 0.610
										26 - N		31 - 0.610
1975												
	JAN	7 - 0.610	FEB	5 - 0.597	MAR	5 - 0.675	APR	3 - 0.597	MAY	1 - 0.546	JUN	4 - 0.872
		14 - 0.649		12 - 0.610		12 - 0.757		10 - 0.571		9 - 0.558		10 - 0.757
		22 - 0.636		19 - 0.597		18 - 0.662		18 - 0.610		21 - 0.610		18 - 0.843
		29 - 0.636		26 - 0.623		25 - 0.662		25 - 0.546		29 - 0.636		27 - 0.887
	JULY	11 - 0.757	AUG	13 - 0.977	SEPT	9 - 0.931	OCT	9 - 0.843	NOV	7 - 0.771	DEC	1 - 0.730
		23 - 0.757		22 - 0.961		22 - 0.931		29 - 0.814		18 - 0.771		12 - 0.675
				28 - 0.931								22 - 0.662
1976												
	JAN	6 - 0.597	FEB	4 - 0.584	MAR	2 - 0.675	APR	2 - 0.636	MAY	3 - 0.522	JUN	7 - 0.786
		15 - 0.597		19 - 0.649		11 - 0.636		19 - 0.623		12 - 0.610		16 - 0.992
		26 - 0.571				22 - 0.636				26 - 0.702		30 - N
	JULY	12 - RO	AUG	11 - RO	SEPT	13 - RO	OCT	12 - 0.843	NOV	16 - 0.675	DEC	14 - 0.546
		21 - RO		23 - RO		22 - RO				30 - 0.610		23 - 0.497
		30 - RO		31 - RO								
1977												
	JAN	5 - 0.497	FEB	14 - 0.450	MAR	7 - 0.450	APR	12 - 0.427	MAY	3 - 0.393	JUN	15 - 0.339
		18 - 0.497		23 - 0.438		22 - 0.415		22 - 0.415		12 - 0.371		
		27 - 0.474				31 - 0.393				24 - 0.382		
	JULY	8 - 0.319	AUG	11 - 0.289	SEPT	9 - 0.250	OCT	12 - 0.260	NOV	29 - 0.241	DEC	28 - 0.222
		24 - 0.329		26 - 0.279		23 - 0.250		28 - 0.250				

N - No Reading
RO - Flume Running Over

FIGURE A-40

H-5

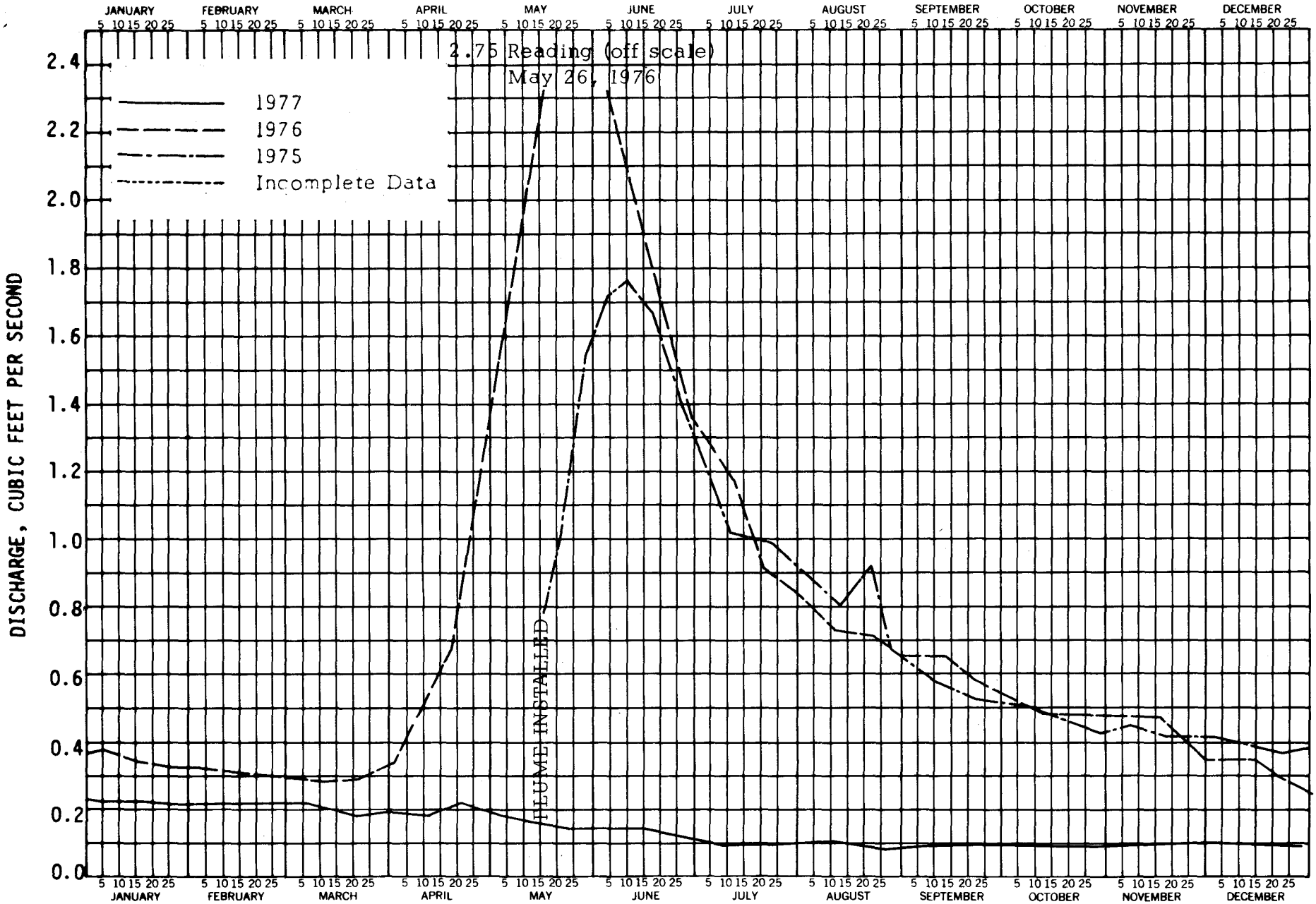


TABLE A-40 DISCHARGE AT H-5, SPRING ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 42' 02", Longitude: 108° 21' 35"
NE1/4, SW1/4, Sec. 14, T4S, R98W, Rio Blanco County

1975											
MAY	16 - 0.78	JUN	4 - 1.71	JULY	11 - 1.17	AUG	13 - 0.80	SEPT	9 - 0.58	OCT	8 - 0.50
	21 - 1.04		11 - 1.77		23 - 0.99		22 - 0.92		22 - 0.52		29 - 0.42
	29 - 1.56		18 - 1.68				28 - 0.67				
			27 - 1.39								
NOV	7 - 0.45	DEC	2 - 0.41								
	18 - 0.41		22 - 0.36								
1976											
JAN	6 - 0.38	FEB	4 - 0.32	MAR	11 - 0.28	APR	2 - 0.34	MAY	3 - 1.45	JUN	7 - 2.22
	15 - 0.34		19 - 0.31		22 - 0.29		19 - 0.69		12 - 2.06		16 - 1.84
	26 - 0.32								26 - 2.75		30 - 1.36
JULY	12 - 1.17	AUG	11 - 0.73	SEPT	13 - 0.65	OCT	12 - 0.48	NOV	16 - 0.47	DEC	14 - 0.34
	21 - 0.92		23 - 0.71		22 - 0.58				30 - 0.34		23 - 0.28
	30 - 0.85		31 - 0.65								
1977											
JAN	5 - 0.23	FEB	14 - 0.22	MAR	7 - 0.22	APR	12 - 0.18	MAY	3 - 0.18	JUN	15 - 0.14
	18 - 0.23		23 - 0.22		22 - 0.18		22 - 0.22		12 - 0.16		
	27 - 0.22				31 - 0.19				24 - 0.14		
JULY	8 - 0.09	AUG	11 - 0.10	SEPT	9 - 0.09	OCT	12 - 0.09	NOV	29 - 0.10	DEC	28 - 0.09
	24 - 0.09		26 - 0.08		23 - 0.09		28 - 0.09				

FIGURE A-41

H-6

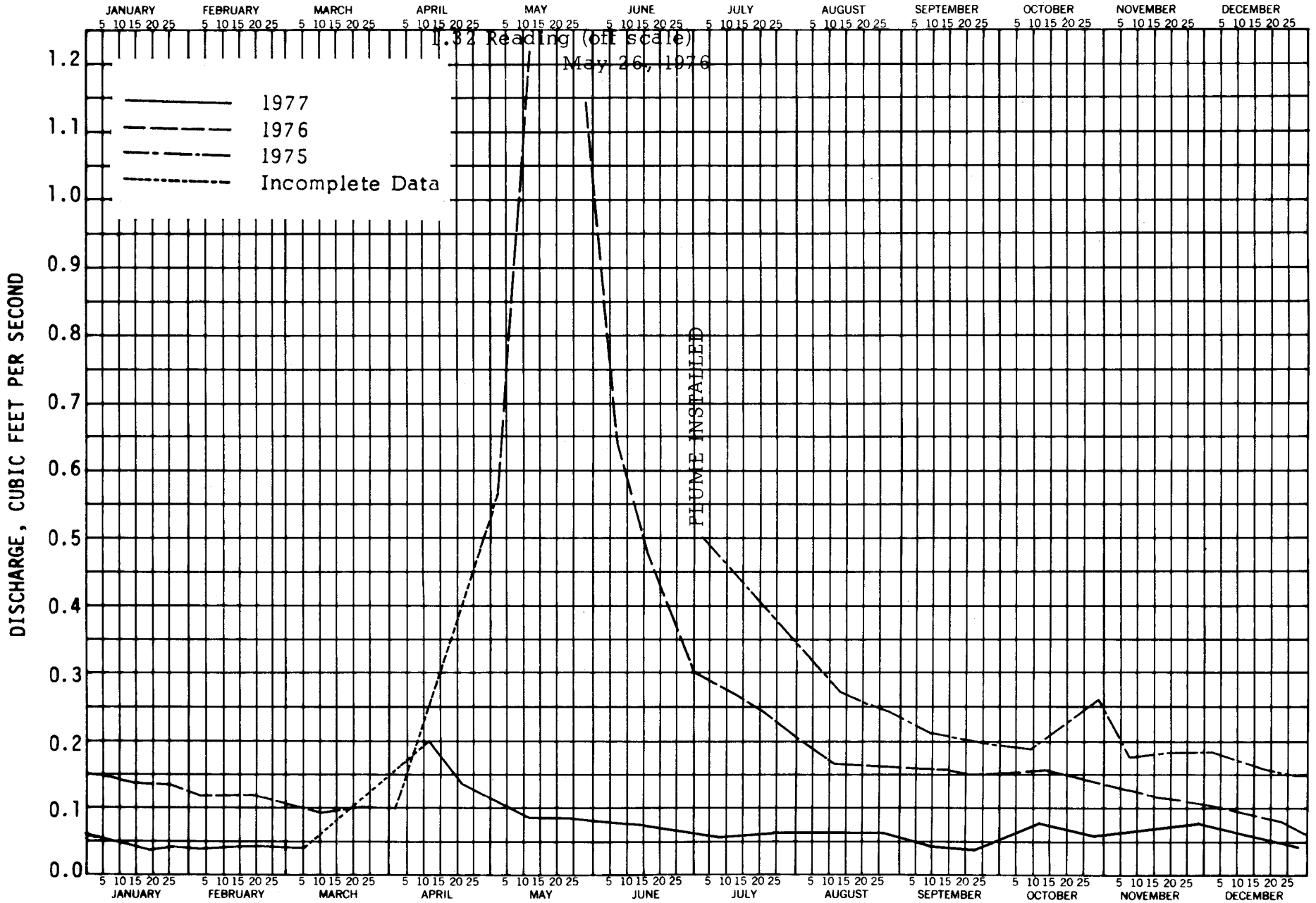


TABLE A-41 DISCHARGE AT H-6, SPRING ON HUNTER CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 41' 08", Longitude: 108° 21' 13"
NW1/4, SE1/4, Sec. 23, T4S, R98W, Garfield County

1975											
	JULY	8 - 0.497	AUG	13 - 0.269	SEPT	9 - 0.213	OCT	9 - 0.187	NOV	7 - 0.170	DEC 2 - 0.179
		23 - 0.382		22 - 0.250		26 - 0.196		29 - 0.260		18 - 0.179	17 - 0.154
				28 - 0.241							22 - 0.146
1976											
	JAN	6 - 0.146	FEB	4 - 0.117	MAR	11 - 0.082	APR	2 - 0.095	MAY	3 - 0.571	JUN 7 - 0.636
		15 - 0.131		19 - 0.117		22 - 0.095		19 - N		12 - 1.22	16 - 0.474
		26 - 0.131								26 - 1.32	30 - 0.299
	JULY	12 - 0.269	AUG	11 - 0.162	SEPT	13 - 0.154	OCT	13 - 0.154	NOV	16 - 0.109	DEC 14 - 0.82
		21 - 0.241		23 - 0.162		22 - 0.146				30 - 0.102	23 - 0.76
		30 - 0.205		31 - 0.154							
1977											
	JAN	5 - 0.053	FEB	14 - 0.037	MAR	7 - 0.037	APR	12 - 0.196	MAY	3 - 0.102	JUN 15 - 0.070
		18 - 0.037		23 - 0.037		22 - N		22 - 0.131		12 - 0.082	
		27 - 0.042				31 - N				24 - 0.082	
	JULY	8 - 0.053	AUG	11 - 0.064	SEPT	9 - 0.047	OCT	12 - 0.076	NOV	29 - 0.076	DEC 28 - 0.047
		24 - 0.064		26 - 0.064		23 - 0.037		28 - 0.053			

N - No Reading

FIGURE A-42

W-1

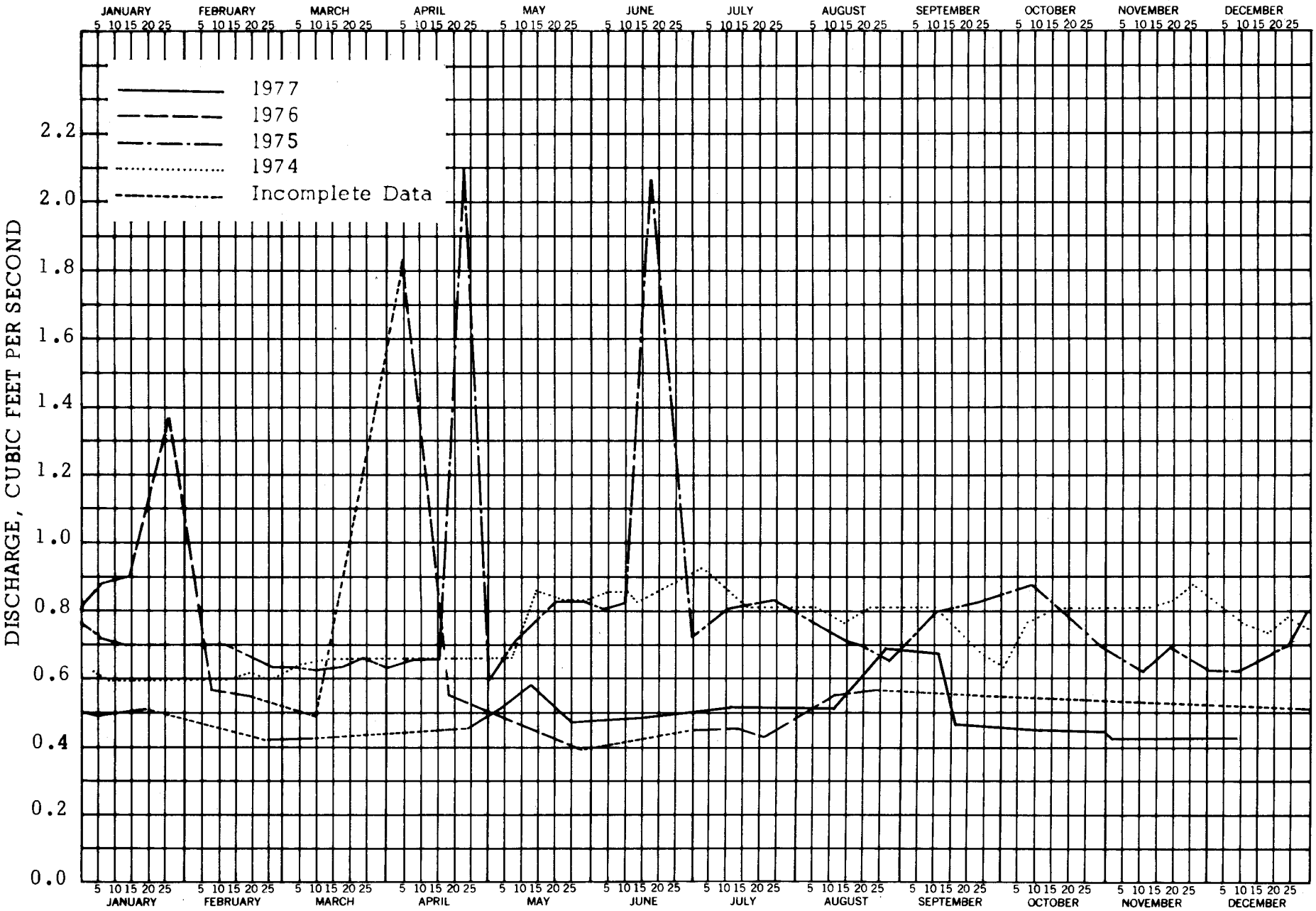


TABLE A-42 DISCHARGE AT W-1 (USGS STATION NO. 131), SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 50' 20", Longitude: 108° 14' 35"
SW1/4, SE1/4, Sec. 26, T2S, R97W, Rio Blanco County

1974												
	JULY	3 - 0.92	AUG	7 - 0.80	SEPT	4 - 0.80	OCT	1 - 0.63	NOV	2 - 0.80	DEC	5 - 0.80
		10 - 0.87		14 - 0.76		11 - 0.80		8 - 0.76		6 - 0.80		11 - 0.76
		17 - 0.80		22 - 0.80		20 - 0.71		16 - 0.80		13 - 0.80		18 - 0.73
		31 - 0.80		30 - 0.80		24 - 0.67		24 - 0.80		20 - 0.82		24 - 0.78
										26 - 0.87		31 - 0.73
1975												
	JAN	7 - 0.71	FEB	5 - 0.69	MAR	5 - 0.63	APR	2 - 0.63	MAY	1 - 0.58	JUN	4 - 0.80
		14 - 0.69		12 - 0.69		12 - 0.61		9 - 0.65		8 - 0.69		10 - 0.82
		22 - 0.69		19 - 0.65		18 - 0.63		16 - 0.65		21 - 0.82		18 - 2.06
		29 - 0.69		26 - 0.63		25 - 0.65		24 - 2.09		29 - 0.82		30 - 0.71
	JULY	11 - 0.80	AUG	14 - 0.71	SEPT	11 - 0.80	OCT	9 - 0.87	NOV	11 - 0.61	DEC	1 - 0.61
		24 - 0.82		21 - 0.69		23 - 0.82		29 - 0.69		19 - 0.69		9 - 0.61
				28 - 0.65								23 - 0.69
1976												
	JAN	7 - 0.87	FEB	9 - 0.56	MAR	2 - 1.81 (H)	APR	5 - 1.84	MAY	27 - 0.39	JUN	- N
		16 - 0.89		20 - 0.54		12 - 0.48		20 - 0.54				
		27 - 1.36				23 - 1.02 (H)						
	JULY	1 - 0.45	AUG	12 - 0.54	SEPT	- N	OCT	- N	NOV	- N	DEC	- N
		13 - 0.45		24 - 0.56								
		22 - 0.42										
		31 - 0.48										
1977												
	JAN	6 - 0.48	FEB	15 - N	MAR	9 - 0.42	APR	4 - N	MAY	4 - 0.50	JUN	15 - 0.48
		19 - 0.50		24 - 0.41				14 - N		13 - 0.58		
								25 - 0.44		26 - 0.47		
	JULY	11 - 0.52	AUG	12 - 0.52	SEPT	12 - 0.67	OCT	12 - 0.45	NOV	2 - 0.42	DEC	9 - 0.42
		25 - 0.52		26 - 0.69		16 - 0.47		31 - 0.45				

N - No Reading
H - High Reading

FIGURE A-43

W-2

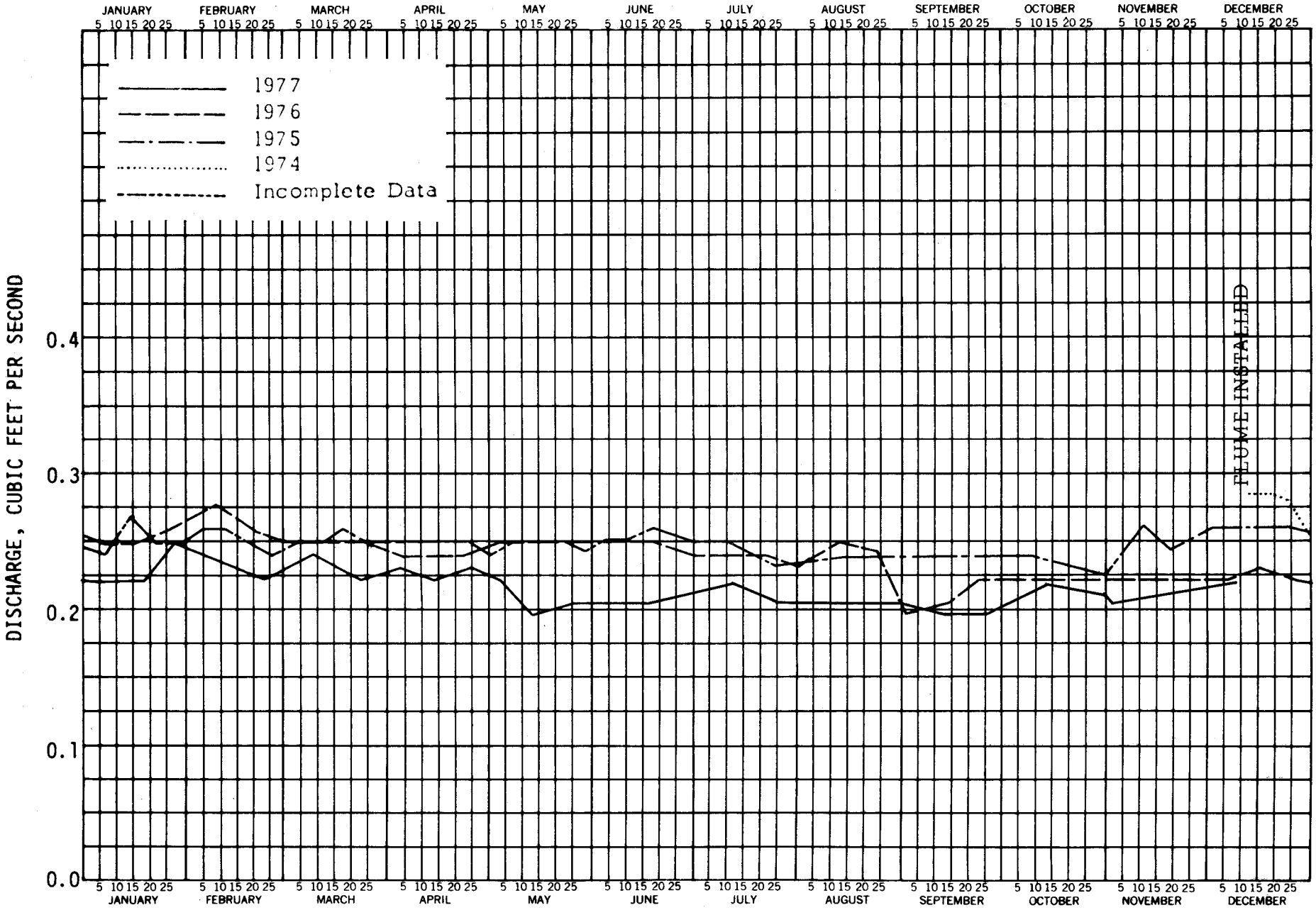


TABLE A-43 DISCHARGE AT W-2, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 47' 36", Longitude: 108° 14' 59"
NE1/4, NW1/4, Sec. 14, T3S, R97W, Rio Blanco County

1974											
	DEC	12 - 0.289									
		18 - 0.289									
		24 - 0.279									
		31 - 0.250									
1975											
	JAN	7 - 0.241	FEB	5 - 0.260	MAR	5 - 0.250	APR	2 - 0.250	MAY	1 - 0.241	JUN 4 - 0.250
		14 - 0.269		12 - 0.260		12 - 0.250		9 - 0.250		8 - 0.250	10 - 0.250
		22 - 0.250		19 - 0.250		18 - 0.260		16 - 0.250		21 - 0.250	18 - 0.260
		29 - 0.250		26 - 0.241		25 - 0.250		24 - 0.250		29 - 0.241	30 - 0.250
	JULY	11 - 0.250	AUG	14 - 0.241	SEPT	11 - 0.241	OCT	9 - 0.241	NOV	11 - 0.260	DEC 1 - 0.260
		24 - 0.231		21 - 0.241		23 - 0.241		30 - 0.222		19 - 0.241	11 - 0.260
				28 - 0.241							23 - 0.260
1976											
	JAN	7 - 0.250	FEB	9 - 0.279	MAR	2 - 0.250	APR	5 - 0.241	MAY	4 - 0.250	JUN 8 - 0.250
		16 - 0.250		20 - 0.260		12 - 0.250		23 - 0.241		27 - 0.250	17 - 0.250
		27 - 0.260				23 - 0.250					
	JULY	1 - 0.241	AUG	12 - 0.250	SEPT	1 - 0.196	OCT	15 - 0.222	NOV	11 - 0.222	DEC 6 - 0.222
		13 - 0.241		24 - 0.241		14 - 0.205		27 - 0.222			15 - 0.231
		22 - 0.241				23 - 0.222					27 - 0.222
		31 - 0.231									
1977											
	JAN	6 - 0.222	FEB	15 - 0.231	MAR	9 - 0.241	APR	4 - 0.231	MAY	4 - 0.222	JUN 16 - 0.205
		19 - 0.222		24 - 0.222		23 - 0.222		14 - 0.222		13 - 0.196	
		28 - 0.250						25 - 0.231		26 - 0.205	
	JULY	11 - 0.222	AUG	12 - 0.205	SEPT	12 - 0.196	OCT	13 - 0.222	NOV	2 - 0.205	DEC 9 - 0.222
		25 - 0.205		30 - 0.205		25 - 0.196		31 - 0.213			

FIGURE A-44

W-3 (USGS STATION NO. 132)

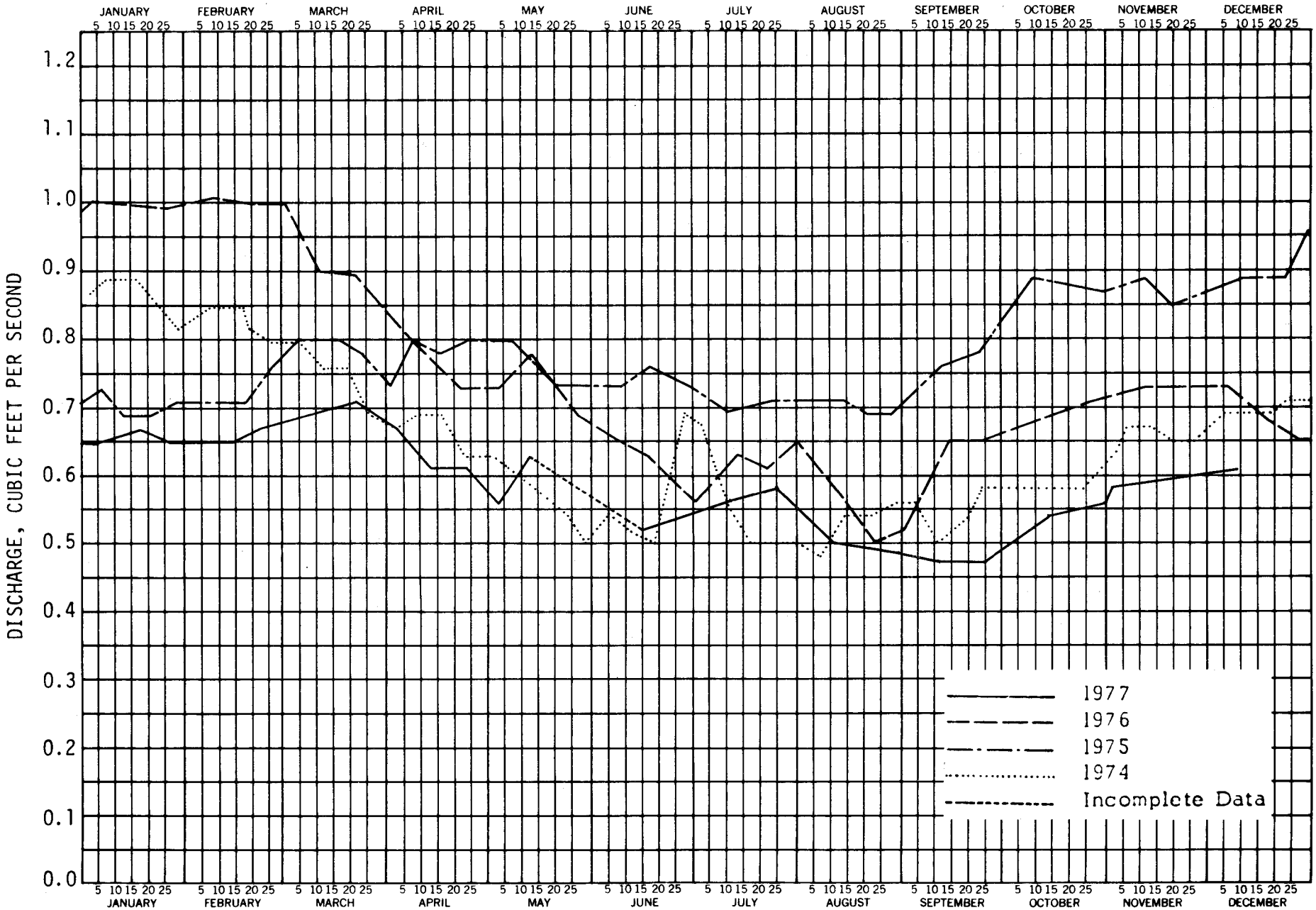


TABLE A-44 DISCHARGE AT W-3 (USGS STATION NO. 132), SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: April 1968 to current year
Latitude: 39° 47' 17", Longitude: 108° 15' 03"
NW1/4, SW1/4, Sec. 14, T3S, R97W, Rio Blanco County

1974												
	JULY	3 - 0.65	AUG	7 - 0.48	SEPT	4 - 0.56	OCT	1 - 0.58	NOV	2 - 0.63	DEC	5 - 0.69
		10 - 0.56		14 - 0.54		11 - 0.50		8 - 0.58		6 - 0.67		11 - 0.69
		17 - 0.50		22 - 0.54		20 - 0.54		16 - 0.58		13 - 0.67		18 - 0.69
		31 - 0.50		30 - 0.56		24 - 0.58		24 - 0.58		20 - 0.65		24 - 0.71
										26 - 0.65		31 - 0.71
1975												
	JAN	7 - 0.73	FEB	5 - 0.71	MAR	5 - 0.80	APR	2 - 0.73	MAY	1 - 0.80	JUN	4 - 0.73
		14 - 0.69		12 - 0.71		12 - 0.80		9 - 0.80		8 - 0.80		10 - 0.73
		22 - 0.69		19 - 0.71		18 - 0.80		16 - 0.78		21 - 0.73		18 - 0.76
		29 - 0.71		26 - 0.76		25 - 0.78		24 - 0.80		29 - 0.73		30 - 0.73
	JULY	11 - 0.69	AUG	14 - 0.71	SEPT	11 - 0.76	OCT	9 - 0.89	NOV	11 - 0.89	DEC	1 - 0.87
		24 - 0.71		21 - 0.69		23 - 0.78		30 - 0.87		19 - 0.85		11 - 0.89
				28 - 0.69								23 - 0.89
1976												
	JAN	7 - 1.02	FEB	9 - 1.10	MAR	2 - 0.97	APR	5 - 0.82	MAY	4 - 0.73	JUN	8 - 0.65
		16 - 0.99		20 - 0.99		12 - 0.89		23 - 0.73		13 - 0.78		17 - 0.63
		27 - 0.97				23 - 0.85				27 - 0.69		
	JULY	1 - 0.56	AUG	12 - 0.58	SEPT	1 - 0.52	OCT	15 - 0.69	NOV	11 - 0.73	DEC	6 - 0.73
		13 - 0.63		24 - 0.50		14 - 0.65		27 - 0.71				15 - 0.69
		22 - 0.61				23 - 0.65						27 - 0.65
		31 - 0.65										
1977												
	JAN	6 - 0.65	FEB	15 - 0.65	MAR	9 - 0.69	APR	4 - 0.67	MAY	4 - 0.56	JUN	15 - 0.52
		19 - 0.67		24 - 0.67		23 - 0.71		14 - 0.61		13 - 0.63		
		28 - 0.65						25 - 0.61		26 - N		
	JULY	11 - 0.56	AUG	12 - 0.50	SEPT	12 - 0.47	OCT	13 - 0.54	NOV	2 - 0.58	DEC	9 - 0.61
		25 - 0.58		30 - 0.48		25 - 0.47		31 - 0.56				

N - No Reading

FIGURE A-45

W-4 (USGS STATION NO. 133)

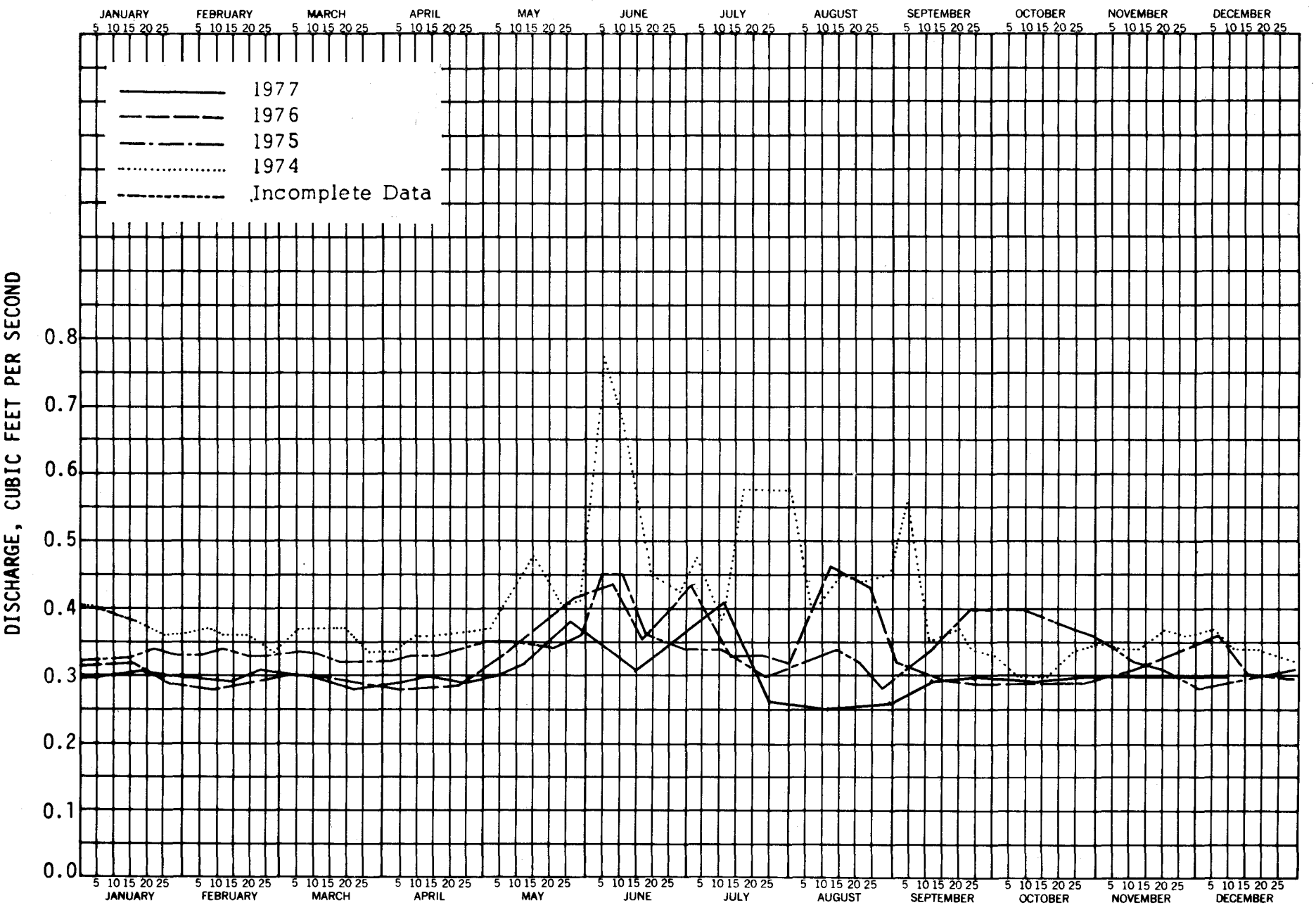


TABLE A-45 DISCHARGE AT W-4 (USGS STATION NO. 133), SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 47' 37", Longitude: 108° 15' 51"
Center, Sec. 27, T3S, R97W, Rio Blanco County

1974											
	JULY	3 - 0.474	AUG	7 - 0.393	SEPT	4 - 0.558	OCT	1 - 0.33	NOV	2 - 0.350	DEC 5 - 0.371
		11 - 0.382		14 - 0.450		11 - 0.350		8 - 0.30		6 - 0.339	11 - 0.339
		17 - 0.571		22 - 0.438		20 - 0.371		16 - 0.30		13 - 0.339	18 - 0.339
		31 - 0.571		30 - 0.450		24 - 0.339		24 - 0.34		20 - 0.371	24 - 0.329
										26 - 0.361	31 - 0.319
1975											
	JAN	7 - 0.329	FEB	5 - 0.329	MAR	5 - 0.339	APR	2 - 0.319	MAY	1 - 0.350	JUN 4 - 0.450
		14 - 0.329		12 - 0.339		12 - 0.329		9 - 0.329		8 - 0.350	10 - 0.450
		22 - 0.339		19 - 0.329		18 - 0.319		16 - 0.329		21 - 0.339	18 - 0.361
		29 - 0.329		26 - 0.329		25 - 0.319		24 - 0.339		29 - 0.361	30 - 0.339
	JULY	11 - 0.339	AUG	14 - 0.339	SEPT	11 - 0.339	OCT	9 - 0.404	NOV	11 - 0.319	DEC 1 - 0.279
		24 - 0.299		21 - 0.319		23 - 0.404		30 - 0.361		19 - 0.309	23 - 0.309
				28 - 0.279							
1976											
	JAN	7 - 0.319	FEB	9 - 0.279	MAR	3 - 0.299	APR	5 - 0.279	MAY	4 - 0.319	JUN 8 - 0.438
		16 - 0.319		20 - 0.289		12 - 0.299		23 - 0.289		27 - 0.415	17 - 0.350
		27 - 0.289				23 - 0.289					
	JULY	1 - 0.438	AUG	12 - 0.462	SEPT	1 - 0.319	OCT	15 - 0.289	NOV	11 - 0.309	DEC 6 - 0.361
		13 - 0.329		24 - 0.427		14 - 0.299		27 - 0.289			15 - 0.309
		22 - 0.329				23 - 0.289					27 - 0.299
		31 - 0.319									
1977											
	JAN	6 - 0.299	FEB	15 - 0.289	MAR	9 - 0.299	APR	4 - 0.289	MAY	4 - 0.299	JUN 15 - 0.309
		19 - 0.309		24 - 0.309		23 - 0.279		14 - 0.299		13 - 0.319	
		28 - 0.299						25 - 0.289		26 - 0.382	
	JULY	11 - 0.404	AUG	12 - 0.250	SEPT	12 - 0.289	OCT	13 - 0.289	NOV	3 - 0.299	DEC 9 - 0.299
		25 - 0.260		30 - 0.260		25 - 0.299		31 - 0.299			

FIGURE A-46

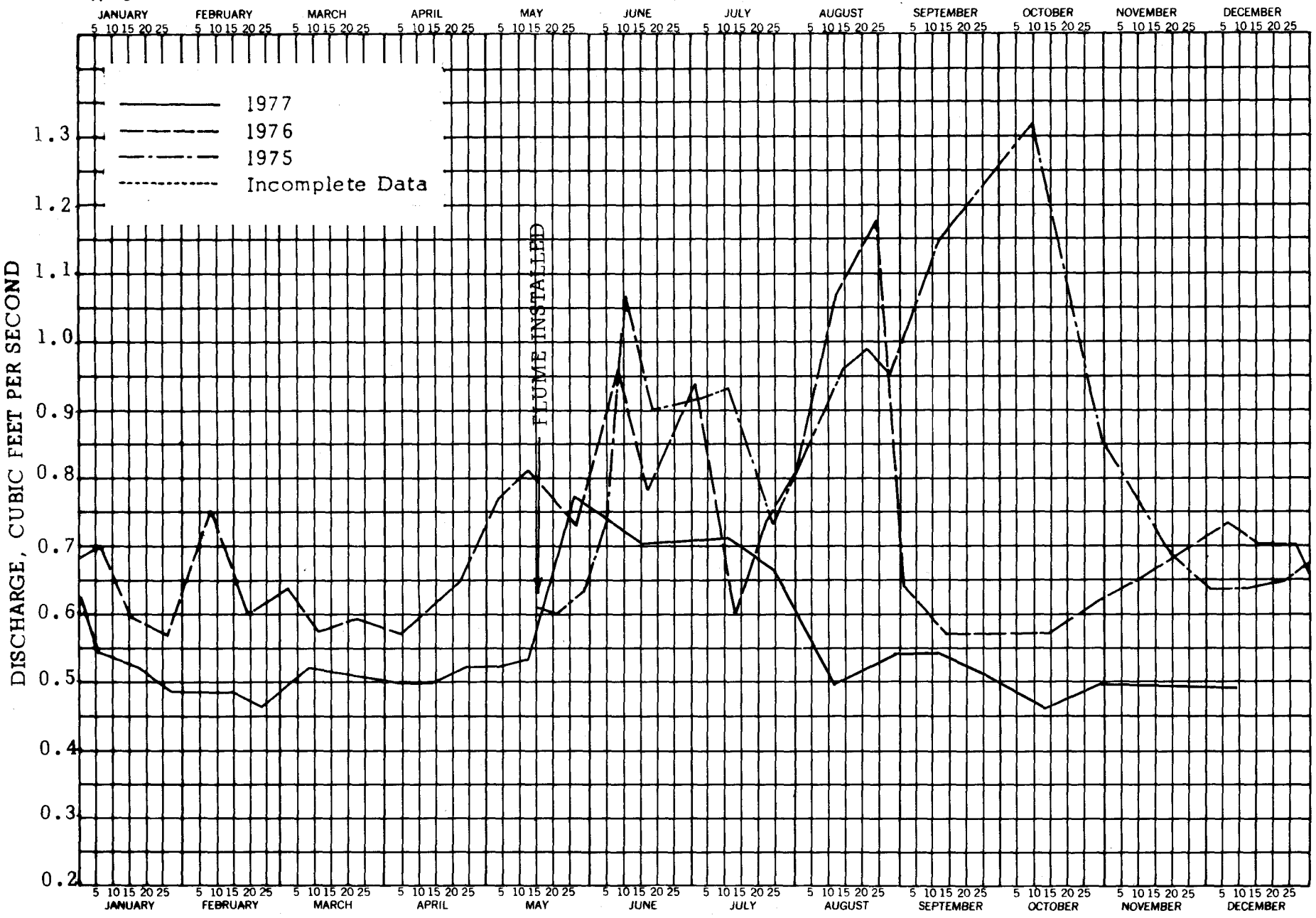

W-5
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2

TABLE A-46 DISCHARGE AT W-5, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 45' 25", Longitude: 108° 15' 57"
NE1/4, SW1/4, Sec. 27, T3S, R97W, Rio Blanco County

1975												
MAY	15 - 0.610	JUN	4 - 0.730	JULY	1 - 0.916	AUG	14 - 0.961	SEPT	11 - 1.15	OCT	9 - 1.32
	21 - 0.597		10 - 1.07		11 - 0.931		21 - 0.992		23 - 1.22		30 - 0.858
	29 - 0.636		18 - 0.902		24 - 0.730		28 - 0.946				
NOV	11 - 0.757	DEC	1 - 0.636								
	19 - 0.689		11 - 0.636								
			23 - 0.649								
1976												
JAN	7 - 0.702	FEB	9 - 0.757	MAR	3 - 0.636	APR	5 - 0.571	MAY	4 - 0.771	JUN	8 - 0.961
	16 - 0.597		20 - 0.597		12 - 0.571		23 - 0.649		13 - 0.814		17 - 0.786
	27 - 0.571				23 - 0.597				27 - 0.730		
JULY	1 - 0.946	AUG	12 - 1.07	SEPT	1 - 0.636	OCT	15 - 0.571	NOV	11 - 0.649	DEC	6 - 0.730
	13 - 0.597		24 - 1.18		14 - 0.571		27 - 0.610				15 - 0.702
	22 - 0.730				23 - 0.571						27 - 0.702
	31 - 0.814										
1977												
JAN	6 - 0.546	FEB	15 - 0.485	MAR	9 - 0.522	APR	4 - 0.497	MAY	4 - 0.522	JUN	15 - 0.702
	19 - 0.522		24 - 0.462		23 - 0.509		14 - 0.497		13 - 0.534		
	28 - 0.485						25 - 0.522		26 - 0.771		
JULY	11 - 0.716	AUG	12 - 0.497	SEPT	12 - 0.546	OCT	13 - 0.462	NOV	3 - 0.497	DEC	9 - 0.485
	25 - 0.662		30 - 0.546		25 - 0.509		31 - 0.497				

FIGURE A-47

W-6

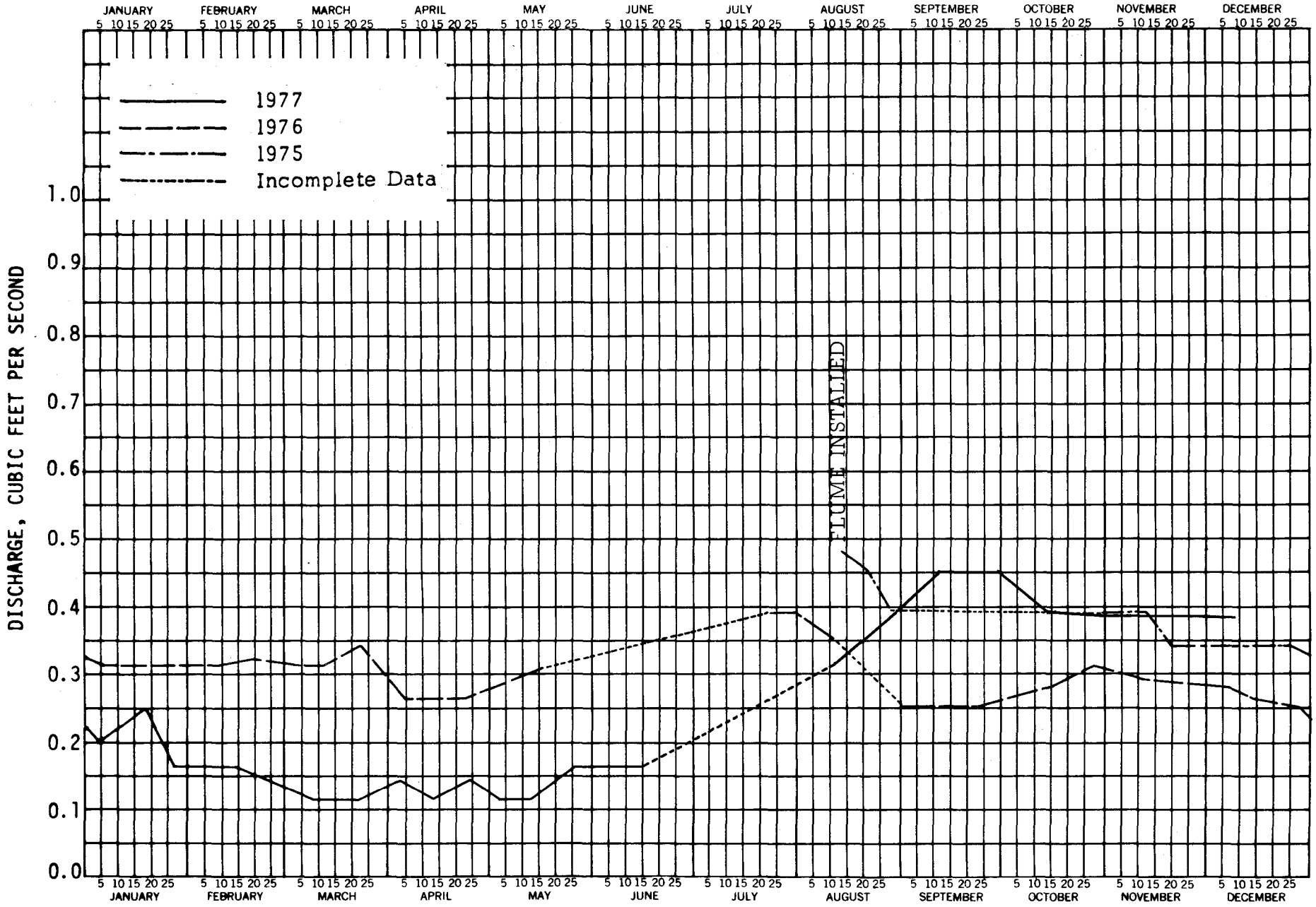


TABLE A-47 DISCHARGE AT W-6, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 39° 45' 23", Longitude: 108° 15' 50"
NW1/4, SE1/4, Sec. 27, T3S, R97W, Rio Blanco County

1975											
	AUG	13 - 0.48	SEPT	- N	OCT	9 - N	NOV	11 - 0.39	DEC	1 - 0.34	
		21 - 0.45				30 - 0.39		19 - 0.34		23 - 0.34	
		28 - 0.39									
1976											
	JAN	7 - 0.31	FEB	9 - 0.31	MAR	3 - 0.31	APR	5 - 0.26	MAY	4 - 0.28	JUN - N
		16 - 0.31		20 - 0.32		12 - 0.31		23 - 0.26		17 - 0.31	
		27 - 0.31				23 - 0.34					
	JULY	1 - N	AUG	12 - 0.34	SEPT	1 - 0.25	OCT	15 - 0.28	NOV	11 - 0.29	DEC 6 - 0.28
		13 - N		24 - N		14 - 0.25		27 - 0.31			15 - 0.26
		22 - 0.39				23 - 0.25					27 - 0.25
		31 - 0.39									
1977											
	JAN	6 - 0.20	FEB	15 - 0.16	MAR	9 - 0.11	APR	4 - 0.14	MAY	4 - 0.11	JUN 15 - 0.16
		19 - 0.25		24 - 0.14		23 - 0.11		14 - 0.11		13 - 0.11	
		28 - 0.16						25 - 0.14		26 - 0.16	
	JULY	8 - I	AUG	12 - 0.32	SEPT	12 - 0.45	OCT	13 - 0.39	NOV	3 - 0.38	DEC 9 - 0.38
				30 - 0.39		25 - 0.45		31 - 0.38			

N - No Reading
I - Irrigating Above Flume

FIGURE A-48

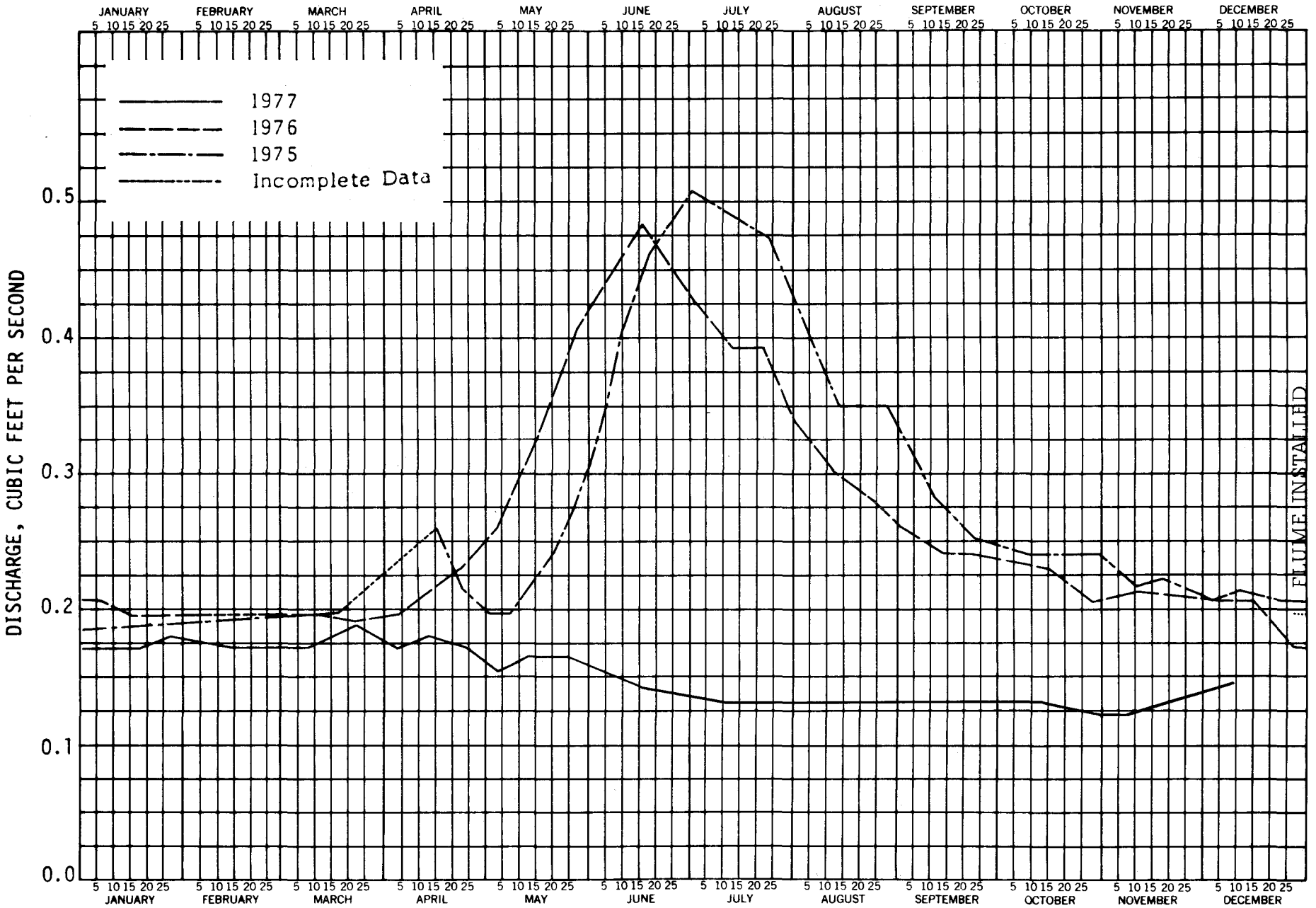

W-7
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.5
0.4
0.3
0.2
0.1
0.0
FLUME INSTALLED

TABLE A-48 DISCHARGE AT W-7, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 41' 37", Longitude: 108° 16' 56"
NW1/4, NE1/4, Sec. 21, T4S, R97W, Garfield County

1974											
DEC	27 - 0.196										
	31 - 0.196										
1975											
JAN	- N	FEB	- N	MAR	5 - 0.187	APR	2 - N	MAY	1 - 0.196	JUN	4 - 0.339
					12 - 0.196		9 - N		8 - 0.196		10 - 0.404
					18 - 0.196		16 - 0.260		21 - 0.241		18 - 0.462
					25 - N		24 - 0.213		29 - 0.289		
JULY	1 - 0.509	AUG	14 - 0.350	SEPT	12 - 0.279	OCT	9 - 0.241	NOV	11 - 0.213	DEC	3 - 0.205
	11 - 0.497		21 - 0.350		23 - 0.250		30 - 0.241		19 - 0.222		11 - 0.213
	24 - 0.474		28 - 0.299								23 - 0.205
1976											
JAN	7 - 0.205	FEB	9 - N	MAR	3 - 0.196	APR	5 - 0.196	MAY	4 - 0.260	JUN	8 - 0.450
	16 - 0.196		23 - 0.196		12 - 0.196		23 - 0.231		13 - 0.309		17 - 0.485
	27 - 0.196				23 - 0.187				27 - 0.404		
JULY	1 - 0.427	AUG	12 - 0.299	SEPT	1 - 0.260	OCT	15 - 0.231	NOV	11 - 0.213	DEC	6 - 0.205
	13 - 0.393		24 - 0.279		14 - 0.241		28 - 0.205				15 - 0.205
	22 - 0.393				23 - 0.241						27 - 0.170
	31 - 0.339										
1977											
JAN	6 - 0.170	FEB	15 - 0.170	MAR	9 - 0.170	APR	4 - 0.170	MAY	4 - 0.154	JUN	16 - 0.138
	19 - 0.170		24 - 0.170		23 - 0.187		14 - 0.179		13 - 0.162		
	28 - 0.179						25 - 0.170		25 - 0.162		
JULY	11 - 0.131	AUG	12 - 0.131	SEPT	12 - 0.131	OCT	13 - 0.131	NOV	8 - 0.124	DEC	9 - 0.146
	25 - 0.131		30 - 0.131		25 - 0.131		31 - 0.124				

N - No Reading

FIGURE A-49

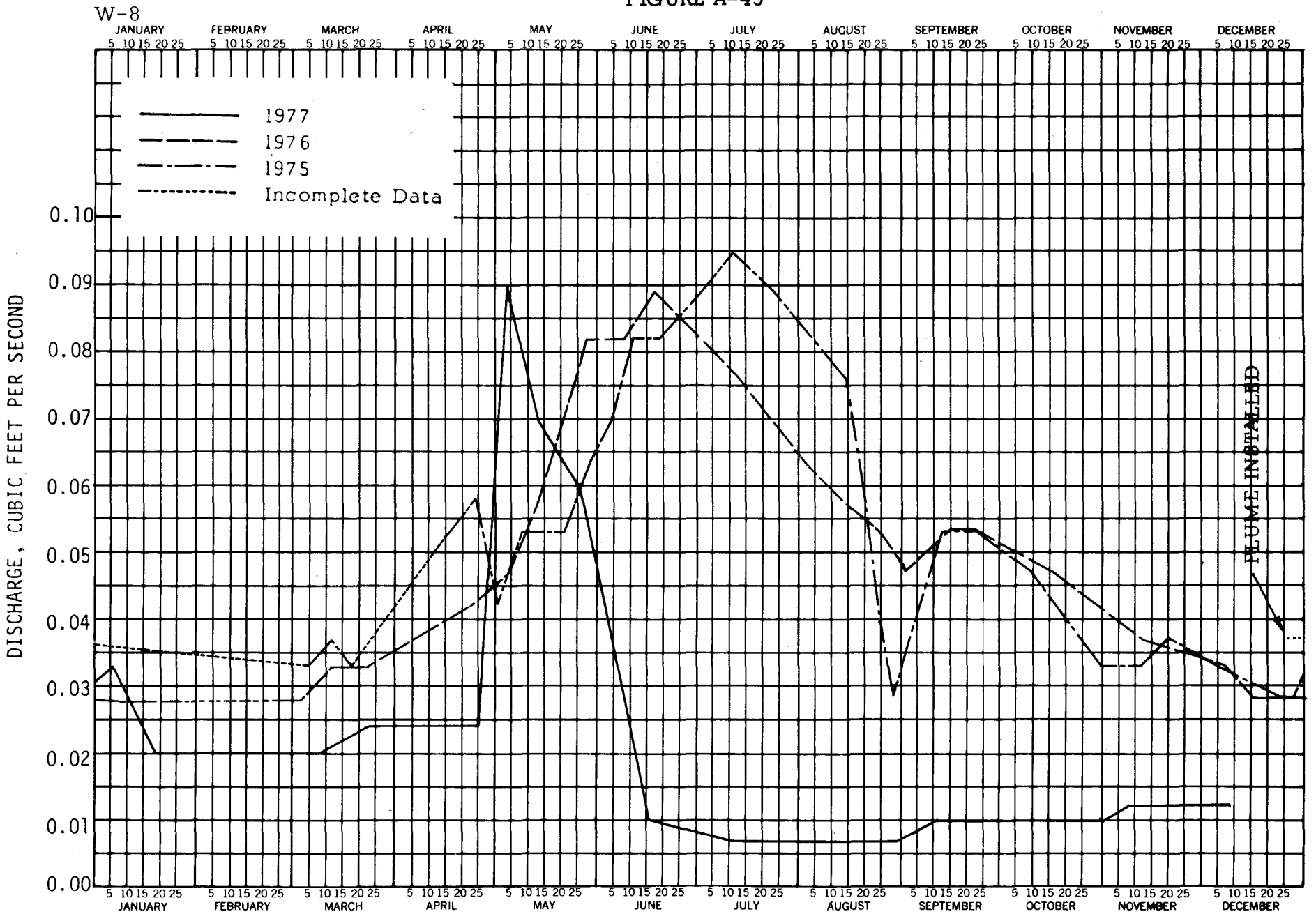

W-8
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
PLUME INSTALLED

TABLE A-49 DISCHARGE AT W-8, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 41' 25", Longitude: 108° 16' 54"
NW1/4, NE1/4, Sec. 21, T4S, R97W, Garfield County

1974											
DEC	27 - 0.037										
	31 - 0.037										
1975											
JAN	7 - N	FEB	- N	MAR	5 - 0.033	APR	2 - N	MAY	1 - 0.042	JUN	4 - 0.070
					12 - 0.037		9 - N		8 - 0.053		10 - 0.082
					18 - 0.033		16 - 0.053		21 - 0.053		18 - 0.082
					25 - N		24 - 0.058		29 - 0.064		
JULY	1 - 0.089	AUG	14 - 0.076	SEPT	12 - 0.053	OCT	9 - 0.047	NOV	11 - 0.033	DEC	3 - 0.033
	11 - 0.095		21 - 0.053		23 - 0.053		30 - 0.033		19 - 0.037		23 - 0.028
	24 - 0.089		28 - 0.028								
1976											
JAN	7 - 0.028	FEB	9 - N	MAR	3 - 0.028	APR	5 - 0.037	MAY	4 - 0.047	JUN	8 - 0.082
	16 - 0.028		23 - 0.028		12 - 0.033		23 - 0.042		13 - 0.058		17 - 0.089
	27 - 0.028				23 - 0.033				27 - 0.082		
JULY	1 - 0.082	AUG	12 - 0.058	SEPT	1 - 0.047	OCT	15 - 0.047	NOV	11 - 0.037	DEC	6 - 0.033
	13 - 0.076		24 - 0.053		14 - 0.053		28 - 0.042				15 - 0.028
	22 - 0.070				23 - 0.053						27 - 0.028
	31 - 0.064										
1977											
JAN	6 - 0.033	FEB	15 - 0.020	MAR	9 - 0.020	APR	4 - 0.024	MAY	4 - 0.09	JUN	16 - 0.010
	19 - 0.020		24 - 0.020		23 - 0.024		14 - 0.024		13 - 0.07		
	28 - 0.020						25 - 0.024		25 - 0.06		
JULY	11 - 0.007	AUG	12 - 0.007	SEPT	12 - 0.010	OCT	13 - 0.010	NOV	8 - 0.013	DEC	9 - 0.013
	25 - 0.007		30 - 0.007		25 - 0.010		31 - 0.010				

N - No Reading

W-9

FIGURE A-50

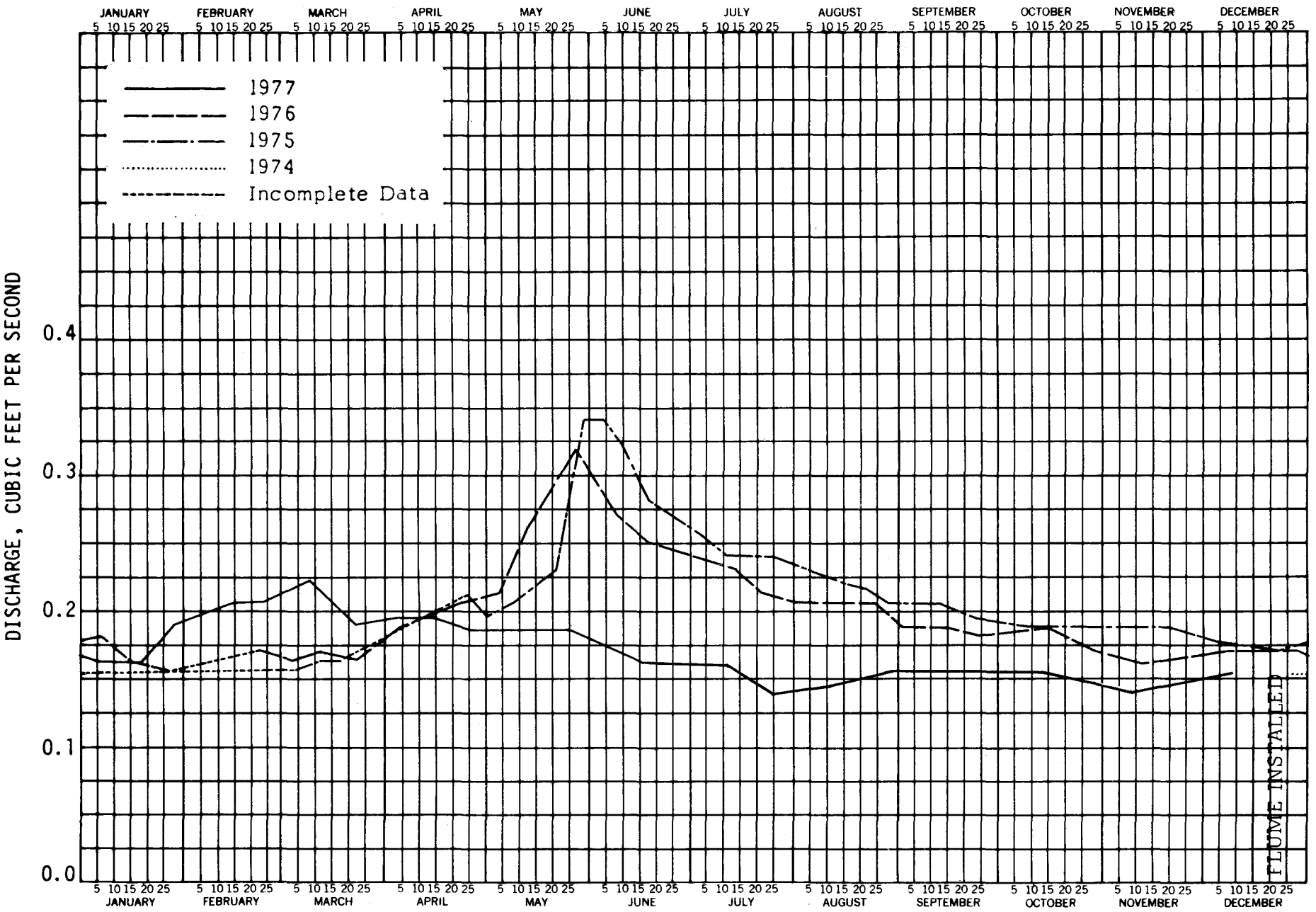


TABLE A-50 DISCHARGE AT W-9, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 40' 51", Longitude: 108° 16' 50"
SW1/4, SE1/4, Sec. 21, T4S, R97W, Garfield County

1974

DEC											
	26 - 0.154										
	31 - N										

1975

JAN		FEB		MAR		APR		MAY		JUN	
	- N		- N		5 - 0.154		2 - N		1 - 0.196		4 - 0.339
					12 - 0.162		9 - N		8 - 0.205		10 - 0.319
					18 - 0.162		16 - N		21 - 0.231		18 - 0.279
					25 - N		24 - 0.213		29 - 0.339		
JULY		AUG		SEPT		OCT		NOV		DEC	
	1 - 0.260		14 - 0.222		12 - 0.205		9 - 0.187		11 - 0.187		3 - 0.179
	11 - 0.241		21 - 0.213		23 - 0.196		30 - 0.187		19 - 0.187		23 - 0.170
	24 - 0.241		28 - 0.205								

1976

JAN		FEB		MAR		APR		MAY		JUN	
	7 - 0.179		9 - N		3 - 0.162		5 - 0.187		4 - 0.213		8 - 0.269
	16 - 0.162		23 - 0.170		12 - 0.170		23 - 0.205		13 - 0.260		17 - 0.250
	27 - 0.154				23 - 0.162				27 - 0.319		
JULY		AUG		SEPT		OCT		NOV		DEC	
	1 - 0.241		12 - 0.205		1 - 0.187		15 - 0.187		11 - 0.162		6 - 0.170
	13 - 0.231		24 - 0.205		14 - 0.187		28 - 0.170				15 - 0.170
	22 - 0.213				23 - 0.179						27 - 0.170
	31 - 0.205										

1977

JAN		FEB		MAR		APR		MAY		JUN	
	6 - 0.162		15 - 0.205		9 - 0.222		4 - 0.187		4 - 0.170		16 - 0.162
	19 - 0.162		24 - 0.205		23 - 0.179		14 - 0.187		13 - 0.170		
	28 - 0.179						25 - 0.170		25 - 0.170		
JULY		AUG		SEPT		OCT		NOV		DEC	
	11 - 0.162		12 - 0.146		12 - 0.154		13 - 0.154		8 - 0.138		9 - 0.154
	25 - 0.138		30 - 0.154		25 - 0.154		31 - 0.146				

N - No Reading

W-10

FIGURE A-51

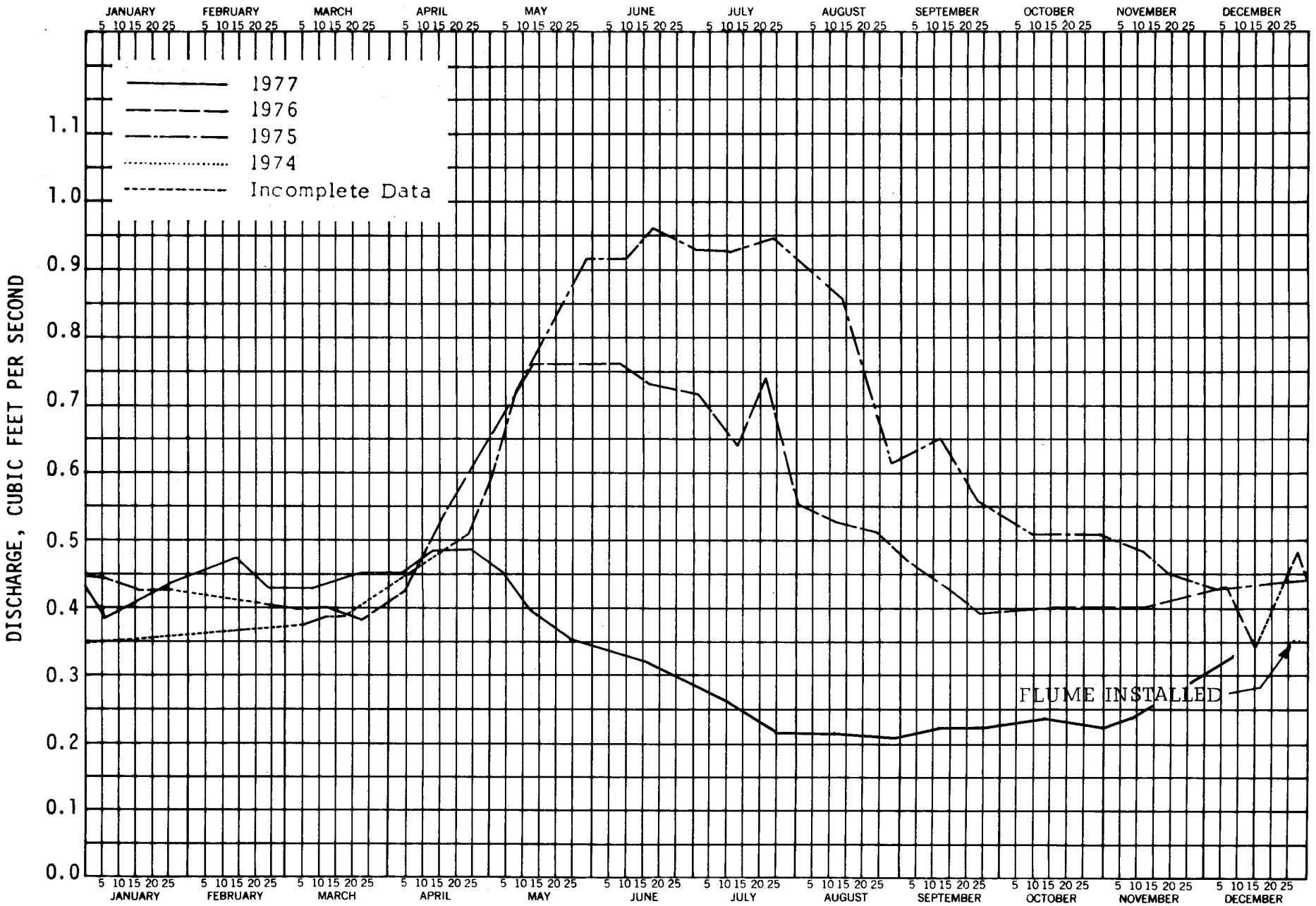


TABLE A-51 DISCHARGE AT W-10, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 40' 37" , Longitude: 108° 16' 51"
NW1/4, NE1/4, Sec. 28, T4S, R97W, Garfield County

1974												
	DEC	26 - 0.350										
		31 - N										
1975												
	JAN	- N	FEB	- N	MAR	5 - 0.371	APR	2 - N	MAY	1 - 0.597	JUN	4 - 0.916
						12 - 0.382		9 - N		8 - 0.716		10 - 0.916
						18 - 0.382		16 - N		21 - 0.843		18 - 0.961
						25 - N		24 - 0.509		29 - 0.916		
	JULY	1 - 0.931	AUG	14 - 0.858	SPET	12 - 0.649	OCT	9 - 0.509	NOV	11 - 0.485	DEC	3 - 0.427
		11 - 0.931		21 - 0.744		23 - 0.558		30 - 0.509		19 - 0.450		23 - 0.438
		24 - 0.946		28 - 0.610								
1976												
	JAN	7 - 0.438	FEB	9 - N	MAR	3 - 0.393	APR	5 - 0.427	MAY	4 - 0.689	JUN	8 - 0.757
		16 - 0.427		23 - 0.404		12 - 0.404		23 - 0.597		13 - 0.759		17 - 0.730
		27 - 0.427				23 - 0.382				27 - 0.759		
	JULY	1 - 0.716	AUG	12 - 0.522	SEPT	1 - 0.474	OCT	15 - 0.404	NOV	11 - 0.404	DEC	6 - 0.427
		13 - 0.636		24 - 0.509		14 - 0.427		28 - 0.404				15 - 0.339
		22 - 0.744				23 - 0.393						27 - N
		31 - 0.558										
1977												
	JAN	6 - 0.382	FEB	15 - 0.474	MAR	9 - 0.427	APR	4 - 0.450	MAY	4 - 0.450	JUN	16 - 0.319
		19 - 0.415		24 - 0.427		23 - 0.450		14 - 0.485		13 - 0.393		
		28 - 0.438						25 - 0.485		25 - 0.350		
	JULY	11 - 0.260	AUG	12 - 0.222	SEPT	12 - 0.231	OCT	13 - 0.241	NOV	8 - 0.241	DEC	9 - 0.339
		25 - 0.222		30 - 0.213		25 - 0.231		31 - 0.231				

N - No Reading

FIGURE A-52

W-11

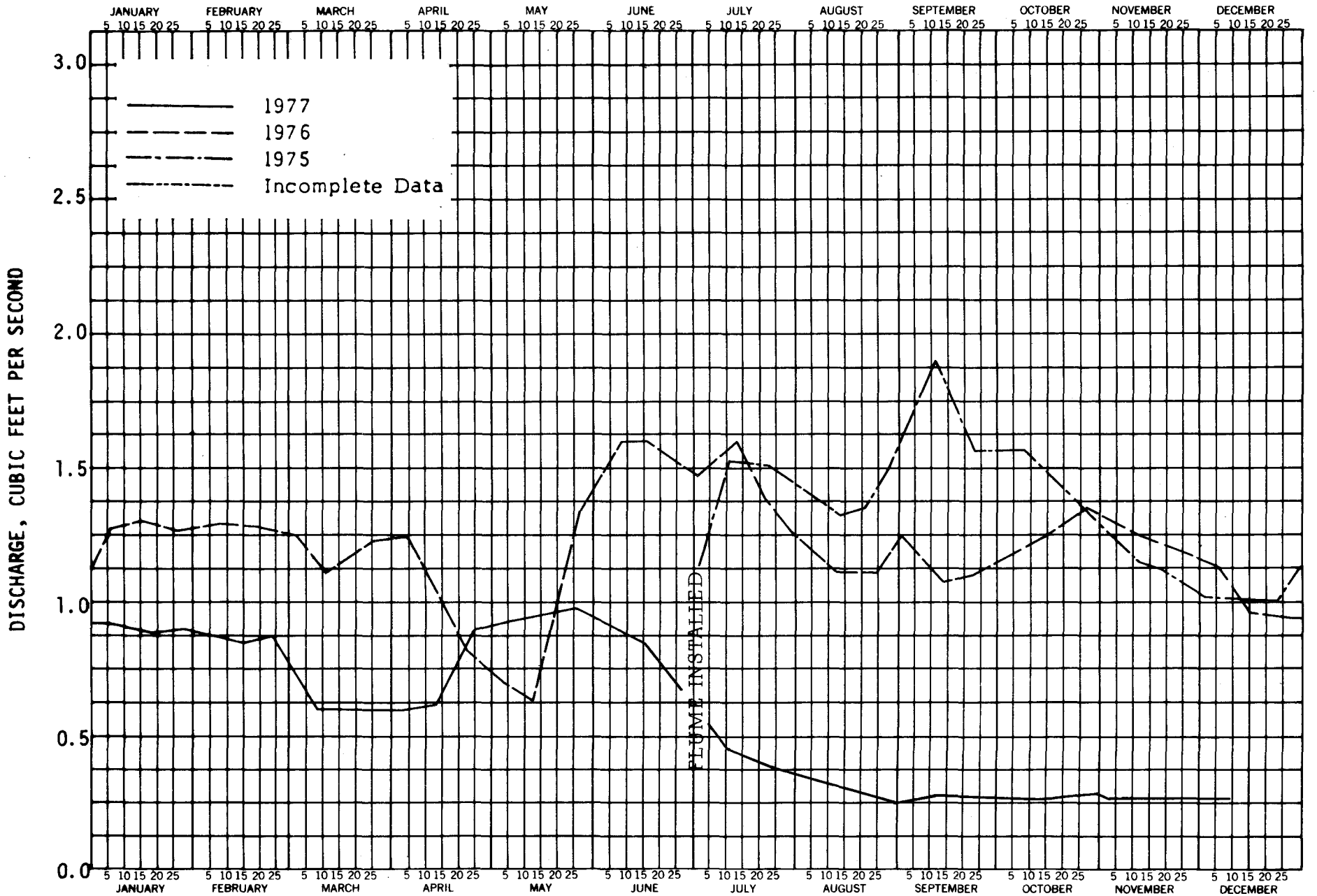


TABLE A-52 DISCHARGE AT W-11, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 45 02", Longitude: 108° 16' 07"
NE1/4, NW1/4, Sec. 34, T3S, R97W, Rio Blanco County

1975

JULY	2 - 1.15	AUG	14 - 1.31	SEPT	11 - 1.90	OCT	9 - 1.56	NOV	11 - 1.15	DEC	1 - 1.07
	11 - 1.53		21 - 1.34		23 - 1.56		30 - 1.31		19 - 1.12		23 - 1.02
	24 - 1.50		28 - 1.50								

1976

JAN	7 - 1.28	FEB	9 - 1.31	MAR	3 - 1.26	APR	5 - 1.23	MAY	4 - 0.69	JUN	8 - 1.59
	16 - 1.31		20 - 1.28		12 - 1.12		23 - 0.82		13 - 0.63		17 - 1.59
	27 - 1.28				23 - 1.23				27 - 1.36		
JULY	1 - 1.48	AUG	12 - 1.12	SEPT	1 - 1.26	OCT	15 - 1.23	NOV	11 - 1.23	DEC	6 - 1.12
	13 - 1.59		24 - 1.12		14 - 1.07		27 - 1.34				15 - 0.94
	22 - 1.39				23 - 1.10						27 - 0.87
	31 - 1.26										

1977

JAN	6 - 0.87	FEB	15 - 0.71	MAR	9 - 0.69	APR	4 - 0.69	MAY	4 - 0.85	JUN	16 - 0.69
	19 - 0.80		24 - 0.76		23 - 0.69		14 - 0.73		13 - 0.89		
	28 - 0.82						25 - 0.80		26 - 0.97		
JULY	11 - 0.45	AUG	30 - 0.25	SEPT	12 - 0.28	OCT	13 - 0.26	NOV	3 - 0.26	DEC	9 - 0.26
	25 - 0.38						31 - 0.28				

FIGURE A-53

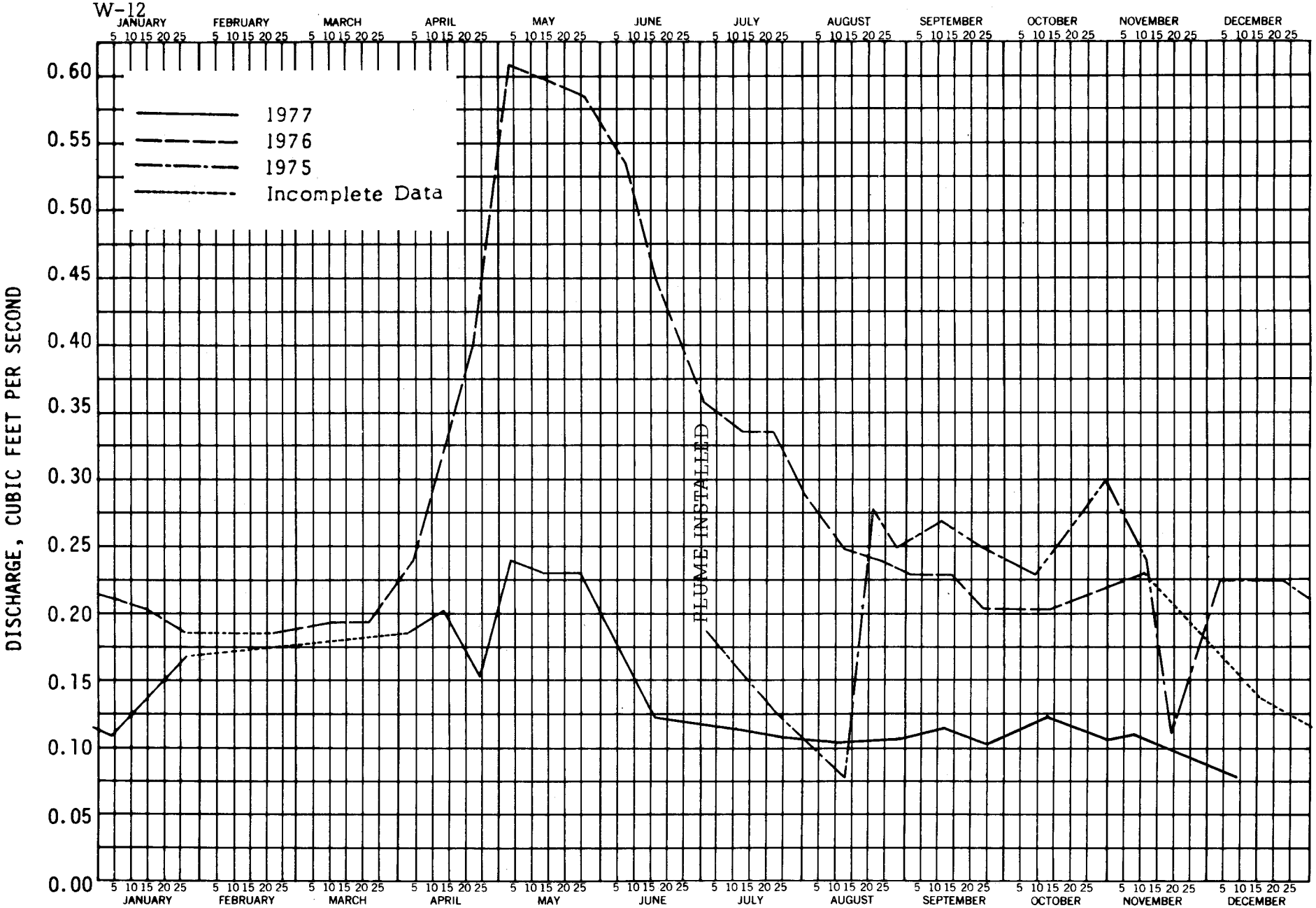

W-12
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND

TABLE A-53 DISCHARGE AT W-12, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 40' 19", Longitude: 108° 19' 02"
NW1/4, SW1/4, Sec. 30, T4S, R97W, Garfield County

1975											
JULY	2 - 0.187	AUG	13 - 0.076	SEPT	11 - 0.269	OCT	9 - 0.231	NOV	11 - 0.241	DEC	3 - 0.222
	24 - 0.124		21 - 0.279		23 - 0.250		30 - 0.299		19 - 0.109		23 - 0.222
			28 - 0.250								
1976											
JAN	7 - 0.213	FEB	9 - N	MAR	12 - 0.196	APR	5 - 0.241	MAY	4 - 0.610	JUN	8 - 0.534
	16 - 0.205		23 - 0.187		23 - 0.196		23 - 0.404		27 - 0.584		17 - 0.450
	27 - 0.187										
JULY	1 - 0.361	AUG	12 - 0.250	SEPT	1 - 0.231	OCT	14 - 0.205	NOV	11 - 0.231	DEC	6 - N
	13 - 0.339		24 - 0.241		14 - 0.231						15 - 0.138
	22 - 0.339				23 - 0.205						27 - F
	31 - 0.289										
1977											
JAN	6 - 0.109	FEB	- N	MAR	- N	APR	4 - 0.187	MAY	4 - 0.241	JUN	16 - 0.124
	28 - 0.170						14 - 0.205		13 - 0.231		
							25 - 0.154		25 - 0.231		
JULY	11 - 0.117	AUG	12 - 0.102	SEPT	12 - 0.117	OCT	13 - 0.124	NOV	8 - 0.117	DEC	9 - 0.076
	25 - 0.109		30 - 0.109		25 - 0.102		31 - 0.109				

N - No Reading
F - Frozen

FIGURE A-54

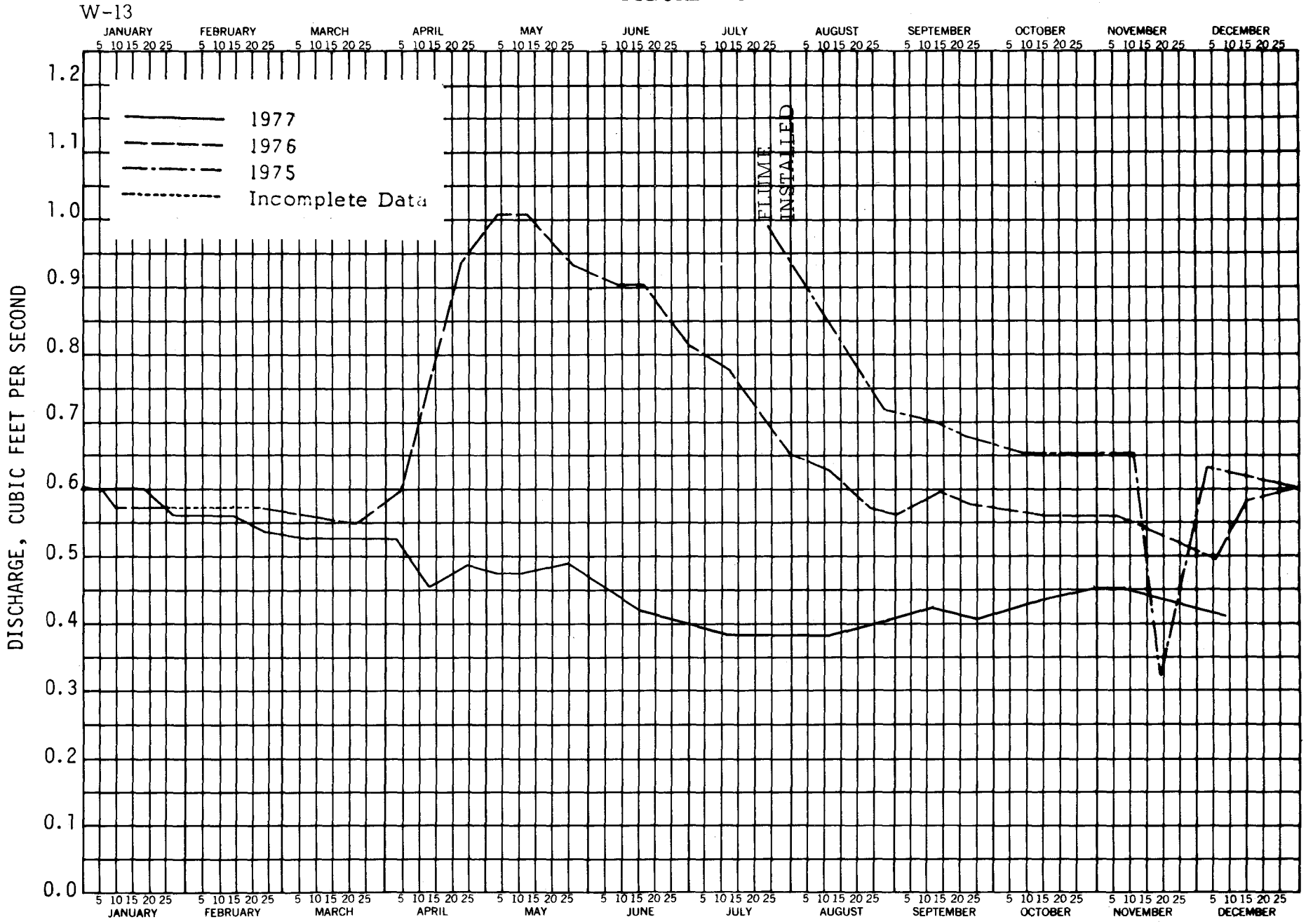

W-13
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-54 DISCHARGE AT W-13, SPRING ON WILLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 39' 26", Longitude: 108° 17' 10"
SE1/4, NW1/4, Sec. 33, T4S, R97W, Garfield County

1975											
	JULY	24 - 0.992	AUG	14 - 0.828	SEPT	12 - 0.702	OCT	9 - 0.649	NOV	11 - 0.649	DEC 3 - 0.636
				21 - 0.771		23 - 0.675		30 - 0.649		19 - 0.319	23 - 0.610
				28 - 0.716							
1976											
	JAN	7 - 0.597	FEB	9 - N	MAR	12 - 0.558	APR	5 - 0.597	MAY	4 - 1.05	JUN 8 - 0.902
		16 - 0.571		23 - 0.571		23 - 0.546		23 - 0.931		13 - 1.04	17 - 0.902
		27 - 0.571								27 - 0.931	
	JULY	1 - 0.814	AUG	12 - 0.623	SEPT	1 - 0.558	OCT	15 - 0.558	NOV	11 - 0.558	DEC 6 - 0.497
		13 - 0.771		24 - 0.571		14 - 0.597					15 - 0.584
		22 - 0.744				23 - 0.571					27 - 0.597
		31 - 0.649									
1977											
	JAN	6 - 0.597	FEB	15 - 0.558	MAR	9 - 0.522	APR	4 - 0.522	MAY	4 - 0.474	JUN 16 - 0.415
		19 - 0.597		24 - 0.534		23 - 0.522		14 - 0.450		13 - 0.474	
		28 - 0.558						25 - 0.485		25 - 0.485	
	JULY	11 - 0.382	AUG	12 - 0.382	SEPT	12 - 0.427	OCT	13 - 0.438	NOV	8 - 0.450	DEC 9 - 0.415
		25 - 0.382		30 - 0.404		25 - 0.404		31 - 0.450			

N - No Reading

FIGURE A-55

CER-6 (USGS STATION NO. 135)

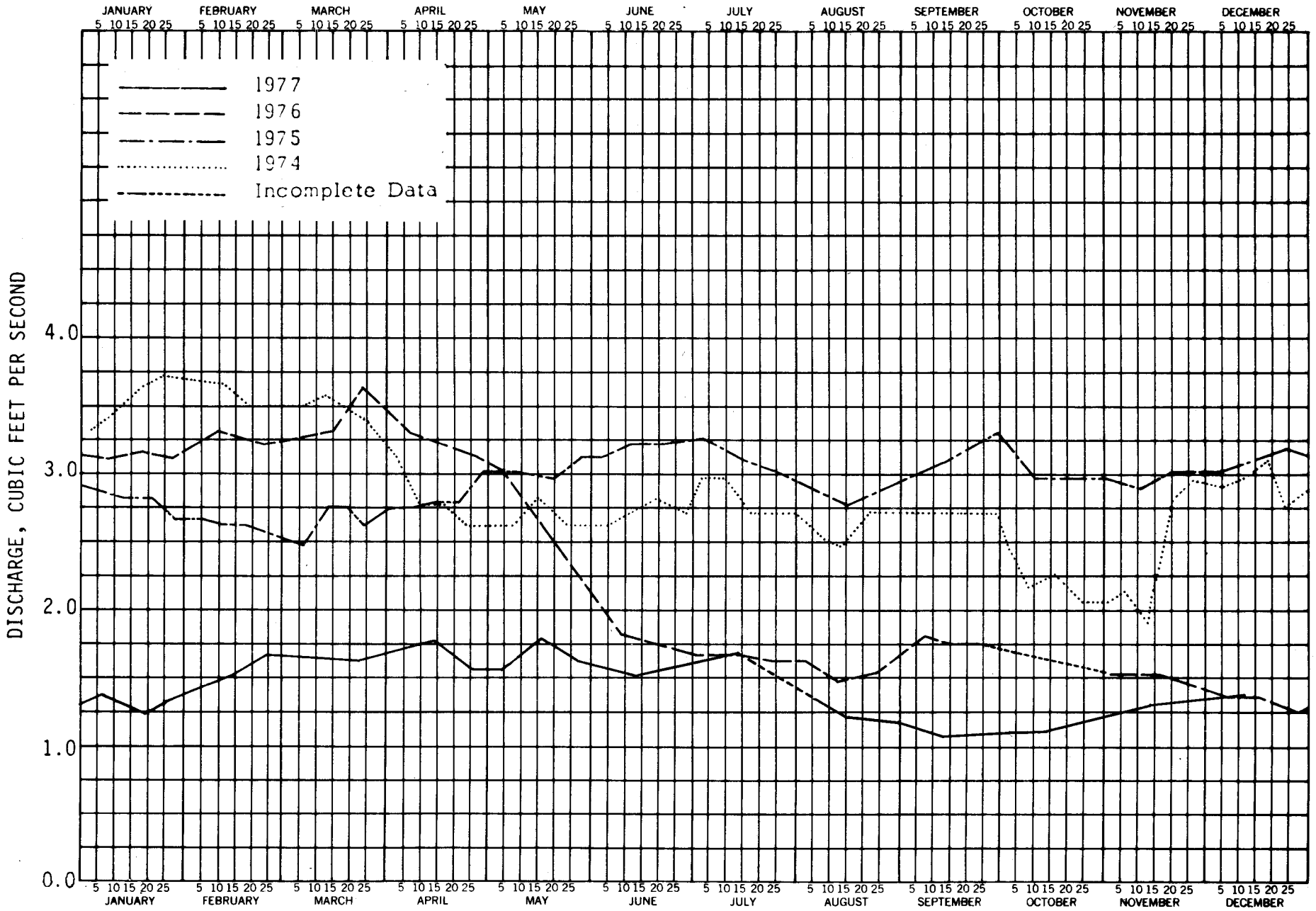


TABLE A-55 DISCHARGE AT CER-6 (USGS STATION NO. 135), SPRING ON EAST FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

18" Parshall Flume
Period of Record: August 1972 to current year
Latitude: 39° 48' 25", Longitude 108° 10' 34"
SE1/4, NW1/4, Sec. 9, T3S, R96W, Rio Blanco County

1974						
JULY 3 - 2.95	AUG 7 - 2.52	SEPT 4 - 2.73	OCT 2 - 2.45	NOV 2 - 2.06	DEC 5 - 2.87
10 - 2.95	14 - 2.45	11 - 2.73	8 - 2.13	6 - 2.13	11 - 2.95
17 - 2.73	22 - 2.73	20 - 2.73	16 - 2.25	13 - 1.88	18 - 3.10
31 - 2.73	30 - 2.73	24 - 2.73	24 - 2.06	20 - 2.80	24 - 2.73
		30 - 2.73		26 - 2.95	31 - 2.87
1975						
JAN 7 - 2.87	FEB 5 - 2.66	MAR 7 - 2.46	APR 1 - 2.73	MAY 8 - 3.02	JUN 3 - 3.10
14 - 2.80	12 - 2.60	14 - 2.73	8 - 2.73	20 - 2.95	11 - 3.17
22 - 2.80	19 - 2.60	20 - 2.73	15 - 2.80	28 - 3.10	19 - 3.17
29 - 2.66	26 - 2.52	25 - 2.60	22 - 2.80		
			29 - 3.02		
JULY 3 - 3.24	AUG 15 - 2.73	SEPT 15 - 3.10	OCT 10 - 2.95	NOV 10 - 2.87	DEC 4 - 3.02
14 - 3.10		29 - 3.32	31 - 2.95	20 - 3.02	24 - 3.17
25 - 3.02					
1976						
JAN 8 - 3.10	FEB 10 - 3.32	MAR 4 - 3.24	APR 6 - 3.32	MAY 5 - 3.02	JUN 9 - 1.88
19 - 3.17	24 - 3.17	15 - 3.32	26 - 3.10		18 - 1.76
28 - 3.10		24 - 3.62			
JULY 2 - 1.64	AUG 2 - 1.58	SEPT 7 - 1.82	OCT - N	NOV 2 - 1.52	DEC 7 - 1.36
14 - 1.64	13 - 1.46	15 - 1.76		17 - 1.52	16 - 1.36
23 - 1.58	25 - 1.52	24 - 1.76			28 - 1.24
1977						
JAN 7 - 1.36	FEB 16 - 1.52	MAR 14 - 1.58	APR 5 - 1.70	MAY 5 - 1.52	JUN 14 - 1.46
20 - 1.24	25 - 1.64	24 - 1.58	15 - 1.76	17 - 1.76	
26 - 1.30			26 - 1.52	27 - 1.58	
JULY 14 - 1.70	AUG 5 - 1.36	SEPT 13 - 1.09	OCT 3 - 1.14	NOV 14 - 1.30	DEC 12 - 1.36
28 - W	16 - 1.24		14 - 1.14		
	31 - 1.19				

N - No Reading

FIGURE A-56

CER-7 (USGS STATION NO. 136)

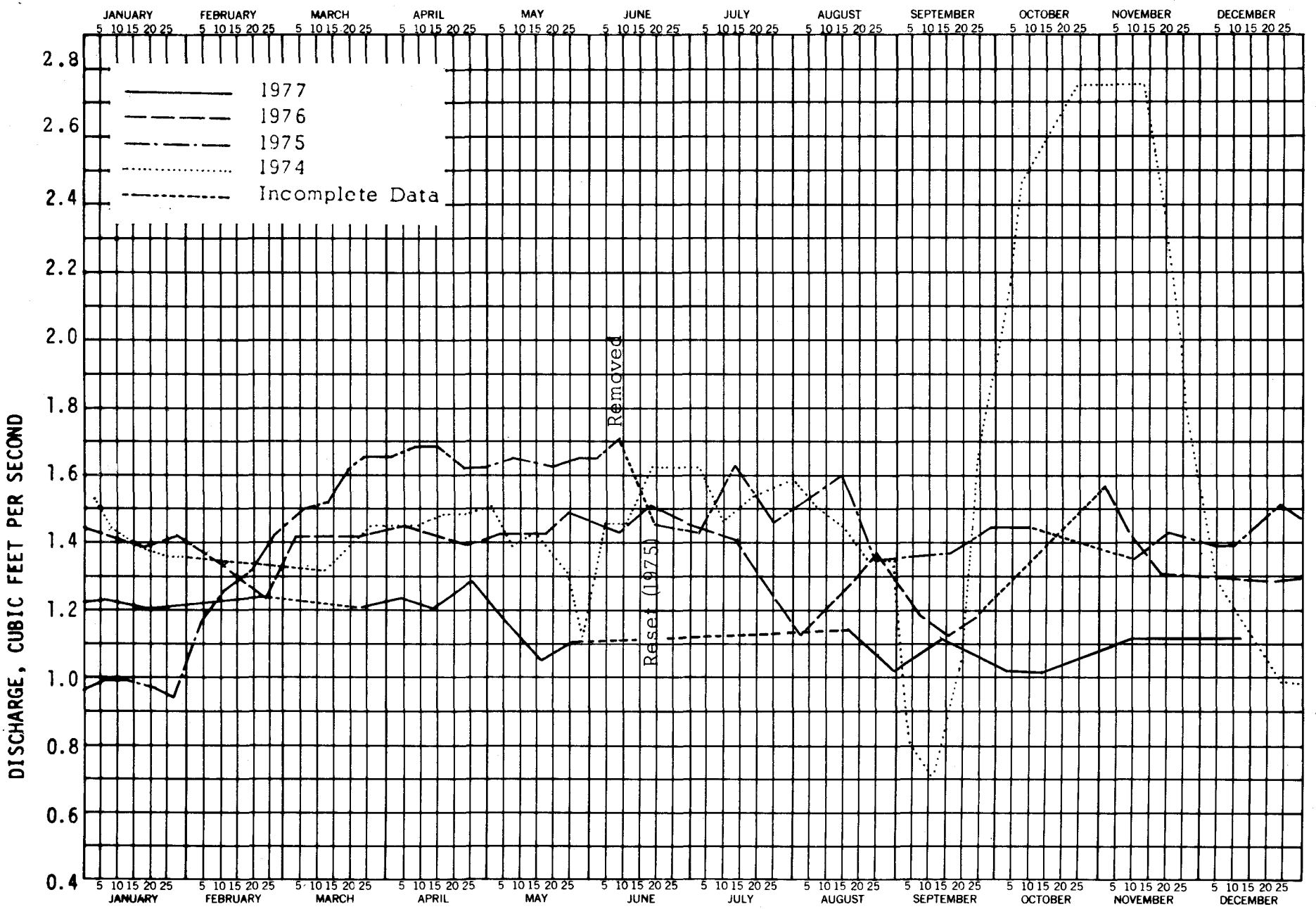


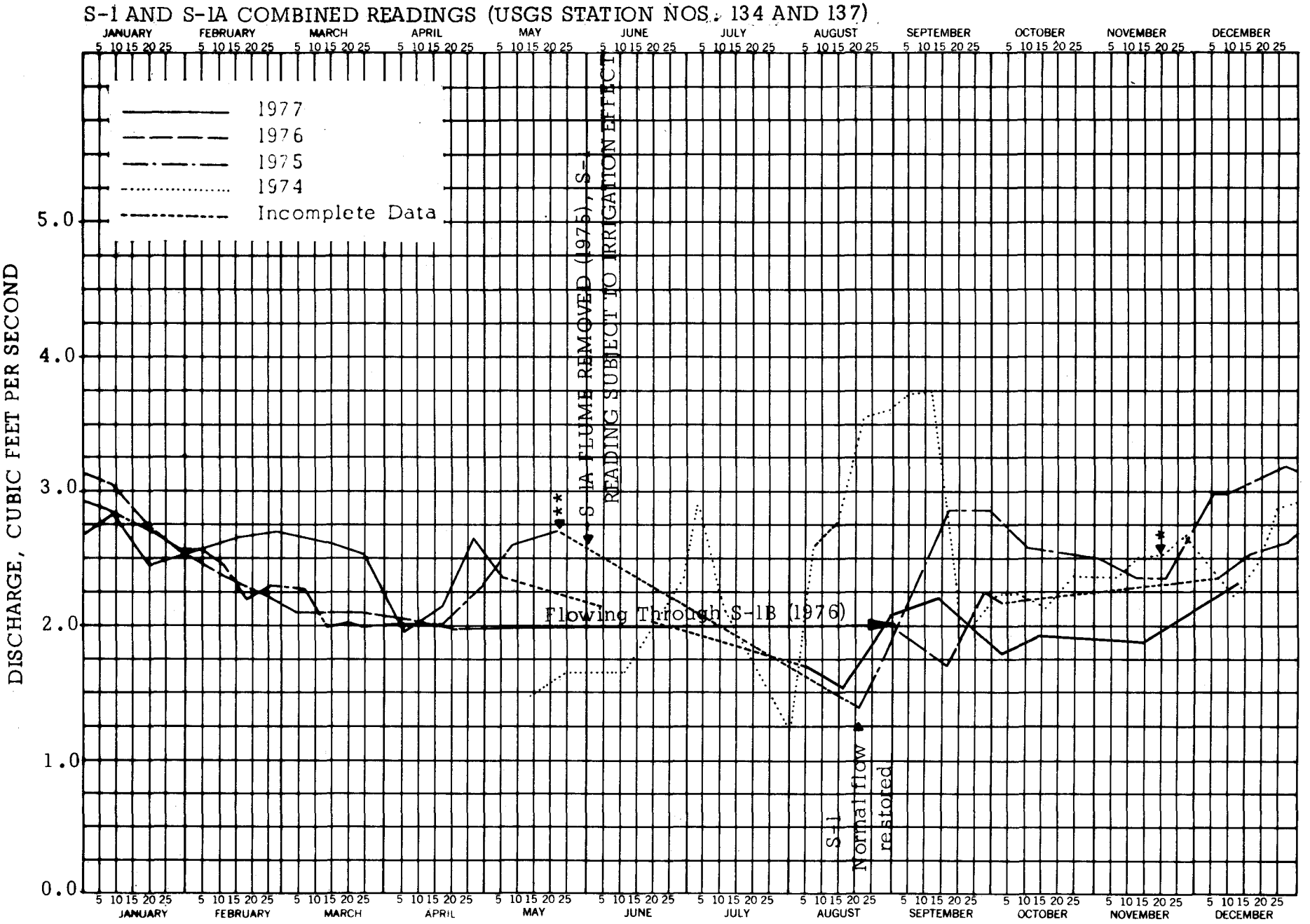
TABLE A-56 DISCHARGE AT CER-7 (USGS STATION NO. 136), SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: August 1972 to current year
Latitude: 39° 44' 50", Longitude: 108° 10' 05"
SW1/4, NE1/4, Sec. 33, T3S, R96W, Rio Blanco County

1974											
	JULY	3 - 1.62	AUG	7 - 1.50	SEPT	4 - 0.80	OCT	2 - 2.03	NOV	2 - 2.75	DEC 5 - 1.28
		10 - 1.45		14 - 1.45		11 - 0.69		8 - 2.46		6 - 2.75	11 - 1.17
		17 - 1.53		22 - 1.34		20 - 1.50		16 - 2.60		13 - 2.75	18 - 1.07
		31 - 1.59		30 - 1.34		24 - 1.62		24 - 2.75		20 - 2.36	24 - 0.99
										26 - 1.77	31 - 0.97
1975											
	JAN	6 - 0.99	FEB	5 - 1.17	MAR	7 - 1.50	APR	2 - 1.65	MAY	8 - 1.65	JUN 3 - 1.65
		13 - 0.99		12 - 1.26		14 - 1.53		9 - 1.68		20 - 1.62	11 - R
		22 - 0.97		19 - 1.31		20 - 1.62		16 - 1.68		28 - 1.65	19 - 1.45
		29 - 0.94		26 - 1.42		25 - 1.65		23 - 1.62			
								30 - 1.62			
	JULY	3 - 1.42	AUG	15 - 1.59	SEPT	16 - 1.36	OCT	10 - 1.45	NOV	10 - 1.34	DEC 4 - 1.39
		14 - 1.62		25 - 1.34		29 - 1.45		31 - N		20 - 1.42	10 - 1.39
		25 - 1.45									24 - 1.50
1976											
	JAN	8 - 1.42	FEB	10 - 1.34	MAR	4 - 1.42	APR	6 - 1.45	MAY	5 - 1.42	JUN 9 - 1.42
		19 - 1.39		24 - 1.23		15 - 1.42		26 - 1.39		18 - 1.42	18 - 1.50
		28 - 1.42				24 - 1.42				28 - 1.48	
	JULY	2 - 1.42	AUG	2 - 1.12	SEPT	7 - 1.17	OCT	- N	NOV	1 - 1.56	DEC 7 - 1.28
		14 - 1.39		13 - 1.23		15 - 1.12				17 - 1.31	16 - N
		23 - 1.26		25 - 1.36		24 - 1.17					28 - 1.26
1977											
	JAN	7 - 1.23	FEB	16 - 1.23	MAR	14 - W	APR	5 - 1.23	MAY	5 - 1.17	JUN 14 - N
		20 - 1.20		25 - 1.23		24 - 1.20		15 - 1.20		17 - 1.04	
								26 - 1.28		27 - 1.10	
	JULY	14 - I	AUG	16 - 1.15	SEPT	13 - 1.12	OCT	3 - 1.02	NOV	10 - 1.12	DEC 12 - 1.12
		28 - I		31 - 1.02				14 - 1.02			

N - No Reading
W - Washed Out
R - Flume Removed
I - Irrigating Above Flume

FIGURE A-57 (a & b)



* FLOWING THROUGH S-1 ONLY (1974)

** FLOWING THROUGH S-1 AND S-1A (1975)

TABLE A-57(a) DISCHARGE AT S-1, SPRING ON STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: June 1968 to current year
Latitude: 39° 49' 30", Longitude: 108° 11' 07"
NE1/4, NE1/4, Sec. 5, T3S, R96W, Rio Blanco County

1974						
JULY 3 - 0.17	AUG 7 - 0.62	SEPT 4 - 0.70	OCT - N	NOV 20 - 2.52	DEC 5 - 2.39	
10 - 0.17	14 - 0.41	11 - 0.76		26 - 2.66	11 - 2.18	
17 - 0.19	22 - 0.64	20 - 0.76			18 - 2.44	
31 - 0.81	30 - 0.76	24 - 0.76			24 - 2.88	
					31 - 2.93	
1975						
JAN 7 - 2.88	FEB 5 - 2.57	MAR 7 - 2.27	APR 2 - 2.02	MAY 8 - 2.61	JUN 3 - 0.00 (I)	
14 - 2.79	12 - 2.44	14 - 1.98	9 - 2.02	22 - 0.94	11 - 0.00 (I)	
22 - 2.70	19 - 2.18	20 - 2.02	16 - 2.02	28 - 0.00 (I)	19 - 0.00 (I)	
29 - 2.57	26 - 2.31	25 - 1.98	23 - 2.02			
			30 - 2.61			
JULY 3 - 0.00 (I)	AUG 22 - 1.44	SEPT 16 - 2.84	OCT 10 - 2.57	NOV 12 - 2.35	DEC 5 - 2.98	
14 - 0.00 (I)		29 - 2.84	31 - 2.52	21 - 2.35	9 - 2.98	
					26 - 3.17	
1976						
JAN 9 - 3.07	FEB 12 - 2.39	MAR 5 - 2.10	APR 7 - 2.06	MAY - S-1B	JUN - S-1B	
20 - 2.75	25 - 2.18	16 - 2.10	22 - 1.98			
29 - 2.57		25 - 2.10				
JULY - S-1B	AUG - S-1B	SEPT 3 - 1.94	OCT 2 - 2.18	NOV - N	DEC 7 - 2.35	
		16 - 1.70			17 - 2.52	
		27 - 2.27			28 - 2.61	
1977						
JAN 10 - 2.84	FEB 17 - 2.66	MAR 15 - 2.61	APR 6 - 1.94	MAY 6 - 2.35	JUN 21 - N	
21 - 2.44	28 - 2.70	25 - 2.52	18 - 2.14	18 - N		
			27 - 2.66	31 - N		
JULY 14 - I	AUG 5 - 1.70	SEPT 14 - 2.22	OCT 3 - 1.78	NOV 15 - 1.82	DEC 13 - 2.27	
	16 - 1.55		14 - 1.86			
	31 - 2.10					

N - No Reading
S-1B - Flowing Through S-1B
I - Irrigating Above Flume

TABLE A-57(b) DISCHARGE AT S-1A (USGS STATION NO. 137), SPRING ON STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

9" Parshall Flume
Period of Record: May 1969 to current year
Latitude: 39° 49' 30", Longitude: 108° 11' 07"
NE1/4, NE1/4, Sec. 5, T3S, R96W, Rio Blanco County

1974

JULY	AUG	SEPT	OCT	NOV	DEC
3 - 2.70	7 - S	4 - 2.98	1 - 2.22	2 - 2.35	- S-1
10 - 2.02	14 - S	11 - 3.02	8 - 2.22	6 - 2.35	
31 - 0.41	22 - 2.88	20 - 2.14	16 - 2.14	13 - 2.48	
	30 - 2.84	24 - 1.98	24 - 2.35	20 - S-1	

1975

JAN	FEB	MAR	APR	MAY
- S-1	- S-1	- S-1	- S-1	22 - 1.78
				28 - R

R - Flume Removed
S - Submerged
S-1 - Flowing through S-1

FIGURE A-57 (c)

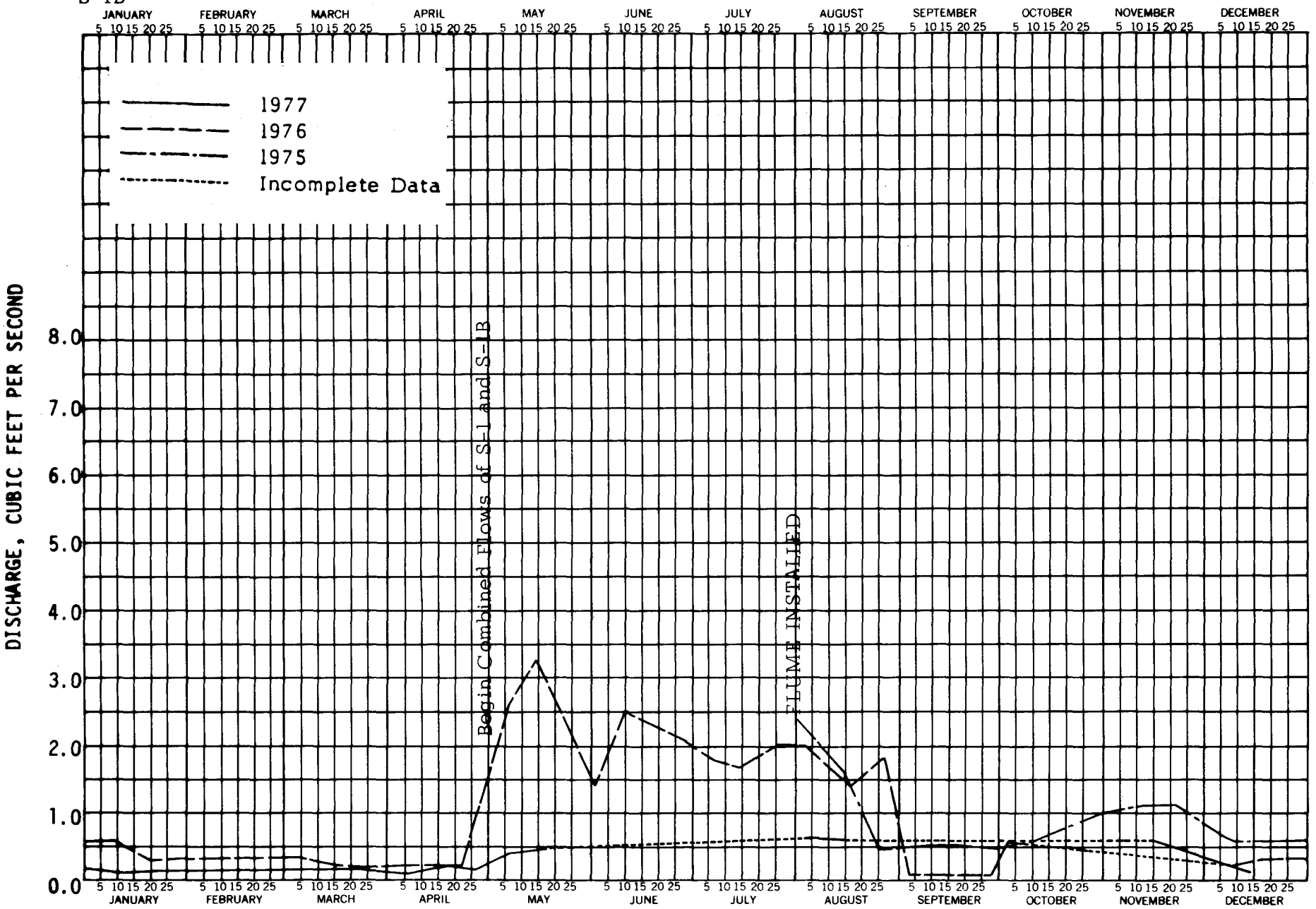

S-1B
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Begin Combined Flows of S-1 and S-1B
FLUME INSTALLED

TABLE A-57(c) DISCHARGE AT S-1B, SPRING ON STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

24" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 49' 03", Longitude: 108° 11' 10"
NE1/4, NE1/4, Sec. 5, T3S, R96W, Rio Blanco County

1975											
	JULY 30 - 2.40	AUG	14 - 1.57	SEPT	16 - 0.51	OCT	10 - 0.56	NOV	12 - 1.11	DEC	5 - 0.66
			25 - 0.42		29 - 0.42		31 - 0.99		21 - 1.11		9 - 0.56
											26 - 0.56
1976											
	JAN 9 - 0.56	FEB	12 - 0.30	MAR	5 - 0.30	APR	7 - 0.23	MAY	6 - 2.57 (C)	JUN	1 - 1.37 (I)(C)
	20 - 0.30		25 - 0.30		16 - 0.23		22 - 0.23		14 - 3.26 (C)		10 - 2.48 (C)
	29 - 0.34				25 - 0.19						24 - 2.16 (C)
	JULY 6 - 1.79 (C)	AUG	3 - 1.93 (C)	SEPT	3 - 0.08	OCT	2 - 0.56	NOV	- N	DEC	7 - 0.23
	15 - 1.64 (C)		16 - 1.37 (C)		16 - 0.04						16 - 0.27
	26 - 2.01 (C)		26 - 1.79 (C)		27 - 0.06						28 - 0.30
1977											
	JAN 10 - 0.11	FEB	17 - 0.13	MAR	15 - 0.14	APR	6 - 0.09	MAY	6 - 0.38	JUN	21 - N
	21 - 0.14		28 - 0.13		25 - 0.14		18 - 0.22		18 - 0.47		
							27 - 0.14		31 - N		
	JULY 14 - I	AUG	5 - 0.61	SEPT	14 - N	OCT	N	NOV	15 - 0.61	DEC	13 - 0.19
			16 - 0.56								

N - No Reading
I - Irrigating Above Flume
C - Combined with S-1

FIGURE A-58

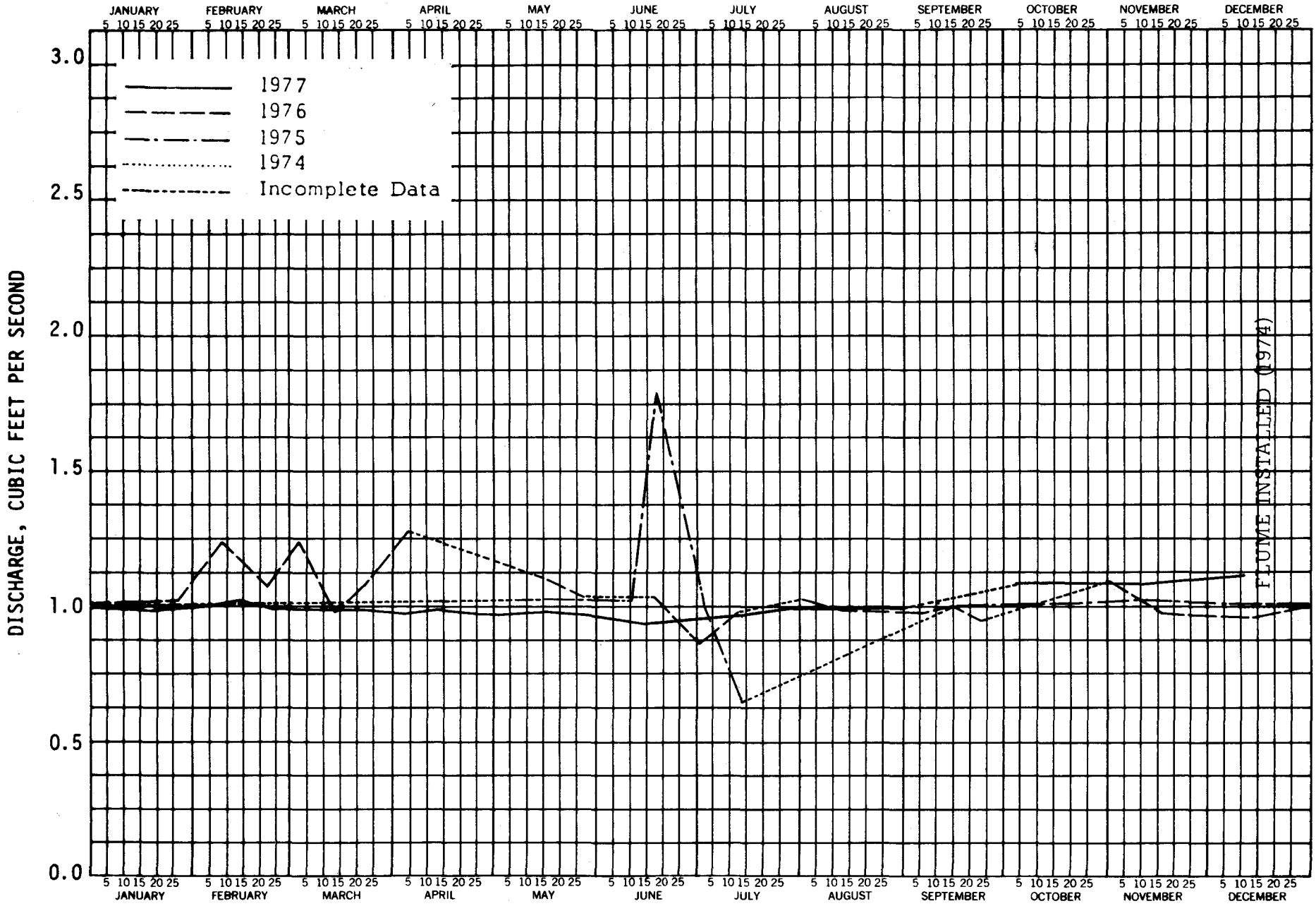

S-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
FLUME INSTALLED (1974)

TABLE A-58 DISCHARGE AT S-2, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

6" Parshall Flume
Period of Record: December 1974 to current year
Latitude 39° 47' 18", Longitude: 108° 10' 22"
NE 1/4, SW1/4, Sec. 16, T3S, R96W, Rio Blanco County

1974											
DEC	12 - 0.99										
	18 - 0.99										
	24 - 0.99										
	31 - 0.99										
1975											
JAN	6 - 0.99	FEB	- N	MAR	- N	APR	- N	MAY	8 - N	JUN	3 - 1.02
	14 - 0.97								15 - 1.04		11 - 1.02
	22 - N								20 - 1.04		19 - 1.77
	29 - N								28 - 1.04		
JULY	3 - 1.02	AUG	- N	SEPT	16 - 0.99	OCT	10 - 0.99	NOV	10 - 1.07	DEC	4 - 1.04
	14 - 0.65				29 - 0.99				20 - 1.10		10 - 1.02
	25 - N										24 - 1.04
1976											
JAN	8 - 1.02	FEB	10 - 1.23	MAR	4 - 1.23	APR	6 - 1.28	MAY	17 - 1.10	JUN	9 - N
	19 - 1.02		24 - 1.07		15 - 0.97		26 - N		28 - 1.04		18 - 1.04
	28 - 1.02				24 - 1.07						
JULY	2 - 0.87	AUG	2 - 1.02	SEPT	7 - 0.97	OCT	- N	NOV	1 - 1.10	DEC	7 - 0.97
	14 - 0.99		13 - 0.97		15 - 0.99				17 - 0.97		16 - 0.97
	23 - N		25 - 0.97		24 - 0.94						28 - 0.99
1977											
JAN	7 - 0.99	FEB	3 - 0.99	MAR	14 - 0.97	APR	5 - 0.94	MAY	5 - 0.92	JUN	21 - 0.87
	20 - 0.97		16 - 1.04		24 - 0.97		15 - 0.97		17 - 0.97		
			25 - 0.97				26 - 0.94		24 - 0.94		
JULY	14 - 0.97	AUG	16 - 0.99	SEPT	13 - 1.17(S)	OCT	3 - 1.10	NOV	10 - 0.99	DEC	12 - 1.04
	28 - 0.99		31 - 0.99				14 - 1.10				

N - No Reading
S - Submerged

FIGURE A-59

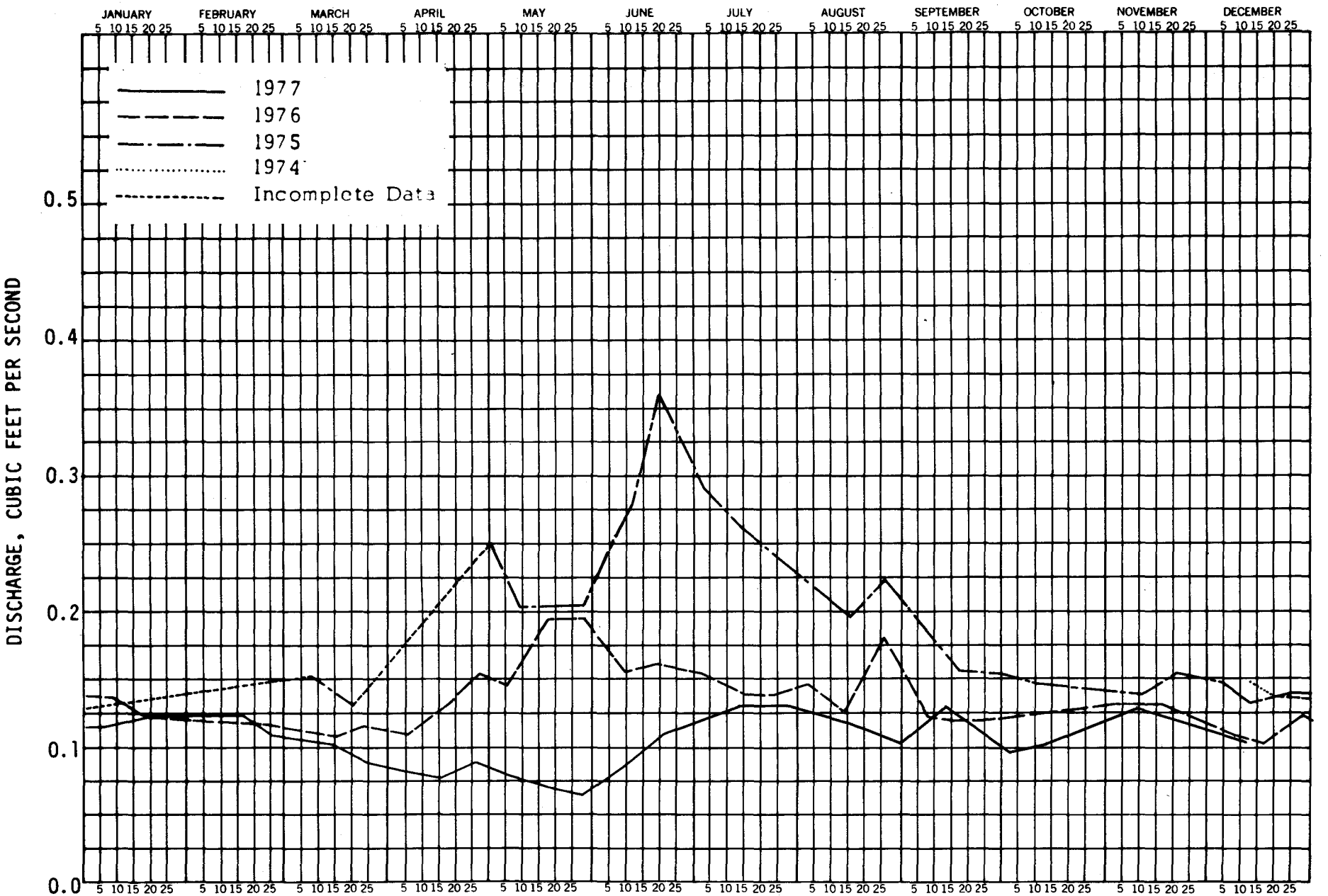

S-3
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
1974
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5

TABLE A-59 DISCHARGE AT S-3, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 40' 15", Longitude: 108° 11' 20"
NE1/4, SE1/4, Sec. 29, T4S, R96W, Garfield County

1974											
DEC	12 - 0.146										
	18 - 0.131										
	24 - N										
1975											
JAN	- N	FEB	- N	MAR	7 - 0.154	APR	2 - N	MAY	8 - 0.205	JUN	3 - 0.241
					14 - N		9 - N		20 - 0.205		11 - 0.279
					20 - 0.131		16 - N		28 - 0.205		19 - 0.361
					25 - N		23 - N				
							30 - 0.250				
JULY	3 - 0.289	AUG	15 - 0.196	SEPT	16 - 0.154	OCT	10 - 0.146	NOV	10 - 0.138	DEC	4 - 0.146
	14 - 0.260		25 - 0.222		29 - 0.154		31 - N		20 - 0.154		12 - 0.131
	23 - 0.241										24 - 0.138
1976											
JAN	8 - 0.138	FEB	10 - N	MAR	15 - 0.109	APR	6 - 0.109	MAY	5 - 0.146	JUN	9 - 0.154
	19 - 0.124		24 - 0.117		24 - 0.117		26 - 0.154		17 - 0.196		18 - 0.162
	28 - 0.124								28 - 0.196		
JULY	2 - 0.154	AUG	2 - 0.146	SEPT	7 - 0.124	OCT	- N	NOV	1 - 0.131	DEC	7 - 0.109
	14 - 0.138		13 - 0.124		15 - 0.117				17 - 0.131		16 - 0.102
	23 - 0.138		25 - 0.179		24 - 0.117						28 - 0.124
1977											
JAN	7 - 0.117	FEB	3 - 0.124	MAR	14 - 0.102	APR	5 - 0.082	MAY	5 - 0.082	JUN	21 - 0.109
	20 - 0.124		16 - 0.124		24 - 0.089		15 - 0.076		17 - 0.070		
			25 - 0.109				26 - 0.089		27 - 0.064		
JULY	14 - 0.117	AUG	16 - 0.109	SEPT	13 - 0.117	OCT	3 - 0.095	NOV	10 - 0.117	DEC	12 - 0.102
	28 - 0.117		31 - 0.102				14 - 0.102				

N - No Reading

FIGURE A-60

S-4

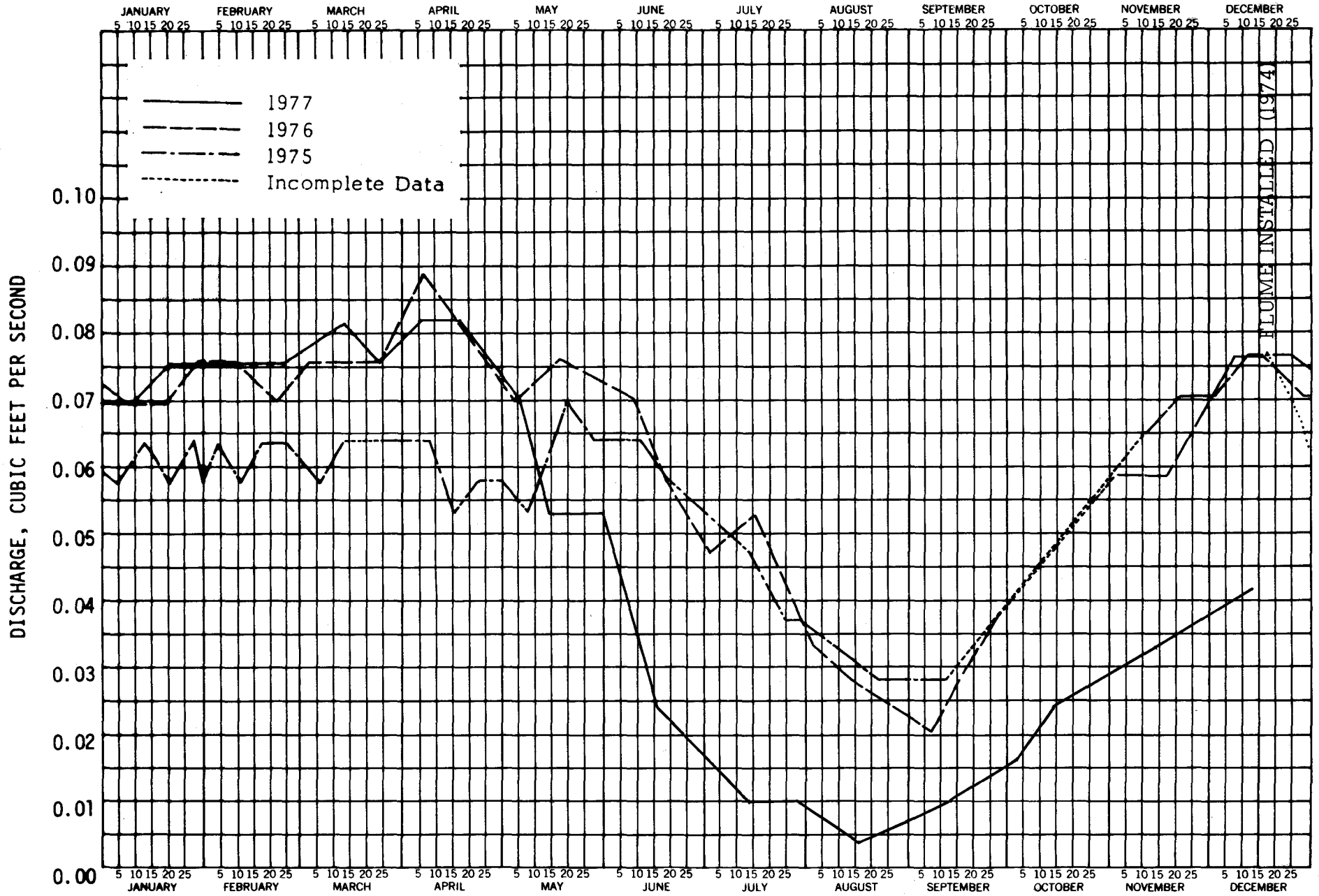


TABLE A-60 DISCHARGE AT S-4, SPRING ON WEST FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: December 1974 to current year
Latitude: 39° 44' 45", Longitude: 108° 12' 27"
SW1/4, NE1/4, Sec. 31, T3S, R96W, Rio Blanco County

1974											
	DEC	16 - 0.076									
		24 - 0.070									
		31 - 0.058									
1975											
	JAN	6 - 0.058	FEB	5 - 0.064	MAR	7 - 0.058	APR	2 - 0.064	MAY	8 - 0.053	JUN 3 - 0.064
		14 - 0.064		12 - 0.058		14 - 0.064		9 - 0.064		21 - 0.070	11 - 0.064
		22 - 0.058		19 - 0.064		20 - N		16 - 0.053		28 - 0.064	19 - 0.058
		29 - 0.064		26 - 0.064		25 - 0.064		23 - 0.058			
								30 - 0.058			
	JULY	14 - 0.047	AUG	22 - 0.028	SEPT	12 - 0.028	OCT	- N	NOV	10 - 0.064	DEC 1 - 0.070
		25 - 0.037		29 - 0.028		29 - N				20 - 0.070	10 - 0.076
		29 - 0.037									17 - 0.076
											24 - 0.076
1976											
	JAN	9 - 0.070	FEB	10 - 0.076	MAR	4 - 0.076	APR	7 - 0.089	MAY	5 - 0.070	JUN 9 - 0.070
		20 - 0.070		23 - 0.070		25 - 0.076				18 - 0.076	18 - 0.058
		29 - 0.076									
	JULY	2 - 0.047	AUG	2 - 0.033	SEPT	7 - 0.020	OCT	- N	NOV	2 - 0.058	DEC 7 - 0.076
		15 - 0.053		13 - 0.028		15 - 0.028				17 - 0.058	16 - 0.076
				25 - 0.024		27 - 0.037					28 - 0.070
1977											
	JAN	10 - 0.070	FEB	3 - 0.076	MAR	14 - 0.082	APR	6 - 0.082	MAY	6 - 0.070	JUN 21 - 0.024
		21 - 0.076		16 - 0.076		25 - 0.076		18 - 0.082		15 - 0.053	
				25 - 0.076				27 - 0.076		31 - 0.053	
	JULY	14 - 0.010	AUG	16 - 0.004	SEPT	13 - 0.010	OCT	3 - 0.016	NOV	14 - 0.033	DEC 13 - 0.042
		28 - 0.010		31 - 0.007				14 - 0.024			

N - No Reading

FIGURE A-61

S-5

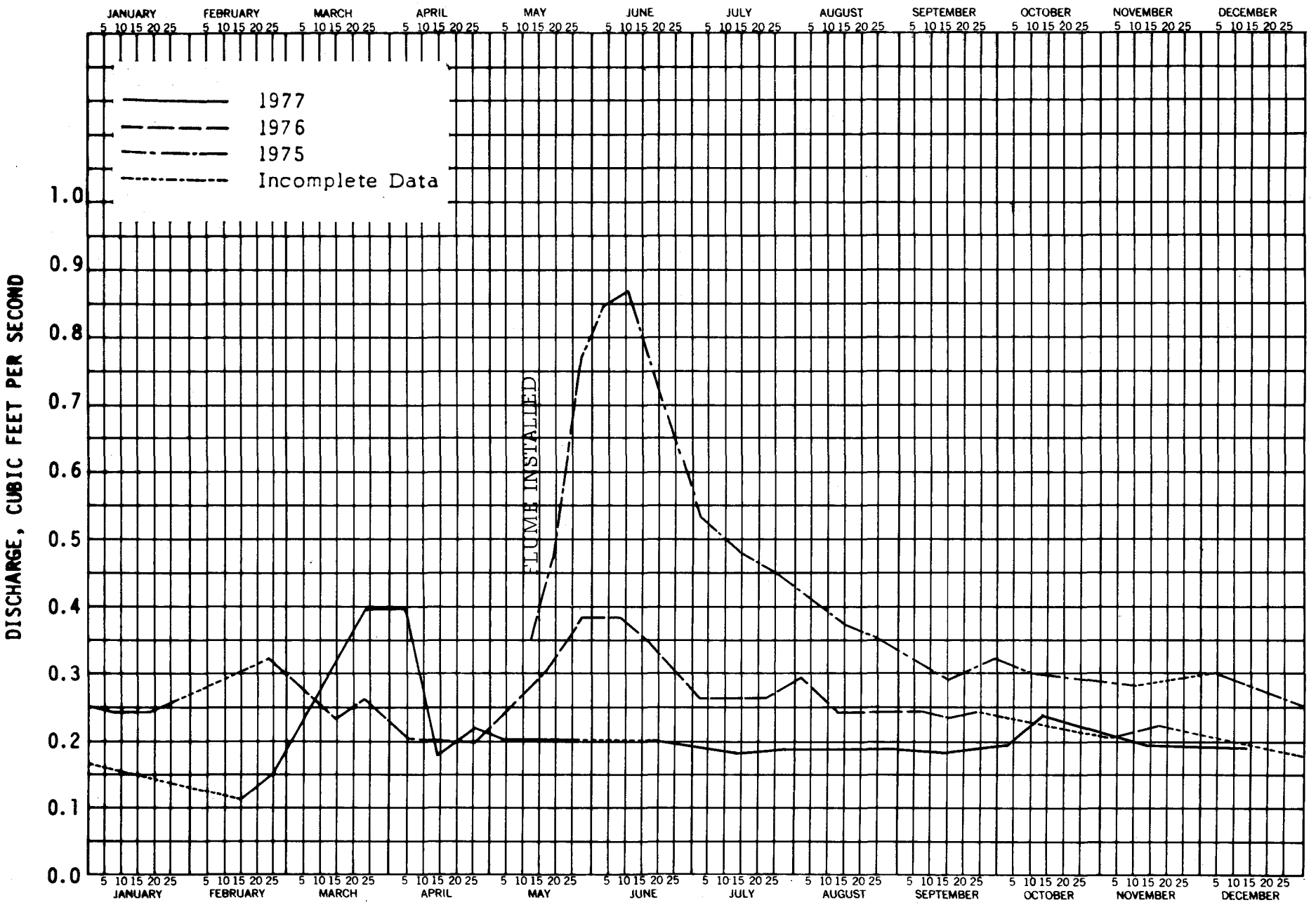


TABLE A-61 DISCHARGE AT S-5, SPRING ON EAST FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 41' 55", Longitude: 108° 08' 40"
NW1/4, SW1/4, Sec. 14, T4S, R96W, Rio Blanco County

1975											
MAY	13 - 0.350	JUN	3 - 0.843	JUL	3 - 0.534	AUG	15 - 0.371	SEPT	15 - 0.289	OCT	10 - 0.299
	20 - 0.474		11 - 0.872		14 - 0.485		25 - 0.350		29 - 0.319		31 - 0.289
	28 - 0.771		19 - 0.744		25 - 0.450						
NOV	10 - 0.279	DEC	4 - 0.299								
	20 - N		24 - 0.260								
1976											
JAN	8 - 0.241	FEB	10 - N	MAR	15 - 0.231	APR	6 - 0.205	MAY	5 - 0.241	JUN	9 - 0.382
	19 - 0.241		24 - 0.319		24 - 0.260		26 - 0.196		17 - 0.299		18 - 0.339
	28 - 0.260								28 - 0.382		
JULY	2 - 0.260	AUG	2 - 0.289	SEPT	7 - 0.241	OCT	- N	NOV	2 - 0.205	DEC	- F
	14 - 0.260		13 - 0.241		15 - 0.231				17 - 0.222		
	23 - 0.260		25 - 0.241		24 - 0.241						
1977											
JAN	- F	FEB	3 - F	MAR	24 - 0.393	APR	5 - 0.393	MAY	5 - 0.196	JUN	- N
			16 - 0.109				15 - 0.170		17 - 0.196		
			25 - 0.146				26 - 0.213		27 - 0.196		
JULY	14 - 0.179	AUG	16 - 0.187	SEPT	13 - 0.179	OCT	3 - 0.196	NOV	14 - 0.196	DEC	12 - 0.187
	28 - 0.187		31 - 0.187				14 - 0.241				

N - No Reading
F - Frozen

S-6

FIGURE A-62

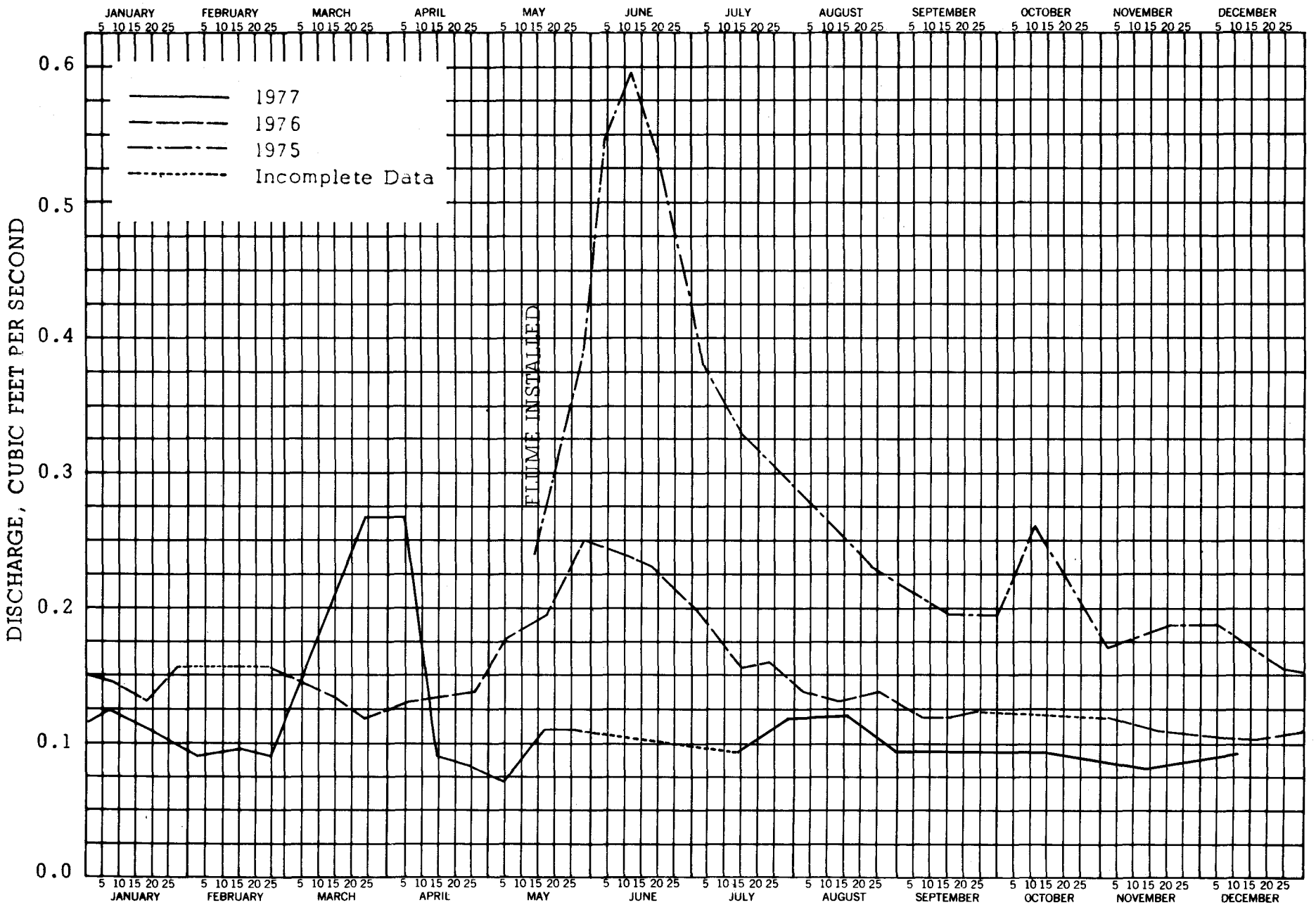


TABLE A-62 DISCHARGE AT S-6, SPRING ON EAST FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 41' 10", Longitude: 108° 08' 45"
NE1/4, SE1/4, Sec. 22, T4S, R96W, Garfield County

1975											
	MAY	13 - 0.241	JUN	3 - 0.546	JUL	3 - 0.382	AUG	15 - 0.250	SEPT	15 - 0.196	OCT 10 - 0.260
		20 - 0.309		11 - 0.597		14 - 0.329		22 - 0.231		29 - 0.196	31 - 0.170
		28 - 0.393		19 - 0.534		25 - 0.279					
	NOV	10 - 0.179	DEC	4 - 0.187							
		20 - 0.187		24 - 0.154							
1976											
	JAN	8 - 0.146	FEB	10 - N	MAR	15 - 0.131	APR	6 - 0.131	MAY	5 - 0.179	JUN 9 - 0.241
		19 - 0.131		24 - 0.154		24 - 0.117		26 - 0.138		17 - 0.196	18 - 0.231
		28 - 0.154								28 - 0.250	
	JULY	2 - 0.196	AUG	2 - 0.138	SEPT	7 - 0.117	OCT	- N	NOV	2 - 0.117	DEC 7 - 0.102
		14 - 0.154		13 - 0.131		15 - 0.117				17 - 0.109	16 - 0.102
		23 - 0.162		25 - 0.138		24 - 0.124					28 - 0.109
1977											
	JAN	7 - 0.124	FEB	3 - 0.089	MAR	24 - 0.269	APR	5 - 0.269	MAY	5 - 0.070	JUN - N
		20 - 0.109		16 - 0.095				15 - 0.089		17 - 0.109	
				25 - 0.089				26 - 0.082		27 - 0.109	
	JULY	14 - 0.095	AUG	16 - 0.102	SEPT	13 - 0.095	OCT	3 - 0.095	NOV	14 - 0.082	DEC 12 - 0.095
		28 - 0.102		31 - 0.095				14 - 0.095			

N - No Reading

FIGURE A-63

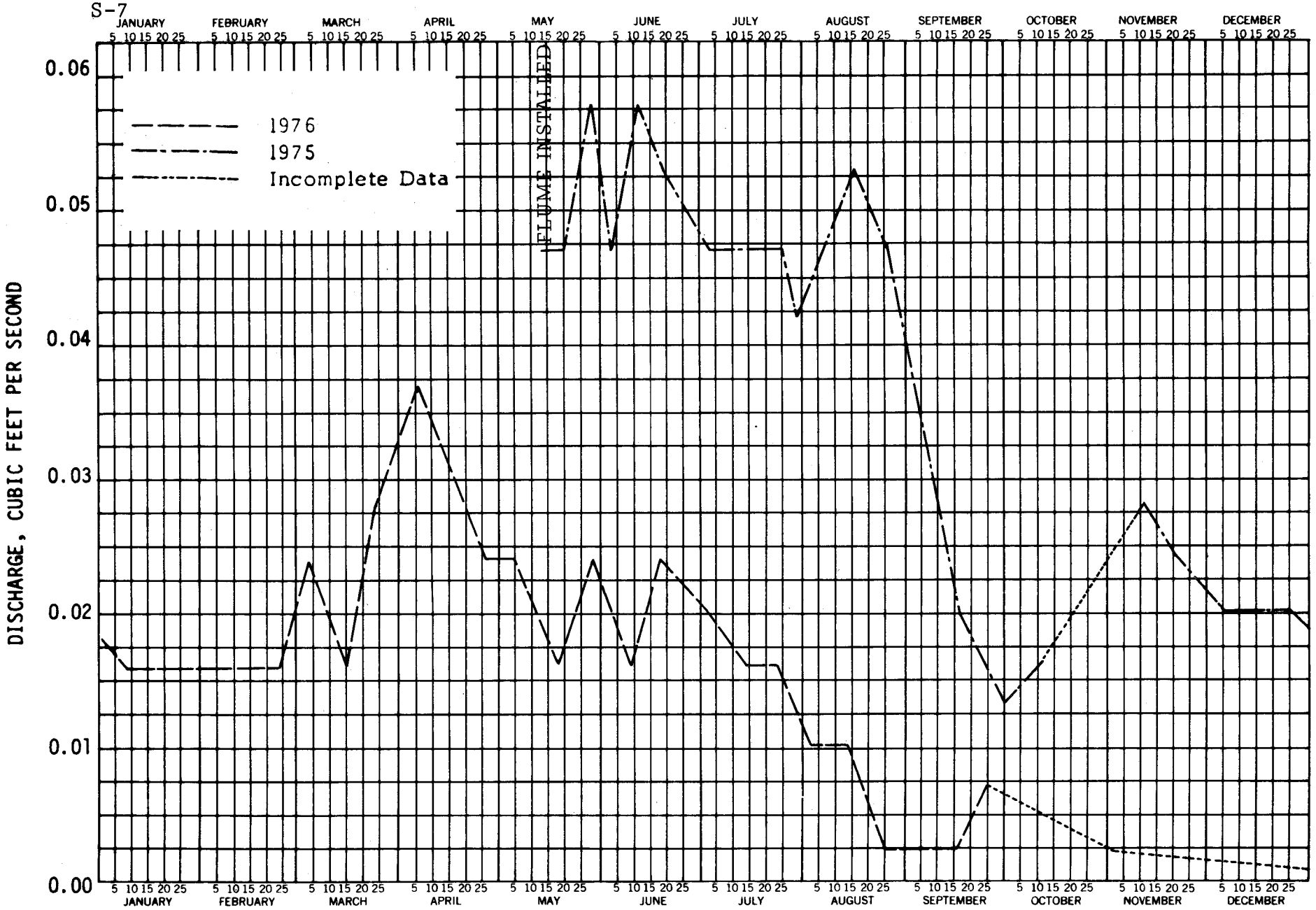

S-7
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND

TABLE A-63 DISCHARGE AT S-7, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 44' 15", Longitude: 108° 10' 05"
NE1/4, NE1/4, Sec. 4, T4S, R96W, Rio Blanco County

1975											
MAY	13 - 0.047	JUN	3 - 0.047	JULY	3 - 0.047	AUG	15 - 0.053	SEPT	16 - 0.020	OCT	10 - 0.016
	20 - 0.047		11 - 0.058		14 - 0.047		25 - 0.047		29 - 0.013		31 - N
	28 - 0.058		19 - 0.053		25 - 0.047						
					29 - 0.042						
NOV	10 - 0.028	DEC	4 - 0.020								
	20 - 0.024		24 - 0.020								
1976											
JAN	8 - 0.016	FEB	10 - 0.016	MAR	4 - 0.024	APR	6 - 0.037	MAY	5 - 0.024	JUN	9 - 0.016
	19 - 0.016		24 - 0.016		15 - 0.016		26 - 0.024		18 - 0.016		18 - 0.024
	28 - 0.016				24 - 0.028				28 - 0.024		
JULY	2 - 0.020	AUG	2 - 0.010	SEPT	7 - 0.002	OCT	- N	NOV	1 - 0.002	DEC	- F
	14 - 0.016		13 - 0.010		15 - 0.002				17 - F		
	23 - 0.016		25 - 0.002		24 - 0.007						
1977											
JAN	- F	FEB	- F	MAR	- F	APR	- D	MAY	- D	JUN	- D
JULY	14 - D	AUG	16 - D	SEPT	13 - D	OCT	3 - 0.0	NOV	10 - D	DEC	12 - D
	28 - D		31 - D				14 - 0.0				

N - No Reading
F - Frozen
D - Dry

FIGURE A-64

S-8

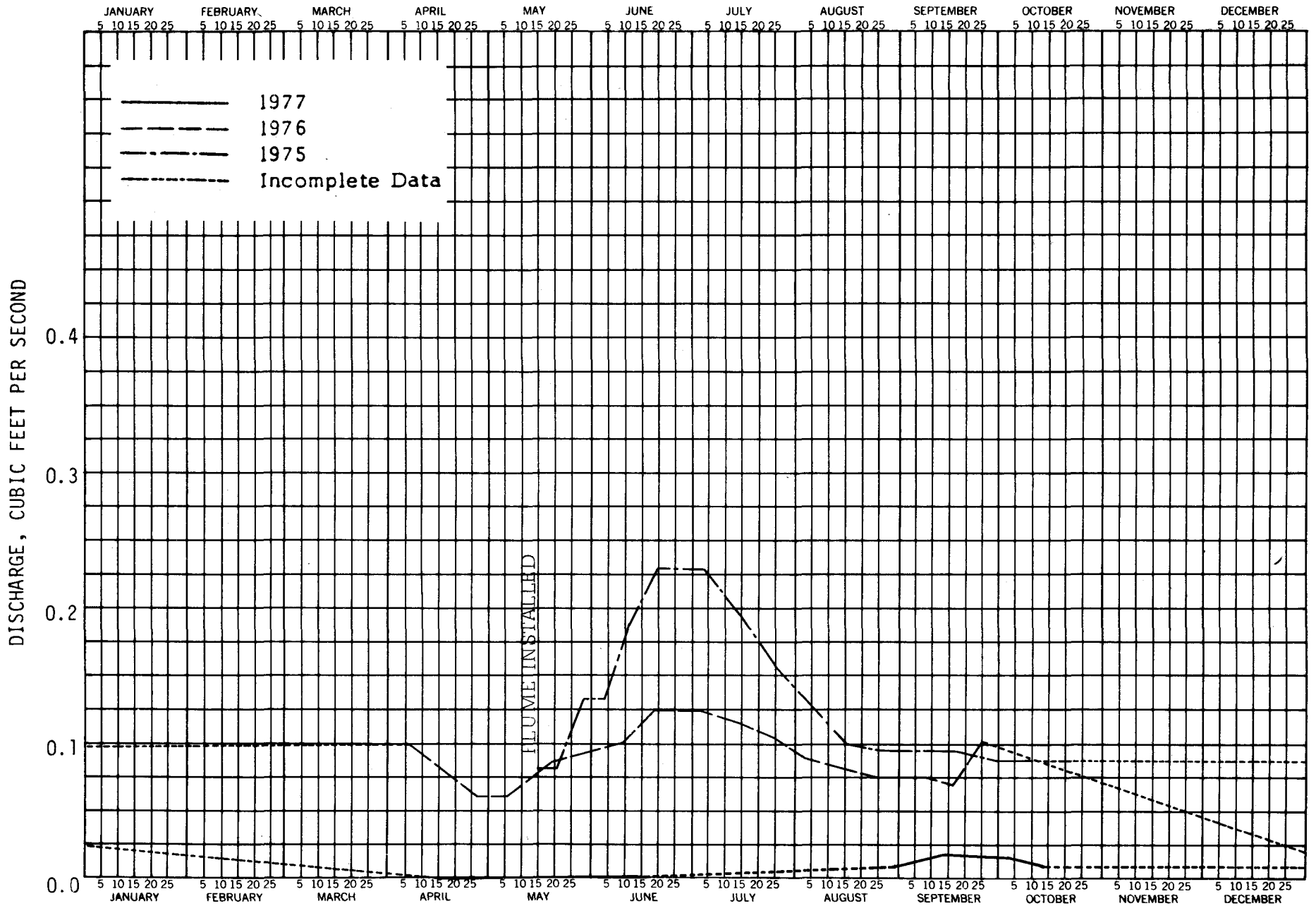


TABLE A-64 DISCHARGE AT S-8, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 42' 00", Longitude: 108° 10' 50"
NE1/4, SE1/4, Sec. 17, T4S, R96W, Rio Blanco County

1975						
MAY	14 - 0.082	JUN 3 - 0.138	JULY 3 - 0.231	AUG 15 - 0.102	SEPT 16 - 0.095	OCT 10 - 0.089
	20 - 0.082	11 - 0.196	14 - 0.196	25 - 0.095	29 - 0.089	31 - N
	28 - 0.138	19 - 0.231	25 - 0.154			
NOV	- F	DEC - F				
1976						
JAN	- F	FEB - F	MAR - F	APR 6 - 0.102	MAY 5 - 0.064	JUN 9 - 0.102
				26 - 0.064	18 - 0.089	18 - 0.124
					28 - 0.095	
JULY	2 - 0.124	AUG 2 - 0.089	SEPT 7 - 0.076	OCT - F	NOV - F	DEC - F
	14 - 0.117	13 - 0.082	15 - 0.070			
	23 - 0.109	25 - 0.076	24 - 0.102			
1977						
JAN	- F	FEB - F	MAR - F	APR - D	MAY - D	JUN - D
JULY	14 - D	AUG 16 - T	SEPT 13 - 0.020	OCT 3 - 0.016	NOV 9 - F	DEC 12 - F
	28 - D	31 - 0.013		14 - 0.010		

N - No Reading
F - Frozen
D - Dry

FIGURE A-65

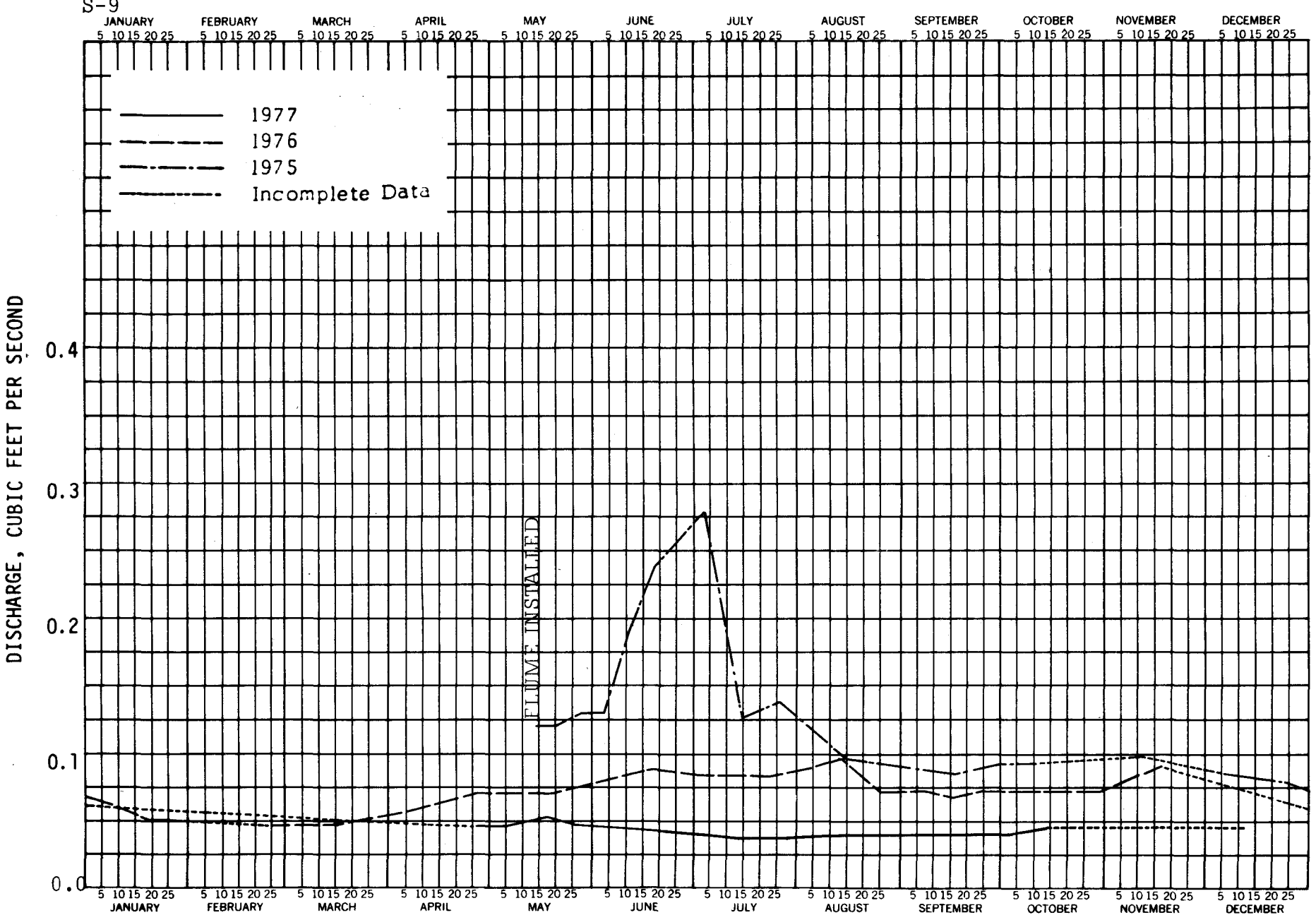

S-9
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.4
0.3
0.2
0.1
0.0
FLUME INSTALLED

TABLE A-65 DISCHARGE AT S-9, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 40' 55", Longitude: 108° 12' 50"
SW1/4, SW1/4, Sec. 19, T4S, R96W, Garfield County

1975											
MAY	14 - 0.117	JUN	3 - 0.131	JULY	3 - 0.279	AUG	15 - 0.095	SEPT	16 - 0.082	OCT	10 - 0.089
	20 - 0.117		11 - 0.196		14 - 0.124				29 - 0.089		31 - N
	28 - 0.131		19 - 0.241		25 - 0.138						
NOV	10 - 0.095	DEC	4 - 0.082								
	20 - F		24 - 0.076								
1976											
JAN	8 - 0.064	FEB	10 - N	MAR	15 - 0.047	APR	6 - 0.058	MAY	5 - 0.070	JUN	9 - 0.082
	19 - 0.053		24 - 0.047		24 - 0.053		26 - 0.070		18 - 0.070		18 - 0.089
	28 - 0.053								28 - 0.076		
JULY	2 - 0.082	AUG	2 - 0.089	SEPT	7 - 0.070	OCT	29 - 0.070	NOV	17 - 0.089	DEC	- F
	14 - 0.082		13 - 0.095		15 - 0.064						
	23 - 0.082		25 - 0.070		24 - 0.070						
1977											
JAN	- F	FEB	- F	MAR	- F	APR	26 - 0.047	MAY	4 - 0.047	JUN	21 - 0.042
									17 - 0.053		
									26 - 0.047		
JULY	14 - 0.037	AUG	16 - 0.042	SEPT	13 - 0.042	OCT	3 - 0.042	NOV	9 - F	DEC	12 - 0.047
	28 - 0.037		31 - 0.042				14 - 0.047				

N - No Reading
F - Frozen

FIGURE A-66

S-10

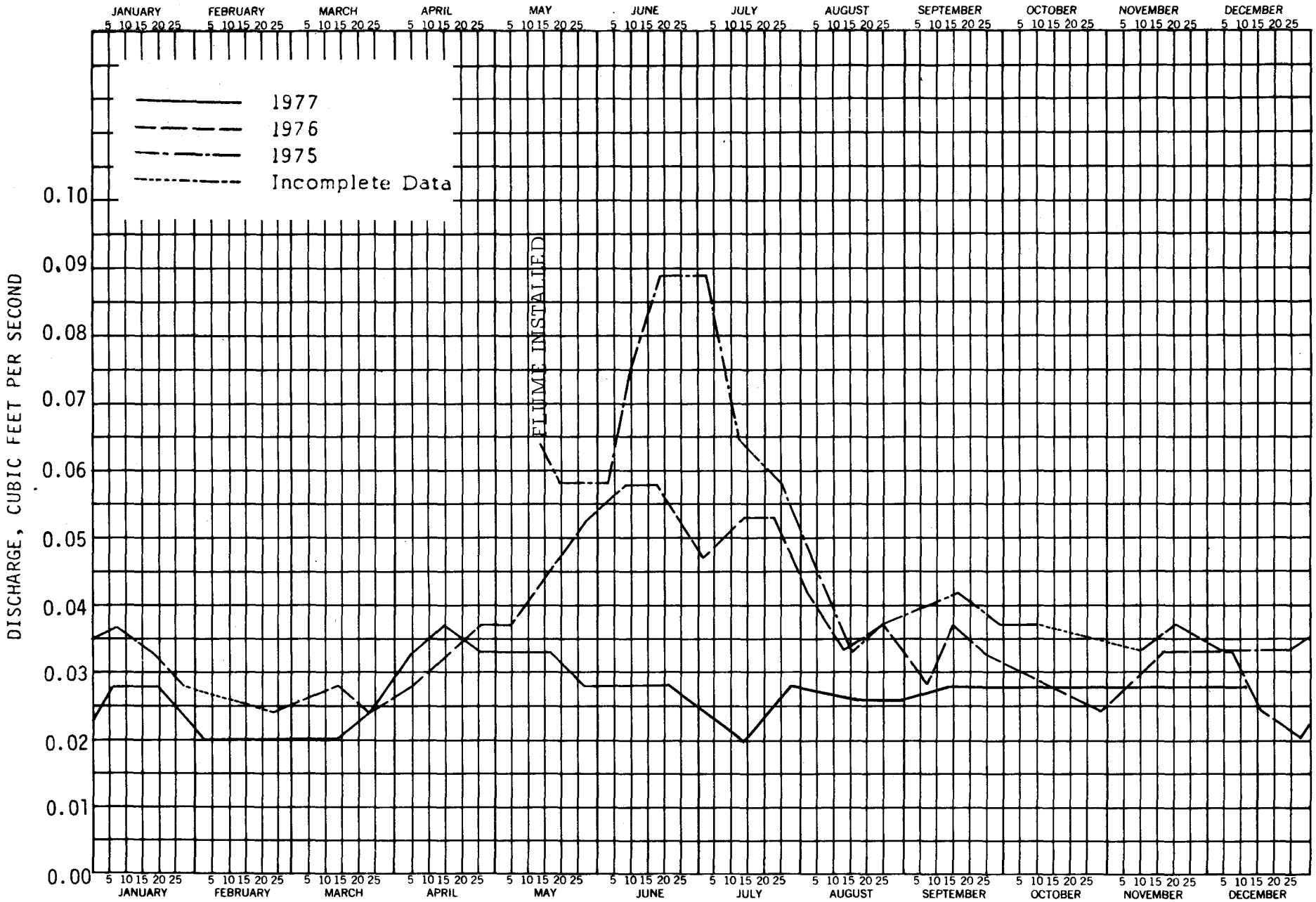


TABLE A-66 DISCHARGE AT S-10, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 40' 35", Longitude: 108° 12' 58"
SW1/4, NW1/4, Sec. 30, T4S, R96W, Garfield County

1975											
MAY	14 - 0.064	JUN	3 - 0.058	JULY	3 - 0.089	AUG	15 - 0.033	SEPT	16 - 0.042	OCT	10 - 0.037
	20 - 0.058		11 - 0.076		14 - 0.064		25 - 0.037		29 - 0.037		31 - N
	28 - 0.058		19 - 0.089		25 - 0.058						
NOV	10 - 0.033	DEC	4 - 0.033								
	20 - 0.037		24 - 0.033								
1976											
JAN	8 - 0.037	FEB	10 - N	MAR	15 - 0.028	APR	6 - 0.028	MAY	5 - 0.037	JUN	9 - 0.058
	19 - 0.033		24 - 0.024		24 - 0.024		26 - 0.037		28 - 0.053		18 - 0.058
	28 - 0.028										
JULY	2 - 0.047	AUG	2 - 0.042	SEPT	7 - 0.028	OCT	29 - 0.024	NOV	17 - 0.033	DEC	7 - 0.033
	14 - 0.053		13 - 0.033		15 - 0.037						16 - 0.024
	23 - 0.053		25 - 0.037		24 - 0.033						28 - 0.020
1977											
JAN	7 - 0.028	FEB	3 - 0.020	MAR	14 - 0.020	APR	5 - 0.033	MAY	5 - 0.033	JUN	21 - 0.028
	20 - 0.028		16 - 0.020		24 - 0.024		15 - 0.037		17 - 0.033		
			25 - 0.020				26 - 0.033		26 - 0.028		
JULY	14 - 0.020	AUG	16 - 0.024	SEPT	13 - 0.028	OCT	3 - 0.028	NOV	9 - 0.028	DEC	12 - 0.028
	28 - 0.028		31 - 0.024				14 - 0.028				

N - No Reading

FIGURE A-67

S-11

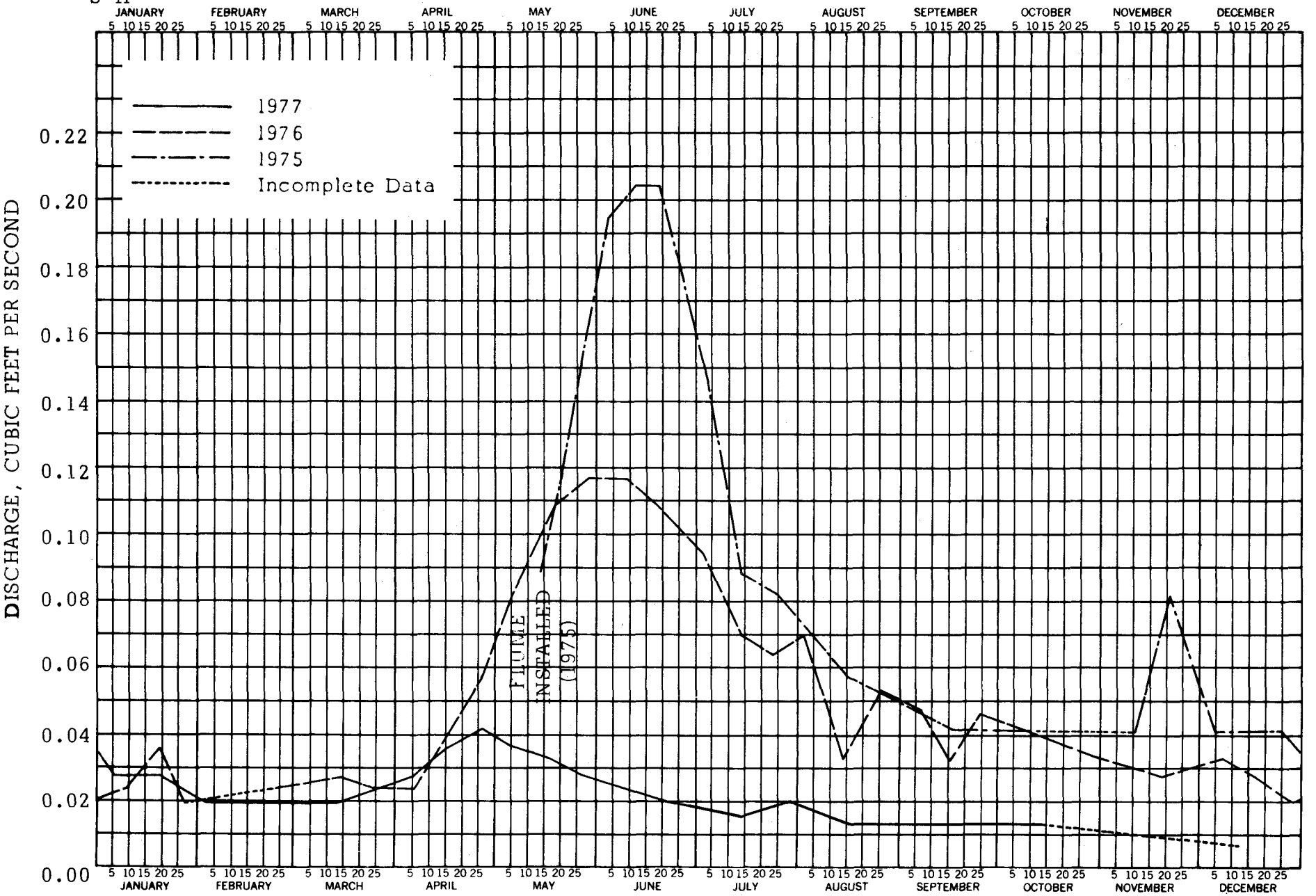


TABLE A-67 DISCHARGE AT S-11, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 40' 55", Longitude: 108° 13' 40"
SE1/4, SW1/4, Sec. 24, T4S, R97W, Garfield County

1975											
	MAY	14 - 0.089	JUN	3 - 0.196	JULY	3 - 0.146	AUG	15 - 0.058	SEPT	16 - 0.042	OCT 10 - 0.042
		20 - 0.117		11 - 0.205		14 - 0.089		25 - 0.053		29 - 0.042	31 - N
		28 - 0.162		19 - 0.205		25 - 0.082					
	NOV	10 - 0.042	DEC	4 - 0.042							
		20 - 0.082		24 - 0.042							
1976											
	JAN	8 - 0.024	FEB	10 - N	MAR	15 - 0.028	APR	6 - 0.024	MAY	5 - 0.082	JUN 9 - 0.117
		19 - 0.037		24 - 0.024		24 - 0.024		26 - 0.058		18 - 0.109	18 - 0.109
		28 - 0.020								28 - 0.117	
	JULY	2 - 0.095	AUG	2 - 0.070	SEPT	7 - 0.047	OCT	29 - 0.033	NOV	17 - 0.028	DEC 7 - 0.033
		14 - 0.070		13 - 0.033		15 - 0.033					17 - 0.028
		23 - 0.064		25 - 0.053		24 - 0.047					28 - 0.020
1977											
	JAN	7 - 0.028	FEB	3 - 0.020	MAR	14 - 0.020	APR	5 - 0.028	MAY	5 - 0.037	JUN 21 - 0.020
		20 - 0.028		16 - 0.020		24 - 0.024		15 - 0.037		17 - 0.033	
								26 - 0.042		26 - 0.028	
	JULY	14 - 0.016	AUG	16 - 0.013	SEPT	13 - 0.013	OCT	3 - 0.013	NOV	9 - F	DEC 12 - 0.007
		28 - 0.020		31 - 0.013				14 - 0.013			

N - No Reading

FIGURE A-68

S-12

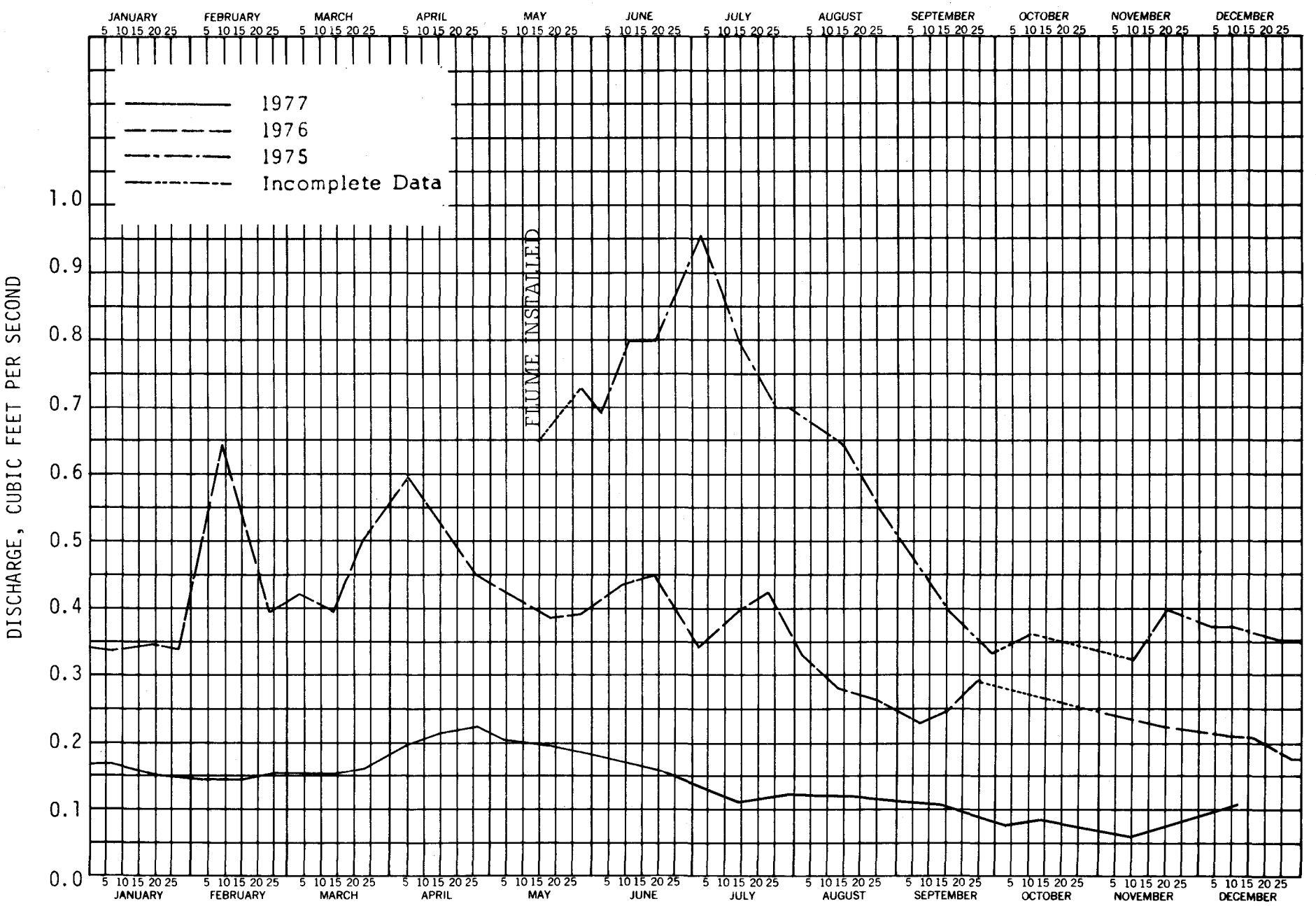


TABLE A-68 DISCHARGE AT S-12, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: May 1975 to current year
Latitude: 39° 44' 10", Longitude: 108° 10' 08"
NE1/4, NE1/4, Sec. 4, T4S, R96W, Rio Blanco County

1975											
MAY	15 - 0.649	JUN	3 - 0.689	JULY	3 - 0.961	AUG	15 - 0.636	SEPT	16 - 0.393	OCT	10 - 0.361
	20 - W		11 - 0.800		14 - 0.800		25 - 0.546		29 - 0.329		31 - N
	28 - 0.730		19 - 0.800		25 - 0.702						
					29 - 0.702						
NOV	10 - 0.319	DEC	4 - 0.371								
	20 - 0.393		10 - 0.371								
			24 - 0.350								
1976											
JAN	8 - 0.339	FEB	10 - 0.649	MAR	4 - 0.427	APR	6 - 0.597	MAY	5 - 0.427	JUN	9 - 0.438
	19 - 0.350		24 - 0.393		15 - 0.393		26 - 0.450		18 - 0.382		18 - 0.450
	28 - 0.339				24 - 0.509				28 - 0.393		
JULY	2 - 0.339	AUG	2 - 0.339	SEPT	7 - 0.222	OCT	- N	NOV	1 - 0.241	DEC	7 - 0.205
	14 - 0.393		13 - 0.279		15 - 0.241				17 - 0.222		17 - 0.205
	23 - 0.427		25 - 0.260		24 - 0.289						28 - 0.170
1977											
JAN	7 - 0.170	FEB	3 - 0.146	MAR	14 - 0.154	APR	5 - 0.196	MAY	4 - 0.205	JUN	21 - 0.154
	20 - 0.154		16 - 0.146		24 - 0.162		15 - 0.213		17 - 0.196		
			25 - 0.154				26 - 0.222		27 - 0.187		
JULY	14 - 0.117	AUG	16 - 0.124	SEPT	13 - 0.109	OCT	3 - 0.076	NOV	10 - 0.058	DEC	12 - 0.109
	28 - 0.124		31 - 0.117				14 - 0.082				

N - No Reading
W - Washed Out

FIGURE A-69

S-13

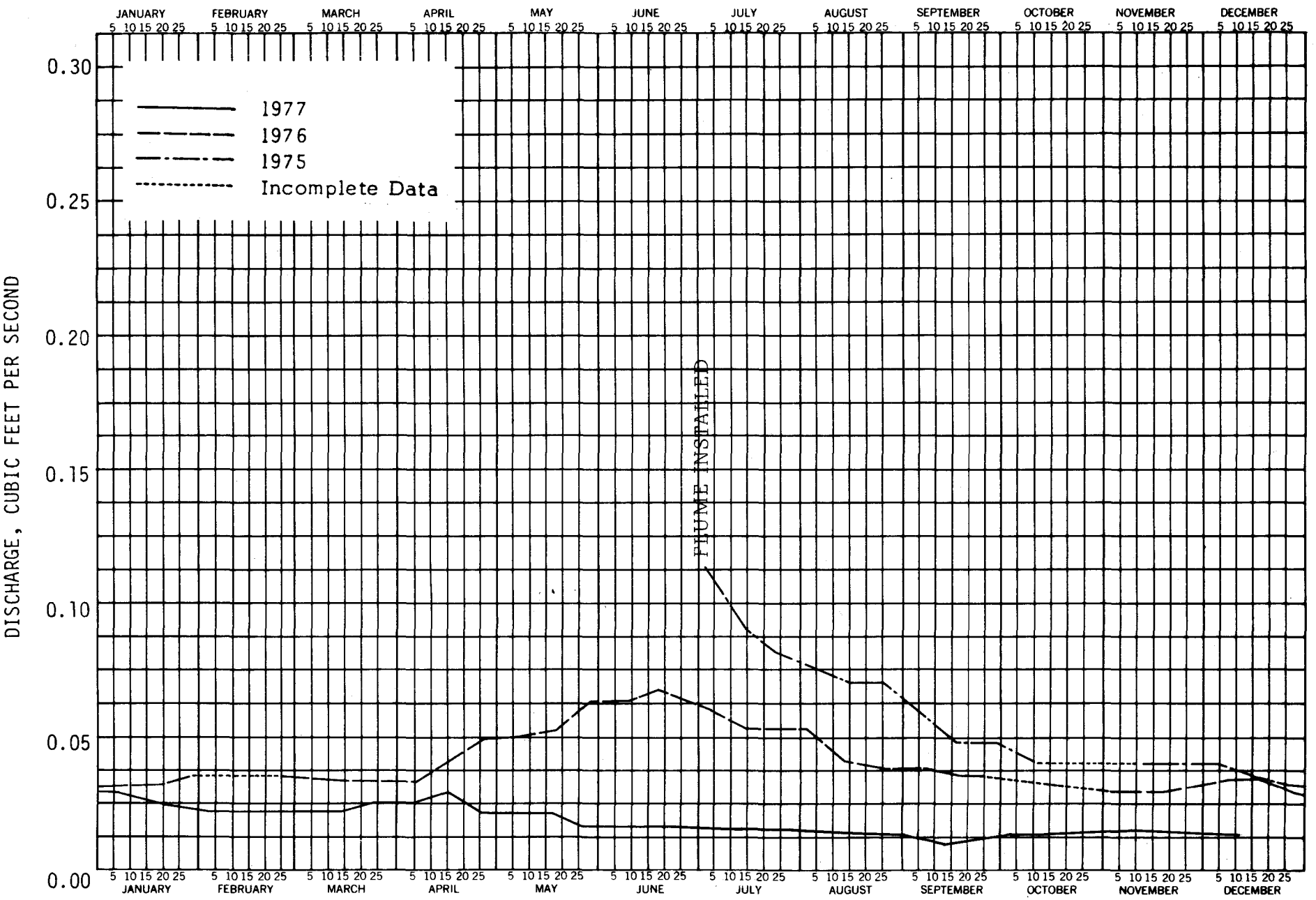


TABLE A-69 DISCHARGE AT S-13, SPRING ON MIDDLE FORK STEWART GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: July 1975 to current year
Latitude: 39° 40' 10", Longitude: 108° 11' 17"
SW1/4, SE1/4, Sec. 29, T4S, R96W, Garfield County

1975											
JULY	3 - 0.117	AUG	15 - 0.070	SEPT	16 - 0.047	OCT	10 - 0.042	NOV	10 - 0.042	DEC	4 - 0.042
	14 - 0.089		25 - 0.070		29 - 0.047		31 - N		20 - 0.042		12 - 0.037
	23 - 0.082										24 - 0.033
1976											
JAN	8 - 0.033	FEB	10 - N	MAR	15 - 0.033	APR	6 - 0.033	MAY	5 - 0.047	JUN	9 - 0.064
	19 - 0.033		24 - 0.037		24 - 0.033		26 - 0.047		18 - 0.053		18 - 0.070
	28 - 0.037								28 - 0.064		
JULY	2 - 0.058	AUG	2 - 0.053	SEPT	7 - 0.037	OCT	- N	NOV	1 - 0.028	DEC	7 - 0.037
	14 - 0.053		13 - 0.042		15 - 0.033				17 - 0.028		17 - 0.037
	23 - 0.053		25 - 0.037		24 - 0.033						28 - 0.028
1977											
JAN	7 - 0.028	FEB	3 - 0.020	MAR	14 - 0.020	APR	5 - 0.024	MAY	5 - 0.020	JUN	21 - 0.016
	20 - 0.024		16 - 0.020		24 - 0.024		15 - 0.028		17 - 0.020		
			25 - 0.020				26 - 0.020		27 - 0.016		
JULY	14 - 0.016	AUG	16 - 0.013	SEPT	13 - 0.010	OCT	3 - 0.013	NOV	9 - 0.016	DEC	12 - 0.013
	28 - 0.016		31 - 0.013				14 - 0.013				

N - No Reading

FIGURE A-70

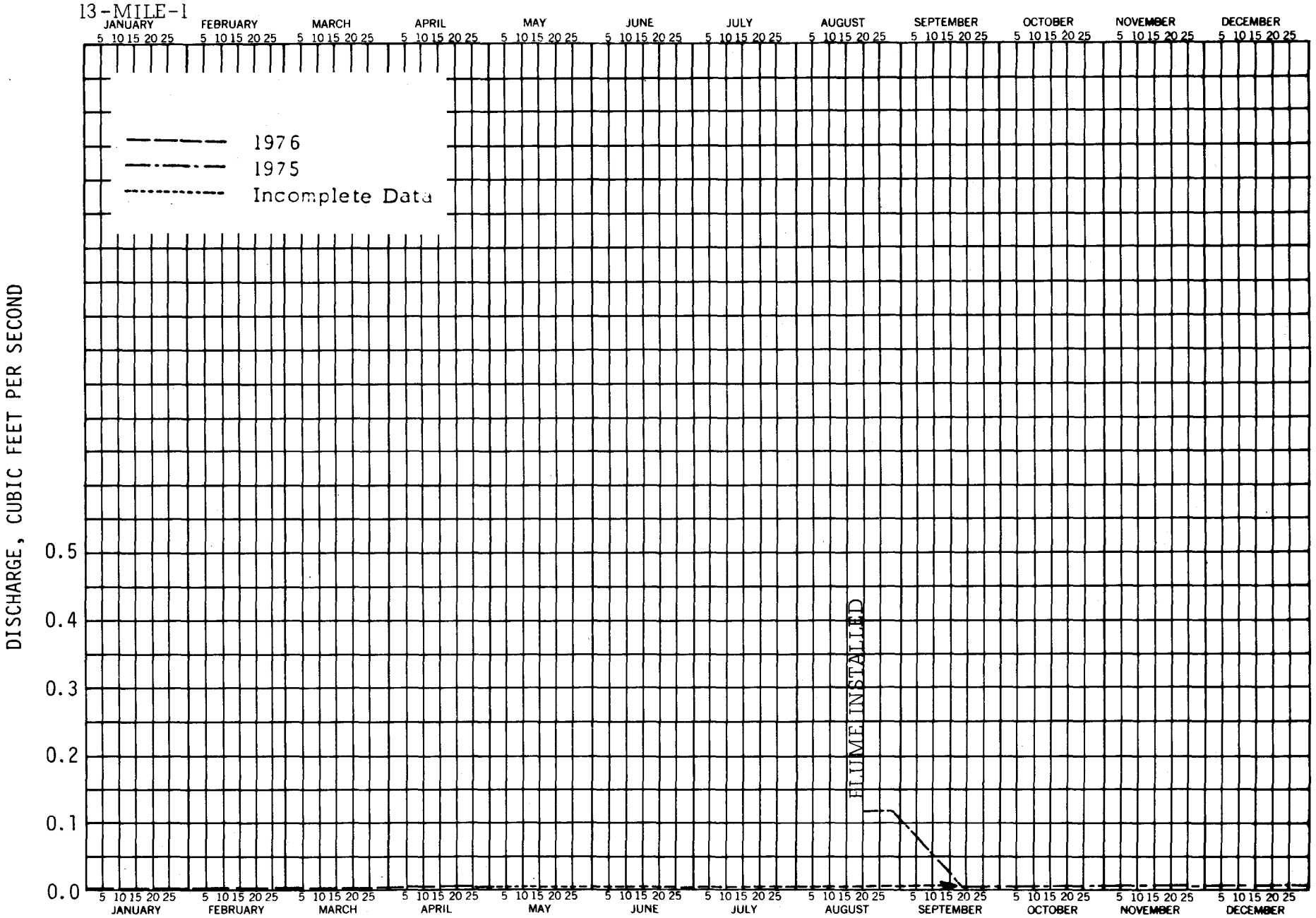

13-MILE-1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-70 DISCHARGE AT 13-MILE-1, SPRING ON THIRTEEN-MILE CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to April 1976
Latitude: 39° 50' 37", Longitude: 108° 01' 38"
NW1/4, SW1/4, Sec. 26, T2S, R95W, Rio Blanco County

1975											
	AUG	20 - 0.117	SEPT	- D	OCT	20 - 0.00	NOV	4 - D	DEC	- N	
		29 - 0.117						12 - 0.00			
								21 - 0.00			
1976											
	JAN	- N	FEB	- N	MAR	- D	APR	- D			

N - No Reading
D - Dry

FIGURE A-71

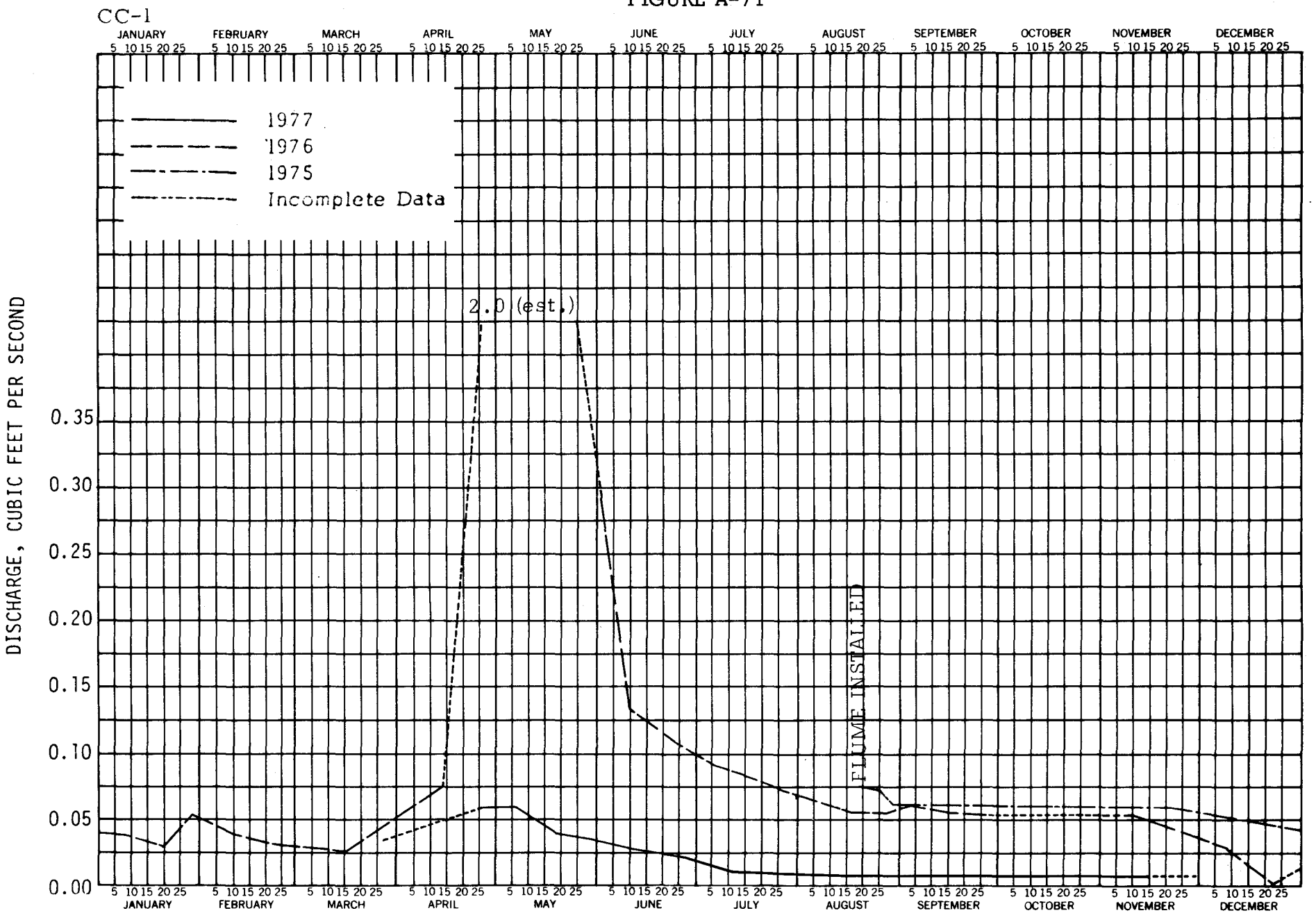

CC-1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
2.0 (est.)
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00

TABLE A-71 DISCHARGE AT CC-1, SPRING ON WEST BRANCH COW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: August 1975 to current year
Latitude: 39° 41' 42", Longitude: 108° 00' 09"
NW1/4, NE1/4, Sec. 24, T4S, R95W, Garfield County

1975											
	AUG	18 - 0.076	SEPT	17 - 0.058	OCT	20 - 0.058	NOV	4 - 0.058	DEC	26 - 0.042	
		25 - 0.070		30 - 0.058				12 - 0.058			
		29 - 0.058						21 - 0.058			
1976											
	JAN	9 - 0.037	FEB	12 - 0.037	MAR	16 - 0.024	APR	14 - 0.076	MAY	6 - 2.00 (est.)	JUN 1 - 0.289
		20 - 0.028		25 - 0.028						14 - 2.00 (est.)	10 - 0.131
		29 - 0.053									24 - 0.109
	JULY	6 - 0.089	AUG	3 - 0.064	SEPT	3 - 0.058	OCT	- N	NOV	10 - 0.053	DEC 8 - 0.028
		15 - 0.082		16 - 0.053		16 - 0.053					22 - 0.002
		26 - 0.070		26 - 0.053		27 - 0.053					29 - F
1977											
	JAN	- N	FEB	- F	MAR	- F	APR	6 - F	MAY	6 - 0.058	JUN 8 - 0.028
								18 - F		18 - 0.037	27 - 0.020
								27 - 0.058		31 - 0.033	
	JULY	12 - 0.013	AUG	18 - 0.010	SEPT	1 - 0.010	OCT	19 - 0.010	NOV	15 - 0.010	DEC 23 - F
						14 - 0.010					
						22 - 0.010					

N - No Reading
F - Frozen

FIGURE A-72

Y-1

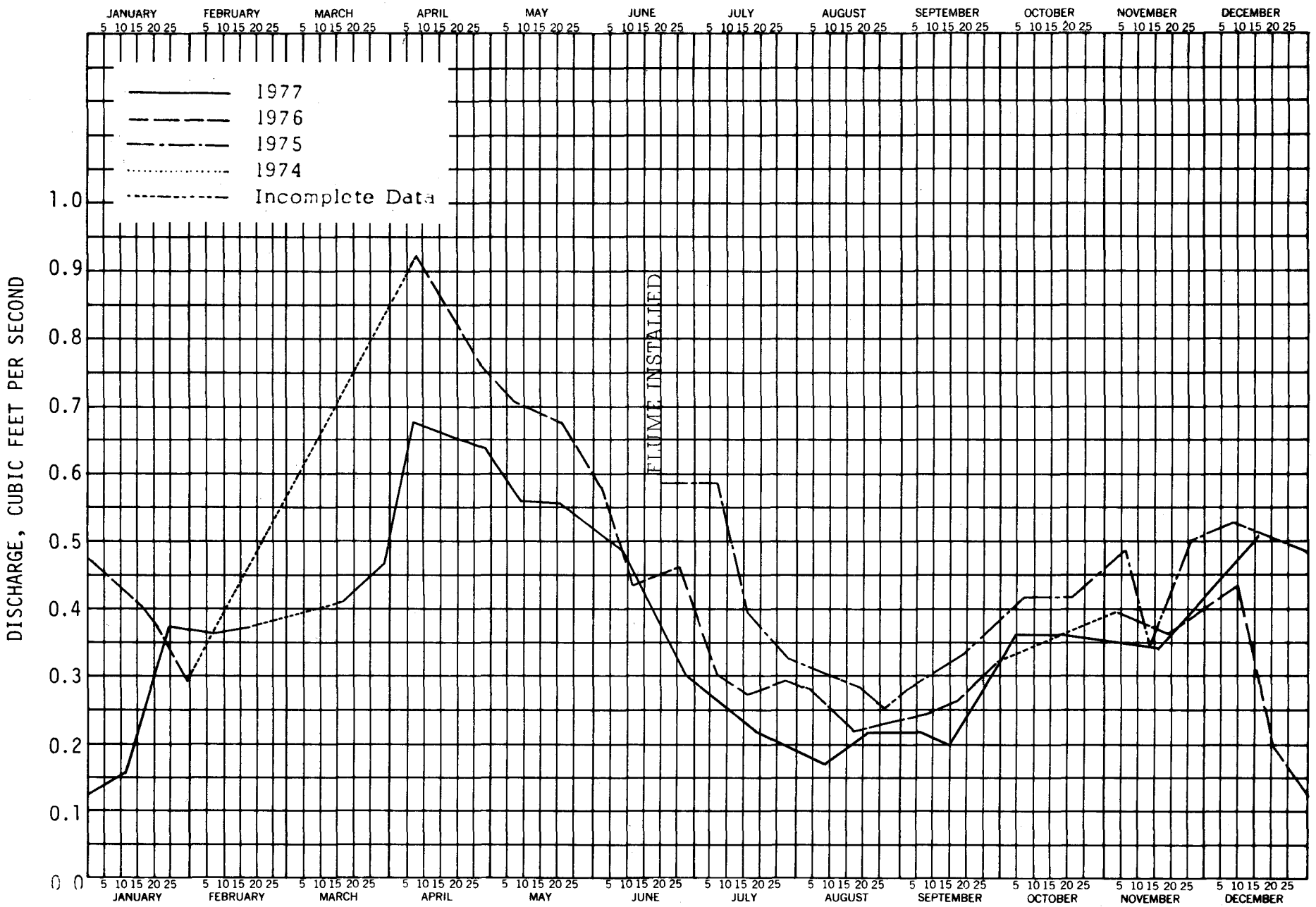


TABLE A-72 DISCHARGE AT Y-1, SPRING ON YELLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 40° 06' 03", Longitude: 108° 21' 26"
SW1/4, NE1/4, Sec. 35, T2N, R98W, Rio Blanco County

1975											
	JUN	20 - 0.584	JULY	7 - 0.584	AUG	6 - 0.309	SEPT	2 - 0.279	OCT	6 - 0.415	NOV 5 - 0.485
				16 - 0.393		18 - 0.279		18 - 0.329		21 - 0.415	13 - 0.339
				28 - 0.329		26 - 0.250					25 - 0.497
	DEC	8 - 0.522									
		29 - 0.485									
1976											
	JAN	12 - 0.427	FEB	- W	MAR	- W	APR	8 - 0.916	MAY	7 - 0.702	JUN 2 - 0.571
		21 - 0.371						27 - 0.757		21 - 0.675	11 - 0.427
		30 - 0.289									25 - 0.462
	JULY	7 - 0.299	AUG	4 - 0.279	SEPT	8 - 0.241	OCT	- N	NOV	3 - 0.393	DEC 9 - 0.427
		16 - 0.269		17 - 0.213		17 - 0.260				19 - 0.361	20 - 0.196
		27 - 0.289		27 - 0.231		29 - 0.319					30 - 0.124
1977											
	JAN	11 - 0.154	FEB	8 - 0.361	MAR	1 - W	APR	7 - 0.675	MAY	9 - 0.558	JUN 8 - 0.462
		24 - 0.371		18 - 0.371		16 - 0.404		19 - 0.649		19 - 0.558	27 - 0.299
						28 - 0.462		28 - 0.636			
	JULY	19 - 0.222	AUG	9 - 0.170	SEPT	6 - 0.222	OCT	5 - 0.361	NOV	17 - 0.393	DEC 16 - 0.509
				22 - 0.222		15 - 0.250		18 - 0.361			

N - No Reading
W - Washed Out

FIGURE A-73

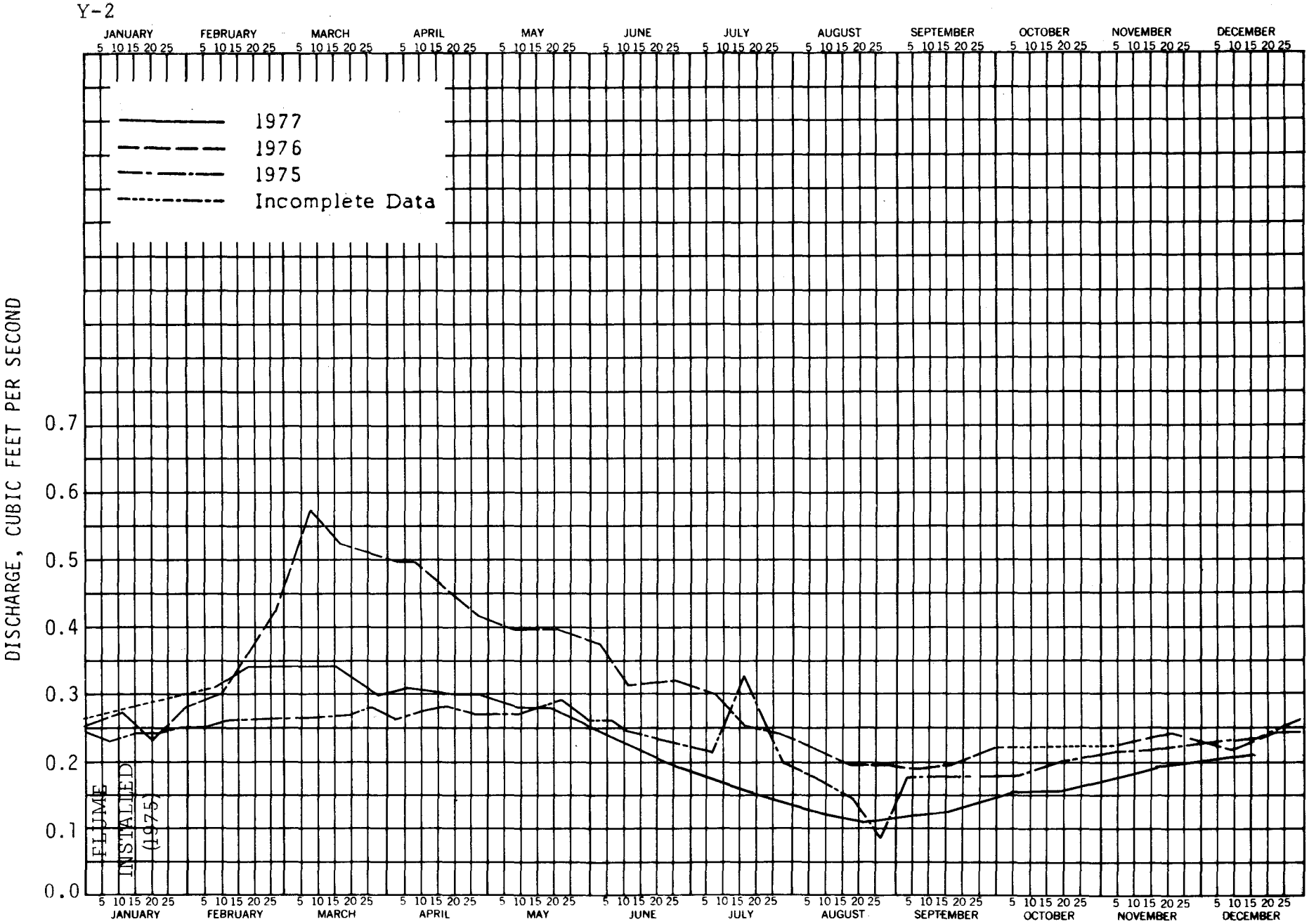

Y-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
FLUME INSTALLED (1975)

TABLE A-73 DISCHARGE AT Y-2, SPRING ON YELLOW CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: January 1975 to current year
Latitude: 40° 00' 54", Longitude: 108° 20' 42"
SW1/4, NW1/4, Sec. 36, T1N, R98W, Rio Blanco County

1975											
JAN	2 - 0.241	FEB	6 - 0.250	MAR	6 - 0.260	APR	3 - 0.260	MAY	2 - 0.269	JUN	6 - 0.260
	8 - 0.231		13 - 0.260		13 - 0.269		10 - 0.269		9 - 0.269		12 - 0.241
	15 - 0.241		20 - 0.260		19 - 0.269		18 - 0.279		22 - 0.289		20 - 0.231
	23 - 0.241		27 - 0.260		26 - 0.279		25 - 0.269		30 - 0.260		
	30 - 0.250										
JULY	7 - 0.222	AUG	6 - 0.179	SEPT	2 - 0.170	OCT	6 - 0.170	NOV	5 - 0.213	DEC	16 - 0.231
	16 - 0.329		18 - 0.146		18 - 0.170		21 - 0.196		13 - 0.213		29 - 0.260
	28 - 0.196		26 - 0.082						25 - 0.222		
1976											
JAN	12 - 0.269	FEB	11 - 0.299	MAR	8 - 0.571	APR	8 - 0.497	MAY	7 - 0.393	JUN	2 - 0.371
	21 - 0.231		27 - 0.427		17 - 0.522		27 - 0.415		21 - 0.393		11 - 0.309
	30 - 0.279				26 - 0.509						25 - 0.319
JULY	7 - 0.299	AUG	4 - 0.222	SEPT	8 - 0.187	OCT	- N	NOV	3 - 0.222	DEC	9 - 0.222
	16 - 0.250		17 - 0.196		17 - 0.196				19 - 0.241		20 - 0.241
	27 - 0.241		27 - 0.196		29 - 0.222						30 - 0.241
1977											
JAN	- N	FEB	8 - 0.309	MAR	1 - 0.339	APR	7 - 0.309	MAY	9 - 0.279	JUN	8 - 0.231
			18 - 0.339		16 - 0.339		19 - 0.299		19 - 0.279		27 - 0.187
					28 - 0.299		28 - 0.299				
JULY	19 - 0.154	AUG	9 - 0.131	SEPT	6 - 0.124	OCT	5 - 0.154	NOV	17 - 0.196	DEC	16 - 0.213
			22 - 0.109		15 - 0.131		18 - 0.154				

N - No Reading

FIGURE A-74

D-1

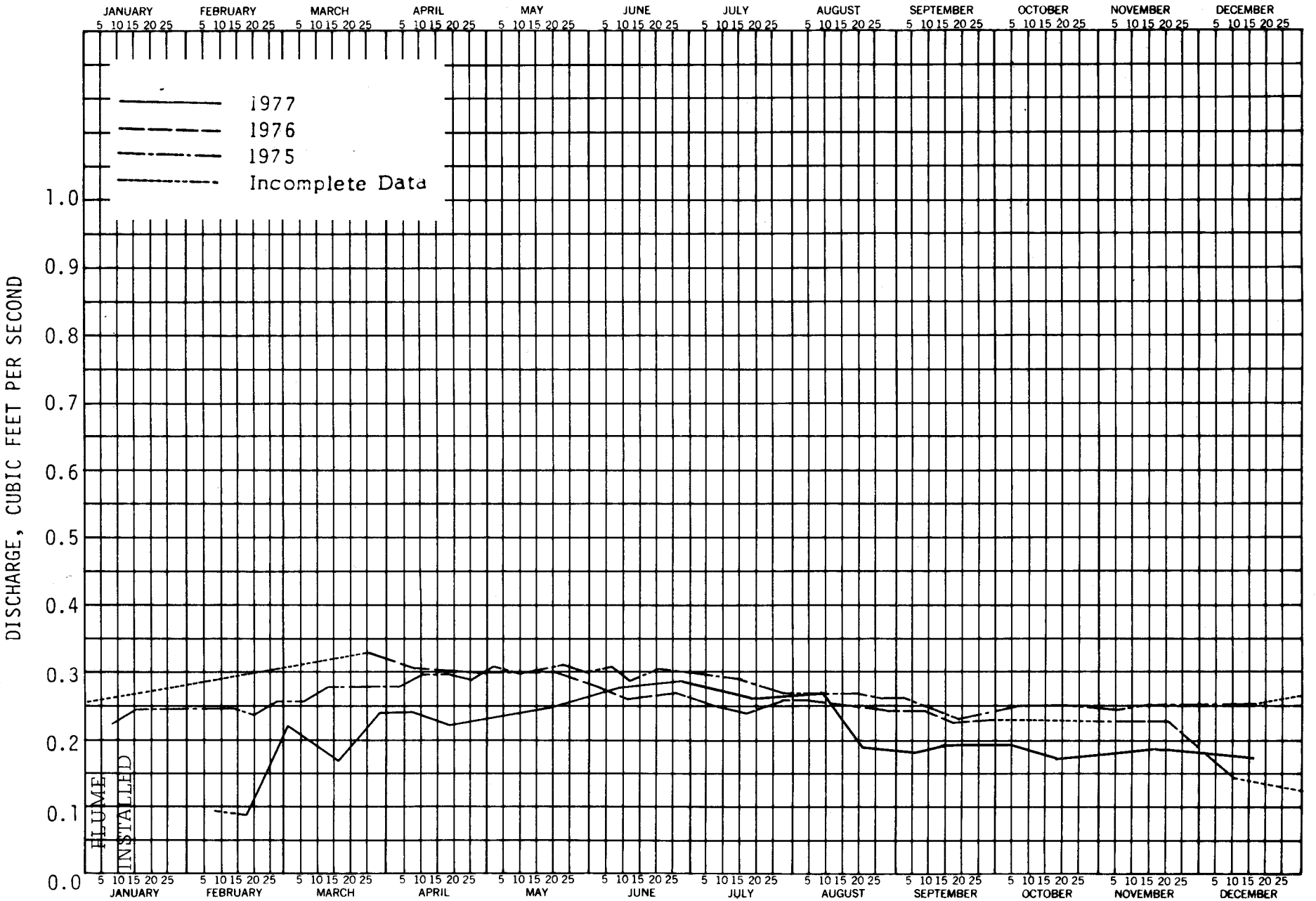


TABLE A-74 DISCHARGE AT D-1, SPRING ON BIG DUCK CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: January 1975 to current year
Latitude: 39° 58' 45", Longitude: 108° 23' 18"
SE1/4, NE1/4, Sec. 9, T1S, R98W, Rio Blanco County

1975											
	JAN	8 - 0.231	FEB	6 - 0.250	MAR	6 - 0.260	APR	3 - 0.279	MAY	2 - 0.309	JUN	6 - 0.309
		15 - 0.250		13 - 0.250		13 - 0.279		10 - 0.299		9 - 0.299		12 - 0.289
		23 - 0.250		20 - 0.241		19 - 0.279		18 - 0.299		22 - 0.309		20 - 0.309
		30 - 0.250		27 - 0.260		26 - 0.279		25 - 0.289		30 - 0.299		
	JULY	7 - 0.299	AUG	6 - 0.269	SEPT	2 - 0.260	OCT	6 - 0.250	NOV	5 - 0.241	DEC	16 - 0.250
		16 - 0.289		18 - 0.269		18 - 0.222		21 - 0.250		13 - 0.250		29 - F
		28 - 0.269		26 - 0.260						25 - 0.250		
1976												
	JAN	- F	FEB	11 - F	MAR	8 - W	APR	8 - 0.309	MAY	7 - 0.299	JUN	2 - 0.279
				27 - W		17 - W		27 - 0.299		21 - 0.299		11 - 0.260
						26 - 0.329						25 - 0.269
	JULY	7 - 0.250	AUG	4 - 0.260	SEPT	8 - 0.241	OCT	- N	NOV	3 - 0.222	DEC	9 - 0.138
		16 - 0.241		17 - 0.250		17 - 0.222				19 - 0.222		20 - F
		27 - 0.260		27 - 0.241		29 - 0.231						
1977												
	JAN	- N	FEB	8 - F	MAR	1 - 0.222	APR	7 - 0.241	MAY	9 - 0.241	JUN	8 - 0.279
				18 - 0.089		16 - 0.170		19 - 0.222		19 - 0.250		27 - 0.289
						28 - 0.241		28 - 0.231				
	JULY	19 - 0.260	AUG	9 - 0.269	SEPT	6 - 0.179	OCT	5 - 0.187	NOV	17 - 0.187	DEC	16 - 0.170
				22 - 0.187		15 - 0.187		18 - 0.170				

N - No Reading
F - Frozen
W - Washed Out

FIGURE A-75

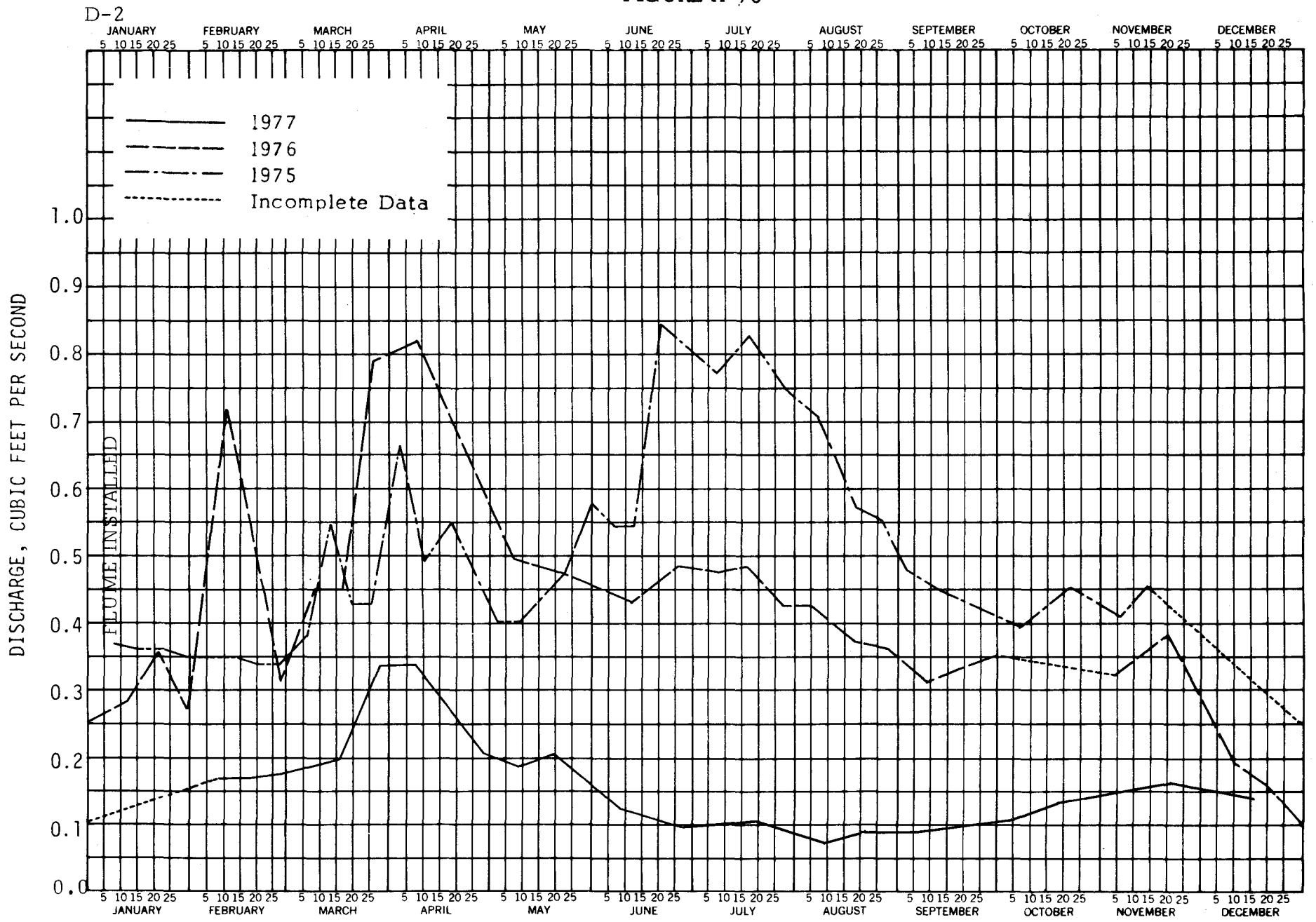

D-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
FLUME INSTALLED
DISCHARGE, CUBIC FEET PER SECOND
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

TABLE A-75 DISCHARGE AT D-2, SPRING ON BIG DUCK CREEK
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: January 1975 to current year
Latitude: 39° 56' 56", Longitude: 108° 32' 28"
NW1/4, SE1/4, Sec. 19, T1S, R99W, Rio Blanco County

1975											
JAN	8 - 0.371	FEB	6 - F	MAR	6 - 0.382	APR	3 - 0.662	MAY	2 - 0.404	JUN	6 - 0.546
	15 - 0.361		13 - 0.350		13 - 0.546		10 - 0.485		9 - 0.404		12 - 0.546
	23 - 0.361		20 - 0.339		19 - 0.427		18 - 0.546		22 - 0.474		20 - 0.843
	30 - 0.350		27 - 0.339		26 - 0.427		25 - 0.474		30 - 0.571		
JULY	7 - 0.771	AUG	6 - 0.702	SEPT	2 - 0.474	OCT	6 - 0.393	NOV	5 - 0.404	DEC	29 - 0.250
	16 - 0.828		18 - 0.571		18 - 0.427		21 - 0.450		13 - 0.450		
	28 - 0.744		26 - 0.546						25 - F		
1976											
JAN	12 - 0.289	FEB	11 - 0.716	MAR	8 - 0.450	APR	8 - 0.814	MAY	7 - 0.497	JUN	2 - 0.450
	21 - 0.361		27 - 0.309		17 - 0.450				21 - 0.474		11 - 0.427
	30 - 0.269				26 - 0.786						25 - 0.485
JULY	7 - 0.474	AUG	4 - 0.427	SEPT	8 - 0.309	OCT	- N	NOV	3 - 0.319	DEC	9 - 0.196
	16 - 0.485		17 - 0.371		17 - 0.329				19 - 0.382		20 - 0.154
	27 - 0.427		27 - 0.361		29 - 0.350						30 - 0.102
1977											
JAN	- N	FEB	8 - 0.170	MAR	1 - 0.179	APR	7 - 0.339	MAY	9 - 0.187	JUN	8 - 0.124
			18 - 0.170		16 - 0.196		19 - 0.260		19 - 0.205		27 - 0.095
					28 - 0.339		28 - 0.205				
JULY	19 - 0.102	AUG	9 - 0.070	SEPT	6 - 0.089	OCT	5 - 0.109	NOV	21 - 0.162	DEC	16 - 0.146
			22 - 0.089				18 - 0.138				

N - No Reading
F - Frozen

FIGURE A-76

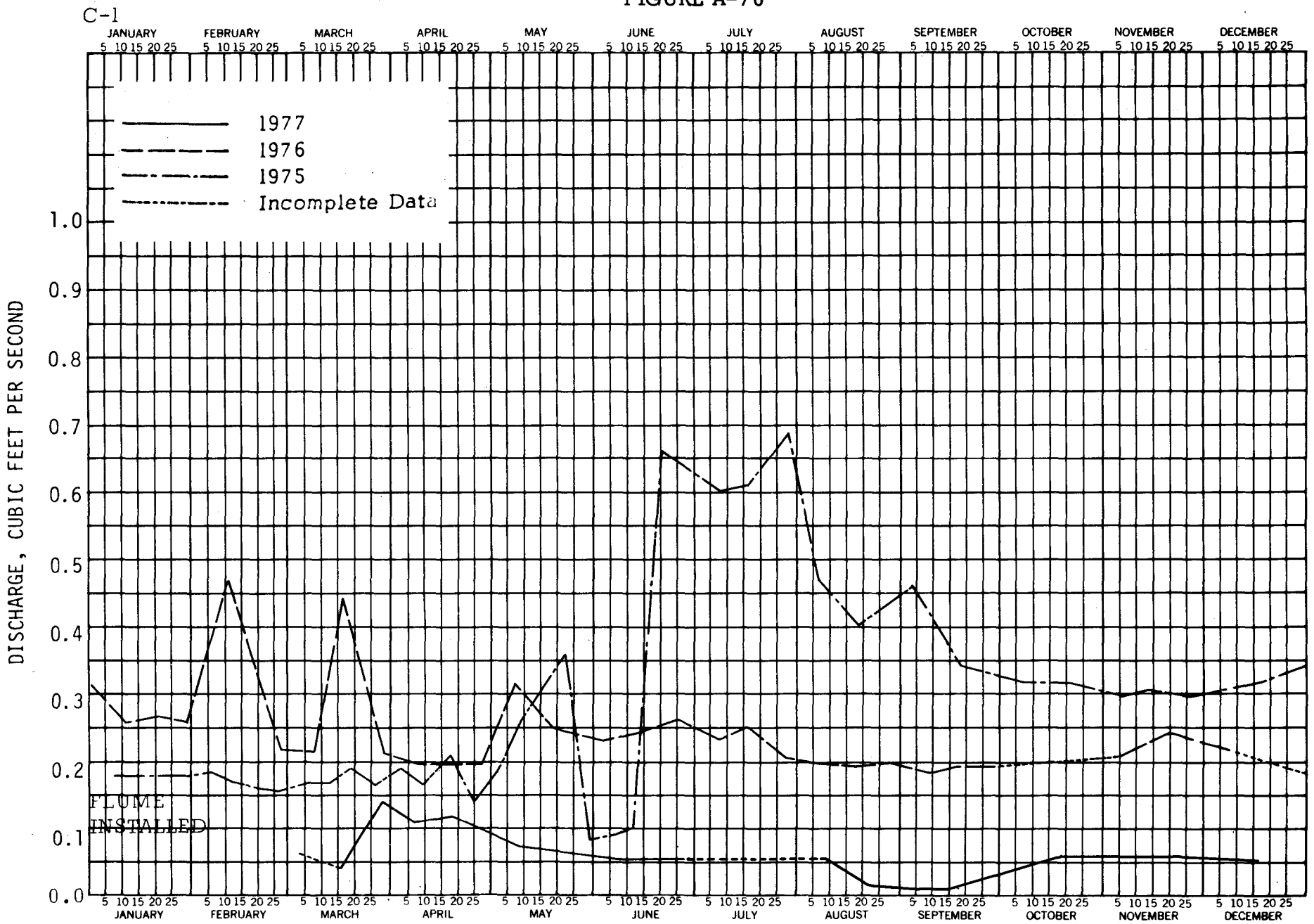

C-1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
FLUME
INSTALLED

TABLE A-76 DISCHARGE AT C-1, SPRING ON CORRAL GULCH
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: January 1975 to current year
Latitude: 40° 56' 05", Longitude: 108° 25' 47"
NE1/4, SE1/4, Sec. 30, T1S, R98W, Rio Blanco County

1975											
JAN	9 - 0.179	FEB	6 - 0.187	MAR	6 - 0.170	APR	3 - 0.187	MAY	2 - 0.187	JUN	6 - 0.089
	15 - 0.179		13 - 0.170		13 - 0.170		10 - 0.162		9 - 0.260		12 - 0.102
	23 - 0.179		20 - 0.162		19 - 0.187		18 - 0.213		22 - 0.361		20 - 0.662
	30 - 0.179		27 - 0.154		26 - 0.162		25 - 0.138		30 - 0.082		
JULY	7 - 0.597	AUG	6 - 0.474	SEPT	3 - 0.462	OCT	6 - 0.319	NOV	5 - 0.299	DEC	16 - 0.319
	16 - 0.610		18 - 0.404		18 - 0.339		21 - 0.319		13 - 0.309		29 - 0.339
	28 - 0.689		26 - 0.427						25 - 0.299		
1976											
JAN	12 - 0.260	FEB	11 - 0.474	MAR	8 - 0.213	APR	8 - 0.196	MAY	7 - 0.319	JUN	2 - 0.231
	21 - 0.269		27 - 0.222		17 - 0.450		27 - 0.196		19 - 0.250		11 - 0.241
	30 - 0.260				29 - 0.213						25 - 0.269
JULY	7 - 0.231	AUG	4 - 0.196	SEPT	8 - 0.179	OCT	- N	NOV	4 - 0.205	DEC	9 - 0.222
	16 - 0.250		17 - 0.187		17 - 0.187				19 - 0.241		20 - F
	27 - 0.205		27 - 0.196		29 - 0.187						30 - F
1977											
JAN	- N	FEB	- F	MAR	1 - W	APR	7 - 0.109	MAY	9 - 0.070	JUN	8 - 0.053
					16 - 0.042		19 - 0.117				27 - 0.053
					28 - 0.138		28 - 0.095				
JULY	19 - N	AUG	9 - 0.053	SEPT	6 - 0.016	OCT	5 - W	NOV	21 - 0.058	DEC	16 - 0.053
			22 - 0.020		15 - 0.016		18 - 0.058				

N - No Reading
F - Frozen
W - Washed Out

FIGURE A-77

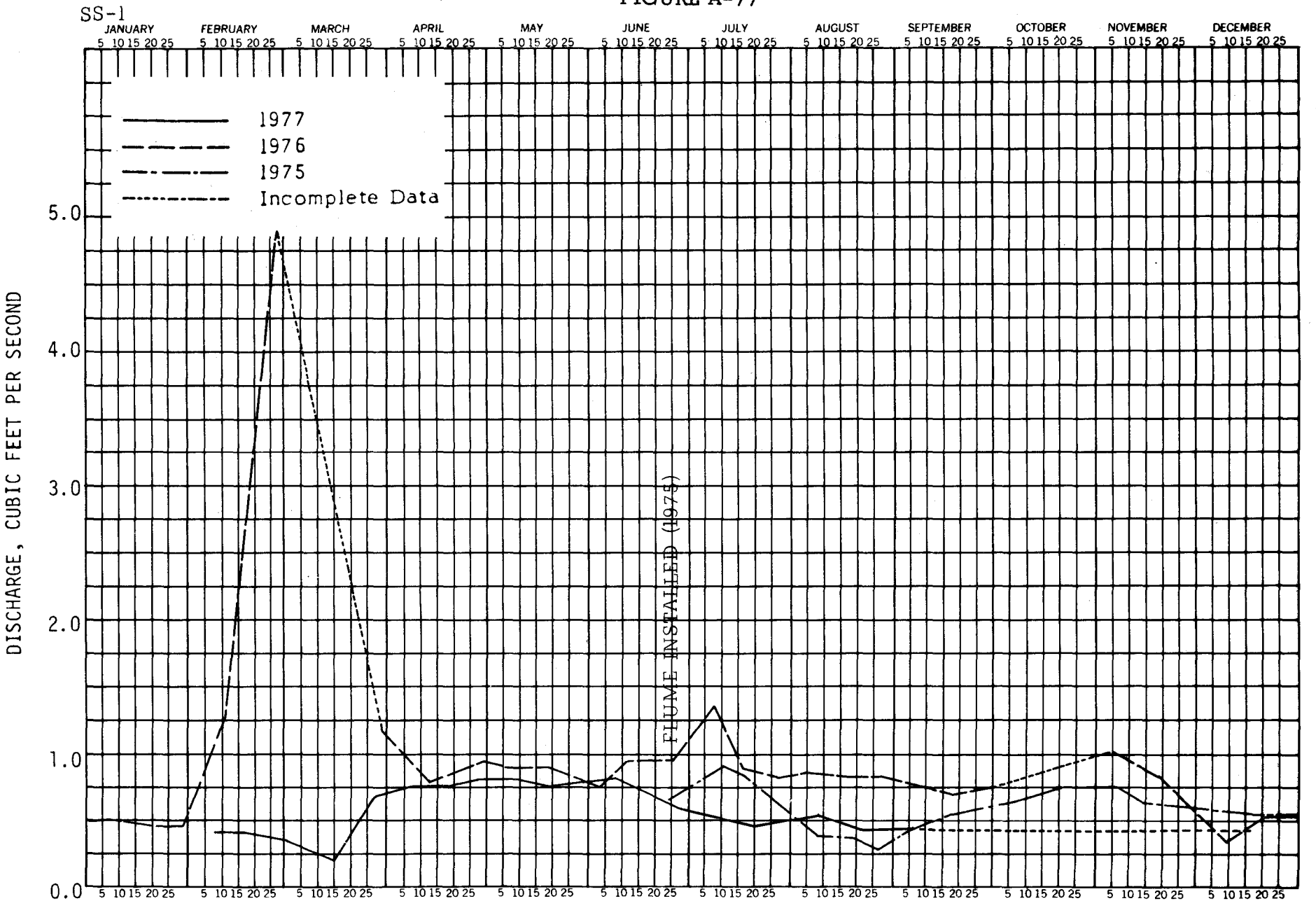

SS-1
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
5.0
4.0
3.0
2.0
1.0
0.0
DISCHARGE, CUBIC FEET PER SECOND
FLUME INSTALLED (1975)

TABLE A-77 DISCHARGE AT SS-1, SPRING ON STAKE SPRINGS DRAW
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 39° 53' 27", Longitude: 108° 27' 12"
NE1/4, SW1/4, Sec. 12, T2S, R99W, Rio Blanco County

1975											
	JUN	23 - 0.064	JULY	10 - 0.089	AUG	8 - 0.037	SEPT	3 - 0.042	OCT	6 - 0.064	NOV 5 - 0.076
				17 - 0.082		19 - 0.037		18 - 0.053		21 - 0.076	13 - 0.064
						26 - 0.028					25 - 0.058
	DEC	16 - 0.053									
		29 - 0.053									
1976											
	JAN	12 - 0.053	FEB	11 - 0.131	MAR	8 - W	APR	13 - 0.082	MAY	7 - 0.089	JUN 2 - 0.076
		21 - 0.047		27 - 0.497 (H)		17 - W		29 - 0.095		19 - 0.089	11 - 0.095
		30 - 0.047				29 - 0.124					25 - 0.095
	JULY	7 - 0.138	AUG	4 - 0.089	SEPT	8 - 0.076	OCT	- N	NOV	4 - 0.102	DEC 9 - 0.033
		16 - 0.089		17 - 0.082		17 - 0.070				19 - 0.082	20 - 0.053
		27 - 0.082		27 - 0.082		29 - 0.076					30 - 0.053
1977											
	JAN	- N	FEB	8 - 0.042	MAR	1 - 0.037	APR	7 - 0.076	MAY	9 - 0.082	JUN 8 - 0.082
				18 - 0.042		16 - 0.020		19 - 0.076		19 - 0.076	27 - 0.058
						28 - 0.070		28 - 0.082			
	JULY	19 - 0.047	AUG	9 - 0.053	SEPT	6 - 0.042	OCT	5 - N	NOV	22 - 0.042	DEC 16 - 0.042
				22 - 0.042		15 - N		18 - N			

N - No Reading
H - High Reading Caused by Snow Melt
W - Washed Out

FIGURE A-78

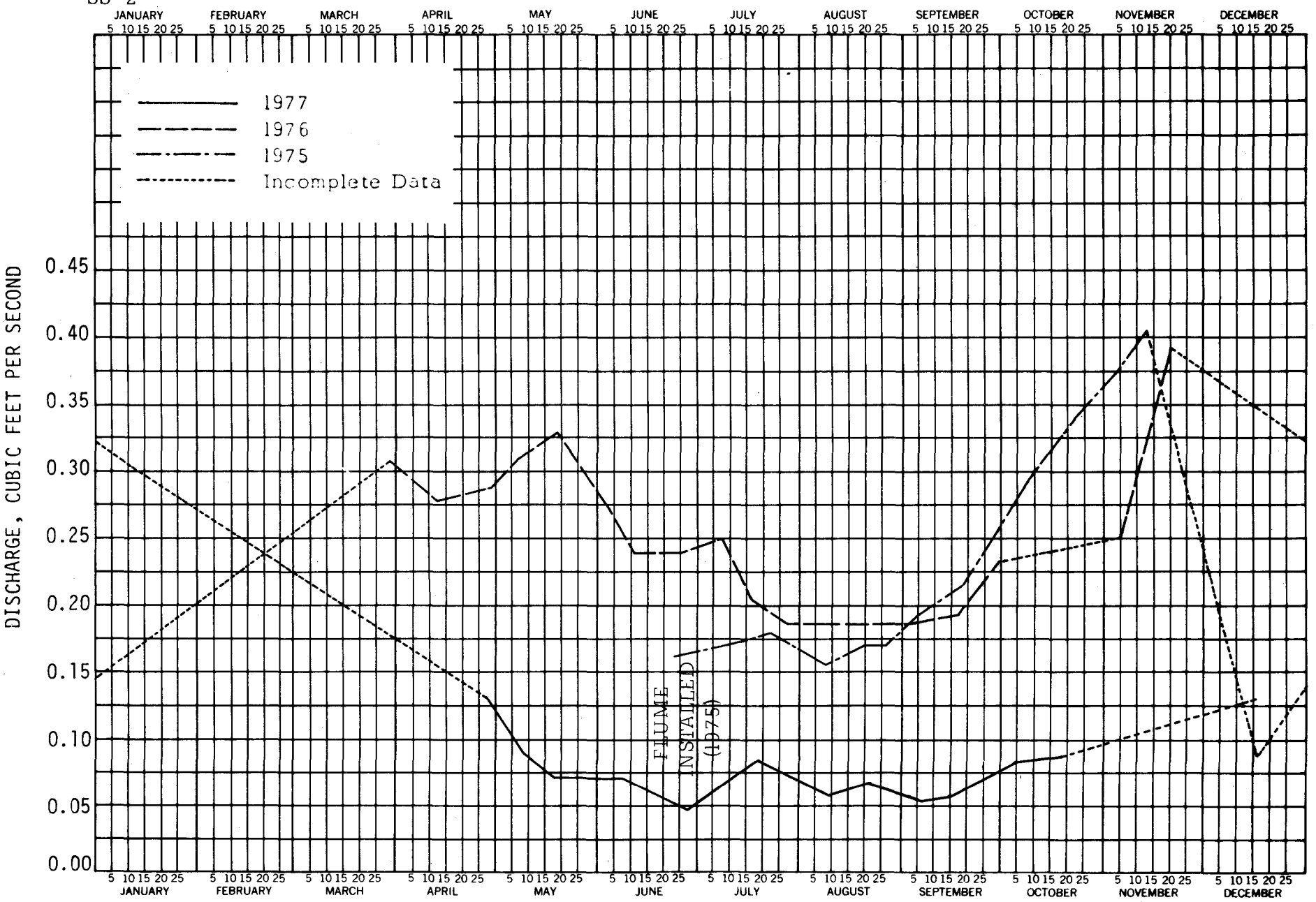

SS-2
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
1977
1976
1975
Incomplete Data
DISCHARGE, CUBIC FEET PER SECOND
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
FLUME INSTALLED (1975)

TABLE A-78 DISCHARGE AT SS-2, SPRING ON STAKE SPRINGS DRAW
READINGS IN CUBIC FEET PER SECOND

3" Parshall Flume
Period of Record: June 1975 to current year
Latitude: 39° 52' 48", Longitude: 108° 28' 22"
NE1/4, NW1/4, Sec. 14, T2S, R99W, Rio Blanco County

1975											
	JUN	23 - 0.162	JULY	10 - 0.170	AUG	8 - 0.154	SEPT	3 - 0.187	OCT	6 - 0.289	NOV 5 - 0.382
				17 - 0.179		19 - 0.170		18 - 0.213		21 - 0.339	13 - 0.404
						26 - 0.170					25 - F
	DEC	16 - 0.089 (est.)									
1976											
	JAN	12 - N	FEB	11 - F	MAR	8 - F	APR	13 - 0.279	MAY	7 - 0.309	JUN 2 - 0.279
		21 - N		27 - F		17 - F		29 - 0.289		19 - 0.329	11 - 0.241
		30 - N				29 - 0.309					25 - 0.241
	JULY	7 - 0.250	AUG	4 - 0.187	SEPT	8 - 0.187	OCT	- N	NOV	4 - 0.250	DEC - F
		16 - 0.205		17 - 0.187		17 - 0.196				19 - 0.393	
		27 - 0.187		27 - 0.187		29 - 0.231					
1977											
	JAN	- N	FEB	- F	MAR	- F	APR	7 - F	MAY	9 - 0.089	JUN 8 - 0.070
								19 - F		19 - 0.070	27 - 0.047
								28 - 0.131			
	JULY	19 - 0.082	AUG	9 - 0.058	SEPT	6 - 0.053	OCT	5 - 0.082	NOV	22 - F	DEC 16 - 0.131
				22 - 0.070		15 - 0.058		18 - 0.089			

N - No Reading
F - Frozen

APPENDIX B

LOCATION OF SPRINGS AND DISCHARGE DATA FOR SPRINGS USED IN CALIBRATING AN EXPANDED GROUND WATER MODEL

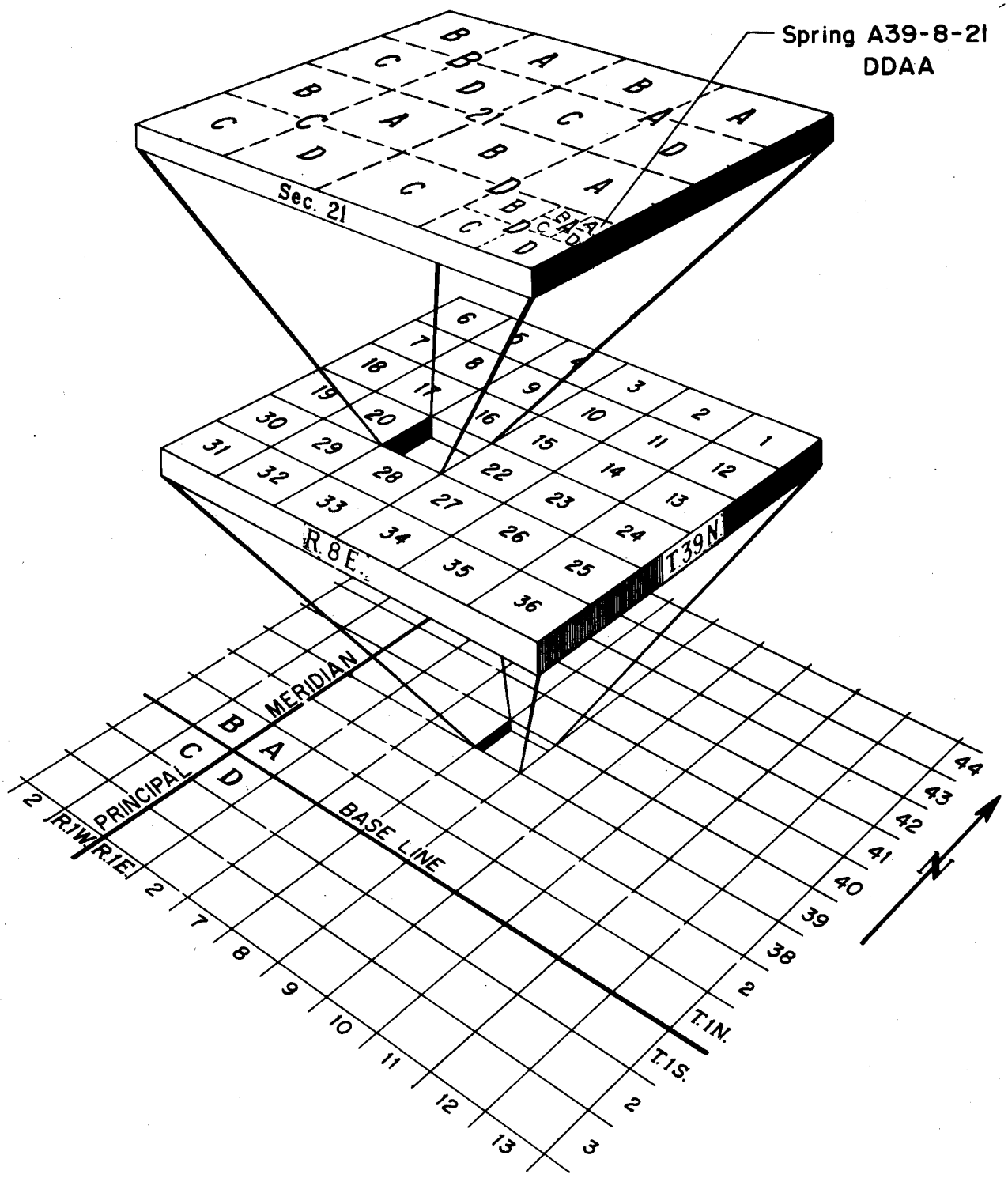


Figure B-1.--System of numbering springs.

TABLE B-1
DATA FOR SMALL SPRINGS NOT INCLUDED
IN MONITORING SYSTEM

I.D. Number	Township	Range	Section	Date Visited	Observed Discharge (gpm unless otherwise noted)
			BARCUS CREEK SE QUADRANGLE		
Y-1B	B1	98	1 DCDC	11/17/77	0.362 (cfs)
			WHITE RIVER CITY QUADRANGLE		
DC-5	C1	96	4 BCBC	1/31/78	0.324 (cfs)
DC-6	C1	96	4 BBCB	1/31/78	3.0
P-17	B1	97	35 DCCC	3/16/77	0.403 (cfs)
			SAGEBRUSH HILL QUADRANGLE		
D-3	C1	99	30 BCBB	8/22/77	5.0
D-4	C1	100	25 ADDB	8/22/77	3.5
D-5	C1	100	25 ADCD	8/22/77	1.0
D-6	C1	100	1 ADAD	1/05/78	1.0
D-7	C1	100	25 BBBD	1/09/78	10.0
D-8	C1	100	23 DCBC	6/12/78	8.0
D-9	C1	100	25 CDCB	6/26/78	60.0
C-6	C2	100	2 CADB	4/28/78	0.25 (cfs)
C-3	C2	99	7 BABD	1/10/78	1.0
C-2	C2	99	5 CBBC	3/17/77	6.0
C-4	C2	99	6 ACDA	2/04/77	35.0
C-5	C2	99	6 BDBD	2/04/77	30.0
			WOLF RIDGE QUADRANGLE		
SS-9	C2	99	12 ACBA	5/02/78	0.084 (cfs)
SS-10	C2	99	14 BCDC	10/19/78	11.0
			SQUARE S RANCH QUADRANGLE		
P-19	C1	97	15 AAAB	11/17/77	1.5 (est.)
			GREASEWOOD GULCH QUADRANGLE		
P-22	C1	97	2 DBAB	1/25/78	45.0
			BLACK CABIN GULCH QUADRANGLE		
Galloway I	C3	99	17 DCDA	5/24/76	0.171 (cfs)
SS 3 A	C3	99	6 BCCB	9/24/75	12.0
				10/05/76	5.0 (est.)
BE I	C2	100	23 CDBC	10/04/76	0.019 (cfs)
BE I A	C2	100	22 DBCB	10/04/76	Dry
BE I B	C2	100	23 CADD	10/04/76	2.0
BE I C	C2	100	22 DBCA	10/04/76	1.0

(cont'd)

BLACK CABIN GULCH QUADRANGLE (CONT'D)

R 4 A	C3	99	7 CDCA	10/05/76	2.0
Galloway-2	C3	99	17 ADAB	3/15/77	4.0
TD-1	C3	100	12 CDCD	6/02/77	1.0
R-9	C3	99	19 ABAD	5/04/78	60.0
R-10	C3	99	18 BCDC	6/02/78	50.0 (est.)
R-11	C3	99	7 DCCD	10/19/78	3.0
R-12	C3	99	8 CCDA	11/02/78	1.0
R-15	C3	99	8 AACC	2/22/78	0.5
SS-6	C2	99	31 ACCB	2/28/78	20.0
SS-7	C2	100	36 BCBA	2/28/78	1.0
SS-8	C3	99	6 CCDA	5/31/78	15.0
BE-2	C2	100	14 CBDA	1/13/78	Dry
BE-3	C2	100	13 CCBC	1/16/78	0.007 (cfs)
BE-4	C2	100	24 BACA	1/25/78	15.0
BE-5	C2	100	26 ABAA	2/17/78	Dry
R7	C3	99	28 BBDA	9/23/77	2.5
R8	C3	99	28 BCBA	9/23/77	Dry
Swizer-2	C3	99	28 DCAB	9/23/77	Dry
SS4	C3	100	1 ACBC	10/18/77	7.0
SS5	C3	100	1 BDDB	10/18/77	2.0

YANKEE GULCH QUADRANGLE

B-9	C3	98	7 BDAA	3/07/77	0.256 (cfs)
R-2a	C2	98	19 CAAD	3/11/77	35.0
R-5	C2	98	19 CBAD	3/11/77	10.0
R-6	C2	98	19 CCDA	3/11/77	0.096 (cfs)
Swizer Spg.	C3	99	22 DADB	6/03/76	0.106 (cfs)

ROCK SCHOOL QUADRANGLE

F-6	C2	97	30 AADA	2/28/77	35.0
F-7	C3	98	15 DDDD	2/28/77	1.0 (cfs)(est.)

JESSUP GULCH QUADRANGLE

W-14	C2	97	35 ABAD	2/28/77	30.0
W-15	C2	97	35 ABAD	2/28/77	200.0 (est.)
W-16	C2	97	35 ABDA	2/28/77	12.0
P-9	C3	96	11 ABCA	2/14/77	0.30 (cfs)(est.)
P-10	C3	96	11 DABD	2/14/77	0.30 (cfs)(est.)
S-14	C3	96	20 CAAD	1/31/77	15.0
S-15	C3	96	20 CADB	1/13/77	15.0
S-16	C3	96	30 DDAB	3/10/77	0.30 (cfs)
				1/13/77	0.343 (cfs)
P-21	C2	96	31 DDCA	12/30/77	15.0
CER-6B	C3	96	9 BDDB		
P-16	C2	97	36 ACAC		
W-19	C3	97	3 CADA	7/19/77	0.306 (cfs)

NO NAME RIDGE QUADRANGLE

P-20	C3	96	12 CCBC	12/30/77	26.0
P-13	C3	95	35 AABA	3/10/77	1.00 (cfs)(est.)
P-11	C3	95	8 DDAA	2/14/77	Dry
P-12	C3	95	23 BDCD	2/14/77	0.75 (cfs)(est.)
13 Mile B	C3	95	4 AABB	10/13/76	7.0

BRUSHY POINT

4A1	C5	100	8 CACA	7/13/77	3.0
BM-1	C4	100	33 CCCA	1/18/77	Dry

RAZORBACK RIDGE QUADRANGLE

CL-1	C4	99	19 ADAA	6/08/77	1.0 (est.)
CL-2	C4	99	20 CBCB	6/08/77	6.0
WW-1	C4	99	20 DDAA	6/08/77	3.0
WW-2	C4	99	28 ABAC	6/09/77	1.0
WW-3	C4	99	28 ACAA	6/09/77	12.0
BM-2	C5	100	1 CBCC	7/05/77	1.0
BM-3	C5	100	12 ABDC	7/05/77	Trickle
BM-5	C5	100	1 CDAB	7/06/77	Dry
BM-6	C5	100	1 DBAB	7/06/77	1.0
BM-7	C5	100	12 AACC	7/06/77	Wet; No Flow
BM-8	C5	100	12 AADD	7/06/77	Wet; No Flow
BM-13	C5	99	7 CACC	7/07/77	Dry
B-10	C4	99	8 CBDD	6/09/77	Trickle
SK-9	C4	99	32 ACBA	9/27/77	5.0
SK-10	C4	99	32 CABB	9/27/77	0.5
SK-11	C4	99	32 CBDA	9/27/77	1.5
SK-12	C4	99	32 CBAB	9/27/77	3.0
BC-2	C4	100	24 CCDD	9/30/77	Dry
BC-3	C4	100	33 AABC	10/05/77	0.75
BM-20	C5	100	2 ACAD	7/12/77	Dry
BC-1	C4	100	35 ADCB	1/17/77	No Reading
SK-1	C5	99	9 ADDB	12/27/76	3.0
B-6A	C4	99	16 ACCB	10/03/78	0.082 (cfs)

FIGURE FOUR QUADRANGLE

F4A	C4	98	17 ADBA	9/28/76	No Reading
F5b	C4	98	5 CDCC	9/28/76	No Reading
				10/11/76	40.0
F5C	C4	99	13 DDAC	10/11/76	15.0
MS1	C4	98	29 CAAC	12/13/76	3.0
MS2	C4	98	29 CDDD	12/13/76	24.0
MS3	C4	98	32 BAAA	12/13/76	2.0
MS4	C4	98	32 ABBB	12/13/76	1.0
MS5	C4	98	32 BAAD	12/13/76	4.0
NN1	C4	99	25 DABA	12/14/76	3.0
NN2	C4	99	25 DACA	12/14/76	Dry
EW1	C4	99	23 BCCA	12/14/76	4.0
EW2	C4	99	23 CBAB	12/14/76	6.0
EW3	C4	99	23 CABC	12/14/76	15.0
EW4	C4	99	23 CBAD	12/14/76	6.0
EW5	C4	99	23 CACD	12/14/76	13.5
EW6	C4	99	23 DCCC	12/14/76	30.0
B-13	C4	99	15 AABB	10/04/78	3.0
B-14	C4	99	3 CBDD	6/30/78	7.0
B-5B	C4	99	15 CBCB	10/03/78	2.0
Fig. 4B	C4	99	10 ADCB	7/10/78	40.0
E-1	C4	99	14 AABB	6/28/78	20.0
E-2	C4	98	6 CBAD	6/30/78	10.0
E-3	C4	98	6 CDCB	6/30/78	0.50 (cfs)
Y-G-1	C3	99	36 CDDB	6/28/78	7.0
Y-G-2	C4	99	2 DABA	6/28/78	30.0
F-6	C4	98	19 ACCC	9/01/78	Dry

(cont'd)

FIGURE FOUR QUADRANGLE (CONT'D)

F-7	C4	98	18 DBDD	9/08/78	10.0
F-8	C4	98	18 DBDA	9/08/78	2.0
F-9	C4	98	18 ACAA	9/08/78	30.0
F-10	C4	98	18 ABDD	9/08/78	3.0
F-11	C4	98	8 BCDD	9/01/78	1.0
F-12	C4	99	24 AABA	9/08/78	4.0
F-4b	C4	98	20 BAAB	7/10/78	40.0
F-4c	C4	98	20 BAAB	2/18/77	7.5
H-7	C4	98	15 CDBB	3/18/77	40.0
H-8	C4	98	21 DACA	3/18/77	6.0
H-9	C4	98	21 CDBD	4/22/77	0.306 (cfs)
B-11	C4	99	7 DCCA	3/16/77	Dry
B-12	C4	100	13 DDDC	3/17/77	Dry
F5E	C4	98	18 BBDA	9/21/77	4.0
F5F	C4	98	7 CDDC	9/21/77	1.0
F5G	C4	99	13 AAAB	9/21/77	1.0
WW5	C4	99	35 CDCB	9/22/77	4.0
WW6	C4	99	34 AACC	9/22/77	1.0
H-10	C4	98	21 CDBD	10/31/77	7.0
MS-6	C4	98	33 BDCB	1/19/77	2.0 (est.)
MS-7	C4	98	33 DBCD	1/19/77	Dry
MS-8	C5	98	3 CBCA	1/19/77	1.0
F-5-D	C4	98	19 ABBB	2/18/77	1.0
F-4-C	C4	98	20 BAAB	2/18/77	7.5
F-4-B	C4	98	20 BAAB	2/18/77	12.0
F-4-D	C4	98	17 CDAA	2/18/77	25.0
F-4-E	C4	98	17 AACA	2/18/77	32.0
WW-4	C4	99	22 CDCC	6/09/77	Dry
NN-3	C4	98	30 CCAC	6/10/77	3.0
NN-4	C4	98	31 BADA	6/10/77	1.5
NN-5	C4	98	31 DACB	6/10/77	1.5
NN-6	C5	98	5 BBBB	6/10/77	3.0

BULL FORK QUADRANGLE

W-21	C4	97	18 DCAD	10/17/78	0.5
W-22	C4	98	13 DDDD	10/17/78	0.5
W-23	C4	97	18 CCDC	10/17/78	0.5
H-11	C4	98	15 DACD	4/13/78	0.159 (cfs)
H-12	C4	98	14 BACC	10/16/78	0.75
W-20	C5	97	4 CBAA	11/04/77	14.0
CG-16	C4	98	35 DCCA	1/19/77	Dry
PAT-1	C4	97	21 ACBB	1/14/77	6.0
WP-32	C5	97	11 CBBA	2/17/77	4.0
W-17	C4	97	28 ABBD	4/14/77	18.0
W-12a	C4	97	19 ACDA		
W-13f	C4	97	33 CCAC		
W-13g	C4	97	33 CADC	5/25/77	10.0
W-13h	C4	97	33 CADB	5/25/77	8.5
W-18	C4	97	33 CCDC	7/19/77	7.5
PO-1	C5	97	8 CBDB	12/02/76	10.5
H-6-E	C4	98	35 BABC	11/16/76	0.5
W-12-c	C4	97	30 CBDC	10/14/76	0.09 (cfs)
W-12-D	C4	97	31 BCDA	10/14/76	10.0 (est.)
W-13-F	C4	97	33 CCAC	10/14/76	23.0
W-13-E	C5	97	5 DADD	10/15/76	17.5
W-13-D	C5	97	9 BADB	10/15/76	7.5
H-5-A	C4	98	14 CCDD	10/12/76	0.147 (cfs)
H-6-B	C4	98	26 ABAC	11/16/76	9.0
H-6-C	C4	98	26 ACCC	11/16/76	15.0
H-6-D	C4	98	26 DCBA	11/16/76	2.0

BULL FORK QUADRANGLE (CONT'D)

Pats Spg.	C4	97	16 DBCC	6/08/76	0.046
W-12-B	C4	97	17 ACCB	5/27/76	0.115
W-12-A	C4	97	19 ACAD	5/04/76	0.184
WP-8	C5	97	10 ADDD	11/24/76	0.176
WP-9	C5	97	10 DABB	11/24/76	0.115
WP-10	C5	97	10 BDAD	11/23/76	8.0
CG-1	C5	97	6 CAAB	12/08/76	9.0
CG-2	C5	97	6 CADC	12/08/76	6.5
CG-3	C5	97	6 DBBD	12/08/76	8.5
CG-4	C5	97	6 DCDA	12/08/76	5.0
CG-5	C5	97	6 CDBB	12/08/76	6.0
CG-6	C5	97	6 CCDC	12/08/76	22.0
CG-7	C5	97	6 CCCC	12/08/76	3.0
CG-8	C5	98	1 DDDB	12/09/76	24.0
CG-9	C5	98	12 ADAB	12/09/76	0.5
CG-11	C5	98	12 BDDB	12/09/76	5.0 (est.)
CG-12	C5	98	2 DDAA	12/09/76	0.75
CG-13	C5	98	2 DAAB	12/09/76	0.065 (cfs)
CG-14	C5	98	2 ADCC	12/09/76	5.0 (est.)
CG-15	C5	98	2 ACAC	12/09/76	0.072 (cfs)

CUTOFF GULCH QUADRANGLE

S-9-A	C4	96	30 BBDD	10/29/76	6.0
S-8-B	C4	96	29 CBAA	10/29/76	25.0
				5/27/77	24.0
WP-1	C5	97	1 DCAA	12/01/76	11.0
WP-2	C5	97	1 CADB	12/01/76	35.0 (est.)
WP-3	C5	97	2 DAAD	11/24/76	9.5
WP-4	C5	97	2 DADA	11/24/76	30.0
WP-5	C5	97	2 DADC	11/24/76	26.0
WP-6	C5	97	2 DDBA	11/24/76	2.0
WP-7	C5	97	11 ACBB	11/24/76	2.5
WC-1	C5	96	7 CBDA	11/22/76	0.12 (cfs)
S-18	C4	97	35 AADD	3/14/77	2.0
				11/09/77	0.5
S-19	C4	96	32 AADB	3/14/77	12.0
S-8a	C4	96	29 CBDC	5/27/77	11.0
S-24	C3	96	35 ADDA	10/20/78	Trickle
WP-43	C5	97	2 BABA	5/24/78	1.0
S-17	C3	96	31 CDAD	1/13/77	2.5
WP-20	C5	97	1 CBCB	1/20/77	16.0
WC-10	C5	97	12 DADB	1/20/77	0.106 (cfs)
WP-23	C5	96	7 DAAA	2/01/77	8.0
WP-24	C5	96	8 BBDC	2/15/77	9.0
WP-25	C5	96	5 CCDC	2/15/77	2.5
WP-26	C5	96	8 BADA	2/15/77	1.0
WP-27	C5	96	8 ABBC	2/15/77	2.0
WP-28	C5	96	8 ABBB	2/15/77	1.0
WP-29	C5	96	8 AAAB	2/16/77	1.5
WP-30	C5	96	5 DDBC	2/16/77	19.0
WP-31	C5	96	5 DDBB	2/16/77	2.5
DG-1	C4	96	35 DBDC	3/01/77	Dry
WP-33	C5	96	8 DBCC	2/17/77	2.0
WP-42	C5	96	10 ACAB	8/15/77	Trickle
S-22	C5	96	23 BCBB	11/14/77	28.0
WP-35	C5	96	4 CBDC	7/26/77	2.5
WP-36	C5	96	4 CBDC	7/26/77	Trickle

(cont'd)

CUTOFF GULCH QUADRANGLE (CONT'D)

WP-37	C5	96	6 DCBA	7/27/77	Trickle
WP-38	C5	96	5 CCBA	7/27/77	1.0
WP-39	C5	96	5 CBDC	7/27/77	Trickle
WP-40	C5	96	5 CBCD	7/27/77	Dry
WP-41	C5	96	10 DACD	7/27/77	Dry
S-20	C4	96	2 CBDC	7/26/77	Trickle
S-21	C4	96	23 DCBC	7/26/77	5.0

MCCARTHY GULCH QUADRANGLE

EF-1	C5	95	3 BDCA	3/08/77	6.0
EF-2	C5	95	3 CADD	3/08/77	12.0
EF-3	C5	95	3 DCBD	3/08/77	2.0
EF-4	C5	95	10 ABAD	3/08/77	7.5
SG-3	C4	95	34 CABA	3/08/77	2.0
Schutte-1	C4	95	31 DAAB	3/09/77	30.0
Schutte-2	C5	96	1 BDBA	3/09/77	0.5
McCarthy-1	C4	95	26 CCCC	6/23/78	30.0 (est.)
McCarthy-2	C4	95	27 ADCB	7/14/78	0.033 (cfs)
McCarthy-3	C4	95	11 ACDC	7/14/78	Trickle
McCarthy-4	C4	95	15 CDBB	10/20/78	5.0
Schutte-3	C5	95	6 ACCD	10/31/78	10.0
Schutte-4	C5	95	6 CDDA	10/31/78	150.0 (est.)
CC-6	C4	95	35 AAAD	6/23/78	10.0
CC-8	C4	95	36 BABD	9/15/78	6.0
SG-1	C4	95	5 CCAB		
SG-4	C4	95	18 BBCC	10/06/78	0.75
S-23	C4	96	1 BDDC	9/22/78	1.0
SG-2	C4	95	20 CBCD	12/07/76	1.0 (est.)
COLONY #1	C5	96	1 BDBA	3/01/77	50.0 (est.)
Davis Spg.	C5	96	12 ACDC	10/11/77	60.0
EF-6	C5	95	2 BCAB	6/17/77	1.5
EF-7	C5	95	2 BAAB	6/17/77	3.0

RIO BLANCO QUADRANGLE

T-3	C5	94	4 CBDA	12/02/77	1.0
T-4	C5	94	4 CACC	12/02/77	1.0
T-5	C5	94	4 CBDD	12/02/77	Trickle
T-6	C5	94	4 BDCB	12/06/77	4.0
T-7	C5	94	4 ABDD	12/06/77	1.0
T-8	C5	94	4 DACA	12/06/77	3.0
T-9	C5	94	3 CCBC	12/06/77	1.0
T-10	C5	94	3 BDAD	12/19/77	No Reading
T-11	C5	94	7 BDBC	12/19/77	25.0
CC-2	C4	94	34 BCDD	2/23/77	Trickle
CC-3	C4	94	32 DACC	2/23/77	3.0
CC-4	C4	94	32 CADB	2/23/77	1.5
CC-5	C4	94	32 BCBA	2/23/77	12.0
T-2	C5	94	5 CDBC	6/17/77	30.0
CC-7	C4	95	24 DDDC	9/15/78	4.0
T-1	C5	94	7 AAAA	11/12/76	0.065 (cfs)

CALF CANYON QUADRANGLE

4A-2	C5	100	8 DDAC	7/13/77	2.0
4A-4	C5	100	16 CBDC	7/20/77	Dry

HENDERSON RIDGE QUADRANGLE

4A-3	C5	100	15 DCBB	7/13/77	Dry
4A-5	C5	100	21 AADC	7/20/77	Trickle
4A-6	C5	100	15 BCCD	7/20/77	1.0
4A-7	C5	100	22 CAAC	7/20/77	1.0
4A-8	C5	100	26 BAAB	7/22/77	Dry
4A-9	C5	100	23 CDDD	7/22/77	Dry
4A-10	C5	100	23 DCCB	7/22/77	1.0
4A-11	C5	100	28 AABC	7/25/77	Dry
4A-12	C5	100	28 AADA	7/25/77	Trickle
4A-13	C5	100	28 ADDD	7/25/77	Dry
4A-14	C5	100	27 BCAA	7/25/77	1.25
4A-15	C5	100	28 BDDC	7/28/77	0.75
4A-16	C5	100	28 DDCC	7/28/77	Dry
4A-17	C5	100	27 DADB	7/28/77	Trickle
4A-18	C5	100	34 AAAB	7/28/77	Dry
4A-19	C5	100	35 DACD	7/29/77	0.5
4A-20	C5	100	36 CCCA	7/29/77	Dry
4A-21	C6	100	5 CCBC	7/29/77	1.0
4A-22	C5	100	35 BACB	1977	Dry
4A-23	C5	100	35 BDDA	1977	Trickle
4A-24	C5	100	34 DDDC	1977	0.5
4A-25	C6	100	16 CADB	1977	0.5
4A-26	C6	100	16 ABCA	1977	1.0
4A-27	C6	100	16 ABAB	1977	0.5
4A-28	C6	100	9 CADD	1977	0.5
4A-29	C6	99	14 BBBB	8/16/77	0.5
4A-30	C6	99	11 DCCA	8/16/77	Dry
4A-31	C6	99	14 AABB	8/16/77	Dry
4A-32	C6	99	12 CCCD	8/16/77	Dry
BM-4	C5	99	19 ACBB	7/05/77	Trickle
BM-9	C5	99	21 CCCC	7/06/77	0.5
BM-10	C5	99	28 ACBC	7/07/77	0.38
BM-11	C5	99	28 ACBD	7/07/77	0.5

DESERT GULCH QUADRANGLE

SK-2	C5	99	14 ADBA	12/28/76	1.0 (est.)
SK-3	C5	99	14 ADDA	12/28/76	No Reading
SK-4	C5	99	24 CBDB	12/28/76	2.0 (est.)
SK-6	C5	98	34 BBDB	12/28/76	2.0 (est.)
SK-7	C5	98	34 BBCA	12/28/76	Frozen
BM-12	C5	99	28 DADD	7/07/77	1.0
BM-14	C5	99	27 DBAA	7/07/77	2.0
BM-15	C6	99	9 ABAC	7/08/77	Trickle
BM-16	C6	99	16 BBAD		
BM-17	C6	99	15 CBCB		
BM-18	C5	99	34 DAAA	7/12/77	Dry
BM-19	C5	99	36 CDBD	7/12/77	Trickle
SK-13	C5	99	23 BBAC	9/29/77	1.5
SK-14	C5	99	13 CABC	9/29/77	0.5
SK-15	C5	98	18 CBCA	9/29/77	0.25
SK-16	C5	98	30 CACD	9/29/77	2.0
SK-17	C5	98	19 AAAC	10/03/77	Dry
SK-18	C5	98	20 BACA	10/03/77	Dry
SK-19	C5	98	29 CCCB	10/03/77	8.0
SK-20	C5	98	28 BDCB	10/04/77	1.5
SK-21	C6	98	8 DBCA	10/04/77	0.5

MOUNT ELAINE QUADRANGLE

WC-8	C5	97	23 BCBA	11/18/76	20.0
WP-11	C5	97	9 DBDD	11/23/76	2.0
WP-12	C5	97	9 CDAA	11/23/76	4.0
WP-13	C5	97	10 CCDA	11/23/76	4.5
WP-14	C5	97	16 AACA	11/23/76	2.0
WP-15	C5	97	16 ACCD	11/23/76	9.0
WP-16	C5	97	15 BACC	11/24/76	4.5
WP-17	C5	97	15 CBAC	11/23/76	9.5
SK-8	C6	98	16 BCBC	12/29/76	2.0 (est.)
CG-10	C5	98	13 BCBD	12/09/76	2.0 (est.)
CR-1	C5	97	35 BCAC	12/19/76	2.0 (est.)
CR-2	C5	97	35 BCCC	12/17/76	8.5
CR-3	C5	97	34 DACD	12/17/76	1.0
Doe-1	C5	97	27 DCAA	12/16/76	15.0
Doe-2	C5	97	27 DCCD	12/16/76	4.0
Doe-3	C5	97	34 ABBA	12/16/76	1.5
Doe-4	C5	97	34 ABCB	12/16/76	4.0
PC-1	C5	97	27 BABD	12/15/76	2.0
PC-2	C5	97	27 BABC	12/15/76	2.0
PC-3	C5	97	27 BCBB	12/15/76	6.0
PC-4	C5	97	27 BCBD	12/15/76	0.5
PC-6	C5	97	27 BCDB	12/15/76	3.0
SH-1	C5	97	20 DBAA	12/02/76	1.5
SH-2	C5	97	20 DDCC	12/02/76	20.0
SH-3	C5	97	29 ADAA	12/03/76	7.5
SH-4	C5	97	28 BBBA	12/03/76	2.5 (est.)
SH-5	C5	97	21 CBDC	12/03/76	5.5
SH-6	C5	97	29 DDDA	12/03/76	2.0 (est.)
WE-1	C5	97	17 CDBB	12/01/76	20.0
WE-2	C5	97	20 BCCC	12/01/76	1.0 (est.)
WE-3	C5	97	19 DCAD	12/01/76	1.0 (est.)
PO-2	C5	97	8 CCBB	12/02/76	20.0
PO-3	C5	97	7 DDCB	12/02/76	2.0 (est.)
PO-4	C5	97	7 DCAA	12/02/76	1.5
CG-16	C5	98	14 DDAB	7/18/77	0.5
PO-5	C5	97	18 CCCD	7/19/77	1.0
LP-17	C6	98	26 AAAC	4/02/77	0.5
LP-18	C6	98	24 CCAC	5/03/77	0.5
LP-20	C6	97	19 DCDA	5/03/77	1.0
CR-4	C5	97	35 BAAC	8/19/77	7.0
PC-7	C5	97	21 DAAD	10/10/77	3.0
PC-8	C5	97	28 DDCC	10/10/77	Trickle
LP-2	C6	97	5 BBCC	1/24/77	3.0 (est.)
LP-3	C6	97	6 DADA	1/24/77	2.0 (est.)
LP-9	C6	97	7 DADA	2/03/77	1.0
LP-10	C6	97	7 BABB	2/03/77	2.0
LP-11	C6	97	18 AABA	2/03/77	1.0
LP-12	C6	97	13 DBDD	2/03/77	1.0
LP-13	C6	97	18 DCAB	2/08/77	Frozen
LP-14	C6	97	24 BDCD	2/08/77	1.0
LP-15	C6	97	19 BADC	2/08/77	1.5
WC-11	C5	97	15 DCDA	1/20/77	2.0 (est.)
WP-18	C5	97	11 CCBC	2/17/77	8.0
PC-5	C5	97	27 CCCD	12/15/76	4.0

CIRCLE DOT QUADRANGLE

BR-1	C5	97	24 DCDB	1/21/77	30.0 (est.)
BR-3	C5	97	24 DCCB	1/21/77	4.0 (est.)
BR-4	C5	97	24 CDDA	1/21/77	2.0 (est.)

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CIRCLE DOT QUADRANGLE (CONT'D)

BR-5	C5	97	24 CDCD	1/21/77	7.0 (est.)
BR-7	C5	97	25 BCBC	1/21/77	3.0 (est.)
BR-8	C5	97	25 CDDB	1/31/77	5.0
BR-9	C5	97	36 ABBA	1/31/77	No Reading
BR-10	C5	97	36 BADC	1/31/77	1.0
BR-11	C5	97	36 BDAB	1/31/77	1.0
LP-1	C6	97	5 BBDD	1/24/77	4.0 (est.)
LP-4	C6	97	4 CBBD	1/26/77	2.0
LP-5	C6	97	4 CBBC	1/26/77	3.0
LP-6	C6	97	5 DACC	1/26/77	10.0
LP-7	C6	97	5 DBDD	1/26/77	1.0
LP-8	C6	97	5 DCDC	1/26/77	4.0
CA-1	C6	97	4 DCAC	2/10/77	10.0
CA-2	C6	97	9 BAAD	2/10/77	2.0
LC-1	C6	97	4 ADAA	2/10/77	0.5
LC-1A	C6	97	3 BCBB	2/09/77	1.0
LC-2	C6	97	3 BABA	2/09/77	No Reading
LC-3	C6	97	3 ABAB	2/09/77	3.0
LC-4	C6	97	3 ABAA	2/09/77	5.0
LC-5	C6	97	32 CCCD	2/09/77	2.0
LC-6	C6	97	32 CCDB	2/10/77	8.0
WP-19	C5	96	18 ACCC		
WP-21	C5	96	18 ABCD	2/01/77	5.0
WP-22	C5	96	18 ABDB	2/01/77	3.0
WP-34	C5	96	17 BABA	2/17/77	3.0
BR-12	C5	96	30 BBAD	1/31/77	3.0
WC-2	C5	97	13 BDDB	11/22/76	1.0
WC-3	C5	97	13 CCCA	11/22/76	6.5
WC-4	C5	97	24 BBBD	11/22/76	1.5
WC-5	C5	97	14 DDDC	11/22/76	10.0
WC-6	C5	97	23 ACBA	11/22/76	4.0
WC-7	C5	97	23 CAAA	11/22/76	1.5
WC-9	C5	97	14 CDBB	11/18/76	1.5
WP-19	C5	96	18 ACCC	11/18/76	3.5
HL-1	C6	97	3 DABB	6/20/77	3.0
HL-2	C6	97	3 ADCA	6/20/77	5.0
HL-3	C6	97	2 BBAA	6/20/77	1.5
HL-4	C6	97	2 BAAA	6/20/77	4.5
HL-5	C5	96	33 CCBC	6/20/77	6.0
HL-6	C5	96	33 CABC	6/20/77	7.5
HL-7	C5	96	33 ACAA	6/20/77	2.0
CA-3	C6	97	9 CDDC	6/22/77	Trickle
CA-4	C6	97	10 BCBD	6/22/77	2.0
CA-5	C6	97	15 BAAC	6/23/77	1.0
DOT-1	C6	97	2 CBDC	6/21/77	2.0
DOT-2	C6	97	2 CBDA	6/21/77	3.0
DOT-3	C6	97	1 BBBC	6/21/77	5.0
DOT-4	C6	97	12 BCCD	6/21/77	4.5
DOT-5	C6	97	1 AACA	6/22/77	2.0
DOT-6	C6	96	6 ABAB	6/22/77	1.5
DOT-7	C6	97	11 BCAD	6/23/77	2.5
DOT-8	C6	97	11 BCBB	6/23/77	Trickle
DOT-9	C6	97	11 CCAA	6/23/77	1.0
DOT-10	C6	97	11 CCBD	6/23/77	2.0
DOT-11	C6	97	10 DAAC	6/28/77	2.0
DOT-12	C6	97	14 BCCA	6/28/77	Dry
DOT-13	C6	97	14 CCAA	6/28/77	2.0
DOT-14	C6	97	22 ACAD	6/28/77	5.0
DOT-15	C6	97	22 DBBB	6/28/77	1.0

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CIRCLE DOT QUADRANGLE (CONT'D)

DOT-16	C6	97	22 BDBB	6/28/77	1.0
DOT-17	C6	97	22 BABA	6/28/77	7.0
DOT-18	C6	97	15 CDCD	6/28/77	3.0
DOT-19	C6	97	22 BDCB	6/29/77	2.0
DOT-20	C6	97	28 AAAB	6/29/77	Trickle
DOT-21	C6	97	23 ADCC	6/29/77	1.25
DOT-22	C6	97	23 DBAA	6/29/77	1.0
CR-5	C5	97	35 BAAC	8/19/77	Dry
BR-15	C6	97	4 BBDA	8/31/77	1.5
BR-16	C5	97	36 DCDB	8/31/77	2.0
BR-17	C5	97	36 DCAA	8/31/77	2.5
DOT-29	C6	96	5 CCBA	9/01/77	Dry
DOT-30	C6	97	1 BDBC	9/01/77	3.5
DOT-31	C6	97	12 AABD	9/01/77	0.75
DOT-32	C6	96	6 CDBB	9/01/77	0.25
DOT-33	C6	96	5 BADA	9/01/77	Trickle
DOT-34	C6	96	6 BAAA	9/01/77	Trickle
DOT-35	C6	97	24 CDAB	9/26/77	0.5
DOT-36	C6	97	24 CDBD	9/26/77	Dry
DOT-37	C6	97	24 CCBB	9/26/77	Dry
DOT-38	C6	97	14 ACCC	9/26/77	3.0
CA-6	C6	97	9 ACAD	9/20/77	6.0
CA-7	C6	97	9 ACDA	9/20/77	4.0
CA-8	C6	97	9 DDDB	9/20/77	10.0
CA-9	C6	97	10 CAAC	9/26/77	2.5
BR-2	C5	97	25 BAAA	7/21/77	2.0
BR-13	C5	96	16 DDCD	7/21/77	0.5
BR-14	C5	96	16 DDCA	7/21/77	Dry
LC-7	C5	96	31 DBAD	1977	3.0
LC-8	C5	96	29 CDDB	1977	2.5
LC-9	C5	96	32 ABAC	1977	0.5
LC-10	C5	96	32 ABCA	1977	11.0
DOT-23	C6	97	24 BDDC	7/14/77	0.5
DOT-24	C6	96	18 CABD	7/14/77	Trickle
DOT-25	C6	97	13 CADA	7/14/77	Dry
DOT-26	C6	97	13 CABC	7/15/77	0.5
DOT-27	C6	97	13 CCBB	7/15/77	1.0
DOT-28	C6	97	13 CCBC	7/15/77	Dry

FORKED GULCH QUADRANGLE

LR-3	C5	95	14 BCDA	12/08/77	1.5
LR-4	C5	95	14 DADB	12/08/77	Trickle
LR-5	C5	95	15 BDBA	12/14/77	Trickle
LR-2	C5	95	21 CADB	12/14/77	Trickle
SR-1	C5	95	25 BDCD	12/15/77	0.5
SR-2	C5	95	35 ABDD	12/15/77	Dry
SR-3	C5	95	36 CAAD	12/15/77	Dry
SR-4	C5	95	36 ABCA	12/15/77	1.5
EF-5	C5	95	9 DCBB	3/09/77	6.0
LR-1	C5	95	20 DABB	6/13/77	Trickle

ANVIL POINTS QUADRANGLE

NW-1	C5	94	14 BADC	6/14/77	1.0 (est.)
NW-2	C5	94	14 BDAA	6/14/77	Dry
NW-3	C5	94	14 CBBC	6/14/77	6.0
NW-4	C5	94	16 ACDC	6/14/77	2.0
NW-5	C5	94	17 BAAA	6/14/77	3.0
NW-6	C5	94	16 BDCA	6/14/77	22.0
NW-7	C5	94	22 BCDA	6/15/77	2.0
NW-8	C5	94	20 ABBC	6/15/77	1.5
NW-9	C5	94	20 BAAB	6/15/77	1.0
NW-10	C5	94	29 ABBA	6/15/77	2.0
NW-11	C5	94	29 ABAA	6/15/77	1.0
NW-12	C5	94	20 CABD	6/15/77	5.0
NW-13	C5	94	20 BCAD	6/16/77	1.0
NW-14	C5	94	18 DDCC	6/16/77	0.0
EP-1	C5	94	23 CCCA	6/16/77	3.0
NW-15	C5	94	20 CBCA	12/07/77	1.0
NW-16	C5	94	20 BBDC	12/07/77	1.0
NW-17	C5	94	19 DBDB	12/07/77	1.0
NW-18	C5	94	19 BCCA	12/08/77	Trickle
NW-19	C5	95	24 ABAD	12/08/77	Trickle

LONG POINT QUADRANGLE

LP-16	C6	98	36 BBBD	4/02/77	1.5
LP-19	C6	97	31 CCBA	5/03/77	0.5
LP-21	C6	97	30 CACB	5/03/77	1.0

RED PINNACLE QUADRANGLE

RP-1	C6	97	26 DBBB	6/29/77	1.0
RP-2	C6	97	26 CBBB	6/29/77	0.5
RP-3	C6	97	26 BADD	6/29/77	Dry
RP-4	C6	97	25 ACDD	6/30/77	4.0
RP-5	C6	97	25 CAAD	6/30/77	Dry
RP-6	C6	97	36 DCAC	6/30/77	1.5
RP-7	C7	97	1 ACCA	6/30/77	Trickle
RP-8	C7	97	1 DCBC	6/30/77	1.0
RP-9	C7	97	12 BADC	6/30/77	Trickle
RP-10	C7	97	12 CADD	6/30/77	2.0
RP-11	C7	97	13 BACA	6/30/77	2.5
RP-12	C7	97	2 DCBB	8/29/77	0.5
RP-13	C7	97	2 BDAA	8/29/77	0.5
RP-14	C7	97	11 BDCC	8/29/77	0.75
RP-15	C7	97	11 CDAA	8/29/77	3.0
RP-16	C7	97	14 ABBA	8/29/77	Trickle
RP-17	C7	97	14 ADCC	8/29/77	Dry
RP-18	C6	97	35 DCCA	8/30/77	0.5
RP-19	C7	97	13 BDCC	8/30/77	1.5
RP-20	C7	97	13 BCDD	8/30/77	2.0
RP-21	C7	97	13 AACC	8/30/77	7.0