DISTRIBUTION OF PRECIPITATION IN LITTLE LONG VALLEY AND DRY VALLEY CARIBOU COUNTY, IDAHO

Dale R. Ralston
E. Woody Trihey

SURFACE ENVIRONMENT & MINING
SEAM
PROGRAM

IDAHO BUREAU OF MINES AND GEOLOGY
Moscow, Idaho
December, 1975

Information Circular No. 30

Information Circular No. 30 December, 1975

DISTRIBUTION OF PRECIPITATION IN LITTLE LONG VALLEY AND DRY VALLEY, CARIBOU COUNTY, IDAHO

by

Dale R. Ralston
Hydrologist
Idaho Bureau of Mines
and Geology

E. Woody Trihey
Assistant Director
Idaho Water Resources
Research Institute

A basic data release of the Idaho Bureau of Mines and Geology - University of Idaho cooperative studies program on:

Water Resource Problems Related to Phosphate
Mining in Southeastern Idaho

Prepared in cooperation with the Surface Environment and Mining Division of the U.S. Forest Service and several mining companies

IDAHO BUREAU OF MINES AND GEOLOGY
Moscow, Idaho

ABSTRACT

Nineteen storage type precipitation gages were installed in the Little Long Valley-Dry Valley portion of the Phosphate Mining Area in southeastern Idaho in September, 1974. Results from the first year of gage operation indicate a range in precipitation of an average of 18 inches on the valley floors to an average of 21 inches on the ridges. Long term precipitation records at a nearby station indicate that the 1975 water year was near the long term average.

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

FIGURES

TABLES

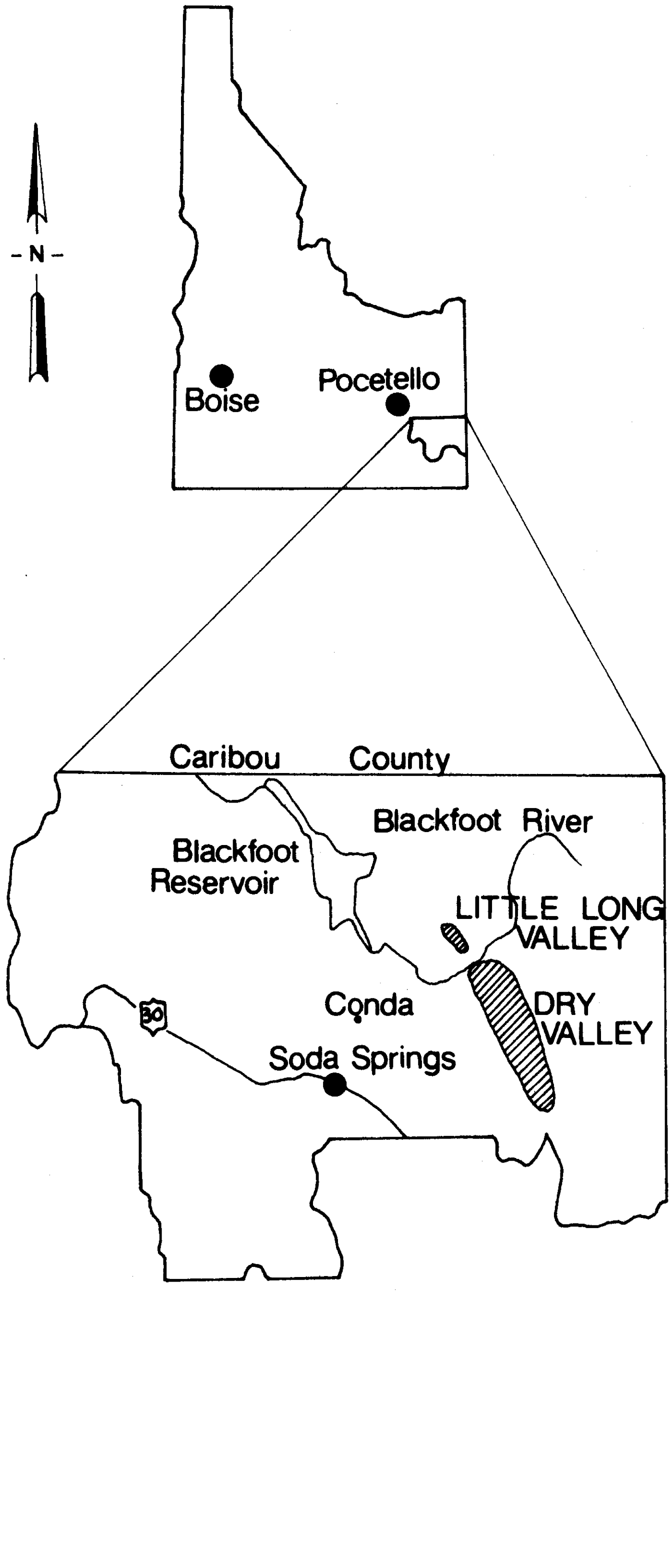


Figure 1. Location map of Dry Valley and Little Long Valley

INTRODUCTION

The phosphate mining area of southeastern Idaho is presently undergoing intense scrutiny with respect to mine planning and evaluation of environmental impacts from proposed and existing mining efforts. One of the main constraints on both mine planning and assessment of environmental impact is the lack of basic hydrologic data. A three-year study was initiated in June, 1974, by the Idaho Bureau of Mines and Geology and the University of Idaho to obtain basic hydrologic data for several selected areas in order to provide an assessment of the water resources within the area. This effort is partially supported by the Surface Environment and Mining Division (SEAM) of the U.S. Forest Service and by cooperative efforts of several mining companies.

A network of storage type precipitation gages was installed in two valleys within the phosphate mining area in September, 1974, as part of this general investigative effort. This report presents data on the areal distribution of annual precipitation in the Little Long Valley - Dry Valley area (Figure 1) for the 1975 water year (October 1974 - September 1975). These data are compared with data collected by Triangle Mining Company at the Wooly Valley Mine and National Weather Service at Conda, Idaho (N.O.A.A., 1965-1975).

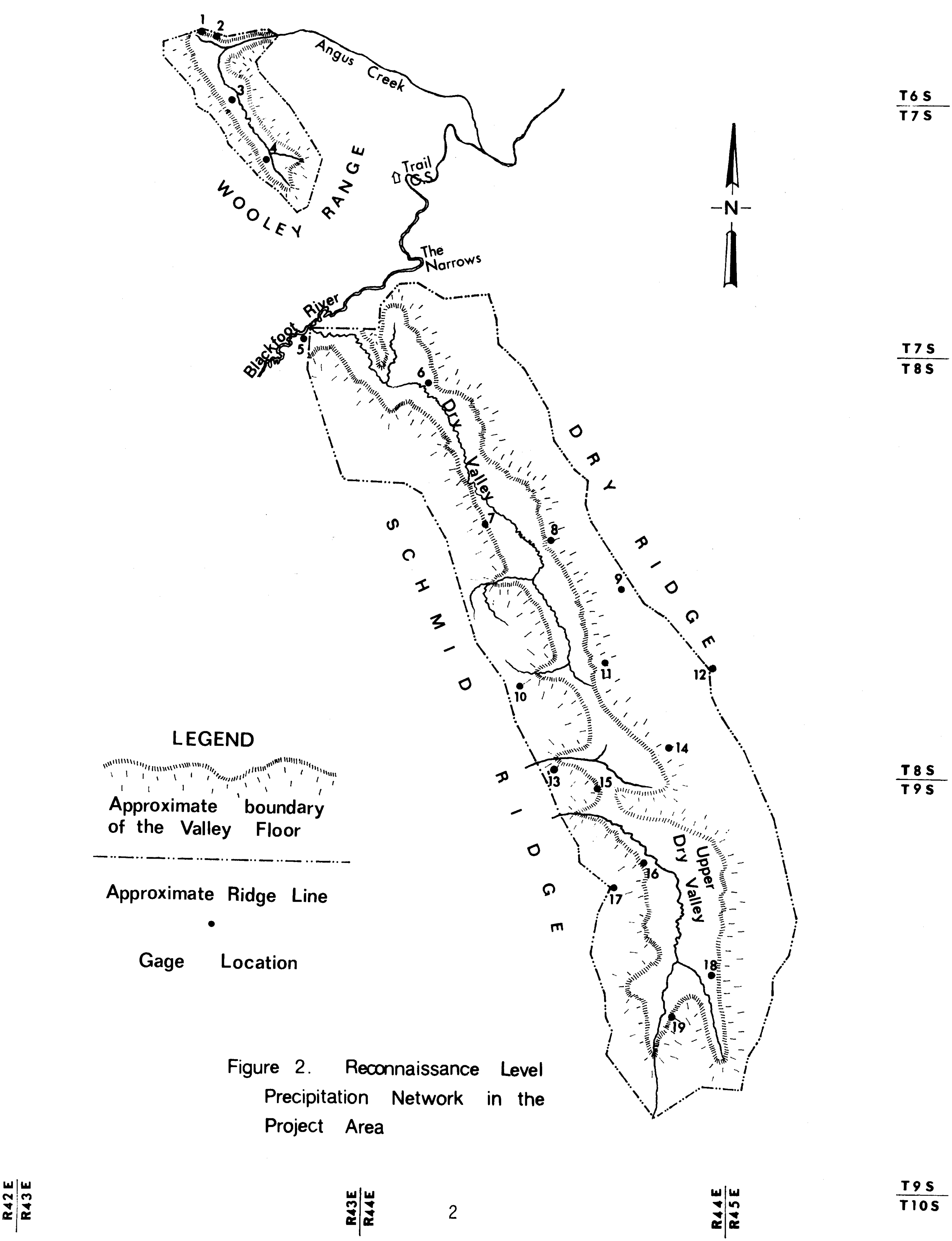


Figure 2. Reconnaissance Level Precipitation Network in the Project Area

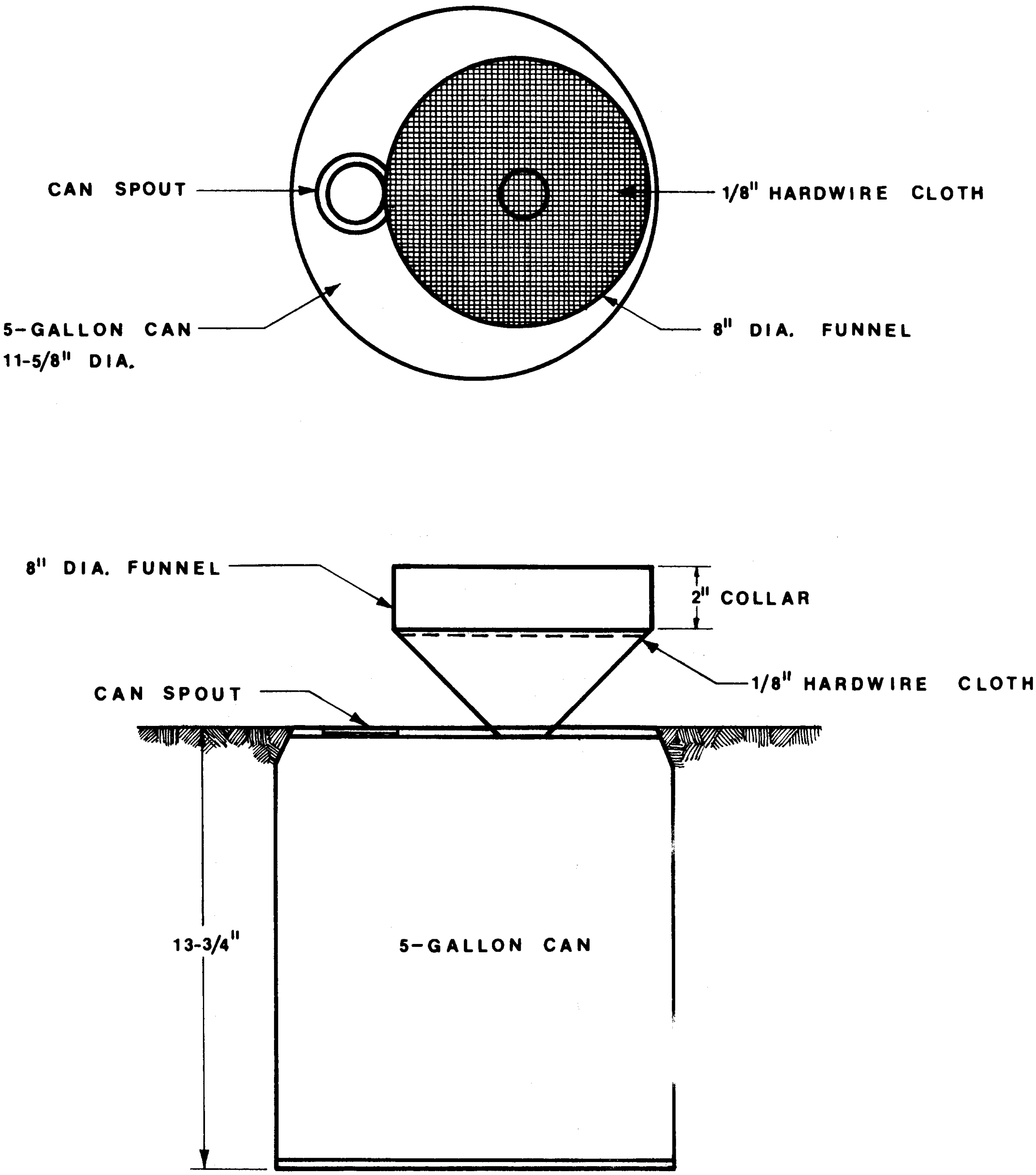


Figure 3. Five Gallon Pit Gage

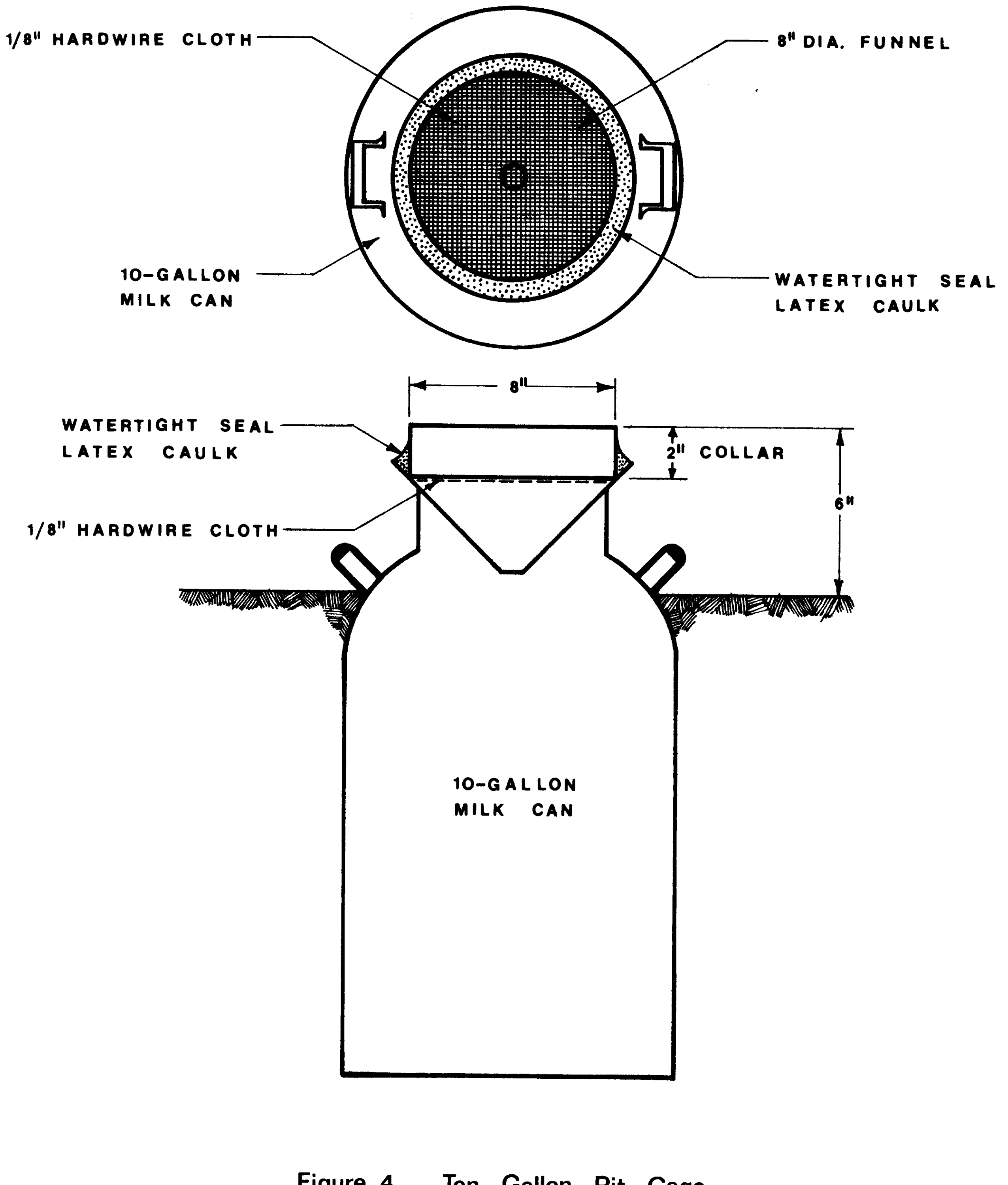


Figure 4. Ten Gallon Pit Gage

PROCEDURE

The reconnaissance level precipitation network installed in the project area in September, 1974, consisted of four gages in the Little Long Valley area and fifteen gages throughout Dry Valley (Figure 2). Gage locations were selected on the basis of aspect, exposure, surrounding vegetation, elevation, slope and accessibility.

Ground-level storage gages and field techniques used in this study were developed during a study of the Raft River basin in southern Idaho funded by the Office of Water Research and Technology (Trihey 1974). The gages are of two basic designs. The first model consists of a two-inch collar soldered into the top of a five-gallon can (Figure 3). A piece of hardware cloth is placed inside the funnel just below the two-inch collar to keep insects and rodents from becoming trapped inside and clogging the funnel constriction. The gages are placed so that the top of the can is level with the surrounding land surface. The top of the funnel is thus about six inches above ground surface. Storage capacity of the five gallon gage is approximately 23 inches of precipitation. A larger capacity storage gage, assembled from a ten-gallon milk can and an altered eight-inch funnel, was also used in the study (Figure 4). The ten-gallon model has considerably more storage capacity (approximately forty inches of precipitation) and is easy to service. The funnel, which is sealed to the milk can with latex calk, can readily be removed during servicing. An improvised cattle guard was placed around each gage to deter livestock from trampling the gage orifice. A photograph of an installed five gallon gage is presented in Figure 5.

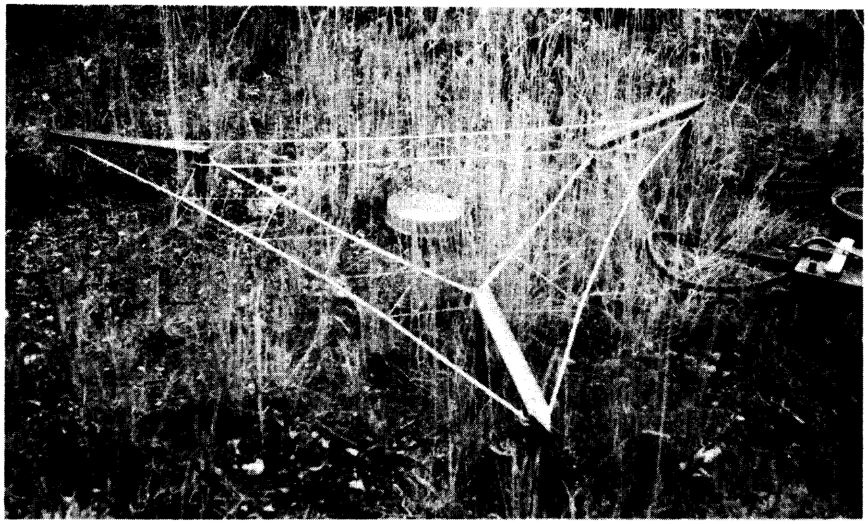


Figure 5 A pit gage installation with cattle guard.

The gages are charged with antifreeze to prevent damage from ice during freezing weather and oil to prevent evaporation. Two pounds of antifreeze and one-half pound of ten-weight oil were used to charge the gages. The gages are emptied by using a section of garden hose and a portable marine pump to draw out the contents. The weight of precipitation at each site is determined by weighing the total contents pumped from each gage and subtracting the weight of the antifreeze and oil. Annual precipitation in inches is calculated by converting the weight of water collected in the gage to a volume then dividing by the area of the eight-inch funnel (the catchment area). The annual precipitation recorded at each site is presented in Table 1.

ANALYSIS OF DATA

The precipitation recorded at each site is presented in Table 1 and shown on Figure 6. The storage gage results indicate a range in precipitation from a low of 15 inches to a high of 41 inches. Some of this variation can be explained by the local conditions surrounding each gage as noted on Table 1. Isohyetal lines are presented on Figure 6 on the basis of interpreted precipitation data. These data indicate a mean precipitation of about 20 inches on the floor of Dry Valley with precipitation rates of 25 inches to 35 inches on the surrounding ridges. Precipitation recorded on the floor of Little Long Valley averaged about 16 inches increasing to 20 inches on the east and west ridges. Snow drift areas yielded an equivalent of up to 40 inches of precipitation. These data compare well with the recorded precipitation of about 17 inches at the Triangle Mining Company Office near Little Long Valley. The station at Conda noted about 18 inches of precipitation during the same period.

The monthly total precipitation at the Triangle and Conda stations are presented on Figure 7 to illustrate the occurrance throughout the 1974-75 water year. Peaks in precipitation may be noted in October, February-March and June-July. Sylvester (1975) noted that the fall and winter climates in the area are dominated by cold, dry continental air and by cyclonic storms. Most of the precipitation during this period is in the form of snow, which accumulates on both ridges and valleys. Precipitation during the spring usually results from cool marine air flowing in from the south. Summer precipitation is primarily associated with thunderstorm activity. Wide areal variations in precipitation occur from these storms of limited extent and duration. The variations in precipitation resulting from summer storm activity may be noted on Figure 7 by comparing the differences in precipitation between nearby stations for the July-August period.

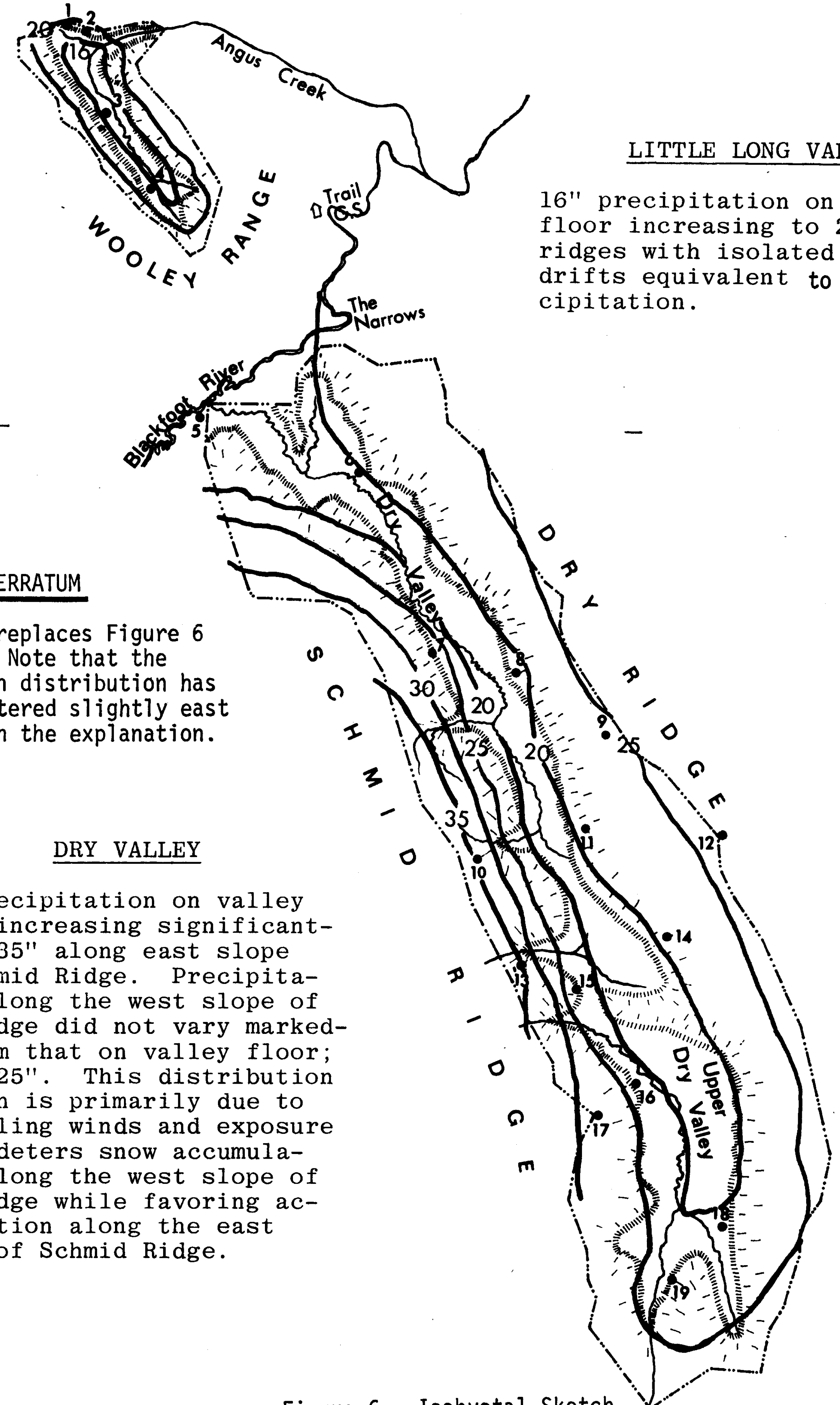
The recorded total precipitation for the 1975 water year at Conda was below both the ten-year and long term averages (Figure 8). However, precipitation data at Conda are missing for four days during the 1975 water year. Records from several nearby stations indicate less than 0.50 inches of precipitation fell in the area during the two-day period

TABLE I

DATA FROM PROJECT GAGES
SEPTEMBER 1974 - SEPTEMBER 1975

Gage	Location	Elevation (feet M.S.L.)	Annual Precipitation (inches)	Comments
			LITTLE LONG VALLEY	
1	NW/4; Sec 33; T 6S; R 43 E	6780	23	Drifting Snow
2	NE/4; Sec 33; T 6S; R 43 E	6920	16	
3	NE/4; Sec 3; T 7S; R 43 E	6780	16	
4	SW/4; Sec 11; T 7S; R 43 E	6930	39	Drifting Snow
			DRY VALLEY	
5	SW/4; Sec 25/ T 7S; R 43 E	6340	18	
6	SW/4; Sec 32: T 7S; R 44 E	6440	21	Gage capacity exceeded
7	SE/4; Sec 8; T 8S; R 44 E	6610	31	
8	NW/4; Sec 15; T 8S; R 44 E	6560	20	Gage capacity exceeded
9	SW/4; Sec 14; T 8S; R 44 E	7860	23	Wind swept exposure
10	SW/4; Sec 28; T 8S; R 44 E	6940	15	Gage orifice trampled
11	NE/4; Sec 27; T 8S; R 44 E	6790	23	Water standing in funnel Gage capacity exceeded
12	NE/4; Sec 25; T 8S; R 44 E	8600	15	Gage orifice trampled
13	SW/4; Sec 34; T 9S; R 44 E	6620	41	Drifting
14	SW/4; Sec 36; T 8S; R 44 E	6760	N/A	Gage not recovered
15	NE/4; Sec 3; T 9S; R 44 E	6650	21	
16	NE/4; Sec 11; T 9S; R 44 E	6560	23	Gage capacity exceeded
17	SW/4; Sec 11; T 9S; R 44 E	7010	26	Gage capacity exceeded
18	NW/4; Sec 19; T [illegible]S; R 44 E	6810	21	Gage in rain shadow of Ridge Point
19	SW/4; Sec 24; T 9S; R 44 E	6680	23	Gage capacity exceeded

of no record in December, 1974. Less than 0.10 inches of precipitation was recorded at the nearby stations for each day of no record at Conda during January and May. Since little thunderstorm activity occurs during December, January, and May, the nearby records are assumed to be representative of precipitation during the periods of no record at Conda. The recorded precipitation of 17.74 inches at Conda for the 1975 water year, adjusted for the missing record of about 0.70 inches, is close to the long term annual average of 18.77 inches. The precipitation collected by the storage gages during the year may be considered as representative of average or just below average conditions.



LITTLE LONG VALLEY

16" precipitation on valley floor increasing to 20" on ridges with isolated snow drifts equivalent to 40" precipitation.

ERRATUM

This figure replaces Figure 6 on page 10. Note that the precipitation distribution has been reregistered slightly east to agree with the explanation.

DRY VALLEY

20" precipitation on valley floor increasing significantly to 35" along east slope of Schmid Ridge. Precipitation along the west slope of Dry Ridge did not vary markedly from that on valley floor; about 25". This distribution pattern is primarily due to prevailing winds and exposure which deters snow accumulation along the west slope of Dry Ridge while favoring accumulation along the east slope of Schmid Ridge.

Figure 6. Isohyetal Sketch of Study Area

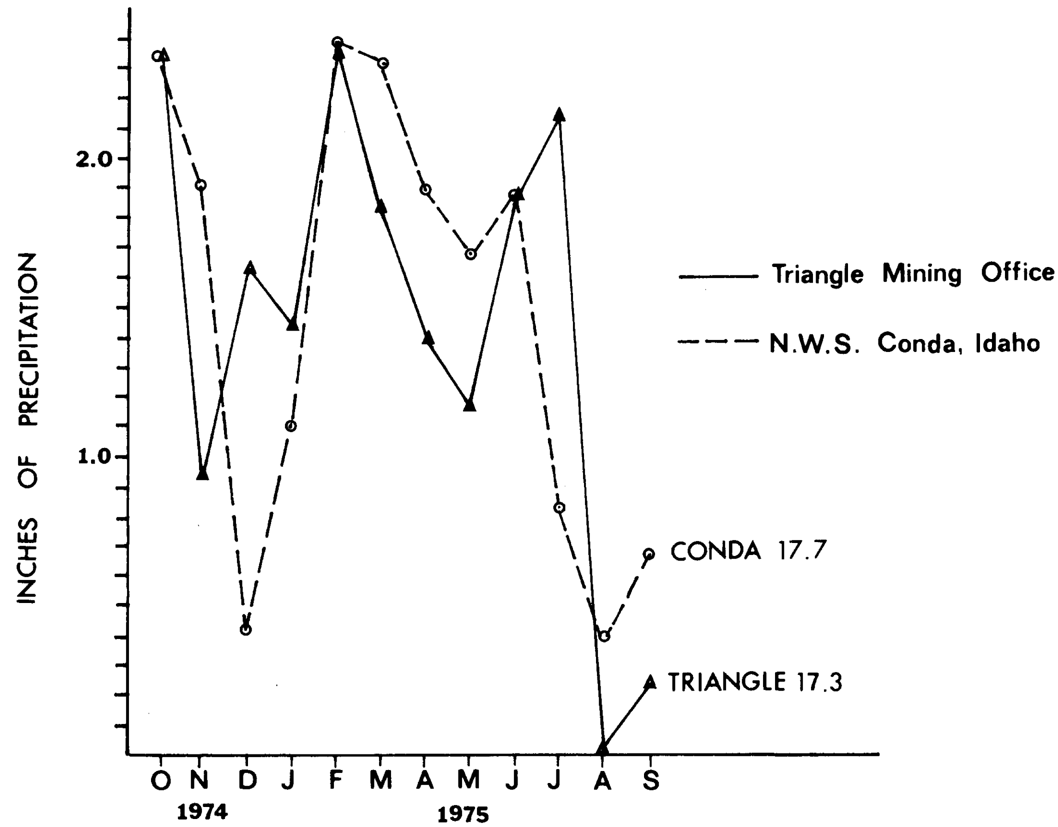


Figure 7. Monthly Precipitation at Conda and Triangle Mine For the 1975 Water Year

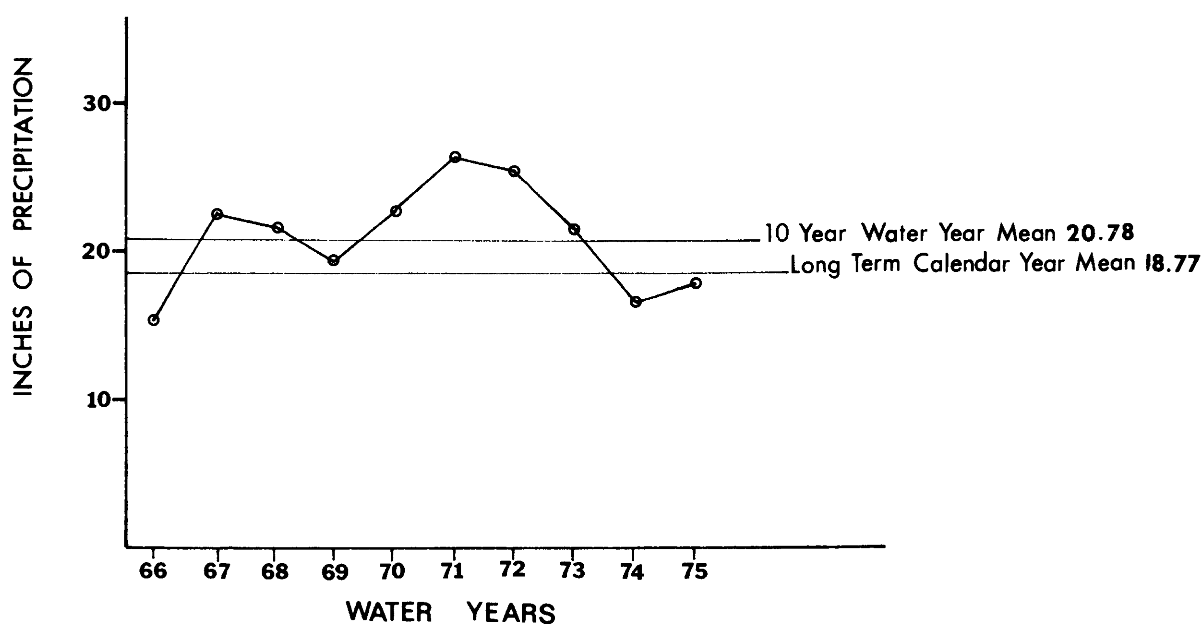


Figure 8. Annual Precipitation At Conda, Idaho By Water Year 1966 - 75

CONCLUSIONS

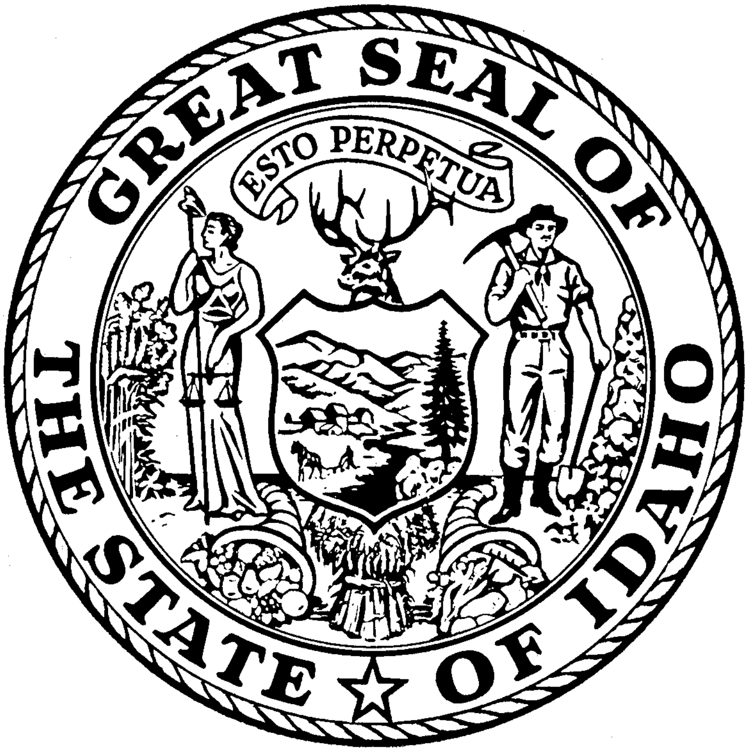
The distribution of precipitation in two areas within the phosphate mining district in southeastern Idaho was determined for an average water year utilizing a network of storage type gages. The precipitation ranged from an average of 18 inches on the valley floors to an average of 25 inches on the ridges.

REFERENCES

National Oceanic and Atmospheric Administration (N.O.A.A.), 1965-1975, Climatological Data - Idaho; Volumes 68-76.

Sylvester, Kenneth A., 1975, A Preliminary Evaluation of Ground Water in Upper Dry Valley and Little Long Valley, Caribou County, Idaho: Idaho Bureau of Mines and Geology Pamphlet No. 159, 97 p.

Trihey, E. Woody, 1974, Techniques for Determining Amount and Distribution of Precipitation in Mountain Valleys of Idaho: Water Resources Research Institute, University of Idaho, Open File Series, no. 203, 39 p.



State of Idaho • Cecil D. Andrus, Governor