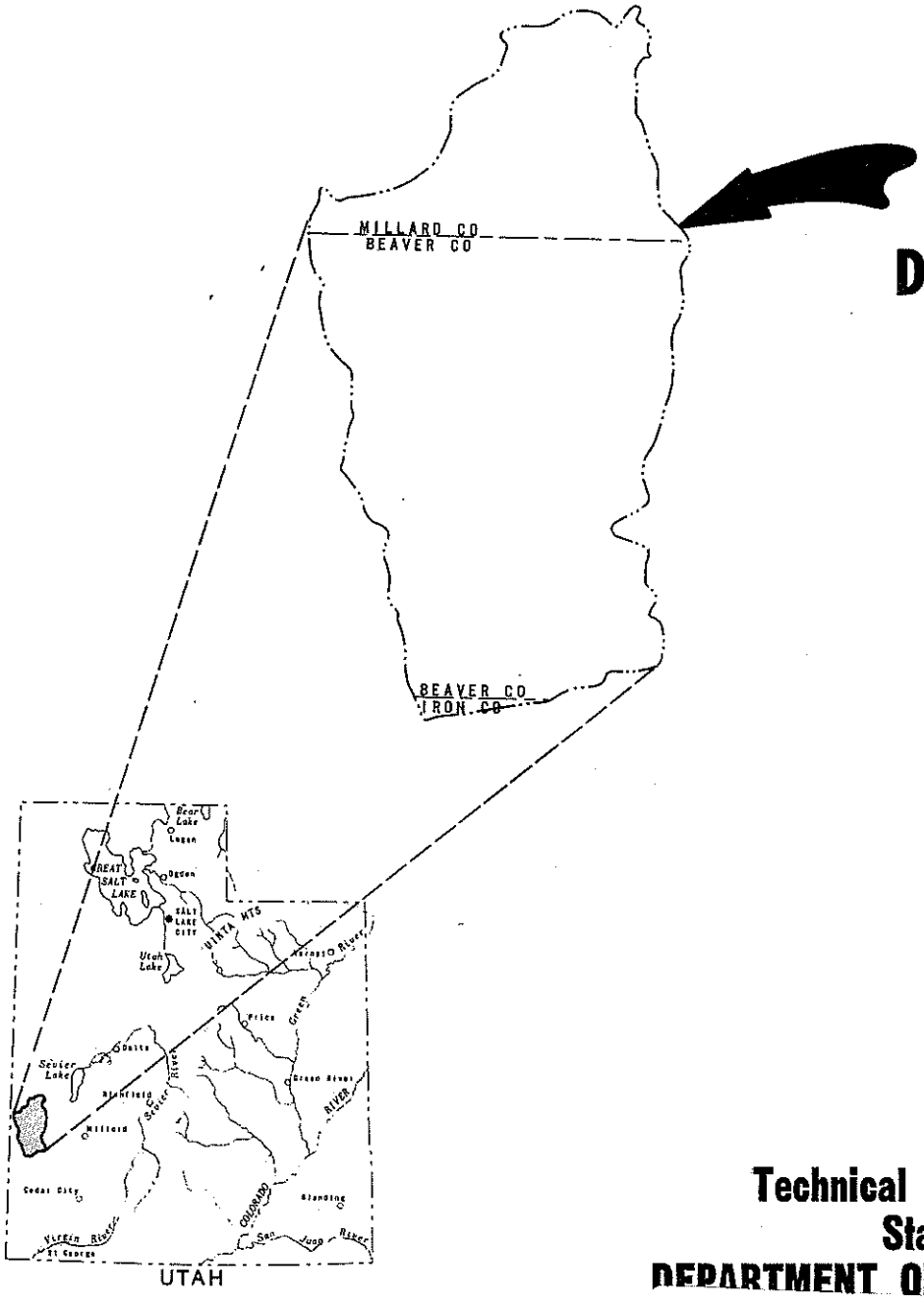
HYDROLOGIC RECONNAISSANCE OF THE PINE VALLEY DRAINAGE BASIN, MILLARD, BEAVER, AND IRON COUNTIES, UTAH



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and spring these reservoirs store small quantities of water for livestock, but during summer most of them are dry. Total storage capacity of such impoundments is probably less than 100 acre-ft (0.12 hm^3).

At least two stream impoundments serve, in part, to store water for diversion to off-stream uses. Water from Pine Grove Creek is diverted intermittently from a reservoir at (C-28-16)28dbc by an open unlined ditch to the East Pine Reservoir, a stock pond at (C-27-16)31cac. Water has also been pumped from an impoundment on Sheep Creek at (C-30-17)19cda for use in adjacent mineral-recovery operations. Total volume of water diverted from these impoundments is unknown but probably is small.

There is no surface outflow from the Pine Valley drainage basin; thus the long-term average consumptive use of surface water by evapotranspiration, livestock, and wildlife equals the difference between total precipitation and ground-water recharge within the basin (table 4). The estimated consumptive use of surface water (excluding springflow), therefore, averages nearly 95 percent of the total precipitation.

Ground water

Most of the known ground-water sources in the Pine Valley drainage basin are in extrusive igneous rocks (Te, table 2) in the Needle Range. The major ground-water reservoir in the basin, however, is in the older alluvium (QTa, table 2), which forms the bulk of the valley fill. The physical characteristics of these hydrogeologic units and the other units described in table 2 control the recharge, occurrence, movement, storage, and discharge of ground water in the basin.

Recharge

Total recharge from precipitation in the Pine Valley drainage basin is estimated to average about 21,000 acre-ft (26 hm^3) annually or about 5 percent of total precipitation (table 4). The estimate was made using a method developed by Eakin and others (1951, p. 79-81) for use in Nevada and modified by Hood (Hood and Waddell, 1968, p. 22-23) for use in western Utah. More than 80 percent of the recharge is from precipitation at altitudes greater than about 6,000 ft (1,829 m), where normal annual precipitation exceeds 12 in (305 mm) (pl. 1). A significant part of the area where recharge actually occurs, however, is at altitudes below 6,000 ft (1,829 m), where runoff from the higher parts of the drainage basin infiltrates the relatively permeable sand and gravel deposits in and along the stream channels.

Although no direct determinations of channel losses are available for streams in Pine Valley, measurements made on similar streams in Wah Wah Valley, a few miles to the east, indicate channel losses by infiltration of 0.3-1.3 $ft^3/s/mi$ (0.005-0.023 $m^3/s/km$) (Stephens, 1974, p. 13). It is probable that infiltration losses of similar magnitude occur in stream-channel alluvium in Pine Valley.

Table 4.--Estimated average annual volumes of precipitation and ground-water recharge

(Areas of precipitation zones measured from pl. 1)

Precipitation zone (in)	Area (acres)	Precipitation		Recharge	
		Ft	Acre-ft	Percent of precipitation	Acre-ft
Area within Pine Valley ground-water basin					
Quaternary and Tertiary rocks					
Less than 8	101,400	0.58	58,810	0	0
8-10	104,300	.75	78,220	0	0
10-12	100,400	.92	92,370	3	2,770
12-16	52,200	1.17	61,080	6	3,660
More than 16	8,400	1.42	11,930	20	2,390
Subtotal	366,700		302,410		8,820
Paleozoic rocks					
Less than 8	2,100	0.58	1,220	0	0
8-10	14,100	.75	10,570	0	0
10-12	20,400	.92	18,770	4	750
12-16	22,400	1.17	26,210	8	2,100
More than 16	11,900	1.42	16,900	25	4,220
Subtotal	70,900		73,670		7,070
Total (rounded)	438,000		376,000		16,000
Area within Wah Wah Valley ground-water basin					
Quaternary and Tertiary rocks					
10-12	1,800	0.92	1,660	3	50
12-16	2,600	1.17	3,040	6	180
Subtotal	4,400		4,700		230
Paleozoic rocks					
10-12	2,100	0.92	1,930	4	80
12-16	12,500	1.17	14,620	8	1,170
16-20	8,400	1.50	12,600	25	3,150
More than 20	600	1.75	1,050	25	260
Subtotal	23,600		30,200		4,660
Total (rounded)	28,000		35,000		5,000[1]
Total Pine Valley drainage basin (rounded)	466,000		410,000		21,000

[1]3,000 acre-ft per year is assumed to move eastward under the drainage divide into Wah Wah Valley drainage basin; 2,000 acre-ft per year is recharge in Pine Valley from surface runoff that infiltrates the alluvial slopes on the western flank of the Wah Wah Mountains.