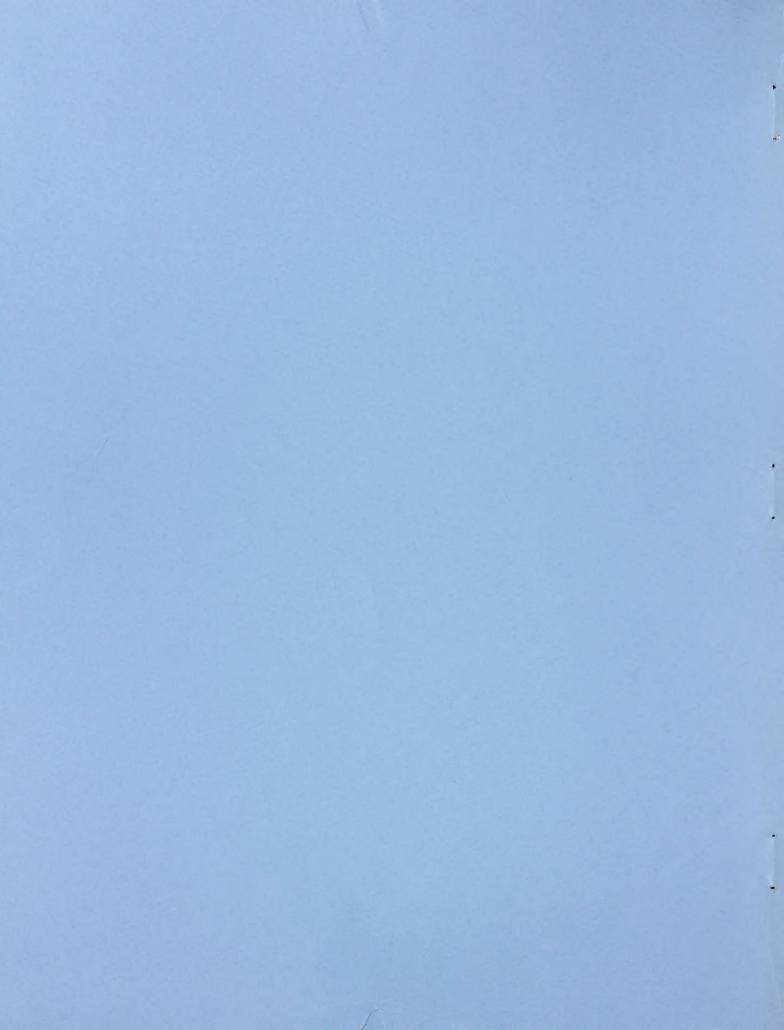


RECONNAISSANCE APPRAISAL OF THE WATER RESOURCES OF THE HENRY MOUNTAINS COAL FIELD WAYNE AND GARFIELD COUNTIES UTAH 1975-1977

> by Harry D. Goode and Eric Olson University of Utah

Prepared for Water Resources Division U.S. Geological Survey in cooperation with U.S. Bureau of Land Management Research supported by U.S. Geological Survey Department of the Interior July 1977

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ABSTRACT

The Henry Mountains area encompasses about 1500 square miles in Wayne and Garfield Counties, Utah. It is a scoop-shaped structural basin whose deepest part is near the western boundary along the Waterpocket Fold. The rocks of the area range in age from the Permian Cutler to the Cretaceous Mesaverde and in many places are covered by extensive pediment gravels, stream deposits, and eolian sand of Quaternary age. The structural basin of Laramide age was intruded in Oligocene time by stocks and laccoliths of diorite porphyry which domed up the central part of the basin and formed a subsidiary basin, the coal basin, between the Waterpocket Fold on the west and the intrusive mountains on the east. The Cretaceous Ferron, Emery, and Mesaverde Sandstones of the coal basin contain the principal coal deposits.

Water demand to develop the coal of the area will depend on the way and rate the coal is developed, and may range from 10,000 to 45,000 acrefeet per year for a gasification plant to as little as 7500 acre-feet per year for shipping ten million tons of coal a year by pipeline. Water for such development is probably available only from the Navajo Sandstone, which may contain 50,000 acre-feet per square mile in storage. Under much of the coal-bearing area the Navajo is 4000 to nearly 6000 feet deep but its water may be under artesian pressure of 2000 or more feet. With properly spaced wells the Navajo probably can supply 20,000 to 30,000 acre-feet per year. Other sources that could supply small quantities of water that likely would be drastically reduced during drought years are: springs and streams from the mountains, perhaps 200 acre-feet per year; and Oak Creek or Pleasant Creek, perhaps 1000 to 2000 acre-feet per year. Some of the sandstone units that lie above the Navajo might yield quantities of a few hundred to a few thousand acre-feet per year. These include the Entrada, Morrison, Dakota, Ferron, Emery, and Mesaverde. All except the Entrada, which is known to yield a few tens of gallons per well near Hanksville, are untested as aquifers, but the geologic structure is favorable for storing the meagre recharge into these units so they are worthy of exploration for small supplies.

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In addition to its conclusion that the Navajo is the best probable source for large quantities of water, this report contains schedules of 209 springs and chemical analyses of 61 samples of spring water, of 11 samples of stream water, and of 24 samples of well water. It also contains the results of grain-size analyses and porosity determinations of 11 samples of sandstone collected from surface exposures, measurements or estimates of flow of many streams, and 16 cross-channel profiles of streams that drain the coal basin.

INTRODUCTION

Location

The Henry Mountains area encompasses about 1500 square miles in Wayne and Garfield Counties, Utah (fig. 1). It is bounded on the southwest and west by the Waterpocket Fold, on the north by the Fremont River, and on the east and southeast by the Dirty Devil River and Lake Powell. In plan view the area is an asymmetric oval with its long axis northsouth and with a rather narrow point at the south end where the Waterpocket Fold meets Lake Powell. The three highest peaks of the range, from north to south Mt. Ellen, Mt. Pennell, and Mt. Hillers, are all about 11,000 feet high and roughly bisect the area. The two lower mountains, Ellsworth and Holmes, are southeast of the main peaks and are about 8,000 feet high.

The principal deposits of the Henry mountains coal field lie in a structural basin (here called the coal basin to distinguish it from the larger Henry Mountains structural basin of which it is a part) west of the Henry Mountains in Wayne and Garfield Counties, Utah (figs. 3 and 4). The coal occurs in three zones: the lowest coal zone is in the Ferron Sandstone member of the Mancos Shale, and two, a lower and upper, are in the Emery Sandstone member of the Mancos Shale. Minor amounts of coal also occur in the Dakota Sandstone. The coal beds are exposed around the sides of the mesas and occur in the subsurface in Ts. 29 and 30 S., Rs. 8, 9, and 10 E. in Wayne County and in Ts. 31, 32, 33, and 34 S., Rs. 8, 9, 10, and 11 E., in Garfield County. The deposits of Emery coal most convenient for development are in Ts. 31, 32, & 33 S., Rs. 8 and 9 E., in Garfield County, in the vicinity of Wildcat and Tarantula Mesas.

Purpose and Scope

This project, funded by the U.S. Geological Survey through Grant No. 14-08-0001-G-218 to the University of Utah, was set up to make a reconnaissance evaluation of the water resources of the Henry Mountains area with respect to their potential to supply water to develop the coal

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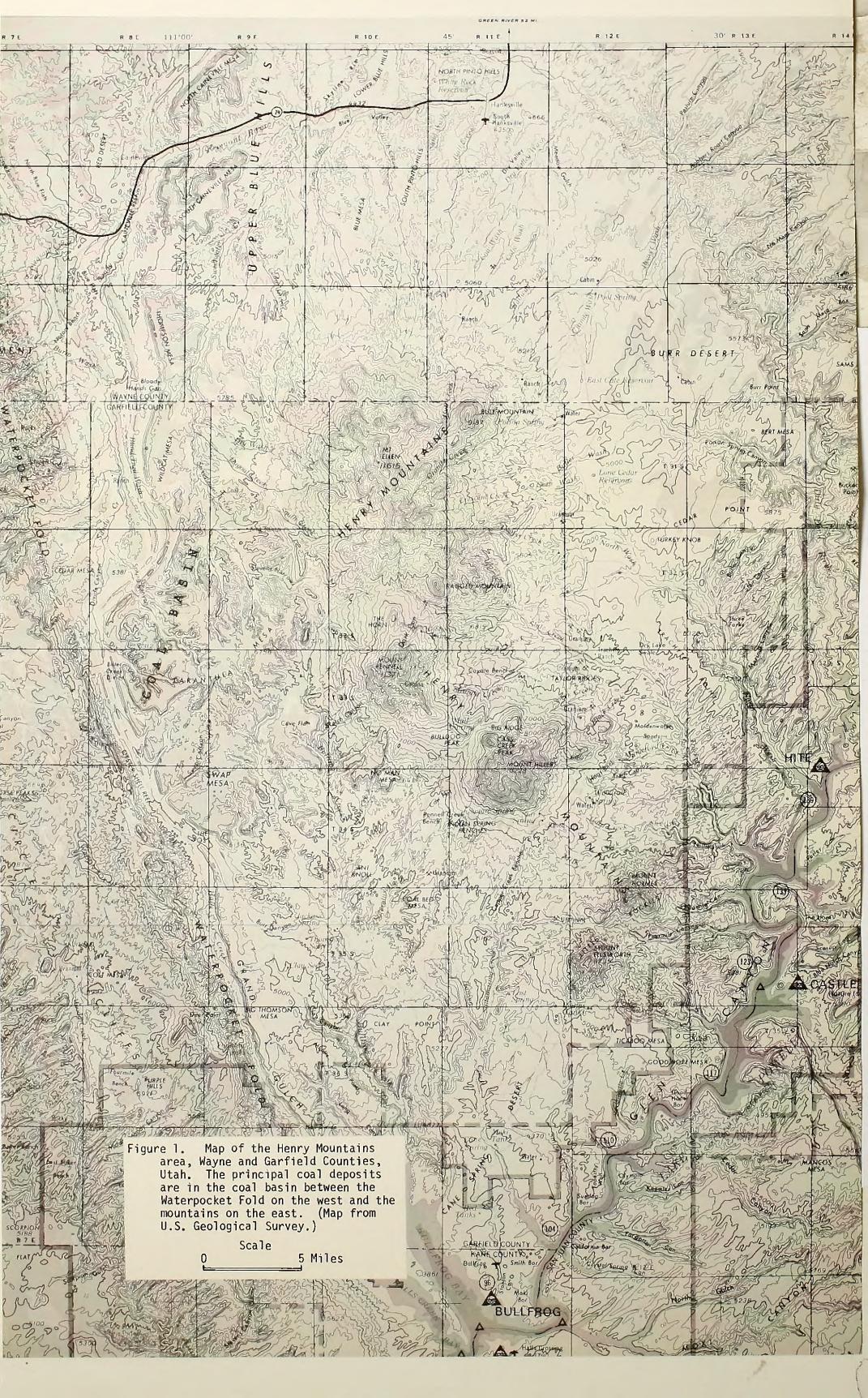
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that is in the Cretaceous rocks of the basin west of the mountains. Gilbert (1877) and Hunt (1953) studied the geology of the area and published comprehensive reports. Hunt's report included measurement of many exposures of the coal, and a later report by Doelling and Graham (1972) added to the available information on the coal deposits. Some springs in the area are shown on Hunt's map (1953, pl. 1), others are shown on the topographic quadrangles, and nearly all springs are shown on a map of the Henry Mountains Resource Area prepared by the U.S. Bureau of Land Management (1972). Open-file information on water wells and on streamflow have been available from the Water Resources Division, U.S. Geological Survey, and from the Utah Division of Water Rights. Open-file information about oil wells has been available from the Utah Oil and Gas Conservation Division. Also used in this report is certain information from test holes drilled by the Conservation Division, U.S. Geological Survey and by AMAX Coal Company.

The purpose of this report is to summarize the work done from June 1975 through July 1977, to present information on water supplies, and to make recommendations about where to obtain water supplies needed for different kinds of coal development.

Work done June 1975 - July 1977

Between June 25, 1975, and September 12, 1975, five trips, covering a total of 42 days, were made to the Henry Mountains area. During this period, about 105 springs or seeps were visited, and temperature and conductance measurements were made where flow was sufficient to insure reasonable reliability. The flow of these springs and the flow of many creeks were measured or estimated, and 47 water samples were collected and later analyzed chemically.

After the first field season, the work was concentrated on determining the structure of the sedimentary rocks, principally the Navajo Sandstone which is likely to be the best source of underground water, between the Waterpocket Fold on the west and the Dirty Devil and Colorado Rivers (Lake Powell) on the east.

Chemical analyses of water samples collected from springs, geology,

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chemical analyses of writer samples collected trop an investments

and assessments of sources for water supplies were presented in a Progress Report dated June 1976.

Between July 6, 1976 and September 2, 1976, three more trips covering 35 days, were made to the Henry Mountains area. Some springs visited in 1975 were revisited, and about 70 springs not visited in 1975 were visited. Flow measurements were repeated on many creeks, and 16 samples of spring, stream, and well waters were collected for chemical analysis. Eleven sandstone surface samples were collected and later analyzed for grain-size distribution and porosity. During the field work 16 sites on stream channels that drain the potential coal area were surveyed with tapes and brunton, and cross-channel profiles were drawn. These profiles are presented in the appendix. Grab samples of the channel sediments were turned over to the U.S. Geological Survey for further study. The profiles and sediment samples should be useful for "before-and-after" studies at these sites if coal is developed in the area.

In July 1977, six days were spent in the field revisiting about 25 springs and 15 stream sites, to determine the effect of the drought during the 1977 water year.

Methods of Work

Discharges of streams and springs were measured by capturing the flow with a tarp and measuring it with bucket and stopwatch. Extensive experimentation with the method suggests that measurements of flow of 0 to 300 gpm are accurate to ± 3 to 5 percent and measurements of flows 300 to 750 gpm are accurate to ± 5 to 10 percent.

The method involves selecting a channel site where a waterfall can be constructed. The stream must be flowing down a gradient steep enough to permit the water to be raised above the channel with the tarp and directed into a bucket as a waterfall. The typical site requires 10 to 30 minutes of preparation of the channel. This involves making a flume of rocks on which the tarp is placed. The upstream end of the tarp is buried in the stream channel and sealed with dirt or clay to prevent underflow. At the downstream end of the tarp a waterfall is formed, high and assessments of sources for water supplies were preserved in a

Between inty 6, 1076 and September 2, 1976, three more critic apprendent 20 mays, were made for the heary Mountains area. See choined in an about 20 springs ont mission in the max were repeated on many crements were collected for the hear wall, stere repeated on many crements with a local and respected for the hear and solar and a local and and a local and and and a local and a local and and a local and a local

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The tarps we used were reinforced polyethylene of 6×8 ft and 6×12 ft. Buckets used were 2 gallons, 5 gallons, and 15 gallons.

Some measurements were made by splitting the flow into two channels and measuring each channel separately. This method is useful where flows are higher than can conveniently be measured with the available bucket. For example a 2-gallon bucket can measure 50 to 75 gallons per minute of single flow; if the flow is split, 100 to 125 gpm can be measured with the same bucket.

At nearly all sites, temperature was measured with a thermometer, and conductance with a conductance meter - in 1976 and 1977 conductance was measured with two meters. enough to direct the flow into an upright anches of hasmy volume in the tate sim bucket is then timed with a stop watch. At Jeach Annur margingents are taken to insuce reasonable accuracy.

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GEOLOGY

Rock Units and Their Water-bearing Properties

Rocks exposed within the Henry Mountains area include a reasonably continuous sedimentary section from the Cutler Formation of Permian age to the Mesaverde Formation of Late Cretaceous age. After the Mesaverde was deposited, the sedimentary rocks were downwarped into a structural basin. Later, in Tertiary time, the mountain area was raised up when stocks and laccoliths, principally of diorite porphyry, intruded the sedimentary sequence. Since that time the intrusions and the uplifted sedimentary rocks have been extensively dissected by erosion, and many areas are covered by pediment gravels, probably principally of Pleistocene age. Continued erosion and deposition by streams have resulted in valley broadening and deposition of flood plains in the lower areas.

The descriptions of the exposed rocks are summarized in the attached table (table 1). The geologic map (fig. 2) is a copy of a portion of the Geologic Map of Southeastern Utah, compiled by L. H. Hintze and W. L. Stokes (1964).

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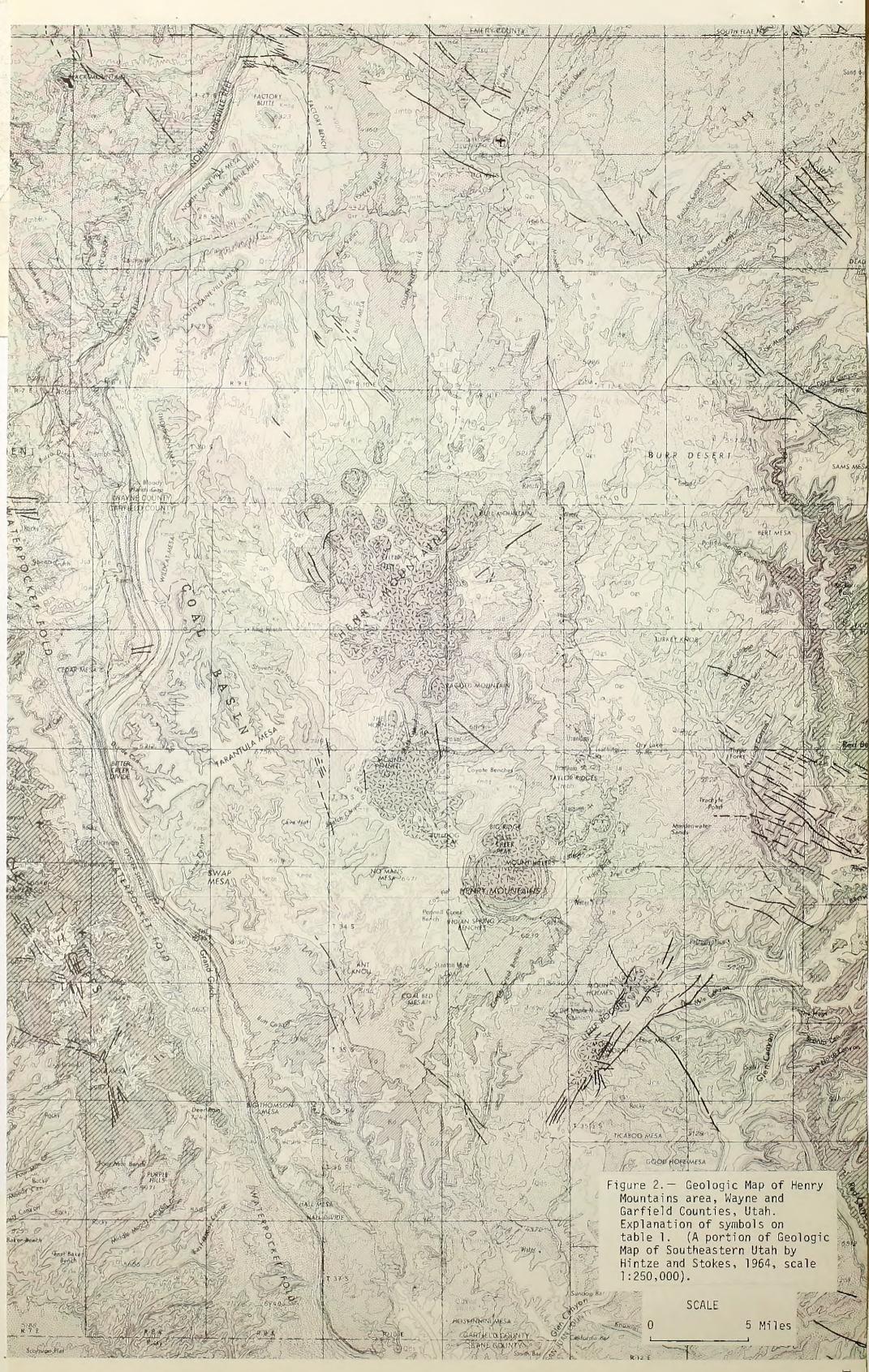
The descriptions of the exposed rocks are summinged in the existent table (table 1). The geologic map (fig. 3) is a copy of a portion of the Boulegic Map of Southeastern Utah, compiled by L. A. Hingse and W. L. States (1984).

TABLE 1. -THICKNESS, DESCRIPTION, TOPOGRAPHIC EXPRESSION, AND WATER-BEARING PROPERTIES OF ROCKS EXPOSED IN HENRY MOUNTAINS AREA, WAYNE AND GARFIELD COUNTIES, UTAH.

Source: Thickness and descriptive information chiefly from Hunt 1953. Symbols in Formation column are those used on Geologic Map of figure 2

	GEOLOGIC SYSTEM	SERIES	FOR	MATION	THICKNESS	DESCRIPTION	TOPOGRAPHIC EXPRESSION	WATER-BEARING PROPERTIES
0 1 C	QUATERNARY	Holocene	col	uvium & luvium ay, Qos Qds	Variable	Unconsolidated deposits from streams, on slopes, and by wind	Partially fill most valleys and stream channels; talus and slopewash on slopes; eolian sand deposits cover large areas underlain by Entrada Sandstone.	Unconsolidated flood-plain deposits of Fremont River and major tributaries such as Sandy Creek and Sweetwater Creek probably would yield water to shallow wells. Quality probably would be comparable to quality of stream water.
ENOZ		Pleistocene	gravel Qgs ligocene Igneous stocks and laccoliths Tip pper Mesaverde			Rounded cobbles and boulders generally in a sandy matrix	Caps some mesas where it forms slopes that grade away from mountains.	Supplies water to small springs and seeps where pediment sur- faces are truncated,
U	TERTIARY	01igocene				Mostly diorite porphyry	Forms domal intrusions at cores of the mountains, and forms horizontal, tongue-like, laccolithic intrusions around mountain cores.	The igneous rocks tend to hold water in overlying sediments or to direct its movement. Fract- ure zones around the stocks (cores) may act as conduits or reservoirs for water.
	CRETACEOUS	Upper Cretaceous			400 feet	Thick-bedded sandstone separated by thin partings of shaly sandstone	Occurs only as the cap of Tar- antula Mesa where it forms steep cliffs at the mesa edges.	Rainfall on Tarantula supplies only recharge for Mesaverde. Seeps occur at base; might sup- ply wells with limited quantities of water from storage.
			Ш	Masuk Member Kmm	600-800	Lenticular beds at sandy gray shale, carbonaceous shale, and cross-bedded sandstone	Forms steep slopes with sandstone ledges.	Likely forms a confining unit; base may be water bearing.
			SHAL	Emery Sandstone Ke	200-300	Lenticular sandstone, shale, and coal - upper 75 feet; Massive sandstone - lower 150 feet.	Caps many prominent mesas: Caineville, Factory Butte, Thompson, and Stevens. Forms cliffs around mesas.	Minor seeps and springs of poor quality water rise from the Emery. It may contain water in storage in the coal basin.
		2		Blue Gate Shale Ктbg	1500	Blue-gray marine shale	Forms badlands and long slopes below cliffs of Emery. Occurs in coal basin and mountain slopes.	Likely forms a confining unit.
			ANCOS	Ferron Sandstone Kfe	300 - 150 west east	Consists of three units of nearly equal thickness: Top- lenticular coal-bearing shale and sandstone; middle-massive sandstone; base-interbedded sandstone and shale	Cliff former. Forms the escarpment between the Blue Gate and Tununk.	Fresh water reported in a well (0-31-9)22. Yields water to Bert Avery spring. Probably should be tested by any well that penetrates it, for there may be water in storage in the coal basin.
			M	T unun k Shale Kmt	525-650	Oark blue-gray fissile marine shale; thin beds of shaly sandstone and bentonite	Forms badlands, undulating hills and areas of deeply weathered loose detritus. Occurs in coal basin and in mountains.	Likely forms a confining unit.
0 I C		Upper and Lower(?) Cretaceous	K	ds tone d	0-50	Sandstone with conglomerate and carbonaceous beds. Locally contains coal.	Caps low mesas in south, forms discontinuous low hogback on east flank of Waterpocket Fold.	Eggnog spring and Thompson seep rise from Dakota. Probably too thin to produce water in quantity.
MESOZ	JURASSIC	Upper Jurassic			500-600	Sandstone, conglomerate, mud- stone, and claystone; varie- gated color. Gypsum, jasper, and limestone common.	Exposed around periphery of structural basin. Forms the Pinto Hills.	Yields water of poor quality to a few small springs. Is reported to be wet in underground workings of uranium mine in Shitamaring Canyon.
			U P	Summer- ville Formation Jsu	250 - north 40 - south	Evenly bedded fine-grained sandstone with minor beds of shale, gypsum, and limestone	Forms minor cliffs and steep slopes below escarpments of Morrison sandstone or conglomerate.	Sandstones in these units may be water bearing locally, but many beds are thin or discon-
			GRO	Curtis Formation Jcu	175 - 0 Pinches out eastward	Evenly bedded gray sandstone and shaly sandstone with pebbles to one inch at base. Sandstone commonly has greenish caste	Forms gray and greenish slopes below the Morrison-Summerville escarpment	tinuous and poorly sorted; none is likely to yield water in quantity.
				_ UNCONFORMIT	Y	Two facies: Western facies	- Oune sands cover large exposures	Western earthy facies may be too
			RAFAEL	Je		is red earthy sandstone, evenly bedded with large proportion of clay; eastern facies is massive cross- bedded sandstone	of the Entrada in eastern part. Forms hoodoos and other queer- shaped erosional remnants	tight to yield water to wells; eastern sandy facies supports wells that produce water of good quality in the Hanksville area. The Entrada, especially the sandy facies, may have more potential to yield water than is presently recognized.
			SAN	Carmel Formation Jca	600 - 100 west east	Two facies: Thick western facies is red sandstone, shaly sandstone, limestone, gypsum, and gypsiferous sand- stone; eastern facies is red shaly sandstone interbedded with red or buff fine-grained sandstone	Where underlying Navajo is steeply tilted most of Carmel is eroded into valleys; where Navajo is flat lying in east and southeast it remains partly capped by Carmel	Western facies may be water bear- ing in places but likely contains water of poor quality, about 3000mg/l. Wells that penetrate the western facies should seal off the Carmel. Eastern facies is probably too thin to contain water in quantity but it may be of good guality.
	TRIASSIC	Jurassic Upper Triassic	GROUP	- UNCONFORMIT Navajo Sandstone Jna		Massive cross-bedded, fine- grained, well-sorted, eolian sandstone	Forms steep hogbacks along Waterpocket Fold and steep to vertical cliffs where it is nearly horizontal along Dirty Oevil River	Yields 3 to 7 cfs to wells in the structural basin north of the Fremont River. Probably is com- pletely saturated in the coal basin where water may be under sufficient confining pressure to
			ANYON	Kayenta Formation JTk	240 - 320	Flat bedded, lenticular, and cross-bedded sandstone and shaly sandstone	These units underlie the structural basin but crop out only along the eastern margin or where they are	give heads of 2000 + feet. Generally is a confining unit. In other areas where Navajo and Kayenta are flat lying, springs issue from base of Navajo at
			GLEN C	Wingate Sandstone Tw	270 - 380	Massive, very fine grained cross bedded sandstone loosely cemented with cal- cium carbonate	upturned by the intrusives of Mt. Hillers, Ellsworth, and Holmes.	contact with the Kayenta. Probably is water bearing but its grains are finer than those of the Navajo (0.003 vs 0.01 inches) and therefore the Wingate may not yield its water very readily.
		Upper Triassic	Chir	DNFORMITY				
		Lower	Con	narump glomerate nkopi				
PALEO- ZOIC	PERMIAN	Triassic	For	mation				
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Structural Geology

The Henry Mountains area of this report is part of a slightly larger area, the Henry Mountains region, whose structure was described by Hunt (1953, p. 88):

> The Henry Mountains structural basin is one of the major structural depressions of the Colorado Plateaus and is the counterpart of the upwarps of the Circle Cliffs and the San Rafael Swell which border it, being of the same size and form, only inverted. The basin is diamondshaped and is a little more than 100 miles long and 50 miles wide. All but the southernmost tip of the closed part of it is included in the area shown on plate 5 (equivalent here is figure 3). The fold is sharply asymmetric for the trough is crowded against the steep west flank.

Although the Henry Mountains are near the geographic center of the basin, they are on the gentle east flank about 12 miles east of the trough (pl. 5)...

Each of the Henry Mountains is a huge structural dome. The southern four domes are each 6 to 8 miles in diameter, whereas the northern dome, Mount Ellen, is twice that width. Each has several thousand feet of structural relief that interrupts the otherwise gentle east flank of the structural basin. The gentle west dip of this flank of the basin persists around the mountains and when projected through them meets with the dip on the other side (pl. 5).

By and large the domes have smooth flanks but all, except the Mount Ellsworth dome, have superposed upon the top a great many small anticlinal noses and domes produced by the individual laccoliths or other intrusions. The smaller folds are each a mile or two in diameter, have a structural relief of a few hundred to 1,500 ft, and are not circular but are tongue-shaped, like the laccoliths that produce them...

The Henry Mountains structural basin was produced by orogenic movements, probably in late Cretaceous or early Tertiary time. The major domes of the five mountains and the smaller anticlines on their tops were produced by intrusions, probably subsequent to the orogenic folding, perhaps in early or middle Tertiary time.

To expand on Hunt's description of the structural basin: the basin, as defined by the Navajo Sandstone for example, might be likened to a broad coal scoop. The relatively flat east edge of the scoop tilts gently upward to the east and is exposed along the Dirty Devil River and Lake

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The heavy sourceives structured bests is one of the manage structured depressions or the Galmendo Siekerse of the the counterpart of the spearps of the Civele Civele and the San Mathed Samit wells bonder 16, Walmon 2015 size and form, call invertors, the forth 15 summedsize and form, call invertors, the forth 15 summeddemon and is a little more source for the the star and the sector of the section of the the star and the sector of the sector of the the sector of the sector of the sector of the sector and the sector of the se

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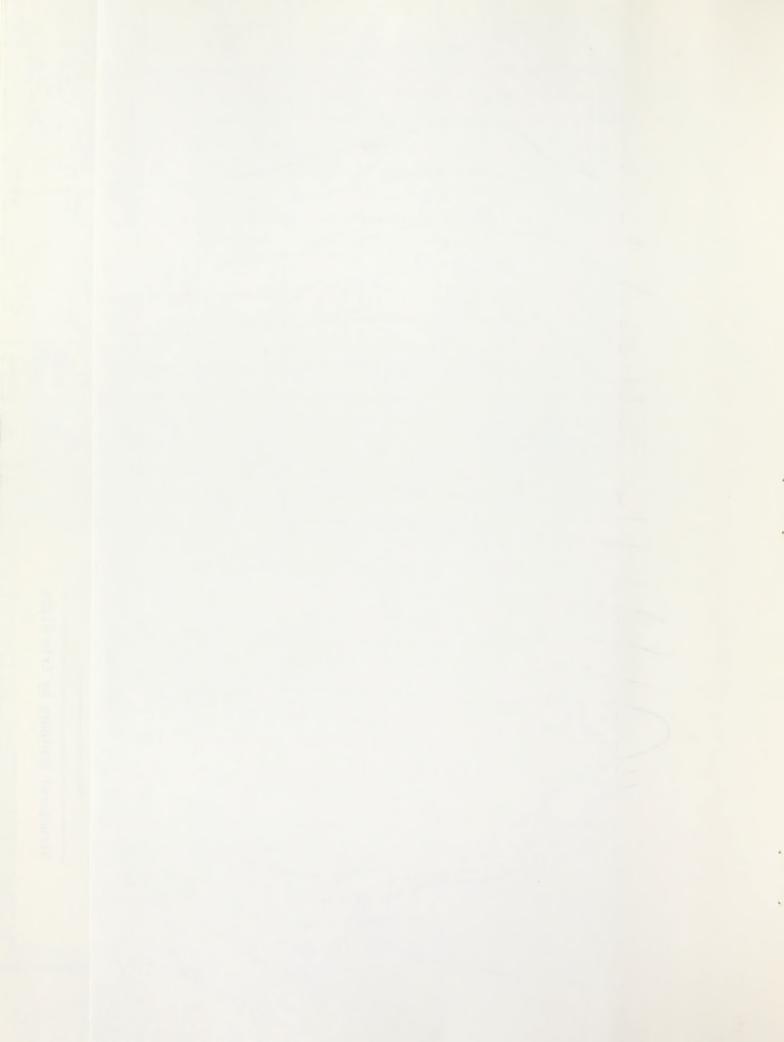
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Powell. From this eastern exposure the Navajo dips down westward beneath the younger sediments until it comes to the surface again at the steep back end of the scoop along the Waterpocket Fold. From the exposures in the east, where the top of the Navajo is at about 5000 feet, the gentle westward dip brings the top of the formation to about 600 feet (5700 feet below the surface) a few miles east of the fold. At the Waterpocket Fold the Navajo rises sharply upward to above 6000 feet.

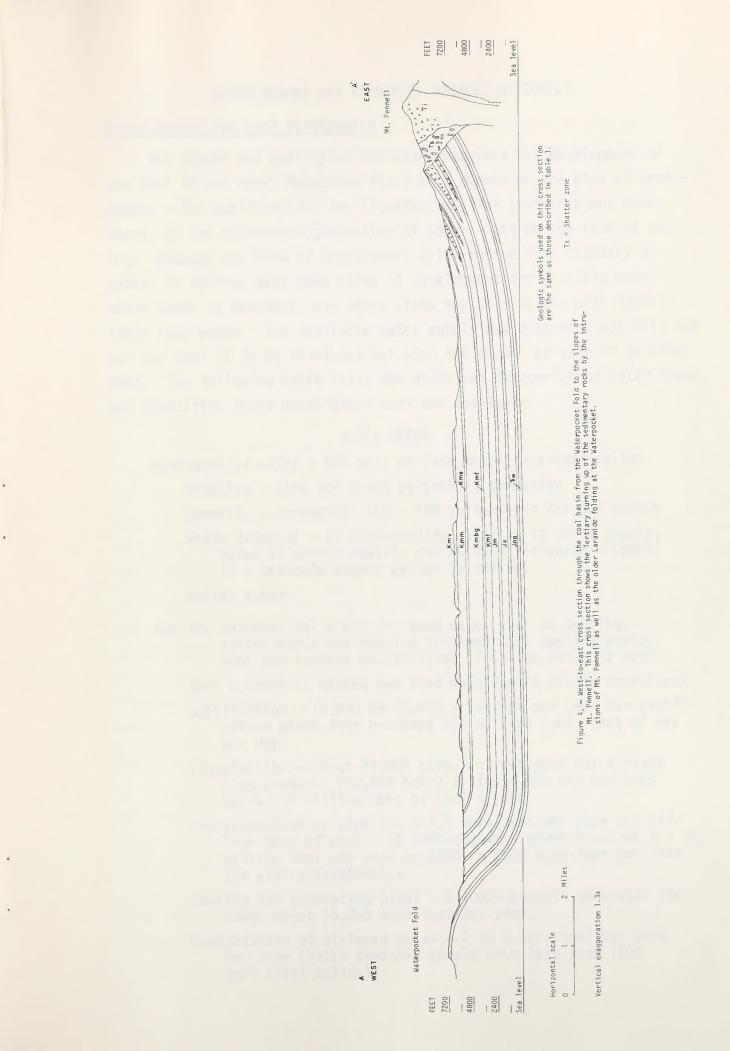
In the vicinity of the mountains the top of the Navajo has been domed up 2000 to 3000 feet above the plane of the regional scoop. Presumably much of this doming is the result of a deep-seated intrusion (which Hunt does not mention) from which the stocks and laccoliths derived their material. The stocks and laccoliths further deformed the sediments they intruded. The intrusive stock of Mt. Ellen (the inner core of the mountain) cut vertically through the older sedimentary rocks (including the Navajo), and the lateral injection of the intrusions that formed the mushroom-shaped domes of the laccoliths of Mt. Ellen was principally into the Morrison and overlying formations (Hunt, pl. 8). Around Mt. Pennell and Mt. Hillers and also around Ellsworth and Holmes, however, the Navajo and even older formations were upturned by the intruding stocks, and some of the lateral intrusions penetrated between beds of these older formations. Thus, the intrusion of the most northern stock, Mt. Ellen, may not have materially changed the local doming of the Navajo, whereas the Mt. Pennell intrusion probably upturned the Navajo (fig. 4), and the three smaller intrusions to the south undoubtedly curled up the Navajo and even older formations around the edges of the stocks. The curling is especially spectacular around the southwest flank of Mt. Hillers where the triangular hogbacks formed by the upturned Navajo look like giant shark's teeth.

The broad scoop shape of the structural basin resulted from Laramide folding; the doming around the mountains resulted from the intrusive activity in Oligocene time (Hintze, 1973, p. 81). Between the Waterpocket Fold and the dome of the mountains, then, is a deep subsidiary basin, herein called the coal basin (fig. 4).

Alerthic from this distance exposition the Mreado Alpa down mestowerd according to grantian sediments and if it comes to the surface again at the score path and at the score along the Waterpocket Fold. From the exposures in the sest, where the top of the Waterpocket Fold. From the set, the paths westward ally brings the top of the Anna, inc. to asset the formation to asset where the surface) a tew miles east of the fold.

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WATER DEMAND and PRINCIPAL SOURCES of SUPPLY

Water Demand for Loa! Development

The amount and quality of the water required for development of the coal in the Henry Mountains field will depend on the kind of development — for gasification, for liquefaction, for transshipment elsewhere, or for mine-mouth generation of power — and on the rate of mining. Because any kind of development will require some quantity of water, it follows that some kinds of development are feasible only where water is abundant, but other kinds may be feasible with appreciably less water. The available water supply may determine not only the way the coal is to be developed but also the amount or rate of development. The following table lists the different categories of water needs and quantifies those needs where data are available:

WATER NEEDS

High-quality water - 500 mg/l or less total dissolved solids.

Drinking — mine and plant personnel, community

Domestic - community: 100 - 150 gallons per day per person

Waste disposal — If high-quality water is in short supply, water of poorer quality can be used for waste disposal if a separate supply system is set up.

Boiler water

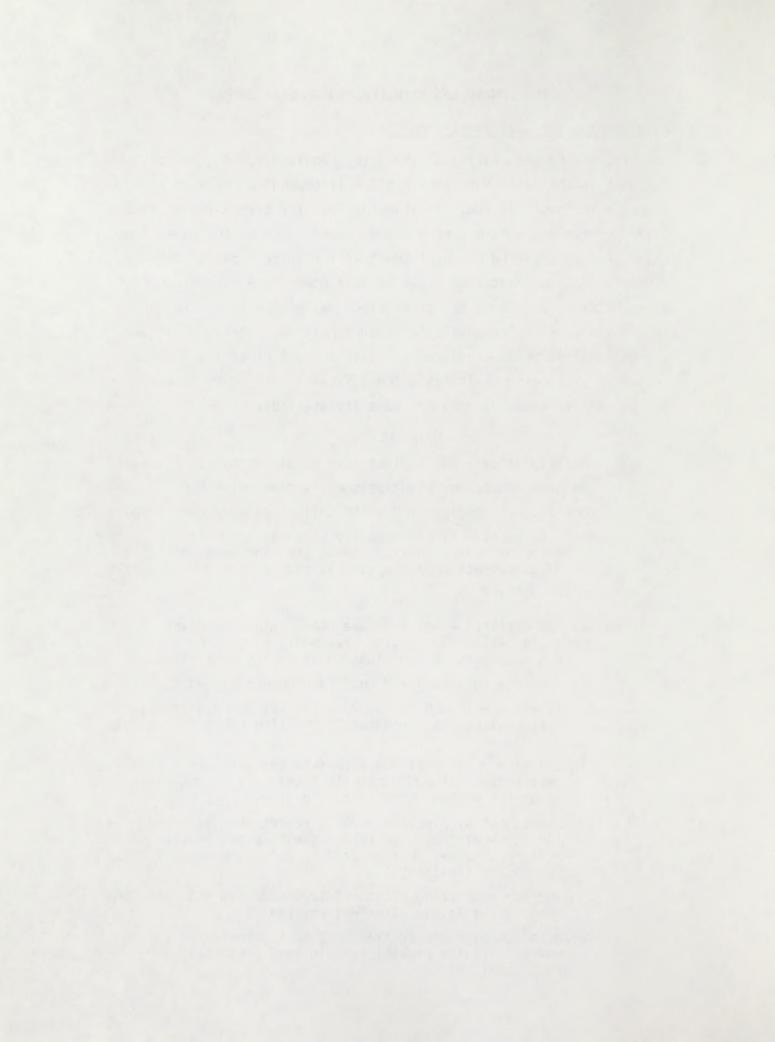
Quality not critical — but for some uses, such as cooling, saline water may require treatment, or cooling equipment may require modification if saline water is used.

Dust control in mining and road maintenance mining operations

Gasification — 10,000 to 45,000 acre-feet per year for gasification plant that produces 250 million cubic feet of gas per day.

Liquefaction — about 24,000 acre-feet per year for a plant that produces 100,000 barrels liquid per day and uses about 1.4 million tons of coal a year.

- Transportation by pipeline 750 acre-feet per year per million tons of coal. (A 1000-megawatt plant requires 3 - 3¹/₂ million tons per year or 2250 to 2600 acre-feet per year for slurry treatment.)
- Cooling for generating plant A 1000-megawatt generator consumes about 15,000 acre-feet per year.
- Revegetation of stripped areas 2 to 4 acre-feet per acre per year (Water probably should have less than 1500 mg/l total solids).



Summary of Potential Sources of Supply

Water in the quantities required for gasification (10,000 to 45,000 acre-feet per year for a plant of 250 mcf gas per day), for liquefaction (24,000 acre-feet per year for a plant producing 100,000 bbls liquid per day), or for mine-mouth generation of power (15,000 acre-feet per year for a 1000-megawatt plant) may be available to the coal fields of the Henry Mts. basin only from deep ground-water supplies in the Navajo Sandstone, or less likely in the Entrada Sandstone. Even the amount required to ship 3 to 3 1/2 million tons of coal per year by pipeline (2250 to 2600 acre-feet) probably is not consistently available from nearby surface supplies, but it is likely that Oak Creek or Pleasant Creek, which get their water from Boulder Mountain west of the Waterpocket Fold, could supply such quantities if rights to the water can be purchased from present owners. But observation in 1977 showed that surface water supplies may be appreciably less in dry years. Water in limited quantities (say 200 to 400 acrefeet per year) for drinking and culinary purposes probably could be obtained during most years by pipeline from springs in the mountains east of the caol basin. Perhaps an equal amount could be obtained from Dugout and South Creeks by purchase of rights from the King Ranch.

The drought of 1976-77 showed that springs and the streams fed by them are not dependable sources during drought years, because most are fed by snowmelt and they thus dry up when there is little snow. Thus any use that depends on springs or surface water in this area should have available a back-up supply of ground water for use during drought years.

Sources of Water in the Henry Mountains area

The Henry Mountains area must be described as poor in readily available water supplies. Even so, it is possible to obtain water from three sources: 1) Water that falls on the area as rain or snow and feeds surface streams directly or later as spring water, 2) water in storage in shallow or deep water-bearing rocks, or 3) water that moves into or around the area by the Fremont River and its principal tributaries Oak Creek and Pleasant Creek.

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The precipitation map (fig. 5) shows that only the top of Mt. Ellen receives more than 30 inches of precipitation a year and that much of the area receives less than eight inches. Satellite infrared photographs show that the vegetation is less dense on the Henry Mountains than it is on Boulder Mountain to the west or the Abajo Mountains to the east. Likely the Henry Mountains are in the rain shadow of Boulder Mountain and the Aquarius Plateau which together form a very massive area at high altitude west of the Waterpocket Fold. The smaller amounts of precipitation on the Henrys fall on steep slopes which generate runoff that is dissipated rapidly, both by the local vegetation and by penetrating into the ground where some of it may recharge one or more of the possible aquifers. Some of the water that penetrates the land surface emerges downslope as springs, whose waters generally are dissipated again rather rapidly. About the only watercourse that regularly brings water below 5500 feet is Bull Creek which flows northeastward off Mt. Ellen, and is diverted to supply irrigation water for Fairview Ranch.

But Bull Creek, like other watercourses in the Henry Mountains, depends on snowmelt and hence its flow to Fairview of about 65 gpm on July 2, 1977 was only a small fraction of the more than 600 gpm measured on August 3, 1976.

The amount of precipitation that falls on the flat mesas is related to their altitude: Tarantula Mesa, whose top ranges from 6300 to 7100 feet, supports appreciably more vegetation than do Wildcat and Swap Mesas which are about 1000 feet lower.

All-in-all the direct precipitation supports local vegetation but provides little or no runoff except as flash floods. Therefore any attempt to use the direct precipitation must be based on capturing spring water essentially at its source. Information about the small quantities of good quality water that might be captured from springs is given in the section on culinary water below.

Water in Deep and Shallow Aquifers

The water-bearing properties of all exposed rock units are shown in Table 1 in the section on Geology. Here it will be sufficient to Non-constitution and (fig. 2) stoke that rely induces and the intervereceives developed of precipitation a year and the math of our area receiver less than all hit incress. Satellith, increased another wavers show that the respectivity is less dense on the librup incortains, the rest. It is in the fourtain to the west of the histo Non-tains to the rest. It is in four the fourtain to the west of the histo Non-tains to the rest. It is in fourtain to the west of the histo Non-tains to the rest. It is in fourtain to the west of the histo Non-tains to the rest. It is in fourtain to the west of the histo Non-tains to of are solutions flates which together form a new measure of are solutions for the interpret of the intervention of the solution of are solutions for the terms of the interpret form a new measure in the intervention of the former fail on the rest values which presents for of are solution in the Henrye fail on the other form a new measure in the solution of the solution, both by the least values the last are the notified and the rest of the where that our the term of are solution in the former fail on the solution to the solution of are solution in the former failed by the last and the solution and the solution and the solution of the where that our the last are the notified and the rest of the solution that our the last are the solution of the solution of the solution that our the last investigation rest of the terms of the matter fail of the solution of our the time failed is directed to supply irregarion when the last our terms of the solution of the terms of the solution of the solution of the solution of the solution of the our the time rest of the terms of the solution failed for the solution of the our the time rest of the terms of the solution failed for the solution of the s

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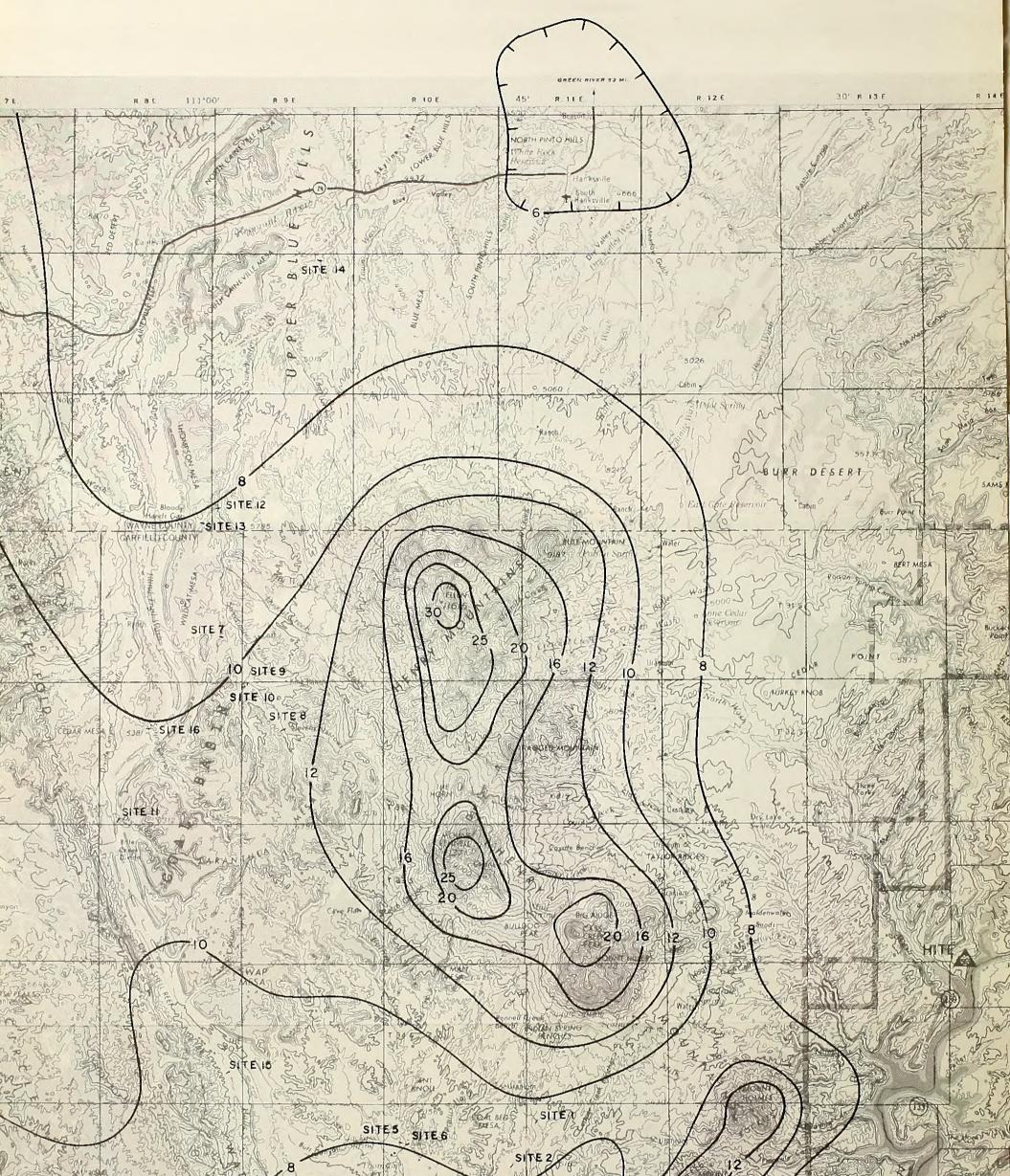
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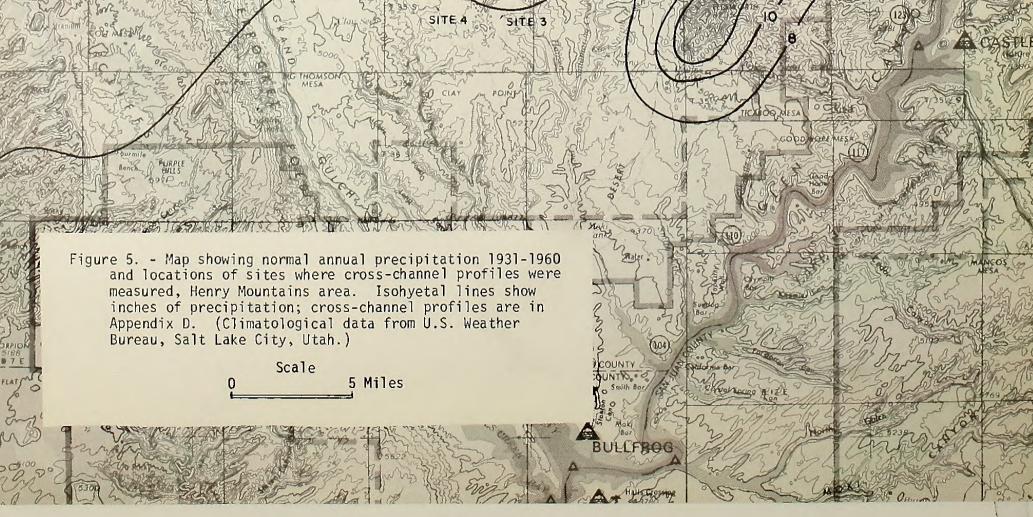
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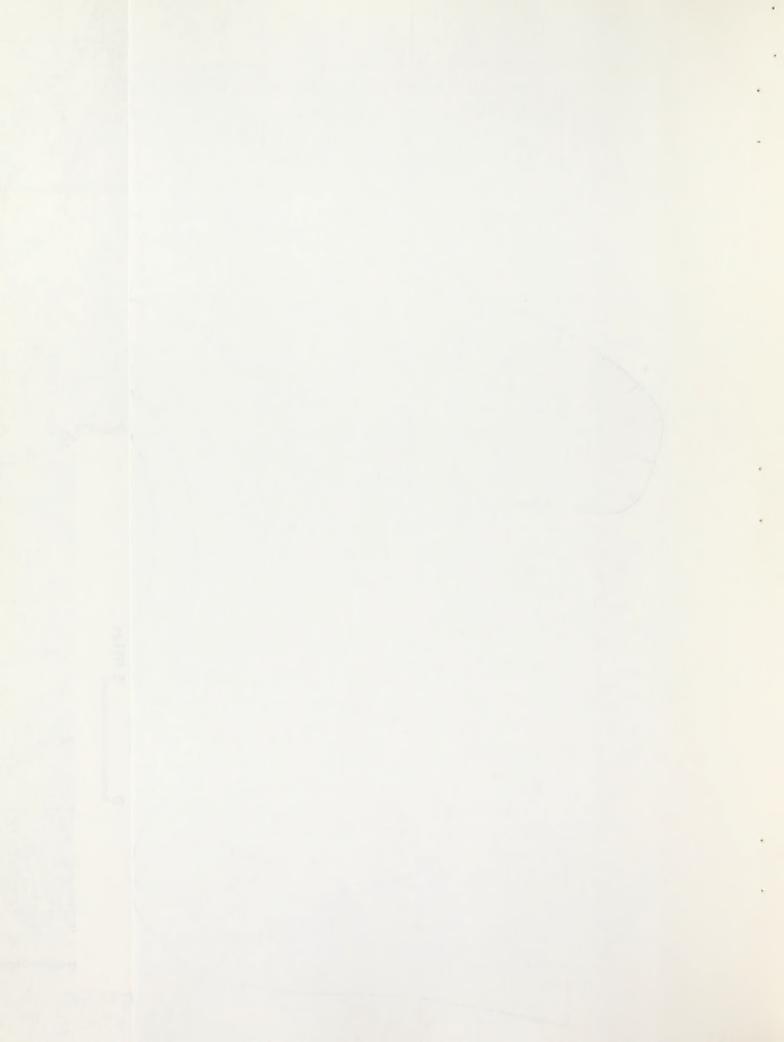
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name the sandstones that possibly are water-bearing - from oldest to youngest, the Winyate, Navajo, Entrada, Morrison, Dakota, Ferron, Emery, and Mesaverde - and then to qualitatively evaluate the potential of each. The Navajo Sandstone is undoubtedly the unit with the greatest potential and therefore it will be treated separately in the next section.

Of the other units, the two deepest aquifers will be considered first and then the five younger sandstones.

The Wingate Sandstone probably contains water but it is finer grained, 0.003 inches vs 0.01 inches (Hunt, 1953), than the Navajo and therefore probably is appreciably less permeable than the Navajo. It is not likely to be a target where the overlying Navajo contains water.

The Entrada Sandstone crops out over large areas both east and west of the mountains and consequently has large potential recharge. Furthermore it yields water of good quality to wells in the vicinity of Hanksville. Therefore, because it forms part of the favorable synclinal structure and because it is probably 500 to 750 feet thick, it should be a good target for exploration. Yet a well (D-38-8)29dcb (N-2 on fig. 6) in 1973-1974 penetrated the Entrada and got its water from the Navajo; and the IPP well, (D-28-8)33bbb (N-3 on fig. 6), drilled in 1975, penetrated the Entrada but drew its water from the deeper Navajo. Evidently the Entrada is too "tight" in most areas to yield more than small quantities. The "tightness" of the Entrada is confirmed by they grain-size analyses reported in appendix E. They show that the two samples of Entrada are finer grained and contain a larger silt and clay fraction than any of the other eight samples examined. Thus the Entrada may be worth testing if found to yield water, but bypassed if the yields are low.

The five younger sandstones, the Morrison, Dakota, Ferron, Emery, and Mesaverde, are all folded into the coal basin (fig. 4) and they therefore should be tested by any wells that penetrate. None is likely to produce enough water to supply a coal-development project, but one or more of them might produce some water whose usefulness would depend on quality. The Morrison is reported by uranium miners to contain

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water in the mines northward from Shitamaring (Shootaring) Canyon (Jerry Ekker, personal communication), and drillers of test holes north of the mines also report water in 1977 in the Morrison. The Dakota is probably too thin to supply significant quantities of water, and the Mesaverde at the top of Tarantula Mesa is probably too well drained to retain much water in storage, but the Ferron and Emery may contain significant amounts of water in storage. Both the Ferron and Emery are exposed over large areas of potential recharge, and although dissection has probably resulted in the draining of most water from the outcrop areas, the synclinal structure would favor movement of some water into the coal basin. Both units, therefore, are worth testing, for the porosities of surface samples of Ferron at 20-25 percent and of Emery at 26 and 27 percent are even higher than the porosities of samples of Entrada and Navajo, both at 18 percent (Appendix E). 1. In the other nonthwined from Shreamaring (Shoutering) annual (Linew There, reclard) communication, and urillers of real and the formulant of the communication, and urillers of real and the formulant. The communication is and urillers of the horizon. The communication of the communication of the communication of the formulant of the communication of the formulant of the communication of the communica

Water in the Navajo Sandstone

Wells drilled to test the Navajo in the basin north of the Fremont River have reported yields of as much as 2800 and 3100 gpm (N2 and N3, table 3). These wells produced water of rather poor quality (table 4), but it is possible that dissolved minerals were coming from the overlying Carmel. Other wells of lower yield (N5,6,7,8, and 9, table 3) have been drilled in various localities around the mountains and they produce water of good quality (table 4). In addition, logs of three oil-test wells report fresh water in the Navajo south of the coal basin:

Operator	Location	Depth to Navajo	Altitude of Navajo
Skyline Oil	T.35S., R.9E., sec. 36	1573	3531
Cleary Funds, Inc.	T.36S., R.10E., sec. 20	1340	3620 +
Skyline Oil	T.36S., R.11E., sec. 19	574	3500 +

In contrast at least four oil-test wells drilled northeast of the mountains report no water in the Navajo:

<u>Operator</u>	Location	Depth to Navajo	Altitude of Navajo
Amerada Petroleum	T.29S., R.11E., Sec. 2	643	3859
Kimbark Co.	T.29S., R.12E., Sec. 30	-	
Phillips Petroleum Phillips Petroleum	T.29S., R.13E., Sec. 1 [*] T.29S., R.13E., Sec. 1 [*]	30 25	5225 5230

These wells are east of the Dirty Devil River. Both wells were reported to have water in the Wingate below about 900 feet.

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The available information suggests that water in large quantities but perhaps of uncertain quality should be obtainable from the Navajo in the vicinity of the coal basin. Beneath Tarantula Mesa, the top of the 800-foot-thick Navajo should be about 5700 feet below the mesa top (fig. 4). The mesa top dips gently westward, as does the Navajo in the subsurface. The Navajo should be saturated, and artesian pressure should make the water rise 2000 feet or more above the top of the formation. If this interpretation is correct, it should be possible to pump 500 to 2000 gallons per minute (800 to 3200 acre-feet per year) from each well. Water so pumped would be removed from storage and likely would be replaced by natural recharge only at a rate much slower than the pumping rate (the problem of recharge vs discharge is discussed in more detail below). However, if the porosity of the Navajo is 10 percent (a low estimate, for a porosity determination made on this project gave 18 percent - see Appendix E), there is minimum of 50,000 acre-feet of water in storage in the Navajo for each square mile of surface. Careful spacing of the producing wells could permit them to supply 20,000 to 30,000 acre-feet a year during the productive life of the coal field.

Any plan to develop water in the Navajo will likely raise several questions:

- a) is water in the Navajo stagnant or is it moving from recharge areas to discharge areas? how fresh is the water in the Navajo?
- b) will quantities pumped be matched by recharge?
- c) what effect will pumping have on recharge or discharge area?

Obviously these questions and their answers are interrelated, and, although it may be difficult to give absolute answers to the questions, it may be possible to come up with probable answers by considering the local structure and great extent of the Navajo, its performance as an aquifer elsewhere, and by evaluating information from water wells north of the Fremont, as well as from wells in this area.

The structural basin formed by the Navajo in the Henry Mts. area (figs. 3 & 4) may be likened to a nearly flat scoop whose steep back end

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ODVIDED & MASE questions and their answers are interviewing and although it and be difficult to mile about a serieves to the invettors. It may an posyfole to come up with probably arsiers by considering the iscal serieves and great extent of the Neveju, its performance as an aquiter elsewieves and by evaluating intormation from water wells morth of the France 1 as well as from wells in this area.

The structural basin formed by the Navajo in the Honry Mis. score

is the Waterpocket fold on the west and whose eastern edge is exposed along the Dirty Devil and Colorado Rivers. This scoop has been penetrated and domed up locally by the five stocks that form the core of the mountains. The doming by the mountains has resulted in a subsidiary basin, here called the coal basin, between the mountains and the Waterpocket Fold.

Probably the principal recharge to the Navajo in the coal basin comes from the streams that cross outcrops of the Navajo along the Waterpocket Fold. The principal water carriers are the Fremont River, Pleasant Creek, and Oak Creek, but there are many minor ephemeral channels that could provide slight recharge. Recharge from streams that cross the fold occurs at elevations from about 5200 feet on the Fremont to about 6000 feet on Oak Creek. Slight recharge may also occur where the Navajo is upturned and exposed along the south and southwest flanks of Mt. Hillers and along the northwest flanks of Mt. Holmes and Mt. Ellsworth. The low rainfall in these areas makes appreciable recharge highly unlikely but the well that penetrates the Navajo in Shitamaring Canyon, (D 35-11)16dcd, bottom at about 4000 feet, may owe the freshness of its water to recharge from Mt. Ellsworth. Another possible, but completely unevaluated, source of recharge is the shatter zones around the stocks. These zones are in areas of relatively high precipitation and they may feed water into beds of Navajo that they contact (see figure 4).

In the deep part of the coal basin the base of the Navajo is about at sea level and the top is 800 feet higher. The Navajo rises southward and is exposed at the surface at Lake Powell. The lowest areas of outcrop of the Navajo are now covered by 300 feet of water by Lake Powell to about 3700 feet. Before Lake Powell began to fill, the Navajo possibly discharged water to the Colorado River (there are no known records to support this idea at Bullfrog Basin, but at Wahweap records of wells drilled to supply water for the building of Glen Canyon dam show pre-Lake Powell water levels that slope downward toward the river (Goode, 1964, p. 61). Today it is likely that the rise of Lake Powell has in part reversed that slope and that water is moving northward from Lake

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Powell into the Navajo. This water ultimately will provide additional recharge to the coal basin, but likely will require many years to raise artesian pressures 30 or more miles from this new source of recharge.

If the Colorado River in the vicinity of the present Bullfrog Basin once was the principal discharge area for water in the Navajo, were (are) there any others? Some discharge has been reported where the Dirty Devil River cuts into the Navajo 15 to 20 miles northeast of Mt. Ellen, but I found only one spot of leakage, no flow just moisture for vegetation, from the Navajo during a boat traverse I made in September 1975 between Bullfrog Basin and Ticaboo Canyon.

The only other likely natural discharge is by upward movement through the overlying sediments. There is no field evidence to support this premise, but upward movement through fractures is certainly possible through all the units between the top of the Navajo and the Dakota (Carmel, Entrada, Curtis, Summerville, Morrison). It is highly unlikely, however, that water would move upward through the Mancos Shale. More likely, water reaching the shale would seal fractures, and upward movement would stop.

Probably much of the water that may rise from the Navajo from the bottom of the coal basin would be diverted laterally by any permeable units, such as the Entrada, Summerville, and Morrison. These units could discharge appreciable quantities through seepage that would simply support surface vegetation.

At present this premise is strictly speculative, but, if upward and lateral movement of water is occurring, sandstone units between the Mancos and the Navajo may contain exploitable water, and water in the Navajo may be fresher because of the movement.

The above discussion of recharge to and possible discharge from the Navajo has not been quantitative because no quantitative information is available. Yet it is possible to add to the picture. The Navajo is an efficient aquifer in many places - Black Mesa, Arizona, near St. George, Utah, and at Glen Canyon Dam - and scattered wells in this area and new wells near Caineville attest that it must contain water here. Water in

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the Navajo beneath the coal basin must be in equilibrium with the present environment: natural discharge, by whatever means, must be matched by recharge. But water moves slowly through the Navajo and therefore both discharge and recharge are small. Nevertheless it is safe to assume that the Navajo is full of water right up to the sources of recharge. In other words water does not "pour" into the Navajo from the Fremont or from Pleasant or Oak Creeks, but rather it moves slowly in response to the distant discharge. The Navajo, then, represents a vast "plumbing" system that has been filling with water for millions of years until it is now as full as it can be. (Obviously if the rise of water in Lake Powell has had the effect of damming discharge points by temporarily reversing the flow in the Navajo, in that area the Navajo will continue to gain water).

The Navajo underlies about 700 square miles in the area bounded by the Waterpocket Fold, the Fremont River, the Henry Mts., and Bullfrog Basin. In much of this area it is probably saturated through most of its 800-foot thickness. If its porosity is a conservative 10 percent -Cordova and others estimated as much as 30 percent specific yield (essentially same as porosity) in the St. George area (1972, p. 28) each square mile contains about 50,000 acre-feet of water (10% x 800 x 640), which, in most of the area of possible coal development, is under artesian pressure of several thousand feet. Partly because water that is under high pressure expands as pressure is released, it is likely that widely spaced wells - in Black Mesa, Arizona, deep artesian wells are spaced 2 miles apart (Peabody Coal Co., 1970, p. 10) - could withdraw 500 gpm simply by pumping to reduce the pressure in the aquifer. Ultimately, the water withdrawn would be replaced at least in part by natural recharge, but likely it would require a long time, years or perhaps decades, before the reduction in pressure in the aquifer would result in increased recharge by the principal stream sources.

Thus to briefly answer the questions posed above:

 a) Water in the Navajo probably is not stagnant but it may be moving exceedingly slowly in most places. Its freshness in the Shitamaring well (N-8 on fig. 6) suggest closeness to

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recharge and perhaps relatively rapid movement; its poor quality in wells north of the Fremont (N-1,N-2,N-3,N-4) suggests distant recharge and slow movement (or perhaps contamination from the overlying Carmel).

- b) Because wells pumped in the coal basin probably will be many miles from recharge, it is likely that water pumped for the first few years will come from storage and that recharge areas will not be affected for a long time.
 - c) The effect pumping may have on natural discharge areas is unknown because those areas themselves are unknown. The effect of the pumping on recharge areas is covered in b).

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- a) The super wolfs transmit in any coal basis property with be easily with from recharges of the fillerly that webs many on the first test vects will down from from equal that readerly served with not be a trucked neers that the.

Water from Surface Sources

Sources of surface water that might supply some water for the coal basin include local streams, more distant sources such as Oak Creek and Pleasant Creek, both of which rise on Boulder Mountain to the west, and the Fremont River itself. All are subject to wide variations in discharge and much if not all the water has been appropriated or is subject to strong protest by holders of current rights.

Measurements and estimates of discharge (1975-1977) of many streams that drain the Henry Mountains are given in Appendix B and some are plotted on the map of figure 6. The discharges observed in 1977 are all much lower than discharges observed in 1975 or 1976, and they serve as a warning that surface waters cannot be considered to be dependable sources of supply.

Like all creeks in the Henry Mountains area, the creeks that drain the coal basin, principally Sweetwater Creek and its tributaries to the north and Bullfrog and Hansen Creeks and their tributaries to the south, are fed by snowmelt and springs in their headwaters, but are generally intermittent below about 5000 feet. In their lower reaches these streams are generally "dry except for short periods of flood immediately after local storms" (Hunt, 1953, p. 212). Thus the streams near the coal deposits are not likely to provide dependable supplies, although some of the springs that provide headwaters flow might be tapped as described below under culinary water.

At the present time water from South and Dugout Creeks, tributaries to Sweetwater, is diverted for irrigation on the King Ranch. The amount diverted is not known, but estimates of the flows of these two creeks indicate that during spring and summer in years of normal precipitation they might yield about 2 cfs of water of good quality. The right to use this water for coal development might be purchased from the present owner.

Oak Creek and Pleasant Creek rise on Boulder Mountain west of the Waterpocket Fold and then flow eastward and northward to join the Fremont River. Water rights recorded by the State Engineer (Proposed Determination

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Sources of sortans water that might supply some water for the conbasic incluse (acal streams, mail alstant sources such as 0.44 michaeland Pleasand treat, born of which rise on Bouldon Mountain (1) the american the immone given itself. All are subjuct to wide an inclusion and on a monoprised of the water has been impropriated of the studied be strong protect by bolders of current mights.

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det Greek und Eleosent Greek rise on Boulder Mourland west of the Matemanderi Fold and Then 1" ov ekstvart and norditwart to join the Science Riger Tweter Pinki, recorded by the State Engineer (Propound Telermontur of Water Rights in Colorado River Drainage Area, Dirty Devil River Division, Pleasant Creek and Sandy Creek Subdivisions, no date) suggest that each of these creeks yields 7,000 to 10,000 acre-feet. But this water is diverted by holders of the rights, so that little water, except possibly from flash floods, flows from these creeks to the Fremont. We have a measurement of one diversion of 5 cfs from Oak Creek at the mouth of Oak Creek Canyon and spot estimates on Oak and Pleasant Creeks (Appendix B). In addition, the U.S. Geological Survey measured Pleasant Creek 0.2 mile above its confluence with the Fremont from March 1969 through September 1972 and recorded discharges of 3020 acre-feet in water year 1970, 2340 in 1971, and 1510 in 1972 (U.S. Geological Survey 1970, 1971, 1972). If water from either or both of these streams could be diverted where they cross the Navajo Sandstone it is likely that the water would be of good quality, less than 500 mg/l total solids. But the acquiring of rights to as much as 5000 acre-feet a year would be a costly and time consuming project.

The Fremont River discharged at Caineville an average of 67.1 cubic feet per second (cfs) for a total of 51,150 acre-feet per year from March 1967 through September 1974. Maximum discharge was 2310 cfs on August 27, 1971, and the minimum discharge was 11 cfs on August 13-15, 1972 (U.S. Geological Survey, 1975). The range in quality of water in the Fremont River was equally great, as these figures, which were abstracted from the computer records of the U.S. Geological Survey, show: All intervalues in Calarzia Siver Irainaça Area, Nirzy deuti Siver Division (1997)

The frame of the discharged as Calendrille an interact of 1 intoic fact may second (22) for a such of 51,150 arre-free (ar year from fact) 1967 through beutanber 1974. Maying discharge as 2310 cf. on funct 27. 1971; and the attribut discharge may 11 ct. on functs 11-19 from (1.5. Geological Lorney) 1975). The reace to quality of mater is the first workdoreal Lorney) 1975). The reace to quality of mater is the first best discharge as these figures, which were solvered from the computer records of the 11 for material tories, they first is computer records of the 11 for material tories, they first he computer records of the 11 for material tories, then first he computer records of the 11 for material tories, the

Date	Discharge cfs	Dissolved Solids mg/1	Specific Conductance mmho
3/14/67	82	444	620
9/12/67	47	737	952
6/17/69	250	3010	3060
8/15/69	64	2030	2110
1/15/70	164	412	588
5/14/70	112	392	543
9/8/70	104	536	730
3/16/71	92	379	606
9/14/71	45		825
3/24/72	53		740
8/9/72	28		700
5/1/73	601		320
6/7/74	28		490
4/16/75	76		660
8/28/75	35	519	790
5/25/76	31	637	870

In addition to dissolved minerals, the Fremont River commonly carries a heavy load of sediment as U.S. Geological Survey records near Caineville between March 1967 and May 1972 show:

<u>Water year</u>	Discharge acre-feet	Suspended load Tons
1968	49,200	101,105
1969	46,750	414,519
1970	48,200	60,461
1971	54,400	171,441
Oct. 1, 1971 to May 31, 1972	36,750	24,661

In engration to dissolved elements, the Fremont River community care its a heavy find of sections in U.S. Septoyical Survey records near Cainerilia tetract Munch 1967 and May 1972 shows

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In one day, on July 20, 1969, with a total discharge of about 196 acre-feet, the Fremont River carried a load of 48,100 tons (U.S. Geological Survey, 1969, p. 72), nearly 80 percent of the total load carried by the River in 1970.

Any plan to use water for coal development from the Fremont would have to consider the wide ranges both in chemical quality and amount of suspended sediment.

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An plan to use water for coal development from the Fremont which have to enviden the wide ranges boin in chemical quality and expont of successful sediment.

Culinary Water from Springs

Springs that rise on the west slopes of Mt. Ellen and Mt. Pennell might supply culinary water via pipeline to the coal fields. The table below gives locations and yields of such springs and indicates areas that might be supplied by them.

Spring name and location	Total <u>Yield</u> 2/ <u>Solids</u>	Area to d to be supplied	Approximate pipeline distance miles
Oak Springs (Sw-49,50) <u></u> Wayne-Garfield County line Sec. 33, T.30S., R10E.	300 - 190-350 400 gpm	Stevens Mesa	6
Elk Head Spring (Bf-9) Sec. 33, T.32S., R.10E.	80 244	Tarantula	6-7
Pine Spring (Bf-11) Sec. 4, T.33S., R.10E.	60 215 1.8 (77)	School section: 36 in T.32S., 2 in T.33S., R	R.9E.
Cass Res. Spr. (Bf-21) Sec. 32, T.33S., R.11E.	65 210 20 (77)	Tarantula Cave Flat	11 9

- 1/ Numbers in parentheses identify these springs in Appendix A and on figure 6.
- 2/ The two measurements identified by (77) show decrease in yields in 1977 as a result of drought.

With adequate storage facilities, any one of these springs could supply the domestic needs of several hundred people, during years of normal precipitation. But they cannot be relied on after winters of low snowfall on the mountains.

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The end that rise on the west slopes of M2. Eller and M2. Formally often subdup cultoney water via pipeline as the coal fields. The tarks while the incubion and vicids of such springs and indicates areas that stars he subplies by them.

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- 3/ The two measurements telentrited by (77) show devictor in yields in 1977 as a result of drouble.

With adapted storage fact three, any one of these terings could subply the damestic needs of several hundred people, ouring years of normal precipitation. But they sament be relied on atter wheter of low second it on the countains.

Chemical Quality of Water - from springs, wells, streams

Springs.

Table 2 lists 61 analyses of water samples collected from 52 springs; of the 61 samples, 48 were collected as part of this project, and the other 13 were collected by others.

The analyses show a wide range in chemical quality: Benson Spring (TC-15) and Black Canyon Spring (TC-6) are low in dissolved solids with 119 and 118 mg/l respectively, whereas Swap Canyon Spring (H1-7) has more then 8800 mg/l.

Thirty-three springs have less than 500 mg/l dissolved solids, 18 springs have between 675 and 8800 mg/l, and one spring, McMillan (Sw-ll), has 493 or 506 mg/l as determined for two samples collected 8 days apart.

Except for the five springs that yield poor water from the Emery and the two springs that yield poor water from the Dakota, there is little correlation between the chemical quality of water and the geologic unit identified at the orifice of a spring. Springs that rise from the Mancos and Morrison yield waters that contain both more and less than 500 mg/l dissolved solids. Most springs that rise from colluvium or alluvium yield water of less than 500 mg/l, but Mill Race (HC-15) with 3380 mg/l is certainly an exception.

One generalization can be made from the chemical analyses: all sampled springs that yield 50 gpm (.11 cfs) or more supply water that contains less than 500 mg/l dissolved solids. Most of these springs rise above 7000 feet and thus are close to the snowmelt that supplies them. The only "spring" in this category below 7000 feet is Cow Wash Spring (DV-1) which is supplied by return flow from irrigation on Fairview Ranch.

Similarly, all ten springs that supply water containing more than 1000 mg/l yield 5 gpm (.01 cfs) or less, generally much less. However, low yield is not always an indicator of poor quality, for Dell Seeps (PB-5) yields excellent water, 160 mg/l, from the Entrada; Ticaboo

TABLE 2.-CHEMICAL ANALYSES OF WATER FROM SELECTED SPRINGS, HENRY MOUNTAINS AREA, WAYNE AND GARFIELD COUNTIES, UTAH (LOCATIONS OF SPRINGS ARE SHOWN ON FIGURE 6.)

	TABLE 2CHEMICAL ANALYSES OF WATER FROM SELECTED SPRINGS, HENRY MOUNTAINS AREA, WAYNE AND GARFIELD COUNTIES, UTAH (LOCATIONS OF SPRINGS ARE SHOWN ON FIGURE 6.)														UN	ITEO STA		TMENT OF I			CAL SURVEY							
Map <u>Number Name</u>	LUCAL IVENT- I- FIER	DATE GEO- OF LOGIC STATION NUMBER SAMPLE UNIT 1)	CHARGE	TEMPER- ATURE (0EG C) (00010)	(SI02) (MG/L)	015- SOLVEO CAL- CIUM (CA) (MG/L) (00915)	015- SOLVEO MAG- NE- Slum (MG) (MG/L) (U092S)	015- SOLVEO SOOIUM (NA) (MG/L) (00930)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	8ICAR- HONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)			015- SULVEO NITRITE PLUS NITRATE (N) (MG/L) (00631)	015- SOLVEO FLUO- RIOE (F) (MG/L) (00950)	0IS- SOLVEO ORTHO. PHOS- PHORUS (P) (MG/L) (00671)	UIS- SOLVED ORTHU PHUS~ PHATE (P04) (MG7L) (00660)		PROCESS OIS- SOLVEO ARSENIC (AS) (UG/L) (01000)	OIS- SOLVEO LEAO (PB) (UG/L)	OIS- SOLVEO LITHIUM (LI) (UG/L)	ZINC (ZN) (UG/L)	OIS- SOLVED SOLIDS (SUM OF CUNSTI- TUENTS) (MG/L)	OIS- SOLVEO SOLIOS (RES1- OUE AT 180 C) (MG/L)	SPE- CIFIC CON- OUCT- ANCE	HARO- NESS (CA+MG) (MG/L)	CAH-	S00IUM AO- SURP- Tion RATIU (00931)
SC-1 Divide Canyon SC-2 Spring Canyon SC-7 Blind Trail -7	(0-33- 8) 200-51 (0-32- 8)2180A-51 (0-31- 8)270AB-51	3757391110003 75-08-13 211MVR0 380041111015600 76-09-01 211EMRY 380450111003101 75-07-22 211EMRY 75-08-22 211EMRY	< .01 < .01 < .01	14.5 20 19.0	7.8 13 9.8 10	200 220 200 160	80 150 140 160	28 270 230 240	4.3 8.5 7.1 6.6	256 479 368 383	7.1	620 1400 1200 1200	15 22 20 19	.05 .02 .05 .02	.9 .4 .3 .2	.01 .01 .01 .00	.03 .03 .03 .00	120 270 200 210	0 2 	1 0 	130 130 80	10 10 350	1080 2320 1990 1990	1120 2460 2220	1500 2975 2580 2500	830 1200 1100 1100	620 770 770 740	0.4 3.4 3.1 3.2
Sw-1 Igneous S.r-2 Six Gallon Sw-4 080-A Sw-9 Willow East Sw-10 Willow Wildlife -10	(D-32-10) 880C-S1 (D-32-10) 8680-S1 (D-32-10)1868A-S1 (D-31-10)32868-S1 (D-31-10)3140A-S1	380219110500501 380203110500800 380121110512000 380410110502200 380413110502600 75-07-30 200MNCS 75-07-30 200MNCS	.01 .01 .01 .01 .25	23.0 13.0 15.5 7.0 8.0	20 21 8.1 14 15 15	60 180 430 120 110 100	14 S8 460 S8 27 28	11 37 1000 31 14 14	•2 •3 26 2•5 1•4 •8	222 270 423 309 239 233		39 500 4600 290 200 190	4.8 14 40 12 3.1 2.7	.01 .06 .19 .S2 .S3	.3 .4 .3 .1 .3 .3	.02 .01 .01 .01 .01 .01	.06 .03 .03 .03 .03 .03	210 560 410 70 60 20	0 0 0 0 0	2 1 2 6 	0 30 1300 20	0 0 0 0	259 944 6780 681 491 468	265 997 7660 723 499	440 1250 6500 1050 730 740	210 690 3000 540 390 370	25 470 2600 290 190 170	•3 •6 8•0 •6 •3 •3
Sw-ll McMillan -ll Sw-l7 Dripping Rock Sw-23 Corral Point Sw-25 Beaver Oam	(U-31-40)31ABH-S1 (U-31-8)24CAA-S1 (U-31-10)29BD8-S1 (U-31-10)30ADA-S1	38042211050S401 75-07-22 111CLVM 75-07-30 111CLVM 380543110584101 75-08-22 211EMRY 380505110500701 76-07-29 111CLVM 380503110502501 76-07-29 111CLVM	.01 .07 .11	9.0 15.0 7.5 8.0	I6 15 8.9 11 9.5	110 110 140 57 72	30 32 120 7.4 16	17 16 74 7.3 8.2	1.1 1.2 4.3 .5 .8	267 275 364 149 205		180 190 630 64 80	6.0 4.9 11 2.7 2.8	.21 .25 .02 .15 .09	.3 .2 .2 .2	.01 .00 .00 .00 .00	.03 .00 .00 .00 .00	50 50 110 30 30	 1 0 0 0	13 1 3 4	0 50 10 10	10 10 10 10	493 506 1170 224 291	542 1240 220 245	781 750 1500 350 460	400 410 840 170 250	180 180 550 51 78	.4 .3 1.1 .2 .2
Sw-26 Aspen Hole Sw-29 North Fork South Sw-31 Dead Cows Sw-49 Oak South	(0-31-10)30AAA-S1 (D-31-10)20B8D-S1 (0-31-9)17CBA-S1 (D-30-10)33CDH-S1	380513110502601 76-07-29 111CLVM 380559110501600 75-07-30 111CLVM 380636110565200 75-07-31 200MNCS 380917110501900 75-07-26 200MNCS	.11 .15 .02 .35	8.0 5.5 25 8.0	11 13 19 13	56 49 150 52	6.9 5.0 67 5.0	7.6 6.7 62 6.0	•5 •3 •8	147 150 248 155		64 35 520 34	3.U 2.5 29 2.8	.29 .01 .01 .02	•2 •2 •5 •2	•00 •01 •01 •00	.00 .03 .03 .00	30 30 110 30	0 4 0 0	0 4 3 2	10 0 30 0	0 10 0 0	223 186 971 190	216 189 1050 204	340 340 1350 320	170 140 650 150	48 ∠0 450 ∠3	•3 •2 1.1 •2
TW-4 Jet Basin Bu-2 Lonesome Beaver -2 Bu-5 Birch Bu-6 McClellan Wash	(0-30-10)23C88-S1 (0-31-10)1480C-S1 (0-30-10)258C8-S1 (0-30-10)2588A-S1 (0-20-11)508C-S1	381113110481900 76-08-28 200MNCS 380643110462901 75-07-22 200MNCS 75-07-29 200MNCS 381036110471701 76-08-27 110PT00 381050110470401 76-08-27 110PT00 281323110410400 76-08-27 110PT00	.03 .03 .05	13.5 5.0 9.0 15.0 17.0	15 12 11 17 20	82 64 67 90 110	18 10 11 16 21	40 6.9 6.7 23 36	1.5 •5 •5 •6	257 174 178 223 244	8.2 8.2 8.2	130 61 66 130 160	6.6 3.1 2.0 11 14	.17 •11 •06 •01 •01	.3 .2 .4	.01 .01 .00 .00 .01	.03 .03 .00 .00 .03	80 50 30 170 210	0 0 0	0 9 4 3	30 10 10	0 20 10 0	421 244 252 398 483	387 267 354 471	680 314 410 620 770	280 200 210 290 360	68 58 67 110 160 120	1.0 •2 •6 •8 1.0
OV-1 Cow Wash BG-9 Angel Cove PB-1 Poison P8-5 Oell Seeps PB-6 -6	(D-30-11) 508C-S1 (0-29-13) 7АВС-S1 (0-31-41) 180С-S1 (0-30-13)30САО-S1 (0-31-13) 98СО-S1	381332110441800 76-08-03 110PT00 381828110320901 76-09-21 220NVJO 380827110391001 75-08-01 221MHSN 381014110321700 75-07-28 221ENRO 380735110292301 57-06-20 231WNGT 76-07-co 231WNGT	. 22 •00 < .01 .01 	23 16.5 24.5 27.0 17.5 19.0	21 9.3 12 14 9.1 8.9	89 35 170 22 25 25	18 47 37 14 28 30	39 41 21 9.4 46 47	1.1 8.6 2.9 3.6 8.5 9.4	210 332 194 107 275 274	 7.4 7.6	180 55 420 30 44 50	6.1 23 10 7.4 12 12	.01 .09 .00 1.4 1.2	.9 .3 .3 .3 .3	.00 .01 .01 .01	.00 .00 .03 .03 .00	100 50 70 30 60 90	 7 15 	0 3 4 <1 	20 20 0 	10	459 384 769 160 312 323	472 814 161 305	680 640 1025 255 528 550	300 280 580 110 176 190	420 420 25 0 0	1.1 .4 .4 1.5 1.5
NW-5 Cottonwood - Cottonwood Pipe NW-11 South Hog NW-12 North Wash	(0-32-11)24AAA-S1 (0-32-12)1986C-S1 (0-33-13)50AC-S1 (D-33-13)1580C-S1	380051110382600 75-08-01 221MRSN 380048110381600 75-08-01 221MRSN 375742110294601 75-05-13 231WNGT 375612110281101 63-06-09 231WNGT	.02 .01	15.5 30.0 14.5	11 9.8 10 10	62 35 44 34	36 50 42 31	24 41 40	3.2 5.1 9.9	293 253 315 281	7.5	88 150 94 63	10 13 10 9.0	.30 .01 .00	.3 .3 .4	.01 .01 .03	.03 .03 .09	60 90 90	0 0 	3 8 	30 0 	10 10 	380 429 406 332	383 439 308	610 830 689 562	300 290 280 210	63 86 24 0	•6 1•0 1•0 1•5
TC-5 Hancock -5 TC-6 Black Canyon TC-9 Willow Spring TC-14 Aspen	(0-32-10)34088-51 (0-32-10)35860-51 (0-32-10)35000-51 (0-33-11)21800-51	375847110473300 75-07-08 11ICLVM 75-08-14 111CLVM 375849110470401 75-08-16 111ALVM 375828110462600 75-07-09 111CLVM 375521110423200 75-08-01 200MNCS	.04 .02 .07 .05 .06	5.5 5.0 4.0 6.0 8.0	12 12 8.8 11 23	74 71 33 86 62	7.9 9.0 4.3 12 12	7.3 7.0 3.0 5.6 9.8	•5 •4 •5 •6 •3	192 200 92 220 158		67 57 21 87 55	2 • 2 2 • 8 2 • 3 2 • 7 22	.25 .29 .03 .04 .04	.3 .1 .2 .3	.02 .00 .00 .02 .01	.06 .00 .00 .06 .03	20 30 20 30 30	1 2 0 0	4 3 1 5 6	0 0 0 0	0 0 0 0	267 259 119 314 263	247 258 113 303 275	350 420 170 350 420	220 210 100 260 200	60 50 25 84 75	•2 •2 •1 •2 •3
TC-15 Benson TC-21 Starr -21	(U-33-11)15CAO-S1 (O-34-11)14088-S1	375604110411000 75-08-02 111CLVM 375103110395301 75-05-13 111L0L0 75-08-03 111L0L0	.35 2	0.0	15 15 16	28 46 50	3.0 6.2 6.3	6.0 7.3 8.1	•2 •5 •5	93 146 151		14 34 38	2.5 2.7 2.2	.62 .00 .01	.2 .3 .4	.03 .03 .01	.09 .09 .03	110 20 20	4 	3	0 	0 10	118 184 196	119 199	185 310 320	82 140 150	6 21 27	•3 •3 •3
LR-2 Ticaboo Shelf HC-6 No Name HC-8 Honey Pot HC-15 Mill Race Bf-4 Airplane Bf-6 Roadside Bf-9 Elk Head	I (0-35-I2)27CCA-S1 (0-36-I1)29CUC-S1 (0-36-I1)6ACA-SI (0-36-I1)32CA0-S1 (0-32-I0)21CCC-S1 (U-32-I0)30AAA-S) (0-32-10)336C0-S1	374206110344800 75-08-18 221CRML 374859110433100 75-08-04 200MNCS 374238110442400 75-08-17 221MRSN 373754110430901 75-08-17 11ALVM 380006110491200 75-08-14 111CLVM 380001110503000 75-08-14 111CLVM 375848110490600 75-08-15 111CLVM	< .01 .01 < .01 .05 .02 .17	28.0 25.0 25.0 11.0 17.5 8.0	17 16 11 16 22 25 13	36 190 360 100 120 59	28 52 260 130 19 42 9.4	20 180 300 520 19 53 8.1	2.9 6.5 13 11 .4 .9 .4	197 254 405 152 203 305 182		38 1100 1800 2200 100 240 53	24 9.9 15 48 61 43 4.4	1.1 .02 .14 3.4 .72 .01 .13	.4 .5 .4 .6 .4 .9 .5	.01 .00 .00 .01 .00 .00	.03 .00 .00 .03 .00 .00	70 110 120 150 80 150 60	6 1 0 1 1 1	1 1 2 2 1 2	40 170 180 10 40 10	50 10 10 10 10 10 0	268 1780 2790 3380 425 675 238	261 2050 3000 3520 445 681 244	480 2200 3000 4000 700 1000 390	210 940 1500 1400 330 470 190	730 1200 1300 160 220 37	2.6 3.3 6.0 .5 1.1 .3
Bf-ll Pine Bf-l2 Pennell Igneous Bf-21 Cass Reservoir Bf-32 Egg Nog -32	(0-33-10) 48C8-S1 (0-33-10) 98BC-S1 (0-33-11)328CD-S1 (D-35-10)1884D-S1	375804110491100 375707110491600 375707110491600 375339110433200 374610110510100 59=04=26 221MRSN 75=08=19 221MRSN	.13 .13 .15 <.01	8.0 10 8.0 15.0	13 14 14 12 13	61 47 46 57 55	7.5 4.1 8.0 16 17	8.0 7.8 10 67	•7 .2 •5 1•3	171 116 125 187 189	7.5	40 55 52 175 170	4.8 1.9 2.5 16 14	.39 .12 .07 .19	• 3 • 6 • 5 • 2 • 3	.02 .01 .01 	.06 .03 .03 	40 120 120 80 70	0 3 3 	7 0 2 1	0 0 30	0 0 10 0	221 188 196 441 432	215 184 210 425	360 275 320 674 700	180 130 150 208 210	43 39 45 55 52	.3 .4 2.1 2.0
Bf-37 Four Mile Bf-38 Clay Seep H1-1 Bitter Spr. Creek H1-7 Swap Canyon LC-1 Oove LC-2 Berts -2	(0-35-10)3308C-S1 (0-35-9)26888-S1 (0-33-8)27868-S1 (0-33-8)36ACA-S1 (0-36-9)10ACC-S1 (0-36-9)100CB-S1	374305110484200 374432110533501 375458111011901 375555110582500 374135110542800 374114110542801 37508-19 2110k0T 59-04-26 2178CKR 75-08-19 2110k0T	< .01 .02 .01 < .01 < .01	19 23 23.0 19.0 21.0	8.3 16 7.3 12 22 14 18	26 26 84 520 330 79 85	23 10 94 830 180 41 49	280 30 1000 160 70	4.0 3.5 7.3 9.5 	371 293 293 671 287 269 294	8.2 8.0 7.7	440 72 390 6000 1500 246 280	12 11 4.9 130 45 22 27	.13 .02 .03 .04	.6 .4 .2 .3 .3 .4 .4	.00 .01 .00 .00 .00	.00 .03 .00 .00 .00	130 60 80 820 170 120 130	$\frac{3}{1}$ $\frac{1}{4}$ $\frac{4}{-0}$	0 2 1 3	190 40 450 140 	0 10 20 290 	978 383 759 8830 2390 681	971 734 11000 2560 703	1460 608 910 >8000 2800 855 975	160 107 600 4700 1600 365 410	0 360 4200 1300 144 170	9.6 4.3 0.5 6.3 I.8 1.5 1.5

1) Abbreviations for geologic units: ALVM = Alluvium; CLVM = Colluvium; BCKR = Buckhorn conglomerate of Stokes (1944); CRML = Carmel; OKOT = Dakota; EMRY = Emery; ENRO = Entrada; FRRN = Ferron; MNRO = Mesaverde; NVDO = Navajo; PTOO = Pediment, terrace, or deposits; TRTR Tertiary undivided; WNGT = Wingate

Shelf Spring (LR-2) yields good water, 268 mg/l, from the Carmel; and even the water from Egg Nog Spring (Bf-32) from the Morrison is chemically acceptable at 432 mg/l.

Wells.

Chemical analyses of water from selected wells that draw water from the Entrada Sandstone or Navajo Sandstone are given in table 4.

Most of the wells that draw water from the Entrada are in or near Hanksville, in sections 15 and 16, T.28S., R.11E. Wells E 1,3,4,5, and 6 yield sodium bicarbonate-sulfate water with less than 500 mg/l dissolved solids, water which is soft to moderately hard. Well E 2, in section 16, yields calcium-sodium sulfate water of at least 1200 mg/l total solids. Well E 2 is a little deeper (407 feet vs 290 to 363) than the other wells and it, like the E 8 well, may be getting minerals from the top of the underlying Carmel. Well E 9, in section 11, T.35S., R.11E., like most others in the Entrada, yields sodium bicarbonate-sulfate water.

Water drawn from the Navajo falls into two categories: dissolved solids in the range of 933 to 4200 and dissolved solids in the range of 188 to 442. Wells N 1,2,3, and 4, drilled north of the Fremont River in sections 29 and 33, T.28S., R.8E., are in the poorer category, perhaps because the water is contaminated by minerals from the overlying Carmel.

The other five wells that draw the better-quality water from the Navajo are scattered among five townships (table 3), from 29 to 36 south, on both sides of the mountains. The analyses show that the waters are not very similar: N 5 and 9 are relatively high in calcium, N 7 and 9 in magnesium, N 8 in sodium (so that it is low in hardness), N 5 and 7 in bicarbonate, N 9 in sulfate, and N 5 in chloride. Despite the diversity of dissolved constituents, all these waters are of acceptable quality.

helt sorring (LR-2) yields good vaters 253 mg/L. From the Carroll, and even the rater from Log Mod Spring (LT-32) from the Horrison & chemcostly accession at 432 mg/L.

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Charical analyses of water from selected wells that draw water from the Entrade Surgestore or Navejo Saudstore are given in table 4.

Most of the wells that draw weer from the Entrade are 11 or near functivities in actions [5 and [6, 7,285], 3,115. [Wells 7,1,3,4,5, and 5 yield continue treatmente-sulfate water with less than FOD may1 dissolved rolids, water which is soft to moderately hard. Well 5 2, in section 16, wiends calcium-sodium sulfate water of at least 1200 mg/1 with collect wells and [1, 1]the the E well. may be certing minorate from the other wells and [1, 1]the the E & well. may be certing minorate from the top, or the underlying formal. Well [2, th rection [1, 5.5. Bills. The most others in the Enrade, yields sodium preather.

(Liter drawn from the havajo falls into two cate-projes: dissolved solid; in the range of 933 to 4200 and dissolved colles in the range of 188 to 472 liells N 1,2,3, and 4, drilled north of the Fremmer Siver in sections 25 and 32, 7,285., R.85., are in the source estegory, pername focause the vater is contanimated by minerals from the overlying Canwel.

The other five well: that draw the better-quality water from the language are acattered among tive townships (taole 3). From 29 to 36 south, on their tides of the mountains. The analyses show that the waters are not year similar: A 5 and 9 are relatively high in colorade, V / and 9 in namesium. A 8 in softum (so that it is low in "nordness). It s and 7 to bicardonate. It 9 in sufface and A 5 in colorade, and A 5 in colorade, and a sector and A 5 in colorade. Despite the solution densities all these waters are of acceptable and a solution the solution (so that it is low in "nordness). It s and 7 to bicardonate. It 9 in suffaces, all these waters are of acceptable acceptable.

USE DF WATER	CUL, IRR CUL, IRR CULINARY CULINARY PUBLIC	PUBLIC CULINARY UNUSED IND,CUL	570CK UNU5ED UNU5ED UNU5ED	IRR, CUL, 5TK 5TOCK IND, CUL UNU5ED	
DATE DF COMPLETIDN	4-24-73 9-5-68 7-14-63 12-21-38	8-17-34 11-19-66 6-30-51 1969	8- 7-55 1-25-74 8-30-75 1975 8-10-76	1969 1958 1976 8-18-69	Discharge followed by F indicates a flowing well.
PUMPING PERIOD HDUR5	24.0 8.0 2.0	8.D 8.D CONT.	27 840.0 0.3 8.0	CDNT.	indicates
5PECIFIC CAPACITY GPM/FT	1.3 0.1 0.2		ייייי יייייי ייייייי		llowed by F
DRAW DDWN FEET	214 214 15D	1111	512	::::	icharge fo
DISCHARGE GPM	60 16 32 4 F	35 35 35	100 3110 2800 200 F 200 F	55 12 350	<u>3/</u> Dis
	40.00+ 20.00+ 23.60+ 20.70+ 19.90+	40.00+ F 180.62+ 	69.90+ 108.00+ 119.00+G 183.50+ 140.90	305.00 140.00 F	above ige.
ALTITUDE LAND R SURFACE	434D 4316 4310 4305 4318	4315 4320 4795	494D 4897 4884 4823 4616	5361 49DD 3956	followed by + are abo use of pressure gage.
DEPTH A TO AQUIFER	40 387 95 30 30	25 30 260 	720 668 709 210	580	s followed s use of p
PRINCIPAL AQUIFER	221ENRD 221ENRD 221ENRD 221ENRD 221ENRD	221ENRD 221ENRD 221ENRD 221ENRD 221ENRD	220NVJ0 220NVJ0 22DNVJ0 22DNVJ0 22DNVJ0 220NVJ0 220NVJ0	22DNVJ0 22DNVJ0 220NVJ0 220NVJ0 220NVJ0	easured in feet below land surface. Measurements followed by + are above surface. F indicates a flowing well. G indicates use of pressure gage.
DEPTH TD FIRST OPENING	265 402 305 327	292 353 312 	720 679 704 1286 D	58D 2996	owing well.
DEPTH CASED	265 402 335 350 195	332 363 458 	720 679 704 1400	23D5 3D43	below lar cates a fl
CASING DIAMETER INCHES	7. 6 8.63 6.25	1 99 1	13.38 16 20 13.63	10.75 4.5D	Measured in feet below land surface. surface. F indicates a flowing well.
DEPTH DF WELL FEET	290 407 340 350 340	332 360 560	764 761 1250 1350	2305 450 1000	2/ Measu land surf
DEPTH DRILLED FEET	290 407 340 350 340	332 500 	764 761 1685 140D 510	6648 3043	act.
STATION NUMBER	382229110422201 382224110433501 382220110425501 382220110425501 3822209110425901	382210110424201 382153110430601 381431110392501 374527110421201	382D24111D43DD1 382D271110416D1 382D271110346D1 382D2011110346D1 3819341110323D2 38144D1103628D1	38D354111D446D2 38D8591103548D1 37453111D42DDD1 374D0D111D4915D1	d; 5, plugged back; ell on the ten-acre tr
LOCAL NUMBER 1,	(D28-11)158DC- (D28-11)16CBA- (D28-11)16CBA- (D28-11)16DAC- (D28-11)16DAC- (D28-11)16DAD- 1	(D28-11)16DDB- 1 (D28-11)21A8D- 1 (D29-11)36DAA- 1D (D35-11)16CDD- 1	(D28-8)29CCC-1 (D28-8)29CCB-1 (D28-8)338BB-1 (D28-8)338BB-15 (D28-8)33CD-15 (D29-12)33ACD-2	(D31-7)36DAD-15 (D31-12)4BDB-1 (D35-11)16DCD-1 (D36-10)218DB-1	$\underline{1/}$ Codes indicate: D, deepened; 5, plugged back; 1, first well; 2, second well on the ten-acre tract.
DWNER	JIM-N-ELL5 CORP. BULLARD, D E 5TAGECDACH MDTEL U5 FED AVIA ADM U5 GRAZING SERVICE	HANKSVILLE CANAL CD US BUR LAND MANAGE ENERGY FUELS, INC 5HITAMARING MINE	US BUR LAND MANAGE GARKANE POWER A55N IPP TEST WELL IPP-COLT TEST U5 BLM (USGS #3)	WEAVER, RDBERT (031-7)365A0- PDI509 WELL (05 BLM)(021-2)4085- 5HITAMARING MINE (035-11)165CD- ROMEX NO. 1 FED. (036-10)218080-	<u>1</u> , cod 1,
MAP NUMBER	E1 E3 E5 E5	E 2 4 E 3 5 E 3 5	N N N N N N N N N N N N N N N N N N N	N 8 N 8 N 9 N 9 N 9	

(LDCATIONS OF WELLS ARE PLOTTED DN FIGURE 6. CHEMICAL ANALYSES DF WATERS FRDM THESE WELLS ARE GIVEN IN TABLE 4.)

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TABLE 3. - RECORD5 DF 5ELECTED WELLS THAT DRAW WATER FROM ENTRADA SAND5TONE DR NAVAJO SAND5TONE, HENRY MOUNTAINS AREA.

TABLE 4. - CHEMICAL ANALYSES OF WATER FROM SELECTED WELLS THAT ORAW WATER FROM ENTRADA SANOSTONE OR NAVAJO SANOSTONE, HENRY MOUNTAINS AREA.

MAP	R OWNER		LOCAL NUMBER	STATION NUMBER	OATE OF SAMPLE	TEMPER- ATURE (DEG C) (00010)		DIS- SOLVEO CAL- CIUM (CA) (MG/L) (00915)	015- SOLVE0 MAG- NE- SIUM (MG) (MG/L) (00925)		DIS- SOLVEO PO- TAS- SIUM (K) (MG/L) (0093S)		PH (UNITS) (00400)	0IS- SOLVEO SULFATE (SO4) (MG/L) (00945)	CHLO- RIOE (CL) (MG/L)	0IS- SOLVEO NITRITE PLUS NITRATE (N) (MG/L) (00631)	0IS- SOLVEO FLUO- RIOE (F) (MG/L) (00950)	015- SOLVEO ORTHO. PHOS- PHORUS (P) (MG/L) (00671)	015- SOLVED ORTHO PHO5- PHATE (PO4) (MG7L) (00660)	BORON (B) (UG/L)	OIS- SOLVED ARSENIC (AS) (UG/L) (0I000)	LEA0 (P8) (UG/L)	OIS- SOLVEO LITHIUM (LI) (UG/L)	01S- SOLVEO ZINC (ZN) (UG/L)	MULTI OIS- SOLVED SOLIOS (SUM OF CONSTI- TUENTS) (MG/L)	IPLE STATI OIS- SOLVEO SOLIOS (RESI- OUE AT	ON LISTIN SPE- CIFIC CON- OUCT- ANCE (MICRO- MHDS)	HARO- NESS	NON- CAR+ BONATE HARO- NESS (MG/L)	SOOIUM AO- SORP- TION RATIO
NUMBE E1 E2 E2 E3 E3 E3	JIM-N-E BULLARC	ELLS CORP.	(028-11)1580C- 1 (028-11)16C8A- 1 (028-11)16OAC- 1	382229110422201 382224110433501 382220110425501	75-12-06 69-05-28 76-07-26	 E11.0	13 14 12 7.5 14	11 99 100 21 15	5.0 35 36 .0 8.0	120 220 230 130	1.3 3.0 3.3 1.5	236 159 154 245 235	7.3 8.0 7.4 8.2	110 758 730 165 133	2.7 21 7.6 6.0 9.0	0.02	0.4 .2 .2 .4 .3	.00	.00	230 350 920 190	10 0	 0	 	160 30	380 1308 1200 426	441	1980 1550 605	48 390 400 54 70	0 260 270 0 0	7.5 4.8 5.0 6.7
E 4 E 4 E 5 E 6	US GRAZ	AVIA AOM ZING SERVICE ILLE CANAL CO	(028-11)160A0- 1 (028-11)160CA- 1 (028-11)1600B- 1	382220110424601 382209110425901 382210110424201	65-09-13 75-06-10 47-03-16		11 13	11 19 15 10	5.0 5.3 14 8.7	120	1.7	236 238 238 236	8.4 8.3 	109 130 130 119	7.0 3.5 8.0 4.0	.02	. 4 . 4 . 7 . 7	.01 	.03	170 150 	0	0	 	40 	405 397 410 		660 650 657 617 588	50 69 95 61	0 0 0	7.5 6.3
E6 E6 E7 E8 E9	ENERGY	. LANO MANAGE FUELS, INC ARING MINE	(028-11)21A80- 1 (029-11)360AA- 10 (035-11)16C00- 1	382153110430601 381431110392501 374527110421201	76-09-22	20	16 12 7.5 15	18 9.8 120 21	.0 2.8 70 12	110 460 83	1.2 7.6 5.5	243 214 228 104 177	8.6 7.9 8.4	109 112 90 1400 130	3.0 3.0 2.6 19 8.1	.01 .07 .78	.0 .3 .2 .3	.01	.03 .00	110 240 70		 6	100		341 2140 369	380 372 	605 528 2950 610	43 46 36 590 100	0 0 500 0	7.9 8.0 8.3 3.6
N 1 N 2 N 3 N 4 N 5	GARKANE IPP TES IPP-COL			382024111043001 382027111041601 382020111034601 381934111032302 381440110362801	74-10-04 75-11-24 75-08-21	24 17.5 17.5 16.5	10 13 9.3 9.6 11	126 284 95 110 59	50 88 28 52 31	520 494 760 130 26	5.0 4.4 3.7 5.6 7.5	291 289 225 239	8.2 7.8 7.0 7.0 7.5	618 1070 660 380 110	463 625 800 130 15	.01 .01 .06	. 4 . 4 . 7 . 2 . 2	 .00 .00 .00	 .00 .00 .00	340 280 530 60 40	1 	0 11		0 20	1940 2500 933 378	2000 3746 	3000 4200 4050 1400 640	520 1070 350 490 280	280 120 310 79	9.9 6.6 18 2.6 .7
N6 N7 N8 N9	POISON SHITAMA	, ROBERT WELL (US BLM) ARING MINE NO.1 FEO.	(031-7)360A0-1S (031-12) 4808-1 (035-11)160C0-1 (036-10)2180B-1	380354111044602 380859110354801 374531110420001 374000110491501	75-07-28 76-08-30	17.5	9.6 10 15 9.7	32 26 13 53	20 43 11 40	6.5 18 55 17	2.0 3.9 4.6 5.9	175 245 153 110	7.1 8.5 7.7	27 67 60 229	2.8 7.6 8.0 10	.27 .01 .73	.1 .2 .3	.01 .01 .01	.03 .03 .03 	30 30 70 150	0 5 	12 4	20 80	560 110	188 297 250 442	305 237 444	350 510 400 629	160 240 78 296	19 41 0 206	.2 5 2.7 .4
					TA8LE 5					CTEO STRE/ OTTEO ON I			NS AREA.										UN	IITEO STA	TES OEPAR MULT	TMENT OF	INTERIOR Ion Listi	- GEOLOGIO	CAL SURVE	Y
	ORAINAGE	ALTITUOF	LOCAL NUMBER ST	OATE OF ATION NUMBER SAMPLE	CHARGE (CFS)		SOLVED S1L1CA (S102) (MG/L)	SOLVED CAL- Clum (CA) (MG/L)	NE- SIUM (MG)	DIS- SOLVEO SODIUM (NA) (MG/L) (00930)	TAS- SIUM (K)	BICAR- BONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)	SOLVEO SULFATE (SO4)	SOLVED CHLU- RIDE (CL)	NITRITE PLUS NITRATE (N)	SOLVEO FLUO- RIOE (F)	015- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L) (00671)	ORTHU PHUS- PHATE (PU4)	OIS- SOLVEO BORON (B)	ARSENIC (AS)	LEAO (PB) (UG7L)	015- SOLVED LITHIUM (LI) (UG/L) (01130)	SOLVEO ZINC (ZN) (UG/L)	SOLIDS (SUM OF CONST1- TUENTS) (MG/L)	(MG/L)	CIFIC CON- OUCT- ANCE (MICRO- MHOS)	(MG/L)	HARO- NESS (MG/L)	SOOIUM AO- Surp- Tion Ratio (00931)
PL1 PL1 000 CE0	EASANT CREEK UP EASANT CREEK LO GOUT CREEK DAR CREEK K CREEX	PPER 5910	(0-30- 7)29A8A 38 (0-29- 7)25BCC 38	1047111104900 75-08-23 1529111070900 75-08-23 0426110492200 75-07-29 0742110522901 76-07-30 1121110513400 75-07-27	3 2.	23.5 26. 9. 26 11.5	24 27 9.1 14 20	28 190 56 52 88	13 51 4.6 6.6 14	4.4 32. 4.1 7.8 16	1.8 4.7 0.7 0.5 0.4	121 216 138 122 196		25 540 44 62 100	1.7 6.4 0.9 4.5 15	0.00 0.01 0.41 0.12 0.01	0.1 0.3 0.2 0.2 0.2 0.4	.03 .01 .00 .00 .02	.09 .03 .00 .00 .06	20 130 10 50 80	1 3 0 1 0	0 1 2 7 1	0 30 0 0	0 10 10 0 0	158 958 189 208 351	162 1000 197 204 350	239 1200 320 325 550	120 680 160 160 280	24 510 46 57 120	0.2 0.5 0.1 0.3 0.4
811 811 801 FA	RCH CREEK UPPER RCH CREEK MIOOL RCH CREEK LOWES LL CREEK IRVIEW OITCH	LE 6380	(0-30-10)23CCC 38 (0-30-10 23A88 38	1030110484000 75-07-11 10521104823 76-08-02 10401104749 76-08-02 11571104508 75-07-28 1225110443701 76-08-03	2.13	18. 22. 27. 18. 23.	19 17 18 13 13	64 45 33 65 67	8.6 9.4 8.3 14 15	13 13 13 13 13 15	0.7 0.8 0.8 1.0 0.9	182 140 104 170 99		56 58 59 93 120	5.1 5.3 5.4 4.2 5.2	0.01 0.02 0.09 0.03 0.02	0.3 0.3 0.2 0.2	.02 .00 .00 .01 .00	.06 .00 .00 .03 .00	50 70 50 40 50	1 0 1 0	2 0 2 0	0 0 0 10	0 0 10 10	257 218 190 287 285	236 208 183 307 301	385 330 285 480 480	200 150 120 220 230	46 36 31 81 150	0.4 0.5 0.5 0.4 0.4
GR/	ANITE CREEK	8960	(0-31-10)26A88 38	0518110463200 75-07-29	.48	7.	8.8	38	2.6	3.2	0.6	116		18	0.7	0.02	0.1	.00	.00	10	0	4	0	0	129	137	220	110	10	0.1

														015-		DIS-					015-		015-	015-				U	ITEO STAT		MENT OF I	ON LISTI	GEOLOGIC	AL SURVEY	
MAP										OATE OF	TEMPER- ATURE (OEG C) (00010)	DIS- SOLVEO SILICA (S102) (MG/L) (00955)	DIS- SOLVEO CAL- CIUM (CA) (MG/L) (00915)	SOLVEO MAG- NE- SIUM (MG) (MG/L) (00925)	015- SOLVEO SODIUM (NA) (MG/L) (00930)	SOLVEO PO- TAS- SIUM (K) (MG/L) (0093S)			0IS- SOLVEO SULFATE (SO4) (MG/L) (0094S)	0IS- SOLVEO CHLO- RIOE (CL) (MG/L) (00940)	SOLVEO NITRITE PLUS NITRATE (N)	0IS- SOLVEO FLUO- RIOE (F) (MG/L) (00950)	SOLVEO ORTHO. PHOS- PHORUS (P) (MG/L) (00671)	SOLVED ORTHO PHOS- PHATE (PU4) (MG/L)	0IS- SOLVEO BORON (B) (UG/L) (01020)	ARSENIC (AS) (UG/L)	(P8) (UG/L)	LITHIUM (LI)	ZINC (ZN) (UG/L)	SOLVED SOLIOS (SUM OF CONSTI- TUENTS) (MG/L) (70301)	(MG/L)	CON- OUCT- ANCE (MICRO- MHOS)	(MG/L)	NON- CAR+ BONATE HARO- NESS (MG/L) (00902)	S001UM A0- S0RP- TION RATIO (00931)
NUMBER		OWNER JIM-N-ELLS	CORP.		LOCAL NU (028-11)1			ATION NUM8 2291104222		AMPLE		13	11	5.0	120	1.3	236	7.3	110	2.7	0.02	0.4	.00	.00	230					380			48	0	7.5
E2 E2 E3 E3		BULLARD, O E STAGECOACH	E		(028-11)1 (028-11)1	6C8A-1	382	22411043350 22011042550	01 69-0 76-0 01 55-0	05-28 07-26 05-19		14 12 7.5 14	99 100 21 15	35	220 230 130	3.0 3.3 1.5	159 154 245 235	8.0 7.4 8.2	758 730 165 133	21 7.6 6.0 9.0	. 43	.2 .2 .4 .3	.01	. 03	350 920 190	10 0	0 0		160 30	1308 1200 426	441	1980 1550 605	390 400 54 70	260 270 0 0	4.8 5.0 6.7
E 4 E 4		US FEO AVIA	A AOM		(028-11)1	60A0- 1	382	22011042460	65-0	09-13		11	11	5.0	120	1.7	236	8.4 8.3	109	7.0	.02	. 4			170	0 	0		40	405 397 410		660 650 657	50 69	0 	7.5
E 4 E 5 E 6		US GRAZING HANKSVILLE			(028-11)1 (028-11)1			2091104259	01 47-0			13	19 15 10	5.3 14 8.7	120	1.5	238 238 236		130 130 119	3.5 8.0 4.0		.4 .7 .7	.01 	.03								617 588	95 61	0	
E6 E6 E7 E8 E9		US BUR. LANC ENERGY FUEL SHITAMARING	LS, INC		(028-11)2 (029-11)3	60AA- 10	381	1531104306(4311103925(62-0 01 75-0 01 76-0	09-22		16 12 7.5	18 9.8 120	.0 2.8 70	 110 460 83	 1.2 7.6 5.5	243 214 228 104 177	8.6 7.9 8.4	109 112 90 1400 130	3.0 3.0 2.6 19 8.1	.01 .07 .78	.0 .3 .2	.01	 .03 .00	 110 240 70				 30	 341 2140 369	380 372 	605 528 2950 610	43 46 36 590 100	0 0 500	7.9 8.0 8.3 3.6
E 9		SELLAMARING	PINC		(035-11)1	6000- I	574	52711042120	UT 76-0	18-30	20	15	21	12	83	5.5	177	0.4	150	0.1	.70	. 5			10	ů									
N 1 N 2 N 3 N 4 N 5		US BUR LANC GARKANE POWE IPP TEST WEL IPP-COLT TES US BLM (USGS	ER ASSOC LL ST		(028-8)2 (028-8)2 (028-8)3 (028-8)3 (028-8)3 (029-12)3	9008-1 3888-1 3000-15	382 382 381	02411104300 02711104160 02011103460 93411103230 44011036280	01 74-1 01 75-1 02 75-0	10-04 11-24 08-21	24 17.5 17.5 16.5	10 13 9.3 9.6 11	126 284 95 110 59	50 88 28 52 31	520 494 760 130 26	5.0 4.4 3.7 5.6 7.5	291 289 225 239	8.2 7.8 7.0 7.0 7.5	618 1070 660 380 110	463 625 800 130 15	.01 .01 .06	. 4 . 4 . 7 . 2 . 2	.00 .00 .00	 .00 .00	340 280 530 60 40	1	0 11		0 20	1940 2500 933 378	2000 3746 	3000 4200 4050 1400 640	520 1070 350 490 280	280 120 310 79	9.9 6.6 18 2.6 .7
N6 N7		WEAVER, ROBE POISON WELL	ERT		(031 - 7)3 (031 - 12)	60A0- 15	380	35411104460 85911035480	02 75-0	08-29	17.5	9.6 10	32 26	20 43	6.5 18	2.0	175	7.1	27	2.8	.27	.1	.01	.03	30 30	0	12	20	560	188 297	305	350 510	160 240	19 41	.2
N8 N9		SHITAMARING ROMEX NO.1	MINE		(035-11)1 (036-10)2	6000- 1	374	53111042000 00011049150	01 76-0	08-30	21.0	15 9.7	13 53	11 40	55 17	4.6	153 110	8.5 7.7	60 229	8.0 10	.73	.2	.01	.03	70 150	5	4	80	110	250 442	237 444	400 629	78 296	0 206	2.7
									TABL	E 5 C		NALYSES O						NS AREA.																	
											(LOCATI	ONS OF SA	MPLE SIT	ES ARE PL	OTTED ON)											U	NITEO STA	MULT	IPLE STAT	ION LISTI	- GEOLOGI Ng	CAL SURVE	Y
								0ATI OF	T E	CHARGE (CFS)	(DEG C)	SOLVED	SOLVED CAL- Clum (CA) (MG/L)	NE- SIUM (MG) (MG/L)	DIS- SOLVEO SODIUM (NA) (MG/L)	TAS- SIUM (K)	BICAR- BONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)	SOLVEO SULFATE (SO4)	SOLVED CHLU- RIDE (CL)	OIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	SOLVEO FLUO- RIOE (F)	ORTHO. PHOS- PHORUS (P)	ORTHU PHUS- PHATE (PU4)	OIS- SOLVEO BORON (B)	ARSENIC (AS)	LEAO (PB) (UG/L)	015- SOLVED LITHIUM (LI) (UG/L) (01I30)	SOLVEO ZINC (ZN) (UG/L)	SOLIDS (SUM OF CONST1- TUENTS) (MG/L)	(RESI- OUE AT IBO C) (MG/L)	CIFIC CON- OUCT- ANCE (MICRO- MHOS)	(MG/L)	NON- CAR- BONATE HARO- NESS (MG/L) (00902)	TION RATIO
	ORAINAG	E A	ALTITUOE 5910	LOCAL				BER SAMPI	LE	000017																1	0	0	0	158	162	239	120	24	0.2
PLE OUG CEO		REEK LOWER	5030 8880 7020	(0-30-1) (0-29-1) (0-31-1) (0-31-9) (0-30-1)	7)25BCC D)29000 9)1288C	38 38	1529111070 0426110492	900 75-08 900 75-08 200 75-07 901 76-07 400 75-07	-23	9. 2. 0.5 0.33 2.	23.5 26. 9. 26 11.5	24 27 9.1 14 20	28 190 56 52 88	13 51 4.6 6.6 14	4.4 32. 4.1 7.8 16	1.8 4.7 0.7 0.5 0.4	121 216 138 122 196		25 540 44 62 100	1.7 6.4 0.9 4.5 15	0.00 0.01 0.41 0.12 0.01	0.1 0.3 0.2 0.2 0.4	.03 .01 .00 .00 .02	.09 .03 .00 .00 .06	20 130 10 50 80	3 0 1 0	1 2 7 1	30 0 0 0	10 10 0	958 189 208 351	1000 197 204 350	1200 320 325 550	680 160 160 280	510 46 57 120	0.5 0.1 0.3 0.4
8IR 8IR	RCH CREE RCH CREE RCH CREE L CREEK IRVIEW O	K MIOOLE K LOWEST	6380 5880 5380	(0-30-10 (0-30-10 (0-30-10 (0-30-10 (0-30-10)	0)23CCC 0_23A88 1)180A8	38 38 38	1052110482 1040110474 1157110450		-02 -02 -28	.17 .13 .05 3.00 1.40	18. 22. 27. 18. 23.	19 17 18 13 13	64 45 33 65 67	8.6 9.4 8.3 14 15	13 13 13 13 13	0.7 0.8 0.8 1.0 0.9	182 140 104 170 99		56 58 59 93 120	5.1 5.3 5.4 4.2 5.2	0.01 0.02 0.09 0.03 0.02	0.3 0.3 0.2 0.2	.02 .00 .00 .01 .00	.06 .00 .03 .00	50 70 50 40 50	1 0 0 1 0	2 0 0 2 0	0 0 0 10	0 0 10 10	257 218 190 287 285	236 208 183 307 301	385 330 285 480 480	200 150 120 220 230	46 36 31 81 150	0.4 0.5 0.5 0.4 0.4
	ANITE CR			(0-31-10				200 75-07			7.	8.8	38	2.6	3.2	0.6	116		18	0.7	0.02	0.1	. 00	.00	10	0	4	0	0	129	137	220	110	10	0.1



Streams.

The chemical analyses of water collected from eleven sites on seven streams are given in table 5.

Pleasant Creek, which drains off the east slope of Boulder Mountain, west of the Henry Mountains area, was sampled in its upper reaches near Pleasant Creek Ranch and then after it had passed through the Notom area. The increase in dissolved solids from 158 mg/l to 958 mg/l probably can be attributed to return flow from irrigation to the Notom area.

All other creeks whose waters were analyzed head in the Henry Mountains. They are spring fed and all the waters are of excellent chemical quality though all are moderately hard to very hard.

Sampling of the water of Birch Creek, which flows northward off the north slope of Mt. Ellen, in 1975 and 1976 showed that Birch Creek loses nearly half its calcium carbonate as it flows over the fan north of the mouth of its canyon. This loss appears to be due to the fact that as the temperature of the water rises downstream, the water loses dissolved carbon dioxide and thus some calcium carbonate is precipitated. We don't know whether or not this phenomenon occurs with other springfed streams, but it seems a likely event. Discharge and conductance measurements of Birch Creek made on July 2, 1977, indicated that the same downstream decrease in calcium carbonate was still occurring.

The details of the investigation of the loss of calcium carbonate by Birch Creek are given in Appendix F.

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striking are given in table 5

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anoth slop of PL Ellen, in 1975 and 1976 chouse that direburn of the month slop of PL Ellen, in 1975 and 1976 chouse that direb Creak mart metric also of PL Ellen, in 1975 and 1976 chouse that direburn of metric also all its canan. This Too, appears to the due to the fact that the mart of He Elenan. This Too, appears to the due to the fact that at the tomerature of the water rises consistents, the late fact that the due t home whethe and this some talking carbon e is precisitated. The due t home whethe on was the present of the sole of the sole of the tomerature of the sole the sole of the fact that the due t home whethe and this some talking carbon e is precisitated. The due t home whether on was the parametron deside the tot the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole of the sole of the sole of the stream the sole of the sole o

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CONCLUSIONS and RECOMMENDATIONS

Conclusions

Observations during the 1975 and 1976 field seasons, after winters of normal precipitation, and during the 1977 field season, after a dry winter, confirm that springs and the mountain streams fed by them cannot be depended upon as water supplies. Therefore any major development of coal will have to depend on water from underground supplies.

The water requirements for major development of coal would include 100 to 150 gallons per day per person, water for plant maintenance and revegetation of perhaps 1000 acre-feet per year, plus water for the kind of coal development based on these approximate demands:

- Coal gasification 10,000 to 45,000 acre-feet per year for plant producing 250 million cubic feet of gas per day.
- Coal liquefaction A plant producing 100,000 barrels of liquid per day requires about 24,000 acre-feet of water per year.
- Transshipment by slurry pipeline 750 acre-feet per million tons of coal (a 1000-megawatt generating plant requires 3 to 3¹/₂ million tons of coal and 2250 to 2600 acre-feet of water for shipping per year).
- 4) Cooling for generating plant a 1000-megawatt generator consumes about 15,00 acre-feet of water per year.

Water to meet these requirements may be available from the following sources:

- In years of normal or excessive precipitation water from springs by pipeline in amounts of 200 to 400 acre-feet per year. Measurements of springs after the dry winter of 1976-77 prove that springs are not dependable and therefore any use dependent on springs would require a back-up source of water.
- 2) Water from the Navajo Sandstone might support properly-spaced wells in a field that would yield 20,000 to 30,000 acre-feet per year. Water from the Navajo in this and other areas may be

CONCLUSIONS and RECOMMENDATIONS

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Unservitions during the 1976 and 1976 field adapts, aftur whenees of normal precipitation, and during the 1977 field season, after a dep winter, confirm that anythes and the mountain streams fed by them cannot be depended upon as mater supplice. Therefore any mains development of cont will have to depend on water from underground such hes.

(00 to 150 gelions perides for major development of coal would facilule (00 to 150 gelions perides per person, water for plant mathtendors and revegetation of perhaps 1000 tere-feel per year, plus mater for the bills of coal development mases in these approximate dowinds:

- Dad gastficacion 10,000 to 45,000 acre-fort per year for plant producing 280 militor cubic feet of day one days
- Food Transfection A plant producting (00,000 barrels of Found new day requires about 24 100 occurrences of mater now years
- A) Transchipment by Sluevo Dibeline 750 acte-free per military tans of coal (a 1000-merowrit generaling robust requires 2 20 20 militan coas of coal and 2250 to 2600 acre-front at water for shipping per year).
 - i) Cooling for centrating plant a 1000-megawort generator comsumes about 16.00 acre-feet of water on year

Mater in meet biere requirements may be available from the following

- 1) in yours of normal or eccessive mercipilation which from prings by mostime in amounts of 200 to 400 same-fact per-year. Menisonnauts of surveys after the dry winter of 1976-77 prove shat surings are not uspendable and therefore any the dependent on surings are not uspendable and therefore any the dependent on
 - 2) Mater from the Nevado Sendations might support more ly-spaced wells in a field that would vield 20,000 to 30,000 dom-feet per year. Mater from the Minajo in this and other erists may be

of excellent to poor chemical quality and thus may require treatment before use.

- 3) Water from shallow aquifers such as the Mesaverde, Emery, Ferron, Morrison, or Entrada might supply limited quantities of perhaps 2000 to 3000 acre-feet per year. Water samples collected from these formations during this investigation suggest that water from these sources is of poor or variable chemical quality and therefore may require treatment before it can be used.
- 4) Water imported from Oak Creek and/or Pleasant Creek might supply 2000 to 3000 acre-feet per year if water rights can be purchased from present owners. Although these creeks were not looked at in 1977 it is likely that the general drought caused both to have low flow: likely these sources of water would be no more dependable than the springs in the Henry Mountains.

Recommendations

We recommend that any plan for coal development include the firming up of a dependable supply of water early in the planning stage. Because surface water supplies are meagre and undependable, the only possible local source of water is underground. Therefore we recommend that test wells be drilled in any area where coal is to be developed. These wells should test each penetrated aquifer for yield and chemical quality. If the water is to be used for drinking it should also be tested for bacteria. Holes that are collared on Tarantula Mesa should successively test the Mesaverde, Emery, Ferron, Morrison, Entrada, and Navajo; holes that are collared below Tarantula should test all the above-named units that are penetrated. The depths at which these formations are penetrated will depend on location: a well drilled on top of Tarantula should reach the top of the Navajo at about 5700 feet; a well drilled on Wildcat Mesa should reach the top of the Navajo at about 4500 feet. of ever that to poor marked anality and that any source

- A state from shallow manifers sum as the Meseyand... there, a rate. Monifson or Entrada might supply limited mannettics of purings 2000 to 3000 at market per years. Mater samiles collected to a lugse formal huns during this have better suggest hat water from these sources is of even an entable cleanced quality are therefore may forum. these treateness colleic and of duality are therefore may forum. Streateness colleic and of duality are therefore may forum.
- 1 Water imported from Oak Greek and/or Pleasant Greek winnt supply 2000 to 2000 acre-feet per year of water rights can be purchased from present owners. Although sheet greeks kerns not Scand 11 in 1977 fr is likely that the general decount a tree main to have law from 10-11 these tourdes of safer would be no not dependeble toan the springs in the near numbers.

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he recommend that any play for and baselopiem, include the formulae and of a domendable supply of water early in the planning stage. Because surface mater supplies are needed and undependeble, showing measure has a source of water to underground. Therefore an occamment that they walls be defined in any area mere real to be developed. Mose with the start each paretrated analier for yield and whenfold the have the start is the used for unrelier for yield and whenfold under the have the start is the used for unrelier for yield and whenfold under the have the start is the used for unrelier for yield and whenfold under the have the start is the used for unrelier for yield and whenfold under the have the start is the used for unrelier for yield and whenfold under the have the start is the set of and in the horizon. End when should use here the infit are an instantia shuffed that all the doubted to be the start is the set of intering a work of the start of the start infit are an instantian and an infit the abovernous infit are an instantian and an the start of the start of the start is the set of the started of the start of the start of the start is the started are the started and the start of the start is the started are the started of the start of the started of the start is the started of the started of the start of the started of the start is the started of the started of the started of the started of the start is the started of the started of the started of the started of the started is the started of the started of the started of the started of the started is the started of the started of the started of the started of the started is the started of the started of the started of the started of the started is the started of the started of the started of the started of the started is the started of the started of the started of the started is the started of the started

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Dale Ross and Dee Williamson, of the Richfield office of the U.S. Bureau of Land Management, provided information about springs in the Henry Mountains and were very helpful in answering questions about specific localities.

We are especially grateful to Harold Ekker and to Reo Hunt of Hanksville, for they several times helped us to keep our ancient field vehicle capable of moving. In particular we are grateful for the help we received on Sunday July 3, 1977 when we limped into Hanksville at about 11:30 in the morning with a severe crack in the frame of our carryall. In less than two hours we were out of Hanksville, heading for the mountains, only because Reo Hunt was able to arrange for swift welding of the crack.

Charles Wier, of AMAX Coal Company, graciously provided us with logs of the test holes drilled by AMAX in 1972, and permitted us to release the information given in Appendix C. Ben Law, of Conservation Division, U.S. Geological Survey, gave us information about the test drilling he supervised in 1976.

The difficult typing of this report was done mostly by Vickie Beesley, with some very timely assists by Connie Wiscombe. We are most grateful to both for their help.

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Charles View, of AMAR Carl Company, gradicusly provided us with logs of the test holes drilled by AMAR in 1972, and permitted us (a release the information given in Appendix 5. Een Low, of Educeviritien siviation, U.S. Reological Survey, game as information shout the met drilling he supervised in 1975.

The difficult typing of this report was done methy by Vickle hereiny, with once very timely assists by Doon's Maconne, we are In addition to providing the secretarial help in typing this report, the Department of Geology and Geophysics of the University of Utah provided the field vehicle used during the three field seasons; and Wil Forsberg, Business Manager for the department, maintained the accounts for the project.

We are also grateful to Dorothy Boulton of the State Engineer's Office for providing expert guidance through the records of that office.

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APPENDICES

- A. Records of springs in the Henry Mountains area
- B. Discharge estimates (E) or measurements (M) on selected streams in the Henry Mountains area, 1975-1977
- C. Test drilling by AMAX Coal Company, by Conservation Division, U.S. Geological Survey, and for uranium exploration
- D. Cross-channel profiles of selected streams that drain the coal basin
- E. Grain-size analyses and porosity determinations of surface samples from selected sandstones
- F. Birch Creek and its downstream loss of calcium carbonate

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APPENDIX A

Table 6. - Records of Springs in the Henry Mountains area.

The appended 209 spring schedules are arranged by drainage area, clockwise around the Henry Mountains, beginning in the northwest with Sandy Creek (SC), which flows into the Fremont, and ending in the southwest with Halls Creek, which flows into Lake Powell. Within each drainage the springs are listed in upstream-to-downstream order by subdrainage, beginning with the highest. Each spring is also shown on the map of figure 6.

Measurements of flow of the springs were made with tarp, bucket, and stopwatch, as described under Methods of Work. Measurements of conductance were made with a Beckman meter in 1975 and with Beckman and Hach meters (both used at each site) in 1976 and 1977. Temperatures were measured with mercury thermometers.

Most entries on the schedules are self-explanatory. Abbreviations used: M = measured, E = estimated, R = reported, C = chemical analysis available in table 2. Spring numbers are coded according to main drainage:

Springs	Drainage	Page
SC-1 to SC-7	Sandy Creek	A-1
Sw-1 to Sw-52	Sweetwater Creek	A-2 to A-8
TW-1 to TW-6	Town Wash	A-9
BC-1 to BC-6	Birch Creek	A-10
SaW-1	Sand Wash	A-10
Bu-1 to Bu-12	Bull Creek	A-11, A-12
DV-1 to DV-2	Dry Valley Wash	A-12
BG-1 to BG-9	Beaver-Granite	A-13, A-14
PB-1 to PB-6	Poison-Butler	A-14
NW-1 to NW-13	North Wash	A-15, A-16
TC-1 to TC-22	Trachyte Creek	A-17 to A-19

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assess A = measured. E = mitinated (C = reported. C = shewhich many) is
restlable in table 2. Soring numbers are coded accounting to mid.
crainage:

LR-1 to LR-6	Little Rockies - streams that drain southeastward from	A-20
HC-1 to HC-17	Hansen Creek	A-21 to A-23
Bf-1 to BF-39	Bullfrog Creek	A-24 to A-28
LC-1 to LC-3	Long Canyon	A-29
H1-1 to H1-8	Halls Creek	A-30

A comparison of the flows of springs measured in 1977 with flows of the same springs measured in 1975 or 1976 gives a fair indication of the effect of the drought during the winter of 1976-77. For convenience the springs revisited in 1977 are listed below, along with the pertinent measurements (M) or estimates (E).

Map #	Spring Name	Yield in 1977 gpm	Yield in 1975 or 1976 gpm
SW-1 SW-9 SW-10 SW-11 SW-12 SW-23 SW-29 TW-2 TW-3 BC-6 BU-5 BU-6 TC-1 TC-5 TC-8 TC-10 TC-15 TC-21 BF-11 BF-19 BF-20	Igneous Willow East Willow Wildlife McMillan Birch Corral Point North (South) Fork Lost Spring Lower Lost Spring Bert Avery Birch McClellan Wash Box Hancock Tank Browns Hole Benson Starr Spring overflow Pine Pennell Sackett	gpm <1E <1E 23M 1M 1-2E 15M <1E 2E 5 1/2M 1M 8M 20M <1 pt M 1.5M 2.4M <1E 100M None 1.8M 4.8M 15-20E	gpm 3M 3-4E 110 and 120M 3M 8-10E 32M 50 and 70M Dry 9M 1E 13M 23M 1 pt to 1 qt M 6.7 and 10M 5M 36M 170M 11, 43, and 85M 40 and 60M 25-30E 15-20E
BF-21 BF-33 BF-34	Cass Reservoir Indian Cow Seeps	20M <1/4E 1 1/4M	48 and 60M 1/4E 1M

A comparison of the flows of springs measured in 1977 uses flow of the same springs measured in 1976 or 1076 gives a fair indication of of the effort of the fronget during the sinter of 1976-77, con companience the springs revisited in 1977 are ifeted builder, along with the perfinde measurements (M) or estimates (E).

	A-1
Reference Number Spring Schedule Henry Mountains Region Name Divide Canyon Drainage Sandy Creek Quadrangle Wagon Box Drainage Sandy Creek Coordinates (D33-8)2ccd Sub-drainage Divide Canyon County Garfield Ident. ∉ (Lat.) 37 57 39 (Long.) 111 00 03 Dwner Topography Near bottom of ateep canyon about 300 feet below the rim of Tarantula Mesa 300 feet below the	Reference Spring Schedule Name Cottonwood Spring Number SC-5 Henry Mountains Region Quadrangle Quadrangle Notom Drainage Sandy Creek Coordinates (D30-8)3labc Coordinates (D30-8)3labc Sub-drainage Cottonwood Wash Cnunty Wayne Ident. # (Lat.) 38 09 52 (Long.) 111 05 27 Owner Topography In wash near outcrops of Carmel Corman Control Coordinates (D30-8)3labc
Altitude 5980 Openings Formation (or kind of rock) Sandstone on grey sandy shale in Mesaverde	Altitude 5150 Dpenings Formation (or kind of rock) Alluvium
Improvements, use	Improvements, use
Conductance 1500 m mhos pH Date of record <u>8/13/</u> 1975 1976 Recorded by <u>H. D. Goode</u> Remarks: C 8/13/75	Date of record <u>8/23/</u> 1975 1976 Recorded by <u>H. D. Goode</u> Remarks: No Water Contorted beds of gypsum, shale, mudstone. Small grove of cottonwoods.
Reference Spring Schedule Name Spring Canyon Number SC-2 Henry Mountains Region Quadrangle Quadrangle Drainage Sandy Creek Coordinates (D32-8)21dba Sub-drainage Spring Canyon County Garfield Ident. # (Lat.) 38 00 41 (Long.) 111 01 56 Dwner Topography Stream channel upstream from hogbacks of Emery Sandstone County Sandstone	Reference Spring Schedule Name Burro Spring Number SC-6 Henry Mountains Region Quadrangle Notom Drainage Sandy Creek Coordinates (D3-8)32aaa Sub-drainage Burro Wash County Wayne Ident. # (Lat.)38 09 55 (Long.) 111 03 55 Dwner Topography In wash below junction of Fivemile and Burro Washes
Altitude 5500 Openings Several Formation (or kind of rock) Emery Sandstone through alluvium **	Altitude 5040 Dpenings Formation (or kind of rock)_Alluvium
Improvements, use <u>Stock</u> Discharge <u>2</u> gpm cfs M, <u>C</u> R Temperature <u>20</u> °C °F Conductance <u>* 2975</u> m mhos <u>7,1</u> pH Date of record <u>197S</u> <u>9/1/</u> 1976 Recorded by <u>H. D. Goode</u> Remarks: <u>* Hach meter measured 3150</u> ** Water may come from contact with Maauk Ss. C 9/1/76 Salt cedar, red paintbruah, tall grass	Improvements, use Stock Dischargegpmcfs M, E, R Temperature °C°F Conductancem mhospH Date of record <u>8/23/</u> 19751976Recorded by H. D. Goode Remarks: Looked at from distance, did not visit. Vegetation: Abundant Phreatophytes
Reference Spring Schedule Name_Bank Spring_ Number_SC-3 Henry Mountains Region Quadrangle_Notom_ Drainage_sandy Creek (Mainstream) Coordinates_(D31-8)7ada Sub-drainage County_Garfield Ident. # (Lat.)_38_07_38_(Long.)_111_03_38 Owner	Reference Spring Schedule Name Blind Trail Spg NumberSC-7 Henry Mountains Region Quadrangle Notom Drainage Sandy Creek_ Coordinates (D31-8)27dab Sub-drainage_Blind Trail Wash County Garfield Ident. # (Lat.) 38 04 50 (Long.) 111 00 31 Dwner Topography_Blind Trail Canyon Diagonal
Altitude <u>5120</u> Dpenings Formation (or kind of rock) <u>Alluvium over Entrada</u> Improvements, use none; atock	Altitude_ 5520 Dpenings Formation (or kind of rock)_Sandstone - Emery Improvements, use_Trough; stock
Discharge <u>4-5 gpm</u> cfs M, (E) R, Temperature <u>14</u> °C °F Conductance <u>2700</u> m mhos pH Date of record <u>8/23/1975</u> <u>1976</u> Recorded by H. D. Goode Remarks: Water from sandy alluvium over Entrada. Alluvium probably derived mostly from Carmel.	Discharge <u>* gpm</u> cfs M, E, R, Temperature <u>19</u> °C °F Conductance <u>2700</u> m mhos pH Date of record <u>8/22/1975</u> <u>1976</u> Recorded by <u>H. D. Goode</u> Remarks: C 8/22/75 * 7/17/76 a few drops/minute * 8/5/76 40-50 drops/minute
	Cottonwoods in canyon
Reference Spring Schedule Name_False Spring Number_SC-4 Henry Mountains Region Quadrangle_Notom Drainage_Sandy Creek Coordinates_(D31-7)lbcb Sub-drainage_Fivemile Wash County_Garfield Ident. # (Lat.)_38 08 43 (Long.)_111 05 39 Owner	
Altitude 5240 Dpenings Formation (or kind of rock)	
Discontract, add Discontract, add Conductance 235 m mhos pH Date of record <u>8/23/1975</u> 1976 Recorded by <u>H. D. Goode</u> Remarks:	
Remarks. Rainwater appears to collect in what may be a large pothole or plunge-pool partly filled with alluvium. No sign that water is issuing from bedrock or alluvium. This pseudo-spring is noted only because it appears on the BLM maps as Fivemile Spring.	

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Reference Spring Schedule Name Igneous Number Sw=1 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates_(D32-10)&bdc Sub-drainage D & D County_Carfield Ident. # (Lat.) 38 02 19 (Long.) 110 50 05 Dwner Topography_Carfield Topography Canyon bottom Dpenings Formation (or kind of rock)_colluvium on igneous rock Improvements, use Discharge	Reference Spring Schedule Name South Fork - A Number Sw-5 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D32-10)4bca Coordinates (D32-10)4bca Sub-drainage South Creek - South Fork County_Carfield Ident. # (Lat.) 38 03 19 (Long.) 110 49 09 Dwner Topography Swale in west slope Mt. Ellen
Reference Spring Schedule Name_Six Callon Spg Number_Sw-2 Henry Mountains Region Quadrangle_Mt_Filen Drainage_Sweetwater_Creek Coordinates_(D32-10)&bbd Sub-drainage_D & D County_Carfield Ident. # (lat.) 38 02 03 (Long.) 110 50 08 Owner Topography_South = facing alope Openings Formation (or kind of rock) colluvium over Tununk shale Improvements, use Discharge_6 gpmCfs Discharge_6 gpmCfs PH Date of record 8/14/1975 1976 Recorded by H. D. Coode Remarks: C 8/14/75 1976 Recorded by H. D. Coode	Reference Spring Schedule Name South Fork - B Number Sw-6 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D32-10)4bcd Sub-drainage South Creek - South Fork County Carfield Ident. # (Lat.) 38 03 11 (Long.) 110 49 03 Owner Topography Near head of South Creek Owner Topography Altitude 9200 Dpenings Formation (or kind of rock) Probably near contact of igneous over Blue Gat Improvements, use Stock Discharge <1 gpm
Reference Spring Schedule Name D & D - B Number Sw=3 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates Coordinates (D32-10)18aaa Sub-drainage D & D County Carfield Ident. # (Lat.) 38 01 49 (Long.) 110 50 29 Dwner Topography Colluvium south side of channel Dwner Altitude 7620 Openings 2 Formation (or kind of rock) Colluvium Improvements, use Discharge 15 °C °F Conductance 640 m mhos pH Date of record 8/15/1975 1976 Recorded by H. D. Goode Remarks: Vegetation: ponderosa grove Vegetation: ponderosa grove	Reference Spring Schedule Name North Fork - A Number Sw-7 Henry Mountains Region Quadrangle Mu endrangle Mu en
Reference Spring Schedule Name_D & D - A NumberSw-4Henry Mountains Region Quadrangle_Mt_Ellen DrainageSweetwater Coordinates(D32-10)18cba Sub-drainageD & D County_Carfield Ident. # (Lat.)38 01 21 (Long.)_110 51 20 Owner	Reference Spring Schedule Name NumberSw=8 nv Henry Mountains Region Quadrangle_Mt_Ellen DrainageSweetwater Coordinates (D31-10)32ddb Sub-drainageSouth Creek CountyCarfield Ident. # (Lat.)_38_03_42_(Long.)_110_50_07 Owner

	A-3
Reference Number Sw=9 Spring Schedule Henry Mountains Region Name_Willow East Quadrangle Mt_Ellen Drainage Sweetwater Coordinates (D31-10) 32bcb Sub-drainage South Creek - Willow County_Garfield Ident. # (Lat.) 38 04 1D (Long.) 110 5D 22 Owner	Reference Spring Schedule Name Five Canyon A Number Sw=13 Henry Mountains Region Quadrangle Mt Pennell Orainage Sweetwater Coordinates (D32-9)31dbd Sub-drainage Five Canyon County Garfield Ident. # (Lat.) 37 58 4D (Long.) 11D 57 16 Owner Topography Alcoves in rim of Tarantula Mesa Altitude 6320 Openings Formation (or kind of rock) Mesaverde Formation Improvements, use Oischarge gpm Oischarge gpm cfs M, E, R, Temperature °C Date of record 8/13/ 1975 1976 Recorded by H. D. Goode Remarks: Three alcoves cross canyon at different levels. Slight seep from each but no down stream flow. Location of center alcove given.
Reference Spring Schedule Name Willow Wildlife Number Sw-10 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 31ada Sub-drainage South Creek - Willow County Garfield Ident. # (Lat.) 38 04 13 (Long.) 110 50 26 Owner Topography Swale near creek Openings Several Altitude 8500 Openings Several Formation (or kind of rock) Colluvium over Blue Gate Shale Improvements, use Discharge 120* gpm cfs E, R Temperature 8 °C 46 °F Conductance 740 m mhos pH Oate of record 7/30/1975 7/16/1976 Recorded by H. D. Goode Remarks: *7/16/76 7°C 680 mmho 11D gpm M Vegetation: Willows C 7/30/75 7/3/77 9.5°C 660mmho 23gpm M M Yay 10.0000	Reference Spring Schedule Name Five Canyon B Number Sw-14 nv Henry Mountains Region Quadrangle Mt Pennell Orainage Sweetwater Coordinates (D-32-9)31daa Sub-drainage Five Canyon County Garfield Ident. # (Lat.) 37 58 42 (Long.) 11D 57 01 Owner Owner Topography Below rim of Tarantula Mesa Mesawerde Formation Altitude 622D Openings Formation (or kind of rock) Mesawerde Formation Improvements, use Discharge gpm cfs M, E, R Temperature °C °F Conductance m mhos pH Date of record 1975 1976 Recorded by H. D. Goode Remarks: 2/11/77 Did not visit - shown on BLM map Status of the shown on BLM map
Reference Spring Schedule Name*McMillan Spg Number Sw-11 Henry Mountains Region Quadrangle_Mt_Ellen Drainage Sweetwater Coordinates (D31-10)31abb Sub-drainage South Creek County_Garfield Ident. # (Lat.) 38 04 22 (Long.) 110 5D 54 Owner	Reference Spring Schedule Name Five North Spg Number Sw-15 Henry Mountains Region Quadrangle Mt Pennell Drainage Sweetwater Coordinates (D32-9)30bcc Sub-drainage Five Canyon County Garfield Ident. # (Lat.) 37 59 42 (Long.) 11D 58 D2 Owner Topography Alcove in rim of Tarantula Mesa Owner Openings Formation (or kind of rock) Mesaverde Formation Improvements, use Discharge Seep gpm cfs M, E, R, Temperature °C °F Conductance m mhos pH Oate of record 8/13/1975 1976 Recorded by H. D. Goode Remarks: Large alcove 250 ft below meaa rim. Seep in sandstone over grey sandstone and shale.
7/3/7/ 10°C 780mmho 1gpm M Reference Spring Schedule Name_Birch Spring NumberSw-12	Reference Spring Schedule Name Five South Spg Number Sw-16 Henry Mountains Region Quadrangle Mt Pennell Orainage Sweetwater Coordinates (D32-9)30cbb Sub-drainage Five Canyon County Garfield Ident. # (Lat.) 37 59 35 (Long.) 110 58 00 Owner Topography Alcove in rim of Tarantula Mesa Altitude 6180 Openings Formation (or kind of rock) Meaaverde Formation Improvements, use Oischarge Seep gpm Oischarge Seep gpm Cfs M, E, R Oate of record 8/13/ 1975 1976 Recorded by H. D. Goode Remarks: Large alcove 250 ft below mesa rim. Seep in sandstone over grey sandstone and shale.

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Reference Number Spring Schedule Henry Mountains Region Name Dripping Rock Seep Quadrangle Mt Ellen Coordinates (D31-8)24caa Drainage Sweetwater Coordinates (D31-8)24caa Sub-drainage Sweetwater County Carfield Ident. # (Lat.) 38 05 43 (Long.) 110 58 41 Dwner Topography Sandstone ledge beside stream channel Market Altitude 5480 Openings Seep Formation (or kind of rock) Emery Sandstone over shale Improvements, use Stock Discharge gpm cfs M, C R, Temperature 15 °C °F Conductance 1500 m mhos pH Date of record 8/22/1975 1976 Recorded by H. D. Goode Remarks: 75 C 8/22/75 1975 1976 Recorded by H. D. Coode	A-4 Reference Spring Schedule Number Sw=21 Henry Mountains Region Quadrangle Mt Ellen Orainage Sweetwater Sub-drainage Dugout Ident. # (Lat.) 38 04 29 (Long.) 110 49 22 Owner Topography North side of creek channel Altitude 8860 Dpenings Many Formation (or kind of rock) Colluvium Improvements, use Flows into Dugout Creek Discharge 50-100 qpm cfs M, R, Temperature °C °F Conductance m mhos pH Date of record 1975 7/18/1976 Recorded by H. D. Goode Remarks: Road crossing, head of Dugout. Water goes directly into Dugout Creek. 7/4/77 6°C 35Dmmho 20gpm E - no flow in adjacent Dugout Creek
Reference Number Spring Schedule Henry Mountains Region Name Poison Wash Spg Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-8)13bcc Sub-drainage Poison Wash County Garfield Ident. # (Lat.) 38 06 38 (Long.) 110 59 08 Owner Owner Topography Canyon bottom Openings Formation (or kind of rock) Emery Sandstone (probably about 100 ft below upper ? coal) Discharge 1 gpm cfs M. Proceeded by H. D. Goode °F Conductance 1975 8/5/ 1976 Recorded by H. D. Goode Remarks: Alluvium may store some flood water but is so clayey most flood water runs off. Vegetation: Wiregrass, salt cedsr	Reference Spring Schedule Name Burned Ridge Spg. Number Sw-22 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)28aca Sub-drainage Dugout Creek County Garfield Ident. # (Lat.) 38 05 05 (Long.) 110 48 33 Dwner Topography South slope Burned Ridge Dwner
Reference Spring Schedule Name Head-of-Dugout Number Sw-19 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)33abc Sub-drainage Dugout Creek County Garfield Ident. # (Lat.) 38 04 14 (Long.) 110 48 40 Dwner Topography Deep gully cut by Dugout Creek Altitude 9480 Dpenings Formation (or kind of rock) Igneous colluvium on the Blue Gate Shale Improvements, use	Reference Spring Schedule Name Corral Point Spg NumberSw=23 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)29bdb Sub-drainage Dugout Creek County Carfield Ident. # (Lat.) 38 05 05 (Long.) 110 50 08 Owner Topography Slope below road west slope Corral Point Altitude 8320 Openings Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use
Reference Number Spring Schedule Henry Mountains Region Name Cabin Spring Drainage Swe20 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetvater Coordinates(D31-10)28ccc Sub-drainage Dugout Creek County Carfield Ident. # (lat.) 38 04 28 (Long.) 110 49 17 Owner Topography Slope above Dugout Creek County Carfield Altitude 8960 Openings Owner Downer Formation (or kind of rock) Colluvium over Blue Gate Shale Discharge 22 Improvements, use	Reference Spring Schedule Name Dugout_Corral Spg Quadrangle Mt Ellea Drainage Sweetwater Quadrangle Mt Ellea Drainage Dugout Coordinates (D31-10)29bcb Sub-drainage Dugout County_Garfield Ident. # (Lat.) 38 05 00 (Long.) 110 50 23 Dwner Topography Steep bank above Dugout Creek Dever Dever Altitude 8070 Openings Openings Formation (or kind of rock) Ferron Sandstone or colluvium over Tununk Shale Improvements, use

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Reference Spring Schedule Name Beaver Dam Spg	Reference Spring Schedule Name North (South) Pork
Number Sw-25 Henry Mountains Region Quadrangle Mt Ellen	Quadrangle Mt Ellen
Drainage Sweetwater Coordinates (D31-10) 30ada	Drainage Sweetwater Coordinates (D31-10)20bbd
Sub-drainage Dugout Creek County Carfield	Sub-drainage Dugout, Pistol County Garfield
Ident. # (Lat.) 38 05 03 (Long.) 110 50 25 Dwner	Ident. # (Lat.) 38 05 59 (Long.) 110 50 16 Dwner
Topography Slope west aide Corral Point	Topography Colluvial slope Spring riaea below cluater of four aspen
Altitude 8080 Openings	Altitude 8620 Dpenings
Formation (or kind of rock) Ferron Sandstone or colluvium over sandstone	Formation (or kind of rock) Colluvium over Tununk shale
Improvements, use	Improvements, use
Discharge 50 gpm cfs (M) E, R, Temperature 8 °C °F	Discharge 70 gpm cfs (M) E, R, Temperature 6 °C 42 °F
Conductance 460 m mhos pH	Conductance 340 m mhos pH
Date of record 1975 7/29/1976 Recorded by H. D. Coode	Date of record 7/30/ 1975 1976 Recorded by H. D. Goode
Remarks:	Remarks:
C 7/29/76	C 7/30/75
Tufa deposita. Beaver dam blocks flow.	7/17/76 8:45 A 7°C 305mmho 50gpm M
Vegetation: Aspen	7/4/77 8:05 A 6.5°C 320mmho <lgpm e<br="">preaent orifice is about 50 ft below dry</lgpm>
Read There are a second and a se	orifice at aapen
	Improvementa: 7/4/77 Ditch bulldozed from road
	to gully 25 ft weat of apring; work apparently abandoned becauae of low flow.
Reference Spring Schedule Name Aapen Hole Spg	Reference Spring Schedule Name Dave Teeples Spg
Number Sw-26 Henry Mountains Region Quadrangle Mt Ellen	Number Sw-30 Henry Mountains Region Quadrangle Mt Ellen
Drainage Sweetwater Coordinates (D31-10) 30aaa	Drainage Sweetwater Coordinates (D31-9)22cdc
Sub-drainage Dugout Creek County Carfield	Sub-drainage Dugout Creek County Garfield
Ident. # (Lat.) 38 05 14 (Long.) 110 50 26 Owner	Ident. # (Lat.) 38 05 21 (Long.) 110 54 29 Owner
Topography West slope Corral Point	Topography Low Pediment Benches
lopography west stope corrar forme	topography how rediment benches
Altitude 8080 Dpenings	Altitude 6280 Openings Several
Formation (or kind of rock) Igneous colluvium over Tununk Shale	Formation (or kind of rock)Pediment gravel at Emery sandstone lower contact
Improvements, use	Improvements, use Spring house; atock
Discharge 50 [*] gpm cfs M E, R Temperature 7 °C °F	Discharge 5-8 gpm cfs M, (E) R Temperature 11 °C 52 °F
Conductance 340 m mhos pH	Conductance 750 m mhos pH
Date of record 1975 7/29/ 1976 Recorded by H. D. Goode	Date of record 7/31/ 1975 1976 Recorded by H. D. Coode
Remarks:	Remarks:
Meaaured at the change in slope 150 yds below orifice.	Perhaps 50 gpm could be developed
C 7/29/76	
$7/17/76$ 6 $1/2^{\circ}$ C 50 ⁺ gpm E	
Water rises through colluvium in grove of aspen but can be	
heard upalope above orifice.	
Reference Spring Schedule Name Igneous Slope Spg Number SW-27 Henry Mountains Region	Reference Spring Schedule Name Dead Cows Spring Number Sw-31 Henry Mountains Region
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30 aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, slope steepens below	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30 aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpmcfs M. F. R. Temperature 7 °C °F	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm cfs M, E R, Temperature 30 °C 86 °F
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use 0ischarge 14 gpm cfs % E, R, Temperature 7 °C °F Conductance 380 m mhos pH	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Owner Owner Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use 0ischarge 14 gpm cfs % E, R, Temperature 7 °C °F Conductance 380 m mhos pH	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: 1976 Recorded by H. D. Goode
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use 0 Oischarge 14 gpm cfs (M) E, R, Temperature 7 °C °F °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Name Aspen Spring	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Owner Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) R, Temperature Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 1976 Name Star Flat Spg
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpmcfs % E, R, Temperature7 °C°F Conductance 380 m mhospH Date of record1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Owner Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpm cfs (M) E, R, Temperature 7 °C °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Reference Spring Schedule Name Aspen Spring Number Sw-28 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30dad	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County_Carfield Ident. # (Lat.)_38_06_36_(Long.)_110_56_52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpmcfsN_ERTemperature30_ °C86_ °F Conductance1300 _m_mhospH Date of record7/31/19751976Recorded by H. D. Goode Remarks: c7/31/75 1976Recorded by H. D. Goode Remarks: c7/31/19751976
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County_Carfield Ident. # (Lat.)_38_06_36_(Long.)_110_56_52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpmcfsN_ERTemperature30_°C86_°F Conductance1300 _m_mhospH Date of record7/31/19751976
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 Otatance 380 m mhospH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Reference Spring Schedule Name_Aspen_Spring Duadrangle Menry Mountains Region Duadrangle Mt Ellen DrainageSweetwater Coordinates(D31-10)30dad Sub-drainageDugout Creek County	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.)_38_06_36_(Long.)_110_56_52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. E R, Temperature _30 °C_ 86 °F Conductance_1300 m mhos
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpm cfs % E, R, Temperature 7 °C °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Quadrangle Mt Ellen Drainage Sweetwater Quadrangle Mt Ellen Quadrangle Mt Ellen Sub-drainage Dugout Creek Coondinates (D31-10)30dad County_Carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner Topography_North-facing alope above Dugout Creek	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County_Carfield Ident. # (Lat.)_38_06_36_(Long.)_110_56_52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Obscharge 8-10 gpm cfs M, E R. Temperature_30 °C_86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Quadrangle Mt Ellen Drainage Swetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.)_38_06_32_(Long.)_110_50_27
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, E Oischarge 8-10 gpm cfs M, E R. Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography_ Gully bottom, about 30 ft deep Altitude 8960 Openings Openings
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpm cfs K E, R, Temperature 7 °C °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-10)30dad County_Carfield Ident: # (Lat.) 38 04 45 (Long.) 110 50 29 Owner TopographyNorth-facing alope above Dugout Creek Altitude 8320 Openings_Many amall orifices Formation (or kind of rock) Colluvium over Blue Cate Shale Cate Shale	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge Oischarge 8-10 gpm cfs M, E R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Gully bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use 0ischarge 14 Oischarge 14 gpmcfs K, Temperature 7 °C°F Conductance 380 m mhospH Date of record 1975 7/29/ 1976 Recorded by M. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30dad County_carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 1976 Recorded by H. Ellen Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Matitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Colluvium over Tununk Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 Oischarge 14 gpm cfs Oischarge 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Number Sw-28 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30dad Sub-drainage Dugout Creek County Carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner Owner Topography North-facing alope above Dugout Creek Altitude 8320 Openings Many amall orifices Formation (or kind of rock) Colluvium over Blue Cate Shale Improvements, use Stock Discharge 15-20 gpm	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M, (E) Onductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 1976 Recorded by H. Ellen Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Goodinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Mattitude 8960 Openings<
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpm cfs M) E, R, Temperature 7 °C °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30dad County Carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner Owner Topography North-facing alope above Dugout Creek County Carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner Topography North-facing alope above Dugout Creek <td< td=""><td>Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Quadrangle Mt Ellen Drainage Swetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shal</td></td<>	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Quadrangle Mt Ellen Drainage Swetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shal
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use Oischarge 14 gpmcfs PH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Drainage Sweetwater Coordinates(D31-10)30dad Sub-drainage Dugout Creek County_carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner TopographyNorth-facing alope above Dugout Creek County_carfield Ident. # (Lat.) Altitude 8320 Openings_Many amall orifices Formation (or kind of rock) Colluvium over Blue Cate Shale Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua 1 Improvements, use Oischarge 14 gpm cfs Oischarge 14 gpm cfs N. Temperature 7 °C °F Conductance 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-10)30dad Coordinates(D31-10)30dad Coordinates(D31-10)30dad Sub-drainage Dugout Creek County Carfield Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 Owner Topography North-facing alope above Dugout Creek County Carfield Ident. # (Lat.)<	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R. Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Number Sw=32 Henry Mountains Region Name Star Flat Spg Quadrangle Mt Ellen Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Altitude 896
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) _38 05 13 (Long.) _110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua 1 Improvements, use Oischarge 14 gpm Otd care 380 m mhos pH Date of record 1975 7/29/ 1976 Recorded by H. D. Goode Remarks: Vegetation: Abundant Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30dad Coordinates (D31-10) 30dad Sub-drainage Dugout Creek County Carfield Ident. # (lat.) 38 04 45 (long.) 110 50 29 Owner Topography North-facing alope above Dugout Creek County Carfield Altitude 8320 Openings Many amail orifices Formation (or kind of r	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) _38 05 13 (Long.) _110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw=31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm Oischarge 8-10 gpm cfs M. (C) R, Temperature 30 °C 86 °F Conductance 1300 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: c 7/31/75 Drainage Sweetwater Coordinates (D31-10)18daa Sub-drainage Dry Wash (Arch Creek on Hunt's map)County Carfield Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 Owner Topography Guily bottom, about 30 ft deep Altitude 8960 Openings Formation (or kind of rock) Colluvium over Tununk Shale
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) _38 05 13 (Long.) _110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm
Number Sw-27 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-10) 30aab Sub-drainage Dugout County_Carfield Ident. # (Lat.) _38 05 13 (Long.) _110 50 33 Dwner Topography Top of change in slope, alope steepens below Altitude 7990 Dpenings 1 Formation (or kind of rock) Colluvium over igneoua Improvements, use	Number Sw-31 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-9)17cba Sub-drainage Dugout County Carfield Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 Owner Topography Channel of tributary to Dugout Creek Altitude 5740 Dpenings Formation (or kind of rock) Alluvium Improvements, use Oischarge 8-10 gpm

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Reference Spring Schedule Name Mud Spring Number Sw-33 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D-31-9)15bab Count of control (D-31-9)15bab	Reference Spring Schedule Name Indian Water Spg NumberSw-37Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D30-9) 32bab Sub-drainage Unnamed trib County Wayne
Sub-drainage Dry Wash CountyGarfield Ident. # (Lat.) 38 07 00 (Long.) 110 54 29 Dwner Topography South bank Dry Wash	Ident. # (Lat.) 38 09 55 (Long.) 110 57 55 Dwner TopographyAlcove in Emery Sandstone
Altitude 6080 Openings Formation (or kind of rock) Pediment gravel over Blue Gate Shale Improvements, use Tank; stock	Altitude 5410 Dpenings Formation (or kind of rock) Emery Improvements, use
Discharge 2 gpm cfs M, () R, Temperature 15.5 °C °F Conductance 1275 m mhos pH Date of record 1975 8/4/ 1976 Recorded by H. D. Goode Remarks: * Could yield 5-10 gpm. Two seep areas (slightly mislocated on topo sheet) SE of main spring were dry. Vegetation: Willows	Discharge 2 gpm cfs M, (c) R, Temperature °C °F Conductance m mhos pH Date of record 1975 8/4/1976 Recorded by H. D. Goode Remarks: Not readily accessible; looked at from rim.
Reference Spring Schedule Name_Upper_Dry_Wash NumberSw-34 Henry Mountains Region Quadrangle_Mt_Ellen Drainage_Sweetwater Coordinates (D31-9)7aca Sub-drainage_Dry_Wash County_Garfield Ident. # (Lat.)_38_07_37_(Long.)_110_57_18 Owner Topography_Rises in stream channel County_Garfield	Reference Number Spring Schedule Henry Name Sweetwater Spring Drainage Sweetwater Guadrangle Mt Ellen Drainage Sweetwater Coordinates (D29-9)32ccb [*] Sub-drainage County Wayne Ident. # (Lat.) 38° 14° 23(Long.) 110 57 37 Topography Main channel Sweetwater Creek County Wayne
Altitude 5580 Dpenings Formation (or kind of rock) Alluvium over Emery Sandstone Improvements, use	Altitude 4850 Dpenings Formation (or kind of rock) Probably Blue Gate Shale Improvements, use
Discharge 5 gpm cfs M E, R Temperature 19 °C °F Conductance 2200 m mhos pH Date of record 1975 8/4/1976 Recorded by H. D. Goode Remarks: Probably stream channel underflow forced up by Sandstone barrier in stream channel. *Flow may be higher than normal because of rain from storms of 7/31/ and 8/1/76.	Discharge gpm cfs M, E, R Temperature °C °F Conductance m mhos pH Date of record 1975 1976 Recorded by H. D. Goode Remarks: 3/24/77 * Shown on BLM and Topo maps; Air photos show vegetation. Did not visit; too remote.
Reference Spring Schedule Name_Dry Wash Trib Spg NumberSw-35Henry Mountains Region Quadrangle_Mt Ellen DrainageSweetwater Coordinates (D31-9) 7abc Sub-drainage_Dry Wash CountyGarfield Ident. # (Lat.) 38 07 44 (Long.) 110 57 24 Owner TopographySide of channel in trib to Dry Wash	Reference Number Spring Schedule Henry Mountains Region Name Cedar-A Spg Quadrangle Mt Ellen Drainage Sweetwater Coordinates(D31-10)18aad Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 06 54 (Long.) 110 50 27 Dwner Topography Canyon wall, south of Cedar Creek Altitude 8880 Dpenings
Formation (or kind of rock) Probably alluvium over Emery Sandstone or Improvements, use Discharge 1 gpm cfs M, (E) R, Temperature	Formation (or kind of rock) Colluvium over Turunk Shale Improvements, use
Conductance 2400 m mhos pH Date of record 1975 8/4/ 1976 Recorded by H. D. Goode Remarks: * Temperature measured in pool	Conductance560m mhospH Date of record19757/30/1976Recorded by Eric Olson Remarks: Vegetation: Aspen
Reference Spring Schedule NameDry Wash Sandstone Number Sw-36 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)7acb County_Garfield Sub-drainage Dry Wash County_Garfield Ident. # (Lat.) 38 07 43 (Long.) 110 57 32 Owner	Reference Spring Schedule Name Cedar-B Spg Number Sw-40 Henry Mountains Region Quadrangle Mr Blan Orainage Sweetwater Coordinates(D31-10)18baa Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 07 04 (Long.) 110 50 59 Owner Topography South side channel Cedar Creek
Altitude 5550 Dpenings Formation (or kind of rock) Emery Sandstone Improvements, use	Altitude 8300 Openings Formation (or kind of rock) Dakota Sandstone Improvements, use
Discharge < 1/8 gpm cfs M, (E) R Temperature 27 °C [*] °F Conductance 2000 m mhos pH Date of record 1975 8/4/1976 Recorded by H. D. Goode Remarks:	Discharge 10 gpm cfs M, (E) R Temperature 7 °C °F Conductance 355 m mhos pH Date of record 1975 7/30/1976 Recorded by Eric Olson Remarks:
Water oozes from Sandstone, not on bedding plane. *Temperature measured in pool.	

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Reference Spring Schedule Name Cedar-C Spg	Reference Spring Schedule Name
Number <u>6w-41</u> Henry Mountains Region Quadrangle Mt Ellen	Number Sw-45 nv Henry Mountains Region Quadrangle Mt Ellen
Drainage Sweetwater Coordinates (D31-10)7cdd	Drainage Sweetwater Coordinates (D30-9)26aba
	Sub-drainage Cedar Creek County Wayne
Sub-drainage Cedar Creek County Garfield	
Ident. # (Lat.) 38 07 06 (Long.) 110 51 04 Dwner	Ident. # (Lat.) 38 10 52 (Long.) 110 54 19 Owner
Topography Rises in valley of tributsry from north	Topography
Altitude 8240 Openings	Altitude 5330 Dpenings
Formation (or kind of rock) Colluvium	Formation (or kind of rock)
Improvements, use	Improvements, use
Discharge 2 gpm cfs M, C, R, Temperature 11.5°C °F	Discharge gpm cfs M, E, R, Temperature °C °F
Conductance 490 m mhos pH	Conductancem mhospH
Date of record 1975 7/30/1976 Recorded by Eric Olson	Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Remarks:	Remarks: Shows on BLM and topo maps. No visible vegetation on air
	photos. Did not visit; too remote.
Reference Spring Schedule Name Cedar-D Spring	Reference Spring Schedule Name Number Sw-46 nv Henry Mountains Region Quadrangle Mr. Filer
Number Sw-42 Henry Mountains Region Quadrangle Mt Ellen	Number Sw-46 nv Henry Mountains Region Quadrangle Mt Ellen
Drainage Sweetwater Coordinates (D31-10) 7ccd	Drainage Sweetwater Coordinates (D30-9)13bcd
Sub-drainage Cedar Creek County Garfield	Sub-drainage Cedar Creek County Wayne
Ident. # (Lat.) 38 07 16 (Long.) 110 51 27 Owner	Ident. # (Lat.) <u>38 12 15 (Long.) 110 53 43</u> Owner
Topography North side of stream channel	Topography
Altitude 7900 Openings	Altitude 5080 Openings
Formation (or kind of rock) Alluvium	Formation (or kind of rock) Probably Alluvium
Improvements, use	Improvements, use
Discharge 1 gpmcfs M, (;) R Temperature 8 °C°F	Dischargecfs_M, E, RTemperature°C°F
Conductance 430 m mhosPH	Conductancem mhospH
	Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Date of record1975 7/30/ 1976 Recorded by Eric Olson	
Remarks:	Remarks: Shows on BLM and topo maps. Sparse vegetation on air photos,
	Did not visit; too remote.
Reference Spring Schedule Name Maiden Water Spg	Reference Spring Schedule Name Oak Creek Bench
Numbon Su-/3 Honny Mountains Region	Reference Spring Schedule Name Oak Creek Bench Number
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellen *	Number Sw-47 nv Henry Mountains Region Quadrangle Mt Ellen
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9) 3bbc	Number Sw-47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D30-10) 32bbc
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)3bbc* Sub-drainage Cedar Creek County Garfield	Number Sw-47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D30-10)32bbc Sub-drainage Oak Creek, unnamed trib County Wayne
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Number Sw-43 Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D31-9)3bbc* Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner Topography Gully bottom Altitude 5910 Dpenings Formation (or kind of rock) Blue Gate Shale Improvements, use Pipe and 2 troughs, stock Discharge 1 gpm Conductance 750 m mhos pH Date of record 7/31/1975 1976 Recorded by H. D. Goode Remarks: * * Sec 3 includes about 900 acres Reference Spring Schedule Number Sw-44 nv Henry Mountains Region Quadrangle Drainage Sweetwater Sub-drainage Coold acreek	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D30-10)32bbc Sub-drainage Oak Creek, unnamed trib County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench Altitude Dpenings Formation (or kind of rock) Mudflow over Tununk shale Improvements, use DH Date of record 1975 1976 3/24/77 Recorded by H. D. Goode Remarks: Shows on BLM map and Hunts Geologic Map of the Henry Mtns but not on topo. Vegetation shows on air photos at approximate location. Did not visit; difficult access. Reference Spring Schedule Number Sw-48 nv Henry Mountains Region Quadrangle_Mt Ellen Drainage Oak Creek Sub-drainage Oak Creek*
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Number Sw-43 Henry Mountains Region Quadrangle Mt Ellem Drainage Sweetwater Coordinates (D31-9) 3bbc* Sub-drainage Cedar Creek County_Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Oak Creek, unnamed tr1b Coordinates (D30-10) 32bbc Sub-drainage Oak Creek, unnamed tr1b County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellem Drainage Sweetwater Coordinates (D31-9) 3bbc* Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Oak Creek, unnamed trIb Coordinates (D30-10) 32bbc Sub-drainage Oak Creek, unnamed trIb County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench Altitude Dpenings Formation (or kind of rock) Mudflow over Tununk shale Improvements, use Discharge Discharge gpm
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellem Drainage Sweetwater Coordinates (D31-9) 3bbc* Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Oak Creek, unnamed tr1b Coordinates (D30-10) 32bbc Sub-drainage Oak Creek, unnamed tr1b County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellem Drainage Sweetwater Coordinates (D31-9) 3bbc* Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Oak Creek, unnamed trIb Coordinates (D30-10) 32bbc Sub-drainage Oak Creek, unnamed trIb County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench Altitude Dpenings Formation (or kind of rock) Mudflow over Tununk shale Improvements, use Discharge Discharge gpm
Number Sw-43 Henry Mountains Region Quadrangle Mt Ellem Drainage Sweetwater Coordinates (D31-9) 3bbc* Sub-drainage Cedar Creek County Garfield Ident. # (Lat.) 38 08 52 (Long.) 110 54 44 Dwner	Number Sw=47 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Oak Creek, unnamed trIb Coordinates (D30-10) 32bbc Sub-drainage Oak Creek, unnamed trIb County Wayne Ident. # (Lat.) 38 09 50 (Long.) 110 51 36 Dwner Topography Bench Altitude Dpenings Formation (or kind of rock) Mudflow over Tununk shale Improvements, use Discharge Discharge gpm

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A-8 Reference Spring Schedule Name Oak South Sp Number Sw-49 Henry Mountains Region Quadrangle Mt Ellen Name Oak South Spring Drainage Sweetwater Coordinates (D30-10)33cdb Sub-drainage Oak Crk County Wayne Ident. # (Lat.) 38 09 17 (Long.) 110 50 19 Dwner Topography Valley bottom between Table Mtn and Mt Ellen Altitude 7320 Dpenings Many Formation (or kind of rock) Probably Ferron Sandstone over Tununk Shale Improvements, use Feeds stream Discharge 150-200 gpm _____cfs M, (E) R, Temperature 8 °C ____46 °F Conductance 320 m mhos_____pH Date of record 7/26/1975 1976 Recorded by H. D. Goode Remarks: C 7/26/75 Aggregate flow of this tributary, plus Oak Creek (including Oak North Spring) estimated at 300-400 gpm. Vegetation: Abundant Name Oak North Spring Reference Spring Schedule Sw-50 Henry Mountains Region Quadrangle Mt Ellen Number Drainage Sweetwater Coordinates (D30-10) 33cca Sub-drainage Oak Creek County Wayne Ident. # (Lat.) 38 09 19 (Long.) 110 50 24 Owner Topography Stream channel between Table Mtn and Mt Ellen Altitude 7280 Openings Formation (or kind of rock) Colluvium over Tununk shale Improvements, use_____ Discharge 100 gpm cfs M, E, R Temperature 7 °C 43 °F Conductance 360 m mhos pH Recorded by H. D. Goode Date of record 7/26/1975 1976 Remarks: Water in stream comes from higher up. Temp of stream $14^{\circ}C$ 100 yds upstream from spring. Reference Spring Scnewule Number Sw-51 Henry Mountains Region Quadrangle_Mt Ellen Name Spring on Flat Drainage Sweetwater Coordinates (D30-10) 32 dac Sub-drainage Oak County Wayne Ident. # (Lat.) 38 09 26 (Long.) 110 50 48 Owner Topography Swale on gentle slope Altitude 7000 Openings 1 Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Discharge 4-5 gpm cfs M, (E) R, Temperature 18 °C 65 °F Conductance 850 m mhos pH Date of record 7/26/1975 1976 Recorded by H. D. Goode Remarks: Reference Spring Schedule Number Sw-52 nv Henry Mountains Region Name Oak Creek Spring Number Quadrangle Mt Ellen Drainage Sweetwater Coordinates (D30-10)29abc Sub-drainage Oak Creek County Wayne Ident. # (Lat.) 38 10 38 (Long.) 110 51 05 Owner_ Topography Stream channel in deep gully Altitude Openings Formation (or kind of rock) not known Improvements, use Discharge____gpm___cfs M, E, R Temperature____°C___ °F Conductance_____ ____ m mhos рH Date of record 1975 1976 3/24/77 Recorded by H. D. Goode Remarks: Shows on BLM and topo maps. Vegetation shows on air photos. Did not visit; difficult access.

A-9 Reference Spring Schedule Name<u>Willow Spring</u> Number TW-1 Henry Mountains Region Quadrangle Mc Ellen Reference Reference Spring Schedule Number TW-5 Henry Mountains Region Quadrangle Factory Butte Name Willow Spring Drainage Town Wash Coordinates(D30-10)29dba Orainage Town Wash Coordinates (D29-10)20bbc Sub-drainage Cottonwood Sub-drainage Cottonwood Crk County Wayne County___Wayne Ident. # (Lat.) 38 10 25 (Long.) 110 50 58 Owner_ Ident. # (Lat.) 38 16 39 (Long.) 110 51 38 Owner Topography Stripped surfaces on sandstone Topography Small topo basin below talus from Table Mountain Altitude 6300 Openings Altitude 4720 Openings Seep Formation (or kind of rock) Colluvium over Tununk Formation (or kind of rock) Water from Ferron Sandstone over Tununk shale Improvements, use Stock Improvements, use Discharge 2 * gpm cfs M, (E) R, Temperature °C °F Discharge_O_gpm__cfs_M, E, R, Temperature__°C__°F Conductance m mhos_____pH Conductance_____ m mhos_____pH Date of record 7/26/1975 1976 Recorded by H. D. Goode Date of record 7/25/1975 1976 Recorded by H. D. Goode Remarks: * Tufa above meadow suggests greater discharge in past. Remarks: Vegetation: Cottonwood Topo and BLM maps show incorrect location about 1/3 mile south of proper location. Vegetation: Heavy grasses in 10-acre meadow Reference Spring Schedule Name Lost Spring Number TW-2 Henry Mountains Region Quadrangle_Mt Ellen Name Lost Spring Reference Spring Schedule Name Town Seep Reference Spring Schenuite Hame Low Seep Number TW-6 Henry Mountains Region Quadrangle Factory Butte Orainage Town Wash Coordinates (D30-10)20ddb Orainage Town Wash Coordinates (D29-10)17acd Sub-drainage Cottonwood Creek County Wayne Sub-drainage Unnamed trib County Wayne Ident. # (Lat.) 38 11 04 (Long.) 110 50 48 Owner Ident. # (Lat.) 38 17 21 (Long.) 110 50 54 Owner Topography Gentle slope northwest of Table Mtn Topography South side of sandy wash Altitude 4730 Altitude 6020 Openings Openings Formation (or kind of rock) Colluvium Formation (or kind of rock) Alluvium Improvements, use Improvements, use_____ Discharge Dry gpm cfs M, E, R Temperature °C Oischarge____gpm___cfs M, E, R Temperature____ °C
 Conductance______m mhos____pH

 Date of record_____1975_7/31/_1976
 Recorded by H. D. Goode
 Conductance ____m mhos__ pН Oate of record 7/25/ 1975 1976 Recorded by H. D. Goode Remarks: Remarks: Meadow grasses, no water. No water Vegetation: Cottonwoods 7/3/77. Since 1975 this spring has been developed and a pipe put in. 0.8 gpm M 11°C 610 mmho (pipe) Overflow yields another 1 gpm E Reference Spring Schedule Name Lower Lost Spring Schedule Name Lower Lost Spring TW-3 Henry Mountains Region Quadrangle Mt Ellen Name Lower Lost Spg Orainage Town Wash Coordinates (D30-10)20aca County___Wayne Sub-drainage Cottonwood Creek Ident. # (Lat.) 38 11 30 (Long.) 110 50 54 Owner____ Topography Northwest slope Table Mtn Altitude 5780 Openings Formation (or kind of rock) Colluvium over Ferron Improvements, use Collection box, pipeline to tank Oischarge 9 gpm cfs (M) E, R, Temperature 12 °C 54 °F Conductance 830 m mhos____ рН Oate of record 7/27/1975 1976 Recorded by H. D. Goode Remarks: 7/3/77.5 1/2 gpm 12°C 780 mmho M Reference TW-4 Spring Schedule Spring Schedule Henry Mountains Region Quadrangle <u>Mt Ellen</u> Name_Jet Basin Spg_ Number Coordinates (D30-10) 23cbb Orainage Town Wash Sub-drainage Coaly Wash County Wayne Ident. # (Lat.) 38 11 13 (Long.) 110 48 19 Owner Topography Water rises from Mancos - probably from Sandstone bed - down dip 10° in east side of deeply eroded Jet Basin. Altitude 6040 Openings Probably several Formation (or kind of rock) Probably a sandstone bed in Tununk Shale Improvements, use Probably used by stock Oischarge 14 gpm cfs (%) E, R Temperature 13.5 °C _____ Conductance 680 * Beck m mhos 8.2 pH Oate of record 1975 8/28/ 1976 _____ Recorded by H. D. Goode Remarks: C 8/28/76 * Hach meter measured 650 Vegetation: Birch, pine, tall grass

Reference Spring Schedule Name Upper Dry Lakes Number BC-1 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Birch Creek Coordinates(D31-10)4dad Sub-drainage County_Garfield Owner	Reference Spring Schedule Name Dugout Break Spg Number BC-5 Henry Mountains Region Quadrangle Mt Ellen Drainage Birch Creek Coordinates (D30-10)12add Sub-drainage Unnamed trib County_Wayne Ident. # (Lat.) 38 13 08 (Long.) 110 46 23 Owner Topography Break in slope at edge of pediment Altitude 5280 Openings Formation (or kind of rock) Pediment gravel on Tununk Shale Improvements, use
Reference Number Spring Schedule Henry Mountains Region Name Lower Dry Lakes Quadrangle Mt Ellen Coordinates(D31-10)3dbb Drainage Coordinates(D31-10)3dbb Coordinates(D31-10)3dbb Sub-drainage County Garfield Ident. # (Lat.) 38 08 30 (Long.) 110 48 04 Owner Topography Canyon Altitude 8650 Openings Formation (or kind of rock) Probably colluvium over Blue Gate Shale Inprovements, use Discharge gpm Discharge gpm cfs M, E, R Date of record 1975 1976 2/4/77 Recorded by H. D. Goode Remarks: * Sec 3 includea about 900 acres. Did not visit. Record from topo map.	Reference Spring Schedule Name Bert Avery Spg Number BC-6 Henry Mountains Region Quadrangle Factory Butte Drainage Birch Creek Conrdinates (D29-10) 22ccc Sub-drainage Unnamed County Wayne Ident. # (Lat.) 38 16 03 (Long.) 110 49 19 Owner Topography Below stripped sandstone bed Altitude 4860 Openings Formation (or kind of rock) Ferron sandstone over shale bed Inprovements, use Tank, stock Discharge 1 gpm Date of record 7/25/1975 1976 Remarks: * Location of Southern Spring 6/15/77 20°C 535 mmho about 1 gpm 7/2/77 21°C 605mmho pH7.5 Igpm M
Reference Spring Schedule Name_Cold Spring NumberBC-3 nv Henry Mountains Region Quadrangle_Mt_Ellen Drainage_Birch Creek Coordinates (D=30-10) 35cdd Sub-drainage_Birch Creek CountyWayne Ident. # (Lat.) 38 09 12 (Long.) 110 48 04 Owner	
Reference Spring Schedule Name Dugout Bench NumberBC-4 Henry Mountains Region Quadrangle_Mt Ellen DrainageBirch_Creek Coordinates (p30-10)13beb Sub-drainageUnnamed CountyWayne Ident. # (Lat.)_38_12_20 (Long.) 110_47_11 Owner	Reference Number Spring Schedule Henry Mountains Region Name_Sand Seeps Quadrangle_Factory Butte Coordinates (D29-10)laad Drainage Sand Waah * County Wayne Ident. # (Lat.)_38 19 14 (Long.)_110 46 08 Owner

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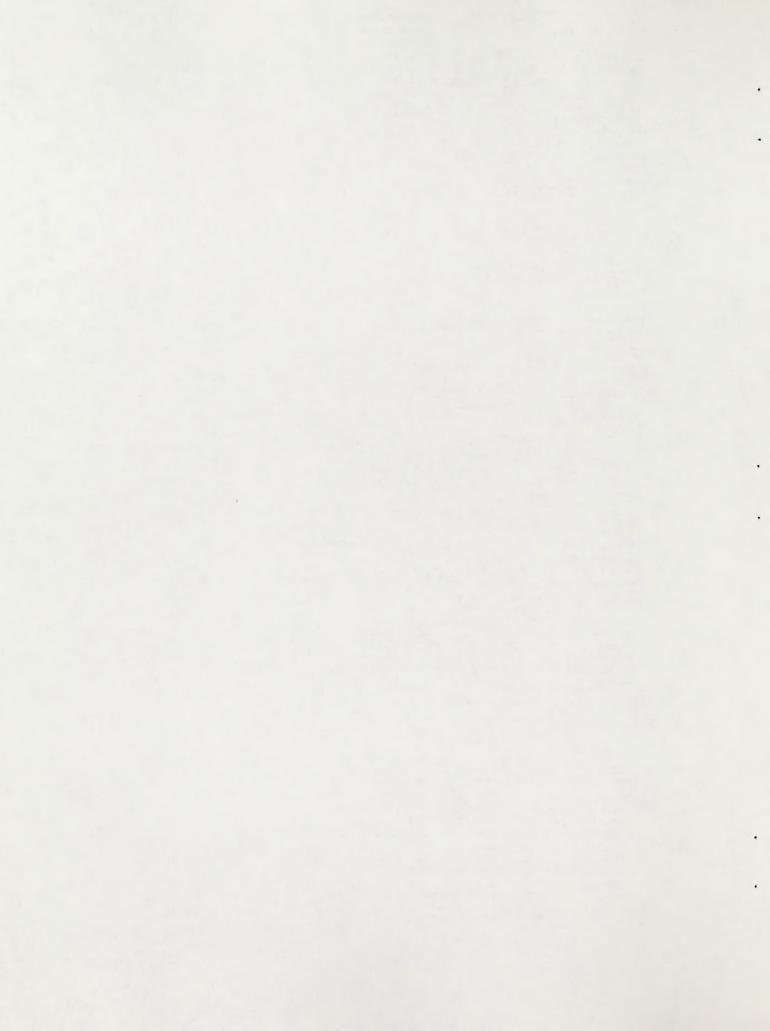
	A-11
Reference Number Spring Schedule Henry Mountains Region Name Bull Creek Pass Quadrangle Mt Ellen Drainage Bull Creek Coordinates(D31-10)27bdc Sub-drainage Bull Creek County Garfield Ident. # (Lat.) 38 04 58 (Long.) 110 47 54 Dwner Topography Steep gully east slope Mt Ellen Dwner Altitude 10,480 Openings In broken diorite Formation (or kind of rock) Diorite below fracture zones Improvements, use	Reference Number Spring Schedule Henry Mountains Region Name Birch Spring Quadrangle Mt Ellen Orainage Bull Creek Coordinates (D30-10)25bcb Sub-drainage McClellam Wash County Wayne Ident. # (Lat.) 38 10 36 (Long.) 110 47 17 Owner Topography Near top of ridge on west-facing slope Altitude 6320 Openings Seepage Formation (or kind of rock) Probably pediment gravel over igneous or shale Improvements, use stock Oischarge 13 gpm cfs Oate of record 1975 8/27/1976 Recorded by H. D. Goode Remarks: Water reaches main channel and disappears. C 8/27/76 Measured and sampled below birches, near bend in fence line. 7/2/77 27°C 680mmho 8gpm M
Reference Spring Schedule Name Lonesome Beaver Number Bu-2 Henry Mountains Region Quadrangle_Mt Ellen OrainageBull Creek Coordinates_(D31-10)14bdd Sub-drainageBull Creek County_Garfield Ident. # (Lat.) 38 06 43 (Long.)_110 46 29 Owner	Reference Number Spring Schedule Henry Mountains Region Name McClellan Wash Drainage_Bull Creek Coordinates (D30-10)25bba Sub-drainage_McClellan Wash County Wayne Ident. # (Lat.) 38 10 50 (Long.) 110 47 04 Owner Topography_Bottom of stream channel - water issues from pediment gravel
Altitude 8090 Openings Formation (or kind of rock) Improvements, use Campground Oischarge gpm cfs M, E, R Temperature 9 °C °F Conductance 410 m mhos pH Oate of record 7/29/ 1975 1976 Recorded by H. D. Goode Remarks: c 7/29/75 Water from campground faucet. Vegetation: Pine Forest c 8/22/75	Altitude 6140 Openings Several Formation (or kind of rock) Pediment gravel Improvements, use Stock Discharge 23 gpm cfs (M) E, R Temperature 12 °C °F Conductance 770 * Beck m mhos 8.2 pH Oate of record 1975 8/27/ 1976 Recorded by H. D. Goode Remarks: * Measured flow and sampled about 100 ft below main orifice (temp 17°) ** Hach meter measured 750. C 8/27/76 7/2/77 2D°C 68Dmmho 20gpm M
Reference Spring Schedule Name Ellen Spring Number Bu-3 nv Henry Mountains Region Quadrangle Mt Ellen Orainage Bull Creek Coordinates (D31-10)9ddd Sub-drainage Mt Ellen Creek Coordinates (D31-10)9ddd Sub-drainage Mt Ellen Creek Coordinates (D31-10)9ddd Jdent. # (Lat.) 38 07 05 (Long.) 110 48 18 Owner Topography East slope Mt Ellen Altitude 9900 Openings Formation (or kind of rock) Boulder colluvium over bedrock (igneous?) Improvements, use Oischarge Oischarge several gpm cfs Oate of record 1975 1976 Prof. Faper 228 Piol not visit. Record from Hunt, Prof. Paper 228. P 213 Pid not visit. Record from Hunt, Prof. Paper 228.	Reference Number Spring Schedule Henry Mountains Region Name McClellan Mash Seen Quadrangle Mt Ellen Orainage Bull Creek Coordinates (D30-10)24cdc Sub-drainage McClellan Wash County Wayne Ident. # (Lat.) 38 10 52 (Long.) 110 47 03 Owner Topography South slope of channel Owner Altitude 6120 Openings_Seep Formation (or kind of rock) Pediment gravel over shale Improvements, use Oischarge 1/4 gpmCfsM, (E) R, Temperature 12.5 %°F °F Conductance 800 m mhosPH Date of record1975 8/27/ 1976Recorded by H. D. Goode Remarks: Tufa deposits Tufa deposits
Reference Spring Schedule Name Little Meadow Number Bu-4 Henry Mountains Region Quadrangle Mt Ellen Orainage Bull Creek Coordinates(D30-11)19db Sub-drainage Unnamed trib County Wayne Ident. # (lat.) 38 11 03 (Long.) 110 45 11 Owner Topography Grassy meadow Altitude 5680 Openings Several Formation (or kind of rock) Swale in Tununk shale Improvements, use Discharge 2 Discharge 2 gpm cfs M, (c) R Temperature 16 °C 61 °F Conductance 595 m mhos pH Date of record 7/11/ 1975 1976 Recorded by H. D. Goode Remarks: Yields 2 gpm E downstream Vegetation: Spring supports about 1 scre of grass	Reference NumberBu-8 Spring Schedule Henry Mountains Region Name Bench Seep-A Quadrangle Mt Ellen Coordinates(D30-10)13dgb Orainage_Bull Creek Coordinates(D30-10)13dgb County_Wayne Sub-drainage_McClellan Wash County_Wayne Ident. # (Lat.) 38 12 05 (Long.) 110 46 18 Owner Topography_Small gully cut into pediment surface Owner Altitude_5560 OpeningsSeepage Formation (or kind of rock)_Pediment gravel * Improvements, use Oischarge_<1_gpmcfs_M, @ RpH

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A-12
 Reference
 Spring Schedule
 Name Bench Seep-B

 Number
 Bu-9
 Henry Mountains Region
 Quadrangle Mt Ellen
 Name Bench Seep-B Drainage Bull Creek Coordinates (D30-10)13acd Sub-drainage Unnamed County Wayne Ident. # (Lat.) 38 12 15 (Long.) 110 46 25 Dwner Topography Side of gully about 20 ft below pediment surface Altitude 5520 Openings 1 Formation (or kind of rock) Pediment gravel over Tununk shale Improvements, use Stock Discharge 1 gpm cfs M, (E) R, Temperature °C °F Conductance_____ m mhos_____pH Date of record 1975 8/27/ 1976 Recorded by H. D. Goode Remarks: Inaccessible; saw from rim. Reference Spring Schedule Number DV-1 Henry Mountains Region Name Side Hill Springs Name Cow Wash Spring
 Reference
 Spring Schedule
 Name Side Hill sp

 Number
 Bu-10
 Henry Mountains Region
 Quadrangle Mt Ellen
 Spring Schedule Quadrangle Bull Mtm Coordinates(D30-11)5dbc Coordinates(D30-10)12ddb Drainage Dry Valley Wash Drainage Bull Creek Sub-drainage Cow Wash Sub-drainage Unnamed County____Wayne County Wayne Ident. # (Lat.) 38 13 32 (Long.) 110 44 18 Ident. # (Lat.) 38 12 47 (Long.) 110 46 18 Dwner Owner Robinson Topography Swale in pediment surface Topography Springs along fully cut into pediment gravel, springs issue 30 to 40 ft below pediment surface Altitude 5310 Dpenings 4 Altitude 5080 Openings Several Formation (or kind of rock) Pediment gravel over Morrison Formation (or kind of rock) Pediment gravel on Tununk shale Improvements, use Stock, feeds creek Improvements, use Discharge 10 gpm____cfs M, (E) R Temperature 18 °C___ Conductance 710 pH Conductance 690 ____m mhos____ m mhos pH Date of record 7/11/ 1975 1976 Recorded by H. D. Goode Date of record _____1975 8/3/ 1976 _____Recorded by H. D. Goode Remarks: Location of Northern Seep Remarks: * Spring area fed by return flow from irrigation. ** At orifice; at a measuring point below two ponds about 1500 ft Vegetation: Willows below orifices: 23°C 680 mmho 100 gpm M Mr. Robinson reports no flow in 1975. C 8/3/76 Reference Spring Schedule Number Bu-11 Henry Mountains Region Reference Spring Schedule Number DV-2 Henry Mountains Region Name Penitentiary Seep Name White Point Seeps Number Quadrangle Hanksville Quadrangle Hanksville Drainage Bull Crk Coordinates (D29-11)19ddd Drainage Dry Valley Wash Coordinates(D29-12)30ccc Sub-drainage Bull Crk Sub-drainage Halfway Wash County Wayne County Wayne Ident. # (Lat.) 38 15 55 (Long.) 110 44 59 Ident. # (Lat.) 38 15 04 (Long.) 110 39 22 Dwner Dwner Topography From alluvium into channel of Bull Crk Topography Coming from bank of stream channel Altitude 4770 Altitude 4750 Openings Openings Formation (or kind of rock) Alluvium Formation (or kind of rock) Alluvium over Entrada Improvements, use Stock Improvements, use Discharge 0 gpm cfs M, E, R Temperature 18 °C 65 °F Discharge_ O gpm____cfs M, E, R, Temperature 23 °C 74 °F Conductance 2200 Conductance <u>> 8000 (off</u> m mhos scale) Date of record <u>7/28/</u> 1975 1976 ____m mhos____ рН pН Recorded by H. D. Goode Date of record 7/27/ 1975 1976 Recorded by H. D. Goode Remarks: Small puddle, no flow. Remarks: Stagnant salty water on black muck Vegetation: Profuse salt cedar Reference Number Bu-12 Spring Schedule Henry Mountains Region Name Morrison Seep Quadrangle Hanksville Drainage Bull Creek Coordinates (D29-11)18add Sub-drainage Bull Creek County Wayne Ident. # (Lat.) 38 17 15 (Long.) 110 44 59 Owner Topography Pond beside stream channel Altitude 4650 Openings Formation (or kind of rock) Morrison (Sandstone) Improvements, use Discharge 1 gpm cfs M, (E) R Temperature 22 °C Conductance 1650 m mhos pH Date of record 1975 8/1/ 1976 Recorded by H. D. Goode Remarks: Pond apparently supported by seepage.



	A-13
Reference Spring Schedule Name Granite Ridge Spg Number BG-1 nv Henry Mountains Region Quadrangle Mt Ellen Drainage Geaver Canyon Goordinates(D31-10)26acb Sub-drainage Granite Wash, Granite Creek County Garfield Ident. # (Lat.) 38 04 59 (Long.) 110 46 33 Owner Topography Swale east slope Granite Ridge Altitude 9320 Openings Formation (or kind of rock) Igneous Improvements, use Discharge gpm Discharge gpm cfs M, E, R, Temperature °C Date of record 7/29/ 1975 1976 Recorded by H. D. Goode Remarks: No flow at road, did not climb to spring.	Reference Spring Schedule Name_Goatwater Spring NumberBG-5_nv Henry Mountains Region Quadrangle Bull Mtn Drainage Beaver Canyon Coordinates(D30-11)36dbb Sub-drainage Granite Wash, Goatwater Creek County_Wayne Ident. # (Lat.) 38 09 28 (Long.) 110 39 54 Owner
Reference NumberBG-2Henry Mountains Region Name Dakota A Quadrangle Bull Mtn DrainageBeaver Canyon Coordinates (D31-11)28aaa Sub-drainageGranite Wash, Unnamed trib CountyWayne Ident. # (Lat.) 38 10 47 (Long.) 110 42 52 Owner TopographyBelow pediment rim Openings	Reference Spring Schedule Name Granite Wash Spg Number BG-6 Henry Mountains Region Quadrangle Bull Mtn Drainage Beaver Canyon Coordinates (D30-12)4caa Coordinates (D30-12)4caa Sub-drainage Granite Wash County Wayne Ident. # (Lat.) 38 13 48 (Long.) 110 36 46 Owner Topography Dunes on both side of channel Openings Seeps Altitude 4635 Openings Seeps Formation (or kind of rock) Sand dunes (may be forced up by Morrison Fm) Improvements, use Stock Discharge gpm cfs M, E, R Temperature 17 °C 63 °F Conductance 2300 m mhos pH Date of record 7/28/1975 1976 Recorded by H. D. Goode Remarks: * Sec 4 has only about 550 acres Abundant salt cedar, perhaps could yield 5-10 gpm.
Reference Spring Schedule Name	Reference Spring Schedule Name Pool Spring Number BG-7 Henry Mountains Region Quadrangle Bull Mtn Drainage Beaver Canyon Coordinates(D29-12) 33cdb Sub-drainage Granite Wash, unnamed trib County Wayne Ident. # (Lat.) 38 14 23 (Long.) 110 36 46 Owner Owner Topography
Reference Spring Schedule Name Granite-A Spring NumberBG-4 Henry Mountains Region Quadrangle_Bull_Mtn DrainageBeaver_Canyon Coordinates (D30-11)27abc Sub-drainageCranite Wash, unnamed trib CountyWayne Ident. # (Lat.)_38 10 43 (Long.)110 42 06 Owner	Reference Spring Schedule Name Beaver Canyon Spg Number BG-8 nv Henry Mountains Region Quadrangle Bull Mtn Drainage Beaver Canyon Coordinates(D29-12) 35aaa Sub-drainage County Wayne Ident. # (Lat.) 38 14 56 (Long.) 110 33 53 Owner Topography Canyon bottom Altitude 4390 Openings Formation (or kind of rock) Improvements, use Discharge gpm cfs M, E, R Temperature °C °F Conductance m mhos pH Date of record 1975 1976 2/21/77 Recorded by H. D. Goode Remarks: Did not visit,

	A-14
Reference Spring Schedule Name Angel Cove Number BC-9 nv Henry Mountains Region Quadrangle Hanksville Drainage Dirty Devil Coordinates(D29-13)7abc Sub-drainage County Wayne Ident. # (Lat.) 38 18 28 (Long.) 110 32 09 Dwner Topography_Steep cliff west side Dirty Devil River Altitude 4100 Openings Formation (or kind of rock) Probably from base of Navajo Sandstone Improvements, use	Reference Spring Schedule Name Buller-A Number PB=3 Henry Mountains Region Quadrangle Bull Mtn Drainage_Poison Spring Canyon Coordinates (D31-11)30dbc Sub-drainage_Butler Creek, South Fork Butler County_Garfield Ident. # (Lat.) 38 04 40 (Long.) 110 44 20 Dwner Topography_Creek bottom
	Reference Number PB-4 Spring Schedule Henry Mountains Region Name_Butler-B Drainage_Poison Spring Canyon Quadrangle_Bull Mtn Sub-drainage_Butler Wash Coordinates (D31-12) 3ccd Ident. # (Lat.) 38 08 03 (Long.) 110 34 52 Owner Topography_Bottom of wash Openings Altitude_4780 Dpenings Formation (or kind of rock) Alluvium Improvements, use_Stock Discharge_* gpm
Reference Spring Schedule NamePoison Spring Number PB-1 Henry Mountains Region Quadrangle Bull Mtn Drainage Coordinates (D31-11)1cab Coordinates (D31-11)1cab Sub-drainage County_Garfield Owner	Reference Spring Schedule Name_Dell Seeps Number PB-5 Henry Mountains Region Quadrangle_Bull Mtn Drainage Poison Spring Canyon Coordinates (D30-13) 30 cad Sub-drainage Unnamed trib County_Wayne Ident. # (Lat.) 38 10 14 (Long.) 110 32 17 Owner Topography Ledge of Entrada Altitude 5140 Dpensings_Seeps Formation (or kind of rock)From X-bedded Sandstone at base of Entrada above Discharge < 1
Reference Spring Schedule Name Poison Trib Spg Quadrangle Bull Mtn Drainage Poison Spring Canyon Coordinates(D31-11)lccd Sub-drainage Unnamed trib County Garfield Ident. # (Lat.) 38 08 01 (Long.) 110 39 18 Dwner Dography Sandstone bench cut by stream Altitude 5205 Openings Formation (or kind of rock) Sandstone in Morrison Fm Improvements, use	Reference NumberPB=6 nv Spring Schedule Henry Mountains Region NameQuadrangle_Fiddler_Butte DrainageCoordinates(D31-13)9bcd* Quadrangle_Fiddler_Butte Coordinates(D31-13)9bcd* Sub-drainageCountyIdent.# (Lat.)_38_07_35_(Long.) 110_29_23Dwner Dwner

	A-15
Reference Spring Schedule Name Copper Basin	Reference Spring Schedule Name Cottonwood Spg
Number NW-1 Henry Mountains Region Quadrangle Mt Ellen	Number NW-5 Henry Mountains Region Quadrangle Bull Mtn
Drainage North Wash Coordinates (D32-10)2ada	Drainage North Wash Coordinates(D32-11)24aaa
Sub-drainage Copper Creek County Garfield	Sub-drainage Cottonwood Wash County Garfield
Ident. # (Lat.) 38 03 21 (Long.) 110 46 00 Owner	Ident. # (Lat.) 38 00 51 (Long.) 110 38 26 Owner
Topography Gully north slope Copper Ridge	Topography_Gully bottom at junction of two gullies.
Altitude 8700 Openings Several	Altitude 5100 Openings Many
Formation (or kind of rock) Igneous rock over shale	Formation (or kind of rock) Morrison Sandstone
Improvements, use	Improvements, use
Discharge 15-20 gpmCfs M, (E) R, Temperature°C°F	Discharge 2 gpm cfs M, (E) R, Temperature 16 °C 60 °F
Conductance m mhos pH	Conductance 610 m mhos pH
Date of record 7/10/1975 1976 Recorded by H. D. Goode	Date of record 8/1/ 1975 1976 Recorded by H. D. Goode
Remarks: Did not sample or measure.	Remarks: C 8/1/75
Did not sample of measure.	
	* Temp measured in botoom of main gully. Sample also taken
	<pre>1/4 mi downstream at a broken pipe (4 gpm M). (Location of "Cottonwood pipe" sample: 38 00 48 110 38 16;</pre>
	conductance at pipe 830)
	Water from Cottonwood Pipe is probably fed by a different spring
	that was not located. See chemical analyses.
Reference Spring Schedule Name Copper Creek Spg	Reference Spring Schedule NameDrinking Cup Spg Number NW-6 Henry Mountains Region
Number NW-2 nv Henry Mountains Region Quadrangle Mt Ellen	Quadrangle Bull Mtn
Drainage North Wash Coordinates (D32-10) 2aaa	Drainage North Wash Coordinates (D32-12)16bdb
Sub-drainage Copper Creek County Garfield	Sub-drainage Cottonwood Wash County Garfield
Ident. # (Lat.) <u>38 03 34 (Long.) 110 46 04</u> Owner	Ident. # (Lat.) 38 01 35 (Long.) 110 35 49 Owner
Topography Gully of Copper Creek	TopographyBottom of wash in shallow bedrock canyon
Altitude 8620 Openings	Altitude 4750 Openings
Formation (or kind of rock)	Formation (or kind of rock) Entrada (rises from Entrada in Wash bottom)
Improvements, use Supplies creek	Improvements, use
Dischargecfs M, E, R Temperature°C°F	Discharge <u>3 gpm</u> cfs M, (E) R Temperature <u>23 °C</u> °F
Conductance m mhos pH Date of record 1975 1976 3/21/77 Recorded by H. D. Goode	Conductance625m mhospH Date of record 1975 8/29/1976 Recorded by H. D. Goode
Remarks:	Remarks:
Did not visit spring - measured creek at road	* Mislocated on topo and BLM maps.
7/10/75 30 gpm M 430 mmhos	Vegetation: Wiregrass
	Reference Spring Schedule Name Turkey
Reference Spring Schedule Name Lecleed Number NW-3 Henry Mountains Region Ouadrangle Bull Mtn	Reference Spring Schedule Name Turkey Number NW-7 Henry Mountains Region Ouadrangle Bull Mtn
Drainage North Wash Coordinates (D31-11)28cbd	
Sub-drainage Crescent Creek County Garfield	Drainage North Wash Coordinates(D32-12)1cda Sub-drainage Unnamed trib County Garfield
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings
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Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, (E) R, Temperature 12 °C °F Conductance 520 m mhos pH	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings Formation (or kind of rock) Sandstone, water from red sandstone Improvements, use Fenced collection box; stock Discharge * gpmcfs M, E, R, Temperature 19 °C°F Conductance750m mhospH
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Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, (E) R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Nume4 Reference Spring Schedule NameDeath Canyon Spg Number NW-4 Henry Mountains Region Quadrangle Bull Mtn	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings Formation (or kind of rock) Sandstone, water from red sandstone Improvements, use Fenced collection box; stock Discharge gpm Cfs M, E, R, Temperature 19 °C °F Conductance 750 m mhos pH Date of record 1975 8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Reference Spring Schedule Name Arches Spg North Number Nw-8 Henry Mountains Region Name Arches Spg North
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, () R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks:	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings Formation (or kind of rock) Sandstone, water from red sandstone Improvements, use Fenced collection box; stock Discharge gpm Cfs M, E, R, Temperature 19 °C °F Conductance 750 m mhos pH Date of record 1975 8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow * No visible flow Name Arches Spg North Reference Spring Schedule Name Arches Spg North Quadrangle_Fiddler Butte Drainage North Wash Coordinates (D31-13) 33 bad
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, E R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Reference Spring Schedule NameDeath Canyon Spg Quadrangle Drainage North Wash Coordinates(D32-12) 3abd* County Gounty Garfield	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings Formation (or kind of rock) Sandstone, water from red sandstone Improvements, use Fenced collection box; stock Discharge * gpm cfs M, E, R, Temperature 19 °C °F Conductance 750 m mhos pH Date of record 1975 8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Reference Spring Schedule Number NW-8 Henry Mountains Region Quadrangle_Fiddler Butte Drainage_North Wash Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, E R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: NameDeath Canyon Spg Quadrangle Bull Mtn Drainage North Wash Coordinates(D32-12)3abd* Sub-drainage Death Canyon County Garfield Owner_	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography Side of southward draining gully Altitude 5020 Openings Formation (or kind of rock) Sandstone, water from red sandstone Improvements, use Fenced collection box; stock Discharge * gpm cfs M, E, R, Temperature 19 °C °F Conductance 750 m mhos pH Date of record 1975 8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow No visible flow Quadrangle Fiddler Butte Drainage North Wash Coordinates (D31-13) 33bad Sub-drainage Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, E R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: NameDeath Canyon Spg Quadrangle Bull Mtn Drainage North Wash Coordinates(D32-12)3abd* Sub-drainage Death Canyon County Garfield Owner_	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Visible flow Quadrangle_Fiddler Butter Drainage_North Wash Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs Mark Granite 12 °C Odductance 520 m mhos Date of record 7/10/1975 1976 Reference Spring Schedule Number Nw-4 Henry Mountains Region Drainage North Wash Coordinates(D32-12) 3abd* Sub-drainage Death Canyon County Garfield Ident. # (Lat.) 38 03 27 (Long.) 110 34 25 Owner	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Value Mumber_NW=8 Henry Mountains Region Quadrangle_Fiddler Butte Coordinates (D31-13) 33.bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow No visible flow Quadrangle_Fiddler Butter Drainage_North Wash Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpmGF M, (C) R, Temperature 12 °C°F Conductance 520m mhospH Date of record 7/10/19751976Recorded byH. D. Goode Remarks: NameDeath Canyon Spg Quadrangle Mult Mtn DrainageNorth_Wash Coordinates(D32-12)3abd* Sub-drainageDeath Canyon CountyGarfield Jdent. # (Lat.) 38 03 27 (Long.) 110 34 25	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Value Mumber_NW=8 Henry Mountains Region Quadrangle_Fiddler Butte Coordinates (D31-13) 33.ad Sub-drainage_Butler Canyon, unnamed trib Coordinates (D31-13) 33.ad Sub-drainage_Butler Canyon, unnamed trib Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19_°C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Value No visible flow Openinge_Butler Canyon, unnamed trib Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, () R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Remarks: Quadrangle Bull Mtn Drainage North Wash Coordinates(D32-12)3abd* Sub-drainage Death Canyon Sub-drainage Death Canyon County Garfield Owner Topography Topography Box canyon County Garfield Owner Altitude 4860 Openings Formation (or kind of rock) Entrada Sandstone Improvements, use Discharge Cfs M, () R Temperature 17 °C °F	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Value Mumber_NW=8 Henry Mountains Region Name Arches Spg North Quadrangle_Fiddler Butter Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpmCfs M, () R, Temperature 12 °C°F Conductance 520m mhospH Date of record 7/10/19751976Recorded by H. D. Goode Remarks: Reference NumberNW-4 Henry Mountains Region Drainage North Wash Sub-drainage Death Canyon County Garfield Ident. # (Lat.) 38 03 27 (Long.) 110 34 25	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19_°C°F Conductance_750 m mhos_pH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Visible flow Quadrangle_Fiddler Butte Drainage_North Wash Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, R. Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Reference Spring Schedule NameDeath Canyon Spg Quadrangle Buil Mtn Coordinates(D32-12)3abd Sob-drainage Death Canyon County_Garfield Ident. # (Lat.) 38 03 27 (Long.) 110 34 25 Owner Owner Topography Box canyon County_Garfield Altitude_4860 Openings Formation (or kind of rock) Entrada Sandstone Improvements, use	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Vamber_NW=8 Henry Mountains Region Drainage_North Wash Coordinates (D31-13) 33bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner Topography_Shelves in thin-bedded sandstone Attitude_5500 Openings Formation (or kind of rock) Carmel Sandstone, water from red over white Improvements, use 3 tanks, trough, collection box; stock Discharge_ 1/8 gpmcfs_M, R_ Temperature_17 °C°F Conductance380 m mhosPH
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, (inclust) R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Number NW-4 Henry Mountains Region Quadrangle Bull Mtn Drainage North Wash Coordinates(D32-12)3abd Sub-drainage Death Canyon County_Garfield Ident. # (Lat.) 38 03 27 (Long.) 110 34 25 Owner Owner Topography_Box canyon Altitude 4860 Openings Formation (or kind of rock) Entrada Sandstone Improvements, use	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Vamber_NW=8 Henry Mountains Region Drainage_North Wash Coordinates (D31-13) 33bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner Topography_Shelves in thin-bedded sandstone Attitude_5500 Openings Formation (or kind of rock) Carmel Sandstone, water from red over white Improvements, use 3 tanks, trough, collection box; stock Discharge_ 1/8 gpmcfs_M, R_ Temperature_17 °C°F Conductance380 m mhosPH
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner TopographyCreek_cuts_deeply_through pediment_gravel_east of Granite_Ridge Altitude6420 Openings_Several Formation (or kind of rock)Alluvium, probably over bedrock dam	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Vamber_NW=8 Henry Mountains Region Drainage_North Wash Coordinates (D31-13) 33bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner Topography_Shelves in thin-bedded sandstone Attitude_5500 Openings Formation (or kind of rock) Carmel Sandstone, water from red over white Improvements, use 3 tanks, trough, collection box; stock Discharge_ 1/8 gpmcfs_M, R_ Temperature_17 °C°F Conductance380 m mhosPH
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner TopographyCreek_cuts_deeply_through_pediment_gravel_east of Granite_Ridge Altitude6420 Openings_Several Formation (or kind of rock)Alluvium, probably_over_bedrock_dam	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19_°C°F Conductance_750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Vamber_NW=8 Henry Mountains Region Drainage_North Wash Coordinates (D31-13) 33 bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner Topography_Shelves in thin-bedded sandstone Altitude_5500 Openings Formation (or kind of rock) Carmel Sandstone, water from red over white Improvements, use 3 tanks, trough, collection box; stock Discharge_ 1/8 gpm_cfs R Temperature_17 °C°F Conductance_380 Mate of record1975_8/29/1976 Recorded by H. D. Goode
Ident. # (Lat.) 38 04 46 (Long.)110 42 31 Owner Topography Creek cuts deeply through pediment gravel east of Granite Ridge Altitude 6420 Openings Several Formation (or kind of rock) Alluvium, probably over bedrock dam Improvements, use Stock Discharge 30-40 gpm cfs M, () R, Temperature 12 °C °F Conductance 520 m mhos pH Date of record 7/10/1975 1976 Recorded by H. D. Goode Remarks: Number Nw-4 Henry Mountains Region Quadrangle Bull Mtn Drainage North Wash Coordinates(D32-12)3abd Sub-drainage Death Canyon Soundarge Owner Topography Box canyon County_Garfield Ident. # (Lat.) 38 03 27 (Long.) 110 34 25 Owner Topography Box canyon Sex canyon Sex canyon Sex canyon Altitude 4860 Openings Formation (or kind of rock) Entrada Sandstone Improvements, use	Ident. # (Lat.) 38 02 52 (Long.) 110 32 26 Owner Topography_Side of southward draining gully Altitude_5020 Openings Formation (or kind of rock)_Sandstone, water from red sandstone Improvements, use_Fenced collection box; stock Discharge_*_gpmcfs_M,E,R, Temperature 19 °C°F Conductance750 m mhospH Date of record1975_8/29/1976 Recorded by H. D. Goode Remarks: * No visible flow Vamber_NW=8 Henry Mountains Region Drainage_North Wash Coordinates (D31-13) 33bad Sub-drainage_Butler Canyon, unnamed trib County_Garfield Ident. # (Lat.) 38 04 20 (Long.) 110 29 13 Owner Topography_Shelves in thin-bedded sandstone Attitude_5500 Openings Formation (or kind of rock) Carmel Sandstone, water from red over white Improvements, use 3 tanks, trough, collection box; stock Discharge_ 1/8 gpmcfs_M, R_ Temperature_17 °C°F Conductance380 m mhosPH

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A-16
 Reference
 Spring Schedule
 NameArches Spg South

 Number
 NW-9
 Henry Mountains Region
 Quadrangle Fiddler Butte

 Reference
 Spring Schedule
 Name North Wash Spg

 Number
 NW-13nv
 Henry Mountains Region
 Quadrangle Browns Rim
 Name North Wash Spg Coordinates (D33-13)15bdc Coordinates (D31-13) 33bad Drainage North Wash Drainage North Wash Sub-drainage Butler Canyon, unnamed trib County Garfield County Garfield Sub-drainage Mainstream Ident. # (Lat.) 37 56 12 (Long.) 110 28 11 Owner Ident. # (Lat.) 38 04 17 (Long.)110 29 10 Dwner Topography Shelves in thin-bedded sandstone Topography West side deep North Wash Canyon Dpenings____ Altitude 3900 Altitude 5500 Dpenings Formation (or kind of rock) Carmel sandstone, water from red over white Formation (or kind of rock) Wingate Sandstone Improvements, use Pipe Improvements, use Discharge______cfs M, E, R Temperature____°C___°F Discharge < 1/8 gpm_____cfs M, (E) R, Temperature 15½°C ____°F Conductance 395 Conductance m mhos_____pH m mhos_____pH Date of record 1975 1976 Recorded by Date of record 1975 8/29/ 1976 Recorded by H. D. Goode Remarks: Remarks: C 6/9/63 Reference Spring Schedule Number NW-10 Henry Mountains Region Quadrangle Mt Hillers Drainage North Wash Coordinates (D32-13) 31dbc County Garfield Sub-drainage Hog Canyon Ident. # (Lat.) 37 58 35 (Long.) 110 31 09 Dwner BLM Topography Bottom of Hog Canyon Altitude 4440 Dpenings____ Formation (or kind of rock) Probably issues from base of Navajo Sandstone Improvements, use Discharge______cfs M, E, R Temperature_____°C____ Conductance_____ ____m mhos_____pH Date of record 1975 1976 Recorded by Remarks:
 Reference
 Spring Schedule
 Name Middle Hog

 Number
 NW-11
 Henry Mountains Region
 Quadrangle
 Mt Hillers
 Coordinates (D33-13)5dbc Drainage North Wash Sub-drainage Hog Canyon County Garfield Ident. # (Lat.) 37 57 43 (Long.) 110 30 03 Dwner____ Topography Bottom of Hog Canyon at top of Wingate Altitude 4170 Openings Much seepage Formation (or kind of rock) Wingate Ss Improvements, use none Discharge * gpm cfs M, E, R, Temperature 31 °C Conductance 680 m mhos pH near top of Wingate Date of record 1975 1976 7/6/77 Recorded by H. D. Goode Remarks: Flow increases downstream. Measured twice on 7/6/77 at waterfall several hundred yds below top of Wingate 7/6/77 12:50 PM 31° 620mmho 6.7gpm M 4:15 PM 33° 650mmho 2.4gpm M
 Reference
 Spring Schedule
 Name South Hog

 Number
 NW-12
 Henry Mountains Region
 Quadrangle Browns Rim
 Coordinates (D33-13)4cbc Drainage North Wash
 Sub-drainage_Hog_Canyon
 County_

 Ident. # (Lat.)_37_57_44_(Long.)_110_29_31
 Dwner_____
 Topography Bottom of Hog Canyon about 100 yds upstream from picnic ground Altitude 4090 Openings Formation (or kind of rock) Fault in Wingate Ss Improvements, use none Discharge 5 gpm cfs M, E R Temperature 19 °C °F Conductance 625 m mhos pH Date of record 1975 1976 7/6/77 Recorded by H. D. Goode Remarks: Fault trends about N70W. Displacement about 5 ft SW side up. Green algae appear in channel at spring. This spring could supply water for Hog Canyon Picnic Ground. C 5/13/75

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Reference Spring Schedule Name Box Spring Number TC-1 Henry Mountains Region Quadrangle Mt Ellen Drainage Trachyte Coordinates(D32-10)21aad Sub-drainage Slate, unnamed trib County Garfield	Reference Spring Schedule Name Hancock Spring Number TC-5 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates (D32-10) 34 dbb Sub-drainage Slate Creek - Black Canyon County_Garfield
Ident. # (Lat.) 38 00 44 (Long.) 110 48 13 Dwner TopographySaddle between Mt Ellen on north and The Horn on the south	Ident. # (Lat.) <u>37</u> 58 47 (Long.) <u>110</u> 47 33 <u>Dwner Near BLM cabin</u> Topography <u>NE facing colluvial slope</u>
Altitude 7750 Dpenings Seep	Altitude 9030 Dpenings Several
Formation (or kind of rock) Colluvium Improvements, use Pipe, trough - stock	Formation (or kind of rock) Colluvium Improvements, use Pipe captures part of flow; tank, camper, BLM cabin
Discharge <u>* gpm</u> cfs (M) E, R, Temperature <u>11 °C 52 °F</u>	Discharge 15-20* gpmcfsM, (E) R, Temperature 5 °C°F
Conductance 600 m mhos pH	Conductance 350 m mhos pH
Date of record <u>6/30/1975</u> 7/11/1976 Recorded by <u>H. D. Coode</u> Remarks:	Date of record 7/8/1975 7/11/1976 Recorded by H. D. Goode Remarks: C 7/8/75, 8/14/75 Vegetation: Aspen and ponderosa
Date * Discharge	Date *Flow from pipe C Cond Uncaptured 7/8/75 10 gpm M 5 350 8 gpm M
6/30/75 l qt 65 sec M 7/8/75 5 qts 310 sec M	7/9/75 10 gpm M 5.5 (After all night rain) 7/10/75 10 gpm M 5 350
7/10/75 1 qt 60 sec M	8/14/75 6.7 M 5 375 7/11/76 6.7 M 5.5 400
7/11/76 l qt 90 sec M 57 ⁰ F 7/4/77 lqt 14D sec M 14°C 6DDmmho	7/4/77 6°C 440mmho 1.5gpm M at enclosed pipe. Trough has been moved about 1D0 ft downslope.
Reference Spring Schedule Name Cougar Spring	Uncaptured spring area yields 1-2gpm E Reference Spring Schedule Name Black Canyon Spg
NumberTC-2 Henry Mountains Region Quadrangle_Mt Ellen	Number TC-6 Henry Mountains Region Quadrangle Mt Pennell
Drainage Trachyte Coordinates(D32-10)13bcb	Drainage Trachyte Coordinates (D32-10) 35bcc Sub-drainage Slate - Black Canyon County Garfield
Sub-drainage State Creek, unnamed trib County Garfield Ident. # (Lat.) 38 01 35 (Long.) 110 46 00 Owner	Ident. # (Lat.) 37 58 49 (Long.) 110 47 04 Owner
TopographySaddle northwest of Ragged Mtn	Topography_ Junction two canyons
Altitude 8760 Dpenings	Altitude 8560 Dpenings
Formation (or kind of rock)Igneous rock or igneous colluvium over Tununk	Formation (or kind of rock) Valley Fill
Improvements, use Discharge 1/4 * gpm cfs M, (F) R Temperature 11 °C °F	Improvements, use <u>Stock</u> Discharge 30 gpm cfs M,(E) R Temperature 4 °C °F
Conductance 680 m mhos pH	Conductance 170 m mhos pH
Date of record 1975 7/15/ 1976 Recorded by H. D. Goode Remarks:	Date of record <u>8/16/1975</u> <u>1976</u> Recorded by <u>H. D. Goode</u> Remarks:
* Partial measurement	C 8/16/75
The second secon	Flow disappears into rubbly creek bottom about 150 yds below orifice.
	Vegetation: Oak, Ponderosa
Reference Spring Schedule Name Horn Spring	Reference Spring Schedule Name Gibbons
Number TC-3 Henry Mountains Pegion	Number TC-7 Henry Mountains Pegion
Number TC-3 Henry Mountains Region Quadrangle_Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage_Slate, unnamed trib County_Carfield	Number TC-7 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Carfield
Number TC-3 Henry Mountains Region Quadrangle_Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Output Owner
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage <u>Trachyte</u> Coordinates(D32-10)34bac Sub-drainage <u>Slate</u> , unnamed trib County <u>Carfield</u> Ident. # (Lat.) <u>37 59 07 (Long.) 110 47 50</u> Dwner Topography North-facing alope of Mt Pennel1 Altitude <u>8670</u> Openings <u>Seepa</u> Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Altitude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10) 34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Mittude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs Weir pH Date of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Nerror Nerror Altitude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs Meir pH
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Mittude 8100 Openings_ Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use_ Stock Stock Discharge 23 gpmcfs MpH Date of record_ 7/9/1975 7/11/1976 Recorded by _H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Outflow greater than in 1975 5 gpm or more crossing
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm cfs Of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Discharge Date of sqts/min 7/1775 S qts/min 7/8/75 4:15 P 9/qts/min 7/9/75 8:45 A 10 qts/min M	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10) 34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm cfs Of record 7/10/ 1975 1976 Recorded by Remarks: Discharge Date 5 qts/min 7/8/75 4:15 P 9/qts/min M	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2° gpm cfs (M) E, R, Temperature 12°C °F Conductance 460 m mhos pH Date of record 7/10/1975 1976 Recorded by <u>H. D. Goode</u> Remarks: Discharge C° 7/1/75 5 qts/min M 7/8/75 4:15 P 9/qts/min M 11:5 7/9/75 8:45 A 10 qts/min M 12 Vegetation: Crassy slope Vegetation: Crassy slope Vegetation: Crassy slope	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Mittude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs Meir pH Date of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Outflow greater than in 1975 5 gpm or more crossing road. Vegetation: Willows Vegetation: Willows
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Mitiude 8100 Openings_Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs %E, R, Temperature 8 °C °F °F Conductance _m mhos _eir pH Date of record 7/9/ 1975 7/11/1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Outflow greater than in 1975 5 gpm or more crossing road. Vegetation: Willows Reference Spring Schedule Name Tank Spring
Number TC-3 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Mitiude 8100 Openings_Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs %E, R, Temperature 8 °C °F °F Conductance m mhos weir pH Date of record 7/9/ 1975 7/11/1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Outflow greater than in 1975 5 gpm or more crossing road. Vegetation: Willows Reference Spring Schedule Name Tank Spring Quadrangle_Mt Pennel1 Drainage_ Trachyte Coordinates (D32-10) 36bcd Sub-drainage State Creek, Left fork Slate Creek County Carfield
Number TC-3 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	NumberTC-7Henry Mountains Region Quadrangle Mt Pennel1 DrainageTrachyte Coordinates (D32-10) 35aad Sub-drainage_Slate, unnamed trib CountyGarfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner TopographyNE_slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm cfs Of record 71/0/ 1975 1976 Recorded by H. D. Goode Remarks: Discharge Date of record 7/17/75 S qts/min 7/8/75 4:15 P 9/qts/min M 7/10/75 9:15 A 7 qts/min M 12 vegetation: Coardinates (D32-10)26bdb Sub-drainage Slate, unnamed trib Coordinates (D32-10)26bdb County_carfield Drainage_ Slate, unnamed trib Coordinates (D32-10)26bdb Sub-drainage	NumberTC-7Henry Mountains Region Quadrangle Mt Pennel1 DrainageTrachyte Coordinates (D32-10) 35aad Sub-drainage_Slate, unnamed trib CountyGarfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner TopographyNE_slope Mt Pennel1 Owner Altitude8100OpeningsSeeps Formation (or kind of rock)_Colluvium over Tununk Shale Improvements, useStock Discharge_23_gpmcfsMeirpH Date of record_7/9/_1975_7/11/1976Recorded byH. D. Goode Remarks: Measured with v-notch weir 7/11/76Outflow greater than in 1975_5 gpm or more crossing road. Vegetation: Willows Reference Spring Schedule NumberC-8 Henry Mountains Region Drainage_Trachyte
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm cfs Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date Discharge C° 7/1775 5 gts/min M 7/8/75 4:15 P 9/gts/min M 11.5 7/9/75 9:45 A 10 gts/min M 12 vegetation: Crassy slope Name_Unnamed Quadrangle_Mt Pennel1 DrainageTc-4_mv Henry Mountains Region Name_Unnamed Quadrangle_Mt Pennel1 Coordinates_(D32-10)26bdb Sub-drainage	NumberTC-7Henry Mountains Region Quadrangle Mt Pennel1 DrainageTrachyte Coordinates (D32-10) 35aad Sub-drainage_Slate, unnamed trib CountyGarfield Ident. # (Lat.) _37 59 01 (Long.) 110 46 02 Owner TopographyNE_slope Mt Pennel1 Owner Altitude8100OpeningsSeeps Formation (or kind of rock)_Colluvium over Tununk Shale Improvements, useStock Discharge_23gpmcfsWE, R, Temperature_8°C°F Conductancem mhospH Date of record_7/9/_1975_7/11/1976Recorded byH. D. Goode Remarks: Measured with v-notch weir 7/11/76_Outflow greater than in 1975_5 gpm or more crossing road. Vegetation: Willows Reference Spring Schedule Name_Tank Spring_ NumberTC-8Henry Mountains Region Drainage_Mt Pennel1 Coordinates (D32-10)36bcd DrainageTrachyte Coordinates (D32-10)36bcd Sub-drainage_Slate Creek, Left fork Slate Creek County_Carfield Ident. # (Lat.) 37 58 49(Long.) 110 45 49Owner
Number TC-3 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) <u>37 59 07 (Long.) 110 47 50</u> Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Altitude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs Meir pH Date of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Outflow greater than in 1975 5 gpm or more crossing road. Vegetation: Willows Name
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm Coductance 460 m mhos pate fischarge cfs Pate Discharge cf 7/1775 S qts/min M 7/8/75 4:15 P 9/qts/min M 11-5 7/9/75 8:45 A 10 qts/min M 12 vegetation: Crassy slope Name_Unnamed Reference Spring Schedule Name_Unamed Number TC -4 nv Henry Mountains Region Quadrangle_Mt Pennel1 Drainage_Slate, unnamed trib Coordinates (D32-10)26bdb Sub-crifield Ident. # (Lat.) _37 59 52. (Long.) _110 46.48 Dwner Topography Bottom of ca	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennell Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner	Number TC-7 Henry' Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner TopographyNE_slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Dwner Topography North-facing alope of Mt Pennel1 Menry Menry Altitude 8670 Openings Seepa Dwner Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm cfs E, R, Temperature 12 °C °F Conductance 460 m mhos pH Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date of record 7/10/ 1975 1976 Retorded by H. D. Goode Reference Stats/min M 11-5 7/9/75 8:45 A 10 qts/min M 12 Vegetation: Crassy slope Coordinates (D32-10)26bdb Quadrangle_Mt Pennel1 Drainage Trachyte Coordinates (D32-10)26bdb Quadrangle_Mt Pennel1 <t< td=""><td>Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 </td></t<>	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm Coductance 460 m mhos Date of record 7/10/ 1975 1976 Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Mt Pennel1 7/10/75 8:45 A 10 qts/min M 11.5 7/9/75 8:45 A 10 qts/min M 12 Vegetation: Crassy slope	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib County_Garfield Ident. # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Altitude 8100 Openings_Seeps Formation (or kind of rock)_Colluvium over Tununk Shale Improvements, use_Stock Discharge_23 gpmcfs_M_E, R, Temperature_8_°C°F Conductance m mhos pH Date of record 7/9/ 1975 7/11/1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/76 Vegetation: Willows Reference Spring Schedule Name_Tank Spring_ NumberTC-8 Henry Mountains Region Quadrangle_Mt Pennel1 Drainage_slate Creek, Left fork Slate Creek County
Number TC-3 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates(D32-10)34bac Sub-drainage Slate, unnamed trib County Carfield Ident. # (Lat.) 37 59 07 (Long.) 110 47 50 Dwner Topography North-facing alope of Mt Pennel1 Altitude 8670 Openings Seepa Formation (or kind of rock) Colluvium Improvements, use Pipe, collection box, pond; stock Discharge 1-2* gpm Coductance 460 m mhos Date of record 7/10/ 1975 1976 Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Recorded by H. D. Goode Remarks: Date of record 7/10/ 1975 1976 Date of record 7/10/ 1975 1976 Mt Pennel1 7/10/75 8:45 A 10 qts/min M 11.5 7/9/75 8:45 A 10 qts/min M 12 Vegetation: Crassy slope	Number TC-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage Trachyte Coordinates (D32-10) 35aad Sub-drainage Slate, unnamed trib Coordinates (D32-10) 35aad Jent # (Lat.) 37 59 01 (Long.) 110 46 02 Owner Topography NE slope Mt Pennel1 Owner Altitude 8100 Openings Seeps Formation (or kind of rock) Colluvium over Tununk Shale Improvements, use Stock Discharge 23 gpm cfs E, R, Temperature 8 °C °F Conductance m mhos pH Date of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode Remarks: Measured with v-notch weir 7/11/16 0utflow greater than in 1975 5 gpm or more crossing road. Vegetation: Willows Reference Spring Schedule Name Tank Spring Quadrangle Mt Pennel1 Drainage Tachyte Coordinates (D32-10) 36bcd Sub-drainage Sub-drainage Slate Creek, Left fork Slate Creek County Carfield Ident. # (Lat.) 37 58 49 (Long.) 110 45 49 Owner Owner Topography Gentle northeast slope Mt Pennel1 Improvements, use

	A-18
Reference Number Spring Schedule Henry Mountains Region Name_Willow Drainage_Trachyte Quadrangle_Mt_Pennell Drainage_Coyote Creek, unnamed trib Coordinates (D32-10) 35dcc Sub-drainage_Coyote Creek, unnamed trib County_Garfield Ident. # (Lat.) 37 58 28 (Long.) 110 46 26 Owner	Reference Spring Schedule Name_Dead Frog Spring Number TC-13 Henry Mountains Region Quadrangle_Mt Hillers Drainage_Trachyte Coordinates (D31-11)21cca Sub-drainage_Straight_Creek - Quaking Aspen_Creek County_Garfield Ident. # (Lat.) 37 55 00 (Long.) 110 42 31 Owner Topography North slope Cass Creek Peak Altitude_7420 Openings_1 Formation (or kind of rock) From talus From talus
Improvements, use Pipe, stock Oischarge * gpmCfs M, E, R, Temperature 6 °C°F Conductance 350 m mhosPH Oate of record 7/ 9/ 1975 7/11/ 1976 Recorded by H. D. Goode Remarks: 8/16/1975 Date * Discharge Only small part of yield discharges 7/9/75 21 gpm M weir from pipe. 8/16/75 5 gpm M weir 7/11/76 Est 5-7 gpm at road (Road was dry in 1975) Vegetation: Willows	Improvements, use Flows to reservoir; stock Oischarge 2-3 gpm cfs M, () R, Temperature 2 °C 36 °F Conductance 110 m mhos pH Date of record 8/2/1975 1976 Recorded by H. D. Goode Remarks: Water obviously derived from melting snow or ice deep in talus.
C 7/9/75 Reference Spring Schedule Name Browns Hole NumberTC-10 Henry Mountains Region Quadrangle_Mt_Pennell DrainageTrachyte Coordinates (033-10)13aca Sub-drainage_Straight - Browns Creek CountyGarfield Ident. # (Lat.) 37 56 19 (Long.) 110 45 17 Owner	Reference Spring Schedule Name Quaking Aspen Spg NumberTC-14 Henry Mountains Region Quadrangle Mt Hillers Orainage Trachyte Creek Coordinates (D33-11)21bcd Sub-drainage Straight Creek- Quaking Aspen Creek Coordinates (D33-11)21bcd Sub-drainage Straight Creek- Quaking Aspen Creek County Garfield Ident. # (Lat.) 37 55 21 (Long.) 110 42 32 Owner Topography_North slope Cass Creek Peak Owner Altitude7060 Openings Formation (or kind of rock) Colluvium Improvements, use Wood housing, stock Discharge 25-30 gpm cfs M. R Temperature 8 °C 46 °F Conductance420 m mhosPH Date of record 8/1/19751976Recorded by H. D. Goode Remarks: c 8/1/75
<pre>* 7/11/76 6°C 350 mmho 36 gpm M 7/4/77 11°C 380mmho <ld></ld></pre> igpm E; dry where measured in 1976 North orifice 7/4/77 14.5 370mmho 1gpm E Reference Spring Schedule Name Wolverton Springs Number <u>TC-11</u> Henry Mountains Region Quadrangle <u>Mt Hillers</u> Drainage <u>Trachyte</u> Coordinates (D33-11)4cad Sub-drainage <u>Straight Creek, unnamed trib</u> County <u>Carfield</u> Ident. # (Lat.) <u>37 57 44</u> (Long.) <u>110 42 18</u> Owner Topography <u>Break in pediment (Coyote Bench)</u>	Reference Number Spring Schedule Henry Mountains Region Name_Benson Spring Quadrangle Name_Benson Spring Drainage_Trachyte Coordinates Drainage Mt Hillers Sub-drainage_Straight Creek - Benson Creek County_Garfield County_Garfield Ident. # (Lat.)_37 56 04 (Long.)_110 41 10 Owner_ Topography_North slope Big Ridge
Altitude6370 Openings_4 springs Formation (or kind of rock) Pediment gravel over Tununk Shale Improvements, use Discharge fs M, ① R, Temperature12 °F Conductance PH Date of record 8/16/1975 1976 Recorded by H. D. Goode Remarks: North most spring plotted * South Spring 12°C 440 mmho Est 1 gpm North Spring 12°C 440 mmho Est 1 gpm Third Spring 11°C 420 mmho Est 1 gpm Fourth Spring in area Vegetation: Juniper and brush	Altitude 6740 Openings 1 Formation (or kind of rock) Colluvium on layer of clay Improvements, use Ditch; stock, perhaps irrigation Oischarge 170 gpm cfs (M) E, R, Temperature 9 °C 48 °F Conductance 185 m mhos pH Oate of record 8/2/1975 1976 Recorded by H. D. Goode Remarks: c 8/2/75 Heavily vegetated 7/5/77 Collection box and 2-mile pipeline to ranch added since 1975. of rom box - 11.5°C 180mmho 4.8gpm M Pipeline was traced to valve and discharge from pipe was measured: 14°C 180mmho 100gpm M
Reference Spring Schedule NameSpg above Bastian Res Number TC-12 Henry Mountains Region Quadrangle_Mt Hillers Orainage Trachyte unnamed trib Coordinates (D31-11)28abb Sub-drainage Straight Creek - Quaking Aspen Creek, County Garfield Ident. # (lat.) 37 54 50 (Long.) 110 42 04 Owner Topography North slope Cass Creek Peak Openings Formation (or kind of rock) Colluvium over white clay (altered igneous ?) Improvements, use Oischarge 22 gpm cfs E, R Temperature 3 °C 38 °F Conductance 140 m mhos pH Date of record_8/2/ 1975 1976	Reference Spring Schedule NameMaidenvater Spg NumberTC-16 Henry Mountains Region Quadrangle_Mt Hillers Drainage_Trachyte Coordinates(D33-12)27bdb* Sub-drainage_Maidenvater Creek, unnamed trib County_Garfield Ident. # (Lat.)_37_54_33 (Long.) 110_34_41 Owner

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	A-19
Reference Spring Schedule Name Maidenwater Creek Number	Reference Spring Schedule Name Starr Spring Number TC-21 Henry Mountains Region Quadrangle Mt Hillers Orainage Trachyte Coordinates(D34-11)14dbb Quadrangle Mt Hillers Sub-drainage Swett Creek, Star Creek County Carfield Ident. # (Lat.)37 51 03 (Long.)110 39 53 Owner USBLM; used at campground Topography Landslides south slope Mt Hillers Altitude 6280 Altitude 6280 Openings Formation (or kind of rock) Landslide over Mancos Shale Improvements, use Collection box, distribution system, faucets Discharge 85-90* gpm cfs % Oate of record 8/3/ 1975 1976 Recorded by H. D. Goode Remarks: C 8/3/75 C 5/13/75 * Discharge was overflow only; measured at campground about 1/4 mi below spring area (37 51 02; 110 39 33) 7/8/76 16.5°C 300 mmho 11 gpm Same measuring 7/25/76 15°C 310 mmho 43 gpm point. 7/6/77 No overflow at campground. Faucet: 26°C 300mmho New sign: "Water purified by fodinator"
Reference Spring Schedule Name Cold Creek Number TG-18 my Henry Mountains Region Quadrangle Mt Hillers Drainage Trachyte Coordinates (D34-11)2aaa Sub-drainage Gold Creek County Garfield Ident. # (Lat.) 37 53 03 (Long.) 110 39 28 Owner Topography Canyon off east slope of Mt Hillers Mountains Region Owner Altitude 6950 Dpenings Formation (or kind of rock) Probably rises on igneous rock Improvements, use	Reference Spring Schedule Name Stock Spring Number _ TC-22 Henry Mountains Region Duadrangle Mt Hillers Drainage Trachyte Coordinates(D34-11)24bbd Sub-drainage Swett Creek, Star Creek County Garfield Ident. # (Lat.) 37 50 33 (Long.) 120 39 09 Owner Topography_Gentle south slope off Mt Hillers Owner Altitude _ 5900 Openings Formation (or kind of rock) Improvements, use _ Tanks, pipe; stock corral Discharge _2-3 gpm _ cfs M, () R Temperature _22 °C _ °F Conductance _ 320 _ m mhos _ pH Date of record <u>8/4/</u> 1975 _ 1976 _ Recorded hy H. D. Goode Remarks: Water may come from Star Spring.
Improvements, use	

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A-20
 Reference
 Spring Schedule
 Name
 Fourmile Spg

 Number
 LR-1
 Henry Mountains Region
 Quadrangle Mt Hillers
 Reference Spring Schedule Number LR-5 Henry Mountains Region Name Wild Horse Spg Name Fourmile Spg Quadrangle Mt Ellsworth Drainage Smith Fork Coordinates (D36-12)5ddd Drainage Fourmile Canyon Coordinates (D35-12)9cdd Sub-drainage____ County Carfield County Garfield Sub-drainage Smith Fork Ident. # (Lat.) 37 46 25 (Long.) 110 35 43 Owner Ident. # (Lat.) 37 40 45 (Long.) 110 36 10 Owner Topography Canyon bottom Topography Gentle slope Altitude 5210 Altitude 4710 Openings Seep Openings Formation (or kind of rock) Navajo, st top of Kayenta Formation (or kind of rock) Carmel (white sandstone) Improvements, use Trough Improvements, use Discharge < 1/8 gpm_____cfs M, (E, R, Temperature 17 °C____ Discharge__O__gpm___cfs_M, E, R, Temperature___°C___ °F Conductance Conductance 500 m mhos pH m mhos_____pH Date of record 1975 8/30/1976 Recorded by H. D. Goode Date of record 8/18/ 1975 1976 Recorded by H. D. Coode Remarks: * BLM map shows Wild Horse Spring in sec 4; Remarks: Abundant vegetation - may yield more water at times. Vegetation: Cottonwood, wire grass, salt cedar, pine BLM marker at spring shows sec 5. Vegetation: Dead cottonwood Reference Spring Schedule Number LR-2 Henry Mountains Region Spring Schedule Henry Mountains Region Name Ticaboo Shelf Reference Number LR-6 Name Mule Spring Quadrangle Mt Ellsworth Quadrangle Mt Ellsworth Drainage Ticaboo Creek Coordinates (D3512-12)27cca Drainage Smith Fork Coordinates (D36-12)8aaa Sub-drainage South Fork Ticaboo Creek, unnamed County Carfield Ident. # (Lat.) 37 42 06 (Long.) 110 34 48 Owner Sub-drainage Smith Fork County Carfield Ident. # (Lat.) 37 40 41 (Long.) 110 36 06 Owner Topography Below mesa surface south side of canyon Topography Gentle slope Altitude 4820 Openings 1 Altitude 4690 Openings Formation (or kind of rock) Carmel (white sandstone) Formation (or kind of rock) Carmel (white sandstone) Improvements, use Fenced enclosure, small open tank - full Improvements, use Collection box, storage tank, trough; stock Discharge < 1/4 gpm cfs M, E R Temperature 24 °C Discharge tricklegpm cfs M, (E) R Temperature 23 °C °F Conductance 440 Conductance 475 m mhos pH m mhos____pH Date of record 8/18/ 1975 1976 Recorded by H. D. Goode Date of record 8/18/ 1975 1976 Recorded by H. D. Goode Remarks: C 8/18/75 Remarks: Tufa deposit 5 ft thick 100 yds downstream. * This spring shown on BLM map in sec 9. Reference Spring Schedule Number LR-3 Henry Mountains Region Name Colt Spring Number___ Quadrangle Mt Ellsworth Coordinates (D3512-12)33ccb Drainage Smith Fork County Carfield Sub-drainage____ Ident. # (Lat.) 37 41 18 (Long.) 110 36 06 Owner Topography Arroyo in bedrock Altitude 4780 Openings Formation (or kind of rock) Carmel (white sandstone) Improvements, use Tank, trough; stock Dischargetrickle gpm____cfs M, (E) R, Temperature 21 °C____ Conductance 460 m mhos pH Date of record 8/18/1975 1976 Recorded by H. D. Goode Remarks: Vegetation: Salt cedar Reference Spring Schedule Name Wild Colt Spring Number <u>LR-4</u> Henry Mountains Region Quadrangle Mt Ellsworth Drainage Smith Fork Coordinates (D36-12)5dsa Sub-drainage____ County Garfield Ident. # (Lat.) 37 40 53 (Long.) 110 36 08 Owner Topography Bresk in bench surface Altitude 4760 Openings Formation (or kind of rock) Contect Entrada over Carmel Improvements, use Trough Discharge____O_gpm____cfs__M, E, R__Temperature____°C____ Conductance_____m mhos_____pH Date of record 8/18/1975_____1976____ Recorded by H. D. Goode Remarks: No water, six cottonwoods. Has BLM mark of Colt spring.

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Reference Spring Schedule Name Squaw Spring Number HG-1 Henry Mountains Region Quadrangle Mt Hillers Drainage Hansen Greek Coordinates (D34-11)8cca Sub-drainage Hansen Creek County Garfield Ident. # (Lat.) 37 51 41 (Long.) 110 43 40 Dwner Topography Gentle slope Altitude 6690 Dpenings Formation (or kind of rock) Colluvium over clay in Tununk Shale Improvements, use Pond; stock Discharge 15 gpm cfs (M) E, R, Temperature 16 °C °F Conductance 360 m mhos pH Date of record 8/3/ 1975 7/9/ 1976 Recorded by H. D. Goode Remarks: 7/9/76 27 ⁰ G 320 mmho 18 gpm 7/5/77 no flow; pond dry 15	A-21 Reference Spring Schedule Number HG-5 Henry Mountains Region Quadrangle Gopper Spring Drainage Hansen Greek Sub-drainage Copper Spring Ident. # (Lat.) 37.50.52 Ident. # (Lat.) 37.50.52
Reference Spring Schedule Name Papoose Spg W Number HG-2 Henry Mountains Region Quadrangle Mt Hillers Drainage Hansen Creek Coordinates (D34-11)18ccb Sub-drainage Unnamed trib County_Garfield Ident. # (Lat.) 37 50 46 (Long.) 110 44 46 Dwner Topography_Edge of pediment Altitude 5920 Dpenings Formation (or kind of rock) Pediment gravel on Tununk Shale Improvements, use_Stock Discharge 1/8 gpm_cfs M. R Temperature_17 °C °F Conductance 420 m mhos_pH Date of record_1975_7/9/1976_Recorded by H. D. Goode Remarks: Name Papoose Spg W	Reference Spring Schedule Name Number HG-6 Henry Mountains Region Quadrangle_Mt Hillers Drainage Hansen Creek Coordinates (D34-11)29cde* Sub-drainage_Copper Creek County_Garfield Ident. # (Lat.)_37_48_59 (Long.)_110_43_31 Dwner Topography_Stream bottom Dpenings Altitude 5120 Dpenings Formation (or kind of rock) Improvements, use Discharge 4-5 gpm
Reference Spring Schedule Name Papoose Spg E NumberHC-3 Henry Mountains Region Quadrangle Mt Hillers Drainage Hansen Creek Coordinates (D34-11)18ccd Sub-drainage Unnamed trib County Garfield Ident. # (Lat.) 37 50 45 (Long.) 110 44 37 Dwner	Reference Spring Schedule Name Thompson Spg Number HC-7 Henry Mountains Region Quadrangle Hall Mesa Drainage Hansen Creek Coordinates(D35-10) 35aab Sub-drainage Thompson Ganyon County Garfield Ident. # (Lat.) 37 43 42 (Long.) 110 46 10 Owner Topography Alcove in sandstone ledge Openings Formation (or kind of rock) Dakota sandstone Improvements, use Discharge 0 gpm cfs M, E, R, Temperature °C °F Conductance m mhos pH Date of record 8/4/ 1975 1976 Recorded by H. D. Goode Remarks: Dry In past water came out of base of Sandstone above shale in east facing Alcove.
Reference Spring Schedule Name Copper Creek Spg Number HC-4 Henry Mountains Region Quadrangle_Mt Hillera Drainage Gopper Creek, unnamed trib Coordinates (D34-11)16dbd Sub-drainage Copper Creek, unnamed trib County_Garfield Ident. # (Lat.)_37_50_54 (Long.)110_42_01 Dwner	Reference Number Spring Schedule Henry Mountains Region Name Honey Pots Drainage Hansen Quadrangle Mt Ellsworth Sub-drainage Thompson Canyon County_Garfield Ident. # (lat.) 37 42 38 (Long.) 110 44 24 Owner Topography Bottom of bedrock canyon Owner Altitude 4260 Dpenings Formation (or kind of rock) Sandstone on grey clay (Morrison) Improvements, use Discharge 2 gpmcfs M, C R Temperature 23 °C°F °F Conductance_3000 m mhospH Date of record 8/17/ 1975 1976 Recorded by H. D. Goode Remarks: C 8/17/75 Forms alcove in stream channel. * BLM map showa apring about 1/4 ml east of actual location.

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	A-22
Reference Spring Schedule Name Chucker Spg. Number HC-9 Henry Mountains Region Quadrangle Mr. Hillers Drainage Hansen Creek Coordinates (D34-11) 27bbb Sub-drainage Shitamaring, unnamed trib County_Garfield Ident. # (Lat.) 37 49 48 (Long.) 110 41 35 Owner Topography Creek channel in pediment gravel southweat of Mt Hillers Altitude 5270 Openings Formation (or kind of rock) Pediment gravel over Tununk Shale Improvements, use Discharge 0 gpm cfs M, E, R, Temperature 18 °C °F Conductance m mhos pH Date of record 1975 7/9/ 1976 Recorded by H. D. Goode Remarks: Wire graaa, three large cottonwoods. Stagnant water only in channel bottom.	Reference Spring Schedule Name_Ant Knoll Spring Number HC-13 Henry Mountains Region Quadrangle_Mt Ellsworth Drainage_ Hanaen Coordinates (D36-11)9adb Sub-drainage_ Shitamaring, unnamed County_Garfield Ident. # (Lat.) 37 41 46 (Long.) 110 41 39 Dwner Topography Deep alcove near Ant Knoll
Reference Spring Schedule NameShitamaring Seep Number HC-10 Henry Mountains Region Ouderpace Mt Hillere	Reference Spring Schedule Name Point Bar Spring Number HC-14 Henry Mountains Region Oundrangle Mr Ellsworth
Mainter Netry Hountains Keylon Quadrangle Mt Hillers Drainage Hansen Coordinates (D35-11)21abb Sub-drainage Shitamaring Creek County Garfield Ident. # (Lat.) 37 45 23 (Long.) 110 42 08 Dwner Topography Bulldozer cut through bedrock Dwner	Number H0-14 Henry Mountains Region Quadrangle Mt Ellsworth Drainage Coordinates (D36-11)29abc Sub-drainage County Garfield Ident. # (Lat.)_37 39 13 (Long.) 110 43 07 Dwner Topography Bend in stream channel
Altitude 4480	Altitude 3970 Dpenings Formation (or kind of rock) Water rises from point bar deposits oppposite Improvements, use bedrock outcrop.
Discharge <1 gpmcfs M, () R Temperature 22 °C°F Conductance 3600 m mhos pH Date of record 1975_8/30/1976 Recorded by H. D, Coode Remarks:	Discharge <u>Seepage_gpm</u> cfs_M, E, R_Temperature <u>30</u> °C°F Conductance <u>_2600</u> m_mhospH Date of record <u>8/17/</u> 19751976Recorded by H, D, Goode Remarks:
Reference Spring Schedule Name Shitamaring Pond Number_HC-11 Henry Mountains Region Quadrangle Mt Ellsworth Drainage Hanaen Creek Coordinates (035-11) 33cba Sub-drainage_Sitamaring Creek County Garfield Ident. # (Lat.) 37 43 14 (Long.) 110 42 32 Owner Topography_Bedrock outcrop beaide alluvial valley Owner	Reference Spring Schedule Name Mill Race Spg NumberHC-15 Henry Mountains Region Quadrangle Mt Ellsworth Drainage_Hansen Coordinates (D36-11) 32 cad Sub-drainage_ County_Garfield Ident. # (Lat.)_37_37_54_(Long.)_110_43_09 Owner
Altitude 4250 Dpenings Formation (or kind of rock)_Entrada or alluvium Improvements, use Bulldozed pond	Altitude 3890 Openings Formation (or kind of rock) Stream channel, probably above bedrock barrier Improvements, use
Discharge - gpm cfs M, E, R, Temperature 23½ °C °F Conductance 4600 m mhos pH Date of record 1975 8/30/ 1976 Recorded by H. D. Goode Remarks: * No viaible flow; aeepage may come from Entrada or	Discharge 5 gpm cfs M, (E) R, Temperature 25 °C °F Conductance 4000 m mhos pH Date of record 8/17/1975 1976 Recorded by H, D. Goode Remarks: C 8/17/75
channel underflow.	⁷ BLM map ahows spring about 1/3 mi north of its actual location.
Reference Spring Schedule Name Loat Spring Number HC-12 Henry Mountains Region Quadrangle Mt Ellaworth Drainage Hanaen Coordinates (D35-11) 34cbb Sub-drainage Shitamaring, Lost Spring Waah County Garfield Ident. # (Lat.) 37 43 15 (Long.) 110 41 36 Owner	Reference Spring Schedule Name Came Spring Number HC-16 Henry Mountains Region Quadrangle Mt Ellaworth Quadrangle Mt Ellaworth Drainage Hansen Coordinates (037-11)9bac County Garfield Jdent. # (Lat.) 37 36 38 (Long.) 110 42 18 Owner Topography Eaat aide stream channel Garfield Garfield Garfield Garfield
Altitude 4460 Dpenings Formation (or kind of rock) Entrada Improvements, use Ory trough Discharge 0 gpm cfs M, E, R Temperature °C °F Conductance m mhos pH Date of record 8/7/1975 1976 Recorded by H. O. Goode Remarks:	Altitude 3820 Dpenings Formation (or kind of rock) Sandstone over ailtstone Improvements, use Discharge 0 gpm cfs M, E, R Temperature °C °F Conductance m mhos Date of record 8/17/1975 1976 Recorded by H. O. Goode Remarks:
Vegetation: Willowa	Water riaes from stream channel below presumed spring aite Est 2 gpm 23 ⁰ 3600 mmhos.

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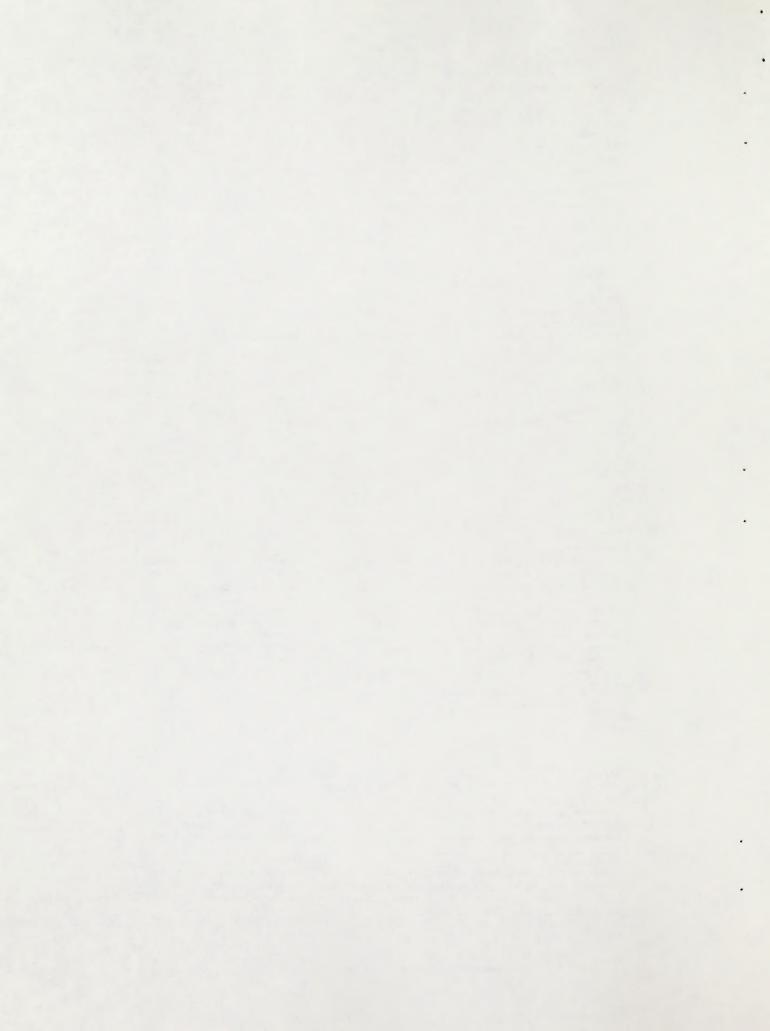
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A-23
 Reference
 Spring Schedule
 Name Wolf Spring

 Number
 HC-17
 Henry Mountains Region
 Quadraugle Mt Elleworth
 Reference Coordinates (D37-11) 34acd* Drainage Hanaen Creek County Garfield Sub-drainage Hansen Creek Ident. # (Lat.) 37 32 56 (Long.) 110 40 46 Owner Topography Alcove in bedrock Altitude <u>3720</u> Openings Formation (or kind of rock) <u>20 ft below white sandstone in Carmel</u> Improvements, use Pipe - (BLM marker)
Discharge _______ cfs M, E, R, Temperature °C °F
Conductance _______ m mhos ______ pH Date of record 8/18/1975 1976 Recorded by H. D. Goode Date 5. Remarks: Dry * Miaplaced about 300 yds on BLM map.

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	A-24
Reference Spring Schedule Name Buffalo Canyon Number Bf-1 Henry Mountains Reginn Quadrangle Mt Ellen Drainage Bullfrog Coordinates(D32-10)9bdb* Sub-drainage Buffalo Cnunty Garfield Ident. # (Lat.) 38 02 27 (Long.) 110 48 57 Owner Topography Valley Bottom Owner	Reference Spring Schedule Name Stockseep Number Bf-5 Henry Mountains Region Quadrangle Mt Ellen Drainage Bullfrog Coordinates(D32-10)29bba Sub-drainage Buffalo, unnamed trib County Garfield Ident. # (Lat.) 38 00 03 (Long.) 110 50 16 Owner Topography Shallow gully For the state of the state
Altitude 8600 Openings Formation (nr kind of rock) Colluvium	Altitude 7040 Openings Seep area Formation (or kind of rnck)
Improvements, use	Improvements, use Fence, collection box, 2 troughs; stock
Discharge 4 gpm cfs (M) E, R, Temperature 10 °C °F	Discharge 2/3 gpm cfs (M) E, R, Temperature 17 °C "F
Conductancem mhospH	Conductance 1350 m mhos pH
Date of record 1975 7/16/ 1976 Recorded by H. D. Goode	Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks: Side Spring from south 15°C 1180 mmho 1 gpm E	Remarks: * Newly developed, not on BLM map.
* This spring is nearly 1/2 mile upstream from location shown on BLM map. Vegetation: Aspen	Newly developed, not on BLM map. Vegetation: Grass
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Reference Spring Schedule Name Buffalo Seep Number Bf-2 Henry Mountains Region Quadrangle Mt Ellen Orainage Bullfrog Coordinates (D32-10) 8ddd Sub-drainage Buffalo, unnamed trib County Garfield Ident. # (Lat.) 38.01.53 (Long.) 110.49.27 Dwner	Reference Spring Schedule Name Roadside Spring Number Bf-6 Henry Mountains Region Ouadrangle Mt Ellen Drainage Bullfrog Coordinates (D32-10) 30 aaa Sub-drainage Buffalo, unnamed trib County Garfield Ident. # (Lat.) 38 00 01 (Long.) 110 50 30 Owner Topography Creek bottom
Altitude 8090 Dpenings	Altitude 6900 Openings Many
Formation (or kind of rock) Colluvial slope over Tununk Shale	Formation (or kind of rock) Colluvium over shale
Improvements, use	Improvements, use <u>Stock</u> Discharge 10 gpm cfs M, (E) R Temperature 17.5 °C °F
Conductancem mhospH	Conductance 1000 m mhos pH
Date of record 1975 7/15/1976 Recorded by H. D. Goode	Date of record 8/14/1975 1976 Recorded by H. D. Goode
Remarks:	Remarks: C 8/14/75
Reference Spring Schedule Name Roadside Seep Number Bf-3 Henry Mountains Region Quadrangle Mt Ellen Drainage Bullfrog Coordinates (D32-10) 8ddb Sub-drainage Buffalo, unnamed trib County Garfield Ident. # (Lat.) 38 02 03 (Long.)110 49 33 Dwner Topography Gentle slope, north of road Dwner Altitude 8220 Dpenings Formation (or kind of rock) Colluvium Improvements, use Discharge gpm Discharge gpm cfs M, E, R, Temperature 25 °C °F Conductance 480 m mhos pH Date of record 8/14/1975 1976 Recorded by H. D. Goode Remarks: No flow; may be capable of yielding 1-2 qts/min Vegetation: Stand of small oaks	Reference NumberBF-7Henry Mountains Region NameBuffalo DrainageBulfrog Coordinates (D32-10) 30bba Sub-drainageBuffalo_Creek, unnamed_trib CountyGarfield Ident. # (Lat.) 38 00 01 (Long.) 110 51 15 Owner TopographySmall_gullysouth of Buffalo Creek, near road AltitudeG460 AltitudeG460 Dpenings Formation (or kind of rock)Colluvium Improvements, use DischargegpmcfsPH Date of record_8/14/_19751976Recorded by H. D. Goode Remarks: State of the sta
Reference Spring Schedule Name Airplane Spring Number Bf-4 Henry Mountains Region Ourdepende No	Reference Spring Schedule Name Horn Hole Number Bf-8 Henry Mountains Region Output Mt Benell
Quadrangle Mt Ellen	Quadrangte Mt Pennell
Drainage_Bullfrog Coordinates (D32-10)21ccc Sub-drainage_Buffalo, unnamed trib County Garfield	Drainage Bullfrog Cnordinates (D32-10) 33aba Sub-drainage Unnamed trib County Garfield
Sub-Grainage Burraio, unnamed trib County Garrield Ident. # (Lat.) 38 00 06 (Long.) 110 49 12 Owner	Ident. # (Lat.) 37 59 12 (Long.) 110 48 34 Owner
Topography <u>Gentle swale near Pennellen Pass</u>	Topography Shallow valley developed on shale
Altitude 7680 Dpenings	Altitude 8240 Openings Two or more
Formation (or kind of rock) Probably colluvium over shale	Formation (or kind of rock) Shale
Improvements, use Collection box, faucet, fence, trough; stock and camping	Improvements, use Stock
Dischargegpmcfs M, E, R Temperature 11 °C°F	Discharge $< 1^*$ gpm cfs M, (E) R Temperature 12 °C °F
Conductance 700 m mhos pH	Conductance800m mhospH
Date of record <u>8/14/1975</u> 1976Recorded by H. D. Goode	Date of record 8/15/ 1975 1976 Recorded by H. D. Goode
Remarks: C 8/14/75	Remarks:
* Probably can yield 5 to 10 gpm.	* Orifice west of one above yields 1 ⁺ gpm, 16 ⁰ , 700 mmhos.
7/4/77 15°C 66Dmmho Measured in trough, no flow from faucet	Vegetation: Several acres of Oak.



	A-25
Reference Spring Schedule Name Elk Head Number Bf-9 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates (D32-10) 33bcd* Sub-drainage Unnamed tributary County_Garfield Ident. # (Lat.) 37 58 48 (Long.) 110 49 06 Owner Topography_Junction of two tributaries on landslide slope Altitude 7740 Openings 2 springs Formation (or kind of rock) Light gray igneous rock (talus ?) over shale Improvements, use Stock Discharge 80 Discharge 80 gpm	Reference Spring Schedule Name Talus Spring Number Bf-13 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates(D33-10)8sds Coordinates(D33-10)8sds Sub-drainage Pipe Spring Canyon, unnamed trib County Garfield Ident. # (Lat.) 37 57 14 (Long.) 110 49 21 Owner Topography South slope steep stream channel Altitude 7840 Altitude 7840 Openings Formation (or kind of rock) Talus Improvements, use Stock Oischarge 15-20 gpm cfs Date of record 1975 7/26/ 1976 Recorded by H. D. Goode Remarks: State of the stream channel
Reference Number Spring Schedule Henry Mountains Region Name Dry Spring QuadrangleMt Pennell Orainage Bullfrog Coordinates (D33-9)12cba Sub-drainage Bullfrog County_Garfield Ident. # (lat.) 37 57 03 (Long.) 110 52 24 Owner Topography Break in slope Formation (or kind of rock) Masuk sandstone over shale Improvements, use Oischargegpmcfs M, E, R Temperature°C°F Conductancem mhospH Date of record1975 7/27/ 1976 Recorded by H, D. Goode Remarks: Dsmp esrth, no flow.	Reference Number Spring Schedule Henry Mountains Region Name Bulldog Peak Spg* Quadrangle Mt Hillers Drainage Bullfrog Coordinates (D33-11)19ccb Sub-drainage Pennell Creek, unnamed trib County Garfield Ident. # (Lat.) 37 55 05 (Long.) 110 44 49 Owner Topography Gully west of Bulldog Peak Altitude 7900 Openings Formation (or kind of rock) Improvements, use Discharge gpm cfs M, E, R Date of record 1975 1976 2/27/77 Recorded byH. D. Goode Remarks: * Plotted as Mud Spg on Topo 7/4/77 Small pool, no visible flow in deep gully
Reference Spring Schedule Name Pine Spring NumberBf-11 Henry Mountains Region Quadrangle Mt Pennell Orainage Bullfrog Coordinates (D33-10) 4bcb Sub-drainage Pipe Spring Canyon County Gerfield Ident. # (Lat.) 37 58 04 (Long.) 110 49 11 Owner Topography NW facing colluvial slope - may be mudflow or landslide Altitude 8160 OpeningsOne principal - at least 2 other Formation (or kind of rock)Colluvium over shale Seeps north of spg Improvements, use Stock Oischarge 60 gpm cfs C % Oischarge 60 gpm cfs PH Date of record 7/8/1975 7/11/1976 Recorded by H. D. Goode Remarks: C 7/8/75 * On BLM map spring is shown in sec 5. 7/11/76 8°C 330 mmho Beckman; 350 Hsch 40 gpm M Vegetation: Large ponderoses st spring, others below 7/4/77 9°C 355mmho 1.8gpm M	Reference Spring Schedule Name_Mud_Spring NumberBf-15Henry Mountains Region QuadrangleMt_Hillers OrainageBullfrog Coordinates (D33-10)24dda Sub-drainagePennell Creek, unnamed_trib CountyGarfield Ident. # (Lat.) 37 54 53 (Long.) 110 44 58 Owner TopographySwale southeast slope Mt_Pennell Owner Altitude750OpeningsSeeps Formation (or kind of rock)Shale Improvements, useStock OischargegpmcfsM_E, R, Temperature°C°F Onductancem_mhospH Date of record197584/1976Recorded by H. D. Goode Remarks: * * Did not measure; low flow. ** BLM map shows this spring in sec 25; USGS map labels s spring in sec 19 as Mud Spring. 7/4/77Owflow
Reference Spring Schedule Name_Pennell Igneous NumberBf=12 Henry Mountains Region QuadrangleRennell DrainageBullfrog Coordinates (D33-10)9bbc Sub-drainageRepring_Canyon, unnamed_trib CountyGarfield Ident. # (lat.)_37 57 18 (Long.)110 49 15 Owner Topography Very steep stream channel in igneous bedrock AltitudeR040 Openings Formation (or kind of rock)Ingneous (may be nesrly vertical contact with Improvements, useStock Oischarge10 gpmcfs @Recorded byH. D. Goode Remarks: c 7/26/76	Reference Spring Schedule Name Sidehili Number Bf-16 Henry Mountains Region QuadrangleMt Pennell Orainage Bullfrog Coordinates (D33-10)23dsa Sub-drainage Pennell Creek, unnsmed trib County Gerfield Ident. # (Lat.) 37 55 13 (Long.) 110 46 06 Owner Owner Topography South slope of Bulldog ridge Altitude 8240 Openings Formation (or kind of rock) Colluvium, probably over igneous rock Improvements, use Collection box, pipe, series of troughs 280 ft long Discharge 3* gpm cfs (M) E, R Temperature 11 °C °F Conductance 350 m mhos pH Oate of record 7/9/ 1975 7/10 1976 Recorded by H, D, Goode Remarks: * 7/10/76 17°C 1 1/2 gpm Measured Vegetation: Oaks Sured

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Reference Spring Schedule Name Spring on Flat Number Bf-17 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates(D33-10)26dbb Sub-drainage Pennell Creek, unnamed trib County Garfield Ident. # (Lat.) 37 54 21 (Long.) 110 46 33 Owner Topography South facing side of hill at base Altitude 7020 Openings Formation (or kind of rock) Mancos shale near intrugive Improvements, use Stock Discharge 2-3 Opm mhos pH Date of record 7/9/ 1975 Date of record 7/9/ 1975 Could not measure. Vegetation: Guid not measure. Vegetation:	Reference Spring Schedule Name Caas Reaevoir Number Bf-21 Henry Mountains Region Quadrangle Mt Hillers Drainage Bullfrog Creek Coordinates (D33-11) 32bcd Sub-drainage Pennell Creek, unnamed trib County_Garfield Ident. # (Lat.) 37 53 39 (Long.) 110 43 32 Owner Topography Steep west slope Mt Hillers Owner Openings 1 Altitude 7400 Openings 1 Owner Formation (or kind of rock) Igneous over shale Improvements, use Stock, flows to reservoir Discharge 60-65 gpm cfs E, R, Temperature 8 "C "F Conductance 320 u mhos pll Date of record 8/2/ 1975 7/9/ 1976 Recorded by H, D, Goode Remarks: c 8/2/75 Flow measured at road, temperature measured at spring opening. 7/9/76 20°C 320 mmho 48 gpm measured at road, Vegetation: Vegetation: Aspen 7/5/77 20°C 305mmho 20gpm M at road
Reference Spring Schedule Name Behnke Spring Number Bf-18 Heury Mountains Region Ouadrangle Mt Hillers Drainage Bullfrog Creek Coordinates (D33-11)29dac County Garfield Sub-drainage Pennell Creek, unnamed trib County Garfield Owner Richard Behnke Topography Steep west slope Cass Creek Peak Owner Richard Behnke Altitude 7960 Dpenings 1 Formation (or kind of rock) Talus Improvements, use Pipe; domestic at mining camp Discharge 2-3 gpm cfs M. R Temperature 4 °C 39 °F Conductance 225 m mhos pH Date of record 8/2/1975 1976 Recorded by H. D. Goode Remarks: State State State State	Reference Number Bf-22 Spring Schedule Henry Mountains Region Name Emery Seep Quadrangle Mt Pennell Drainage Bullfrog Coordinates (D33-9)15cba Sub-drainage Muley Creek County Garfield Ident. # (Lat.) 37 56 10 (Long.) 110 54 33 Owner Topography Deep alcove in sandstone Altitude 5600 Openings Formation (or kind of rock) Emery Sandstone Improvements, use Discharge Discharge 1-2 gpm Cfs M. Q R Temecrature Pll Date of record 1975 7/28/1976 Remarks: Inaccessible
Reference Spring Schodule Name Pennell Spring Number Bf-19 Henry Mountains Region Quadrangle Mt Hillers Drainage Bullfrog Coordinates (D33-11) 30dda Sub-drainage Pennell Creek Coordinates (D33-11) 30dda Sub-drainage Pennell Creek County Garfield Ident. # (Lat.) 37 54 13 (Long.) 110 43 50 Dwner Topography Southaide Pennell Creek Dwner Altitude 7160 Openings Two Formation (or kind of rock) Colluvium Improvements, use Stock Discharge 25-30 [*] gpm	Reference Spring Schedule Name_Footbath Spg NumberBf-23 Henry Mountains Region Quadrangle Mt Pennell Drainage_Bullfrog Coordinates(D33-9)17cd Sub-drainage_Muley Creek County Garfield Ident. # (Lat.) 37 55 50 (Long.) 110 56 50 Owner Topography_Alcove Altitude_S520 Openings Formation (or kind of rock) Sandstone, Emery Improvements, use Stock Discharge_2 gpmcfs_M, (C) R, Temperature 25 °C °F °F Conductance_1300 ni mhospH Date of record_1975.7/28/1976 Recorded by H. D. Goode Remarks: States States States States
Reference Spring Schedule Name Sackett Spring Number Bf-20 Henry Mountains Region Name Sackett Spring Quadrangle Mt. Hillers Quadrangle Mt. Hillers Quadrangle Mt. Hillers Drainage Bullfrog Creek Coordinates(D33-11) 31abb Sub-drainage Pennell Creek, unnamed trib County Garfield Ident. # (Lat.) 37 53 59 (Long.) 110 44 18 Owner Topography Gentle slope Altitude 7020 Openings Formation (or kind of rock) Colluvium Improvements, use Discharge 15-20 gpm cfs Discharge 650 m mhos pH Date of record 8/2/ 1975 1976 Recorded by H. D. Goode Remarks: 7/4/77 11°C 660mmhos 15-20gpm E. This spring appears little changed from what it was in 1975. 1975	Reference Spring Schedule Name Muley X Number Bf-24 Henry Mountains Region Quadrangle Mt Pennell Drainage Sub-drainage Muley Creek Coordinates (D33-9)17ccc Sub-drainage Muley X Quadrangle Mt Pennell Ident. # (Lat.) 37.55.48 (Long.) 110.56.59 Owner Owner Topography Break in sandstone ledge Owner Owner Altitude 5480 Openings Formation (or kind of rock) Sandstone, Emery Improvements, use Discharge < 1/4 gpm cfs M, C R Temperature 20 °C °F Conductance 1800 m mhos pH Date of record 1975.7/28/ 1976 Recorded by H. D. Goode Remarks: Discharge Sub-Starge Sub-Star

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	A-27
Reference Spring Schedule Name Muley Z. NumberBf=25 Henry Mountains Region Quadrangle Mt Pennell DrainageBullfrog Coordinates (D33-9)20bba Sub-drainageMuley Creek CountyGarfield Ident. # (Lat.) 37 55 41 (Long.)110 56 43 Dwner	Reference Spring Schedule Name Buck Spring NumberBf=29 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates (D35-10)7cbb Sub-drainage Muley Creek, Butt Canyon County Garfield Ident. # (Lat.) 37 46 41 (Long.) 110 51 27 Dwner
Topography Broad swale filled with grass and oak	Topography <u>Canyon in sandstone</u> , creek bottom
Altitude 5500 Dpenings	Altitude 4490 Openings
Formation (or kind of rock) Emery Sandstone	Formation (or kind of rock) Alcove in Dakota Sandstone, overlying clay
Improvements, use	Improvements, use
Discharge < 1/8 gpm cfs M, (E) R, Temperature °C °F	Discharge < 1 gpm cfs M, (E, R, Temperature 17 °C °F
Conductancem mhospH	Conductance 2500 m mhos pH
Date of record 1975 7/28/ 1976 Recorded by H. D. Goode	Date of record 8/19/1975 1976 Recorded by H. D. Goode
Remarks:	Remarks:
Vegetation: Oak tall grass	
	Tubus Carles
Reference Spring Schedule Name Muley W Number Bf-26 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates(D33-9)20bbb Coordinates(D33-9)20bbb County_Garfield	Reference Spring Schedule Name Jackass Spring Number Bf-30 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates (D35-9)13bbd Sub-drainage Unnamed trib
Ident. # (Lat.) 37 55 40 (Long.) 110 56 52 Owner	Ident. # (Lat.) 37 46 09 (Long.) 110 52 20 Owner
TopographySide of alcove, below waterfall	Topography_Stripped sandstone surface
Altitude 5440 Openings	Altitude4790Openings
Formation (or kind of rock) Grey sandstone, Emery	Formation (or kind of rock) Dakota sandstone
Improvements, use	Improvements, useTrough; stock
Discharge* gpmcfs M, E, R Temperature°C°F	Discharge < 1/16 gpm cfs M, (E) R Temperature 20 °C °F
ConductancepH	Conductance 620 m mhos pH
Date of record 1975 7/28/ 1976 Recorded by H. D. Goode	Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:	Remarks:
Inaccessible *	
Visual estimate from a distance of several gpm.	
Reference Spring Schedule Name Muley V Number Bf-27 nv Henry Mountains Region Quadrangle Mt Pennel1 Drainage Bullfrog Coordinates (D33-9)19dab Sub-drainage Muley Creek, unnamed left fork County Garfield Ident. # (Lat.) 37 55 14 (Long.) 110 57 11 Dwner	Reference Spring Schedule Name Thompson Seep Number Bf-31 Henry Mountains Region Quadrangle Mt Pennell Drainage Bullfrog Coordinates(D35-9)13cbc Sub-drainage Unnamed trib County Garfield Ident. # (Lat.) 37 45 47 (Long.) 110 52 34 Dwner
Topography Alcove	Topography Shallow alcove
Altitude 5420 Openings	Altitude 4920 Dpenings
Formation (or kind of rock) Emery sandstone	Formation (or kind of rock) X bedded Dakota sandstone above clay
	Improvements, use Collection drum; storage tank, trough; stock
Improvements, use	Discharge < 1 gpm cfs $M_{s}(E)$ R, Temperature ²¹ °C °F
Conductancem mhosPH	Conductance 850 m mhos pH
Date of record1975 7/28/1976Briddle By H. D. Goode	Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:	Remarks:
In deep alcove - Saw only from airplane.	Vegetation: Cottonwood
Reference Spring Schedule Name Muley Seeps Number Bf-28 nv Henry Mountains Region QuadrangleMt Pennell	Reference Spring Schedule Name Egg Nog NumberBf-32 Henry Mountains Region QuadrangleMt Pennel1
Drainage Bullfrog Coordinates (D34-9)22add	Drainage Bullfrog Coordinates (D35-10)18bad
Sub-drainage Muley Creek County Garfield	Sub-drainage Unnamed trib County Garfield
Ident. # (Lat.) 37 50 17 (Long.) 110 53 45 Owner	Jobser a mage County Galified Ident. # (Lat.) 37 46 10 (Long.) 110 51 01 Dwner
Topography Broad Creek Valley	Topography
Altitude 4780 Dpenings	Altitude 4480 Dpenings
Formation (or kind of rock)	Formation (or kind of rock) Dakota sandstone over shale
Improvements, use	Improvements, use
Dischargegpmcfs_M, E, RTemperature°C°F	Discharge 2-3 gpm cfs M, (E, R Temperature 15 °C °F
Conductancem mhospH	Conductance 700 m mhos pH
Date of record 1975 1976 2/27/77 Recorded by H. D. Goode	Date of record 8/19/1975 1976 Recorded by H. D. Goode
Remarks:	Remarks:
Did not visit. No evidence of water on air photos.	C 8/19/75
	Vegetation: Cottonwood, willows, salt cedar

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Reference Spring Schedule Name Indian Spring	Reference Spring Schedule Name Fourmile
Number Bf-33 Henry Mountains Region Quadrangle Mt Hillers	NumberBf-37Henry Mountains Region QuadrangleHall Mesa
Drainage Bullfrog Coordinates(D34-11)7dbc	Drainage Bullfrog Coordinates (D35-10) 33dbc
Sub-drainage Saleratus Wash County Garfield	Sub-drainage Fourmile Canyon County Garfield
	Ident. # (Lat.) 37 43 05 (Long.) 110 48 42 Dwner
Ident. # (Lat.) 37 51 48 (Long.) 110 44 19 Dwner	Topography Stream channel cut into flat lying Morrison Sandstone
TopographyPediment slope	lopography Stream channel cut into fiat lying Hoffison Sandstone
	*
Altitude 6430 Dpenings	Altitude 4320 OpeningsOne principal *
Formation (or kind of rock) Sand, probably over Tununk Shale	Formation (or kind of rock) Morrison
Improvements, use Fenced collection box; stock	Improvements, use Goes downstream; stock
Discharge 1/4 gpm cfs M, (E) R, Temperature 17 °C °F	Discharge 1 gpm cfs M, (E) R, Temperature 19 °C °F
	Conductance 1300 Beck m mhos pH
Conductance 470 m mhos pH	
Date of record 8/2/ 1975 1976 Recorded by H. D. Goode	Date of record 1975 8/31/1976 Recorded by H. D. Goode
Remarks:	Remarks:
Several springs in area. 30 ft diameter pond below one of these,	C 8/31/76
is fed by seep that yields 2 gpm 400 mmhos 17°C.	Vegetation: Cottonwood, wire grass
	* One principal, plus seepage - water issues from crack in
	sandstone in stream channel.
7/5/77 New metal collection box north of old one	
19°C 390mm o <1qt/min E	
	Defenses Capital Cabadala Nama di Ca
Reference Spring Schedule Name Cow Seeps Number Bf-34 Henry Mountains Region Quadrangle Mt Pennel1	Reference Spring Schedule Name Clay Seep Number Bf-38 Henry Mountains Region Quadrappile Hall Mega
Quadrangiene remeir	Qualitative national and
Drainage Bullfrog Coordinates (D34-10)24bca	Drainage Bullfrog Coordinates (D35-9)26bbb
Sub-drainage Saleratus Wash County Garfield	Sub-drainage Clay Canyon, unnamed trib County Garfield
Ident. # (Lat.) 37 50 23 (Long.) 110 45 50 Dwner	Ident. # (Lat.) 37 44 32 (Long.) 110 53 35 Dwner
	Topography Shallow valley in sandstone
Topography Gully cut into edge of pediment	lopography Shallow valley in sandscone
Altitude 5440 Dpenings	Altitude 5000 Dpenings
Formation (or kind of rock) Pediment gravel	Formation (or kind of rock) Morrison
	Improvements, use Six troughs, all full; stock
Improvements, use Trough; stock	
Discharge 1 * 9pmcfs (M) E, R Temperature 17 °C°F	Discharge < 1/8 [*] gpmcfs (M) E, R Temperature 21 °C°F
Conductance 620 m mhos pH	Conductance 710 m mhos pH
Date of record 8/3/1975 1976 Recorded by H. D. Goode	Date of record 8/19/1975 1976 Recorded by H. D. Coode
Remarks:	
* Discharge measured at pipe, no flow at spring.	Remarks: * Could not find source; measured at pipe.
Discharge measured at pipe, no flow at spring.	
7/5/77 19°C 610 mmho 5qt/min M	C 4/26/59
	Defense
Reference Spring Schedule Name Saleratus Spring Number Bf-35 Henry Mountains Region Outdrandle Mt. Percell	Reference Spring Schedule Name Point Seep NumberBf-39 Henry Mountains Region Quadrapple Hall Mesa
Number BI-35 Henry Hounzams Region Quadrangle Mt Pennel1	Number Number Quadrangle Hall Mesa
quadrangie in termeti	decenent of the second s
Drainage Bullfrog Coordinates (D35-10)21bcc	
Drainage Bullfrog Coordinates (D35-10)21bcc	Drainage Bullfrog Coordinates (D36-10) 26ad
Drainage_BullfrogCoordinates(D35-10)21bcc Sub-drainage_Saleratus WashCounty_Carfield	DrainageBullfrogCoordinates (D36-10) 26ad Sub-drainageUnnamed_trib CountyCarfield
Drainage Bullfrog Coordinates (D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner	Drainage Bullfrog Coordinates (D36-10) 26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner
Drainage_BullfrogCoordinates(D35-10)21bcc Sub-drainage_Saleratus WashCounty_Carfield	DrainageBullfrogCoordinates (D36-10) 26ad Sub-drainageUnnamed_trib CountyCarfield
Drainage Bullfrog Coordinates (D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner	Drainage Bullfrog Coordinates (D36-10) 26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner
Drainage Bullfrog Coordinates (D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner	Drainage Bullfrog Coordinates (D36-10) 26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography Altitude 4390 Openings	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography_Edge of mesa Altitude_4900 Openings_
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography Altitude 4390 Openings Formation (or kind of rock) Dakota sandstone caprock over shale	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa Altitude 4900 Openings Formation (or kind of rock) Morrison Formation
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner	Drainage Bullfrog Coordinates(D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident, # (Lat.) (Long.) Dwner Topography Edge of mesa Altitude_4900 Openings_ Formation (or kind of rock) Morrison Formation Improvements, use_
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident, # (Lat.) (Long.) Dwner Dwner Topography Edge of mesa Denings Formation (or kind of rock) Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography Altitude 4390 Openings Formation (or kind of rock) Dakota sandstone caprock over shale Improvements, use	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident, # (Lat.) (Long.) Dwner Dwner Topography Edge of mesa Denings Formation (or kind of rock) Morrison Formation Improvements, use
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident, # (Lat.) (Long.) Dwner Dwner Topography Edge of mesa Denings Formation (or kind of rock) Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident, # (Lat.) (Long.) Dwner Dwner Topography Edge of mesa Edge of mesa Edge of mesa Altitude 4900 Openings Edge of mesa Formation (or kind of rock) Morrison Formation Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F Conductance m mhos pH Date of record 8/4/ 1975 1976 Recorded by H. D. Goode
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County Carfield Ident, # (Lat.) (Long.) Dwner Dwner Topography Edge of mesa Denings Formation Formation Altitude 4900 Openings Denings Formation Formation (or kind of rock) Morrison Formation Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F Conductance m mhos pH PH PH PH
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography_Edge of mesa Dispersion Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography_Edge of mesa Dispersion Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography_Edge of mesa Dispersion Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates (D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa Discharge Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F Conductance m mhos PH Date of record 8/4/1975 1976 Recorded by H. D. Goode Remarks;
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa
Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa
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Drainage Bullfrog Coordinates(D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26ad Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography_Edge of mesa Dispersion Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use
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Drainage Bullfrog Coordinates (D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates (D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa Discharge Altitude 4900 Openings Formation (or kind of rock) Morrison Formation Improvements, use Discharge gpm cfs M, E, R, Temperature °C °F Conductance m mhos PH Date of record 8/4/1975 1976 Recorded by H. D. Goode Remarks;
Drainage Bullfrog Coordinates (D35-10)21bcc Sub-drainage Saleratus Wash County Carfield Ident. # (Lat.) 37 45 07 (Long.) 110 49 16 Dwner Topography	Drainage Bullfrog Coordinates(D36-10)26add Sub-drainage Unnamed trib County_Carfield Ident. # (Lat.) (Long.) Dwner Topography Edge of mesa
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A-29 Reference Spring Schedule QuadrangleHall Mesa Name Dove Spring Drainage Long Canyon Coordinates (D36-9)10acc County Garfield Sub-drainage____ Ident. # (Lat.) 37 41 35 (Long.) 110 54 28 Owner Topography Small alcove in caprock of Mesa Altitude 4960 Openings Formation (or kind of rock) Dakota sandstone over shale Improvements, use Collection box, overturned tank Discharge no flow gpm_____cfs M, E, R, Temperature 19_°C____ Conductance 2800 m mhos pH Date of record 8/19/ 1975 1976 Recorded by H. D. Goode Remarks: C 8/19/75 Reference Spring Schedule Name Berts Spring Reference Spring Schedule Name Berts Spring Number LC-2 Henry Mountains Region Quadrangle Hall Mesa Drainage Long Canyon Coordinates(D36-9)10dcb Sub-drainage Unnamed trib County Garfield Ident. # (Lat.) 37 41 14 (Long.) 110 54 28 Owner Topography Brosd alcove in sandstone below mess top Altitude 4940 Openings Formation (or kind of rock) Dakota over shale Improvements, use Tank and trough; stock Discharge < 1/4 gpm_____Cfs M, (E) R Temperature 25 °C____ Conductance 975 m mhos pH Date of record 8/19/ 1975 1976 Recorded by H. D. Goode Remarks: C 8/19/75 Water for chemical analysis taken from storage tank. Reference Spring Schedule Name <u>Halls Seep</u> Number <u>LC-3 nv</u> Henry Mountains Region Quadrangle <u>Hall Mess</u> Drainage Unnamed * Coordinates (D37-10)17dbd Sub-drainage County Garfield Ident. # (Lat.) 37 35 19 (Long.) 110 49 55 Owner Topography____ Altitude_____ Openings Formation (or kind of rock)____ Improvements, use____ Discharge_____gpm___cfs M, E, R, Temperature____°C____°F
 Conductance______m mhos_____pH

 Date of record_____1975____1976_____Recorded by__
 Remarks: * The seep is on an unnamed tributary to Bullfrog Bssin below Long Canyon. Shows on BLM map. Did not visit, too remote.

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Reference Spring Schedule Name Bitter Spring Number H1-1 Henry Mountains Region Quadrangle Quadrangle Magon Box Drainage Halls Creek Coordinates (D03-8)27bbb Sub-drainage Bitter Spring Creek Coordinates (D03-8)27bbb Sub-drainage Bitter Spring Creek Coordinates (D03-8)27bbb Sub-drainage Bitter Spring Creek Coordinates (D03-8)27bbb Job drainage Bitter Spring Creek Coordinates (D03-8)27bbb Job drainage Bitter Spring Creek Coordinates (D03-8)27bbb Job drainage Bitter Spring Creek Coordinates (D03-8)27bbb Altitude Step canyon in flat-lying rocks	Reference Spring Schedule Henry Mountains Region Name_Swap A Quadrangle_ML Pennell Drainage_Halls_Creek Coordinates (D33-8)25dcd Sub-drainage_Swap Canyon County Carfield Ident. # (Lat.)_37_54_09 (Long.)_110_58_28 Owner
Reference Number Spring Schedule Henry Mountains Region Name Bitter Creek Spg Quadrangle Wagon Box Drainage Halls Creek Coordinates (D33-8)26bbb Sub-drainage Bitter Creek Coordinates (D33-8)26bbb Sub-drainage Bitter Creek County_Garfield Ident. # (Lat.) 37, 54, 55 (Long.) 111 00 09 Owner Topography Broad valley with 20 ft of alluvium above present flood plain Altitude 5290 Openings Formation (or kind of rock) Creek bottom, probably from Emery Sandstone Improvements, use Discharge gpm_cfs Discharge gpm_cfs pH Date of record 8/21/1975 1976 Remarks: Coal bed is about 100 ft above creek.	Reference Spring Schedule Name Swap D Number H1=6 nv Henry Mountains Region Quadrangle Mr Pennell Drainage Halls Creek Coordinates (D33-8)25ddb Sub-drainage Swap, unnamed trib County Carfield Ident, # (Lat.) 37 54 18 (Long.) 110 58 17 Owner Topography Bottom of canyon Altitude 5370 Openings Formation (or kind of rock) Emery Improvements, use Discharge gpm cfs M, E, R Temperature °C °F Conductance m mhos pH Date of record 1975 1976 3/6/1977 Recorded by R. D. Coode Remarks: Shown on BLM map; visible on air photos. Did not visit.
Reference Spring Schedule Name Swap Canyon Spg NumberH1-3 nv Henry Mountains Region Quadrangle Mt Pennell Drainage Halls Creek Coordinates (D33-9)31bbb Sub-drainage Swap County_Carfield Ident. # (Lat.) (Long.) Owner	Reference Spring Schedule Name_Swap 66 Number_H1-7 Henry Mountains Region Quadrangle Mt Pennel1 Drainage_Halls Creek Coordinates(D33-8)36aca Sub-drainage_Swap Canyon County_Carfield Ident. # (Lat.) 37 53 55 (Long.) 110 58 25 Owner
Reference Spring Schedule Name Swap C NumberH1-4 Henry Mountains Region Quadrangle <u>Mt Pennel1</u> Drainage_Halls_Creek Coordinates (D33-8)25cdd Sub-drainage_Swep_Cenyon County_Garfield Ident. # (Lat.) 37_54_12_(Long.)_110_58_42 Owner	Reference Spring Schedule NameCoal Seep Number H1-8 nv Henry Mountains Region Quadrangle Mt Pennell Drainage_Halls Creek Coordinates(D34-8)12bbd Sub-drainage_Swap, unnamed trib CountyCarfield Ident. # (Lat.) (Long.) Owner

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APPENDIX B

Discharge estimates (E) or measurements (M) on selected streams in the Henry Mountains area, 1975-1977.

Discharge of many streams in the Henry Mountains area was estimated visually or measured with tarp, bucket, and stopwatch as described in Methods of Work. At the same time water temperatures and conductance were measured at most sites. These records are listed for the principal drainages clockwise around the Henry Mountains but they begin with Oak Creek and Pleasant Creek which originate off Boulder Mountain to the west. Individual sites are listed in upstream to downstream order beginning with the sites on the tributary farthest from the mouth.

No definite pattern is evident in comparing measurements made in 1976 with those made in 1975, but when selected sites were revisited in the first week of July 1977, it became clear that the low snowfall of the previous winter had resulted in the drying up of most of these springfed streams. Bull Creek which had supplied 600 or more gallons a minute in 1976 was down to 65 gallons a minute at Fairview Ranch and had no flow at several intermediate spots upstream from the ranch (the flow at the ranch was evidently underflow that was forced to the surface by subjacent bedrock). Similarly, Dugout Creek had yielded 600 to 750 gpm in its upper reaches in 1975 and 1976 but was down to an estimated 5 gpm in 1977.

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Treated streams to block (1 or instantion (1) to be bried streams in the

Order and the service in the Henry Humanian area was estimated affilied of here with carp, backet, and stopmatch as described in meaneds of here. At the same time water tomograzures and unductanted area measured at most sites. These records are Tigged for the introluoit d'almater clocketse eround the Henry Mountains but they beyt: with out Groot and Finasan Greek which originate off boarder fountain to the west. Individual sites are listed in gestream to downstrain order source and with the sites are listed in gestream to downstrain order source area with the sites on the tributary farthest from the mouth.

No definite justions is ovident to comparing measurements may in 1978 with those mode in 1978, but when selected sites were revisited in the finer week of July 1977. It became clear that the low whomsail of the previous winter had resolved in the drying up of which of these shringand streams. Buil Grack which had supplied 600 or more gallons a minute it 1976 was down to 65 gallons a minute at Estrution Ranch and had no low at several internation to 65 gallons a minute at Estrution Ranch and had no low the several internation to 65 gallons a minute at Estrution Ranch and had no low be several internations and the top the ranch (the flow without several internation of the top to the set fact by we present upper reacted to 1975 but was forced to the set face by the mean bedrack). Similarly, Dugout Greet had yielded 500 to vertice a gam in in upper reactes in 1975 but was down to an estimated 5 gam in in 1977.

TABLE 7. - DISCHARGE ESTIMATES (E) AND MEASUREMENTS (M) DN SELECTED STREAMS IN HENRY MOUNTAINS AREA, 1975-1977. MAIN ORAINAGES ARE LISTED IN CLOCKWISE ORDER AROUND MOUNTAINS; INDIVIDUAL SITES ARE LISTED IN UPSTREAM-TO-DOWNSTREAM ORDER. SITES AND SOME DISCHARGES ARE ALSO SHOWN ON FIGURE 6. CHEM = CHEMICAL ANALYSIS GIVEN IN TABLE 5.

Orainage	5ub-drainage	Coordinates	Latitude	Longitude	Altitude	Oate	Flow	°C Temp.	Conductance mmho	Remarks
FREMONT	Pleasant Crk (upper)	(030-7)29aba	38 10 47	111 10 49	5910	8/23/75	8-10cfs E	23.5	235	Chem
	Pleasant Crk	(029-7)25bcc	38 15 29	111 07 09	5030	6/29/75				
	(lower) Oak Creek	(031-8)19abc	38 05 59	111 04 03	5250	8/23/75		26	1200	Chem
	(Notom Road) Oak Creek	(031-7)27cbb	38 04 49	111 07 52	5800	8/22/75	5cfs M			Measured diversion,
SWEETWATE	(Siphon) R South Creek	(032-9)1bdc	38 03 11	110 52 15	7120	7/16/76	330gpm M	27	410	not creek Measured at road
	Ougout Creek	(031-10)29dd	d 38 04 26	110 49 22	8880	7/4/77	no flow 250gpm E	9		No evidence of recent flow
		(031-10)29cbi			8220	7/4/77	no flow 750qpm M	16	350	Possibly 2-3 gpm underflow
		(001 10)2500		110 00 11	DEED	7/16/76 7/4/77	600gpm M 5gpm E	15 13	440	2+ hrs of rain, 6 PM 7/29/75
	Olympics ditch	(031-9)24cbc			6880	7/17/76	2cfs E	20	420	Near canyon mouth
	Oiversion ditch to King Ranch	(031-9)26abb (031-9)27cdd			6640 6380	7/17/76	Bi₂−2 cfs E lcfs E			50gpm∸ to creek
	Ougout Creek	(031-9)21cbd			6030	8/4/76	Dicfs E			Flow not diverted to King Ranch - washout
		(D31-9)18aca (O31-9)7ccb		110 57 19 110 57 59	5660 5500	7/31/75 8/4/76	150-200gpm 8	28	1100 630	Near coal mine; flow not
	Dugout-unnamed	(031-10)33aba			9540	7/29/75	130gpm E	15	320	diverted to King Ranch
	trib Ougout-North(No)				8600	7/30/75	50gpm M			0.46.00
	Fork Pistol Cree					7/17/76 7/4/77	28gpm M Oamp, no flow	17 10	380 410	2:45 PM 8:15 AM 7:50 AM
	Ougout-South Fork Pistol Cree	(031-10)20cbc k	38 05 38	110 50 20	8360	7/30/75	65gpm M 35gpm M	19.5 14	290 350	1:00 PM
	Cedar Creek	(031-10)17555	38 07 00	110 50 10	8800	7/4/77	4gpm M	15	440	9:35 AM 8:35 AM
		(031-10)18aba			8460	7/30/76 7/30/76	43gpm M 50gpm E	7 8	235 310	
		(031-10)7cdc	38 07 07	110 51 12	8080	7/30/76	150gpm M	14	350	
		(D31-9)12bbc	38 07 42	110 52 29	7050	7/30/76	100-120 gpm	E 26	325	Chem. Flow disappeared about 200 yds below this point
	Oak Creek (Headwaters of	(030-10)33ccb	38 09 19	110 50 29	7200	7/26/75	300-400gpm E	12		
	Oak Creek mis- labeled as	(030-10)32dad			7100	7/26/75	250gpm E	15	450	
	Cottonwood Crk on Mt. Ellen quad and BLM map	(030-10)32dad			7050 7000	7/26/75	159pm E	16.5	360	
		(030-10)20cba			5700	7/27/75	120gpm M 2cfs E	10.5	630 550	Chem
	Mainstream	(031-8)24caa	38 05 43	110 58 41	5480	7/3/77 8/22/75	27gpm M	15	690	
	Mainstream	(030-9)30cac			5100		10gpm E 14gpm E	25 25	3800 3300	Above Spring 5w17 Below Spring Sw17
	(Channel 5ite 12 Mainstream) (D29-9)2acb		110 54 24	4530	8/6/77	2cfs E			
BIRCH	(Channel Site 14) Mainstream) (030-10)27adc				8/28/76	no flow			
		(000 10)2/002		110 40 40	6650	7/11/75 7/27/75 8/2/76 8/28/76	75gpm M 100gpm M 130gpm M	18 14.5 16.5	385 410 390	Chem,
		(030-10)23ccc	28 10 52	110 40 25	6 300	7/2/77	160gpm M 86gpm M	10.5 21	420 380	
					6380	8/2/76 7/2/77	60gpm E 40gpm E	22 27.5	330 335	Chem
		(030-10)23caa			6100	8/2/76 7/2/77	40gpm £ no flow	25	300	
		(030-10)23abb	38 11 40	110 47 49	5880	8/2/76	24gpm M	27	285	Chem. Flow disappeared about 200 yds below
BULL	Mainstream at Lonesome Beaver	(031-10)14acb	38 06 44	110 46 33	8800	7/29/75		9	410	this point. Chem. Sampled at camp-
						7/13/76 7/3/77	600gpm M 37gpm M	10.5	330 490	ground faucet
	Mainstream at Fairview Diversio	(D30-11)18dab n	38 11 57	110 45 08	5380	7/28/75	3cfs E	18	480	Chem. Sampled from
	Fairview Oiver-	(030-11)17bab	38 12 25	110 44 37	5300	7/2/77 8/3/76	70gpm E 1.4cfs M	16.5	750	diversion ditch
0041175	sion Uitch					7/2/77	65 gpm M	23 19	480 710	Chem
GRAN I TE	Mainstream	(031-10)26abb	38 05 18	110 46 32	8960	7/29/75 7/13/76 7/3/77	210gpm M 100-120gpm E Ory, no flow	7	220	Chem
ORY VALLEY WASH	Mainstream	(029-11)16aaa	38 17 37	110 42 51	4610	7/11/75 7/3/77	6-7cfs E no flow			Flood water. Channel
	Cow Creek	(030-11)5dbc (029-11)33bba	38 13 32	110 44 19	5080	8/1/76	200-300gpm E		620	normally dry
NODTH MACH						8/3/76 7/2/77	100gpm E Both above si	20 ites were	1650 dry	
nenti wash	Copper Creek	(032-10)2aaa	Jo UJ 34	110 46 02	8620	7/10/75 7/11/76 7/13/76	30gpm М 7-8gpm Е 10gpm Е	7	435	After rain
		(D31-10)36bab			8260	7/11/76	>100gpm E			
TRACHYTE	8lack (Dark) Canyon	(032-10)26aca	37 59 51	110 46 21	7420	7/9/75 8/15/75	600gpm Е 5gpm Е	10	250	Could not measure flow Flow 40-50gpm 150 yds upstream
						7/11/76 7/4/77	120-150gpm E No flow, dry			One-half inch of rain fell
	Straight Creek ((033-10)12caa :	37 56 58	110 45 32	7780	7/9/75	150gp.m M			in this drainage an hour before this observation
						7/11/76 7/4/77	130gpm M Dry, no flow	11	220	No evidence of recent flow
		(032-10)3dbb : (D32-10)10aca :			9240 8520	7/16/76 7/10/75	30gpm E 200gpm E	9 9		Upper road
						7/11/76 7/13/76	40-50gpm E 40-50gpm E			Lower road Ouring heavy rain
OULL FROG	Buck	033 10110				7/16/76 7/4/77	30gpm E 3-4gpm E	10 9	410 460	Light rain
		(D32-10)16aaa (8120	7/15/76 7/4/77	Sgpm M No flow	19	570	No evidence of recent flow
	North Fork (Bullfrog	032-10)9ccb (38 01 59	110 49 10	8070	7/15/76 7/16/76 7/4/77	l6gpm M l7gpm M No flow	20 18	720	2:50 PM 12:0D Noon No evidence of recent flow
	(032-10)30bbc 3	37 59 57	110 51 24	6420	8/14/75		25 14	1700 1690	the enderse of recent riow
	Pennell ((D33-11)30dda 3	37 54 13	110 43 13	7160	8/2/75	100gpm E	14	350	
						7/9/76 7/5/77	10gpm E 9.4gpm M	9		All flow from north orifice Pennell Spring - 8f-19
	Pipe Spring (Creek	033-9)13bcb 3	37 56 22	110 52 31	5840	7/27/76	300gpm M	22	600	
		D33-9)14ada 3			5820	7/27/76	60Dgpm M			
	Cneek	D33-9)25abb 3			5480	7/27/76	20-30gpm E			Visual estimate with Dinoculars
	Mainstream (Site 6	035-10)7daa 3	37 46 41	10 50 28	4440	7/25/76	50gpm E			
	Mainstream (035-10)7ddb 3	17 46 27 1	10 50 38	4430	8/19/75 8/31/76	200gpm E 250-300gpm E	22 23.5	2200 2500	

APPENDIX C

Test drilling by AMAX Coal Company, by Conservation Division, U.S. Geological Survey, and for uranium exploration.

In recent years several organizations have done appreciable test drilling for different purposes. The results of this drilling have not been interpreted in detail, but we note the events here as a guide to further interpretation by others.

In December 1972 and January 1973, AMAX Coal Company drilled 42 test holes, most of them 150 to 200 feet deep, with a couple more than 300 feet deep. The general locations of the test holes and the specific locations of nine holes that showed water are given below:

General Area	Township	Total holes	Water reported
Wildcat Mesa	T.31 S., R.8 E.	23	6
King Ranch	T.32 S., R.9 E.	4	1
Swap Mesa	T.33 S., Rs.8&9 E.	7	2
Cave Flat	T.33 S., R.10 E.	8	0
Water Holes Hole #	Location		Total Fluid depth level
105	T.31 S., R.8 E., NE	NE NE Sec. 26	220 146
106	T.31 S., R.8 E., NE	NE SW Sec. 22	280 233
112	T.31 S., R.8 E., SW	NE SE Sec. 10	180 168
115	T.31 S., R.8 E., NW	NW SW Sec. 14	180 149
201	T.31 S., R.8 E., NE	SE SE Sec. 22	210 190
202	T.31 S., R.8 E., NE	NW NW Sec. 26	240 171
102	T.32 S., R.9 E., NW	SE SW Sec. 5	280 130
220	T.33 S., R.8 E., SE	NE SE Sec. 26	220 156
225	T.33 S., R.8 E., NE	SE NW Sec. 24	225 120

D: XIGHENDIX C

In recent rent select organizations have done oppreciations have done oppreciations have able to be an appreciation of the results of this definition have address and interpreted in detail, but we note the events here is a value to contain the detail of the contains a selection by attraction of the contains and the contains a selection by attraction by attraction by attraction by attraction by attraction by attraction by attractions and the contains at the c

in December 1972 and decorpt 1973. AMAX Coal Company devices the section of the section.

In 1976, the Conservation Division, U.S. Geological Survey, contracted for the drilling of 8 test holes north of the Fremont River in T.27 and 28S., R.9E., and 19 holes south of the Fremont: One in T.29S., R.10E; two in T.30S., R.10E.; two in T.31S., R.8E.; five in T.31S., R.9E.; one in T.32S., R.8E.; six in T.32S., T.9E.; and two in T.33S., R.8E. Resistivity and gamma-ray logs of these holes have been placed in the open file in the offices of the U.S. Geological Survey, Federal Center, Denver, Colorado, 80225.

In July 1977 five or six drilling rigs were in operation on the flats at the head of Shitamaring Canyon, principally in T.35S., R.11E. These rigs were evidently exploring for uranium. When or if the results of this drilling will become available is unknown. in 107%, the Construction Division, U.S. Geological Survey contracted int the drilling of 8 best holes north of the Evenant Plants in T.P. and PSS., H.PL., and D holes south of the Frencht: Une to (.2%, ...), I.F. two in T.905., R.JET., Lwo in T.315., R.F. 1996 in T.JIST. A Pater one in T.905., R.JET., Lwo in T.315., R.F. 1996 in T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in T.925., H.OF.; six in T.375., T.W. and the hole T.JIST. A Pater one in the one of the set of the H. Genfoytes) Survey. T.JIST. Concet. One yer, Colter one 20225.

In July 1977 tive of the drilling rigs were in operation on the flore at the north of instantoring Canyon. principally in F.355., A III. These rigs of a wellantly exploring for yeariam. When or II the results of this do liferential become wallable is unknown.

APPENDIX D

Cross-channel profiles on selected streams that drain the coal basin

During the summer of 1976 sixteen sites were located on channels of streams that drain northward and southward from the coal basin (locations of sites are plotted on figure 5); the sites were selected to provide benchmark data about the natural channels as they existed at the time of examination, prior to proposed development of coal in the area. At each site:

 The location was plotted on the appropriate 15-minute quadrangle map - these maps are on file with the U.S. Geological Survey and are not reproduced here. The latitude and longitude of each site is given here on the profiles in figures 7A and 7B,

 The channel was surveyed with tapes and brunton - the profiles that resulted from the survey are shown in figures 7A and 7B,

3) Two or three grab samples of the channel sediments were collected for use of the Geological Survey. The collection points are noted on the profiles,

4) Photographs of the sites were taken generally while tape and sample boxes were in place. Those photographs are on file with the Geological Survey.

If the coal in Coal Bed Mesa, Tarantula Mesa, or Wildcat Mesa is developed in the next several years, the effect of that development on the channel profiles and sediments at these sites may be evaluated by re-surveying and re-sampling.

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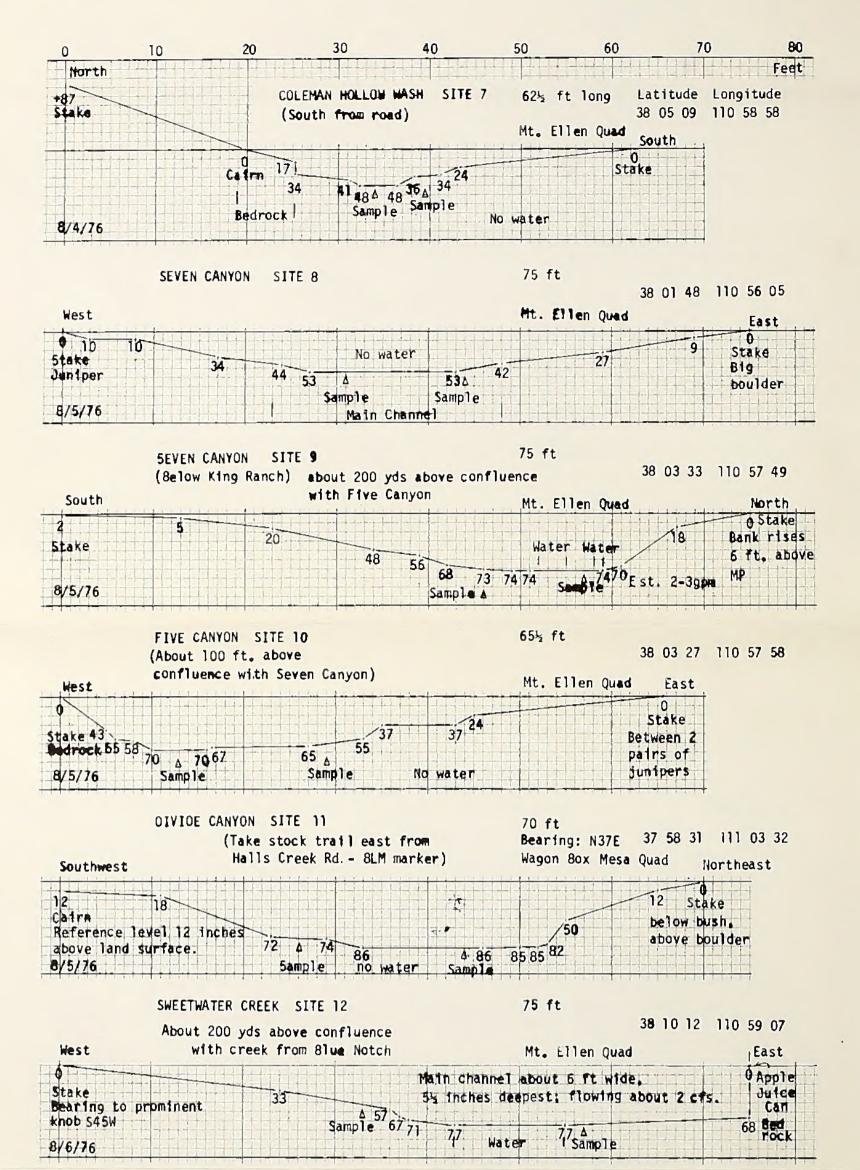
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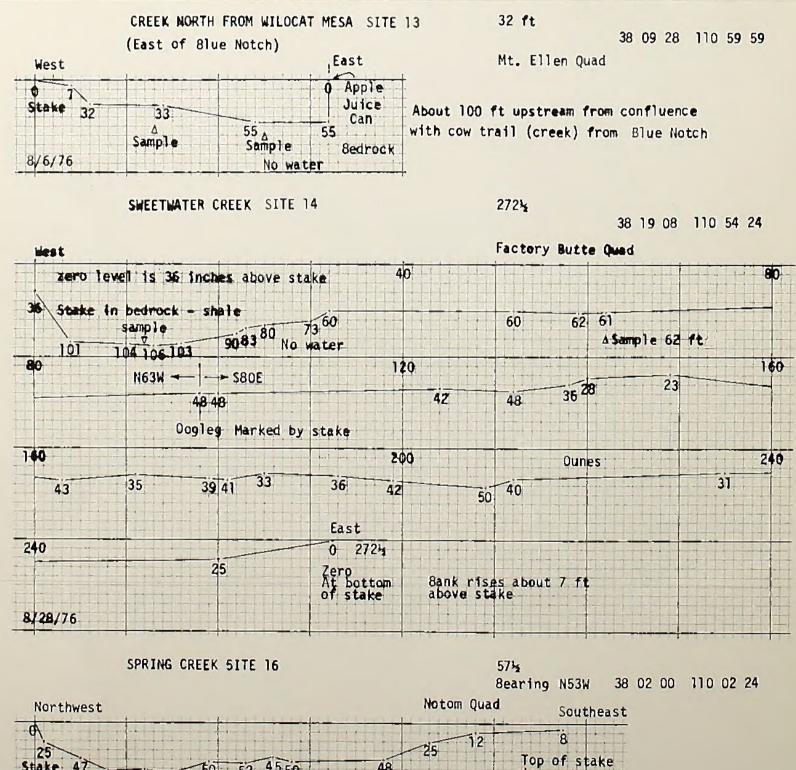
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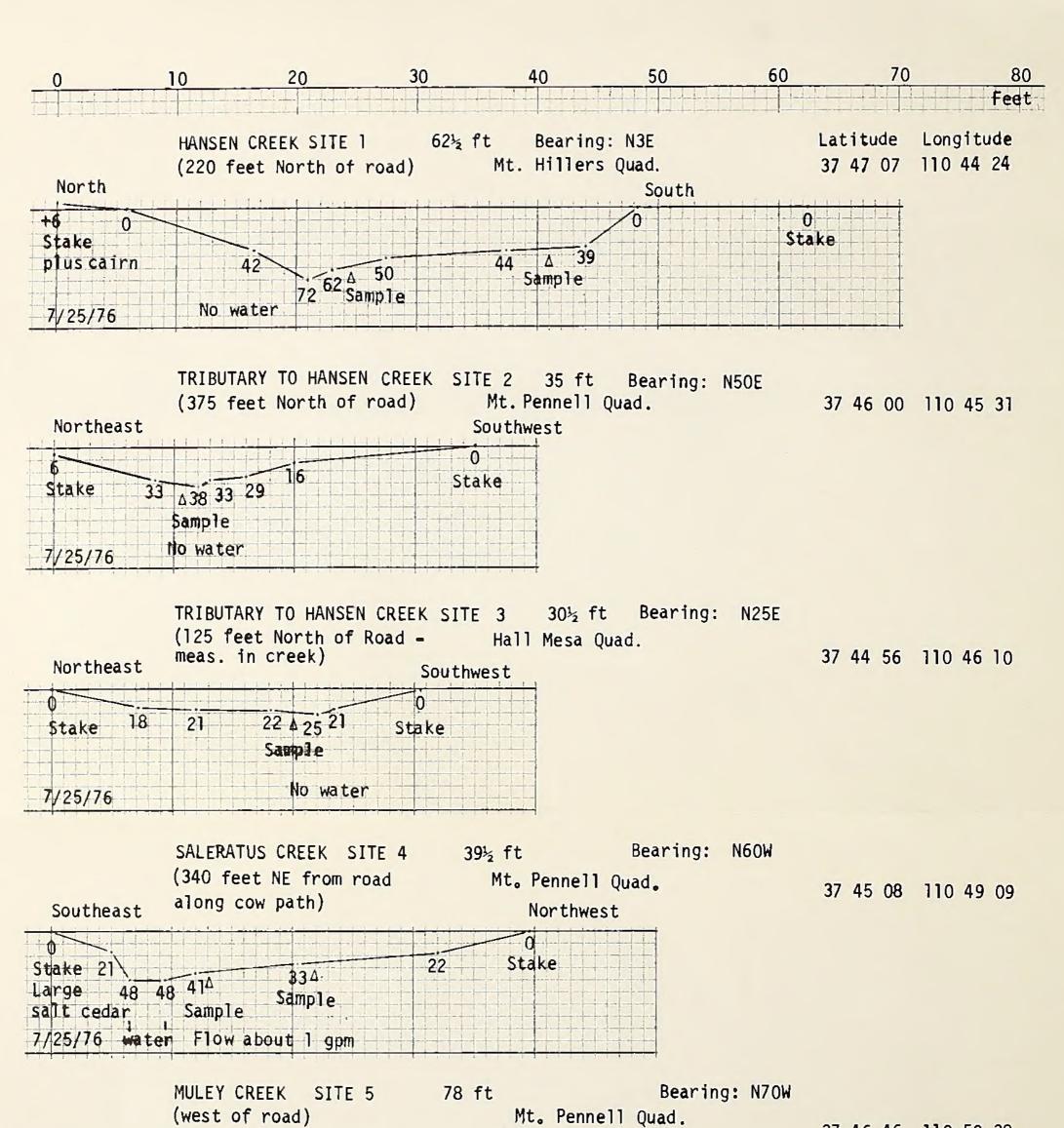




Stake 47 45 50 48 52 50 1s zero In bedrock 62 61 66. Δ Bank rises about 1 Sample 9/1/76 No water 4 ft. above stake Sample

Figure 7A CRO5S-CHANNEL PROFILES OF SELECTED STREAMS THAT ORAIN NORTHWARD FROM COAL BASIN -- HENRY MOUNTAINS AREA. (All sections looking downstream. Sample locations shown by a. Numbers below points are distances in inches below level reference line. Vertical and horizontal scales: 1 inch = 10 feet.)

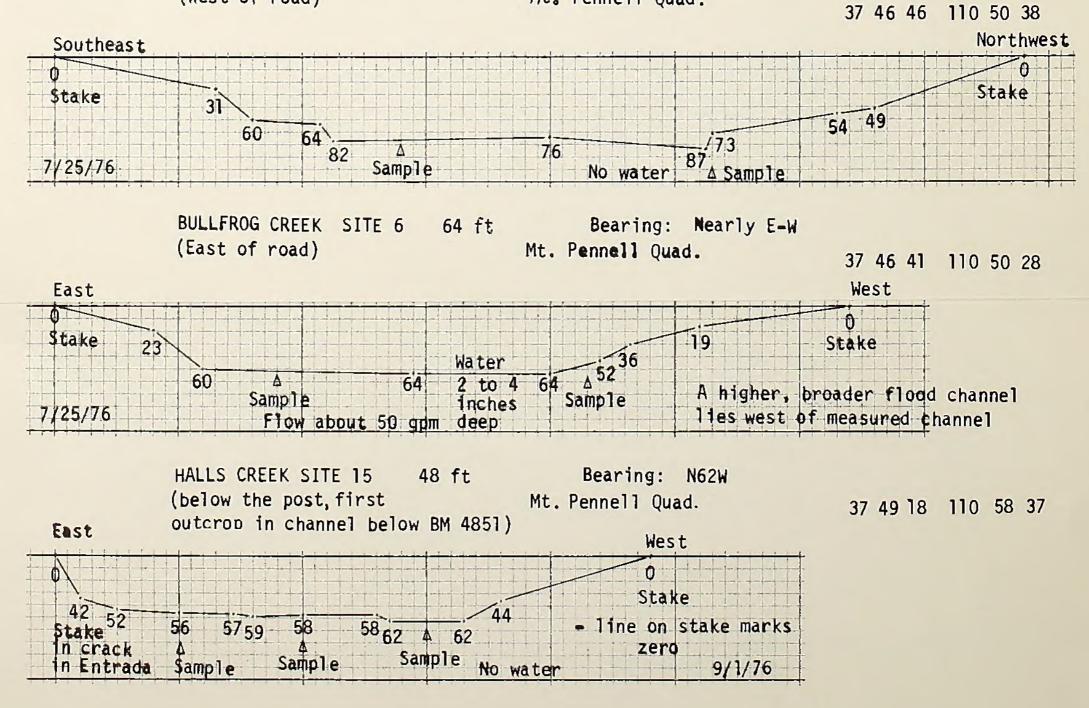




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CROSS-CHANNEL PROFILES OF SELECTED STREAMS THAT DRAIN SOUTHWARD Figure 7B FROM COAL BASIN -- HENRY MOUNTAINS AREA. (All sections looking downstream. Sample locations shown by A. Numbers below points are are distances in inches below level reference line. Vertical and horizontal scales: 1 inch = 10 feet.)



APPENDIX E

Grain-size analyses, and bulk density and porosity determinations of surface samples from selected sandstones.

Grain-size analyses

Portions of ten samples of Emery, Ferron, Morrison, Entrada, and Navajo sandstones collected from surface outcrops were crushed in mortar and pestle and run through a set of U.S. Standard sieves. Size 10 retains very fine gravel; 18, very coarse sand; 35, coarse sand; 60, medium sand; 120, fine sand; 230, very fine sand; and <230, silt and clay. Each size fraction was then weighed and examined under a microscope to determine if the fractions consisted of discrete grains or aggregates. This fact was noted and a second sample of each rock was crushed to eliminate aggregates and sieved. The table shows the results of the analyses.

All samples consist largely of fine sand and very fine sand. Two samples of Emery are about 60 percent fine sand and 31 percent very fine sand; four samples of Ferron range from 60 to 72 percent fine sand and 14 to 24 percent very fine sand; one sample of Morrison is about 60 percent fine sand and 23 percent very fine sand; and one sample of Navajo is about 68 percent fine sand and 21 percent very fine sand. The two samples of Entrada are finer grained than the other samples: one has about 47 percent fine sand, 32 percent very fine sand, and 15 percent silt and clay; the other has about 37 percent fine sand, 49 percent very fine sand, and 13 percent silt and clay.

Bulk density and Porosity determinations

Bulk density and porosity determinations were made on portions of the same samples used for grain-sized analyses. One portion was weighed, coated with Krylon (to water proof), re-weighed, and its volume determined by immersion in cold water in a graduated beaker. From these observations, the bulk density was computed. A second sample was then weighed and its volume computed from the bulk density computation. This sample was then immersed in hot water and kept there generally overnight.

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Table 8.- Grain-size analyses, and bulk density and porosity determinations of selected sandstones. Grain-size determinations in percent. (All determinations by Nancy P. Lundeen.)

	Sample					Bulk	Effective			
	Size Gms.	/10	18	35	60	120	230	<230	density gm/cc	Porosity Percent
Masuk	100								2.56	6
Emery	100.00 96.75	0 0	.14 <u>1</u> / .02	.03	1.27 <u>1</u> / .20	55.98 58.81	32.57 31.90	9.6 9.04	2.00	27
Emery	100 96.73	0 0	0 0	.11 <u>1</u> / .01	.63 <u>2</u> / .18	58.95 60.51	30.66 30.63	9.65 8.68	1.93	26
Ferron	99.77 90.91	0 .05	.3 0	.7 .03	4.2 .28	72.6 72.7	16.6 19.6	5.6 7.4	2.04	24
Ferron	97.41	.02	0	.09	5.05	72.95	13.6	8.3	1.90	24
Ferron	100 97.33	0 0	0 .01	.35 <u>1</u> / .01	6.49 1.48	61.33 59.82	20.25 24.72	11.58 13.97	1.99	25
Ferron	100 95.96	0 .02	.04 .06	.16 .17	9.41 ² / 4.62	68.54 72.86	14.09 14.77	7.76 7.50	2.04	20
Morrison	100 98.41	0 .01	.06 .01	.27 <u>1</u> / .02	9.76 <u>3/</u> 5.30	57.54 61.72	23.34 23.92	9.03 9.02	2.37	16
Entrada	100 97.31	.0 0	.05 .01	.21 ^{2/} .04	7.42 <u>2/</u> 3.18	45.60 48.00	31.28 33.81	15.44 14.96	2.23	
Entrada	100.00 96.92	0 0	.02 <u>1</u> / .01	.05	1.93 ^{2/} .29	35.63 38.32	48.35 49.25	13.80 12.08	2.09	18
Navajo	100.00 96.58	0 0	.09 <u>1</u> / .01	.32 <u>1</u> / .06	8.03 <u>2/</u> 2.33	67.25 69.90	20.48 22.83	3.83 4.87	2.03	18

1/ Aggregates, not discrete grains

2/ Mostly aggregates

.

3/ About one quarter aggregates

Retains:

Sieve size 10 = very fine gravel 18 = very coarse sand 35 = coarse sand60 = medium sand

120 = fine sand

- 230 = very fine sand <230 = silt and clay

The sample was then removed from the water and reweighed along with any loose grains that had become detached from sample. The effective porosity was then computed.

Two samples of Emery Sandstone had effective porosities of 26 and 27 percent. The four samples from the Ferron gave effective porosities of 20 to 25 percent. The single sample from the Morrison had a porosity of 16 percent. The single sample from the Navajo and one sample of Entrada had porosity of 18 percent. The other sample of Entrada disintegrated in the water and no determination could be made.

A sample of Masuk Sandstone which had proved to be too well cemented to disaggregate by mortar and pestle had the highest bulk density (2.56) of any sample and the lowest effective porosity (6).

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APPENDIX F

Birch Creek and its Downstream loss of Calcium Carbonate

Analyses of water samples collected in 1975 and 1976 show that Birch Creek loses a little less than half its calcium carbonate during its flow through a reach about one and a half miles long.

Birch Creek rises on the north slope of Mt. Ellen and flows nearly due north to the Fremont River. Presumably it gets its water from the Dry Lakes Springs (BC-1 and 2) and Cold Spring (BC-3). These sources were not investigated because they rise two miles or more up a steep canyon. Instead, Birch Creek was measured and sampled on July 11, 1975, at the mouth of the canyon at the end of a jeep road. Measurements made later, on July 27, 1975, showed higher flow, 100 gpm vs 75 gpm, than had been measured on July 11. Presumably, the higher flow was due to an increase in snowmelt, for the temperature on July 27 was 15°C, 2½°C colder than it had been on July 11, even though both measurements were made very close to noon.

On August 2, 1976, we remeasured Birch Creek at about 1:30 PM: flow 130 gpm, temperature 16½°C, conductance 390 (essentially the same conductance as the 385 measured in 1975). We then decided to find out where the flow disappeared into the alluvial fan below the canyon mouth, so we drove nearly two miles down the fan and then located the area of disappearance (see map of upper part of Birch Creek, figure 8). Next we chose a good measuring site about 200 yards above the disappearance and measured 24 gpm, 27°C, conductance 285. We were puzzled about the decrease in conductance (we were using two conductance meters, and therefore we could not attribute the change to meter error), so we collected a sample for analysis and then went upstream and measured temperature and conductance of Birch Creek at two intermediate sites (2 and 3 on figure 8), and collected a sample at site 2.

The temperature and conductance at the two intermediate sites and the pertinent parts of the chemical analyses of the three samples (one in 1975, 2 in 1976) are given in the table.

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Analyses of vater samples collected in 1976 and 1976 thow that biron Greek toses a filtile less than half its calcium carbonate during its view chrourn a reach about one ont a balf offes long.

Area for a rises on the forth slope of Ht. Elion and flour marine dee morth in the recent River. Presumply is gets its water from the wore not interfered because they rise two miles on much up a tean contain. In: not, Birch Creek has measured and sampled on Joly 11, 1975 as the worth of the request as the rise and sampled on Joly 11, 1975 been maained on the request as the induct of a feen road. Measurements much been maained on the temperature and it is free right (00 one vs 75 one). The mean is he worth at the temperature on JOD one vs 75 one. The make the react the recent of the temperature on JDD one vs 75 one. The make the start is nownett, for the temperature on JDD one was fire 20.0 tensor than it had been to JDY 11. Presumative on JDD one was fire 20.0 tensor than it had been to JDY 11. Presumative on JDD one was fire 20.0 tensor than it had been to JDY 11. Presumative on JDD one was fire 20.0 tensor than it had been to JDY 11. Presumative on JDD one was fire 20.0 tensor

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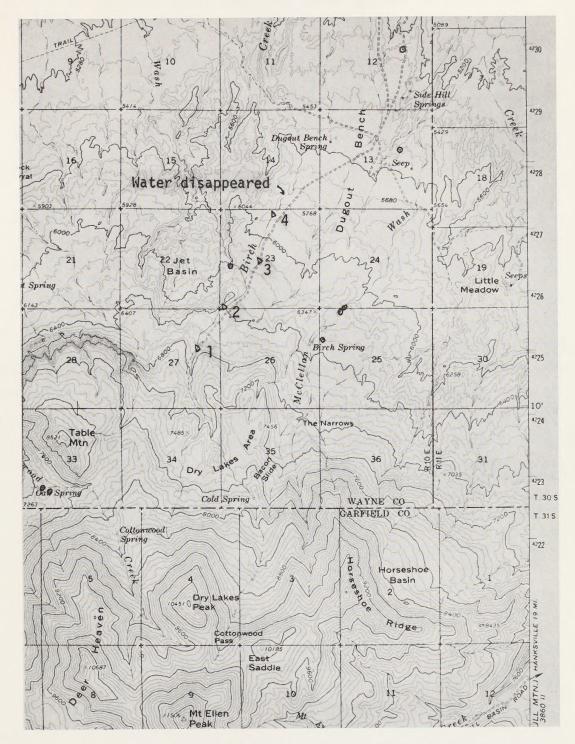


Figure 8. - Map of a portion of Mt. Ellen 15-minute quadrangle showing measuring sites 1, 2, 3, and 4 on Birch Creek.

Scale 0 1 2 Miles Flow data and chemical constituents of water samples collected on Birch Creek

Date	Place	Flow gpm	Cond mmho	Temp °C	Res 180°	Ca	<u>C1</u>	Hard	Mg	<u>Si</u>	Na	<u>50</u> 3	Bicarb
7/11/75	Canyon mouth	75 M	385	18	236	64	5.1	200	8.6	19	13	56	182
8/2/76	Canyon mouth	130 M	390	16 ¹ 2									
8/2/76	Half Mile below mouth	60 E	330	22	208	45	5.3	150	9.4	17	13	58	140
8/2/76	One Mile below mouth	40 E	300	25									
8/2/76	l½ miles below mouth	24 M	285	27	183	33	5.4	120	8.3	18	13	59	104

This table clearly shows the downstream rise in temperature, which would be expected on a bright, sunny day in early August, and the downstream lowering of conductance and dissolved solids. Probably CO_2 is released from the water, perhaps O^2 is added. At any rate, $CaCO_3$ is removed from the water and the water becomes appreciably softer. The content of the other ions remains essentially the same; the amount of Mg as recorded in the middle sample seems anomalous when compared to the other two samples, but it doesn't affect the overall conclusion that the water loses $CaCO_3$ as it moves downstream.

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needs and a courty shows the counctineers rise in temperature, which munds be espected on a bright, summy day in early August, and the anim stream innoring of senductions and discoved solids. Proparity (0, in reinstand from the water, persons of is noted. At any into, Loci, it removed from the water and the muter becomes appreciably inter, Loci, it removed from the water and the muter becomes appreciably inter, Loci, it and of the standard and the muter becomes appreciably interaction and of the same and the same assertially the same: the second as recorded in the additic same assertially the same: the second to the second have and it doesn't affect the overall concluster that an error the standard in the same same anomalous when contained to the state affect the overall state that

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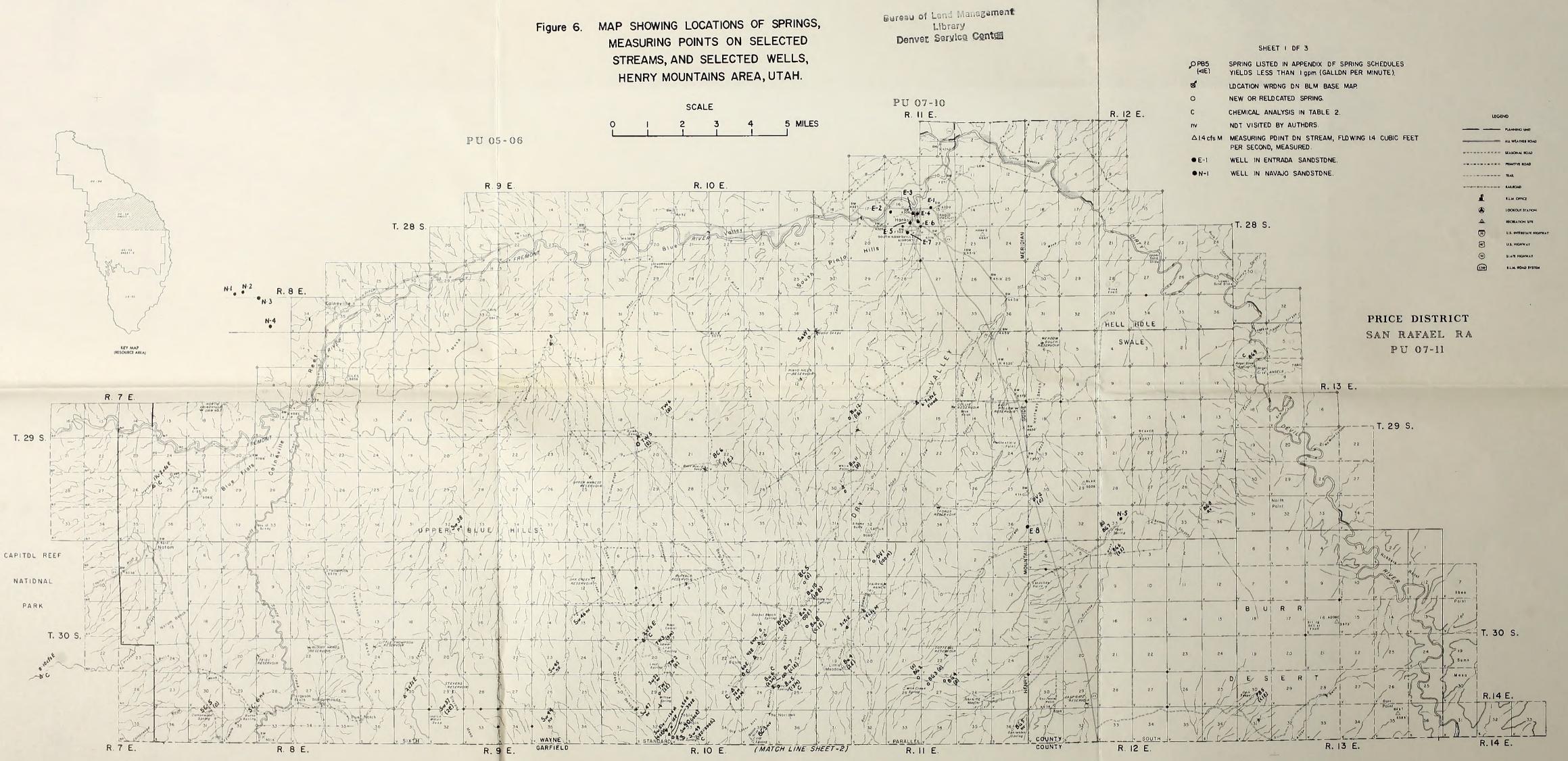
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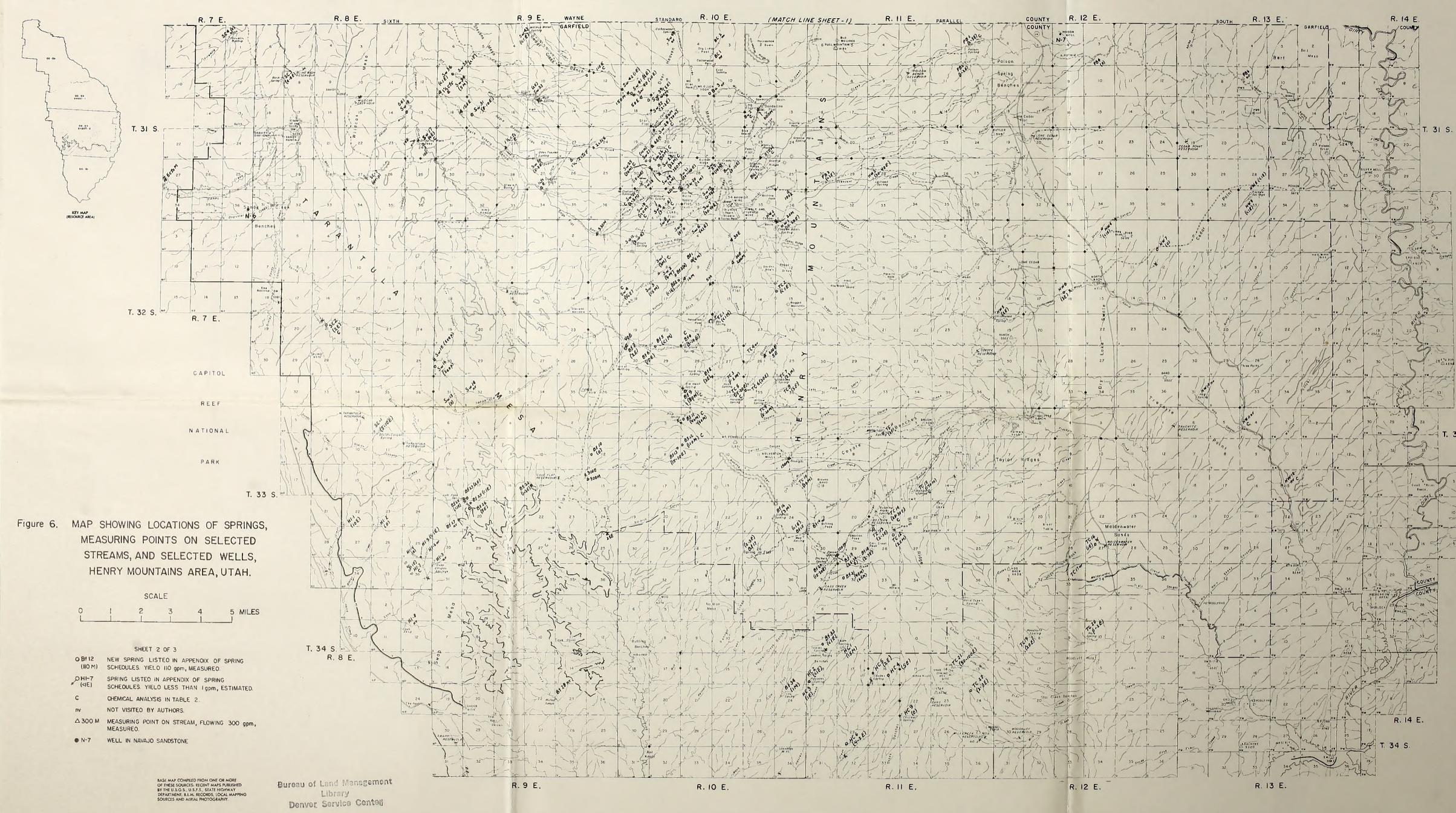
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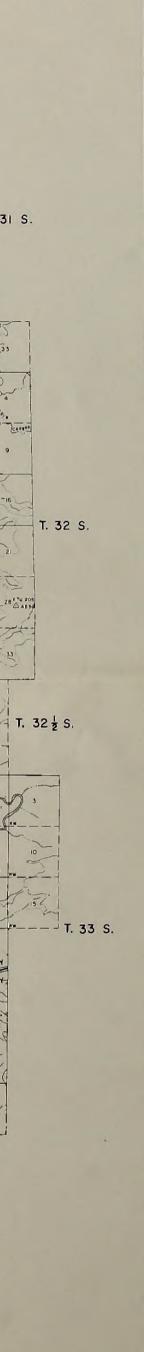
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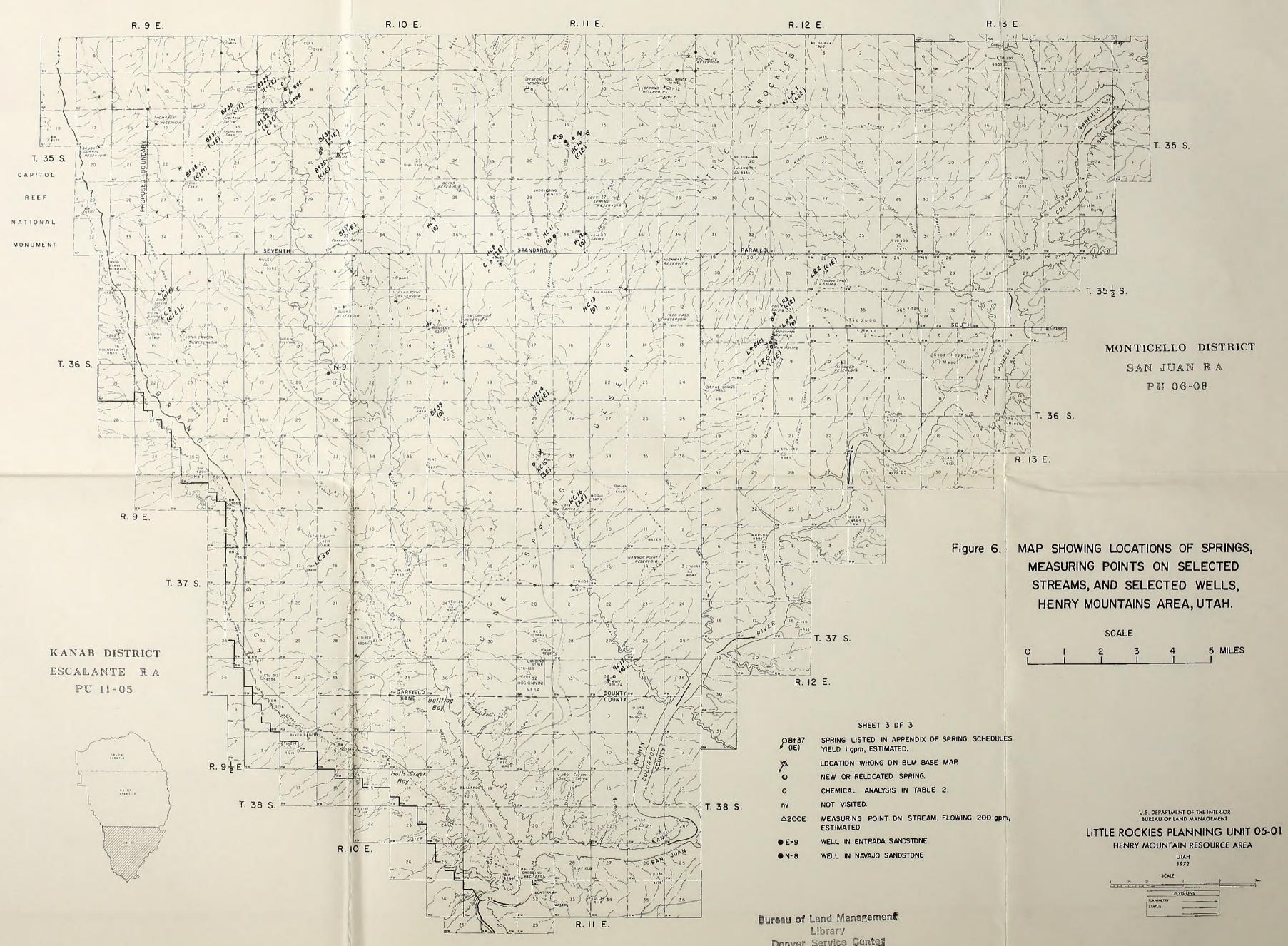
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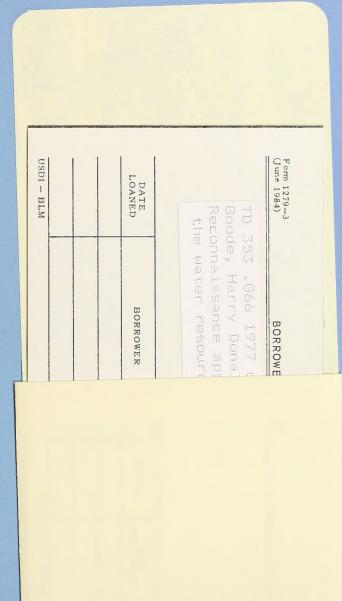






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