

SOUTHWESTERN MONUMENTS  
SPECIAL REPORT

NO 14

PIPE SPRING



BY  
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• REG'L GEOLOG. •

DEPARTMENT OF THE INTERIOR  
NATIONAL PARK  
SERVICE

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# PIPE SPRING NATIONAL MONUMENT

By Vincent W. Vandiver, Associate Regional Geologist

## Introduction

Pipe Springs as a National Monument owes its existence to important historical factors in connection with the early Morman pioneers and their struggles with the Indians of Southern Utah and Northern Arizona. It will be my endeavor in the following pages to relate something as to the geologic history of the general area of the Monument. In the immediate vicinity of Pipe Springs the geology is not particularly exciting; however, one of the prize stratigraphic sections of America, if not in the world, extends from the Colorado River on the south, through the general area of the Monument, and on northward into Utah to the Markagunt Plateau. Rocks from the Archean to the Eocene may be observed in this space of around one hundred miles and very few periods fail to be represented. This great columnar section, comprising some 12,000 feet of sediments, has been made visible to us through the regional uplift of the area, the raising of beds which were at one time below sea level to a height of almost two miles above sea level, with consequent carving of great canyons and the formation of the step-like higher plateaus proceeding northward into Utah, thereby unfolding the geologic history in open-book fashion.

I first visited Pipe Springs in October, 1935, and have since made official visits to the area in company with Dr. Charles N. Gould, Regional Geologist, and in the latter part of 1936 several trips with Dr. Herbert E. Gregory of the United States Geological Survey. Many of the observations discussed in this report have been reviewed with these geologists. The maps included in this report are from published data of the United States with minor alterations of the fault lines between Pipe Springs and Moccasin Springs, the latter in accordance with our interpretation. The area is one which grows in interest with successive visits and after one has seen all there is to be seen he returns and finds that there is "plenty new under the sun".

## Location

Pipe Springs National Monument is situated in northeastern Mohave County, northwestern Arizona, in the famous Arizona "strip", bounded by the Utah state line on the north and the Grand Canyon of the Colorado on the south. The Monument contains only 40 acres in the SW $\frac{1}{4}$  of Section 17; Township 40 North; and Range 4 West. It is about 10 miles south of the Utah line. President Warren G. Harding established the area as a National Monument by Presidential proclamation on May 31, 1923, placing same under the administration of the National Park Service. Reservation was made primarily to protect an old stone fort and springs which have had an important bearing on the history of the early Morman settlers in this desert region and their troubles with the Indians.

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## PIPE SPRING GEOLOGY (CONT.)

The sketch map on the following page shows the general geographic relationships. Travel from the main U. S. Highway No. 66 through northern Arizona and New Mexico is made to Pipe Springs via U. S. Highway No. 89 by way of Cameron, Lee's Ferry, Jacob's Lake and Fredonia. At the latter point one leaves the gravel road and travels southwest, on a graded road, a distance of 15 miles to the Monument. If proceeding into Utah one may travel northwest from Pipe Springs and enter Zion Canyon National Park from the south or return to Fredonia and U. S. Highway 89 for those travelling south. For those driving south from Fredonia there is a sign which calls attention to the fact that the next town (Flagstaff) is 200 miles distant. This is no doubt somewhat disconcerting to motorists during the summer months, especially those with slick casings on their cars.

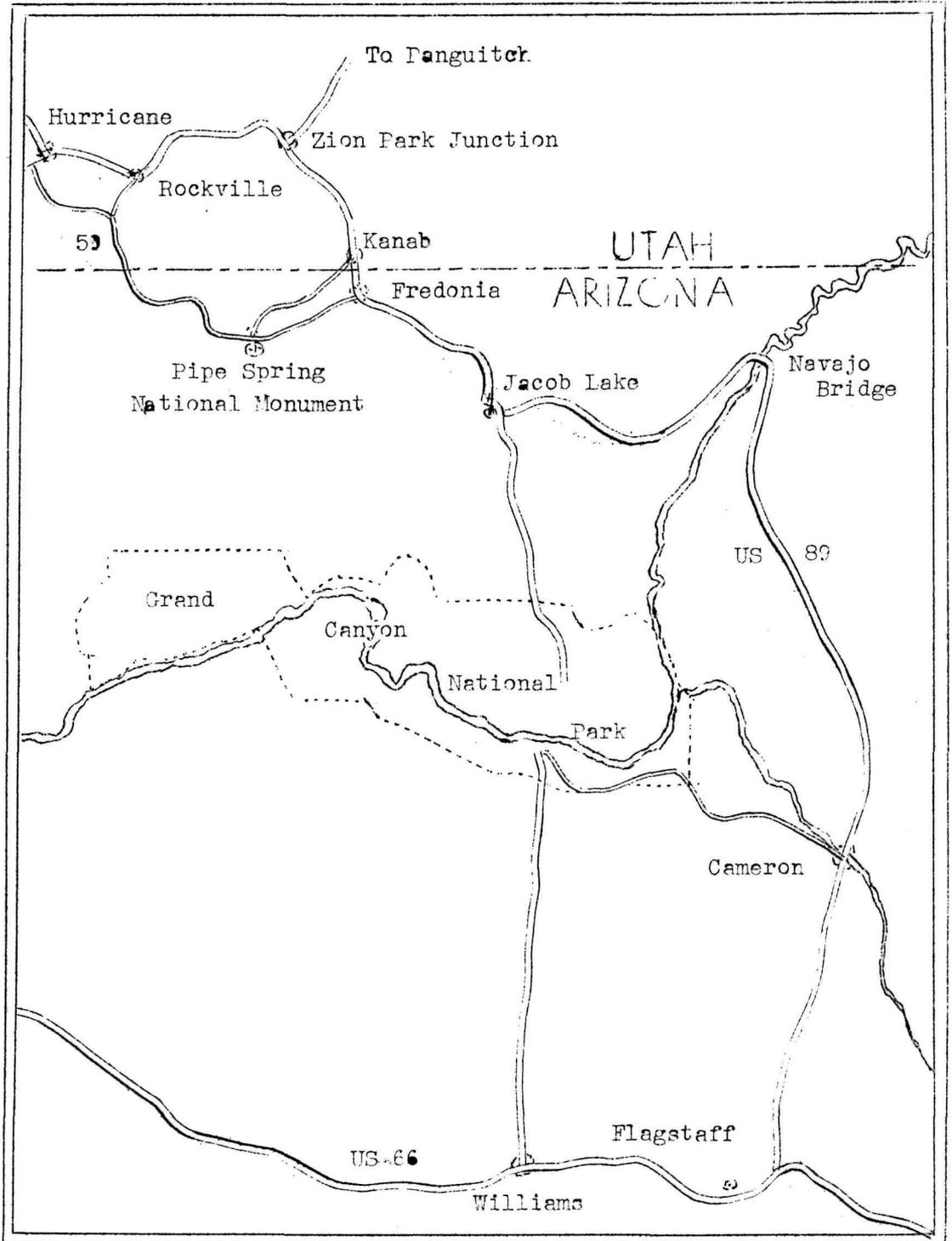
Mr. Leonard Heaton is acting custodian for the Monument. He makes his headquarters at Pipe Springs and resides with his family at Moccasin Springs a few miles north. The Heaton family have lived in this section for about half a century. The acting custodian, from his contacts with members of a large family and from his extensive travels in the section, is ideally situated as the Park Service representative.

### HISTORY

#### Pipe Springs

This region is indeed rich in historical interest. Much of the following data has been obtained from Dr. Herbert E. Gregory (1) and Mr. Leonard Heaton (2-3). The Pueblo Indians attained their peak of culture in the Southwest around 1100 A.D. Cardenas, the Spanish explorer, discovered the Grand Canyon in 1540 and at this time found roving bands of Indians (Navajos ?) on the Coconino Plateau. There were several expeditions into the region during the next three hundred years when efforts were made to establish satisfactory business relations with the Indians. Hunting bands of Navajos, Utes, and Piutes seemed to be in evidence everywhere. "Zion" or Salt Lake City, as it is now known, was founded in 1847 by Brigham Young, President of the Mormon Church. Soon thereafter parties were dispatched southward across the High Plateaus to select sites where water and suitable agricultural lands favored the establishment of settlements.

It was in 1856 that the first white man visited Pipe Springs. This party was sent out by the Mormon Church with instructions to explore the country lying in and around the Colorado River and to endeavor to make peace with the Indians living in the vicinity. The group was headed by Jacob Hamblin. The Monument received its name through a wager made by William Hamblin (Gunlock Bill) and another member of the party who challenged him to shoot through a silk handkerchief at a distance of fifty steps. The handkerchief was hung by its upper edge only and of course remained unpunctured. Accordingly Hamblin, vexed by the joke, dared



## VICINITY MAP

PIPE SPRING NATIONAL MONUMENT, ARIZ.

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PIPE SPRING GEOLOGIC REPORT (CONT.)

Amon Tenney to place his pipe on a rock near the spring which was at some distance, so that the mouth of the bowl faced the party. Hamblin wagered that he could shoot the bottom out of the bowl without touching the rim, which he promptly did, and thus the name Pipe Springs.

According to available records Dr. James M. Whitmore and his brother-in-law, Robert McIntire, made the first settlement at Pipe Springs in 1863. They were mainly interested in the cattle business and lived in a dugout near the present fort. The Navajo Indians were raiding the settlements in this section during 1866-1867 with the result that many of the weaker establishments had to be abandoned. In January, 1866, the Indians stole the livestock that the Whitmores had near the spring. As the rightful owners followed the trail they were killed by the Indians at a point about four miles away. The eight-year old son of Whitmore was left at the springs and he later caused the report of the slaying to reach Captain James Andrews of the State Militia. Six Indians, later found to be innocent, were killed for the crime.

The springs and adjoining lands were purchased from the Whitmore Estate by the Morman Church. Bishop Anson P. Winsor was sent out in 1868 to build a fort and to care for the tithing cattle in the interest of the Church. He constructed temporary two room quarters northeast of the spring which were restored in 1925. A second two-room house was constructed west of the spring, facing south, which commanded a broad view of Antelope valley. These structures were to be used as living quarters during the process of construction of the fort. The latter building was restored in 1929.

In the fall of 1869 a crew of thirty to forty men started to work on the fort. The plans called for two two-room buildings facing each other across a court. The buildings were to have two stores. The court was to be closed off at each end with massive swinging gates. Red sandstones (of the Chinle formation) was obtained from nearby quarries and used in construction. Some of the doors and windows were shipped from Salt Lake City. Most of the lime used for mortar was hauled in wagons from Pocketville or Virgin City, Utah. Much of the lumber had to be cut and hauled for a distance of from forty to fifty miles. The construction of the fort was completed in 1870. The buildings were so located that the spring flowed up into the courtyard and in this way they were always supplied with water.

Soon after completion two of the rooms in the fort were utilized as a cheese factory. The Winsors shipped most of the dairy products to St. George, Utah, where a Morman temple was under construction. Beef steers were driven at frequent intervals to this point and in the spring and fall to Salt Lake City.

In 1871 the Deseret Telegraph Company's line was extended to Pipe Springs with Miss Luella Stewart as operator. This was the first telegraph

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## PIPE SPRING GEOLOGICAL REPORT (CONT.)

line into Arizona. As the Indians were giving no trouble at the time Miss Stewart was transferred in a few months to Kanab, Utah, where she handled much of the business of Major Powell's party, who were conducting exploration work in the surrounding country. Bishop Winsor moved to St. George in 1875 and sold his interests to private parties for a cattle ranch.

The Arizona "strip" country was noted at this time for its excellent grazing lands. Cattle fattened with little effort on the part of the ranchmen. Thousands of head were rounded up each year and driven to market with the result that many comparatively wealthy families became established in the vicinity. Drives were started periodically from Pipe Springs and nearby points to the railroad. Profits proved too much for the settlers, however, and now the whole of the Arizona "strip" country has been overgrazed until little vegetation remains. The Soil Conservation Service are now making every effort to return these lands to their original state.

### Moccasin Springs

This series of springs, situated about five miles north of Pipe Springs, was first claimed by white man in 1865. The name Moccasin was derived, it is said, from an Indian moccasin which was found near the spring by early settlers. In the spring of this year a man appeared at Cannon ranch and informed William Maxwell that he was going to take up a ranch at Moccasin, whereupon Maxwell sent his eldest son over to Moccasin to claim the place, and later sold it to the stranger for \$200. This man built the first cabin and lived at the springs for eight years. The property then changed hands several times until purchased by Allen and Webb, who later became members of the Morman United Order, of Orderville, Utah, at which time their holdings were turned over to the Order. The five Heaton brothers were working the ranch at the time of the abandonment of the Order and received same when the lands were split up. Johnathan Heaton purchased his brothers' interests and Moccasin Springs has been the property of his sons since about 1893 up to the present time. Today there are several nice homes, orchards, etc., making it a beauty spot in the desert.

### Kaibab Indian Reservation

When the United Order, of the Morman Church, was in operation throughout this area many Piute Indians were brought in to assist in farming the lands. Each Indian was given ten acres of land and the group received their portion of the water from the springs. They likewise had foremen to teach them the art of farming. In 1908 the Government established the Kaibab Indian Reservation which consisted of a tract of land about 18 miles in length and 12 miles in width and extending to the Utah State line. At this time there were about 120 Indians belonging on the reservation, whereas today there are only half this

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PIPE SPRING GEOLOGIC REPORT (CONT.)

number. Their headquarters are located about midway between Pipe Springs and Moccasin Springs. This is where they have their homes, schools, etc. Although the Indians now receive one-third of the water from Moccasin Springs their principal interest seems to be in the raising of livestock rather than farming.

GEOGRAPHY

Topography

Pipe Springs is located in the southwestern sector of the Colorado Plateau, which is characterized by high block plateaus being bisected by the mighty canyon of the Colorado River. These uplifted plateaus are outlined by prominent fault scarps trending generally in a north-south direction. The escarpments in this region trend east and west in the main, while the canyons, with the exception of that of the Colorado River, are carved in a north-south direction through the High Plateaus. Dr. H. E. Gregory states the following (1) "The highlands are plateaus, tables, benches or steps rather than mountains, hills or domes, and the streamways are canyons -- narrow or wide, deep or shallow -- rather than river flats, bottoms, swales, or meadow lands. The canyons and plateaus alike are developed on a stupendous scale, and for the region as a whole 'the canyon lands' and 'the plateau country' are equally appropriate terms". Drainage in this area is southward to the Colorado River. Pipe Springs is approximately 5,000 feet above sea level. The Kaibab Plateau to the south and the Markagunt Plateau to the north reach elevations of over 9,000 feet.

CLIMATE

The climate of the plateau country ranges according to altitude from semitropical to temperate. For areas with the general altitude of Pipe Springs (5000 feet) the summers are hot and the winters somewhat severe. The average annual rainfall for Kanab, Utah, about twenty miles northeast and with practically the same elevation, is 12.68 inches. At this point for over a period of years the highest temperature recorded was 105° and a low of -15°. The highest and lowest monthly mean temperature being 67.2° and 33.4° respectively.

Vegetation

The collection of the following list of plants from the Monument was collected by Leonard Heaton, Acting Custodian, and they were named and identified by Jack Whitehead, Boyce Thompson Aboretum, Superior, Arizona. They are included in this report not because of any special connection but as a matter of record only.

Salmon Globe Mallw ..... Maluaceae - sphaeralecta anibigua, A. Gray  
Mariposa tulip ..... Liliaceae - Calochortus flexuosus, S. Wats.

PIPE SPRING GEOLOGIC REPORT (CONT )

Minute California Poppy...	Papacraceae- Escholita Minutifolia, Sluats.
Buffalo Guard.....	Cucurbita foctxi dissima, H. B. K.
Russian Thistle.....	Chenopodiaceae- Salsola Pestifer, A. Nels.
Broomrape.....	Crobanchiiaceae- Orobanche ludouiciana, Nut.
Arizona Four O'clock.....	Nyctaginiaceae- Quenioclidion multiflorum, Torr.
Tansy Mustard.....	Brassicaceae Sophia pinnata, Walt. Howell.
Bee Weed-Yellow Cleome....	Capparidaceae- Cleome lutea, Kuoker.
Desert Trumpet.....	Polygonaceae- Eriogonum niflatum, Tarrey.
Plantain.....	Plantaginimaceae- Plantago Major L.
Narrow Leaved Goosfoot....	Chenopodiaceae- Chenopodium leptwophyllum, Nutt.
Fluff Grass.....	Gramineae- Triodia pluchella, H. B. K.
Six Weeks Grama Grass.....	Gramineae- Buteloua Barbata, Leg.
Ivy leaved Ground Cherry..	Solanaceae- Phycalis hederaeplin, Noes.
Scrub Oak.....	Fragaceae- Quercus ?
Bird Beak.....	Scrophulariaceae- Cordylantus neuinii, Grey.
Saltbrush.....	Chenopediaceae- Artiplex cuneata, A. Nels.
Jimpson Weed.....	Solanaceae- Datura Metaloides, D. C.
Knotweed.....	Polygonaceae- Polygonuni Mulhenbergii, Wats.
Common Horhound.....	Labintae- Marrubium uulcare L.
Crownbeard.....	Compositae- Verbesina encelioides-exuuriculata Rod and Green
Sunflowers.....	Compositae- Helianthus aridus, Rydb.
Cocklebur.....	Compositae- Xanthium Commune, Britton.
Annual Bur-sage.....	Compositae- Franseria Acanthicarpa, Hook, Cav.
Horseweed.....	Compositae- Ergeron Canadensis, L.
Wild Lettuce.....	Compositae- Lactuca Scariola Integrata, Grant
Snakeweed.....	Compositae- Gutierrezia Lucida, Greene.
Creak Se necio.....	Compositae- Se necic douglasi, L.
Aster.....	Compositae- ?

In addition to the above Mr. Heaton states that there are about 100 more plants which have not been named or classified. Some of the most important are greasewood, rabbitbush, sagebrush, cactus, and a lot of grasses. Some of the more common trees are cedar, piñon pine, American elm, locust, ailanthus, silverleaf cottonwood, lombardy poplar, and willow.

Fauna

Mr. Heaton has likewise supplied the following list of birds, animals, and reptiles for the Monument:

<u>Birds</u>		<u>Animals</u>	<u>Reptiles</u>
Quail	Hawks	Jack Rabbits	Desert Rattle Snake
Robin	Eagles	Cottontail Rabbits	Bull, Blow or Gopher
Crows	Ducks	Coyote	Snake.
Killdeer	Cranes	Civit Cat	King Snake
Blackbirds	Gamble Sparrow	Ringtail Cat	Red Racer
Song Sparrow	Herons	Grey Squirrel	at least five kinds of lizards.

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PIPE SPRING GEOLOGIC REPORT (CONT.)

Birds (Cont.)

English Sparrow  
Pinon Jays  
Woodpeckers  
Oriole  
Goldfinch  
Humming Birds  
Flycatchers  
Wrens  
Sandpipers

Animals (cont.)

Striped Chipmunk  
Brown Chipmunk  
Longtail Rat  
Wood or Pack Rats  
Mice  
Porcupines  
Badger

GEOLOGY

Stratigraphy

The sedimentary rocks of this area, which outcrop over broad portions of the Colorado Plateaus, are composed of the Moenkopi formation, the Shinarump conglomerate, and Chinle shales of the Triassic; the Wingate sandstone, Kayenta formation and the Navajo sandstone all of the Glen Canyon Group, Jurassic (?) in age; and northward into Utah the Carmel and Morrison formations of the Marine Jurassic, underlying a thick series of Cretaceous and Tertiary rocks. Looking southeast from Pipe Springs across the broad valley one may see the north flank of the Kaibab monocline, the surface being made up of Kaibab limestone, Permian in age. The Kaibab limestone forms the rim on both sides of the Grand Canyon.

Looking southwest from Pipe Springs the Mount Trumbull volcanic field is visible. These lavas were erupted during Tertiary times and comprise one of the major volcanic fields of the region. The view northward from the Kaibab Plateau, just before going down into the valley after leaving Jacob's Lake is one of the most impressive panoramas of the region. From this point the Vermilion Cliffs, the White Cliffs, and even the Pink Cliffs, which form the steplike High Plateaus of southern Utah, are visible on clear days.

The sequence of geologic formations is indicated in the stratigraphic table on the following page; however, each will be described briefly here.

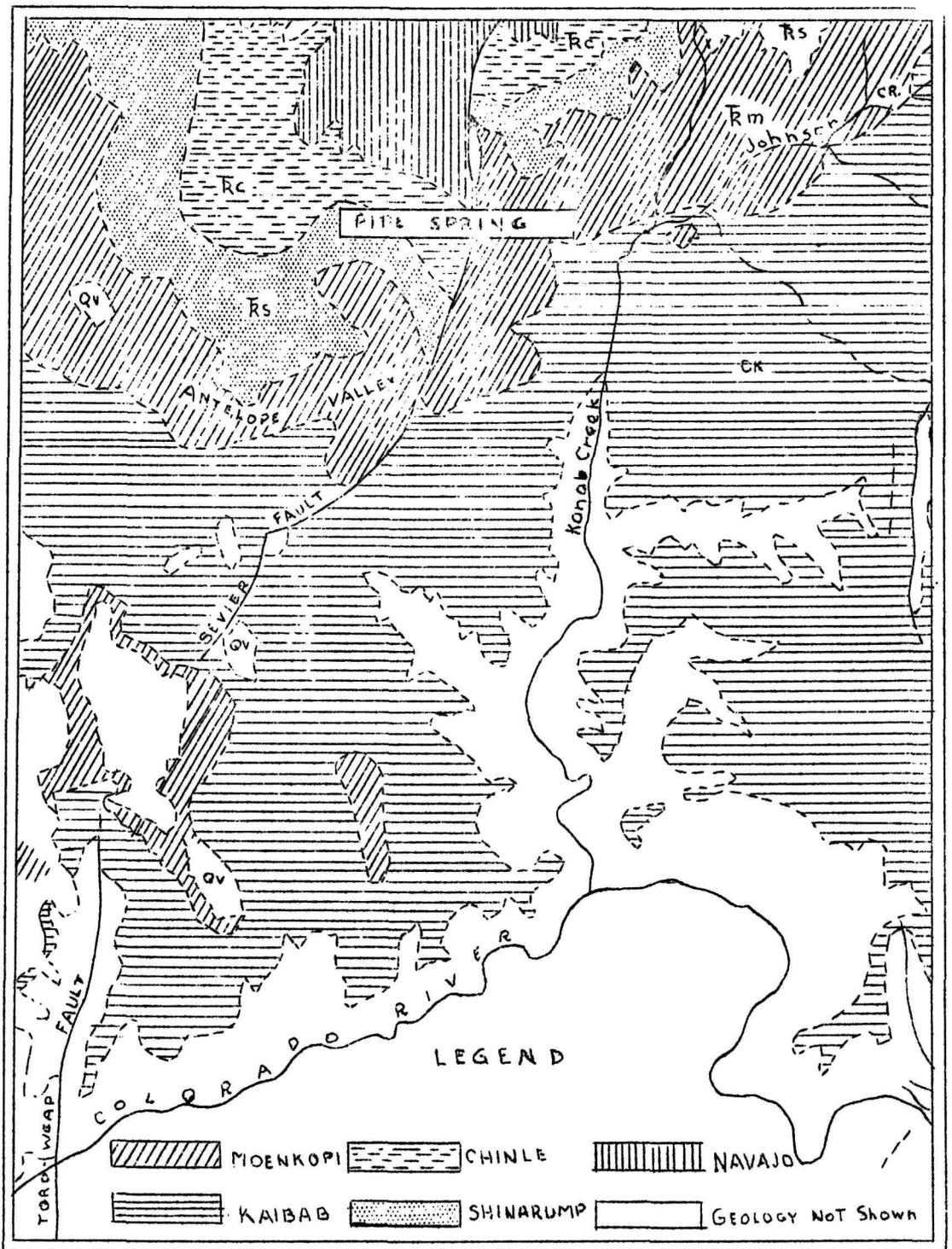
Kaibab Limestone

This gray to buff limestone comprises the basal formation of the plateaus to the north and south of Pipe Springs and forms the uppermost cliffs on both sides of the Grand Canyon. It is a sandy limestone with considerable chert and gypsum in some localities near the base. The formation is quite fossiliferous with some 80 species of sponges, corals, shells and sharks teeth having been described to attest to its marine character. The Kaibab limestone may be observed south and west of Pipe Springs.

GENERALIZED STRATIGRAPHIC SECTION FOR THE REGION AROUND  
PIPE SPRINGS NATIONAL MONUMENT

ERA	PERIOD	FORMATION	THICKNESS (FEET)	CHARACTER	
TERTIARY	EOCENE	Wasatch	400-1500	Highly colored beds of limestone, shale and sandstone with basal conglomerate. "Pink Cliffs" of Bryce Canyon National Park and Cedar Breaks National Monument.	
		Unconformity			
	CRETACEOUS		Kaiparowits		Bluish drab sandstone and sandy shale.
			Wahweap		Yellowish-grey massive sandstone with sandy shale.
			Straight Cliffs	3000 plus	Yellow to brown, irregularly bedded sandstone with some coal.
			Tropic		Bluish drab argillaceous to sandy shale.
			Dakota		Yellow to white sandstone conglomeratic in part. Thin coal beds and petrified wood in places.
			Unconformity		
			Undifferentiated and Carmel Limestone	500 / -	Pinkish gypsiferous sands overlain by massive gypsum, thin limestone and sandy shales. Hard gray fossiliferous limestone.
		MESOZOIC	JURASSIC (?)	Navajo	
Kayenta	2000 / -				
Wingate					
	Unconformity				
UPPER TRIASSIC			Chinle	400-1000	Variegated marls, sandstones and thin cherty limestone conglomerates. Shales included with Bentonite in places. Petrified wood and reptilian remains are abundant.
			Unconformity		
	UPPER (?) Triassic	Shinarump	100 / -	Conglomerate and coarse sandstone with fragments of fossil wood.	
	LOWER TRIASSIC			Red-brown, grey, white and yellow gypsiferous sandy shales with interbedded layers of yellow limestone in lower part and conglomerate at the base. Thickens westward accompanied by change from arid terrestrial deposits to marine beds.	
			Moenkopi	400-1775	
			Unconformity		
PALEOZOIC	PERMIAN	Kaibab	200-1000	Grey to buff cherty sandy limestone with interbedded sandstone and gypsum in places. Contains a marine fauna consisting of some eighty species.	

Note: Mainly from USGS Publications.



## GEOLOGIC SKETCH MAP

PIPE SPRING NATIONAL MONUMENT, ARIZ.

Moenkopi Formation

Unconformably overlying the series of marine limestones is the chocolate brown, grey, white and yellow sandy shales with interbedded layers of limestones in the lower part and a conglomerate member at the base. This group comprising the Moenkopi formation thickens towards the west and the arid terrestrial deposits merge in this direction into marine sediments containing fossils. One of the best sections for the Moenkopi formation may be had at Virgin City, Utah, about forty miles northwest of Pipe Springs, where 1775 feet of section have been measured. The escarpment to the east of Pipe Springs, on the upthrown side of the Sevier fault, is made up of beds belonging to the Moenkopi formation.

Shinarump Conglomerate

The Shinarump is more resistant than the overlying and underlying shales and sandstones and it therefore forms a cap rock, being persistently a cliff-maker, throughout large sections of this region. It is made up of conglomerates and coarse sandstones and is unconformable with the Moenkopi formation below. It rarely exceeds 100 feet in thickness and usually contains fragments of petrified wood in abundance. In some localities the chert pebbles in the conglomerate have been found to contain "Kaibab" fossils.

Chinle Formation

A thick series of shales, sandstones, and thin conglomerates conformably overlie the Shinarump conglomerate and have been designated as the Chinle formation. This series of sandy marls forms one of the most picturesque series of rocks in the region. Because of the great variation of color in brief vertical and horizontal distances together with the vividness of same in various shades of light they are usually referred to as the "Painted Desert". Strictly speaking, however, the "Painted Desert" is generally understood to extend from the vicinity of the Petrified Forest National Monument in a northwest direction to the vicinity of Cameron, Arizona. From the character of rocks now making up the Chinle and the fossil remains thus far discovered we know that the material was deposited by shifting streams and in great shallow bodies of water. At intervals there were great outbursts of volcanic ash from areas of intense activity. This ash was carried to great distances by the wind and is now found intermingled with the beds making up the Chinle. The ash, which is known as bentonite, contributes much to the colors of the formation. A distinctive feature of these rocks is the almost universal presence of petrified wood. The wood is so plentiful in places that they have been termed "forests". Important remains of fossil reptiles and amphibians have been found in these beds.

The old fort at Pipe Springs is constructed from sandstone beds of the Chinle and the fort rests on beds belonging to this formation.

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## PIPE SPRING GEOLOGIC REPORT (CONT.)

### Wingate and Kayenta Formations

The Wingate and Kayenta formations are not exposed at Pipe Springs. They are included in the stratigraphic section since they occur just north of the Utah line. The Wingate is a highly cross-bedded wind-blown sand deposit which cannot be distinguished from the Navajo sandstone unless the intervening Kayenta formation is present. The Kayenta formation is a uniformly bedded calcareous shale deposit with some sandy shales and thin limestone beds.

### Navajo Sandstone

The Navajo sandstone like the Chinle formations is most interesting from the point of view of color but it is mainly known to geologists due to its extreme thickness and the variety of architectural features. Zion Canyon is carved in the Navajo sandstone. At Pipe Springs it may be observed just above the slope of Chinle shales. The Navajo is composed of quartz grains, imperfectly rounded, and held together by a weak cement of calcite and iron oxide. Its various shades of color is due in the main to type and amount of cement. Its principal characteristic is the presence of cross-bedding on a hugh scale. Curved vertical laminae have in many places resulted in the formation of great recesses, caves, and alcoves wherein the Pueblo cliff-dweller found shelter. No distinctive fossils have been found in the Navajo and as the result its age may only be conjectured on a lithologic basis as Jurassic (?). At Zion Park the formation is over 2000 feet in thickness.

The formations for the general area are all indicated on the stratigraphic table. Those above the Navajo do not occur at Pipe Springs or the immediate vicinity and it is not considered important to discuss them at this time.

### Structure

The important structural features of this section of the Colorado Plateau in east-west profile are the Hurricane and Sevier faults which have a general north-south trend and cut the plateaus into great blocks. A section of the wall of the famous Hurricane fault remains and is crossed by the Zion Park and Toquerville highway at the Hurricane Cliffs. Although there is some folding present in the area between the faults the strata is generally undisturbed with dips in the main of less than 2°. Regional uplift and differential erosion have contributed mainly to the present land features.

### Sevier Fault

The Sevier Fault has been traced from the High Plateaus in Central Utah in a southwestward direction for a distance of over 200 miles to Mt. Trumbull and it probably continues across the Grand Canyon of the

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## PIPE SPRING REPORT, GEOLOGY (CONT.)

Colorado as the Toroweap fault. The fault cuts south through the broad valley which extends northward from Pipe Springs where a displacement of 800 to 1000 feet may be noted with the upthrown side to the east. The uplift along the Sevier fault at Mt. Carmel in Utah has brought the Cretaceous rocks in contact with Navajo sandstones of the Jurassic (?) indicating a vertical displacement of about 2000 feet. The Sevier fault may best be seen at Pipe Springs by travelling northward on the road to Moccasin to a point in the vicinity of where the above mentioned photo was taken.

### Pipe Springs

Pipe Springs, Moccasin Springs and the other springs and seeps in the zone to the west of the fault owe their existence to the presence of the Sevier fault. The beds are dipping a few degrees in a northeast direction into the fault. While the rainfall is slight, amounting to less than 13 inches annually, the Navajo sandstone forms a tremendous catchment area and a considerable portion of this water percolates downward as ground water until the Chinle shales are reached. At this horizon it follows the dip until the fault zone is reached where another barrier is formed by the Moenkopi shales and sandstones. As the water is piled up along this zone it is forced to the surface under hydrostatic head. Pipe Springs has a capacity of some 65,000 gallons per day and the Moccasin Spring is some three or four times its size.

### Geologic Signs

No signs are recommended for Pipe Springs since the area within the Monument is so small and the prime geological features are more regional in character, making it difficult to develop them from this point. We have in mind the construction of a wayside shrine for Lee's Ferry Bridge to take in the area from the Grand Canyon to Bryce Canyon in Utah in a geologic section. Pipe Springs and its relative position will be shown on this panorama. It is also considered by the writer that a similar shrine should be erected on the Kaibab Plateau, on the road north from Jacob's Lake, and immediately before one starts dropping down into the valley. Most visitors stop and stare at this marvelous landscape and the features should be pointed out to them as practically all of the tourists are plying between the parks. Pipe Springs could well be brought into this picture. A generalized cross-section from the north rim of the Grand Canyon to Zion National Park through the Pipe Springs area on a large scale is to be drawn and placed on the wall of the old fort at Pipe Springs for the benefit of the visitors who are interested.

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