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THE DISCOVERIES OF NEW MINERALS IN OREGON

by

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In October 1948 there appeared in The Mineralogist a paper titled "Oregon's New Minerals and Discredited Species", in which this writer discussed those minerals first found in Oregon. Thirteen years have elapsed since the publication of that paper and because of new discoveries, it seems worth while to bring the material up to date.

The term "new mineral" is used here only for those minerals which were first discovered in Oregon and were adequately described so that they became acceptable as new mineral species. Not included are those minerals which have been given local names by collectors, usually without any effort to describe thoroughly the material or to determine if it is a new species or merely a variety of a well described mineral. The impropriety and disadvantages of coining local names for such varieties, or mixtures, was pointed out in the 1948 paper mentioned above. Fortunately, this practice seems to have decreased and fewer of these local names are being used. Great care must be exercised in listing discoveries as new minerals, as is indicated by the fact that in the last 10 years trained mineralogists using the latest scientific equipment have been successful in only 56 percent of the cases where they have described minerals as new; in the other 44 percent the new descriptions have been invalidated and the minerals discredited, as indicated by Fleischer (1961). During this period an average of only 23 new minerals per year have been accepted as valid for the entire world.

In chronological order of discovery, 8 new minerals first described from Oregon are given below (see index map). In three instances (johannsenite, heinrichite, and metaheinrichite) the first descriptions were based on specimens from more than one locality and in these cases the honor of "type locality" must be shared with another region.

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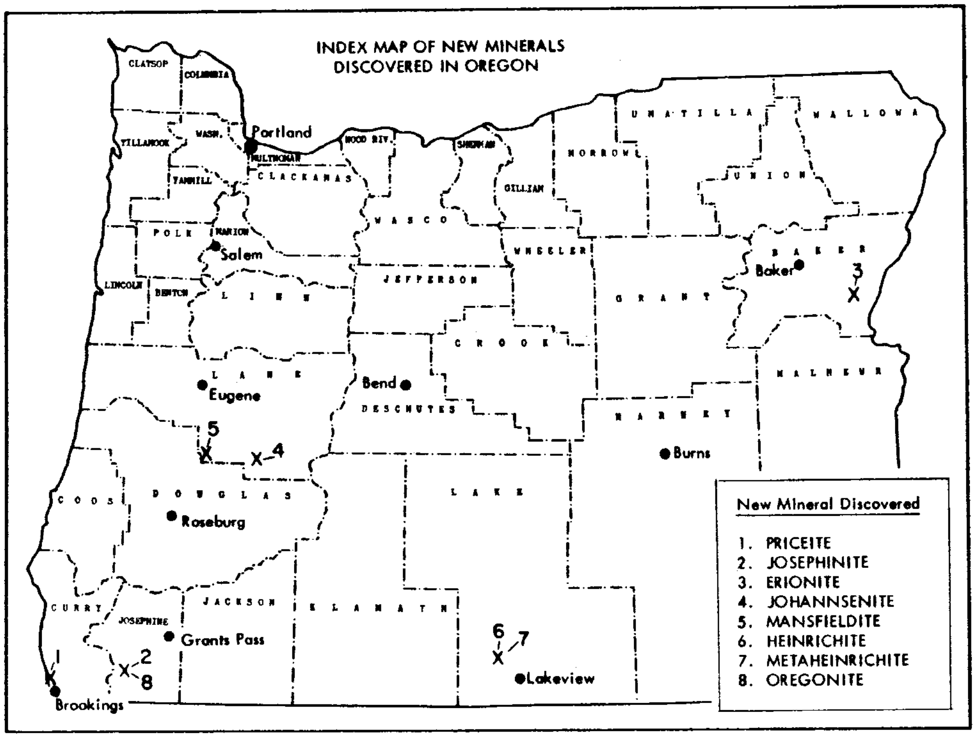

Priceite

Priceite is the first new mineral to be described from Oregon. The honor of doing this went to Benjamin Silliman (1873), professor of chemistry at Yale, after whom the mineral sillimanite was named. He was also founder of the American Journal of Science, and one of the country's most famous early mineralogists. At first it was thought that priceite might be a variety of cryptomorphite, but this was proved not to be the case when Thomas Price of San Francisco showed that, unlike cryptomorphite, there was no soda present in the new mineral. This work led to naming the mineral after Price.

Priceite is a calcium borate ($Ca_4B_{10}O_{19}\cdot 7H_2O$), which was discovered near the mouth of Lone Ranch Creek, south of Cape Ferrelo, and about 4 miles north of Brookings. The mineral occurs as a soft chalky variety so fine that it is almost powdery. The occurrence at Lone Ranch, the paragenesis of the mineral, and the history of the deposit has been discussed by the writer (Staples, 1948-b). Formerly, it was difficult to drive to the deposit, but the relocation of the coast highway (U. S. 101) has made access very easy. The new highway and a state park (Lone Ranch

Area of Samuel H. Boardman State Park) are located directly on the mined area. The mine tunnels are now caved and specimens of priceite are no longer easily obtained.

Josephinite

W. H. Melville (1892) found some brown metallic pebbles in the placer gravels of a stream, which probably was Josephine Creek. The material had been collected by a Mr. Hampton and the exact locality is not known, but Melville named it "josephinite" in honor of Josephine County. For many years there was a question of whether josephinite was terrestrial or meteoric in origin. As a result of later work (Morley, 1949) it is now considered to be of terrestrial origin.

Josephinite occurs as a detrital mineral in Josephine Creek, in pebbles and ellipsoidal masses which are grayish white but usually have a dark brownish-gray coating. It is a highly magnetic nickel iron alloy, often with as much as 75 percent nickel.

Erionite

Erionite, meaning "wooly", was first described by A. S. Eakle (1898) from near Durkee, Baker County, Oregon. This mineral is a zeolite with a wool-like texture that was unknown from other localities until recently. It is now reported in acicular hexagonal prisms from Rock Island Dam, Washington, (Kamb and Oke, 1960) and also in fine grained material from many other localities where it has formed from the alteration of tuffaceous beds.

The location of the original discovery was not clear from the description by Eakle, and the writer spent considerable time in the field before finding the quarry on Swayze Creek, at a distance of 1.6 miles east from U. S. Highway 30. A complete description of the structure and unit cell of erionite was published recently (Staples and Gard, 1959).

Erionite, according to Staples and Gard, has the composition $(Ca,Mg,Na_2, K_2)_{4.5}Al_9Si_{27}O_{72}.27\ H_2O$. Indices of refraction given in textbooks are incorrect and should be O=1.468, E=1.473 with a birefringence of 0.005.

Johannsenite

It is interesting that no new minerals were described from Oregon for the 40 years from 1898 until 1938, when W. T. Schaller described johannsenite. The mineral was named in honor of Albert Johannsen, the famous petrographer, from the University of Chicago. Johannsenite was first reported at a meeting of the Mineralogical Society of America at Harvard in December 1932 and in his abstract Schaller (1933) stated "Johannsenite occurs as a hydrothermal vein-forming pyroxene in the Bohemia District, Western Oregon, and as a product of contact metamorphism at Schio-Vincenten in Northern Italy." From this it is not clear which locality was discovered first, but the first study of the mineral was on material from both localities.

Johannsenite is a silicate with the formula $MnO.CaO.2SiO_2$ and is found in the Bohemia District of Lane County. It is in quartz veins in rhyolite country rock and occurs as brown spherulites or radiating prisms, seldom greater than a quarter of an inch in diameter. It alters to rhodonite, and the excess calcium silicate is deposited as white xonotlite.

Mansfieldite

At Hobart Butte, Lane County, well known because of its kaolinite, realgar, and scorodite, the new mineral, mansfieldite, was discovered. This was first described by Allen and Fahey (1948).

Mansfieldite was named in honor of G. R. Mansfield of the U. S. Geological Survey. It has the composition $Al_2O_3.As_2O_5.4\ H_2O$ and is the aluminum analogue of scorodite. It occurs as white to gray, porous cellular masses with spherulitic structure, some as much as 20 cm in size. It is believed that it was formed by the action of hydrothermal arsenate solutions assimilating aluminum from the Hobart Butte clays, and it is often found in intimate intermixture with kaolinite.

Heinrichite and Metaheinrichite

These are two hydrated arsenates of uranium and barium found at the White King uranium mine near Lakeview. Heinrichite contains 10-12 H_2O and is unstable, dehydrating rapidly to metaheinrichite which contains 8 H_2O. These radioactive minerals occur as yellow to green tetragonal tabular crystals which fluoresce bright green to greenish yellow.

The two new minerals were described by Gross, Corey, Mitchell, and Walenta (1958). Minerals, which later proved to be identical with the heinrichite and metaheinrichite of Lakeview, were found earlier in the central Black Forest of Germany, but the names applied to the White King material have been generally accepted.

As mentioned above, heinrichite rapidly dehydrates, and metaheinrichite is the stable mineral found at the White King. With depth, metaheinrichite gives way to coffinite which is associated with realgar and orpiment.

The new minerals were named after E. W. Heinrich of the Mineralogy Department of the University of Michigan. They were found in a rhyolite tuff where they line vugs and coat fractures.

Oregonite

Only with time can it be certain that a new mineral name will withstand attempts to discredit it. It appears that a bona-fide new mineral has been named after the State of Oregon, through the work of Ramdohr and Schmitt (1959). It is interesting that the name of this mineral, honoring Oregon, should have been given by two Germans from Heidelberg. The article describing the mineral is written in German, in a periodical of limited distribution in this country, but one which is received regularly at the library of the University of Oregon.

The new mineral, oregonite, was discovered by Paul Ramdohr when he was studying josephinite, awaruite, and souesite from various localities. Mr. R. E. Morley of Salem, Oregon, had contributed considerable material from Josephine Creek for this study, and in this material was a pebble of about the size of a plum which closely resembled josephinite. The pebble had a thin, smooth brown crust through which a brilliant metal glistened. It was sectioned, studied with the ore microscope and by X-ray methods, proving to be a new mineral to which the name "oregonite" was given. Mixed with the oregonite was another similar mineral which the authors have designated as mineral "X", rather than name, because they were unable to describe it well enough to set it up as a new species.

Oregonite has a hardness of about 5, S.G. calculated as 6.92, and is hexagonal. The formula assigned is $Ni_{10}Fe_6As_9$ or possibly Ni_2FeAs_2. It is weakly anisotropic, as can be seen along grain boundaries. The authors give X-ray data for it.

A very short review of the paper, in English, is given by Rooseboom (1960). The use of the name "oregonite" for a probably valid mineral re-emphasizes the danger of confusion caused by the arbitrary use of mineral names for invalid species. The misuse of "oregonite" was pointed out earlier (Staples, 1948-a), but the practice continues (Ramp, 1962). The writer regrets that Oregon, a state with many beautiful crystals, does not have named after it a mineral which is more readily identifiable. However, it can take pride in the fact that very few of the 50 states have minerals named after them. A study of the literature shows that although 15 states have previously been so honored, in the cases of only four (Alaska, Colorado, Minnesota, and Montana) are the minerals well-recognized species rather than varietal names or synonyms.

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CHECK LIST OF MINERALS FIRST DISCOVERED IN OREGON

	Mineral	Date Described	Authors	Locality	Chemical Formula
1.	Priceite	1873	Silliman	Lone Ranch Curry County	$Ca_4B_{10}O_{19}.7H_2O$
2.	Josephinite	1892	Melville	Josephine Creek Josephine County	Ni, Fe
3.	Erionite	1898	Eakle	Swayze Creek Baker County	$(Ca,Mg,Na_2K_2)_{4.5}$ $Al_9Si_{27}O_{72}.27H_2O$
4.	Johannsenite	1938	Schaller	Bohemia District Lane County	$CaMnSi_2O_6$
5.	Mansfieldite	1948	Allen & Fahey	Hobart Butte Lane County	$Al_2O_3.As_2O_5.4H_2O$
6.	Heinrichite	1958	Gross, Corey, Mitchell amd Walenta	Lakeview Lake County	$Ba(UO_2)_2(AsO_4)_2 10-12H_2O$
7.	Metaheinrichite				$Ba(UO_2)_2(AsO_4)_2\ 8H_2O$
8.	Oregonite	1959	Ramdohr and Schmitt	Josephine Creek Josephine County	$Ni_{10}Fe_6As_9$

GEOLOGY OF COLLIER STATE PARK AREA, KLAMATH COUNTY, OREGON

By Norman V. Peterson*

As a visitor to central Oregon approaches Collier State Park and Logging Museum along U.S. Highway 97, its natural beauty is at once apparent. The combination of clear, cold rushing streams, rustling pines, and green lawns make the park one of the most pleasant, restful, and delightful recreation areas in Oregon. When he looks around, he sees no immediately visible points of unusual geologic interest. However, the rocks that are exposed within and around the park have a story to tell, and this report has been written to give the visitor a better understanding and appreciation of that story and to show him where to see it.

Collier State Park is an area of about 400 acres situated on both sides of Spring Creek and along the Williamson River within the recently dissolved Klamath Indian Reservation in the western central part of Klamath County. The park is crossed by U.S. Highway 97 about 35 miles north of Klamath Falls, Oregon. There are excellent picnic facilities, including electric stoves, shelters, fireplaces, and tables. More than a mile of trails follow along Spring Creek and the Williamson River. Both streams are stocked with trout and are favorites of fly fishermen. Limited overnight camping facilities have been added.

Logging Museum

An added attraction that is perhaps as famous as the park is "Cap Collier's Camp," an outstanding outdoor logging museum. The museum, the largest of its kind in the nation, displays the tools of logging from its beginning in the Pacific Northwest. The unique collection contains items as varied as old boots to McGiffert stiff-boom log loaders. Single pieces of equipment weight as much as 25 tons and some date as far back as 100 years. Alfred D. "Cap" Collier, Klamath Falls lumberman, is the museum curator and has donated much of the equipment.

History of The Park

The natural beauty of the area now included in Collier State Park was recognized long before Alfred and Andrew Collier envisioned its present use. The first owner was Carlos Blair, who selected the land at the confluence of Spring Creek and the Williamson River as his allotment

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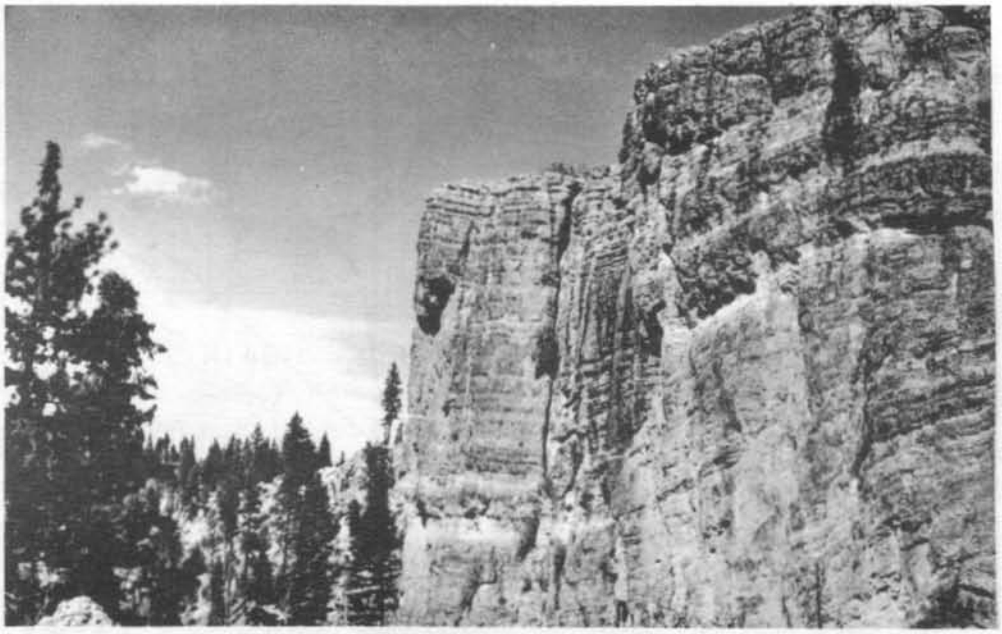


Figure 1. Explosion tuffs about 3 miles northeast of the park where the Williamson River emerges from its canyon.

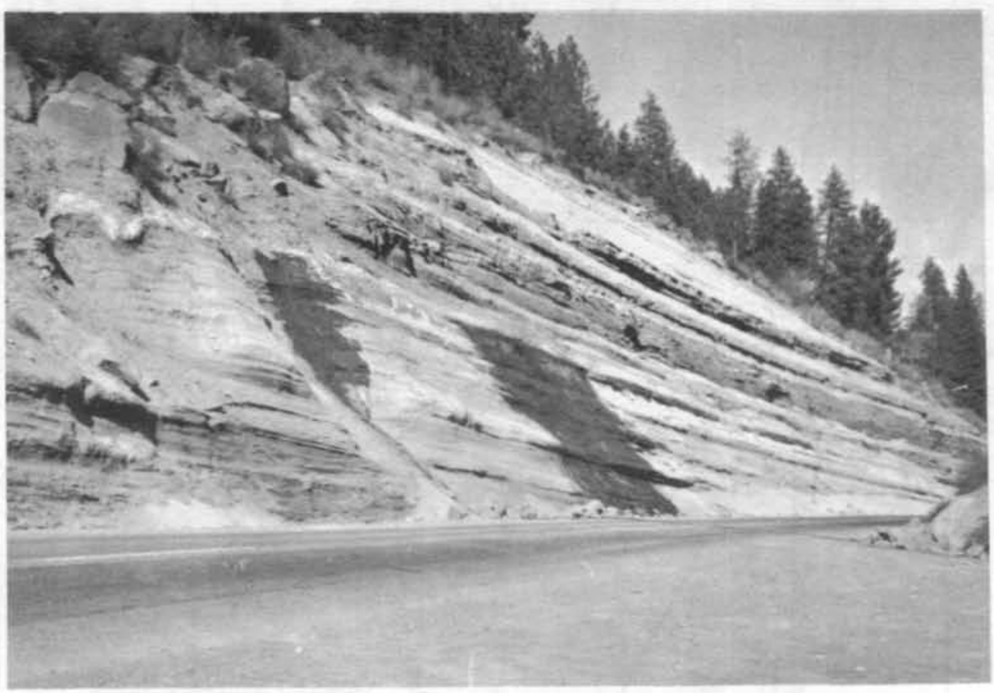
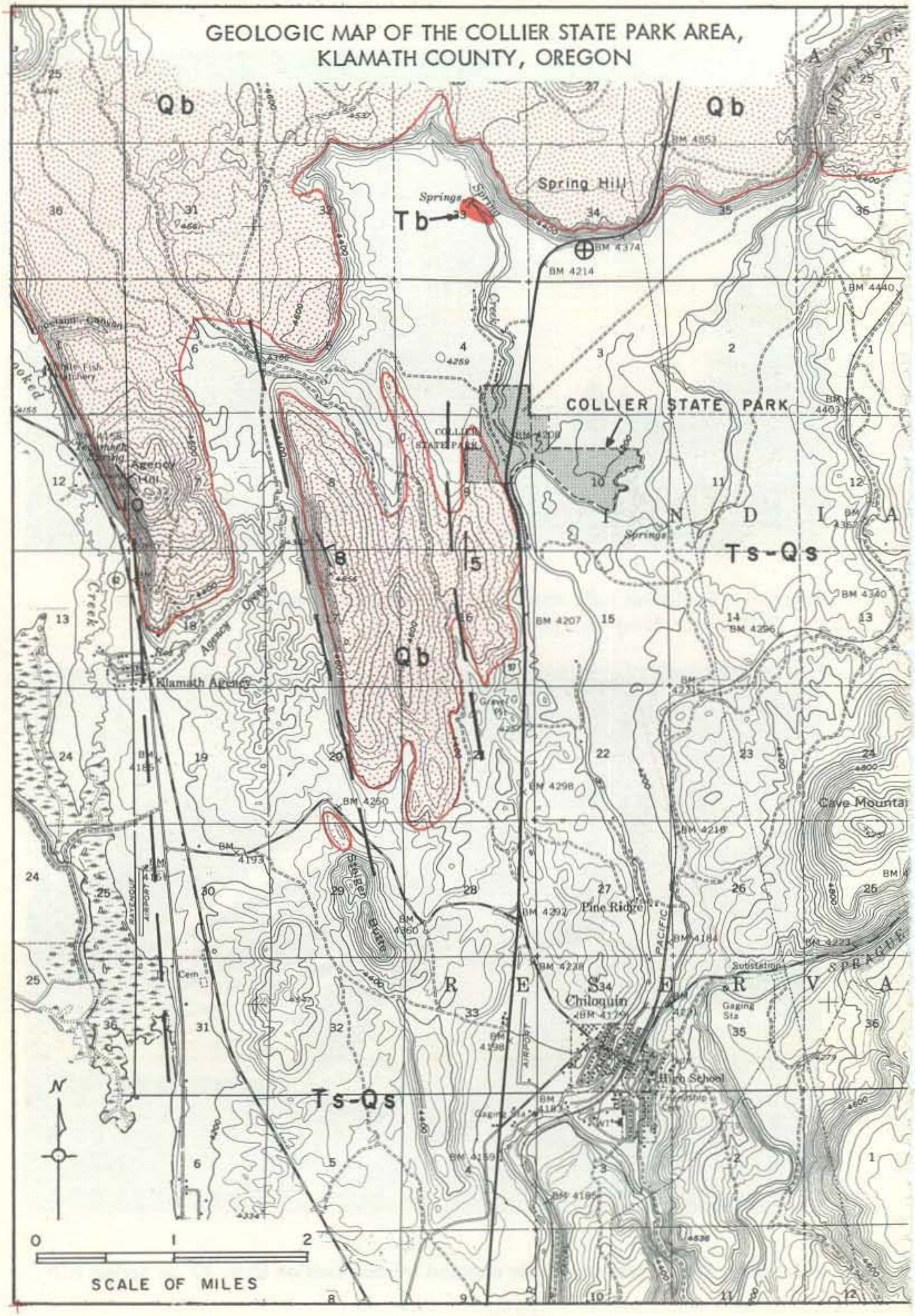


Figure 2. Horizontal lake beds exposed in road cuts on U.S. 97 on Spring Hill.



GEOLOGIC MAP OF THE COLLIER STATE PARK AREA,
KLAMATH COUNTY, OREGON
Qb
Tb
Ts-Qs
Spring Hill
Springs
COLLIER STATE PARK
Agency Hill
Klamath Agency
Cave Mountain
Pine Ridge
Chiloquin
High School
Substation
Gaging Sta
INDIAN RESERVATION
SPRAGUE
WILLIAMSON
N
0
1
2
SCALE OF MILES

Explanation

Pleistocene?	Qb	Light gray to black vesicular basalt flows.
Plio–Pleistocene	Ts-Qs	Layered tuffaceous sedimentary rocks, mainly waterlain but in part airborne. Thin to thick lacustrine beds of silt, sand, and gravel with occasional layers of peat and impure diatomite. Tan to dark brown explosion tuffs locally.
Pliocene	Tb	Dark gray fractured porous flow basalt.
	⟋5	Strike and dip of flows
	⊕	Horizontal beds
	— — —	Fault approximately located
	① ②	Points of interest described in text

Maps adapted from U.S. Geol. Surv. Chiloquin quad. and Army Map Service Sheet NK 10-6, Klamath Falls.

INDEX MAP OF POINTS OF INTEREST, COLLIER STATE PARK AREA

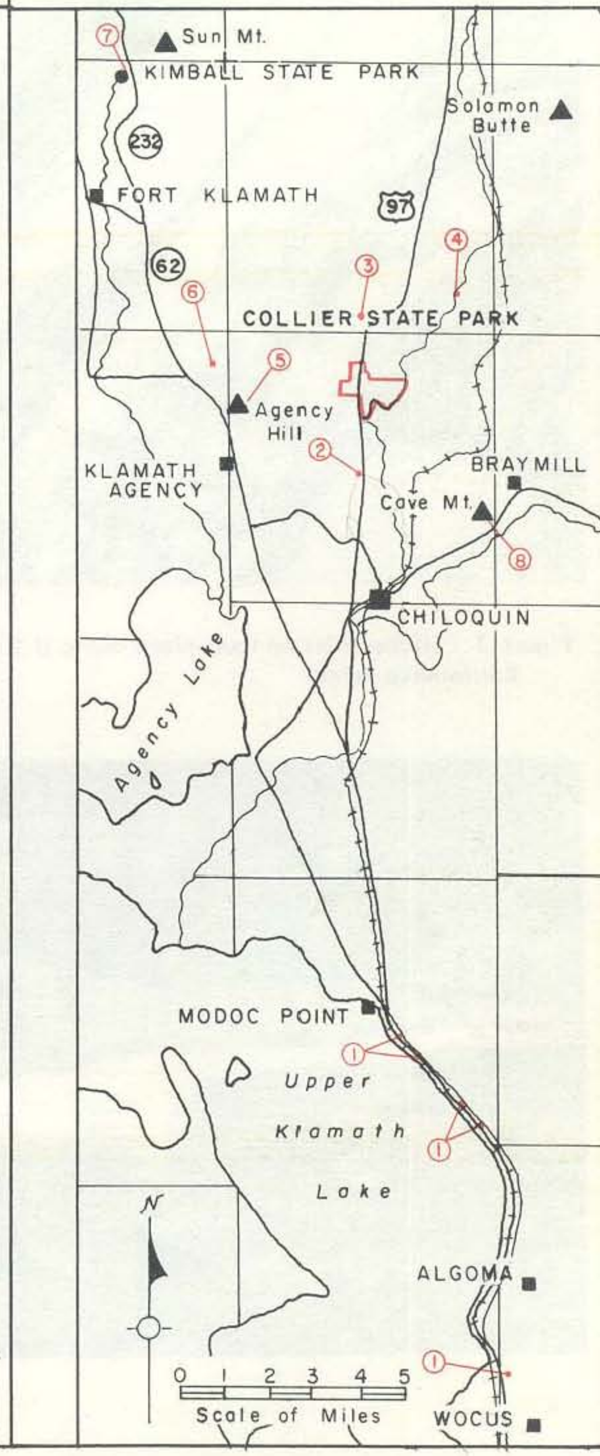


Figure 3. Slickensides on fault plane along U.S. Highway 97 a mile south of Rattlesnake Point.

Figure 4. Erosion of horizontal beds of tuffaceous rock forms step-like riffles and small rapids in Spring Creek about 200 yards east of highway bridge in Collier State Park.

under the Treaty of 1866 between the United States Government and the Klamath and Modoc Indians. When asked why he chose this piece of land he replied, "Because it is such a nice place." Blair was noted as a hunter and fisherman and trapped otter, beaver, and martin in Spring Creek and along the Williamson River.

He sold the land to R. C. Spink for a Model "T" Ford and $800.00. William and Claudia Spink Lorenz of Chiloquin inherited the property and it was from them that Alfred D. Collier and Andrew Collier of Klamath Falls purchased it in 1944 and gave it to the State of Oregon as a park site in honor of their parents, Charles Morse Collier and Janet M. Collier.

Geologic Setting

The geologic history that can be interpreted from the rocks exposed in the cuts of Highway 97 and in the channels of Spring Creek and the Williamson River is relatively short and recent in geologic time. It dates back about 11 million years to the Pliocene epoch when the region was a broad basin, which was occupied at times by large, shallow lakes.

The oldest rocks (see geologic map, page 90) are dark gray basalt flows with only the top of one flow exposed. We can but guess its origin, but the fluid lava is probably a part of a thin sheet that poured out from the east flanks of the Cascade Range into the basin. This basalt can be seen north of the park at the springs which are the source of Spring Creek. The fractured scoriaceous structure of this basalt layer makes it an excellent aquifer, and the abundant snowmelt and groundwater originating to the northwest and northeast can percolate through it freely.

These basalt flows had barely cooled when volcanoes began to puff out ash and cinders that dropped into the lakes or were carried into them by streams. The first explosions were immense, and thick layers of punky pumiceous tuffs were laid down. These are present as horizontal beds exposed in the channels of Spring Creek and the Williamson River.

Short-lived violent explosions formed maars or tuff rings to the east and south. The eroded edges of thin layers of broken rock fragments and ash that formed rims around an explosion crater can be seen also about 3 miles northeast of the park where the Williamson River emerges from its steep canyon (see figure 1). These explosion tuffs are also present in Steiger Butte, about 3 miles south of the park.

A thick series of lake beds, composed mainly of light-colored silt, sandstone, gravel, and clay, accumulated in the regional basin. This series of horizontal, layered rocks can be seen in the road cuts of Spring Hill (figure 2) north of the park. Here a thin capping of resistant basalt protects them from erosion. In the park area, however, several hundred feet of these lake-bed deposits have been removed by erosion.

At times the lakes provided suitable environment for the rapid growth of minute plants called diatoms. Their siliceous skeletons settled to the bottom and became mixed with volcanic ash and sand, forming layers of impure diatomite. These are exposed as almost white layers in the Spring Hill highway cuts.

There were periods when the volcanoes were quiet and vegetation abundant. This is shown by a black layer of peat about one foot thick, which is sandwiched between silt and sand beds. It may be seen in the cuts half way up Spring Hill.

The deposition of the silt, sand, and gravel layers probably continued into the Pleistocene epoch (Ice Age) until finally the lakes were either filled or drained. Then erosion began to form an irregular surface of moderate relief.

Volcanism resumed, probably in Pleistocene time. Light gray olivine basalts from nearby vents spread out to fill the slight depressions and form a gently undulating plateau, which can be seen to the north along U. S. Highway 97. A single flow of this basalt caps the sedimentary rocks at the top of Spring Hill and forms rimrock to the east and west. The contact between the underlying lake beds and the basalt can be seen in the highway cuts; here the molten lava has baked the soil a reddish brown.

Northwest-trending high-angle normal faults (shown on geologic map) are present west of the park. These faults are parallel to the major Basin and Range faults that form the steep escarpments along the east side of the Klamath graben or valley. The relative displacement and tilting of the capping basalt layers by these smaller faults has been slight. The high angle and normal movement on the faults is shown by slickensides on fault planes at several places along the escarpment, such as near Rattlesnake Point (figure 3), Modoc Point, and at a locality a mile north of Klamath Agency.

Uplift, either regional or that associated with Basin and Range faulting, has resulted in rapid erosion in the park area. At least 350 feet of silt, sand, and gravel has been removed to expose the basalt flow at the source of Spring Creek. The rate of erosion has probably gradually slowed, but the youthful streams are still busily cutting down the land surface. Some of the horizontal tuff layers are harder than others, and where the streams undercut the softer underlying material, small falls and rapids form (see figure 4). Deeper pools below the riffles make excellent fishing spots.

The climactic volcanic explosion only 7,500 years ago that led to the collapse of Mount Mazama and the formation of Crater Lake is indirectly visible in the park area. Pumice thrown high in the air drifted eastward on the prevailing winds to shower a vast region. In the park area, the pumice is present just beneath the grass roots. The layer is rather thin (a few inches to a few feet), but it thickens rapidly to the north and has been measured as much as 45 feet thick at Kirk, about 7 miles away. Variation in thickness of the pumice over short distances is caused by the irregular surface on which it fell and also by subsequent wind erosion and drifting.

Points of Interest Near Park

Many of the places that reveal the geologic story are not within Collier State Park but can be reached on a short side trip or on the way to or from the park. The following are some of the points that should be interesting to most visitors (see index map, page 91, for location).

1. Fault escarpments along east side of Klamath Lake: Traveling north from Klamath Falls on U.S. Highway 97, the predominant topography is the result of fairly recent faulting. The steep northwest-trending ridges are practically uneroded fault scarps. The recency of the faulting can be seen at several places where the slickensided surfaces of the fault plane are exposed. One mile south of Rattlesnake Point and at several places between Barkley Spring and Modoc Point the shiny slickensided surfaces can be seen. They are usually exposed where the talus has been removed for use as road material.

Continuing northward toward Modoc Point, the highway cuts through the complex breccias, cinders, lava flows, and dikes that are found near and in vents of volcanoes.

2. Cinder Pit: The center of a small eroded cinder cone has been exposed in a Highway Department quarry about $1\frac{1}{2}$ miles south of Collier State Park just west of U.S. Highway 97. Layered ashes and cinders of this small explosive volcanic feature are easily seen. The cinders of one layer have iron oxide coatings that give bright iridescent colors.

3. Spring Creek Springs: The springs are about $1\frac{1}{2}$ miles north of the park. They can be reached by turning left from U.S. Highway 97 just before it starts to climb over Spring Hill. A large flow of clear cold artesian water bubbles to the surface to form Spring Creek. The pool at the springs and the creek below constitute one of the two places in central Oregon where mares egg algae is found. This rare Nostoc algae grows as colonies of rounded, wrinkled, brown leathery masses from the size of a pinhead to 6 inches in diameter. The other place where mares egg algae is found is at Mares Egg Spring located at the base of the east flank of the Cascades about 7 miles southwest of the town of Fort Klamath.

4. Williamson River canyon: The Williamson River is confined in a steep-walled canyon for several miles before it flows out onto the flat surface eroded in the softer sedimentary rocks about $2\frac{1}{2}$ miles northeast of the park. The canyon has been cut in thick layers of basalt that probably flowed out from the flanks of Solomon Butte, a steep-sided shield volcano to the northeast made up mainly of basaltic lava. There are springs within the canyon that contribute large quantities of water to the Williamson River. For the adventurous angler there is excellent fishing in the deep holes worn in the basalt bedrock.

5. Klamath Agency, Agency Spring, and Agency Hill: These features are 3 miles due west of Collier State Park and can be reached by driving south on U.S. 97 to the junction north of Chiloquin, west to Oregon Highway 62, and then north to the Klamath Agency. This was the administration center for the Klamath Indian Reservation. It is now owned and used by a private corporation and it also serves as the temporary headquarters of the new Winema National Forest.

Agency Spring, just across the highway, is the southernmost in a row of springs at the base of the Agency fault escarpment. This spring flows out from large blocks of rubble at the base of the escarpment, and it is believed to result from the uplift of a basalt aquifer along the north-trending fault scarp. Agency Hill is the highest point along the Agency fault escarpment. A steep road to the summit gives a spectacular view of the Klamath Plain and High Cascades to the west.

6. State Fish Hatchery Springs and Copeland Canyon: Two miles north of Klamath Agency another group of spring orifices at the base of the Agency fault escarpment have been developed for use at the fish hatchery where rainbow trout are raised. These springs, as well as Tecumseh Spring a half mile to the south, are the sources of Crooked Creek. Visitors are welcome at the hatchery and can see large trout where the hatchery outlet empties into Crooked Creek. Copeland Canyon is a hanging or perched valley just to the north of the hatchery. It has been uplifted to its present position by recent movement along the fault. It can be seen by looking east toward the scarp from Oregon Highway 62 about 1 mile north of the road to the hatchery.

7. Jackson F. Kimball State Park: Three miles north of Fort Klamath junction on Oregon Highway 232, turn left just before starting up over Sun Mountain. Here another large spring begins amid boulders of basalt that have broken off the rim and rolled down the steep slope. This spring is the main source of upper Wood River and is noted for its clear, deep blue water. Like the other spring-fed streams, it furnishes excellent trout fishing.

8. Cave Mountain: Cave Mountain is a large mass of bedded tuffs, explosion breccias, occasional basalt flows, and dikes. It is situated about 2 miles northeast of Chiloquin and can be reached by way of Sprague River road. A cave situated on the south side of the mountain was occupied by Indians in ancient times. Artifacts disclose that a favorite camping ground for them was along the Sprague River upstream from Braymill.

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REACTIVE METAL CASTINGS ON DISPLAY

A group of reactive metal castings manufactured by Oregon Metallurgical Corp. of Albany, Oregon, is on display in the Department museum in Portland. The castings are made from vanadium, tungsten, and beryllium, usually in a high vacuum under very exacting controls. These metals are resistant to heat and corrosion and are used for nuclear, aircraft, and chemical applications.

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DRILLING PERMIT NO. 47

The Department issued permit No. 47 to Humble Oil & Refining Co. on June 6, 1962 for a test well in Marion County, 1,633' south and 1,681' east from the NE. corner sec. 11, T. 7 S., R. 1 E. Drilling will be done on the Francis Wicks property 6 miles east of Silverton.

* * * * *

WELL RECORDS RELEASED IN OPEN FILE

Company & Well	County	Depth	Records
John T. Miller Sullenger No. 1 Sec. 18, T. 8 S., R. 5 W.	Polk	710' T.D.	Driller's log History Cuttings*
Oregon Oil & Gas Co. Roberts No. 1 Sec. 25, T. 10 S., R. 8 W.	Lincoln	2,630' T.D.	Driller's log History Gas analysis Cuttings*
Reserve Oil & Gas Co. Roy - L& G - Bruer No. 1 Sec. 31, T. 6 S., R. 4 W.	Polk	5,549' T.D.	Induction log Sonic log Mud log History Dipmeter Cuttings & cores*

*Available for study at the Portland office.

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WHAT IT TAKES TO DRILL FOR OIL*

"This location was drilled on the southeast edge of McComb Field. The McComb Field pay sand was shaled out. No shows were present in the well; plugged and abandoned."

So reads the epitaph for a drilling venture--McComb Field Unit 26-1 in Pike County, Mississippi--in a neatly typed report resting in Sun's Production files. All that remains now of the $60,000 project is a long, slim hole extending two miles down into the South Mississippi earth, and a brief drilling report. Factual and to the point, the report tells the oil man all that he really needs to know about MFU 26-1. It was a dry hole.

But behind that cryptic report lies an interesting story. Back in June, 1961, brisk activity marked the site of MFU 26-1. Eighty-eight men and close to $1.5 million worth of equipment were assembled on the rolling Pike County countryside to buck the odds once more in an effort to bring in a producing oil well. They gambled and, as it turned out, they lost.

The well itself wasn't unusual. It was just one of some 47,000 wells drilled in the U. S. last year, and it wasn't particularly difficult to drill. The fact that it turned out to be a duster wasn't unusual either. After all, 36 per cent of all the wells drilled in 1961 were dry, more than 17,000 wells altogether (in exploratory drilling in untested areas, some 90 per cent of all wells are dry).

To bring MFU 26-1 into perspective, let's back up a bit. The McComb Field is veritably a baby as oil fields go; it was discovered in August, 1959, when Sun and an independent operator brought in a wildcat producing 240 barrels daily. This discovery well, producing from a thin Lower Tuscaloosa sand about two miles down, set off a small boom in drilling and leasing. By the end of the year, 15 producers had been completed.

However, in early 1960 the outlook darkened considerably. Engineering studies showed that the oil sand contained more salt water than oil and that McComb would be a marginal field financially. But the engineers also suggested that the problem could be licked by operating the field as a unit and by applying modern technology to supplement the natural pressure existing in the reservoir. This would be done by pumping additional salt water through selected wells into the producing formation to help displace oil from the sandstone and increase the oil flow from producing wells. After more than a year of intensive effort, agreement on unitization was reached with Sun as unit operator. The salt water injection program, now in operation, is expected to more than double oil recovery.

*Excerpt from article by Dean S. Chaapel in "Our Sun," Spring, 1962, reprinted by permission of Sun Oil Company.

Men, Materials, and Machines for Typical Well

At bottom center are 25 drill bits, flanked by floating tools, centralizers, scratchers and other equipment used in setting casing. Behind are drums of lubricants, with Christmas tree assembly at left. Personnel in foreground are district superintendent in front, two toolpushers behind him at left, and three drilling crews and one roustabout crew in hard hats at left and center. Six men in line at right front are two petroleum engineers, landowner, landman, lawyer and civil engineer. Directly behind are two geologists, left, and two foremen. (Other men in photo work with equipment indicated.)

First row of trucks, from left, includes four pickups used by pumpers; gravel and lumber trucks used in site preparation; and two trucks loaded with mud materials. In second row are butane fuel truck, personnel carrier, two bulldozers, welding truck, swabbing truck, logging truck, perforating truck, electrical logging truck and logging laboratory unit. Large flat-bed truck facing left, first truck in third line, and pickup in rear are utility units. Others in angled line are four special-purpose units used in fracturing producing formations and in cementing operations, a pickup, and two cement trucks (large boxes). Trailer provides field office space. Two rows of trucks at right are loaded with drill pipe, tubing and casing. Drilling rig with mast down is at rear, with toolhouse at front left. At far left are kerosine fuel tank, core-house, mud-house and butane fuel tank for rig. (Sun Oil Co. photo.)

In the late spring of 1961, Sun, as operator, was pushing a drilling program to define all prospective producing acreage. As a part of this program, MFU 26-1 was planned as a unit definition well (a well to help outline the limits of the oil pool) on the southeast edge of the field. According to geological reports, the Lower Tuscaloosa oil sand should be found about 11,000 feet down.

With the decision to go ahead, the stage was set for getting ready to drill, a mammoth job in itself. First, a four-man civil engineering crew moved in to locate and stake the exact site. Since the site was located in the middle of a pasture, the next step was building a quarter-mile stretch of board road in from the highway to enable heavy trucks to bring in equipment and supplies without damage to the land. With the road in, bulldozers were moved in to level the ground, scoop out pits for the drilling mud and prepare the well-site for the drilling rig.

Then came the rig. MFU 26-1 was drilled by a rotary rig owned by Reading & Bates, drilling contractors of Tulsa, Okla. Valued at $568,000, the big rig could drill a hole more than four miles into the earth. After it was positioned, the 142-foot, tapering steel mast was erected and auxiliary equipment tied in.

Although this powerful rig was the prime mover in drilling MFU 26-1, a vast array of other equipment and supplies had to be assembled at the well-site before drilling could begin. (See photo.) . . . When all equipment had been moved in and set up and all personnel were on hand, the stage was set for starting to drill. For MFU 26-1, this moment arrived on the morning of July 4, 1961. A sharp steel bit was screwed onto a section of drill pipe, the pipe was lowered through the rotary table, the big rig came smoothly to life and the bit began biting into the Mississippi soil.

Drilling continued around-the-clock for the next three weeks, with the steady progress of the hole being interrupted only by necessary time out to pull the drill pipe to change bits, and to set surface casing. The Lower Tuscaloosa Formation was hit at 10,855 feet. Between that depth and 11,016 feet, 23 cores (earth samples) were taken from the hole and carefully examined. None showed any signs of oil. MFU 26-1 was a bust. On July 25, after being drilled to a total depth of 11,050 feet, the well was plugged and abandoned.

This story of MFU 26-1 doesn't paint the oil-finding business as a particularly easy one. But to the oil man, disappointing as a dry hole is, the picture is somewhat different. After all, that next well might be a producer and he'll never know unless he drills. And if it is a producer, maybe he can get back some of the money he dropped on dry holes.

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