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1968 - THE YEAR OF THE METEORITE

By Erwin F. Lange
Professor of General Science, Portland State College

-1968-
The Year of the Meteorite

The year 1968 has been designated in Oregon as the year of the meteorite by a committee consisting of Hollis M. Dole, State Geologist, Phil F. Brogan, science writer and former associate newspaper editor at Bend, and the writer. This group firmly believes that there are in Oregon undiscovered meteorites that might be found if many people became more observing of their surroundings, and the group also feels that there may be undescribed or unreported meteorites in the possession of people who are unfamiliar with their importance to science.

Because of the tremendous interest in space exploration, meteorites as objects of scientific study have assumed a new importance. Unlike most geological specimens needed for research, scientists cannot go to a certain area and pick up more specimens as they are needed. For meteoritic specimens science is largely dependent upon lay people or amateurs in science to help uncover new materials. Meteorites are the only authentic samples of space matter now available for direct study. When the first astronauts return from the moon they will bring back rocks for research purposes, some of which will be examined in Oregon laboratories.

Considerable evidence exists that undiscovered meteorites have fallen somewhere in Oregon. Stories of someone knowing about a meteoritic fall are heard in many localities around the state. Nineteen hundred sixty-eight is the year that all of these stories should be investigated and, if true, the meteorites should be made known to science. Each year several brilliant meteors or fireballs streak across the Oregon skies, giving evidence that matter from space is reaching the earth*. What can be accomplished by

* A future article will deal with meteors and observed meteoritic falls.

carrying on a planned program of search for new meteorites is best exemplified by the results obtained by H. H. Nininger of Sedona, Ariz., who has found more new meteorites than any other person. When he first began his search in Nebraska in 1931 only 9 meteorites had been found in that state, while during the next 12 years 20 unknown meteorites were uncovered. Nininger had similar success in Wyoming where only one was known before 1933. By 1940 nine discoveries were listed.

Oregon, one of the larger states in the West, has had but four authentic meteoritic discoveries, and two of these are listed as lost meteorites. In the 1850's a government geologist, Dr. John Evans, forwarded a piece of meteorite along with other mineral specimens for analysis to a chemist in Boston. Before he could lead an expedition to Oregon to recover the main mass, estimated to weigh 10 or 11 tons, he died and with his death was lost the location of the find which was described as being on Bald Mountain 30 or 40 miles from Port Orford. The search for the Port Orford meteorite has continued for more than 110 years, but as yet the great meteorite has not been found, even though one often hears rumors to the contrary.

Some time in the distant past southern Oregon had a shower of iron meteorites, of which five individuals have been found in the Sams Valley area north of Medford. The largest individual piece weighed about 15 pounds and the rest were in the one- or two-pound size. Pieces of this shower are displayed in the museum of natural history at the University of Oregon and at the Jacksonville Museum. Other undiscovered pieces probably exist in the Sams Valley area.

In 1902 Ellis Hughes discovered the largest meteorite yet found in the United States, the 15.5-ton Willamette iron, a short distance from West Linn. After several court cases concerning the ownership of the celestial object, the great meteorite was sold and given to the American Museum of Natural History in New York, where it is viewed by thousands of visitors every year in the Museum's Hayden Planetarium.

The fourth Oregon meteorite was a 30-pound mass found near Klamath Falls about 1952. A piece was brought in for analysis to J. D. Howard, who sent it to H. H. Nininger. It proved to be authentic. The owner apparently never returned for the analysis and the small piece from the Klamath Falls iron is in the Nininger collection of meteorites at Arizona State University at Tempe while the main mass appears to be lost.

Where does one look and what does he look for in the search for new meteorites? This question has often been asked. The answer is rather complex, but helpful hints can be given. Meteorites may be found almost any place. They have been found lying on the top of the ground, and in the top several feet of soil. The plow has uncovered more of these than has any other instrument. A few have fallen through buildings. The writer believes that a major problem in finding new specimens of space matter is one of identification and recognition. Meteorites fall into three general classes:

1. The irons. These attract attention because they are heavy and are made up almost entirely of alloys of nickel-iron.

2. The stones. These resemble terrestrial rocks and are the most difficult to recognize. They are composed of silicates through which tiny particles of bright nickel-iron are distributed.

3. The stony-irons. These are an intermediate class being made up of a network of bright nickel-iron which is filled with the mineral olivine. These are called pallasites and are quite rare.

The following points are useful in the identification of meteorites:

1. All are heavier than the common volcanic rocks.
2. All are magnetic, except that stony meteorites may be only slightly magnetic.
3. Newly fallen specimens have a black or brown fusion coating and shallow pits resembling thumb prints.
4. They are irregular in shape.
5. Weathered specimens may appear very rusty in color.
6. Certain identifying tests can be done best in a scientific laboratory.

If one finds a specimen suspected of being meteoric what should he do? The committee hopes to involve a great many people in this search, particularly many high-school science teachers. It is hoped that science teachers all over the state will discuss meteoritic properties with students, and will also make the preliminary examination of specimens thought to be different from ordinary rocks. If the science teacher thinks that a new meteorite has possibly been uncovered, the information can be forwarded along with a small sample to any member of the committee. The sample will be analyzed and returned to the owner.

The following paperback books may be consulted for a more complete description and account of meteorites:

Heide, Fritz, 1964, Meteorites: University of Chicago Press, $1.95.
Nininger, H.H., 1952, Out of the Sky: New York, Dover Pubs., $1.85.
Watson, Fletcher, 1962, Between the Planets: New York, Doubleday & Co., $1.25.

Also, in hardback form:

Mason, Brian, 1962: Meteorites: New York, John Wiley & Sons, $7.95.

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SENATE VOTES TO LIFT GOLD COVER

A bill eliminating the requirement that Federal Reserve notes in circulation be backed by gold equivalent to 25 percent of their value was passed in the Senate March 14 by a vote of 39 to 37. The measure had passed the House earlier by nine votes. The bill now goes to the President for his signature.

Several amendments were proposed, but all were defeated. These included proposals to retain a $12\frac{1}{2}$ percent gold cover and to deny gold conversion privileges to nations behind in their debt repayments to the United States. [American Mining Congress News Bulletin, March 15, 1968]

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A TWO-PRICE SYSTEM FOR GOLD

On March 17, the Central Banks Governors of the "gold pool" nations announced that they would no longer furnish gold to private buyers but would continue to buy and sell gold at the official monetary price of $35 an ounce in transactions with monetary authorities.

In a related action the Department of the Treasury stated that it would no longer purchase gold in the private market nor will it sell gold for industrial, professional, or artistic uses. The Treasury has amended its Gold Regulations to permit domestic producers to sell and export gold freely to foreign buyers as well as to authorized domestic users. [American Mining Congress Memorandum, March 18, 1968]

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MINERAL LEASING NO THREAT TO SISKIYOU NATIONAL FOREST

Future mining activity along a portion of the Rogue River in Curry County will be permitted only under the mineral leasing laws, if a U.S. Forest Service application for withdrawal from all forms of appropriation under the mining laws is approved. Reason for the proposed withdrawal, which embraces a total of 256 acres, is for "the protection and administration of the Siskiyou National Forest." The land involved lies in portions of T. 34 S., R. 11 W., and T. 35 S., R. 12 W., which is near Agness a famous fishing resort area at the confluence of the Illinois and Rogue Rivers. Placer mining has been conducted on both of these gold-bearing streams for more than 100 years. The Rogue is considered to be one of the prime fishing streams in the West, apparently little affected by a century of mining activity.

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GEOLOGY OF THE HORSE SIGN BUTTE BLACK SAND DEPOSIT AND VICINITY, CURRY COUNTY, OREGON

By Ewart M. Baldwin
Department of Geology, University of Oregon

Introduction

The Horse Sign Butte black sand deposit is situated in Curry County on the ridge between Horse Sign Creek and the Illinois River, about 2 miles northeast of Horse Sign Butte and 7 miles south of Agness (figure 1). The deposit was located before 1914 by Frank Berry of Agness, and it has been of interest to prospectors and geologists for many years.

Butler and Mitchell (1916), the first to report on the black sand near Horse Sign Butte, suggested that the magnetite in the sandstone was nonsedimentary and had impregnated the Myrtle Formation near an intrusion. Allen and Lowry (1942) recognized the sedimentary nature of the black sand, but also included it in the Myrtle. The writer concludes that the black sand is unconformable upon the Myrtle and older formations and that it is much more restricted in tonnage than previously estimated. He assigns it to the middle Umpqua Formation of early middle Eocene age, as described by Baldwin (1965).

This investigation was undertaken to determine the nature and extent of the black sand deposit and to relate it to the geology of the area as part of a regional study that the writer has been working on for many field seasons. The work pertaining to the black sand was supported by the U. S. Geological Survey's heavy-metals program Grant No. 14-08-0001-11058. The writer is indebted to H. Edward Clifton of the U.S. Geological Survey for aid and advice during field study and preparation of this report. He was accompanied in the field by LeRoy Maynard.

Geography and Access

The black sand deposit lies in a rugged part of the northern Klamath Mountains incised by a rejuvenated Illinois River and its tributaries. Many slopes are precipitous, and relief is approximately 3000 feet. The climate is hot and dry during the summer and fall, and snow and rain make roads impassable during the rest of the year. The closest water supply is Horse Sign Creek.

Extremely poor access to the black sand deposit has retarded its exploration. The shortest approach is through the brush from Oak Flat and Horse

Sign Creek. A circuitous approach by way of the Game Lake trail is longer, but perhaps easier. A good road connecting with the Hunter Creek Road is being constructed by way of Collier Butte to Game Lake by the U.S. Bureau of Public Roads. It may be extended toward the deposit following an old jeep road that is now usable as a foot trail.

The geologic map, Figure 1, which accompanies this report includes the northeastern corner of the Collier Butte quadrangle, heretofore unmapped, the southeastern corner of the Agness quadrangle (Diller, 1903), the southwest corner of the Marial quadrangle, which is being mapped by the writer, and the northwestern corner of the Pearsoll Peak quadrangle (Wells and others, 1949).

Stratigraphy

The black sand deposit is situated in a structurally complex belt about 5 miles wide between the Dothan Formation and the Colebrooke Schist. A great expanse of peridotite and serpentine border and may underlie a north-plunging faulted syncline of sedimentary rocks of the Myrtle Group and middle Umpqua beds, which obscure structural relationships between the older rocks. The Dothan Formation and a western belt of volcanic rocks similar to and herein assigned to the Rogue Formation lie east of the belt, whereas the Colebrooke Schist lies to the west.

The Colebrooke Schist, Rogue, and Dothan Formations are considered to be pre-Nevadan and presumably Jurassic in age, but their chronological order is uncertain. In describing these formations, the Colebrooke Schist is treated first because of its greater state of alteration and not because of any new evidence as to chronolgical age.

Colebrooke Schist

The Colebrooke Schist was named by Diller (1903). It is a platy schist or phyllite that is dark gray to black where freshly exposed and silvery gray where weathered. In places the schist contains pods of gabbro and greenstone that may represent dikes, sills, or plugs, as well as piles of lava extruded during deposition of the original rock. If the Colebrook Schist and Galice Formation in the northern end of the Agness quadrangle are equivalent in age, as is believed by the writer, then these greenstone pods would be related to similar bodies within the Galice Formation. However, in the Collier Butte quadrangle the origin of the Colebrooke Schist is unknown. Dott (1966) proposes that it is derived from the Dothan Formation in this area. Coleman (Blake, Irwin and Coleman, 1967) is currently studying the Colebrooke Schist in detail.

Rogue Formation

The Rogue Formation, named by Wells and Walker (1953), includes the belt of extrusive volcanic rocks that lies between the Dothan and Galice Formations in southwestern Oregon. The formation is well exposed along Interstate 5 south of Canyonville. Similar lavas are interbedded with the Dothan and Galice Formations and with the Colebrooke Schist. On most geologic maps relatively small bodies of volcanic rocks are also included within those three formations, and the term "Rogue Formation" is reserved for the thicker and more continuous belts.

In the map area and to the north a thick unit of volcanic rocks parallels the western edge of the Dothan Formation. It crops out in Mule Creek drainage, along the Rogue River, in Shasta Costa, Indigo, and Silver Creeks, and extends southward along the Illinois River toward the Big Craggies. The formation is nearly 10,000 feet thick in the Mule Creek drainage. Wells and Peck (1961) map this as Dothan volcanic rocks, but the writer believes that these rocks are part of the Rogue Formation and that they have been repeated by faulting.

The Rogue Formation rocks seem to grade into coarse-grained gabbro such as that occurring along the North Fork of Indigo Creek and along the Illinois River at Colliers Bar. Were it not for the gradational character of textures, these might be considered to be intrusive bodies, and indeed some of them may be. The writer believes the gabbro is a local metamorphic facies of the volcanic belt.

Dothan Formation

A thick section of rhythmically bedded sandstone and siltstone of the Dothan Formation occupies the eastern edge of the mapped area and extends eastward across the Pearsoll Peak and Marial quadrangles. According to Wells and Walker (1953), the Dothan Formation is 18,000 feet or more thick and dips mostly eastward. The relationship of the western margin of the Dothan to the volcanic rocks of the Rogue Formation is uncertain. A major fault probably underlies the western belt of the Rogue Formation, but it is largely covered to the north by the Umpqua Formation.

Nevadan intrusive rocks

During the interval between deposition of the pre-Nevadan and post-Nevadan sedimentary rocks, there were intrusions of peridotite and diorite. The peridotite was later serpentinized and in some places squeezed into new positions along fault zones. Large masses of peridotite and serpentine are present in the mapped area and no doubt extend beneath Myrtle and Umpqua beds.

Diorite and quartz diorite intrusions generally equivalent in age and

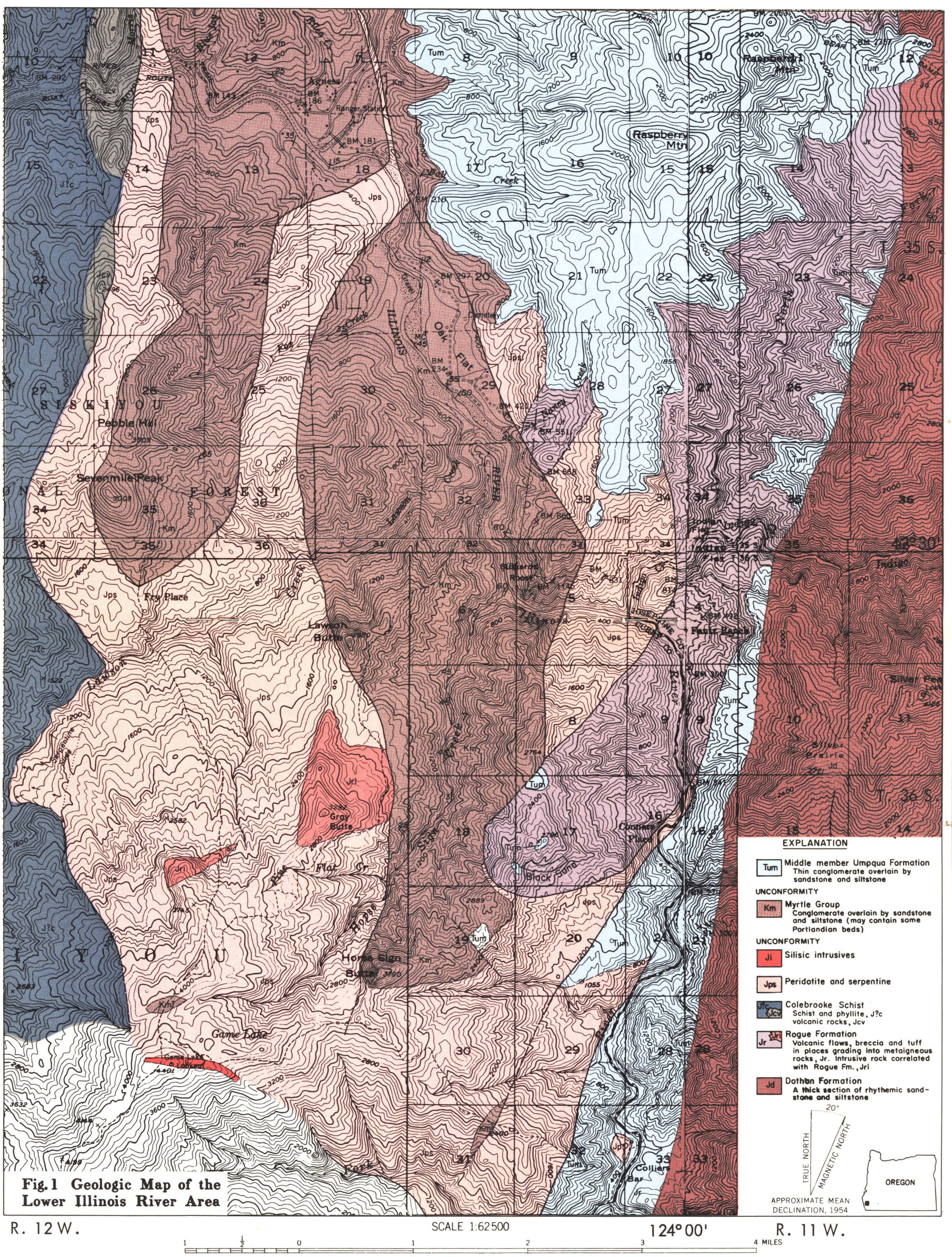

Fig. 1 Geologic Map of the Lower Illinois River Area

composition to the Pearce Peak Diorite (Koch, 1966) are present in Collier Butte to the southeast, but the only intrusion of this type found within the mapped area -- a silicic dike at the Game Lake Lookout -- is probably derived from these intrusions.

Myrtle Group

The sedimentary rocks of the Myrtle Group contain a basal, well-sorted chert-pebble conglomerate that crops out in Horse Sign Butte, Pebble Hill, Lawson Butte, and Buzzards Roost within the area mapped and which may be traced intermittently northeastward toward the Riddle and Days Creek Formations of the Myrtle Group as defined by Imlay and others (1959). The Riddle Formation was considered to be Late Jurrassic and the Days Creek Early Cretaceous, but later evaluation of the faunas by David Jones (written communication, 1967) indicates that the Riddle is also Early Cretaceous. It is likely that the Myrtle Group in the Illinois drainage is also wholly Cretaceous.

The basal conglomerate is a well-sorted chert-pebble conglomerate which was probably laid down during an onlap of the Early Cretaceous seas. The beds grade upward into finer clastic sedimentary rocks. The lithology bears more similarity to the Myrtle Group near Days Creek described by Imlay and others (1959) than to the Humbug Mountain Conglomerate and Rocky Point Formations of Koch (1966). The upper part is characterized by the fossil pelecypod *Buchia crassicollis*, which is also present in the Days Creek Formation and in the Rocky Point Formation of Koch (1966). Because of the obscurity of the contacts, units within the Myrtle Group were not differentiated.

Umpqua Formation

The Umpqua Formation in southwestern Oregon was divided into three members by Baldwin (1965), who at that time concluded that the beds in Raspberry Mountain and southward were a part of the upper member of the Umpqua Formation. Later work indicates that the southward termination of the upper member is in Green Knob on the north side of Shasta Costa Creek north of the map area. It is the middle member that extends across Raspberry Mountain and southward along the Illinois River to the vicinity of Colliers Bar, and also includes the black sand deposits near Horse Sign Butte.

Basal middle Umpqua beds of the Illinois River drainage contain coarse, roughly bedded conglomerates, some with boulders more than a foot in diameter. Pebbles and boulders are composed of a variety of rock types, such as diorite, gabbro, greenstone, chert, and sandstone. This assemblage is not greatly different from that along the Illinois River now. It is probable that during middle Eocene time a river entered a narrow north-trending arm of the sea that opened upon a broader marine embayment farther north.

Faulting was likely in progress during deposition of the Umpqua sediments.

Umpqua beds occupy a narrow graben along the Illinois River east of Horse Sign Butte, and the basal beds in the graben are more than 2000 feet lower in elevation than the black sand deposits.

Wells and others (1949, p. 15) state: "At the mouth of Silver Creek the formation is disturbed considerably by a high angle reverse fault that has brought the basalts and sandstone of the Dothan over the Arago (Umpqua)." Movement along this fault may have been in part pre-Umpqua and the sediments may have been deposited against a pre-existing fault scarp. Only the Umpqua beds east of Raspberry Mountain are seen to cross the contact between volcanic rocks and the Dothan in the area mapped.

Wells and others (1949, p. 15) found a fauna along the Indigo Prairie trail in sec. 35, T. 35 S., R. 11 W. Fossils collected from this locality by the writer contain middle Eocene species that are common in both middle and upper Umpqua beds.

Black Sand Deposits

Description of the areas

Four small outcrop areas of Umpqua Formation were found along the ridge northeast of Horse Sign Butte. These may be numbered from 1 to 4 in a northerly direction. However, only No. 2 contains an appreciable amount of black sand. The deposits are plainly unconformable upon the older greenstone and are less well indurated and less distinctly bedded than the Myrtle Formation.

Area No. 1: The Umpqua in area No. 1 in the center of sec. 19 consists largely of coarse conglomerate. No concentrations of black sand were seen.

Area No. 2: Area No. 2 lies in a saddle on the line between secs. 17 and 18. Virtually all of the black sand known in the region is concentrated in this small deposit. A bulldozer had been used to strip much of the soil and vegetation from the sand, leaving most of it quite well exposed.

The strata dip gently southward against greenstone. It is not known whether this is a fault contact or initial deposition against a topographic high, but the latter appears to be the more likely. Only a few scattered pebbles were noted at the base, and the deposit grades upward into sandstone with an increasing content of black sand. The richest part lies at the southeastern end on the Illinois River side of the divide, whereas the sandstone to the northwest contains a lesser amount of black sand.

A sample of leaner sandstone from the north side of the saddle was examined by Sam Boggs of the University of Oregon Geology Department. It contained: quartz, 6 percent; feldspar, 5 percent; opaque minerals, 21 percent; rock fragments (including quartzite, chert, and schist), 3 percent; non-opaque heavy minerals (many grains altered), 45 percent; and a matrix of altered iron-stained material.

The deposit as paced is approximately 125 feet wide and 250 feet long. It has not been penetrated in the thicker part, but maximum depth is probably less than 50 feet. The black sand makes up only a part of the deposit and if concentrated into one layer it would be less than 10 feet thick. On the basis of these dimensions there may be between 35,000 and 50,000 tons of black sand at this locality.

Allen and Lowry (1942) show the deposit extending nearly 300 feet down the slope toward the Illinois River. This sand had not been exposed by recent bulldozing or test pits, and it was not determined whether the lower part is float from above or a separate small deposit. It is doubtful that the material in this small body will add appreciably to the tonnage of black sand.

In describing the composition of the black sand layer, Allen and Lowry (1942) state that it is composed predominantly of magnetite particles (as much as 95 percent of the mass) with smaller percentages of ilmenite (also probably chromite), hornblende, zircon, quartz, garnet, tremolite, chrysotile, and pyrite.

Spectrographic tests of some of the samples were made by the State of Oregon Department of Geology and Mineral Industries (Allen and Lowry, 1942). Magnetic separates of samples P927-933 showed the following composition:

V	.1-1%	Si	1% plus
TiO_2	.1-5%	P	trace
Cr	2-5%	As	trace
Fe	more than 10%	Ca	trace
Al	.1-1%		

A chemical assay made by Larch Brothers, Hibbing, Minn., was reported by Allen and Lowry (1942) as follows: Fe, 54.94%; S, 0.114%; V, 0.37%; TiO_2, 2.70%; and P, 0.004%.

Tests conducted by the U.S. Geological Survey on two samples indicated gold contents of 0.01 ppm and 0.05 ppm (H. E. Clifton, written communication, December 27, 1967). These are grab samples from the richest concentration of black sand as exposed in the bulldozer cut southeast of the saddle.

Area No. 3: Umpqua sandstone caps a small terrace against a higher outcrop of greenstone a short distance north of the main deposit of black sand. This area has been opened by shallow bulldozed trenches, but very little black sand was in evidence. It is not known whether this deposit of Umpqua is faulted against the greenstone or rests upon an irregular surface, but the latter appears to be more plausible.

Area No. 4: The most northerly patch of Umpqua mapped on the ridge is not well exposed. A few pebbles embedded in the soil indicate that the lower part of this relatively thin deposit is conglomerate which grades upward into sandstone. Some pieces of float contain streaks of black sand which compose less than 50 percent of the rock. This area might be examined through test pits to see if a significant tonnage is present.

Other areas

The other outcrop areas of Umpqua Formation shown on Figure 1 have been visited in reconnaissance, but no concentrations of black sand were seen. The contact of the middle Umpqua with older rocks was followed around the south end of Raspberry Mountain. The basal conglomerate here was found to be very thin to absent and most of the sandstone is medium grained without an appreciable black sand component.

Origin of black sand deposits

The black sands are composed of heavy minerals that are common in the Klamath Mountains and in the Illinois River drainage. The distribution of Umpqua deposits indicates filling of a narrow north-trending marine embayment at the mouth of an ancient stream. Basal beds were mainly poorly sorted conglomerates. Part of the basin may have been down-faulted while sedimentation was taking place, for the narrow block opposite Silver Creek trends northward and appears to be continuous with the terrace-like deposits just south of Indigo Creek. The concentration of black sand in area No. 2 may have occurred as a beach deposit in a cove or small bay shielded by greenstone.

The black sand along the coast generally contains abundant chromite. However, according to Griggs (1945, p. 125), "In the deposits near the Rogue River, magnetite and ilmenite together outweigh chromite 10 to 1." The Horse Sign Butte black sand is similar to that mentioned by Griggs. The high magnetite content in this deposit may be explained by its derivation from the large bodies of peridotite and serpentine in the Rogue-Illinois River region. Magnetite may form during serpentinization of peridotite. It is also possible that the volcanic rocks of the Rogue Formation were the source of some of the magnetite.

Conclusion

The Horse Sign Butte black sand deposit contains a small tonnage of iron and chromium and is highly inaccessible. Accessory materials such as gold and vanadium are present in such minor amounts that they do not appear to be economic within the foreseeable future. In beds where the black sand makes up less than half of the rock there would be a problem of separation and concentration that would detract from their value. It is doubtful if the ancient black sand of the Illinois River drainage basin is at present of economic value.

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NATIONAL SCENIC RIVERS HEARINGS HELD

Hearings on proposals to establish a National Scenic Rivers System were held March 7 and 8 by the Subcommittee on National Parks and Recreation of the House Interior Committee. Several bills are pending before the committee, including H. R. 8416, introduced by Rep. Wayne N. Aspinall (Colo.), and a Senate-passed bill, S. 119.

On March 7 testimony was heard from members of Congress on individual rivers and from Edward C. Crafts, director of Interior's Bureau of Outdoor Recreation, speaking in support of the legislation.

Crafts pointed out that, while both H.R. 8416 and S. 119 would continue the applicability of U.S. mining and mineral leasing laws and would not affect valid mining claims existing on the date of the Act, the House bill provides that, with respect to claims located after the date of the Act, patents thereto would give the claimant title only to the mineral deposits in the claim, together with the right to use the necessary land surface. In addition, H.R. 8416 would withdraw minerals in federal lands that constitute the bed or bank of a river included in the system as well as the minerals on federal lands within a quarter of a mile of such a river. Also, H.R. 8416 withdraws for further study, for not more than an eight-year period, minerals in federal lands adjacent to rivers listed in the bill. He said the Department prefers the mining provisions contained in H. R. 8416.

On March 8 members of Congress and spokesmen for the Department of Agriculture and national conservation groups were heard. The only expressed opposition to the legislation came from the National Reclamation Association, which stated that the legislation did not "conform to the principles of multipurpose development...."

Hearings will continue on March 18 and 19, when opportunity to testify will be afforded representatives of local organizations and private citizens. [American Mining Congress News Bulletin, March 15, 1968]

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LEASE MINING NOT HARMFUL TO RECREATION

The U.S. Forest Service has reaffirmed that mining conducted under the federal mineral leasing laws is compatible with recreational activities. The Forest Service has filed an application with the Bureau of Land Management for the withdrawal of 297 acres in the Whitman National Forest from appropriation under the mining laws but not from leasing under the mineral leasing laws. The applicant desires to set aside the Grande Ronde Guard Station and River Campground and the Woodley Campground in Union County for recreation and administration purposes. This withdrawal, if approved, will decrease still further the areas available for the discovery and production of metals and minerals under the mining laws from the public domain.

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REGULATION OF SURFACE MINING ASKED

The Administration, on March 11, sent to the Congress proposed legislation to provide for regulation of surface mining and the reclamation of surface-mined land through the joint efforts of the federal government and the states. Introduced as S. 3132 by Sen. Henry Jackson (Wash.), chairman of the Senate Interior Committee, Sen. Frank Lausche (Ohio) and Sen. Gaylord Nelson (Wis.), the bill would apply only to surface mines operating on the date of the bill's enactment and those commencing operation after that date.

Under the legislation, states would be given the opportunity to provide within two years of the bill's enactment suitable surface mining control programs that fit local conditions. The federal government would share up to 50 percent of a state's cost of developing, administering, and enforcing the plans.

Two years after enactment of the bill, regulations would be developed by the Secretary of the Interior, after consultation with advisory committees, and applied to surface mining operations in any state that had not submitted a plan or where federal approval of a state plan had been withheld.

The bill provides that mined land reclamation regulations on federal lands must be "at least equal" to any law or regulation under an approved state plan or any federal regulation applicable in a state.

Hearings have been scheduled by the Senate Interior Committee for April 30 and May 1 to consider this bill. Also pending before the committee are S. 217, introduced by Senator Lausche, which would restrict surface mining regulations to coal only, and S. 3126, introduced by Senator Nelson, which covers previously surface-mined lands as well as all future surface mining operations.

In his transmittal letter, Interior Secretary Udall pointed out that the Department hopes to propose a workable program for the reclamation of previously mined areas "in the not too distant future."

As to underground mining, Udall said, "at the direction of the President we will be submitting to him by April 1, 1969, a report, based on studies now being conducted, on the appropriate measures to be taken to prevent and control adverse effects to the environment resulting from underground mines and underground mining operations, and the washing, sizing, or concentrating of minerals." [American Mining Congress News Bulletin, March 15, 1968]

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EOLA-AMITY HILLS GROUND WATER DESCRIBED

"Ground Water in the Eola-Amity Hills Area, Northern Willamette Valley, Oregon," by Don Price has been published by the U.S. Geological Survey as Water-supply Paper 1847. The 66-page report may be obtained for 75 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

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