

RECENT VOLCANIC LANDFORMS IN CENTRAL OREGON*

By Norman V. Peterson and Edward A. Groh**

Introduction

As the race to be the first mortals on the moon continues, the questions of how the lunar surface features originated and what rock types they contain are still not answered.

Many of the lunar configurations that are telescopically visible certainly resemble volcanoes and features associated with them. Even if only a part of the moon's surface has been formed by volcanic processes, some of the smaller volcanic forms, such as hummocky lava flow surfaces, spatter cones, and lava tubes could be present. If these features exist, they could provide ready-made shelters to protect men and vehicles from the hostile environment of radiation, high temperatures, and meteorite and dust bombardment.

A reconnaissance of the Bend-Fort Rock area in central Oregon shows that it has a wealth and variety of fresh volcanic landforms that should be of interest to the planners of our lunar programs as well as to the students of volcanology or to those curious about the rocks of Oregon.

Recent Volcanic Activity in Oregon

Before discussing central Oregon specifically, it may be well to look at the pattern of Recent volcanic activity in all of Oregon. "Recent" volcanism is that which occurred during the Recent Epoch of the geologic time scale, beginning at the close of the Pleistocene (glacial) Epoch about 11,000 years ago and extending to the present.

As shown in Figure 1, numerous lava flows, domes, and pumice and cinder cones of Recent age are present throughout the High Cascades and their eastern slopes, extending as a belt from Mount Hood to Crater Lake, with the greatest concentration in the Three Sisters area. This belt of

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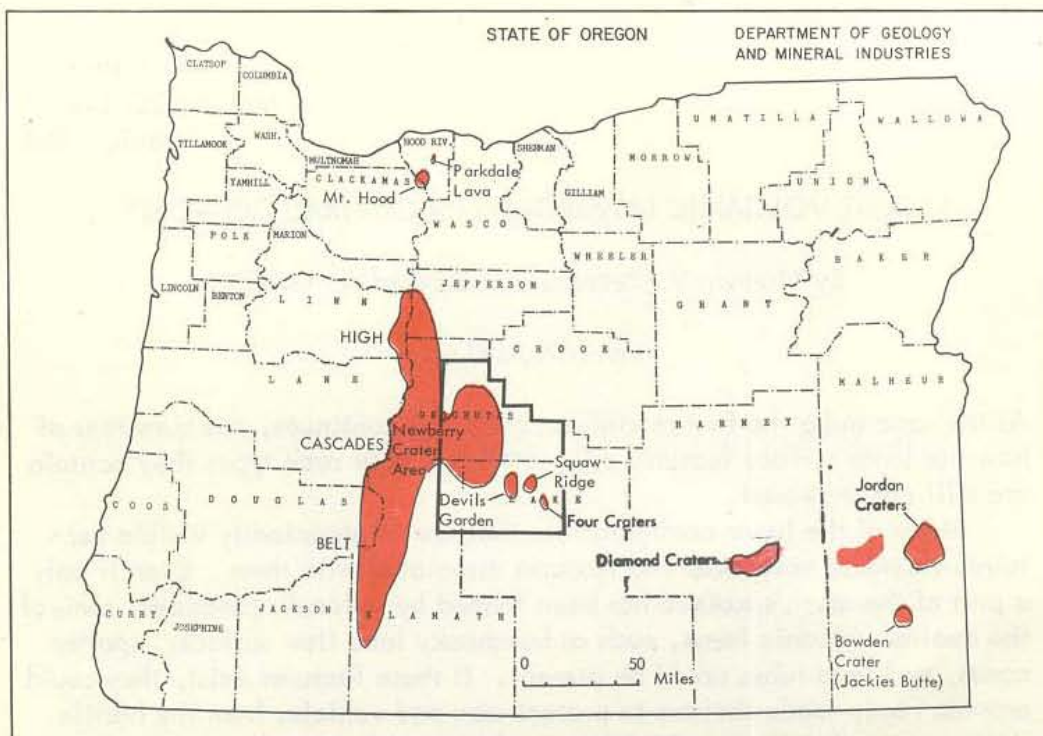


Figure 1. Index map of Oregon showing areas of Recent volcanism.

volcanism contains such well-known features as the Belknap Craters and surrounding lava field, more commonly called the McKenzie Highway lava field; the flow damming Davis Lake; the cones and lava flow damming Clear Lake; cones and flows around the Three Sisters; Lava Butte and its rough lava field; the Lava Cast Forest; and, of course, Crater Lake. A more complete list and description of the numerous Recent volcanic features in this belt, including the Newberry Crater area, can be found in the geologic map by Howel Williams (1957).

Other Recent lava fields and associated cinder cones that are not nearly as well known or described in geologic literature include Devils Garden, Squaw Ridge lava field, and Four Craters lava field. These border the north part of the Fort Rock and Christmas Lake Valleys. Jordan Craters, Bowden Crater, and Diamond Craters are isolated Recent eruptive centers located in southeastern Oregon.

The time of eruption of some of Oregon's volcanoes has been determined quite accurately by radiocarbon dating of carbonaceous material. For example, pumice from the cataclysmic eruptions of Mount Mazama fell about 7,600 years ago. Similarly, a pumice eruption from Newberry Volcano has been dated at about 9,000 years ago and a later one around

2,000 years.

The age of many of the Recent volcanic rocks can be only inferred on the basis of such factors as appearance and geologic relationship. In the estimate of some volcanologists, Lava Butte and the McKenzie Highway lava field are about 1,000 years old. The writers believe the Four Craters cones and lava field to be about this same age. More study and observation of Oregon's Recent lavas may produce carbonaceous materials which will provide accurate determination of their ages by the radiocarbon method.

Of special interest in historic time is the Parkdale lava flow, which issued from a small vent on the northern slope of Mount Hood. The end of this flow is about one mile west from the town of Parkdale in the Hood River valley. Radiocarbon dating of wood carbonized by the heat of this lava flow places its age at about 240 years, therefore setting the eruption in about the year 1720. A thin ash fall around the upper flanks of Mount Hood is believed, from tree-ring dating, to have resulted from a short eruption in the main crater about the year 1800, and may be the last fairly well-substantiated volcanism known in Oregon. Some fumarolic activity still exists on Mount Hood near Crater Rock and at the headwall of Reid Glacier.

In our neighboring state of Washington, report of a short eruption at Mount St. Helens producing an ash fall during November 1843 is well documented. There is evidence that a small, blocky andesite flow may have been extruded on the mountainside around 1838. Also, it has been scientifically demonstrated that an ash eruption may have taken place about 1802. Fumarolic action is still present on this mountain.

To the south in California, Mount Lassen, the United States' latest active volcano, had its most recent eruptions from 1914 to 1917.

Recent Volcanic Areas in Central Oregon

During the summer of 1962, in cooperation with the Bend Chamber of Commerce, a reconnaissance of the area south and east of Bend, including the northern parts of the Fort Rock and Christmas Lake Valleys, was made to determine the extent and variety of Recent volcanic landforms. It is not the intent to list every feature but to show areas where there are concentrations and to illustrate and describe briefly some of the typical landforms.

Figure 2 shows that most of the recent volcanism is within a broad, northwest-trending zone extending from the Three Sisters area at the crest of the High Cascades southeastward through Newberry Volcano and the Devils Garden area until it terminates in the Four Craters lava field in the north part of the Christmas Lake Valley.

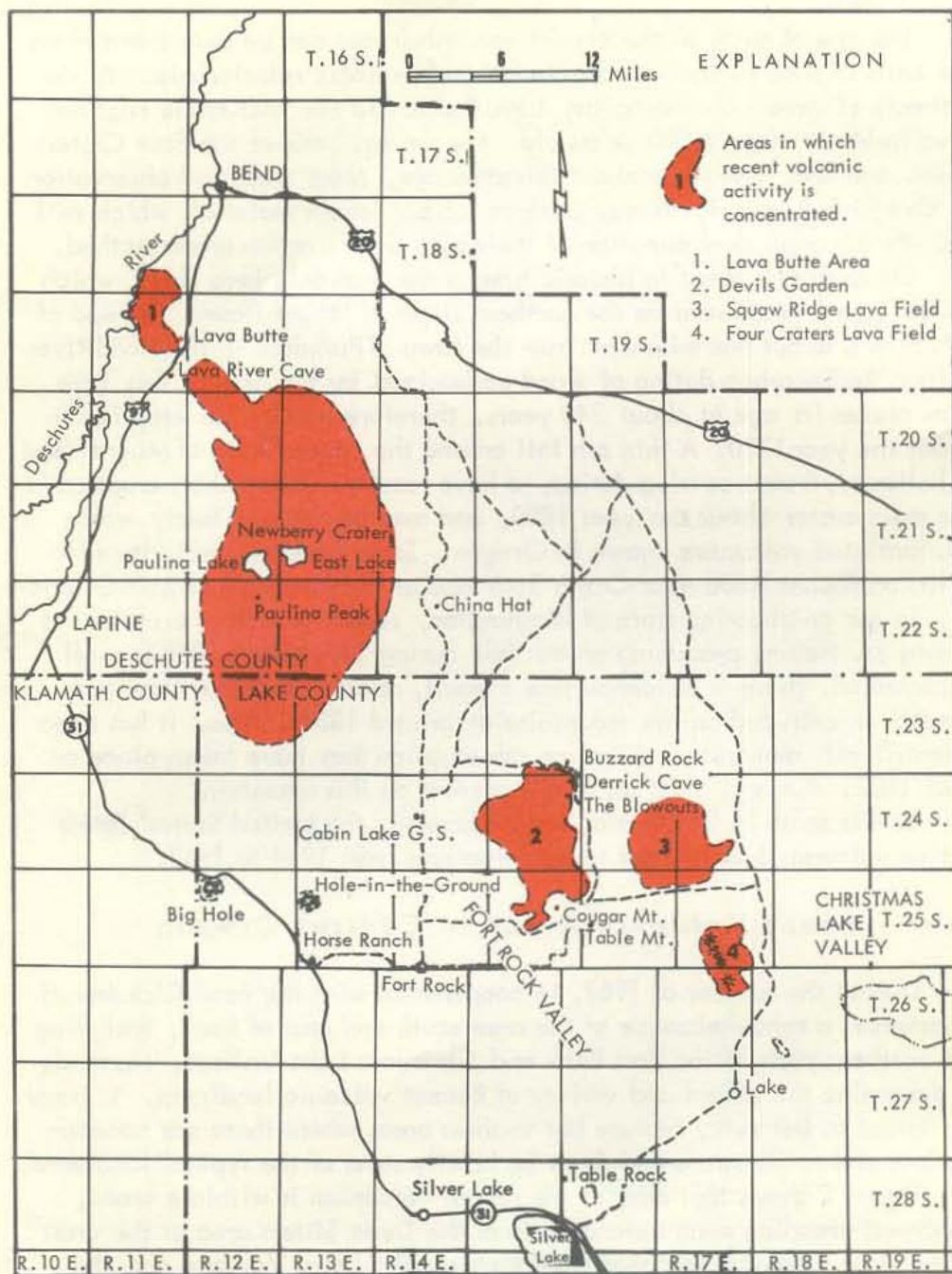


Figure 2. Index map showing areas of Recent volcanic landforms in central Oregon.

Four Craters lava field

This unnamed area, for this report called the Four Craters lava field, is the most remote and farthest southeast area of very recent lava flows and cinder cones. It covers about 12 square miles in Ts. 25 and 26 S., R. 17 E. on the northern edge of the Christmas Lake Valley. This relatively small area is a typical example of the alignment of cinder cones on a strong fissure from which basaltic lavas have been erupted. The four main cratered cinder cones with smaller parasitic scoria mounds are surrounded by clinkery aa flow lavas that came from numerous vents along a fissure that trends about N. 30° W.

Squaw Ridge lava field

A large unnamed basalt cone lies to the south of Squaw Ridge and is called the Squaw Ridge lava field in this report. This broad, shallow cone covers an area 6 to 7 miles in diameter mainly in T. 24 S., Rs. 16 and 17 E. This lava field was not examined in detail because of poor access and difficult terrain; however, both the rough, clinkery aa lava and the smooth-crusted ropy pahoehoe lava were noted at the edge of the flow.

One or more cinder cones top this shield-shaped cone and probably were formed during the last eruptive phases. Two "steptoes" or islands of older rock were seen within the eastern part of the lava field when viewed from the top of the northernmost cinder cone in the Four Craters field.

The Devils Garden

The Devils Garden area covers about 45 square miles of the northern part of the Fort Rock Valley in northern Lake County, mainly in Ts. 24 and 25 S., R. 15 E. Thin flows of black pahoehoe lavas originating from fissures in the north and northeast part spread to the south and southwest. Several rounded hills and higher areas are islands or "steptoes" completely surrounded by the fresh black lavas.

Excellent examples of smooth, ropy pahoehoe lava are common on the upper surfaces of the large slabs formed by collapse when the hot fluid lava of the flows was drained from beneath thin, solidified crusts (Figure 3).

Along the northeast edge of the Devils Garden, there are classic examples of spatter cones, spatter ramparts, and lava tubes. Figure 4 shows one of two especially large spatter cones, locally called "the blowouts," in sec. 12, T. 24 S., R. 15 E. These were built over a fissure from temporary vents by the bubbling up of pasty clots of semi-molten lava. Another

group of these spatter cones (Figures 5 and 6) aligned along a fissure are situated about a mile to the north.

Figure 7 shows the collapsed roof near the entrance to a very interesting lava tube that has been named "Derrick Cave." In some places the height to the roof is more than 50 feet, indicating that the formation of all lava tubes is not as simple as presently explained. Certainly the flow, whose top and sides cooled and later drained owing to pressure of the contained hot fluid lava on its snout, was narrow and thick. Numerous flat benches (Figure 8) on the tube walls show that the drainage of the tube was not continuous but stood still or flowed sluggishly at times. Further study of this lava tube, in which so many primary flow features are preserved, could give valuable information about how they are formed.

Lava Butte area

Lava Butte is situated alongside U. S. Highway 97 about 10 miles south of Bend and is a well-known feature to anyone who has travelled by. A road leading from the highway spirals around this classic, basaltic cinder cone to a parking area at the top. A well-formed crater exists at the apex of this cone and the lava field some 500 feet below can be viewed from its rim. Clinkery aa lava (Figure 9) erupted from a vent at the foot of the cone on the southern side and flowed to the west and northward for about 6 miles, blanketing an area of about 12 square miles. As it was extruded, this flow diverted and dammed the Deschutes River. The gutter through which lava flowed may be seen by following a trail of wooden planks, called the Phil Brogan Trail, which proceeds from the road at the bottom of Lava Butte over the rough lava surface to a viewpoint.

Across the highway to the southeast from Lava Butte is a small area of agglutinated spatter features that are aligned along the same fissure which fed the lava to Lava Butte and its lava field. These features were formed by semi-molten clots of lava thrown out by "fire fountaining" to build irregular mounds.

Figure 10 is a photograph of the quarry cut into Finley Butte, which lies some 12 miles south of Lava Butte. The picture shows the typical structure of a cinder cone, with beds of cinders lying at the angle of repose, about 32 to 35 degrees. Lava Butte would also show this same structure if its slopes were quarried.

Newberry Volcano (Paulina Mountains)

Newberry Volcano, with its large caldera, crater lakes, pumice and

cinder cones, and domes of obsidian is one of the largest and most spectacular volcanic areas in central Oregon. Howel Williams (1935) has adequately described many of the features of Newberry Mountain. However, there are at least 150 small subsidiary cones on Newberry Volcano and many that have not been described in detail. Further study of these would seem to be warranted, since a large percentage of the cones and several lava fields, including Lava Cast Forest, are undoubtedly of Recent age. Of interest also are the several lava tubes situated about the flanks of Newberry Volcano. Probably many more of these tubes exist and will eventually be discovered.

Hole-in-the-Ground

Southward beyond the edge of the broad shield of Newberry Volcano are two young craters in T. 25 S., Rs. 12 and 13 E. that should be mentioned because of their resemblance to smaller lunar craters. Hole-in-the-Ground and Big Hole are maar-type craters that are believed to be formed by a series of brief, violent eruptions when rising basaltic magma encounters water or water-saturated rocks near the surface. These and other maar-type features have been described by Peterson and Groh (1961).

Is New Volcanism to be Expected?

Observation of the numerous volcanic cones, flows, and other features which have been formed by eruptions within the last 11,000 years, many within the last millenium, and some almost to the present, calls for wonder. The question then comes to mind: Will new eruptions take place in the near future - the far-off future?

Oregon, along with the other Western States, is within the zone of volcanic activity which surrounds the Pacific Ocean. Several hundred volcanoes in various phases of activity occur in this circum-Pacific belt. This "belt of fire" is also noted for its seismic (earthquake) activity, which signifies mobility of the earth's crust along this zone.

Volcanic and seismic processes in different segments of this belt have varied greatly in intensity throughout past geologic time and also in historic time. For the present, Oregon is enjoying a stage when activity within its segment is probably at its least. Therefore, volcanism in Oregon should be considered only as dormant, not extinct.

Renewal of volcanism in Oregon could well begin next month - this year - next year - or thousands of years hence. That is to say, its occurrence is not predictable in the light of our present-day geologic knowledge.

New eruptions, should they begin, probably would occur in the areas of most recent activity. The dominant zone of Recent volcanism trending northwest from the Four Craters area to that of the Three Sisters, as previously mentioned, would seem to be most favorable in this respect. Nevertheless, the older volcanic monarchs of the Cascade Range, such as Mount Hood and Mount Jefferson should not be thought of as dead. History has demonstrated that numerous volcanoes considered extinct by the nearby inhabitants could become reactivated. Even calderas thought by most volcanologists to have expended the energy of their magma chambers have renewed activity. Consequently, Newberry Crater and Crater Lake, Oregon's outstanding examples of calderas, should not be considered extinct.

New volcanism, though, is signaled almost invariably by earth tremors of moderate to great intensity and of increasing frequency days to months ahead. Crustal movements allowing magma to ascend toward the surface and/or pressures generated by the ascending magma are thought to produce these seismic tremors. A network of seismic stations in addition to the two now existing in Oregon would quickly establish the spot from which these tremors were radiating. Thus the surface locality through which an eruption might occur would be defined. Inhabitants within the zone of danger could be warned and measures for their protection taken.

Conclusions

In this report, we have touched upon only a few of the unique or unusual volcanic landforms existing within the area of Recent volcanic rocks in central Oregon. For the geologist and volcanologist, and for students of these sciences, there is a wealth of features to be observed and from which to reconstruct the volcanic processes leading to their formation.

Similarly, researchers in our nation's manned lunar landing program are offered a great variety of forms which may be landscape features of the moon's surface. Various instrumented probes will determine more thoroughly the composition and texture of the moon's surface in the immediate future. If this surface is comparable to recent volcanic terrain on the earth, then this central Oregon region should be of great value to those who are developing the vehicles and training the men who will land and explore the moon.

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Fig. 3. Typical pahoehoe lava surface on eastern edge of Devils Garden lava field. Hot fluid lava flowed from beneath the cooled crust, causing it to collapse and break into a jumbled mass of slabs.



Fig. 4. Small spatter cone is disclosed in foreground. In background is an unusually large spatter cone called a "blowout." Another is hidden behind it.

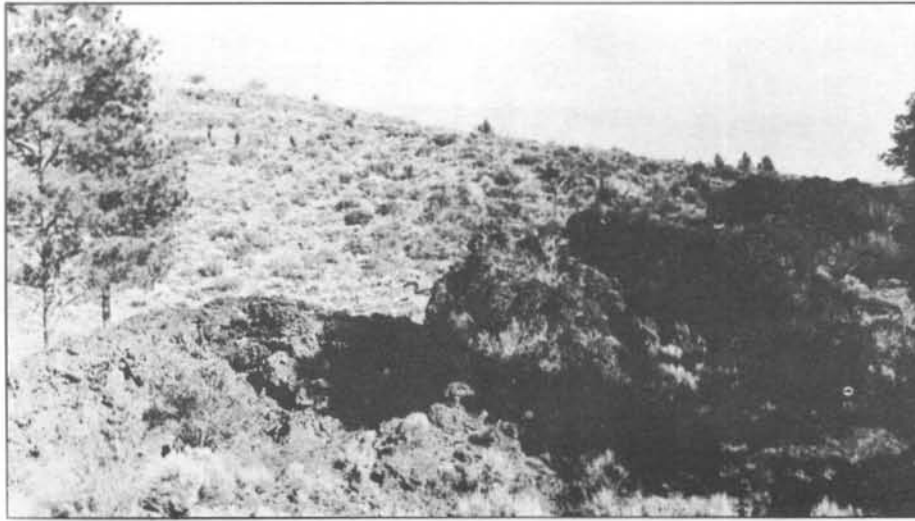


Fig. 5. A row of spatter cones aligned along a westward-trending fissure, which crosses photograph from left to right.

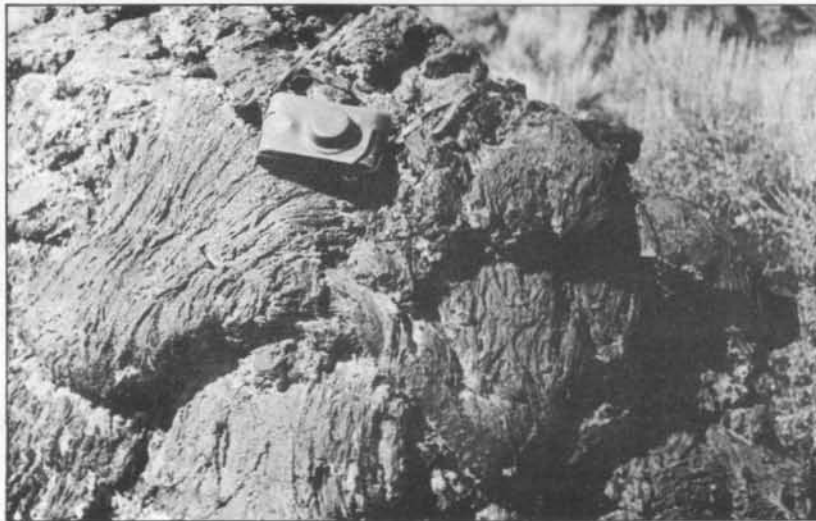


Fig. 6. Detail of flow lines on spatter cone at upper end of row in figure 5. Semi-molten clots of basaltic lava were thrown out and piled on one another to form this feature. Note freshness of lava.

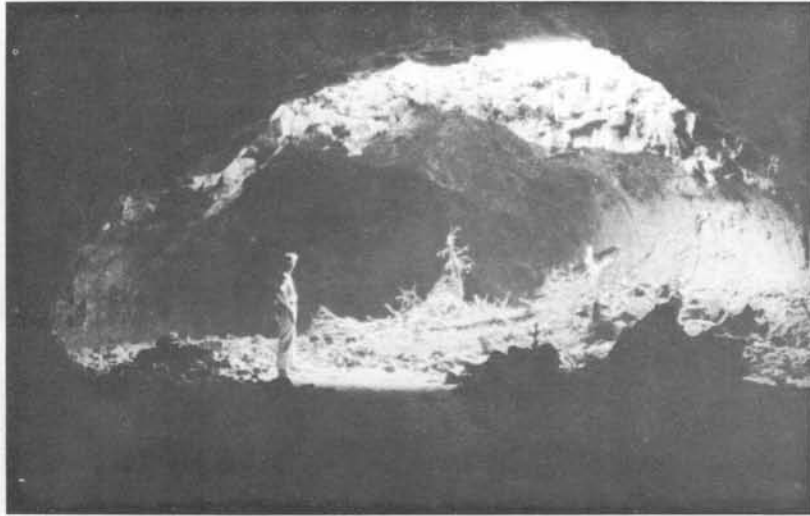


Fig. 7. This photograph was taken a short distance inside entrance of Derrick Cave. The roof has collapsed, allowing light to disclose shape of upper half of this lava tube. Debris from roof fills lower half of cave in foreground.

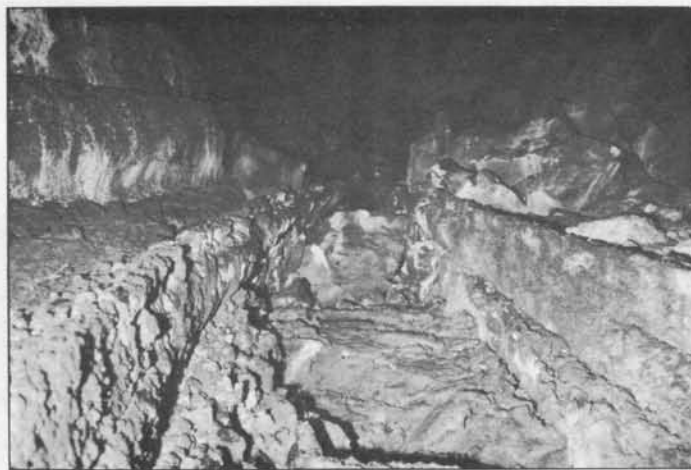


Fig. 8. This photograph taken far back in Derrick Cave displays several benches where lava remained at a temporary level as it flowed from the tube, some of it congealing along the sides. A gutter through last of the lava drained is seen in foreground.



Fig. 9. Clinkery or aa surface of Lava Butte lava field in foreground. Looking eastward, cinder cone of Lava Butte is in background. Lava issued from a vent at right side of base of cone.



Fig. 10. Quarry cut into Finley Butte, picturing bedding of cinders and bombs of a typical basaltic cinder cone. Successive ejections of these pyroclastics produced the beds which lie at angle of repose. Lava Butte has a similar structure.

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LAND WITHDRAWAL IN MALHEUR COUNTY

Announcement has been received that the Federal Aviation Agency has
filed application for the withdrawal of 52.5 acres in T. 34 S., R. 39 E.,
Malheur County, as an addition to the Rome, Oregon, VORTAC air navi-
gation systems facility.

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OIL DRILLING RECORDS RELEASED

The Department of Geology and Mineral Industries released drilling records
from its confidential files on Humble Oil & Refining Co. "D. J. Leavitt 1"
drilled in Lake County during 1960-61. The well was located approximate-
ly 4 miles south of Lakeview and reached a depth of 9,579 feet.

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LEGISLATION OF INTEREST TO MINERAL INDUSTRIES

H.R. 61 - Inventory of mining claims on National Forest lands: Kyl (Iowa) - Committee on Interior and Insular Affairs. Would require the Secretary of Agriculture to make a survey of all public lands under his jurisdiction "to establish an inventory of all unpatented mining claims on such lands, determine the current status and validity of such claims, resolve the validity of doubtful claims and of occupancies under alleged mining claims, and to proceed with eviction of all those in unlawful occupancy of unpatented mining claims."

Would require completion of the survey by December 31, 1964 and a report to Congress not later than February 28, 1965, including the Secretary's recommendations relative to the need for further legislation. The Secretary would also be required to advise Congress twice a year thereafter, until all unauthorized occupancies have been eliminated, of the progress being made to eliminate unauthorized occupancies and to resolve doubtful ones.

H.R. 70 - Eliminate duty on limestone spalls, fragments & fines: Pelly (Wash.) - Committee on Ways and Means. Would amend the Tariff Act of 1930 by adding to the free list "Limestone spalls, fragments, and fines (as distinguished from sized rock)."

Related bill: H.R. 1695, by Pelly, which would add to the free list "Limestone, crude, not suitable for use as monumental, paving or building stone; limestone chips and spalls; and limestone, crushed or ground."

H.R. 930 - National Wilderness preservation system: Saylor (Pa.) - Committee on Interior and Insular Affairs. Would establish a National Wilderness Preservation System composed of some 14.6 million acres of national forest areas which are generally open to prospecting and mining under the general mining laws. These areas are now administratively classified as wilderness, wild, primitive or canoe.

Would provide, with limited exceptions, that "there shall be no commercial enterprise within the wilderness system, no permanent road, nor shall there be any use of motor vehicles, motorized equipment, or motorboats, or landing of aircraft nor any other mechanical transport or delivery of persons or supplies, nor any temporary road, nor any structure or installation, in excess of the minimum required for the administration of the area for the purposes of this Act."

Many similar bills, including S. 4 by Anderson (N. M.), which is identical to S. 174 of the last Congress.

H.R. 935 - "Modernize" Mining Laws: Saylor (Pa.) - Committee on Interior and Insular Affairs. Would amend the mining laws to provide that any mining claim hereafter located may not embrace lands of more than four contiguous 10-acre tracts, each of which must be mineral in character, and must be recorded in the appropriate Federal land office by means of a copy of the notice of location to which would be attached a statement listing the minerals for which the claim is located; no rights in an unpatented mining claim "shall be established prior to a discovery of a valuable mineral deposit within the limit of the claim located, and no rights shall be deemed established unless all requirements of this Act are performed within the period of time provided therefor."

Would authorize location of exploration claims embracing contiguous tracts not exceeding 160 acres, with the maximum area in which any one locator could have an interest in any one State limited to 5, 120 acres at any one time; exploration claims would have to be described in the location notice as provided with respect to regular mining claims.

Other provisions would (1) give the holder of a valid exploration claim exclusive right to explore for locatable minerals within the exploration claim and exclusive right to locate minerals within the exploration claim under the provisions of the general mining laws; (2) unless sooner terminated, by relinquishment or by location of claims under the general mining laws, terminate all rights in an exploration claim at the expiration of the second exploration year (it would be unlawful for the holder thereof to acquire any further interest in the lands covered by the exploration claim for a period of two years thereafter); (3) require the holder of an exploration claim, upon its termination or expiration, to restore the surface to the condition, so far as it is reasonably possible, in which it was immediately prior to exploration activities; (4) require the holder of any unpatented mining claim located prior to the effective date of the bill to file within two years of that date, in the Federal land office, a copy of the notice of location together with a statement setting forth the minerals for which the claim is valuable (failure to so record a location would constitute an abandonment and forfeiture of the mining claim); (5) with respect to assessment work, require the recorded holder of an exploration claim or an unpatented mining claim to perform at least \$10 per acre in assessment work annually and to make a detailed report to the Secretary of the Interior indicating the work done or caused to be done by him during the assessment year (failure of a claimant to report assessment work would be treated as failure to perform the annual assessment work); (6) give the locator or claimant the "right to (A) use so much of the surface as may be reasonably necessary for mining purposes and (B) acquire, through lease, purchase, or permit, the use of surface resources

reasonably required for mining purposes"; (7) terminate the rights to mineral deposits in any mining claim hereafter located at the boundaries of the claim; (8) require applications for patent to be filed (a) within 10 years from the effective date of this Act with respect to claims heretofore located, and (b) within 10 years from the date of location with respect to any claim located after the effective date of the bill (failure to make a mineral patent application within the specified time would terminate the rights within the limits of the claim); and (9) specify that patents to mining claims located on and after the effective date of this Act "shall convey to the patent applicant the mineral estate only; subject, however, to the right of the patentee to purchase or lease surface rights, at fair market value as determined by the head of the department or agency having jurisdiction over the lands involved, for use of so much of the surface as may be necessary for mining and milling purposes only: PROVIDED, That in any areas within national forests the patentee may only receive temporary use of the surface, by lease, permit, or otherwise, to the extent required during the mining operations."

H. R. 2460 - Comprehensive program for a healthy mining industry: Baring (Nev.) - Committee on Interior and Insular Affairs. Title I would state that "Congress has determined that it is essential that the United States be as nearly self-sufficient as is reasonably economically possible in all useful minerals and metals as well as those classified by the Government as strategic and critical, since dependence upon foreign sources invites possible national suicide."

Title II would amend the Minerals Exploration Act of 1958 to "include development work as necessary to bring such minerals into production."

Title III would authorize the location of temporary mining claims for geological, geochemical, geophysical and other scientific methods of prospecting for minerals.

Title IV would require the Secretary of the Interior, if he finds "(1) that the domestic production of any metallic or nonmetallic mineral is being or has been reduced because of the importation of competing products or because of economic conditions to a point where the national defense or the national economy is imperiled, or (2) that the maintenance of, or an increase of production in, any portion of the mining industry would benefit the national defense or economy, or both /to/ impose such import quotas, make such incentive payments, and authorize such barter contracts as may be necessary to maintain or increase such production. Incentive payments may, at the option of the Secretary, be made on an individual mine basis, based upon production costs." Would also authorize the Secretary to make loans to operators of unprofitable mines.

Title V would authorize the Secretary of Interior to establish a program to assist mine operators in meeting the cost of pumping and other required maintenance with respect to mines which can not be profitably operated, if the metals and minerals in such mines are necessary to the national defense.

Title VI would authorize necessary appropriations to carry out the bill's provisions.

S. 57 - National policy on utilization of natural resources: McGee (Wyo.) - Committee on Interior and Insular Affairs. Would require the President to transmit annually to Congress a Resources and Conservation Report setting forth "(1) the condition of the soil, water, air, forest, grazing, mineral, wildlife, recreational, and other natural resources with particular reference to attainment of multiple purpose use; (2) current and foreseeable trends in management and utilization of the aforesaid natural resources; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the nation; (4) a review of the conservation programs and activities of the Federal Government, the state and local governments, and nongovernmental entities and individuals with particular reference to their effect on full conservation, development, and utilization of natural resources; (5) a program for carrying out the policy...together with such recommendations for legislation as he may deem necessary or desirable."

Would create in the Executive Office of the President a Resources and Conservation Council composed of three members appointed by the President, with Senate consent, to (1) assist the President in the preparation of his annual Resources and Conservation Report, (2) gather information concerning natural resource and development trends, and (3) recommend to the President national policies to promote conservation, development, and utilization of natural resources.

S. 139 - Federal minerals survey: Metcalf (Mont.) - Committee on Interior and Insular Affairs. Would authorize the Secretary of the Interior to conduct a survey of Federally owned land for the purpose of locating deposits of minerals and mineral fuels necessary to the national security and economic welfare of the United States. The Secretary would submit to Congress, and make public, records which would include (1) the probable location of strategic minerals and approximate grade of ore, and (2) the availability of mineral lands whether under the mining laws or mineral leasing laws. Would authorize appropriations of not to exceed \$7 million annually to carry out the purposes of this Act.

(American Mining Congress Legislative Bulletin No. 63-1, Feb. 5, 1963)

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TERTIARY DEPOSITIONAL HISTORY PUBLISHED

"Tertiary Geologic History of Western Oregon and Washington," by P. D. Snavely, Jr., and H. C. Wagner, has been published as Report of Investigations No. 22 by the Washington Division of Mines and Geology. In the 25-page booklet the authors recount on a broad regional basis the evolution of the Tertiary geosyncline that occupied western Oregon and Washington and illustrate their concepts by a series of paleogeographic maps. The report, which is of particular interest to those concerned with petroleum exploration, is for sale by the Department of Conservation, Olympia, Washington. The price is 25 cents.

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SURVEY ISSUES NEW REPORTS ON OREGON

Four Water-Supply Papers and one Bulletin concerning the geology in certain parts of Oregon were issued recently by the U.S. Geological Survey. All are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Prices of some have not been announced.

1. "Ground Water in the Coastal Dune Area near Florence, Oregon," (Water-Supply Paper 1539-K) by E. R. Hampton. Evaluates the ground-water supply in the extensive dune sheet north of Florence, Briefly describes the geology of the area, and includes a geologic map. Price not announced.
2. "Ground-Water Resources of the Coastal Sand-Dune Area North of Coos Bay, Oregon," (Water-Supply Paper 1619-D) by S. G. Brown and R. C. Newcomb. Evaluates the ground-water supply in the dune area north of Coos Bay and summarizes the geology. Price 55 cents.
3. "Ground-Water Resources of Cow Valley, Malheur County, Oregon," (Water-Supply Paper 1619-M) by S. G. Brown and R. C. Newcomb. Explains limitations on ground-water supply for small structural basin in northern Malheur County, describes geology, and includes a geologic map. Price 45 cents.
4. "Problems of Utilizing Ground Water in the West-Side Business District of Portland, Oregon," (Water-Supply Paper 1619-O) by S. G. Brown. Presents geologic and hydrologic data on occurrence and use of ground water and includes a geologic map and cross sections. Price not announced.

5. "Geology of the Anlauf and Drain Quadrangles, Douglas and Lane Counties, Oregon," (Bulletin 1122-D), by Linn Hoover. Part of the Survey's investigation of petroleum possibilities of the Coast Range in Oregon. Shows that area is underlain by approximately 20,000 feet of Eocene sedimentary and volcanic rock, including the Umpqua, Tyee, and Spencer marine formations, and the Fisher Formation of nonmarine pyroclastic and volcanic rocks. Post-Eocene intrusive and extrusive rocks occur locally. Includes a multicolored geologic map. Price not announced.

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STOCKPILE CHECKS RED CHINESE CONTROL OF TUNGSTEN

The U.S. tungsten stockpile is now worth something like \$440 million less than the U. S. originally paid for it. But this huge stock may be the key to thwarting Red China's attempts to seize control of the Free World industry.

The situation is already serious. So serious that, even as the Congo-Katanga crisis teetered on the edge of success or failure, 28 members of the United Nations held a two-day closed meeting on tungsten. The problem is price. The working paper for the UN delegates called it "depressed." A spokesman for a U.S. company involved in tungsten says, "Never has there been a depression of prices over such a long time." And a spokesman for another company says prices are "badly deteriorated." The UN conference complained of the "paucity of statistical data" with which to get a complete world picture pointing to effective remedial action.

A spot check of U.S. companies doing business in tungsten found none willing to talk for the record. But all agreed that Red China is at the core of the problem. And none held any glimmer of hope that the situation would improve much in the immediate future, despite UN interest.

The situation is this. Red China has by far the largest known deposits of tungsten ore. And it is high quality. Estimates run as high as 70 percent of world reserves. But the exact amount is a matter of conjecture. There is no doubt that China cannot, at this stage of its industrial development, use the vast majority of the tungsten it is producing. One U.S. tungsten man estimates Chinese output at about 20,000 short ton units of tungsten trioxide (WO_3). He figures they can use only about 1000 tons. And the rest is being dumped directly and indirectly on Free World markets at substantially below the going market. Estimates run as much as 20 percent below.

Tungsten is the metal with the highest melting point and is being used increasingly in space and military applications. But this is not the major consideration of the Chinese. The feeling is that China needs foreign exchange to buy industrial equipment. Its surplus tungsten provides an excellent opportunity to get what is needed. But as China drives the Free World price lower, the return from the tungsten also goes lower: the Chinese must discount to sell. The next logical step, say Free World commentators, would be to make a concerted attempt to drive Free World mines to the wall. When mines were forced out of business, the consumers would be dependent on Chinese ore. China could then put the price at any level. And once a mine is closed it is expensive and time-consuming to open it again. But, as long as the U.S. has large stocks to offset any bad sag in supply, the consensus is the Chinese are stymied - and know it. (F.J. Starin in The IRON AGE for Feb. 28, 1953.)

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METALS AND MINERALS CONFERENCE APRIL 24-27

Four full days of activities have been scheduled for the Pacific Northwest Metals and Minerals Conference to be held at the Multnomah Hotel, Portland, April 24-27. More than 600 miners, metallurgists, space-age specialists, bankers, geologists, and students are expected to attend the 18 technical sessions on the 25th and 26th. Field trips to exotic metals plants, space-age testing facilities, and specialty steel plants will be conducted on the 24th and 27th. Social activities on Wednesday, Thursday, and Friday nights will round out the full schedule for the conference.

The Second Gold and Money Session has attracted from South Africa, New York, and California speakers who are recognized internationally as experts on gold in international finance. Problems of the domestic mining industry will be discussed by a panel of speakers headed by S.H. Williston of Cordero Mining Co. Stockpiling policies of the federal government currently receiving much publicity will be discussed along with the problems of the small miner, the effect of public lands administration, and other subjects of interest to the domestic minerals producer.

The growing impact of electric furnace operations in the area is reflected in the all-day session devoted to that subject with 10 top metallurgists from all parts of the country listed as speakers. Corrosion in the pulp and paper industry, fabrication of missiles, space-age materials, semi- and super-conductors, foundry sand and mold materials, and both astro and submarine geology are subjects to be discussed in other technical sessions.

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