STATE OF OREGON
DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES

PORTLAND, OREGON

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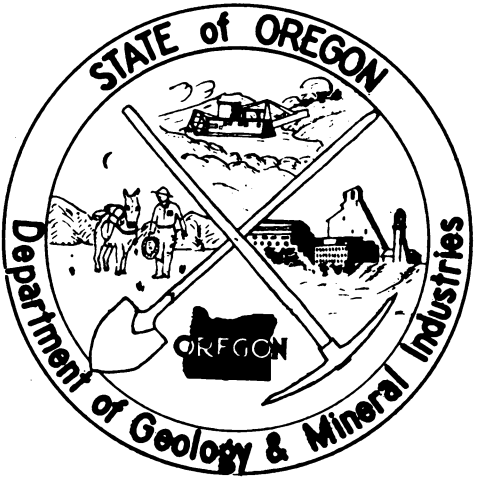

STATE DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
Head Office: 702 Woodlark Bldg., Portland 5, Oregon

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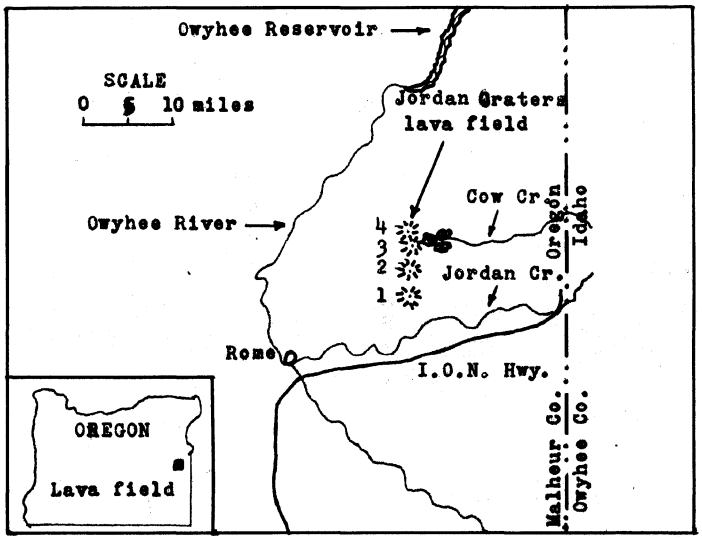
COW LAKES LAVA FIELD

Introduction

The Cow Lakes lava field, formed from Crater No. 4 of the Jordan Craters as designated by Russell*, consists of basaltic lava apparently of quite recent age. An examination of a portion of this area was made by F. W. Libbey and N. S. Wagner of the Department staff on September 14, 1947. A description of the field follows.



Index map showing location of Jordan Craters lava field.

Location

The lava of this field covers an area in the vicinity of and mainly west of Cow Lakes which are in T. 28 S., R. 44 E., Malheur County, Oregon. Although only a small portion of the area was examined, the extent of the field is of such proportions that it very likely is to be found extending in to at least part of adjacent townships. Access is by a dirt road which turns off the I.O.N. Highway near Sheaville and follows westerly down Cow Creek. The lava is seen from a distance of several miles and resembles a huge shadow because of the contrast between the black lava and the light colored rhyolitic rocks of the older surface.

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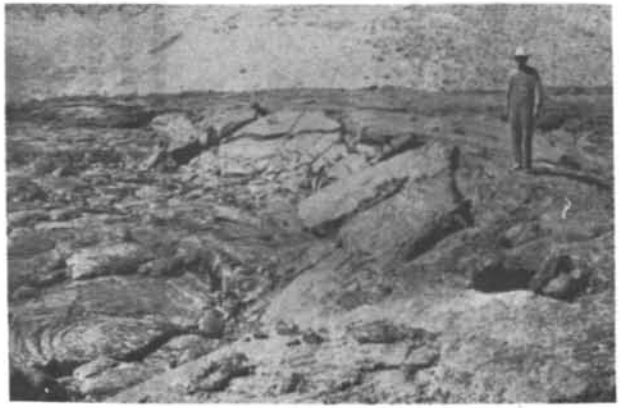
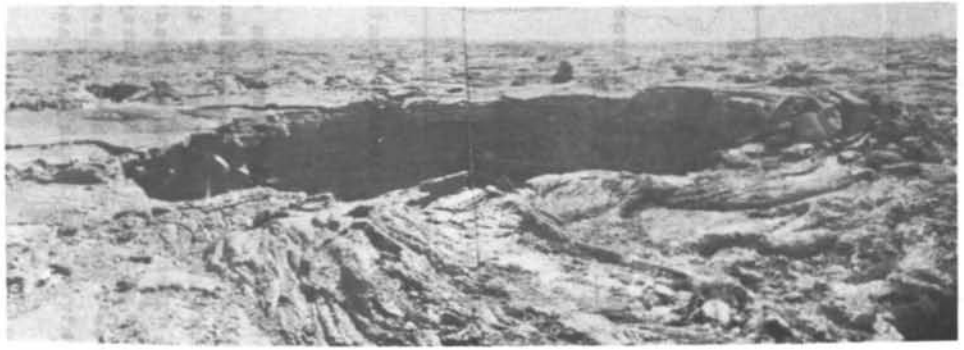
* Russell, Israel C., Geology of Southwestern Idaho and Southeastern Oregon, U.S. Geol. Survey Bull. 217, 1903.

Surface of lava field taken
from near margin.



View from surface of flow showing
crater in distance.



Collapse holes are common in this lava.
This one is about 30' deep.

Portion of crater shown
in above picture.

Cow Lakes Lava Field - Malheur County

Geology

A variety of flow structures are exhibited in the lava. The sides of the part of the field visited stand conspicuously higher than the soil surface of the draw down which it flowed. Sparse vegetation is to be seen on the edges of the flow surface where a small amount of dust and sand has been blown into depressions of the lava from the old surface. The volcano which poured out the main flow is located near the northwest edge of the field and abuts against a rhyolite hill. A crater about 500 feet in greatest diameter was formed, in part, by collapse. Eruption consisted of a relatively quiet flow as but a scant amount of explosive ejecta is to be seen in the area. The lava is of the pahoehoe type, that is, it has a relatively smooth, ropy surface. The texture is generally vesicular with a glassy surface and partly crystalline interior.

Extracts from a much more comprehensive description of Crater No. 4 and the lava field are reproduced from Russell** below:

Jordan Craters

"In the east-central part of Malheur County, Oregon, and from 18 to 20 miles west of the Idaho-Oregon boundary, there are four recently extinct volcanoes, which are here termed, collectively, the Jordan Craters. They are situated to the north of Jordan Creek and to the west of its tributary known as Cow Creek. The four craters referred to are nearly on a line bearing a little west of north and are approximately 3 to 5 miles apart, although the distance of the one at the north from its next neighbor is somewhat greater than the spaces between the others in the series. While but four recent craters are here referred to, there are certain rounded hills to the west of the south end of the series which are probably of volcanic origin, and perhaps represent ancient craters, but these have not yet been examined.

* * * * * * *

"While craters Nos. 1, 2, and 3 are instructive on account of the many square miles of lava poured out from them and the various stages reached in its change to smooth pasture land, the chief interest of the general locality centers about Crater No. 4, at the north end, the youngest of the series.

"Crater No. 4 - This very modern crater, unlike its companions, came into existence on a somewhat steep-sloping hillside, which was trenched by erosion channels previous to the volcanic outburst, and the great flood of extruded lava flowed away in one principal direction. * * *

"Crater No. 4, as it exists today, is in part a cinder and lapilli cone, and in part a lava cone, and extending over an area of about 50 square miles on its southeastern side is a black lava field entirely bare of vegetation. * * *

"Throughout about one-half of the periphery of the cinder and lapilli cone forming Crater No. 4, the older rocks, consisting mainly of Tertiary rhyolite, are without a covering other than a thin layer of soil, to within a distance of 800 or 1000 feet of its base. * * * On the hillside, where the crater is situated, and extending in an essentially straight line from it, both to the north and south, there is a faint escarpment averaging perhaps 15 feet in height, and facing east. This escarpment has the general appearance of a fault scarp, but is by no means certainly of that nature. The only unquestionable evidence of a break in the rocks on which the crater stands is furnished by a row of about 12 driblet cones, situated in a line extending west from the principal center of eruption and up the slope of the hill at right angles to the faint escarpment referred to above. * * *

* * * * * * *

** Russell, I.C., op. cit.

"The lava from Crater No. 4 of the Jordan series, as already stated, flows southeastward over a previously stream-eroded surface. The lava, just after leaving the crater from which it came, formed a stream 545 yards wide, and increasing rapidly in width reached a distance of about 8 to 10 miles. The entire flow is by estimate between 50 and 60 square miles in area. The average depth may perhaps be taken as approximately 100 feet. These statements, it must be remembered, are rough estimates as no surveys have been made, and no maps of the region are available. The lava as it advanced was guided in a conspicuous way by the pre-existing topography, and in several instances progressed short distances up lateral valleys tributary to the main depression down which it flowed. * * * Near the eastern limit reached by the lava it ascended the small canyon of Cow Creek for about 1 mile, and on cooling formed a dam, which now retains the largest and most northern of the Cow Creek lakes, as has been described on a previous page. About its southeastern margin there are several other lakes.

"This great lava stream or lava sheet came from a small crater, termed above Crater No. 4, the bottom of which is approximately 300 feet across. Seemingly the actual conduit must be of still smaller diameter. This effusion of highly liquid lava, with only mild explosions at the beginning of the discharge, is a typical illustration of the manner in which many extensive lava sheets of Idaho, Oregon, and Washington were poured out. * * * "

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SHORTAGE OF SCIENTISTS[1]

In reference to the shortage of technical personnel resulting from the war, Vannevar Bush estimated in his report to the President in 1946 that the deficit of those who would have received a bachelor's degree in science or technology had reached 150,000 and that by 1955 there would be a loss of 17,000 who would otherwise have been given advanced degrees. Karl T. Compton[2] has pointed out that a survey recently conducted among 125 companies throughout the United States by a committee of the American Society of Engineering Education has shown that the future annual demand for engineering graduates will be more than twice as great as before the war. The number graduating from engineering schools has declined to a low in 1946 of less than 7,000 compared to the normal complement early in the war of almost 15,000. These developments point to the immediate need for increasing the number of engineers and scientists in training at the fastest possible rate.

J. R. Killian, Jr.,[3] considers that our national future is more than ever dependent upon the discovery and application of new scientific knowledge. The field of atomic research promises to give us an entirely new technologic structure of its own, yet the United States faces a serious shortage of scientists. At the present time we do not have the scientists needed to take full advantage of our multiplying opportunities in this world of an accelerating technologic change. He remarks that the shortage is not unexpected, inasmuch as we were the only country in the war, either enemy or ally, to stop nearly all scientific and engineering education during the conflict.

* * * * * * *

Coming now to the subject of the training of geologists, it is interesting to learn that the National Roster of Scientific and Specialized Personnel reported at the close of 1945 that 6,113 geologists were among the 396,865 scientific and professional men who were registered with the roster. Compared with mining, metallurgical, petroleum, civil, mechanical, chemical, and electrical engineers, the extent of the education of the geologists was reported to be substantially greater, 24 percent of those registered having master of science degrees and 17 percent having doctor of philosophy degrees.

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[1]From "Advances in petroleum geology and allied subjects," in Quarterly of the Colorado School of Mines, vol. 42, no. 3, July 1947.

[2]Compton, K.T., "A challenge and an opportunity," in Educational Focus, vol. 17, no. 3, 1946.

[3]Killian, J.R., Jr., "Tomorrow's scientists," in The Lamp, vol. 28, no. 4, August 1946.

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