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NEW PRODUCTS FROM OLD VOLCANOES

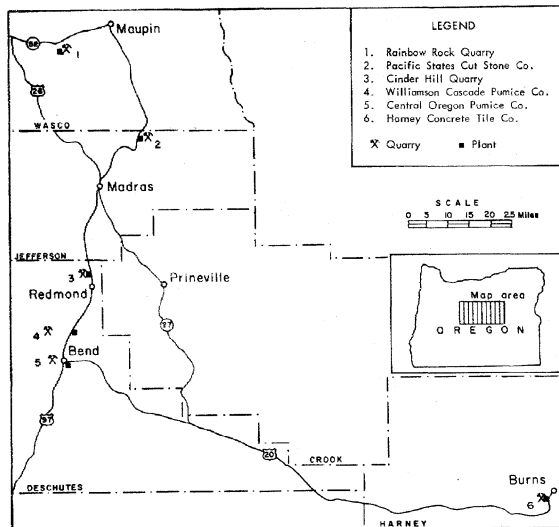
By
Ralph S. Mason*

*TO MRS. O.
WHOSE RESISTANCE IN
PREPARATION AND SORTING
STUFF LIKE THIS
TUFF (HBM)*

Introduction

Central Oregon has been the scene of countless volcanic eruptions. Some were violent, with the emission of vast quantities of dust, ash, and pumice which showered down upon the countryside while others erupted more quietly, with streams of liquid lava flowing out to bury the lowlands and dam the streams. Still others spewed forth masses of sticky lava which hardened rapidly to form gingerbreadlike lumps of porous lava. The most spectacular by far, however,

were the glowing clouds of ash and pumice which raced down the slopes of volcanoes at express train speeds. When the fiery masses came to rest their heat was sufficient to weld them together. Formidable as these eruptions sound, their products are used today to make our living more comfortable and enjoyable. Pumice, cinders, and volcanic tuff are the raw materials for two industries which have sprung up since World War II (see accompanying map).



Pumice and cinders

Pumice covers large areas in central Oregon. It is used today for lightweight aggregate and a variety of other purposes. The cellular structure of the pumice makes it a good insulator for heat, cold, and

sound which, together with its light weight, makes it a valuable aggregate for concrete blocks. Cinders are denser than pumice and usually have a dark red color. Their occurrence is restricted to cones. The porous nature of cinders is similar to that of pumice but cinder blocks have lower shrinkage and greater crushing strength than pumice. The "red roads" of central Oregon owe their color to volcanic cinders used as an aggregate. Some cinder cones produce pieces the right size for block and road aggregate, while others have larger masses which can be used for rock gardens and retaining walls.

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Immediately after World War II the demand for housing resulted in the opening up of about half a dozen pumice pits near Bend. Concrete block manufacturers were clamoring for lightweight aggregate and pumice was ideally suited for the purpose. Some of the early operators merely scraped off overburden and shipped raw pumice without further treatment. The block manufacturer was often as equally inexperienced as the pumice producer, consequently the results were almost disastrous to the pumice aggregate industry. Pumice blocks failed in every conceivable way. They cracked, shrank, spalled, and some just simply came apart. Builders, architects, and building inspectors took one look and had nothing more to do with pumice blocks. Today, after considerable research, pumice producers have succeeded in furnishing the block manufacturer and other users with a carefully tailored and controlled material which furnishes a sound product. Pumice and pumice blended with volcanic cinders have some definite advantages as an aggregate over all other types when used in certain applications. Pumice blocks have excellent acoustical and thermal insulation qualities and they make the lightest of all concrete blocks.

Although pumice was first shipped from the Chemult area in 1939, there is no activity in that area at the present time. The Chemult pumice is extensive, but considerable difficulty was experienced by producers because of the moisture content of their finished material. The pumice lies exposed on the surface where heavy snows cover it in winter, making operations very difficult. The moisture from the melting snow soaks into the pumice during the spring and no economical drying methods have been found successful. In the Bend area the pumice is normally covered by overburden which protects it from much of the surface moisture. Year-around operation is possible and the pits are located close to town where labor and supplies are easily available.

At the present time there are three pumice producers in the central Oregon area: Williamson Cascade Pumice Company and Central Oregon Pumice Company near Bend, and Harney Concrete Tile Company near Burns. The two operations near Bend also produce cinders from nearby deposits and cinders are produced from a deposit near Redmond.

The Williamson Cascade Pumice Company operates a plant 7 miles north of Bend on the Great Northern Railroad at Deschutes siding. Raw pumice is obtained from a pit near Tumalo. After some unsuccessful attempts at artificially drying the pumice to reduce its moisture content, the company now air dries it in a pit approximately three acres in extent where a spring tooth harrow is used to stir up the surface. At the plant the pumice is crushed with 12-inch rolls and vibrating screens provide various fractions. Extensive use is made of rubber conveyor belts in transporting the pumice within the plant and from the plant to cars on the siding. Blends of cinders and pumice are shipped as well as straight pumice and straight cinders. The cinders are obtained from Laidlaw Butte northwest of Tumalo.

In addition to aggregate for concrete block manufacturers, a nursery starter or bedding material ranging in size from 1/8 inch to 20 mesh, a floor sweeping compound consisting of 1/8 inch to dust, and plaster sand packed in 80-pound bags are produced.

Williamson also ships abrasive grade pumice from a quarry located in Newberry Crater. Due to the short season in the Crater, Williamson trucks out considerable quantities of lumps during the summer and stores them at Bend for shipment as required.

Central Oregon Pumice Company is currently producing pumice from numerous small pits located immediately west of Bend. More than a dozen pits are in use, although actual

production is restricted to one or two at any one time. The thickness of the overburden and the pumice vary considerably over short distances.

Air drying of the pumice is attempted whenever possible as artificial means of drying have not proved effective due to the high insulation quality of the material. Pumice exposed in idle pits loses a considerable amount of moisture. Bulldozers strip the overburden and a power shovel equipped with a 3/4-yard bucket loads a 40-cubic yard dump truck. The truck is unique, not only for its huge capacity, but for the mechanism used to elevate the box at the plant. The dumping operation is entirely mechanical and is achieved by setting the brakes on the rear wheels, unlocking the box which forms the frame connecting the rear wheels with the tractor unit, and then slowly backing the tractor. This motion forces a boom connected to the tractor and to the underside of the box to rise, elevating the forward end of the box. After discharging the load the truck moves forward, the box is lowered and locked into position, and the rear gate closes automatically. At the plant, which is located in the railroad district of Bend on Great Northern trackage, pumice passes through a grizzly and storage bin to a belt conveyor feeding onto 30-inch smooth rolls. Crushed material passes over a series of vibrating screens which may be changed to suit the requirements of the customer. Sized fractions are stored in bins from which loading can be into either open gondola cars on the spur or directly into trucks. The plant offers a self-service feature for trucks during hours when the plant is closed. At such times truckers open the bin gates, load their trucks, and leave a note showing the amount taken. The management reports that they have had little, if any, difficulty with keeping track of such movements.

The company also sells cinders which have passed over a 3-inch steel rail grizzly for base coarse road rock. The city of Bend has used this material with great success in its current "blacktop" paving program. The cinder pit is located about a mile west of Bend and is of considerable extent. The cinders in this pit are reddish-brown in color and grade in size from lumps weighing 20 or 30 pounds down to fines.

A second cinder pit operated by Central Oregon Pumice Company is located 4½ miles south of Bend and is the source of block aggregate which is sold extensively in the State of Washington and other areas. The cinders, which are sold under the trade name of "Shalex," are dug, crushed, and screened by a contractor who periodically sets up portable equipment at the pit and prepares several thousands of yards of various sizes. The sized fractions consist of 3/8-inch minus, 5/8 to 3/8 inch, and 3/4 to 1/2 inch. Material from the stockpiles is delivered to the plant as needed, where it is crushed and screened to customer specifications. A blend of pumice and cinders is also available, the particle size of the fractions and the proportion of the two materials being altered for the purpose for which it is to be used. Straight "Shalex," sized from 1/2 to 1/4 inch, is also being sold as a Bermuda-type roofing material which is packaged in 60-pound multi-wall paper bags.

The Harney Concrete Tile Company has been producing pumice near Burns in Harney County since 1948. Five separate occurrences of pumice are known in the area but production has come from only two of them. The pumice occurs in lumps ranging in size from 10 inches in diameter on down to fines. The lumps are hard, fresh looking, and almost pure white. One pit has some off-white material but it is otherwise similar in composition to the other deposits. Insufficient prospecting and exploration work has been done to determine accurately the extent of any of the occurrences. Judging from the exposures made in the course of quarrying and preliminary prospecting it seems fairly certain that a large tonnage exists at each of the five locations.

The chief product from these pits is an aggregate which is shipped to block manufacturers in eastern Oregon and western Idaho. Substantial amounts of pumice, particularly the off-white material, are sold as aggregate for logging roads. Logging operators have found that the pumice makes an excellent surface when it is kept moist and packed.

Dark red cinders for road aggregate are produced by Leroy Grote from Tetherow Butte 2 miles north of Redmond and just west of Highway 97. Locally this Butte is known as Cinder Hill. The cinders are dug with a Hough loader and dumped into trucks which haul the bank-run material a short distance to a portable crushing and screening plant.

Large quantities of the cinders have been used in highway construction locally and by the county for roads. In addition to road aggregate, Grote also supplies a Bermuda-type roofing, aggregate for concrete blocks, and a specialty item used on cinder tracks at high schools throughout the State.

Volcanic tuffs

Volcanic ash, blown high in the air at the time of eruption floated slowly to the ground where much of it was washed by streams into nearby lakes formed during the volcanic activity. Here the ash settled to the bottom, became compacted, and eventually cemented into a solid form. Such rock is known as tuff. Not all of the tuffs of central Oregon were formed by deposition in water. Some volcanoes emitted incandescent masses which fused into solid rock. Tuffs formed in this manner are usually denser and harder than the water-laid type. The color of the rock ranges from buff through red to brown and purple. Some deposits have colored bands, while others have solid colors. An interesting feature of volcanic tuffs is that they increase in hardness upon exposure to the air.

Volcanic tuffs are worked at two quarries in central Oregon, the Rainbow Rock and the Pacific States Cut Stone Company quarries. Several other deposits which contain suitable material may very possibly be worked in the future.

The Rainbow Rock quarry is located approximately 5 miles south of the town of Pine Grove on State Highway 52 in Wasco County. The stone is light pink to red in color with striking dark bands running through it. When quarried the stone is easily worked and when dry quite light in weight. Stripping back from the quarry face has exposed a considerable quantity of tuff and additional stone is available below the present floor of the quarry. The present operators, Madden and Burk, slab the quarry face with a two-wire reverse-twist cable wire saw. Local river sand is used as an abrasive for the wire. The slabs are then drilled with a series of horizontal holes, and plugs and feathers are used to split them for transportation with a lift truck to the re-saw. The re-saw consists of 13 circular blades 5 feet in diameter similar to those used in sawmills but equipped with carbide inserts. The blocks are placed on a heavy carriage running on rails which is drawn under the blades with a power feed. Slabs 2 inches, 4½ inches, and 7 inches thick are produced and then split to about 3-3/4 inches wide in a 40-inch guillotine. Finished pieces are strapped on to pallets and shipped out by truck. Re-sawing and splitting and sorting operations are performed under a shed measuring approximately 80 by 100 feet. All of the equipment is electrically powered.

Fracturing and other imperfections in portions of the quarry make it necessary to discard some material, but the quantity of stone appears to be adequate for an operation of the present size for many years. Approximately 15 men are employed during peak production periods. Ship-

ments of stone have been made to Spokane and Seattle, Washington, Pendleton and Portland, Oregon, and as far south as Los Angeles, California.

The Pacific States Cut Stone Company quarry is located 2.6 miles south of Willowdale on U.S. Highway 97 in northern Jefferson County. The quarry is operating under the management of Mr. E. L. Keater, Box 473, Madras, Oregon. The stone is a volcanic tuff with a rich reddish-brown color grading into dark browns and purples. Portions of the quarry have dark bands running through the stone. Quarry blocks are freed either with the aid of a wire saw or by drilling and broaching a series of closely spaced vertical holes. The quarry saw uses a two-strand twisted-wire cable. Use of the wire saw is made easy by the location of the quarry on the nose of a low ridge. A stiff leg boom at the edge of the quarry lifts the blocks and swings them onto a dolly mounted on rails which then moves the stone under the gang saw. Blocks as large as 8 by 10 feet can be handled. The gang saw is fitted with mild steel blades measuring 1/4 inch thick by 4 inches in width and 13 feet 6 inches in length. The framework is actuated by a pitman driven by a large electric motor which has a mechanical screw feed to slowly lower the blades as the stone is cut. The blades are spaced at intervals of 2 inches, 4 1/2 inches, and 7 inches and the resulting slabs are then passed through a guillotine which breaks them into strips slightly under 4 inches in width. Garnet sand is used as an abrasive in the gang saw and is recovered and re-used by a simple system of launders and a pump. An electric-driven air compressor supplies the track-mounted wagon drill and the air-driven hoist for the stiff leg boom.

During normal operations when several faces of good stone are available, ten or more men are needed. Apparently the former use of dynamite, both in the quarry and in the construction of an irrigation tunnel which passes under a corner of the quarry, caused some damage to areas of the stone. These areas have been by-passed temporarily but will have to be removed to permit the opening of a lower bench. Some silicified zones have been encountered in the quarry. The stone crops out along a low ridge and has a minimum of overburden on the top and south sides but runs into increasingly thicker soil mantle to the north. There appears to be sufficient stone to last for many years.

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DRILLING PERMITS

Revised location for the Portland Company No. 1 test well, which was issued Permit No. 20 on October 15, is 1287 feet south of the north line and 1254 feet east of the west line of sec. 18, T. 24 S., R. 33 E., Harney County, Oregon.

Drilling Permit No. 21 was issued November 8, 1956, to the Seneca Oil, Gas and Development Company, John Day, Oregon. Lessors are Farrell, Byron, Grace, and Royce Lemons, Mt. Vernon, Oregon. The Seneca Oil, Gas and Development Company test is located in the NW 1/4 NE 1/4 sec. 18, T. 17 S., R. 29 E., Grant County, Oregon. Mr. W. J. Griffith, Box 333, John Day, is President and General Manager of Seneca Oil.

Drilling Permit No. 22 was issued November 20, 1956, to the Big Red Uranium Company, Vancouver, Washington. Lessor is John Richartz, Milton-Freewater, Oregon. Location of the Big Red Uranium Company wildcat well is in the NW 1/4 sec. 24, T. 6 N., R. 34 E., Umatilla County, Oregon. Mr. Albert Boone, 508 Main Street, Vancouver, Washington, is President of Big Red Uranium Company.

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BAUXITE BULLETIN ISSUED

"Ferruginous Bauxite Deposits in the Salem Hills, Marion County, Oregon," is the title of Bulletin No. 46 just issued by the State of Oregon Department of Geology and Mineral Industries. R. E. Corcoran, geologist with the Department, and F. W. Libbey, mining engineer and formerly Director of the Department, are co-authors of the 53-page publication which discusses the geology and economics of the deposits.

Bauxite was discovered in the Salem Hills by the Department in 1945 during an investigation of laterite deposits in northwestern Oregon. From 1953 to 1955 more detailed work was done which included a drilling and sampling program to determine, at least approximately, the quality and areal extent of the bauxite. More than 250 samples obtained in this investigation were analyzed chemically. Spectrographic, petrographic, and X-ray diffraction studies of a few selected samples were also made to supplement the results of the chemical analyses. The Salem Hills bauxite averages 35.0 percent Al_2O_3 , 6.7 percent SiO_2 , 31.5 percent Fe_2O_3 , 6.5 percent TiO_2 , and 20.2 percent loss on ignition.

A unique feature of the Salem Hills deposits is the large quantity of residual boulders and nodules of gibbsite or high-grade bauxite scattered widely over the surface. These analyze between 50 and 60 percent alumina and 2 or 3 percent silica. The quantity present has not been determined.

The United States is now importing almost 75 percent of all the bauxite it processes, and if foreign imports were cut off, much, if not all, of the higher grade domestic aluminum ore would be exhausted within five years. Under these conditions the lower grade ores such as are present in the Salem Hills would assume tremendous national importance because of low silica and low-cost mining.

Bulletin 46 may be obtained at the Portland office of the Department, 1069 State Office Building, or at Department field offices in Baker and Grants Pass. Price is \$1.25 postpaid.

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PUBLIC LAW 167 PUBLICATION OF NOTICE BEGINS

Publication of "Notice to Mining Claimants" for determination of surface rights on unpatented mining claims under Public Law 167 has begun in Oregon. The U.S. Forest Service has notified the Department that its first case in Oregon is in the Quartzville area of Linn County. First publication of the Notice was in the weekly newspaper, New Era, of Sweet Home, on November 1. According to the law, the publication of the Notice must be made in nine consecutive issues. Legal descriptions of the lands on which surface determinations are to be made appear in the Notice.

Official public notice of land determinations by the Bureau of Land Management of surface rights in four townships in Josephine County is now being advertised in the Grants Pass Courier. The public lands involved are in T. 34 S., R. 5 W.; T. 34 S., R. 6 W.; T. 37 S., R. 5 W.; and T. 38 S., R. 5 W. First date of publication of the Notice was Wednesday, November 21, 1956. The Notice will appear in the Grants Pass Courier every Wednesday thereafter for nine weeks.

Other public lands under examination by the Forest Service and the Bureau of Land Management (see October 1956 Ore.-Bin for location of these areas) will be advertised similarly in a newspaper having general circulation in the county in which the lands involved are located.

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OWNERS OF VALID CLAIMS CAN PROTECT SURFACE RIGHTS

The date of the first public advertisement (Notice to Mining Claimants) on land determinations is the official date after which the surface rights of the claim may be contested by the Forest Service or the Bureau of Land Management. If a claim is proved invalid, the management of the surface resources comes under the jurisdiction of the Government agencies, according to Public Law 167 (see Ore.-Bin, August 1955 and April 1956). The only way a mining claimant can hope to protect his rights to the surface resources on his property is to file with the Bureau of Land Management a verified statement (a statement under oath) setting forth certain facts about his claim. Failure to file such a statement within 150 days of the first notice shall:

1. Be considered conclusive evidence that the mining claim owner waives and relinquishes any right, title, or interest under such mining claim as regards the surface rights.
2. Constitute a consent by the mining claimant that the mining claim shall be subject to the limitations and restrictions of Public Law 167.
3. Precludes thereafter any assertion of such mining claimant of any right, title, or interest in the mining claim contrary to or in conflict with Public Law 167.

After the mining claimant files a verified statement with the Bureau of Land Management, a mineral examiner will be sent to the mining claim to determine whether the claim should be recognized as valid. If the claim is found to be clearly valid and effective, the owner of the mine may conduct his operation as if Public Law 167 had never been passed. If, on the other hand, the Government doubts the validity of the mining claim, a hearing will be arranged by the Department of the Interior to be held in the county where the claims are located, unless the mining claimant agrees otherwise. The hearing will determine whether the mining claim is valid and effective or invalid and ineffective. Claims declared invalid and ineffective will have their surface subject to management and disposition by the Government bureaus.

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FREE FORMS AVAILABLE FOR MINING CLAIMANTS

The Department is distributing free of charge two forms (Nos. 3 and 4) to assist persons owning mining claims on public lands investigated by the Forest Service or the Bureau of Land Management under Public Law 167. The two forms apply only to unpatented mining claims located before July 23, 1955.

Form No. 4 is a request by the mining claimant for a copy of the Government's notice that land determinations have been made in the area where his claims are located. In order to be sure of receiving the Government bureau's "Notice to Mining Claimants," Form No. 4 should be filed with the County Recorder in the county where the mining claim or claims are located.

Form No. 3 is a verified statement by the mining claimant who wishes to keep the surface rights to his claim the same as before passage of Public Law 167. Form No. 3 is filed in response to the Government bureau's published "Notice to Mining Claimants" that land determinations are to be made. The Notice is published in a newspaper having general circulation in the county in which lands involved are located. If in a daily paper, the Notice will appear in the Wednesday issue and every Wednesday thereafter for nine weeks; if in a weekly paper, the Notice will appear

in nine consecutive issues; if in a semiweekly or a triweekly paper, the Notice will be in the issue of the same day of each week for nine consecutive weeks. Form No. 3 must be filed with the Bureau of Land Management, Department of the Interior, 1001 N.E. Lloyd Blvd., Portland 8, Oregon, within 150 days from the date of the first advertisement of the Notice. Anyone who fails to file a verified statement automatically forfeits to the Government the right to manage the surface resources of his claim.

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SOUTHWEST OREGON MINING NEWS

A 46-ton pod of massive chromite ore measuring 6 by 8 by 10 feet was recently taken out of the Lucky Hunch chromite mine by the owners, Fred Langley and C. W. Dean of Grants Pass. This pod is reported to be the largest chunk of chrome ore ever mined out in one piece in Oregon. Another large pod lies immediately south of the 46-ton pod, and other smaller ones are known to be present. Returns from the first shipment of ore to the Grants Pass depot in October averaged nearly 45 percent Cr_2O_3 . The discovery was made a few months ago as the result of excavation by bulldozer of an area where massive chromite float had been found. The owners are enlarging the open cut and have built about 350 yards of road to the cut. The property is located in the $\text{SE}\frac{1}{4}$ sec. 33, T. 37 S., R. 9 W., in Josephine County, about 10 miles down the Illinois River from Selma.

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Jean W. Pressler, Grants Pass, shipped 25 tons of copper from the Fall Creek mine to the Tacoma Smelter in September 1956. The mine is located on Fall Creek, a tributary of the Illinois River, in sec. 4, T. 38 S., R. 9 W., Josephine County. The mine was reopened in 1955 and the ore, a massive chalcopryite, was mined during the winter 1955-56. It was hauled to the smelter by Dean Axtell Trucking Company.

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NORTHWEST CERAMIC INDUSTRY AND RESOURCES REVIEWED

"Ceramic industry development and raw-material resources of Oregon, Washington, Idaho, and Montana," by H. J. Kelly and others, has been published by the U.S. Bureau of Mines as Information Circular 7752.

The publication summarizes the present ceramic industries and raw-material resources for each of the four States, and is intended as a guide to future development of the industry in the light of an increasing market for ceramic products and availability of natural gas to a large portion of the Northwest. The report reviews the sources of clay, feldspar, expanding shales, and other ceramic as well as refractory materials by counties for each State. Included are illustrations and index maps showing location of deposits and ceramic plants.

Information Circular 7752 is available free of charge from: Publications Distribution Section, U.S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, 13, Pennsylvania.

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RECORD ON ROGUE RIVER WITHDRAWALS STILL OPEN

A public hearing was held November 20 in Grants Pass on the proposed withdrawal of 23,000 acres of public land along the Rogue River from mineral entry. In addition to oral testimony from 18 witnesses, about 20 written statements were entered on the record. Mr. Virgil T. Heath, State Supervisor of the BLM, conducted the hearing and announced that the record would remain open until December 6 for additional written statements. Testimony should be sent to State Supervisor, Bureau of Land Management, 1001 N.E. Lloyd Blvd., P.O. Box 3861, Portland 8, Oregon.
