State Department of Geology and Mineral Industries

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Portland, Oregon

BRISTOL GRANITE QUARRY

Jackson County, Gold Hill Area
REPORT BY: E.A. Youngberg
DATE: March 26, 1945

Ownership:

Leased by Mr. F. I. Bristol.

Location:

Range 3 W., Township 36 S., Section 24, in Jackson County, Oregon. It is approximately two miles east of Gold Hill and one-fourth mile north of Highway 99 from which it may be reached by a graveled road.

Geology:

The deposit is located in a large mass of grano-diorite, a light gray medium-grained rock with dominant plageoclase, quartz, hornblende and biotite. The granodiorite rocks are cut in the quarry by a dike about five to eight feet wide which is much darker and finer grained. The granodiorites adjacent to the dike show minor alteration and considerable cross fracturing. About 30 feet north of the dike in the quarry face the granodiorite is becoming more blocky. It has a columnar structure with an x-section of 1½'-2' x 3' - 4'. The granodiorite is medium-grained and uniform. The grain is slightly coarser than the granite at the Ashland granite quarry.

Development:

The quarry is being presently operated to obtain granite for chicken grit. Mr. Bristol reports that previously several carloads of building stone had been shipped from the quarry. ~~for building stone~~. The present quarry is approximately 30' x 50' with a 25' vertical face. The rock is blasted heavily to produce a maximum

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shattering of the rock, loaded into a mine car and trammed to a fifty-ton storage bin from which it is loaded into tracks and hauledto the Bristol Silica Company plant at Gold Hill for grinding and bagging.

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BRISTOL LIMESTONE Pikes Peak limestone Cow Hill Jackson

Report by K. E. Hamblen in Limestone File

Controlling interest acquired by T. T. Leonard and H. B. Jorgenson (September 1945)

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Report on

THE BRISTOL SILICA DEPOSIT

Jackson County, Oregon

by

Preston E. Hotz

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United States Geological Survey
Grants Pass, Oregon
January, 1942.

February 16, 1942

State Department of Geology and Mineral Industries

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Report on Bristol Silica Deposit

Introduction:

The Bristol Silica deposit is in Jackson County, Oregon in the Gold Hill mining district about 13 miles east of Grants Pass. Two twenty acre claims are in the W½ Sec. 30, T. 36 S., R. 3 W Willamette Meridian. A dirt road 1¼ miles long was laid out to connect the deposit with the Pacific Highway and the town of Rogue River where a crushing plant was constructed. The deposit was discovered and located during the winter of 1938 and the first shipment of crushed silica was made in August, 1939.

So far as is known this deposit is the only one of its kind and purity in Oregon. There are several other bodies of silica in the Pacific Northwest, but the only one that compares with the Bristol property in purity and magnitude is north of Spokane, Washington. The chief use of the silica mined from the Bristol deposit has been for poultry grit though some has been shipped for use as building sand, filter rock, refractory silica, core sand and the manufacture of soap. With the coming of Bonneville power to the Pacific Northwest this deposit assumes greater importance as a source of high grade silicon for the manufacture of ferro-silicon and certain types of glass.

The deposit was mapped in detail by the writer and Robert T. Littleton under the direction of Francis G. Wells, geologist of the United States Geological Survey. A plane table map was made by Littleton assisted by employees of the Bristol Silica Company. The writer is responsible for the preparation of the geologic map.

Mr. F. I. Bristol, owner and operator, rendered invaluable assistance in the preparation of this report.

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General geology:

The country rocks comprise altered volcanics, argillites, quartzites and marbles. These rocks are exposed over a large area in southwestern Oregon. Originally classified as Paleozoic by Diller* and Wells*, they have recently been re-assigned to the Triassic.*

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*Diller, J. S., and Kay, G. F., Mineral resources of the Grants Pass quadrangle and bordering districts, Oregon: U.S.Geological Survey Bull. 380, pp. 48-79, 1908.

*Wells, Francis G., and others, Preliminary geologic map of the Medford quadrangle, Oregon: Oregon Dept. Geol. and Min. Indust., 1939.

*Wells, Francis G., and others, Preliminary geologic map of the Grants Pass quadrangle, Oregon: Oregon Dept. Geol. and Min. Indust., 1940.

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*Wells, F. G. and Hotz, P. E.

Marble is the only unit of the country rocks which is sufficiently exposed at the Bristol deposit to warrent special mention. The other rocks have been adequately described by Wells*. Small, lenticular marble masses lie in several discrete belts which strike N-NE parallel

*Wells, F. G. and others, op. cit. (1939 and 1940).

to the structural trend of the region. As seen in figure _____ a pod-shaped mass of marble borders the silica deposit on the north and north-west. Several smaller marble lenses lie along the lower portion of the western contact. The marble is normally fine-grained and gray. In some places along the contact with the silica body it becomes slightly coarser-grained and is pure white. Elsewhere it is metamorphosed to a tremolite rock which in turn is replaced by blue quartz.

General structure:

The attitude of the country-rock conforms to the general structure of the rocks in this part of Southwest Oregon. The principal trend is N 30 E and the dip varies from 45 to 65 degrees to the south-east. The marble occurs as small pods which lense rapidly and are seldom more than a few hundred feet thick and a few score wide. The contact between marble and the enclosing rock is faulted in several places, for example the contact between marble and the volcanics north-west of the silica body. The actual displacement is not known but probably it is but a few feet. The fracture zone commonly is parallel to the contact and is a bedding-place fault developed between rocks of differing competency at the time of deformation.

The ore body:

There are two kinds of quartz in this deposit. White quartz forms the main mass of the deposit while a blue variety borders 2/3 of the deposit as a narrow band 15 to 75 feet wide. The blue rock contains an undesirable amount of impurities but is of interest in considering the origin of the deposit.

The white silica is dense, very fine-grained quartz. It is translucent, milky to cream-colored and not glassy. Seen under the hand lens the rock is very finely crystalline with a sugary appearance on fresh surfaces. No inclusions other than tiny grains of magnetite can be seen. In some places narrow discontinuous gray bands and streaks of included magnetite are visible.

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Thin sections examined with the microscope show that the rock is 95 per cent quartz with accessory magnetitie and apatite. The magnetite does not exceed 1 per cent while the apatite, which is responsible for the phosphorus contact of the silica varies from 1 to 41.5 per cent. Apatite is more abundant in specimens taken from the borders of the deposit than it is in the center. Hematite pseudomorphs of pyrite are occasionally seen.

The blue quartz, unlike the white, shows some variation in character. All specimens are translucent and have a distinctive bluish cast. Small included streaks and clots of magnetite dust give it a mottled appearance. Some specimens, such as those from the northeast side of the deposit, are massive and even-grained; others, which occur along the western contact, have a distinct linetion due to alternations of quartz with foils and laminae of tremolite. This rock grades very rapidly to massive rock in one direction and to calcite-tremolite rock in the other.

Thin sections of the blue quartz from the western contact have relic crystals of diopside and tremolite. One specimen from the northeast side of the deposit has included calcite crystals which are altering to tremolite. Other specimens are similar to the white quartz when seen in thin section except that they have a little more magnetite. There seems to be no more apatite in the blue quartz than in the white variety.

Structure of the ore body:

The white quartz body is elongate in a north-northeast direction approximately parallel to the structure of the enclosing rocks. The southern half is roughly lense-shaped. The northern half has more or less the form of an isosceles triangle with a long narrow tongue of quartz extending northward from its apex. The surface extent is about 1400 feet and the average width is 280 feet. The widest part is about midway up the slope where it is over 680 feet. The steep outward dipping contacts give the body a wedge-shaped appearance in cross-section.

There are two prominent sets of joints both of which strike about N 60° W. The joints of one system, which are spaced at intervals of 2 or 3 feet, dip steeply to the southwest while the other, which is closely spaced at intervals of 1 to 4 inches, dips northeast from 45 to 65 degrees. Besides these two major joints the rock is broken by a myriad of closely-spaced irregular and curved fractures which are normal to the other two systems. Thus the rock is broken into small irregularly-shaped pieces which greatly facilitate mining as well as the final crushing.

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There is noticeable displacement of the east and west contacts along two faults having a northwesterly trend more or less parallel to the jointing near the middle of the body. Many shiny polished surfaces are visible on the widely-spaced south-dipping joints indicating slight displacement along these planes. Two normal faults with small displacement are well-exposed in the quarry. The lower west contact between the blue quartz and country rock is a fault and it is believed that there has been movement along much of the southwestern contact. The contact between the white quartz body and the fringe of blue quartz is faulted in places as is indicated by narrow zones of fracture and granulation. The displacement along these boundary faults has been small. None of the faults affect the value of the deposit.

Genesis

The relationships of the blue and white quartz to each other and to the enclosing country rock are important to a consideration of the genisis of the deposit.

One of the most important relationships is the general structural concordance between quartz and the country rock. There is a close parallelism of directional trends between the marble and the blue quartz especially along the west border of the deposit where the attitude of the narrow band of blue quartz is the same as that of the marble. Within a few feet of the contact the marble is transformed to a tremolite rock which in turn is replaced by the blue quartz.

In contrast, the contact between the white and the blue quartz is abrupt and although the western contact of the white quartz parallels the blue quartz-marble contact it cross-cuts both the marble and the blue quartz at the upper end of the deposit. Furthermore, there is no concordance along the northeastern contact between the white and blue quartz. Small veinlets of lighter colored quartz cut the blue quartz in a few places., and there is some evidence of slight replacement of the lineated bluish rock by more massive lighter colored quartz.

It is believed that both the blue and the white quartz are of hydrothermal origin. There is nothing which indicates that the deposit is a wholesale replacement of some rock such as marble, though in places there is evidence of partial replacement of the marble by the blue quartz.

There is no evidence to indicate the controlling factors for the emplacements of the siliceous material. Careful examination of the surrounding area has not revealed similar deposits of silica though quartz veins are common.

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There were two separate and distinct periods of quartz deposition. The blue quartz was deposited first as a small lense-like body parallel to the structure of the invaded rocks. It was sufficiently rich in magmatic solutions and vapors to partially replace the marble with which it came in contact. When it had cooled and become solid it fractured and a second wave of siliceous material came in and was deposited. This material had little effect on the invaded rocks. Cooling and contraction combined with outside forces resulted in fracturing and the development of joints and faults.

Quality:

The following are analyses of samples of the white silica:

	1	2	3	4	5
SiO_2	99.57	99.40	99.58	98.71	99.54
Fe_2O_3	no analysis for this oxide			.48	.15
Al_2O_3	no analysis for this oxide			.27	.06
CaO/MgO	no analysis for this oxide			nil	.14
P_2O_5	.068=.030P	.043=.019 P	.064=.029 P	.089=.038 P	.11=.048 P

1. Electro-metallurgical Sales Corp., Portland, Oregon
2. " " " " " "
3. " " " " " "
4. Lerch Bros. Inc., Hibbing, Minn.
5. Electro-metallurgical Sales. Corp., Portland, Oregon

It will be noted that all the samples contain phosphorus. Phosphorus is of concern where the quartz is to be used as a flux, as in the manufacturing of ferro-silicon.

The blue quartz is considered valueless for flux. No adequate analyses have been made of the blue variety but it is considered to have a high percentage of impurities. However, there seems to be no reason for its not being mined for use in enterprises in which purity is not a prime element.

Mining:

The Bristol Silica deposit is well-exposed at the surface of a broad, south-facing 20 degrees slope. The present quarry is 50 feet deep, 50 feet wide and has been extended approximately 70 feet in from the original surface to the working face. The quarry is located on the crest-line of the hillside where there is a minimum of overburden. The thin veneer of weathered material, which is seldom more than 6 feet thick, necessitates a minimum of stripping before the quartz is mined. So far there have been only a few tons of waste

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since everything below the overburden has been clean rock. The waste is dumped below the quarry from the end of the tramway.

Sufficient quartz to supply the mill is mined by two men working one shift a day. The holes are drilled by hand using a single jack and 7/8 inch steel drill. The holes are drilled to a depth of 36 inches and are loaded with 40 percent special geletin.

Approximately 15 tons of rock are broken down for each hole. Because of the closely spaced intersecting fractures the quartz naturally breaks into small fragments which are seldom more than 6 inches across. The material is shot down on to a wooden trap from where it is loaded into a 2 ton car, and is trammed by hand to a 75 ton wooden storage bin. Thequartz is then trucked to the company plant at Rogue River where it is crushed.

Crushing plant:

The crushing plant is completely electrified and has a capacity of approximately 48 tons per day. A 9 x 18 inch jaw crusher reduces the rock to a size of 1¼ inches after which it passes between two 24 x 14 inch rolls which grind it to the required size. These rolls are adjustable to permit gringing to sizes anywhere from 1 to ¼ inch. From the rolls the crushed product is conveyed and elevated to a bank of two three-deck vibrating screens where it is sized and distributed to the bins in the warehouse. The dust from the rolls is elevated to the dust-catcher.

Development and estimated quantity:

A small amount of development work has been done on the property; only sufficient to remove silica required by the sales department of the company. A number of samples for analysis were taken in order to locate the best grade of quartz. Previous to this survey the deposit had not been mapped in detail nor had its extent been proven by drilling.

The surface of exposed white quartz is approximately 396,000 square feet, which, based on a weight of 165 lbs. per cubic foot, would be 32,000 tons per vertical foot of depth. Assuming a mineable depth of 100 feet, a conservative estimate of minimum tonnage is 3,200,000 tons.

Future of thedeposit:

The amount of silica mined, crushed and shipped has been relatively small. However, because of increased industrial activity in the Portland area, this deposit assumes greater potential importance.

The estimated minimum reserve of 3,200,000 tons seems ample to support an industry. It must be remembered that this figure is conservative and there is nothing in the geologic set-up to indicate that depths greater than 100 feet might not be expected.

Quarrying is probably the cheapest and most practical method of removing the quartz. When a depth of 75 to 100 feet has been attained it would be wise to bench the quarry. Thus a series of open cuts could be established one above the other up the hill in step-like fashion. Gravity chutes or conveyor belts might be used to transfer the rock from the quarries to the bin level.

If future quarrying follows the crest-line of the hill there will never be more than a few feet of overburden to deal with. This can most easily be stripped by hand or perhaps with a bulldozer. On the lower east slope the overburned becomes progressively thicker until in places it is over 15 to 20 feet.

The chief problems to be overcome are those of market and transportation. The distance from the mine to the crushing plant is only 5 miles over good road, but the distance from the crushing plant to the Portland area is over 300 miles by rail. An increased demand for the quartz might overcome this problem since there are other bodies of similar size and purity closer to Portland.

The uses for and the requirements which must be fulfilled by quartz in industry are given in the U. S. Bureau of Mines Bulletin 266* and Information Circulars 6472 and 6473*.

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*Weigel, W. M., Technology and uses of silica and sand, U. S. Bureau of Mines, Bull. 266, 1927.

*Santmyers, R. M., Quartz and silica Part I - General summary. U. S. Bureau of Mines Inform. Cir. 6472, August, 1931.

Santmyers, R. M., Quartz and silica Part II, Quartz, quartzite and sandstone, U. S. Bureau of Mines Inform. Cir. 6473, August, 1931.

The possible uses for the quartz from the Bristol Silica deposit are listed below.

Metallurgical and chemical uses:	Fluxing, ferrosilicon, filter rock, quartz for acid towers, sodium silicate (water-glass).
Abrasives	Sandpaper and abrasives wheels, soap, kitchen cleansers, scouring, buffing and polishing compounds.
Fillers for	Paint and wood, rubber, plaster and cement.
Glass	

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Structural uses	Building sand, core sand.
Refractory linings	
Ceramics	White ware and enamel, placing sand.
Poultry grit	

RECORD IDENTIFICATION
RECORD NO............ M061522
RECORD TYPE.......... XIN
COUNTRY/ORGANIZATION. USGS
DEPOSIT NO........... 234A
MAP CODE NO. OF REC..

REPORTER
NAME.......................... SMITH, ROSCOE M.
DATE.......................... 78 08
UPDATED....................... 80 12
BY............................ FERNS, MARK L.; (BROOKS, HOWARD C.)

NAME AND LOCATION
DEPOSIT NAME................. BRISTOL GRANITE

MINING DISTRICT/AREA/SUBDIST. GOLD HILL

COUNTRY CODE.................. US
COUNTRY NAME: UNITED STATES

STATE CODE................. OR
STATE NAME: OREGON

COUNTY..................... JACKSON

QUAD SCALE	QUAD NO OR NAME	
1: 62500	GOLD HILL	
LATITUDE	LONGITUDE	
42-25-30N	123-00-53W	
UTM NORTHING	UTM EASTING	UTM ZONE NO
4696750.	498800.	+10

TWP...... 36S
RANGE.... 03W
SECTION.. 23
MERIDIAN. WB & M

LOCATION COMMENTS: NE/SE

COMMODITY INFORMATION
COMMODITIES PRESENT.......... GRT

ORE MATERIALS (MINERALS,ROCKS,ETC.):
GRANODIORITE

STATUS OF EXPLOR. OR DEV. 4

DESCRIPTION OF DEPOSIT

DEPOSIT TYPES:
MAGMATIC
FORM/SHAPE OF DEPOSIT:

SIZE/DIRECTIONAL DATA
SIZE OF DEPOSIT...... SMALL

DESCRIPTION OF WORKINGS

COMMENTS(DESCRIP. OF WORKINGS):
QUARRY 150X200X30 DEEP

PRODUCTION
YES
UNDETERMINED
23 , SOME PRE - 1946 CHICKEN GRIT

GEOLOGY AND MINERALOGY

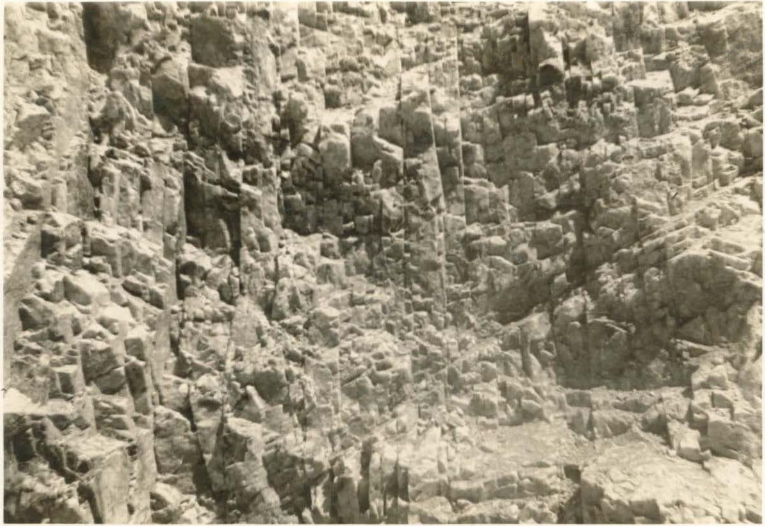
AGE OF HOST ROCKS............. LJUR-CRET
HOST ROCK TYPES............... GRANODIORITE

AGE OF ASSOC. IGNEOUS ROCKS.. LJUR-CRET
IGNEOUS ROCK TYPES........... GRANODIORITE

LOCAL GEOLOGY

NAMES/AGE OF IGNEOUS UNITS OR IGNEOUS ROCK TYPES
1) NAME: GOLD HILL STOCK
AGE: LJUR CRET

GENERAL REFERENCES
1) YOUNGBERG, E.A., 1945, BRISTOL GRANITE QUARRY; ODGMI UNPUBLISHED FILE REPORT



Thrasher.

Consumption of foundry sand in the Pacific Northwest by areas and by types of castings for the year ending Sept. 1, 1937.

Area	Iron	Non-fer.	Iron & non-fer.	Steel	Iron & steel	Steel roll mills	Sand-blast	Total
Seattle								
Tons	4049	354	646	3985	3706	69	1422	14231
Percent	43.3	38.7	39.2	56.8	64.4	18.7	41.4	50.0
Tacoma								
Tons	1852	100	356	708	823	300	833	4972
Percent	19.9	10.9	21.7	10.1	14.3	81.3	24.2	17.5
Portland								
Tons	2162	392	416	2287	901	0	833	6991
Percent	23.2	42.8	25.3	32.6	15.7	0	24.2	24.5
Spokane								
Tons	1270	70	228	35	324	0	350	2277
Percent	13.6	7.6	13.7	0.5	5.6	0	10.2	8.0
Total								
Tons	9333	916	1646	7015	5754	369	3438	28471
Percent	32.8	3.2	5.8	24.6	20.2	1.3	12.1	100.0

Sand used in Pacific Northwest foundries, classified according to geographical location of deposit and use for year ending Sept. 1, 1937.

Location of deposit	Iron, tons	Non-fer. tons	Iron & non-fer. tons	Steel,[1] tons	Iron & steel, tons	Sand-blast, tons	Total Tons	Total Percent
Aberdeen	1116		30		70		1216	4.3
Albany, N. Y.	360	23					383	1.3
Belguim	531	7	122	3348	1666	280	5954	20.9
Bunker	1659	93	556		1108	1620	5036	17.6
Centralia	15						15	.1
Chewelah	24				76		100	.4
Del Monte, Calif.	71	29					100	.4
Denver		50					50	.2
Ellensburg	20						20	.1
Florence, Oregon	293	133	234				660	2.3
France		5					5	.0[2]
Longview	20	10					30	.1
Mica, Wash.	25						25	.1
Minnesota				880			880	3.1
New Jersey					880		880	3.1
Ottawa, Ill.	1371	23		3156	1069	1538	7157	25.1
Portland, Oregon	1125	106	20		345		1596	5.6
San Diego, Calif.	958	328	250				1536	5.4
Seattle	774	75	285		50		1184	4.2
Spokane	788	34	95				917	3.2
Vancouver, Wash.			54				54	.2
Wenatchee	100				490		590	2.1
Whatcom	60						60	.2
Yakima	23						23	.1
Total, tons	9333	916	1646	7384	5754	3438	28471	100.0
Percent	32.8	3.2	5.8	25.9	20.2	12.1	100.0	

[1]Includes 369 tons used in rolling mills.

[2]Less than 0.05 percent.