Black Sand Properties

Curry County

by R.H. West Pres. Alcalore M. & Exp. Co.

Whales Head Beach Placer (Dec. 1957)

12 mi N. of Brookings, 3 mi W. of Highway 101.
Whole of foreshore of Whales Head Bay + 200 yds
Gacke - sec 3, T40S., R14W - 2 mi in length.
Water ft. on Whales Creek 38% Chromite

Watt Placer

Parts Sec 1, 2, & NW¼ NE sec 11, T 42S R 15W - at 800 ft
Elev. below Crystal Creek & Sixes R. about 3 mi
E of Sixes - 2 - old hydraulic pits.

Bedrock serp -

analyses dmarly	√5 %
Other Light minerals	21
Olivine	11
Garnets	2
Magnetics	√
Chrome	6

2 million yds explored
√ " " assumed

A VANADIUM-BEARING MAGNETITE SANDSTONE IN SOUTHWEST OREGON

JOHN ELIOT ALLEN AND WALLACE D. LOWRY

ABSTRACT

A fossil "black-sand" deposit, composed of ~~titaniferous magnetite~~ highly concentrated and well sorted titaniferous magnetite, which contains vanadium in the order of four to eight tenths of one percent along with two to five percent chromium as chromite, occurs as a lens outcropping over an area 600 feet long and 100 feet wide in central Curry county, southwest Oregon. This magnetite sandstone deposit is possibly Cretaceous in age, and represents a beach or offshore concentration of minerals derived from Jurassic basic and ultrabasic rocks of the region, in a manner analagous to the origin of the "black-sands" formed along the Oregon coast-line during the Pleistocene and recent.

INTRODUCTION

Early in March of 1942 a small piece of indurated magnetite sandstone was brought in to the laboratory of the State Department of Geology and Mineral Industries. In the routine spectrographic analysis given all unusual-appearing samples, it was determined to contain appreciable amounts of vanadium. Accordingly, several visits were made to the deposit during the summer of 1942, and it was examined, mapped, and sampled by the authors. Samples were analyzed and studied in the laboratory during the winter of 1943. Dr. H. C. Harrison, spectroscopist of the Department, made the original discovery and later quantitative spectrographic analyses, on the 3-meter Baird grating spectrograph.

The property had been ~~previously~~ known in the literature[1] as an "iron deposit", but ~~it~~ was so inaccessible that little work had ~~ever~~ previously been done upon it.

LOCATION OF THE DEPOSIT

The deposit is located at an elevation of about 3000 feet, about 20 miles inland from the coast, close to the geographic center of Curry County, in the extreme southwest corner of the state. (See figure 1). This portion of Oregon, because of its high relief, steep canyons, and lack of roads, is one of the least

1. Butler, G.M. and Mitchell, G.J. ... see p. 3

populated and most difficult of access remaining in the state. The population of the county, nearly all concentrated along the coastal highway, totals only 2000 souls.

Land surveys have not been made of the area adjacent to the deposit, ~~The area adjacent to the deposit has not been surveyed;~~ but it lies near the west edge of section 17, T. 36 S., R. 11. W. of the Willamette Meridian.

The deposit is usually reached by way of Agness, a hamlet on the Rogue River, located 35 miles from the mouth of the river. Agness is served by a daily boat [redacted] from the town of Gold Beach on the coast, or by way of a fair-weather forest road 35 miles from the end of the railroad at Powers, to the north.

From Agness, the deposit lies about 10 miles by trail up the Illinois River to the south. The last 2 miles of trail are so steep and rugged that it would be very hard to get a horse over it.

GENERAL GEOLOGY

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The ridge immediately to the north of the deposit is made up of a dense, fine-grained, silicified meta-igneous rock termed "greenstone" by Butler and Mitchell. It is in part a meta-andesite or meta-diorite, in part an altered tuff,

A north-south ~~trending~~ band of serpentine (Upper Jurassic?) intrudes the greenstone ~~runs across the ridge just~~ west of the deposit, and a small outcrop of similar basic rock appears adjacent to it on the east. Peridotites are also present over large areas further to the north and ~~west~~ west.

The northeast-southwest trending ridge to the south of the deposit is in part ~~largely~~ composed of ~~Myrtle~~ conglomerate, which is found in large discontinuous lenses in the lower part of the Myrtle formation of southwest Oregon. A number of the higher prominences in central Curry County, such as Horsesign Butte (on the same ridge as the deposit,

two miles to the southwest) Pebble Hill, Seven-mile Hill, and the point northwest of Agness, are composed of ~~the~~ conglomerate, the pebbles of which vary greatly in size and relative abundance. These conglomerates and intrebedded sandy beds are frequently ~~usually~~ deformed and tilted at angles up to 50°. Small discontinuous concentrations of black-sand, a few mm. thick and a few cm. long, are not uncommon in the sandstones. The ~~conglom-~~ Myrtle formation ~~erate~~ was determined by Diller[3] as being upper Knoxville (lower Cretaceous) in age, on the basis of fossils found in Butte Creek, about three miles southwest of the deposit. According to Butler and Mitchell[4] both Aucella crassicolis and Aucella piochii are found there in sandy layers in the conglomerate. More recent work in southern Oregon by Taliaferro[5] indicates that the Myrtle is at least in part Jurassic in age. ~~The~~

DESCRIPTION OF THE DEPOSIT

The magnetite sandstone lies across a small saddle in the ridge, at a point about 2 miles northeast of the prominence on the same ridge known as Horse-sign Butte. Its axis is roughly north-south, and the sandstone extends about 150 feet down the south slope of the ridge, a total length of about 650 feet. Its width averages about 100 feet, although it pinches out gradually to the south. It may either lie unconformably upon the greenstone which borders it upon both sides; (See fig. 3-A) or be faulted down into the greenstone by a fault along its western border (fig. 3-B); ~~be a sedimentary lens within the greenstone series (fig. 3C).~~

Fig. 3

Internal structures are obscure so that the thickness is unknown, although it is probably of the order of 40 feet or more. A 3-inch pebble layer in cut No. 3 (see fig. 2) strikes about N. 55° W. and dips 45° to the southwest.

The magnetite sandstone has a specific gravity of 3.2. It is a greenish-brown color, streaked with irregular dark gray to black "veinlets", which appear to be secondary along fractures.

Screen analysis of the sandstone gave results as follows:

Size	Percent
>100 mesh	8.1
<100>150 mesh	37.5
<150>200 mesh	22.0
<200 mesh	32.4

Thin sections indicate that the size range of the particles varied from less than .003 mm. to over 1 mm.; the average, however, being around .25 mm. in diameter. The magnetite is largely subhedral, the finer sizes frequently occurring as almost euhedral octahedrons. Magnetic separations indicate that the material is about 96% non-magnetic magnetic. The interstitial material is mostly a fine cryptocrystalline aggregate. A few zircon crystals with peculiar "sawfish" terminations were present, indicating (according to Butterfield[6]) some secondary solution and redeposition.

6 Butterfield, J. A. "Outgrowths on Zircon": Geol. Mag. 73, 1936, p. 511.

CHEMICAL AND SPECTROGRAPHIC ANALYSES

Samples were taken from each of the open cuts (1 to 6) and a grab sample was taken of float across the 100 foot width of the deposit on the crest of the ridge. Chemical analysis of composites gave:

	Percent A[7]	B[8]
Iron	54.94	
Titania	2.70	
Vanadium	0.37	0.43
Sulfur	0.114	
Phosphorus	0.004	

Spectrographic analyses of these composites indicated that vanadium was present in amounts between 1/10 and 1 percent, and other elements present were: iron, titanium, ziroon.

Spectrographic analyses of the original composites as compared with the magnetic separates are as follows:

	Composite %	Magnetic separate %
iron	over 10	over 10 (est.)
titania	1-5	1-5 (est.)
vanadium	0.1-1.0	.73-.89 (quantitative)
chromium		2.0-5.0 (")
aluminum		0.1-1.0 (est.)
silicon		1.0 "
phosphorus		Tr. "
arsenic		Tr. "
calcium		Tr. "
magnesium		

7 Lerch Brothers, Hibbing, Minnesota
8 John Beede, Portland

Spectrographic analysis is the various size separates indicated that the vanadium content did not appreciably vary with the size of the grain. Analysis of the non-magnetic portion of the sample showed it to contain almost no vanadium or titanium. No vanadium minerals were identified by microscopic methods.

AGE AND ORIGIN OF THE DEPOSIT

The presence in the sandstone of an appreciable amount of chromite which could only be derived from the late Jurassic serpentines and peridotites of the area, indicate that the age of the deposit is post-Jurassic. The Klamath Mountains of southwest Oregon apparently were, during the Upper Cretaceous and lower Tertiary times, a positive block undergoing erosion which lasted into the Miocene[9], with sediments being deposited around its flanks. The period of erosion resulted in the so-called "Klamath Peneplain", which over large areas is underlain by ultra-basic rocks.

The relatively small amounts of chromite in the sandstone, in proportion to the large amounts of titaniferous magnetite (the ratio is in places almost reversed in the present beach deposits) suggests that the sandstone was laid down early in the erosion cycle, before appreciable areas of ultra-basic chromite-bearing rocks had been exposed. The age of the sandstone is thus tentatively assigned to the Cretaceous(?).

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9 Diller, J. S. "Topographic development of the Klamath Mts." U.S.G.S. Bull. 196, 1902

The magnetite sandstone deposit represents a normal lenticular beach concentration of titaniferous, vanadium-bearing magnetite sand deposited on a post-[illegible]ssic (Cretaceous ?) shore by the same type of selective wave-action which has produced the Pleistocene and recent black-sands along the Oregon coast[10]. It has since been uplifted, tilted, probably faulted, and has undergone slight secondary solution and redeposition of minerals within it.

The titaniferous magnetite was originally derived from the streams and the eroded coastline of that time, probably from the gabbroic and gneissose rocks which are known to be present both adjacent to the deposit and further to the east, although primary titaniferous magnetite deposits are not now known in these rocks, although in the Cretaceous time they were. The chromite was derived from the serpentine and peridotite, which at that time had not been exposed over as large an area as they are today. The vanadium occurs within the titaniferous magnetite in an amount which is slightly greater than is usual in other deposits[11], and it is possible in view of this fact, as well as the fact that the magnetite has already been concentrated by nature, that under the present emergency the deposit may be of commercial value.

Rock-form deposits of magnetite are not uncommonly found in the Sulphur Springs, associated with chromite,

John Eliot Allen
Wallace D. Lowry

Department of Geology and
Mineral Industries,
Portland, Oregon
March 30, 1943

10. Twenhofel, W. H. "Origin of the Black Sand

COPY

ABSTRACT

" A vanadium-bearing black-sand deposit of middle Mesozoic age, in central Curry county, Oregon" , by John Eliot Allen and Wallace D. Lowry, Oregon Department of Geology and Mineral Industries.*

The Pleistocene black-sand deposits lying upon sea-terraces up to 300 feet in elevation along the southern Oregon coast are well known in the literature, and are at the present time being mined on a large scale for their chromite content. A deposit of black-sand lying at an elevation of 3000 feet in central Curry county twenty miles inland, which had previously been called an "impregnation iron deposit" has been found to be a consolidated titaniferous magnetite sandstone containing amounts of vanadium varying from one tenth to one percent.

The elongated deposit, 650 feet long and 100 feet wide, crosses a shallow saddle in an east-west trending ridge composed of"greenstone" (altered lavas and tuffs) and serpentine. Elsewhere along this ridge are downfaulted blocks of conglomerate and sandstone with fossils showing them to be of "Myrtle" age (upper Jurassic or lower Cretaceous) age, younger than the Jurassic greenstones and serpentines. Most of the deposit lies south of the saddle, ranging in elevation from 2650 feet at the lower southern end to 2900 feet in the saddle. It is a massive greenish-brown sandstone of uniform composition and a specific gravity of 3.2. A few layers of exogenic pebbles were found at one locality. The sandstone is medium grained (averaging 0.25 mm. diameter of the grains), indurated, and composed of 95% magnetite, about 3% ilmenite, less than 1% horneblende, with minor amounts of zircon, quartz, garnet, tremolite, chrysotile, pyrite, and probably chromite.

Chemical and spectrographic analyses of the original rock, and of magnetic and heavy mineral separates show the composition to be as follows:

chemical		spectrographic	
Fe	54.94%	Cr	2.0 - 5.0 %
TiO_2	2.7	Al	less than ~~10.0~~ 1.0
V	0.37 - 0.43	~~Mg~~	~~less than 10.0~~
P	0.0004	Si	~~" " 10.0~~ about 1.0
S	0.114	Ca	~~about 1.0~~ Trace
		~~Ni~~	~~0.1 - 1.0~~
		~~Co~~	~~0.1 - 1.0~~
		~~Na~~	~~trace~~
		As	trace

The non-magnetic separate showed no vanadium, and no vanadium minerals were identified microscopically. It is thought to be contained in the magnetite molecule, as is much of the titanium.

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(cont.)

All the contained minerals are also present in relatively small amounts in the adjacent meta-igneous and serpentine rocks of Jurassic age. The small chromite content, in comparison to the large chromite content (up to 40%) in the Pleistocene black-sand deposits, indicate that the serpentines and peridotites from which the chromite is derived had at the time of formation of this deposit, only begun to be exposed to erosion, and thus be able to contribute their minerals to the deposit.

The deposit is thought to have been deposited along the shore of the Myrtle (late Jurassic or early Cretaceous) sea which covered much of the Klamath province at that time.

May 24, 1943

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ABSTRACT

"An investigation of the sea-cliff subsidence of March 30,1943 at Newport, Oregon", by Wallace D. Lowry and John Eliot Allen, Oregon Department of Geology and Mineral Industries.*

A crescent-shaped section, about 1000 feet long and 200 feet wide, of the 70 foot sea-cliff at the north city limits of Newport, Oregon recently broke off and dropped down a distance of 5 to 25 feet, causing considerable property damage. Together with many small tributary cracks and openings, two major fissures opened up from 20 to 30 feet apart, and the block between them fell from 10 to 25 feet.

Minor disturbances which caused walls to crack and doors to stick, were noted by residences as early as late December, 1942, but the major movements occurred following heavy rains during the latter part of March and culminated on March 30. Some houses were removed, other were broken apart and left hangin over the crevasse. Previous movements are reported to have occurred in 1911 and again in 1921, and the present movement is a recurrence along the older break, and an extension of it 800 further north.

The sea-cliff is composed of 25 feet of flat-lying Pleistocene dune-sands, unconformably overlying by massive brown and gray argillaceous sandstones and snady shales of Miocene age, which strike north and south parallel to the coast and dip 21° to the west. At the base of the cliff a few feet of dark gray to black crumbly shales of the Nye formation of Oligocene age are exposed. These underly the sandstones and are notorious along the coast for their incompetent character , as they readily slack to mud upon exposure.

The removal by sea-cliff erosion of the more competent sandy Miocene beds overlying the shales now permits the movement of a block down the sea-sloping unconformity between them . When the shales became saturated by heavy rains soaking through the pervious Pleistocene sandsmovement occured seaward in the lubricated shales, and a block of the cliff moved down and outward.

May 24, 1943

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State Department of Geology and Mineral Industries

July 12, 1941

702 Woodlark Building
Portland, Oregon

REFUGEE PROPERTY (BLACK SAND) Sixes River Area

OWNERS: Mr. L. S. Klineman and Mr. Wade.

LOCATION: SW¼ sec. 27, T. 31 S., R. 15 W., on Boulder Creek, 3 miles south of Denmark. The property adjoins, and lies east of Hwy. 101.

AREA: 160 acres.

HISTORY: One of the oldest black sand mines in the area. Worked at various times by various people. Klineman worked parts of it. In 1940 Leverett Davis put down several test holes.

DEVELOPMENT: 2½ acres have been mined to bedrock. The area is now grown to alders and brush. Klineman reports that he has drilled the entire area, but kept no drill records.

GEOLOGY: The area is an old back-beach. Bedrock elev. is about 145 ft. Above bedrock is block sand, the thickness of which is 1 ft. at the highway and 6 ft. on the east. The black sand is covered by 15-30 ft. of sand.

ECONOMICS: Klineman states that the black sand underlies the entire 160 acres. Davis put down 3 holes south of the mined area and found similar conditions. Gold and platinum varies; - some spots are very rich, - others are poor. Analyses of the black sand are reported as showing 20 per cent Cr_2O_3. No black sand was exposed so no samples could be cut. Water table appears to be as high or higher than the black sand.

INFORMANT: Mr. Klineman and Ray C. Treasher, July 8, 1941.

REPORTED BY: RCT., 7/11/41

A sample taken later by experimental engineers assayed 18.4 % Cr_2O_3.

July 12, 1941

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

CONFIDENTIAL

REFUGEE BLACK SAND

If Klineman's statements are correct, his ¼ section contains 770,880 cubic yards of black sand. (43,560 X 3 X 160 ÷ 27) Of this 20% is Cr_2O_3 or 154,176 cubic yards of chromite. Roughly figuring 3 tons to the yard, the figure would be 462,528 tons of chromite. This seems like a shale of a lot of chromite.

However, the area, and the situation might justify further investigation.

Ray C. Treasher.

3 Tons to yd (?)

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

ASSAY REPORT

Grants Pass, Oregon
Baker, Oregon

July 17 19 41

Sample submitted by Klinematt, F. W. Libbey, Portland office

Sample description: BB 514 Chromite sand

The assay results recorded below are made without charge as provided by Chapter 176, Section 10, Oregon Laws 1937, the sender having complied with the provisions thereof.

NOTICE: The assay results recorded below are from a sample furnished by the above named person. This Department had no part in the taking of the sample and assumes no responsibility, other than the accuracy of the assay of the material as furnished it by the sender.

	GOLD		SILVER		Chrome oxide				
Sample Number	Ounces per ton	Value	Ounces per ton	Value	Percent	Value	Percent	Value	Total Value
BB 514					18.4				

Market Quotations:

Gold	$	per oz.
Silver	$	per oz.
	$	per lb.
	$	per lb.

STATE ASSAY LABORATORY

L. C. Richards

Assayer

Black Sand
sample by F W L
trip to property with Klinematt