

# ANNUAL REPORT TO THE CORPORATION DEPARTMENT

FOR THE YEAR ENDING JUNE 30, ~~1936~~ 1937

Of BRIGGS CREEK CONSOLIDATED MINES, INC.  
(Give legal name in full)

a corporation organized and existing under and pursuant to the laws of the State of Oregon.

The location of its principal office is at No. office of James T. Chinnock Street,  
1st National Bank Bldg.  
 in the city of Grants Pass, in the state of Oregon

The names and addresses of principal officers, with the postoffice address of each, are as follows:

NAMES	OFFICE	BUSINESS ADDRESS
<u>Paul C. Bates</u>	<u>President</u>	<u>Yeon Bldg., Portland, Oregon</u>
<u>James T. Chinnock</u>	<u>Secretary</u>	<u>Grants Pass, Oregon</u>
	<u>Treasurer</u>	

The date of the annual election of officers is 2nd Monday in January of each year

The date of the annual election of directors is 2nd Monday in January of each year

	Common With Par Value	Common No Par Value	Preferred
Amount of authorized capital stock . . . . .	\$.....	<u>1000 Shares</u>	\$.....
Number of shares of authorized capital stock . . . . .			
Par value of each share . . . . .	\$.....	<u>x x x x x x</u>	\$.....
Amount of capital stock subscribed . . . . .	\$.....	<u>575 Shares</u>	\$.....
Amount of capital stock issued . . . . .	\$.....	<u>575 Shares</u>	\$.....
Amount of capital stock paid up . . . . .	\$.....	<u>575 Shares</u>	\$.....
Price at which no par value stock issued . . . . .	<u>x x x x x x</u>	<u>\$ 10.00</u>	<u>x x x x x x</u>

State amount of capital, represented by stock of no par value, with which

the corporation began business . . . . . \$ 5750.00

IN WITNESS WHEREOF, I, JAMES T. CHINNOCK, SECRETARY

of said corporation, have signed this report, this

[CORPORATE SEAL]

29th day of October, A. D. 1937

(signed) James T. Chinnock

STATE OF OREGON, }  
 County of ..... } ss.

I, \_\_\_\_\_, of the above and foregoing named corporation, being first duly sworn, depose and say, that the foregoing is a true and correct statement of the matters therein stated and according to the best of my knowledge and belief the same are true.

RECORD IDENTIFICATION  
RECORD NO..... M061747  
RECORD TYPE..... X1M  
COUNTRY/ORGANIZATION. USGS  
DEPOSIT NO..... DDGMI 100-216  
MAP CODE NO. OF REC..

REPORTER  
UPDATED..... 81 02  
BY..... FERNS, MARK L. (BROOKS, HOWARD C.)

NAME AND LOCATION  
DEPOSIT NAME..... BRIGGS CREEK  
MINING DISTRICT/AREA/SUBDIST. CHROME RIDGE  
COUNTRY CODE..... US  
COUNTRY NAME: UNITED STATES  
STATE CODE..... OR  
STATE NAME: OREGON  
COUNTY..... JOSEPHINE  
DRAINAGE AREA..... 17100311 PACIFIC NORTHWEST  
PHYSIOGRAPHIC PROV..... 13 KLAMATH MOUNTAINS  
LAND CLASSIFICATION..... 41

QUAD SCALE            QUAD NO OR NAME  
1:                    SELMA  
  
LATITUDE            LONGITUDE  
42-22-52N            123-44-43W  
  
UTM NORTHING        UTM EASTING        UTM ZONE NO  
4692150.0            438650.0            +10  
  
TWP..... 37S  
RANGE..... 09W  
SECTION.. 03  
  
ALTITUDE.. 2320

COMMODITY INFORMATION  
COMMODITIES PRESENT..... CR

PRODUCER(PAST OR PRESENT):  
MAJOR PRODUCTS.. CR

## BRIGGS CREEK AREA

Geography and history

The Briggs Creek chromite deposits are on Chrome Ridge, which is in Josephine County, Oreg., and in the north-central part of the Kerby quadrangle. Most of them are in secs. 11, 14, and 23, T. 36 S., R. 9 W. The area is about  $2\frac{1}{2}$  miles as the crow flies but 5 miles by trail west of Ferren Guard Station, from which a forest road leads to Hayes Hill Station on the Redwood Highway. This road is impassable when wet.

The region is very rugged. Chrome Ridge forms the divide between the Briggs Creek-Illinois River drainage on the southeast and the Todd Creek-Rogue River drainage on the northwest. From the broad rough crest of the ridge, 3,800 to 4,500 feet above sea level, the ground falls abruptly about 1,800 feet to the streams. Briggs Creek is perennial and has a large flow.

During the World War the Briggs Creek camp was fairly active. An aerial tram extending from Chrome Ridge southward across Briggs Creek to the next ridge was constructed, 5 miles of road was built, and mining was begun. But at the end of the war, which came before any chrome had been shipped, the equipment was pulled out, and no mining has been done since.

A topographic and geologic map (pl. 71) of an area 2 miles long and 1 mile wide was made during the first 2 weeks of October 1939, under the direction of F. G. Wells. The eastern half of the area was mapped by L. R. Page, Martin Koenig, and W. M. Furnish, the western half by H. L. James and Robert Yates. The entire area was mapped on a scale of 400 feet to the inch, and the most promising prospects were mapped on a scale of 20 feet to the inch. Sketch maps of economically important workings were made with tape and compass.

### Geology

The chromite deposits of the Briggs Creek area are all in the southern part of a sill-like mass of peridotite, which was intruded into hornblende schists and gneisses and thin-bedded quartzites.

The peridotite together with the included ore bodies was fractured by shearing in a northwesterly direction and was then serpentized. At the eastern contact of the main body of peridotite a mass of schistose serpentine rock 600 to 1,000 feet wide was formed. With this exception alteration to serpentine was confined to brecciated shear zones, thin layers along fractures, and the olivine-chromite contacts in some of the ore bodies.

The chromite deposits, which are partly of the pod or high-grade type and partly of the disseminated or low-grade type, are small and are widely scattered throughout the western half of the easternmost peridotite mass. No definite trend of the ore bodies is apparent beyond the limits of the prospect pits.

### Metamorphic rocks

Distribution.--Several areas of metamorphic rocks, mainly amphibolite and quartzite, occur in the tract that was mapped. Two small areas, doubtless connected, lie on the ragged eastern edge; a small patch lies about a quarter of a mile east of Chrome camp; a larger one, which may be called the Chrome camp area, underlies Chrome camp and the valley to the south; and the margin of another area, of unknown extent, lies on the western slope of the west ridge. The different kinds of metamorphic rock are distributed in longitudinal bands, those of quartzite being especially well defined. This distribution indicates that the rocks were originally stratified. The amphibolites may be recrystallized lavas or volcanic sediments.

Lithology.--In the small area east of Chrome Ridge the exposures are poor, but these and the float show that three kinds of rock are present. The most abundant is a banded hornblende-feldspar diorite gneiss. A rock that is similar to this but that contains more hornblende, is finer-grained, and apparently is not schistose is exposed at one place. A cream-colored cherty quartzite was recognized by float only.

The most abundant rock in the Chrome camp area is a coarse-grained banded gneiss, which contains a little quartz but consists mainly of green hornblende and a feldspar that seems to be albite. On the weathered surface, well-formed crystals of hornblende stand forth in bold relief from a matrix of crushed and ill-formed grains of feldspar. The hornblende crystals in places have an alinement that cuts across the banding at an angle of less than  $5^{\circ}$ . A massive rather fine grained amphibolite composed of dark hornblende is associated with the gneiss and grades into it. All along the eastern margin of this Chrome camp area there is abundant float of thin-bedded quartzite but no outcrop.

The western area was studied only at the contact, where it consists of intergrading amphibolite and feldspar-hornblende gneiss.

Contact zones.--The metamorphism in these rocks is mainly regional and is nearly uniform except within a short distance of their contacts with peridotites. Near the contacts, intense igneous metamorphism has been superposed upon the regional metamorphism. The excellent exposures along the east side of the Chrome camp area show a sharp contact in a few places, but elsewhere thin bands of peridotite and country rock alternate in an indefinite zone about 250 feet in greatest width. The included country rock in many places is recrystallized to a very coarse grained mass of hornblende crystals, some of which are as much

as 2 inches in length. On the west contact of the area included fragments of hornblende-feldspar rock contain hornblende crystals as much as 4 inches in length. These crystals commonly lie at an angle with the schistosity that is due to regional metamorphism. Most of the contact along the western ridge is relatively sharp, although near the south end of the ridge the contact zone widens; some of the coarse hornblende rock is here exposed.

#### Ultrabasic intrusive rocks

Two areas of ultrabasic intrusive rocks, which may in general be called peridotites, are present in the district mapped. The main boundaries of the areas are elongated in a north-northeasterly direction, parallel to the banding in the adjacent metamorphic rocks, and the actual contacts, wherever they were seen, are parallel, or nearly so, to the banding in the metamorphic rocks. The ultrabasic intrusive bodies thus appear to be sill-like in general form. Topographically the ultrabasic masses stand out as prominent barren ridges, in sharp contrast to the subdued, brush-covered areas underlain by the metamorphic rocks. At least 95 percent of the ultrabasic mass is an olivine-pyroxene rock, in which the pyroxene appears to be enstatite, so that the rock is classed as saxonite. The proportion of olivine ranges from about 60 to nearly 100 percent, and some of the nearly pure olivine rock should be classed as dunite.

Saxonite.--On fresh fracture the saxonite is a mottled green. The dark cleavage faces of the enstatite stand out in sharp contrast with the lighter muddy green of the granular olivine and have the appearance of phenocrysts, although the crystal size of both minerals is about 2 or 3 millimeters. All the olivine is at least partly altered to serpentine, much of

it being completely replaced, and some of the enstatite is altered to a flaky pale translucent mineral. <sup>positively</sup> On the weathered surface the rock is fawn-colored and the pseudomorphs after enstatite are conspicuously lighter in color than the matrix.

East of Chrome Ridge the saxonite encloses many thin lenses, clots, or layers of dunite or of rock containing so little pyroxene that it might be classed as dunitic saxonite. West of Chrome Ridge pure olivine rock is relatively rare.

Dunite.--Most of the dunite is nearly black on fresh fracture, and its texture is obscure. The olivine is almost entirely altered to serpentine. Chromite, together with the chromium-poor spinel, picotite, is present as an accessory mineral; it is mostly disseminated but is locally concentrated in lenses.

Only a few of the areas of dunite are large enough to be mapped. On the west ridge is a well-defined dunitic layer within the saxonite, lying roughly parallel to the metamorphic-igneous contact. Most of the dunite appears to form clots, having gradational limits, in the saxonite. In the deep valley at the head of Briggs Creek there is an area of dunite, 600 feet wide and about 2,000 feet long, which trends about N. 40° W. The dunite is rather sharply separated from saxonite on the northeastern, southern, and western sides by shear zones. At its northwestern end it is in contact with hornblende schists, and its boundary here has a jagged course which would seem to be due at least partly to movement on faults of northwesterly strike. Fractures are closely spaced throughout this area, and weathered dunite fragments are rarely as much as 6 inches in diameter.

Dunite is characteristically the country rock of the disseminated chromite deposits, which are described later.

Structure.--The sill-like body of peridotite is believed, though hardly proved, to have been folded, together with the

metamorphic rocks, into a syncline whose axis trends northeastward through the middle of the largest area of serpentine, and it may also have been displaced by large longitudinal faults; but the verification of these beliefs must be left for the future.

The peridotite mass shows little internal structure. Some, but not all, of the dunite bodies are alined parallel to the contacts between metamorphic and igneous rocks. At a few places on the west ridge, near the contact with the metamorphic rocks, a streaky distribution of the pyroxene has been noted, but it appears to be very local. Chromitic streaks are common in the dunite lenses, and although these streaks are not uniformly oriented it is probable that before shearing they were essentially parallel to the dunite-saxonite boundaries. ★

Both the igneous bodies and the schist have been displaced by faults of northwesterly strike, best exposed along the west side of the west ridge, where each of several faults has displaced the schist-peridotite contact horizontally from 50 to 250 feet. In most places the southwest block has apparently moved relatively northwestward. This movement has produced shear-breccia zones from a few inches to a few hundred feet thick in the peridotite, along which serpentinization is prominent. Joints along which slight movement has probably taken place trend N.  $10^{\circ}$ - $30^{\circ}$  E. and N.  $70^{\circ}$ - $90^{\circ}$  E.

### Chromite deposits

#### General features

The chromite ores of the Briggs Creek area are of two general types. The most abundant type is in general of low grade; it consists mainly of disseminated grains in dunite, which is either fresh or, more commonly, altered to a mass of talc, chloritoid, and serpentine, though it contains higher-grade



streaks. It is from such ore that the greatest production is likely to be made. The other type, of higher grade, forms pods, kidneys, and irregular masses along shear zones, usually in areas mapped as saxonite, although the rock within and immediately surrounding the ore is always dunitite.

Eight samples of chromite-bearing material were carefully concentrated and the concentrates analyzed. The results are given in the following table.

Partial analyses of chromite in concentrates from Briggs Creek area, in percent

[K. J. Murata, analyst]

	LRP-34-39	LRP-35-39	LRP-36-39	LRP-37-39
Cr <sub>2</sub> O <sub>3</sub> .....	51.93	43.52	39.14	55.28
Fe <sub>2</sub> O <sub>3</sub> .....	18.35	15.50	21.41	13.59
FeO.....	4.27	6.79	.65	7.89
Ratio of concentration.	68.4	69.0	43.6	40.9
	LRP-38-39	LRP-39-39	LRP-42-39	LRP-43-39
Cr <sub>2</sub> O <sub>3</sub> .....	53.61	53.36	46.35	53.49
Fe <sub>2</sub> O <sub>3</sub> .....	15.46	16.27	22.54	14.60
FeO.....	3.65	6.47	7.95	6.40
Ratio of concentration.	62.5	70.5	1.2	35.5

LRP-34-39. Grab sample from dump, 400 feet northwest of group 4.

LRP-35-39. Grab sample from ore in place in first pit in group 8.

LRP-36-39. Grab sample from ore piles in group 5.

LRP-37-39. Grab sample from dump at pit 35 by 22 by 5 feet described under "Other prospects," representing a 6-foot width of banded and disseminated ore.

LRP-38-39. Grab sample across banding representing a 6-foot width of banded and disseminated ore. From west face of third pit from the south end of group 1.

LRP-39-39. Grab sample from dump. Largely massive chromite with some orbicular and banded ore.

LRP-42-39. Grab sample from dump on the east side of the westernmost adit in group 3, on the north side of Brush Creek.

LRP-43-39. Grab sample of all exposed ore in pits northeast of the quarter corner of secs. 11 and 14, group 2.

The chromite has a high chromic-oxide content, but the iron content also is high. The highest chromium-iron ratio is 2.4, the lowest 1.3. Chromite that assays over 50 percent of chromic oxide has a chromium-iron ratio of 2 or greater. From the analysis and the ratio of concentration it is calculated that the highest-grade ore, LRP-39-39, assayed 38 percent of chromic oxide and had a chromium-iron ratio of 2.

The chromite is believed to be an original constituent of dunite. Some, at least, of the high-grade pods and masses along shear zones in areas that are dominantly of saxonite have shells of dunite, and it is possible that all the chromite was originally in dunite but that subsequent shearing caused the higher-grade bands to be segmented and shaped into pods.

Although the chief chromium mineral is chromite, minor amounts of uvarovite and kaemmererite have been noted. These two minerals occur mainly in the higher-grade ores that have been sheared, but kaemmererite occurs also in sheared disseminated deposits.

The original trend of the layers and lenses rich in chromite has been obscured by strong shearing in a northeasterly direction, as a result of which the ore bodies are more or less isolated.

The disseminated, or low-grade, deposits will be described first, and then the kidney, or high-grade, deposits. The deposits in each class are described in order of importance so far as it can be judged from present developments. The location of each deposit or group of deposits is indicated by a circle around an index number on the map (pl. 71).

#### Low-grade deposits

Group 1.--The largest and best-prospected body of low-grade, mainly disseminated chromite ore lies east of the upper

end of Chrome Road. A detailed map of the workings in this deposit was made with plane table and alidade. (See fig. 69).

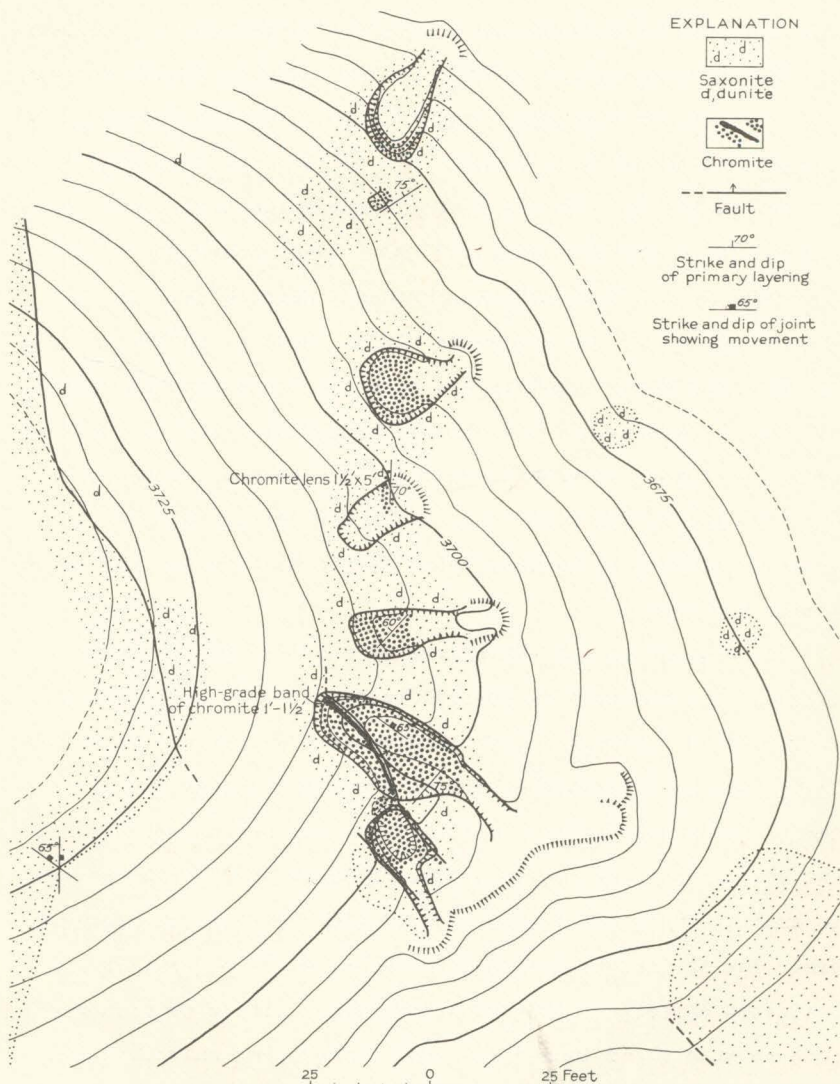


Figure 69.--Sketch map of group 1, Briggs Creek area.

Six pits and one caved adit cross the apparent trend of the ore body. These show much ore in an area 320 feet long from north to south and 25 feet wide, but the showings hardly prove a continuous ore body of these dimensions. In one pit only one kidney of chromite, 5 feet by 15 inches, was exposed

along a fissure. The entire area may be in a shear zone, the western limit of which is indicated in figure 69, and the ore body may thus be essentially a steplike series of fault blocks. The diversity of strike and dip in the chromite layers is probably a result of shearing. The strike of the ore layers in the three southernmost pits is about N.  $40^{\circ}$  E.; the dips range from  $75^{\circ}$  SE. to  $60^{\circ}$  NW. In the next pit north the ore strikes north and dips about  $70^{\circ}$  SE., being nearly parallel to a strong fissure that strikes north and dips  $50^{\circ}$  E. In the pits to the north the ore bands strike about N.  $55^{\circ}$  E. and dip  $75^{\circ}$  NW. All these readings are based on incomplete exposures, but they indicate that the ore, which probably had an original northeast trend, is much disturbed. The general northerly trend of the entire zone is probably due to faults of northwesterly strike, on each of which the north side shifted relatively westward.

The country rock of this area is somewhat serpentinized dunite. The chromite is partly disseminated in grains one-sixteenth to one-eighth inch in diameter, partly concentrated in high-grade layers from half an inch to 6 inches in thickness. These layers contain from 70 to 100 percent of chromite, but the average ore has an estimated tenor of 30 or 35 percent. In much of this area a zone 15 feet wide consists of high-grade ore. The ore grades into dunite containing 1 percent of disseminated chromite. The two southernmost pits show high-grade pods as much as 15 inches wide and 6 feet long which, though located along fissures, have not been crushed and disintegrated by shearing. This ore is similar to that in the lens noted in the pit fourth from the southern end of this group and resembles some of the kidney ores.

The dumps and ore piles contain 50 to 75 tons of ore estimated to contain more than 60 percent of chromite and at least

as much more that would average between 10 and 30 percent. To estimate the reserves is very difficult because of the effects of shearing, but it is believed that these pits have proved about 4,000 to 5,000 tons of 30-percent ore. This estimate is based on the assumption that the minable ore is 15 feet wide. About one-third of this band would be high-grade ore containing over 75 percent of chromite. Because of the shearing of the ore, any reasonable estimate of the depth to which it may extend is impossible. Analyses LRP-38-39 and LRP-39-39 (p. 483) are of the chromite from this area.

Group 2.--East of the quarter corner on the north line of section 14 (see fig. 70) four pits and trenches have exposed a block of ore 40 by 65 feet to a depth of about 8 feet. These, like the previously described pits, are in dunite faulted against saxonite. The showings indicate at least 2,000 tons of ore containing 20 to 30 percent of chromite, and 2,000 tons more may be present. The shearing and dislocation of the ore body have obscured the extent of the ore in depth. Surface indications suggest that the ore probably does not extend horizontally much beyond the exposures in the pits.

The ore piles contain 20 to 30 tons, which average between 25 and 30 percent of chromite as a whole but include 3 or 4 tons containing 40 to 60 percent of chromite. Disseminated chromite that has not been prospected was noted to the north (see pl. 71). Another exposure to the southwest has been explored by a pit 6 feet by 2 feet, which reveals a 12-inch band of 40-percent chromite in dunite.

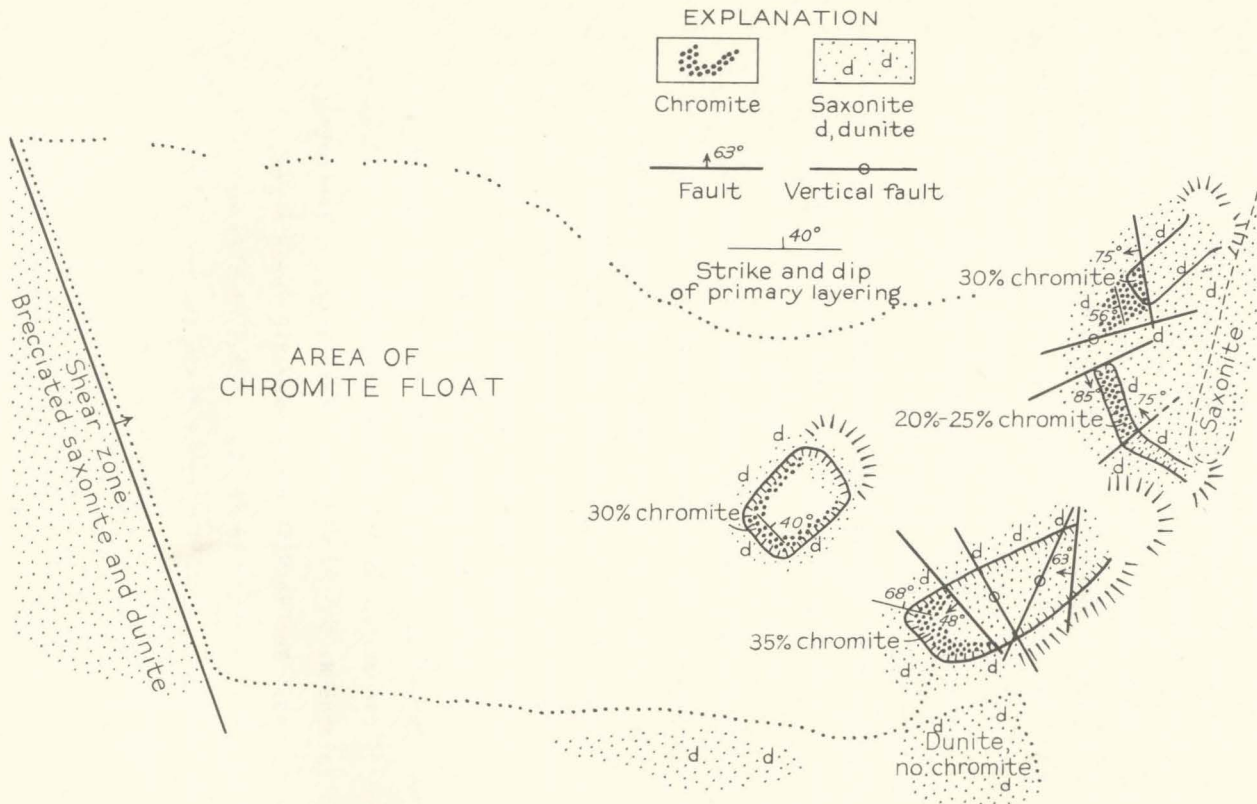


Figure 70.--Sketch map of group 2, Briggs Creek area.

Group 3.--Three pits and two adits, one of which is caved, on the north side of Brush Creek and below Chrome Road, show disseminated and banded chromite in a large body of dunite. Scattered crystals of chromite are common in the dunite and in places make up about 5 percent of the rock. A sample obtained from the dump at the adit represents a similar very low grade ore. It is exposed along the entire length of the adit, which extends  $30^{\circ}$  E. for 36 feet.

The dunite is cut by fractures 1 to 4 inches apart. The adit follows well-developed fissures, which strike N.  $30^{\circ}$  E. and dip  $85^{\circ}$  E. These fissures are crossed by several others that strike N.  $10^{\circ}$  W. and dip  $60^{\circ}$  SW. and by a few that strike N.  $20^{\circ}$  W. and dip  $70^{\circ}$  SW. This adit was evidently driven to intersect the high-grade ore exposed in the pit 20 feet uphill but did not extend far enough to reach the ore body.

Ore dumps at this pit above the adit show 20 to 30 tons of ore containing 85 or 90 percent of chromite, taken from a high-grade layer 3 feet thick striking east of north. No definite direction of trend could be determined because of shearing on planes that strike N.  $30^{\circ}$  E. and dip  $80^{\circ}$  SE., but the general trend of the workings along this band is N.  $50^{\circ}$  E. Thinner layers of ore strike N.  $38^{\circ}$  E. and dip  $55^{\circ}$  SE. across the pit, which extends N.  $10^{\circ}$  E. and is 25 feet long, 10 feet wide, and 10 feet deep. The richest ore apparently forms a pod, which has been sheared. On either side of the high-grade ore there is 18 inches of 30- to 60-percent chromite, and the enclosing country rock contains about one-half of 1 percent of disseminated chromite. A streak 6 to 7 feet wide contains between 60 and 70 percent of chromite. Present developments indicate between 100 and 300 tons of 60-percent ore.

A pit farther west, extending N.  $70^{\circ}$  W., is 15 feet long, 8 feet wide, and 5 feet deep and gives an exposure, 15 feet

long and 3 feet high, of 10- to 20-percent disseminated and banded ore striking north and dipping  $80^{\circ}$  E. This includes a band of 40-percent ore. Prominent fissures strike N.  $30^{\circ}$  W. and dip  $90^{\circ}$ . The ore pile shows 5 tons of 30-percent ore.

To the west a pit 18 by 10 by 5 feet, with its long dimension extending N.  $80^{\circ}$  W., shows a 12-inch band of 80-percent chromite striking N.  $30^{\circ}$  W. and dipping  $40^{\circ}$  NE. This band is truncated by a fissure trending N.  $80^{\circ}$  E., which brings very low grade rock, containing about one-half of 1 percent, into contact with the high-grade chromite. Below the high-grade band is 3 feet of 5- to 10-percent ore. Well-developed shear planes strike N.  $55^{\circ}$  W. and dip  $65^{\circ}$  SW.; others strike N.  $30^{\circ}$  E. and dip  $80^{\circ}$  SE. The ore piles show between 5 and 7 tons of 80-percent disseminated ore.

The caved adit, east of the adit previously described, evidently was mainly in low-grade ore, although a little high-grade material is exposed near the portal. The relation of this high-grade band to that in the pits is not clear.

The workings in this group have uncovered more high-grade ore than other prospects in which the ore is mainly of the disseminated type, but it is too highly sheared and brecciated to allow an accurate estimate of reserves. Judged from present exposures, this group of prospects is not quite so promising as groups 1 and 2.

Group 4.--Southwestward across the head of Brush Creek from group 3 are three pits that expose similar ore. The lowermost and largest consists of two trenches 25 feet long, which intersect to form a V pointing up the hill. It is badly caved and shows no ore in place, but on the dump is 7 or 8 tons of ore containing 60 to 70 percent of chromite. This ore is in part banded, in part disseminated, and the country rock is dunite and dunitic saxonite. The main fissures fall into two systems,



one striking N. 35° W. and dipping 80° NE., the other striking north and dipping 55° E.

The pit above and to the east of this one is about 25 feet long and 15 feet wide and shows 5 feet of disseminated and streaked ore. One thin band of chromite strikes east and dips 50° N. The main fissures strike N. 45° W. and dip 70° NE., although one striking N. 70° E. and dipping 70° SE. is prominent.

The other pit of this group, elongated in a N. 40° E. direction, is 16 by 10 by 10 feet; it exposes banded, disseminated, and orbicular ore that apparently trends north and dips 80° W. The ore is cut by strong joints, of which some strike N. 40° E. and dip 50° E. and others strike N. 70° E. and dip 80° NW.

Other prospects.--Several other pits, scattered throughout the area, reveal only small quantities of disseminated ore containing as much as 20 to 35 percent of chromite, but they deserve mention as evidence of the widespread distribution of ore of this type.

East of group 4 and 35 feet north of the dunite-saxonite contact, a small pit, 6 by 1 by 2 feet, shows scattered grains of chromite, one-fourth to three-eighths inch in diameter, and orbicular masses in green massive serpentine. An obscure banding here strikes N. 45° E. and dips 50° SE. Most of the dunite exposures in this area show one-half of 1 percent of chromite.

A shallow pit, 35 by 22 by 5 feet, extending N. 20° E., is located on the south side of the ridge south of the head of Brush Creek. Slumping has covered the ore body, but piles of ore show 3 or 4 tons of 70-percent chromite ore and between 20 and 35 tons of 30-percent banded and disseminated chromite ore.

Two small pits located near the intersection of Chrome Road with the trail to Chrome camp show disseminated crystals as much as half an inch across and larger aggregates. These have been brecciated and the fractures in them filled with serpentine. This ore averages 5 to 10 percent of chromite.

## High-grade deposits

Group 5.--The largest of the high-grade deposits (see fig. 71) is on the east side of Chrome Road at the head of Brush Creek. Almost no chromite was seen in place, but from workings

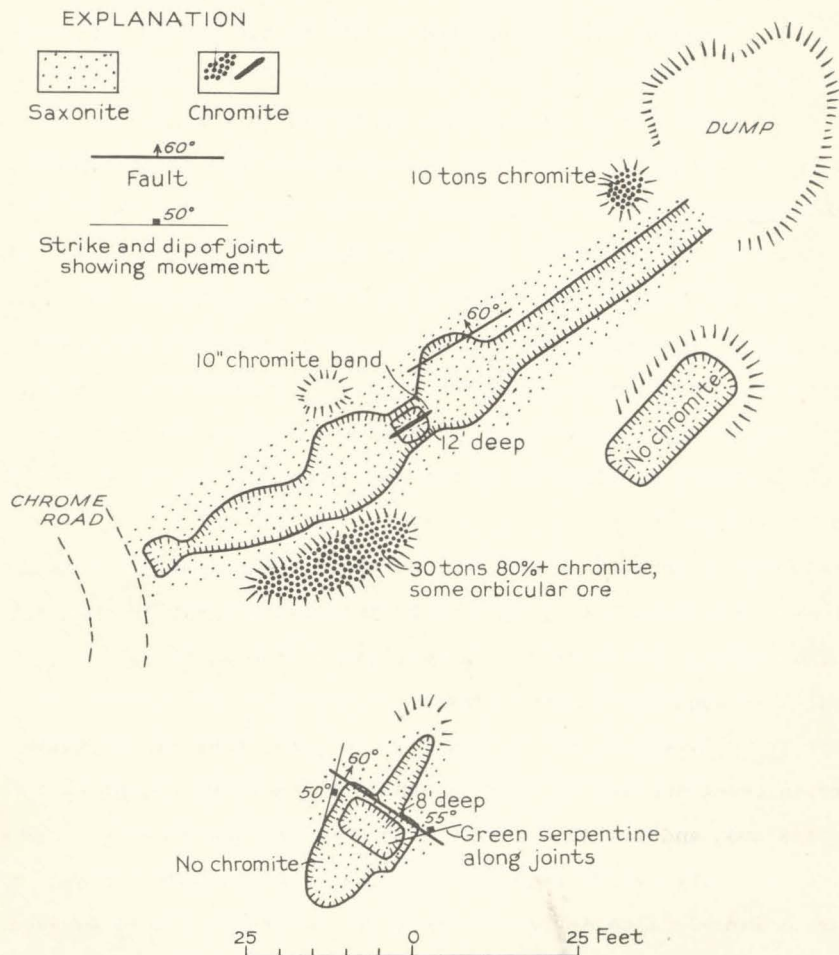


Figure 71.--Sketch map of group 5, Briggs Creek area.

and ore on the dump it is evident that this is the kidney type of deposit and that the ore masses are irregular in shape and distribution. It is estimated that this dump contains between 35 and 40 tons of high-grade orbicular chromite with occasional pieces of disseminated ore. Chrome chlorite is abundant and

occurs, with serpentine, along fissures in the saxonite country rock. A light greenish-yellow serpentine surrounds the chromite in the orbicular ore.

Two other small pits to the southeast show no ore, either exposed or on the dumps.

Group 6.--A pit 40 feet long, 10 feet wide, and 5 feet deep, just north of the trail to Ferren Guard Station shows high-grade ore on the dump but no chromite in place. Chrome garnet and chlorite are fairly abundant. The trench extends N. 20° W., apparently parallel to a shear zone. Well-developed joints strike N. 10° W. and dip 40° NE.

Group 7.--A group of five pits near the southwest corner of the area mapped shows a little kidney ore along fissures that strike N. 65° E. and dip 80° S. and along others that strike N. 35° W. and dip 70° SW., but it shows no ore along other fissures that strike N. 15° W. and in some other directions. These pits are not far from two pits that show disseminated and banded ore, containing 60 to 70 percent of chromite, in a band that trends N. 30° W. and dips 30° SW. It is possible that the kidney type of ore noted in this area was formed by shearing and displacement of banded ore.

Group 8.--A pit east of Chrome Road, about halfway between Brush Creek and group 6, exposes 8 to 10 tons of good high-grade ore, and its dump contains 20 tons of 5-percent chromite ore. The pit is 15 feet long, 10 feet wide and 8 feet deep. A small wedge-shaped drift extends N. 10° W. for 10 feet, suggesting that a large kidney of ore was removed. A layer of ore that strikes N. 20° W. and dips 70° NE. is exposed in the pit for a length of 10 feet. It contains lenticular masses of chromite, which are 1 to 3 feet long and have an average thickness of 10 inches and a maximum thickness of 2 feet. Serpentine slip-surfaces are abundant, and the character of the ore

suggests that the lenses were produced by shearing of banded chromite in dunite. Talcose serpentine gangue is characteristic of this body. Chromite float may be followed northward along the strike of this ore body for 100 feet.

A small pit, 6 by 1 by 3 feet, to the northeast of the one just described shows narrow bands of 60- to 70-percent chromite. The ore is granular and is in a gangue of talc and serpentine. Surface exposures show a zone 3 feet wide trending N.  $20^{\circ}$  E. for 20 feet but faulted on the north against saxonite by a fault that strikes N.  $15^{\circ}$  W. and dips  $80^{\circ}$  NE. This 3-foot zone would probably average 30 percent of chromite or less.

Group 9.--Four trenches lie about 1,000 feet southeast of Chrome camp. One extends N.  $52^{\circ}$  W. and is 45 feet long, 5 feet wide, and 4 feet deep; one extends N.  $15^{\circ}$  W. and is 60 by 5 by 4 feet; the other two extend N.  $20^{\circ}$  W.; one is 17 by 4 by 4 feet, and the other is 6 by 2 by 2 feet. A little ore was seen on the dumps of the two smaller trenches.

Group 10.--At an altitude of 4,010 feet on Chrome Ridge a pit extending N.  $75^{\circ}$  W., 12 feet long, 10 feet wide, and 3 feet deep, shows pods about a foot thick, of high-grade ore, enclosing a little chromium garnet, in shear zones that strike N.  $75^{\circ}$  W. and dip  $50^{\circ}$  N. These bodies are cut by north-south fissures.

Other prospects.--On the east side of Chrome Road and south of Brush Creek are nine scattered prospects, containing high-grade ore, that are not in any of the areas described.

At an altitude of 3,930 feet, a little west of group 8, are two trenches: the one to the northwest extends N.  $30^{\circ}$  W., and is 18 feet long, 5 feet wide, and 2 feet deep; the other extends N.  $50^{\circ}$  W. and is 17 by 9 by 4 feet. In the former a 12-inch layer dipping  $70^{\circ}$ - $90^{\circ}$  NE. and containing 25 percent of chromite is exposed for 5 feet along the pit. About 150 pounds

of granular ore, containing 80 to 90 percent of chromite in a gangue of talc and kaemmererite, has been taken out. There are no exposures in the other pit, but the dump has 2 tons of high-grade ore.

Some 200 feet farther northeast, at an altitude of 3,960 feet, a pit extending N.  $10^{\circ}$  E., 15 feet long, 10 feet wide, and 6 feet deep supplied one ton of ore containing 50 or 60 percent of chromite in a gangue of serpentized dunite.

About 200 feet south of these pits and at an altitude of 3,915 feet, a trench extending N.  $10^{\circ}$  W. and 15 by 7 by 3 feet in dimensions was dug in serpentized saxonite but revealed no ore.

Four hundred feet northwest of group 8, at a 3,960-foot altitude, a U-shaped pit, extending for 10 feet along fissures that strike N.  $30^{\circ}$  W. and N.  $5^{\circ}$  E., shows banded ore striking N.  $27^{\circ}$  W. and dipping  $25^{\circ}$  NE. Most of the ore is in small lenses along fissures. On the dump are between 3 and 9 tons of ore containing 80 to 90 percent of massive granular chromite in a gangue of serpentine and talc.

Three other small prospects, each about 6 feet long, 3 feet wide, and 2 feet deep, lie at the head of the valley, north of group 8. In one pit small lenses of chromite lie along fissures that strike N.  $27^{\circ}$  W. and dip  $60^{\circ}$  SW. The ore is granular and has a gangue of talc, serpentine, and kaemmererite.

Two other small pits, one in section 23 and south of the area mapped, on the north edge of the valley of Briggs Creek, and the other extending N.  $25^{\circ}$  W., 15 feet long, 5 feet wide, and 4 feet deep, between it and Chrome Road, show disseminated ore along shear surfaces.

## Reserves

The widely scattered deposits of this area give an over-favorable impression of the size and value of the chromite deposits. Prospecting of high-grade lenses near the surface give the impression that considerable ore is available, but the individual masses of ore thus revealed are small.

No large tonnage of disseminated ore assaying between 10 and 20 percent of chromic oxide, such as would clearly be worth concentrating, has been exposed by present development. Although the bodies of disseminated ore may have considerable vertical and horizontal extent and further trenching may indicate much larger tonnages than are now visible, the shearing of all such deposits in this area make them difficult to prospect and to mine.

If milling practice is developed that will make 1- or 2-percent ore profitable, the large dunite area in Brush Creek Valley might repay more detailed exploration.

