MANGANESE DEPOSITS
OF SOUTHWESTERN OREGON

BY RICHARD N. APPLING, JR.

United States Department of the Interior—February 1958
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Report of Investigations 5369

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by

Richard N. Appling, Jr. 1/ 2/

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1/ Mining engineer, Bureau of Mines, Region I, Spokane, Wash.
2/ In preparing this report, the author was assisted by E. C. Pattee, mining engineer, Bureau of Mines, Region I, Spokane, Wash.
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SUMMARY AND INTRODUCTION

This compilation presents information obtained through investigation of manganese deposits and a reconnaissance of potential manganese-bearing areas of southwestern Oregon and Del Norte County, Calif., from October 1952 to September 1955. The report includes maps, assays, and preliminary examination data on 39 manganese deposits distributed throughout Curry, Coos, Douglas, Josephine, and Jackson Counties, Oreg., and 1 deposit in Del Norte County, Calif.

On the basis of mineral content the deposits can be divided into three groups: Manganese silicate deposits, manganese oxide deposits, and manganiferous iron deposits. Generally the oxides occur along the coast in the Curry-Coos County area, the manganiferous iron deposits are in the Josephine-Douglas area, and the manganese silicates are found in both the Josephine-Douglas and Jackson County areas. The deposits are characteristically irregular in form and usually small. Most silicate and manganiferous iron deposits are in metasediments of Triassic (?) age; oxide deposits are in sediments varying in age from Jurassic to Eocene.

ACKNOWLEDGMENTS

Most of the fieldwork upon which this report is based was part of an investigation of the mineral resources of southwestern Oregon conducted under a cooperative agreement between the California-Oregon Power Co. and the Bureau of Mines.

The cooperation and assistance of the Oregon Department of Geology and Mineral Industries, represented by David J. White, field geologist, are gratefully acknowledged.

GEOGRAPHY

Physical Features

Southwestern Oregon is bounded on the west by the Pacific Ocean and on the east by the Cascade Mountains. The southern boundary is the California-Oregon State line, and the northern boundary is an indefinite line trending westward in the vicinity of Roseburg.

The topography is rugged and diverse, with high mountains, dissected plateaus, narrow valleys, and several moderate-size valleys suitable for farming. There are two mountain groups within the region - the Coast Mountains, a north-trending range near the Oregon coastline, and the Klamath Mountains, which lie between the Coast Range and the Cascade Range near the California-Oregon line.

Principal drainage is by the Rogue River, which heads in the Cascade Mountains and follows a winding course westward to the ocean. Major tributaries are the Illinois and Applegate Rivers. Short coastal streams and small tributaries of the Umpqua and Coquille Rivers also drain the area.
Transportation

Southwestern Oregon is served by a main line of the Southern Pacific Railroad extending south from Portland through Roseburg, Grants Pass, and Medford and across the Klamath Mountains to points in California (fig. 1). A branch line from the north terminates at Myrtle Point, Oreg., and a branch line from the south terminates at Trinidad, north of Eureka.

Major highway transportation is by U. S. Highway 99, a north-trending highway connecting towns in the central part of the area with points in California and northern Oregon. U. S. Highway 101, which closely follows the coastline, is principally a scenic route and is not well suited for heavy commercial use.

Two highways traverse the area between U. S. Highway 99 and the coast - U. S. Highway 199, connecting Grants Pass, Oreg., and Crescent City, Calif., and State Highway 42, connecting Roseburg with Coquille, a small coast town. Between these highways an area of nearly 3,500 square miles is accessible principally by unimproved roads or foot trails. Several State highways extend from U. S. Highway 99 to points east of the Cascade Mountains.

Industries and Labor Supply

Logging (as well as the manufacture of lumber and lumber products), and agriculture are the principal industries in southwestern Oregon. Some gold mining has been carried out in the past but is inactive at present. Chromite prospecting and small-scale mining are conducted as a result of a Federal Government stockpiling program.

The area is not heavily populated, but the labor supply is adequate for small or moderate-size operations. Because of the seasonal nature of the principal industries, it is easier to recruit workers during the winter than in the summer. Very few experienced miners are available.

Climate

The climate is a humid, marine type, characterized by moderate temperatures, winter rains, and summer drought. Temperatures are seldom higher than 100° F. or lower than 32° F., except on higher mountains where winter temperatures are often below freezing. Rainfall ranges between 30 to 60 inches annually at most inland points and is up to 80 inches along the coast. An occasional 1- or 2-inch snowfall in the lowlands melts in a few days; snowfall in the mountains may aggregate 5 to 8 feet during the season. Many mineral prospects are above 3,000 feet in elevation, where operations would be hampered by snow.

The area is timbered with several species of conifer and some hardwoods. Prospecting is difficult because of the dense underbrush and deep mantle of soil.

GENERAL GEOLOGY

The geology of the region is discussed in publications by the Federal Geological Survey and the Oregon Department of Geology and Mineral Industries. These publications are cited at appropriate places throughout the report. Briefly, the principal rock types are metavolcanic and metasedimentary rocks of Triassic (?) age, interbedded sediments and volcanics of the Jurassic Dothan and Galice formations, and middle and upper Mesozoic intrusions of serpentine, peridotite, gabbro, granodiorite,
Figure 1. - Manganese prospects of southwest Oregon.
hornblende diorite, and granite. The eastern quarter of the area is blanketed by Tertiary lavas from the Cascade slopes.

For the most part the older layered rocks exhibit extensive, often isoclinal, folding. A number of major, usually high-angle, reverse faults have been mapped, and a multitude of minor faults and extensive jointing are noted in nearly all formations. Regionally the formations have a well-defined north-northeast trend, with predominantly steep dips eastward.

Manganese deposits in the area are of three types on the basis of predominant mineral composition: Silicate deposits, composed of rhodonite and quartz; deposits of mixed manganese oxides; and deposits of mixed manganese and iron minerals, herein termed manganiferous iron deposits. The silicate deposits usually are superficially altered to manganese oxide.

The oxide deposits occur predominantly in sedimentary formations, and the rhodonite deposits occur in quartzites and quartz schists presumed to be derived from sedimentary formations. This occurrence suggests a possible sedimentary origin for both types, with rhodonite formed later as a product of metamorphism. The manganiferous iron deposits are apparently similar to the silicate deposits in origin and occurrence.

In general, this investigation has shown that the deposits of manganese oxide and manganese silicate are characteristically small, irregular, and discontinuous and that the manganiferous iron deposits, while low grade, are larger and somewhat more regular in occurrence. The deposits generally average less than 20 percent Mn and 25 to 50 percent SiO₂. This type of material is not acceptable for ordinary commercial processing; however, recent Bureau of Mines research has demonstrated that high-silica, low-grade ore can be smelted, using certain electrosmelting methods. The deposits may therefore be utilized in the future.

CURRY-COOS COUNTY AREA

Physical Features

Curry is the most inaccessible of the three counties of southwestern Oregon (Curry, Josephine, and Jackson) and contains some of the most rugged mountains. Slopes are often precipitous and usually are covered with a dense growth of tough underbrush that is difficult to penetrate. These factors, with a normally deep overburden, are severe handicaps to prospecting.

The means of access, physical features, and geology of south Coos County are similar to those in Curry County. Five Coos County deposits (the Guerin, Rookard, McAdams, Leep, and Fitzgerald) are near the Curry County line.

Access

Curry County has one highway (U. S. 101), which traverses the county from north to south, closely following the coastline. Several towns of 1,000 to 2,000 persons are situated along the highway. A number of dirt roads provide access a short

distance inland, but for the most part the central and eastern parts of the county can be reached only on foot or horseback. Because of the extremely dense underbrush, horses or pack animals are useful only on well-maintained Forest Service trails.

Geology

Geologically the area is composed of sediments of the Jurassic Dothan and Knoxville, the Cretaceous Paskenta, and the Eocene Arago formations, with intrusions of wholly or partly serpentinized peridotite.

Known manganese deposits in the area are separated widely. The majority are deposits of oxides occurring as nodules in chert and as stain on fracture surfaces. Little rhodonite is present; however, several deposits consist of neotocite, a hydrous manganese silicate believed to be altered from rhodonite. The total production of manganese ore from the area is probably less than 250 tons (table 1).

TABLE 1. - Location, production, and ownership of Curry-Coos County area deposits

<table>
<thead>
<tr>
<th>Name</th>
<th>Location 1/</th>
<th>Production</th>
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<th>Owner</th>
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<td>Black Bear</td>
<td>W1/2 sec. 13, T. 41 S., R. 11 W.</td>
<td>One shipment; amount unknown.</td>
<td>2 claims</td>
<td>Harry Benick</td>
<td>Crescent City, Calif.</td>
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<td>Fitzgerald</td>
<td>Sec. 26, T. 33 S., R. 12 W.</td>
<td>do.</td>
<td>10 claims</td>
<td>Stanley Fitzgerald</td>
<td>Coquille, Oreg.</td>
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<tr>
<td>Leep</td>
<td>NW1/4 sec. 24, T. 33 S., R. 12 W.</td>
<td>do.</td>
<td>1 claim</td>
<td>Gene Leep</td>
<td>Do.</td>
</tr>
<tr>
<td>Rookard</td>
<td>NE1/4 sec. 33, T. 29 S., R. 11 W.</td>
<td>None</td>
<td>do.</td>
<td>R. R. Jefferson</td>
<td>Myrtle Point, Oreg.</td>
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1/ Willamette Meridian.

Deposits

Black Bear Prospect

Access to the Black Bear prospect, Curry County, is by the Wimer road and Sourdough Camp road. The Wimer road begins at O'Brien, a small community on U. S. Highway 199, 40 miles from Grants Pass. The deposit is 30 miles from O'Brien.

Elevation at the property is 1,140 feet; relief in the vicinity is moderate. Higher elevations and more mountainous terrain are crossed by the Wimer road, which normally is inaccessible during the winter.
The property was first opened during World War I by a 30-foot adit and a number of test pits. Part of the old workings was rehabilitated during World War II, and a shipment was made to the Metals Reserve Company depot in Grants Pass. The shipment was rejected as not meeting specifications.

The manganese occurs as mixed oxides in veinlets and poorly defined fracture fillings in a lens of chert. Occasional high-grade boulders up to 10 inches in diameter are found.

The area was mapped as the Jurassic Dothan formation, a group of sandstone and shales containing chert lenses. Here the Dothan is a narrow, southeast-trending body bounded on the east and west by peridotite more or less altered to serpentine. Manganese oxides are erratically distributed in a zone of brecciation striking about N. 75° E. and dipping south at a moderate angle. Distinct stringers of oxides within the zone strike north to northeast and dip 40° to 50° eastward.

The chert host rock varies from white and pink to a reddish-purple variety that is especially hard and dense. In the manganiferous zone the chert is gray, somewhat porous, and comparatively soft. The manganese oxide at this deposit seems to be associated with the white chert but not with the colored varieties, in contrast to other coastal deposits where the ore minerals are found with red chert but not with white.

Post-World War II development consists principally of a bulldozer trench 75 feet long and a maximum of 15 feet deep, crossing the manganiferous zone approximately at a right angle to the strike. The zone is exposed for a width of 45 feet and a length of 30 feet.

A shallow pit on the ridge crest about 1,000 feet northeast and 300 feet above the main trench contains concentrations of manganese oxide in the spongy crust produced by weathering. The chert is similar in appearance to the crushed material in the main trench.

A partial analysis of a 6-foot channel through a manganese oxide-stained chert band assayed 17.6 percent Mn, 1.76 percent Fe, and 60.2 percent SiO₂. A grab sample of high-grade oxides assayed 49.2 percent Mn, 1.05 percent Fe, and 12.9 percent SiO₂.

Colegrove Prospect

The Colegrove deposit is on the north bank of the South Fork of Whalehead Creek in Curry County. Access from the nearest town, Brookings, is by way of U. S. Highway 101 and a 1.5-mile jeep trail. The total distance from Brookings is 9 miles. The jeep trail is inaccessible during the winter.

A small amount of bulldozer trenching was completed in the spring of 1941. The deposit was explored further by trenching and construction of logging roads in the summer of 1953.

Two small areas of manganese oxides and one of manganiferous chert occur in two lenses of chert near their contact with a gray, coarse-grained sandstone of probable Jurassic age. The sandstone strikes northeast and dips steeply westward in the vicinity of the deposit. It becomes more argillaceous to the east and west. Basalt crops out nearby.

The chert is thinbedded and reddish brown or locally gray. The layers are 1/2 to 5 inches thick and cut by white quartz veinlets up to 1/2 inch wide. The chert strikes N. 50° - 53° C. The south lens dips 56° W. and the north lens 42° W.

Manganese oxides occur in fractures in the sandstone footwall of the east side of the large lens. Also limonite occurs abundantly in the fractures. The oxides extend into the footwall for 19 feet and are exposed to a depth of 13 feet and for 28 feet along the strike. A possible eastward extension of the oxides is limited to a few feet by the South Fork of Whalehead Creek. The deposit is obscured by overburden a few feet to the west.

A little manganese oxide is exposed in a pit at the north edge of the small lens (fig. 2). Barren trenches a few feet north and east indicate that the oxides do not extend far in those directions, and a gulley limits extension to the west. Outcrops of chert a few feet southward are barren.

A light-brown manganiferous chert occurs in the footwall at the west edge of the large lens. The material is similar to ordinary chert in appearance, except that oxidized surfaces contain heavier manganese oxide stains. A grab sample assayed 14.9 percent manganese. The exposed width is 7 feet, and the depth is 10 feet. Possible extensions are obscured by overburden on the north and east.

Fitzgerald Prospect

The Fitzgerald prospect is approximately 300 feet above the north side of Rock Creek in Coos County. Access is from the town of Powers on the Powers-Agness road to a point 18 miles south. From this point a steep, unimproved road 4 miles long extends to the deposit. The Powers-Agness road is graveled and accessible all year; the access road is usually passable only to four-wheel-drive vehicles during the wet season.

The deposit is in siltstone of the Cretaceous Paskenta formation. The sediments contact serpentine approximately 100 feet west of the deposit.

The deposit is a lens of green chert with intermixed manganese oxides. The chert parallels the bedding planes of a black shale that strikes N. 10° E. and dips 60° W. The chert is altered to a depth of 3 inches on exposed surfaces to the oxides of manganese and iron.

The lens is exposed by a bulldozer cut on the steep bank of Rock Creek for a length of 30 feet, a depth of 30 feet, and a width of 7 feet. Possible extensions are obscured by overburden to the north and south.

A grab sample assayed 7.25 percent Mn.

Figure 2. - Colegrove prospect, Curry County, Oreg.
Guerin Prospect

The prospect is 3 miles southwest of Myrtle Point and about 1,500 feet north of State Highway 42 in Coos County.

The deposit has been prospected for a number of years. The first systematic exploration was begun in 1942 with completion of a 130-foot adit. No ore was found, and the option was relinquished. No work has been done since that time. All workings are caved and inaccessible.

Country rock is the Jurassic Knoxville formation; a group of shales, interbedded sandstones, and chert lenses.

Manganese oxides occur as stain on fractures in the chert. An area of about 30,000 square feet contains abundant manganese oxide-stained chert float. Five prospect pits within the chert lens have exposed oxides concentrated in fractures. The manganiferous zone trends north for a length of 230 feet and a width of 100 feet. Although the deposit occasionally contains small amounts of fair-grade manganese oxides, in general it is very low grade.

Leep Prospect

The Leep prospect is in Coos County, 1.5 miles north of the Fitzgerald prospect, by unimproved road.

Two zones of manganese oxide-bearing chert are exposed in road cuts 500 feet apart (see fig. 3). One zone is small; the other is of moderate size. Both are very low grade.

A 50-foot adit at the west exposure was completed in 1918 by gold prospectors. The east exposure was discovered during construction of the access road in 1950.

The country rock is sandstone of the Cretaceous Paskenta formation. At both zones manganese oxide occurs in chert lenses that parallel bedding planes in the sandstone. The easternmost lens strikes N. 20° W. and dips 59° to 68° W. It is 85 feet long and 25 feet wide. It is composed of layers of gray chert 1 to 4 inches thick and is fractured both parallel to and normal to the bedding plane. The lens is faulted off on the north and south ends, and drag folds near the center indicate that the north end has been displaced a few feet to the east.

Manganese oxides occur as stain along the fractures and as fracture fillings. Some limonite and hematite occur along the fractures but are not as prominent as the manganese minerals. A small amount of disseminated pyrite was found with manganese oxide in surface debris, but none was found in place.

Float indicates that other mineralized lenses may occur a few feet westward. A barren chert lens similar to the one described above occurs a few feet to the north.

The west zone is composed of several chert lenses, varying in strike from N. 7° W. to N. 37° W., with a dip of 62° to 84° W. It is exposed by a bulldozer trench for more than 900 feet, with an indicated width of 80 feet. The trench approximately parallels the strike of the chert. The lenses are 5 to 15 feet wide and composed of chert layers 1 to 4 inches thick. Manganese oxides occur as a stain along fractures and as fracture fillings in sandstone and chert.
Extension of the zone on the north and south is limited to a few hundred feet. Float indicates other manganiferous lenses or zones to the east.

One grab sample representative of 600 feet of the bulldozer trench assayed 2.1 percent manganese and 11.8 percent iron.

**Long Ridge Prospect**

Access to this prospect in Curry County is by the Long Ridge road from Brookings to a point 0.3 mile east of the Long Ridge lookout station, a total distance of 26.7 miles, then by the access road to the deposit, 1.7 miles from the Long Ridge road. The Long Ridge road is passable all year, except during heavy rains. The access road is impassable to conventional vehicles during the winter.

Manganese oxides occur as a stain on the fracture surfaces of two chert lenses in sandstone, as a thin layer on the north side of the lenses, and as erratically distributed pods throughout the lenses.

It was reported that 50 tons of ore was mined from this property during World War II. Final disposition of the ore is not known. Approximately 30 tons of ore has been mined and stockpiled by the present owner.

The country rock is a light-brown, coarse-grained sandstone of Jurassic age, containing gray-chert lenses that parallel the bedding. Small, disconnected veinlets of white quartz up to one-half inch wide occur in both the sandstone and chert.

A chert lens with an indicated length of 135 feet and width of 60 feet is exposed near the south end of the deposit (fig. 4). Fractures on the northeast side of the lens are heavily stained with manganese oxide, and a 4-inch layer of oxides separates the chert and sandstone.

A smaller lens about 30 feet long and 18 feet wide is several hundred feet to the north. Mineralization is similar to that of the larger lens, with manganese oxide stain on fractures on the north side and a 2- to 4-inch layer of oxides at the chert-sandstone contact. Manganese oxide pods, weighing from a few pounds to 6 tons, are erratically distributed throughout both chert lenses. The larger pods have a hard core that in one instance proved to be rhodonite.

A grab sample from the 30-ton stockpile assayed 52.5 percent Mn and 1.3 percent Fe.

**McAdams Prospect**

The McAdams prospect is on a small tributary to Bethel Creek in Coos County 300 yards south of the Bethel Creek road and 3 miles east of U. S. Highway 101. The small town of Langlois is on U. S. Highway 101, 3 miles north of the Bethel Creek road junction.

The region is characterized by steep, well-rounded, grass-covered hills rising sharply from the coastline. Occasional erosion-resistant basalt outcrops form prominent cliffs and knobs.

8/ Work cited in footnote 7.
Figure 4. - Long Ridge prospect, Curry County, Oreg.
Local residents report that 50 to 100 tons of 47-percent manganese ore was mined during World War I.

The property was leased during World War II to Austin McAdams and John Winters, both of Bandon, Oreg. They reportedly shipped about 50 tons of ore, most of which was found as float.

The country rock is the nearly horizontal Knoxville formation of Upper Jurassic age. The formation is a sandstone containing lenses of chert and numerous intrusions of basalt. Schist crops out in a ravine a short distance west of the deposit. Small rhodonite-bearing pods are erratically distributed in the chert lenses.

Development consists of 3 bulldozer cuts about 100 feet long and a maximum of 15 feet deep. The trenches are at right angles to the strike of a chert lens and are benched into the hill in stairstep fashion (fig. 5). The deposit has not been worked for several years, and a watercourse has almost obliterated the trenches.

Much of the rhodonite has been altered to manganese oxide. Float boulders of apparently good-grade oxides, when broken, show pink rhodonite cores. Other boulders show manganese oxides on all surfaces but upon breaking prove to be chert with oxide coatings on fracture faces. Boulders and masses of manganese oxides are found in the overlying soil mantle mixed with sandstone, chert, and basalt debris.

Rookard Prospect

The Rookard prospect is in Coos County, 1/2 mile southeast of the town of Bridge and 11 miles southeast of Myrtle Point. Both communities are on State Highway 42.

Minor concentrations of manganese oxides occur in fractures in chert. Small boulders of manganese oxide, with quartz, and manganese-stained chert are sparsely scattered throughout the overburden. Similar occurrences are more or less common throughout the Cenozoic sediments along the coast.

Smith Prospect

The Smith prospect is in Curry County, 1.5 miles east of Gold Beach, and is reached by a private road from Gold Beach along Riley Creek to a sawmill at the base of the mountain. A steep, indistinct trail about 1.5 miles long leads from the sawmill to an abandoned prospect adit 100 feet below the main outcrop. The mountains, which rise abruptly from the shoreline, are steep and thickly forested, with virgin stands of fir and myrtle. Underbrush and moss are so thick as to make prospecting difficult. Elevation of the outcrop is 1,050 feet by aneroid altimeter.

Neotocite, a hydrous manganese silicate, is associated with two chert lenses that occur in sandstone and interbedded shale. The larger lens consists of a 40-foot layer of red chert with a 10-foot layer of white chert at the top. It strikes northeast and dips southward at an apparently flat angle. Neotocite is associated with the red chert. The hanging wall is sandstone; the foot wall is obscured by overburden but is probably shale. The chert crops out almost continuously for 300 feet, although overburden covers all but a few feet of the width.

Development consists of a narrow, benchlike cut 25 feet in maximum depth, oriented approximately parallel to the contour. A second trench, not more than 3

9/ Work cited in footnote 7.
Figure 5. - McAdams prospect, Coos County, Oreg.
feet deep, trends about 45° south of the axis of the main trench, with which it connects at the east end (fig. 6). Neotocite-bearing chert is exposed in the main trench for 40 feet, with a maximum height of 25 feet. Very low grade neotocite-bearing chert is exposed in the shallow trench. In the main trench the manganiferous zone appears to grade into red chert at either end. Judging by the neotocite in the shallow secondary trench, the deposit probably extends downdip for at least 30 feet.

A smaller chert lens of similar composition and attitude is exposed in the wall of a ravine 200 yards southwest of the main deposit. Some neotocite is present in the chert; however, the grade appears to be considerably lower than that in the main exposure. Chert crops out for about 100 feet southwest of the bluff.

A 40-foot chip sample from the high face in the main trench assayed 23.8 percent Mn, 1.95 percent MnO₂, 3.10 percent Fe, and 35.2 percent SiO₂. A 200-pound grab sample from the main trench assayed 23.4 percent Mn, 3.45 percent Fe, 23.4 percent SiO₂, 0.16 percent C, 0.09 percent P, 5.3 percent CaO, 0.63 percent Al₂O₃, 0.2 percent MgO, and 24.8 percent volatile.

JOSEPHINE-DOUGLAS COUNTY AREA

(Includes 1 prospect in Curry County, Oreg., and 1 in Del Norte County, Calif.)

Physical Features

Josephine County is largely an inaccessible area of rugged mountains. Drainage is by the Rogue River, which flows from east to west through the central part of the county. The Applegate River flows northwest to a junction with the Rogue a few miles below Grants Pass, and the Illinois River follows an alternately north and west course to a junction with the Rogue at Agness, Curry County. Parts of each of the main-stream valleys are accessible by good road and are inhabited. About half of the population of the county resides in Grants Pass and its Rogue Valley environs; a secondary population center is the Illinois Valley in the Kerby-Cave Junction area. Grants Pass is the county seat and main trading center.

Annual rainfall may vary from 30 inches in the eastern part of the county to 60 inches in the west. Temperatures usually are moderate, except at the higher elevations. Roads above 3,000 feet in elevation usually are blocked by snow 6 months of the year or longer, unless opened by a bulldozer. Rainfall is scant during the summer months.

Most mountain areas are timbered with coniferous trees and some hardwoods. Underbrush is moderate to dense. Vegetation is usually sparse in peridotite areas and in some of the intrusive diorite areas. Geologic contacts are often well delineated by differences in vegetation.

Access

U. S. Highway 99 and the Southern Pacific Railroad enter the north-central part of the county, extend south to Grants Pass, and follow the Rogue River to Medford. U. S. Highway 100 begins at Grants Pass, and end at Crescent City, Calif., traversing the southwest part of the county. A graded Forest Service road follows the Rogue River from Grants Pass to Agness, Curry County, but the road is passable only during the summer. A few county roads, either graveled or oil-surfaced, and a few graded Forest Service roads extend into other parts of the county, as do some access roads for logging and mining operations. For the most part, however, the mountain areas are accessible only by foot trail.
Figure 6. - Smith prospect, Curry County, Oreg.
Geologically the county is composed of elongated, north-northeast-trending bands of Upper Jurassic sediments and associated volcanics of the Galice and Dothan formations, separated by intrusions of Jurassic or Cretaceous peridotite and hornblende diorite. The southeast quarter and the extreme eastern edge of the county contain Triassic (?) metavolcanics and metasediments of the Applegate formation and several moderate-size intrusions of quartz diorite similar to those found in Jackson County.

All manganese deposits examined in this county are either rhodonite or manganiferous iron deposits. Small amounts of manganese oxides are associated with the rhodonite as a result of weathering. The manganiferous iron deposits contain hematite, some magnetite, manganese oxides, and rhodonite. They are characteristically irregular and for the most part of limited size; none have produced manganese ore (table 2).

<table>
<thead>
<tr>
<th>Name</th>
<th>Location1/</th>
<th>Production</th>
<th>Type of property</th>
<th>Owner</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Boy</td>
<td>SE1/4 sec. 7, T. 41 S., R. 7 W.</td>
<td>None</td>
<td>1 claim</td>
<td>Robert Owen</td>
<td>Cave Junction, Oreg.</td>
</tr>
<tr>
<td>Campbell-McAllister</td>
<td>Sec. 5, T. 36 S. R. 7 W.</td>
<td>do.</td>
<td>1 claim</td>
<td>Mrs. George King</td>
<td>Do.</td>
</tr>
<tr>
<td>C.M.S. Strategic Metals</td>
<td>Secs. 1, 12, T. 18 N., R. 5 E.2/</td>
<td>do.</td>
<td>8 claims</td>
<td>Charles T. Morris</td>
<td>Takilma, Oreg.</td>
</tr>
<tr>
<td>Grayback</td>
<td>Sec. 35, T. 39 S., R. 6 W.</td>
<td>do.</td>
<td>2 claims</td>
<td>R. J. Pierce</td>
<td>Do.</td>
</tr>
<tr>
<td>Hamaker</td>
<td>SE1/4 sec. 36, T. 38 S., R. 10 W.</td>
<td>do.</td>
<td>4 claims</td>
<td>Paul Hamaker</td>
<td>Kerby, Oreg.</td>
</tr>
<tr>
<td>Jack Pot No. 2</td>
<td>NW1/4 sec. 5, T. 41 S., R. 7 W.</td>
<td>do.</td>
<td>1 claim</td>
<td>James E. Allen</td>
<td>Takilma, Oreg.</td>
</tr>
<tr>
<td>Low Gap</td>
<td>Lake Peak area (see fig. 12).</td>
<td>do.</td>
<td>do.</td>
<td>Robert L. Wells</td>
<td>Jacksonville, Oreg.</td>
</tr>
<tr>
<td>Larkspur</td>
<td>do.</td>
<td>do.</td>
<td>do.</td>
<td>do.</td>
<td>Do.</td>
</tr>
<tr>
<td>No Name</td>
<td>do.</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Do.</td>
</tr>
<tr>
<td>McTimmonds</td>
<td>Sec. 25, T. 33 S., R. 5 W.</td>
<td>do.</td>
<td>1 claim</td>
<td>Bert McTimmonds</td>
<td>Grants Pass, Oreg.</td>
</tr>
<tr>
<td>Oregon Caves Prospect</td>
<td>W1/2 sec. 5, T. 40 S., R. 6 W.</td>
<td>do.</td>
<td>2 claims</td>
<td>Mrs. Lucille Floyd</td>
<td>Cave Junction, Oreg.</td>
</tr>
<tr>
<td>Sunny Mayday</td>
<td>E1/2 sec. 19, T. 38 S., R. 5 W.</td>
<td>do.</td>
<td>1 claim</td>
<td>F. I. Bristol, A. O. Bartell</td>
<td>Grants Pass, Oreg.</td>
</tr>
</tbody>
</table>

1/ Willamette Meridian, except as noted.
2/ Humboldt Meridian.
With three exceptions, all deposits described in this section occur in siliceous metasediments of the Triassic (?) Applegate formation. The Elkhorn deposit is in an amphibole gneiss,\textsuperscript{10} a possible metamorphic equivalent of the Applegate formation. The Campbell-McAllister deposit is in a siliceous, schistose rock in an area of Jurassic Galice formation, a group of volcanic rocks containing lenses of sediments. Locally the schistose rocks are similar in appearance to the amphibole gneiss.

The Hamaker deposit is also in sediments of the Galice formation. The sediments do not, however, exhibit the coarse granularity and schistosity of the country rocks at the Campbell-McAllister deposit. The Hamaker deposit is in Curry County, a short distance west of the Josephine County line. It has been included in the Josephine County section because of the similar means of access.

The Bull Run prospect, the only known manganese deposit in southern Douglas County, has also been included in this section.

**Deposits**

**Black Boy Prospect**

This deposit in Josephine County, inaccessible during the winter, is near the crest of Page Mountain at an altitude of 4,400 feet. It is 22 miles from Cave Junction by way of the Takilma and Happy Camp roads and 1 mile of the Page Creek trail. Page Mountain has rather steep, heavily forested slopes that flatten near the crest to a semiplateau.

This manganiferous iron deposit occurs in a gray, brecciated, chert lens at the contact of metavolcanics and metasediments of the Applegate formation. The lens trends N. 50° W. It is traceable by float and outcrops for a distance of 650 feet and a width of 75 feet. Development consists of a 25-foot shaft, now inaccessible, and 2 small test pits (fig. 7). Workings are insufficient to determine either the attitude of the chert lens or the extent of mineralization.

Hematite and magnetite are associated with manganese oxides and an abundance of quartz in fractures and voids in the outer margins of the chert lens. Float and outcrops indicate that the central part of the chert lens is mineralized to some extent. A grab sample from a 5-ton dump by the shaft assayed 7.4 percent Mn, 21.7 percent Fe, and 49.6 percent SiO\textsubscript{2}. A 4-foot chip sample from the test pit assayed 6.9 percent Mn, 30.2 percent Fe, and 31.2 percent SiO\textsubscript{2}. Both the shaft and test pit are near the margin of the chert lens where the ore appears to be of higher grade.

The southeast end of the ore body is terminated by barren country rock. The northwest end is covered by soil mantle.

**Bull Run Prospect**

This prospect is on Bull Run Creek in Douglas County. Access is by the Quines Creek and Bull Run Creek roads and a rough bulldozer trail one-half mile long. The bulldozer trail probably is inaccessible during the winter. The Quines Creek and Bull Run Creek roads are maintained by the county and are passable throughout the year.

\textsuperscript{10} Wells, F. G., Preliminary Geologic Map of the Grants Pass Quadrangle, Oreg.: Oregon Dept. Geol. and Min. Ind., 1940.
Figure 7. - Black Boy prospect, Josephine County, Oreg.
Rhodonite occurs in an area 35 feet long and 20 feet wide in a soft, weathered, brick-red, mica schist. The schist is similar to that near the rhodonite deposits in the Evans Creek district about 8 miles south and southeast. In the Evans Creek district the schist was classified\(^{11/}\) as Triassic (?) Applegate formation.

Rhodonite with intermixed quartz is exposed for a distance of 15 feet and a width of 4 to 5 feet in the bottom of a trench 7 feet deep. The rhodonite appears to continue beyond the walls of the trench to the north, east, and west but is not exposed by the road cut a few feet south of the trench. The bottom of a small pit a few feet west of the trench also shows rhodonite. Three other smaller trenches in the immediate vicinity have been partly caved. The owners report, however, that rhodonite similar to that in the main trench was found in each of the smaller pits. Small amounts of rhodonite, as indicated on the map (fig. 8), are stockpiled by each trench.

The surface of the rhodonite is well oxidized, with the depth of oxidation often penetrating 4 to 6 inches on fracture surfaces. The oxides are intermixed with quartz and chalcedony. A 6-foot chip sample from the trench assayed 16.2 percent Mn and 33.0 percent $\text{SiO}_2$. A grab sample of stockpiled rhodonite near the trench assayed 12.3 percent Mn and 37.9 percent $\text{SiO}_2$.

Two small pits 129 feet north of the large trench contained only manganese oxide-stained mica schist. A grab sample of this material assayed 3.1 percent Mn. Another trench, 1,550 feet farther, on a bearing of N. 15° E., exposed a layer of dark, friable material containing small amounts of manganese oxide. The country rocks in this area are gray shales and mudstones,\(^{12/}\) mapped as the Jurassic Galice formation.

Campbell-McAllister Prospect

This deposit in Josephine County can be reached from Grants Pass by the Lower River road to Robinsons Bridge, a distance of 12 miles; by the Pickett Creek road for 4 miles; and by approximately 3 miles of foot trail. The Lower River road is paved; the Pickett Creek road is a dirt logging road.

The country rock is classified as the Jurassic Galice formation, a group of volcanic rocks containing lenses of sediments.\(^{13/}\) It is siliceous and slightly schistose, somewhat resembling a diorite. It is similar to the amphibole gneiss occurring several miles westward, which is a possible metamorphic equivalent of the Triassic (?) Applegate formation.

Superficially oxidized rhodonite and intermixed quartz occur as a north-striking lens with a nearly vertical dip. The lens is surrounded by a halo of manganese oxide-stained country rock. Manganese content in the enclosing country rock appears to be less than 1 or 2 percent.

Development consists of a trench 45 feet long, 10 feet wide, and a maximum of 10 feet deep; a depression in the floor of the trench measures 10 feet long, 4 feet deep.


Figure 8. - Bull Run prospect, Douglas County, Oreg.
wide, and 6 feet deep. A roughly circular pit 3.5 feet west of the trench is about 19 feet in diameter and 6 feet deep. Rhodonite and quartz occur in the east wall of the pit and west wall of the trench as a lens 4.5 feet wide and at least 16 feet long; maximum exposed depth is 8 feet.

A grab sample of the best manganiferous material in the trench assayed 11.2 percent Mn, 8.17 percent Fe, and 40.0 percent SiO$_2$.

C.M.S. Strategic Metals Property

The C.M.S. property is in Del Norte County, Calif, about 2 miles south of the State border, but access to the property is through Oregon.

The property is between Poker and Packer Creeks, both minor tributaries of Dunn Creek. It is 12 miles from O'Brien by the Takilma and Happy Camp roads. O'Brien is 30 miles from Grants Pass by U. S. Highway 199. The Takilma and Happy Camp roads are graveled. The last 4 miles to the deposit is by rough bulldozer road and foot trail.

Manganese occurs as small lenses and pods of mixed rhodochrosite, rhodonite and oxides in metasedimentary rocks of the Triassic (?) Applegate formation. The Applegate formation consists of chert, argillite, quartzite, and conglomerate, with scattered lenses of marble. Serpentine forms a ridge a short distance north of the deposit.

Development consists of 1 large and 5 small pits. Manganese oxide is exposed in the large pit and three small pits (see fig. 9).

The manganese deposits occur in steeply dipping, veinlike bodies parallel to the bedding of the country rock. Exposed width varies from a few inches to 8 feet. The deposit exposed in the largest trench can be traced for 45 feet in length with an apparent maximum width of 8 feet and maximum exposed depth of 9 feet, striking N. 20° E. and dipping 55° E. The foot wall is argillite, and the hanging wall is gray chert. The other exposures are much smaller.

Elkhorn Prospect

The Elkhorn prospect is in Josephine County on the crest of the ridge between Brush Creek and Elkhorn Creek. It is approximately 1 mile from the Chrome Ridge road and 37 miles from Merlin, the nearest rail shipping point. Access is by the county road that follows the Rogue River to Galice, then by the Galice Creek and Chrome Ridge roads. The latter road is impassable from November through March because of snow. The area has high relief, but an access road could easily be bulldozed to the prospect from the Chrome Ridge road by following the ridge.

Two small, elongated pods of rhodonite occur in a banded quartzite that has been folded intensely. There is great variation in the attitude of the quartzite because of the extreme folding.

Development consists of 2 pits 5 feet deep and a trench 3 to 6 feet deep (fig. 10). Rhodonite and intermixed quartz occur in the trench and in one of the pits as elongated pods oriented parallel to the fold axes of the quartzite. The largest pod occurs along the crest of an antiformal fold and strikes N. 27° W., with a dip of 40° E. It is exposed in one of the pits to a depth of 5 feet. The smaller pod in the trench is exposed to a depth of 3 feet. It strikes N. 2° E. and dips 46° W.
Figure 9. - C.M.S. prospect, Del Norte County, Calif.
Figure 10. - Elkhorn prospect, Josephine County, Oreg.
The principal mineral is rhodonite that has been altered to the oxides of manganese to a depth of one-half inch on fracture surfaces. At the south end of the west pod alteration to the oxides of manganese extends to a depth of 1 foot. A few quartz veinlets cut the rhodonite. Cinnabar occurs along fractures of the rhodonite and in the oxides but is not disseminated throughout the pod. Yellow garnet is disseminated in small quantities through the rhodonite. A grab sample of the ore assayed 36.6 percent Mn and 0.05 percent Hg.

The absence of manganese outcrops or float on the steep slopes of the ridge at the ends of the pods indicates that the known length would not be increased more than a few feet by exploration.

**Grayback Prospect**

Access to the Grayback prospect in Josephine County is from Cave Junction by way of the Caves Highway and the Grayback Creek road. It is about 12 miles from Cave Junction and 35 miles from Grants Pass. The claims are accessible through the year, except during periods of heavy snow.

A manganiferous iron deposit occurs in an area of meta-andesite flows that have been intruded by irregular bodies of serpentine and several small granodiorite bodies. A few quartzite lenses are found in the area.

The deposit is poorly exposed. Similar float was found during construction of a logging road, and subsequent exploration consisted of a shallow bulldozer pit adjoining the road. The pit is 50 feet long, 40 feet wide, and 2 feet deep. The top layer of overburden has been removed, leaving on the pit floor a loose mixture of soil and hematite on top of solid bedrock. It appears that most of the pit floor is underlain by ore-bearing material.

Hematite float continues south, or uphill, from the main deposit for about 1,000 feet. Again, the float was exposed during road construction, and no further work has been done.

A grab sample of average ore material contained 8.6 percent Mn and 31.5 percent Fe.

**Hamaker Prospect**

The route to the Hamaker prospect, Curry County, from Grants Pass is by U. S. Highway 199, the Eight Dollar road, and the Onion Camp road, a total distance of 40 miles. The last 14 miles of the route is a narrow dirt road that is not passable in winter. The deposit is 230 feet east of the Onion Camp road at a point 500 feet south of the crossing of the north fork of Carter Creek. Altitude is between 4,000 and 4,500 feet. Slopes in the vicinity of the deposit are moderate but steepen a short distance east and west.

The country rock is a siliceous, fine-grained, metasediment, gray-brown when fresh and buff when weathered. The metasediments contact serpentine one-fourth mile northwest of the deposit. The country rock is stained by manganese oxide in the near vicinity of the deposit.

Rhodonite and intermixed quartz, with disseminated pyrite, occur in the metasediments as five small, irregular pods, the largest of which was estimated to weigh approximately three-fourths of a ton. Most of the pods are fractured and oxides of
manganese coat the fracture surfaces. A grab sample from one of the pits assayed 23 percent Mn.

Workings consist of a 64-foot adit, 11 trenches varying in length from 11 to 90 feet, and several small pits (fig. 11). Rhodonite is exposed in 2 of the pits 40 feet apart.

No indications of additional ore in the area were noted.

Jack Pot No. 2

This prospect is in Josephine County 12.2 miles east of O'Brien on the Happy Camp road, a graveled Forest Service road. O'Brien is 37 miles from Grants Pass on U. S. Highway 199.

The deposit is in a small area of metasediments of the Triassic (?) Applegate formation, bounded on three sides by serpentine. Rhodonite and abundant intermixed quartz occur as a boulderlike mass, 18 inches wide and 2 to 3 feet deep, in manganese oxide-stained, banded chert. The boulder is highly siliceous; in places it is nearly pure quartz, with occasional tinges of pink rhodonite. The chert is exposed in a trench 20 feet long and a maximum of 5 feet deep. A grab sample of mixed quartz-rhodonite and manganese oxide-stained chert assayed 6.6 percent Mn and 40.6 percent SiO₂.

Lake Peak-Whiskey Peak District

Four geologically similar and closely adjacent manganese deposits occur on the north slopes of Lake and Whiskey Peaks in secs. 1 and 2, T. 41 S., R. 5 W. The area is accessible from Grants Pass or Medford by highway to the Applegate postoffice and then by graded road following Thompson Creek to the Steve Fork road or to Indian Creek. Two trail approaches are possible - one by the Steve Fork of Carberry Creek, the other by unimproved road to the head of Indian Creek, from which a trail that follows the mountain crests leads to Whiskey Peak. The Steve Fork trail is easy to follow but is a long, difficult climb. The Indian Creek trail is easier on men and horses, but a guide is needed.

The distance from Grants Pass is 18 miles by highway, then 14 miles by graded road to the Steve Fork trail or 18 miles to the Indian Creek trail. An additional 2 miles of unimproved road is traversed to reach the Indian Creek trail. Both foot trails are about 8 miles long.

The area is composed of metamorphosed sedimentary and volcanic rocks of the Triassic (?) Applegate formation and a few small sills of peridotite (fig. 12). The metasediments are principally quartzitic; the metavolcanics are of basic composition. The two rock types are interbedded in places, particularly in the northwest part of the area. Both rock types appear to have been steeply folded. The predominant strike is northeast, with steep dips to the east and west.

Low Gap Claim

The deposit is in Josephine County 1/4 mile west of Low Gap Creek and 1-1/2 miles from the creek outlet. Altitude is 4,500 feet by aneroid barometer. Float occurs a considerable distance down the slope toward the creek.
Figure 11. - Hamaker prospect, Curry County, Oreg.
Figure 12. - Lake Peak-Whiskey Peak district, Josephine County, Oreg.
The deposit is a small quartz-rhodonite lens in fractured quartzite. The long axis is oriented to the north; the walls appear to be vertical. A pit 19 feet long, 7 feet wide, and 7 feet deep has been excavated on the lens. The north and south limits of the lens are exposed by the pit; the west contact, as shown on the accompanying map, is defined by an outcrop of quartzite wall rock. Waste from the pit covers the north part of the east contact; however, the wall of the trench contains quartzite in the southeast corner.

The rhodonite is altered on the surface to the oxides of manganese. A grab sample taken from the walls of the pit assayed 44.8 percent Mn, 2.8 percent Fe, and 22.8 percent insoluble. The relatively high manganese assay is due to a predominance of oxides near the surface and probably is not representative.

A second pit 10 feet south exposed manganese stain in shear planes. The shears strike N. 35° to 40° W. and dip 75° to 85° S. They bear no apparent relation to the rhodonite in the first pit. The manganese stain is heavier than is normally encountered, but it is doubtful if this can be considered an indication of rhodonite at depth.

Hinkle Lake Claim

The deposit is in Josephine County on the ridge approximately midway between Low Gap and O'Connell Creeks. Altitude is 5,500 feet by aneroid barometer.

The ore minerals, hematite, magnetite, and mixed manganese oxides, occur as narrow bands and lenses in quartzite. A grab sample assayed 4.0 percent Mn, 9.19 percent Fe, and 63.9 percent SiO₂. The deposit is exposed by a trench 12 feet long, 6 feet wide, and 8 feet deep, crossing the outcrop approximately normal to the strike. In the trench the manganiferous bands are in a zone 7 to 8 feet wide, striking N. 50° E. and dipping 70° N. The outcrop approximately parallels the contour.

Float can be traced along the strike of the vein for 200 feet southwest and 70 feet northeast of the trench. A considerable amount of float is found near the trench, decreasing in quantity away from it.

Larkspur Claim

The Larkspur claim is in Josephine County in a small saddle on a ridge that extends northward from Whiskey Peak. It is 1 mile from the Whiskey Peak lookout on a bearing of N. 10° W. Altitude is 5,000 feet by barometer. An outcrop of altered basic rock 100 feet north of the deposit stands about 50 feet above the deposit.

This deposit is very similar to the Hinkle Lake claim in mineralogy and occurrence.

The ore minerals are hematite, magnetite, and mixed manganese oxides, occurring as narrow bands in dark quartzite. Petrographic studies revealed rhodonite in some of the samples. A grab sample assayed 5.6 percent Mn, 20.4 percent Fe, and 55 percent insoluble.

The deposit is along the contact of quartzite with metavolcanics. It strikes N. 45° E. and dips 60° S. The southwest part of the deposit is an outcrop 42 feet long, 7 to 8 feet wide, and 7 feet above the surface. Float continues northeast of the outcrop for 115 feet.
No Name Manganese

The prospect is in Josephine County on the east side of Low Gap Creek at an altitude of approximately 4,600 feet. It is one-half mile from the Larkspur claim on a bearing of S. 65° W.

The manganese occurs in quartzite country rock as an oxide, with a small amount of limonite. The deposit is exposed for a length of 8 feet and a width of 37 inches. It strikes N. 30° W. and dips 80° NE. A 37-inch chip sample assayed 1.2 percent Mn, 10.9 percent SiO₂, and 2.2 percent Fe.

McTimmonds Prospect

Access to the McTimmonds prospect, Josephine County, from the town of Leland is by the Grave Creek road for 18 miles to the King Mountain junction, then 3 miles northeast of the junction on the King Mountain road. It is 110 feet east of the road at the Boulder Creek crossing. Both roads are graveled and are normally passable all year. Altitude of the property is 3,000 feet.

The deposit is in the Jurassic Galice formation. The formation is chiefly composed of fine-grained, dark slate, with some sandstone, conglomerate, and shale. Greenstone crops out 1 mile north and south of the deposit. Discontinuous bodies of serpentine and peridotite intrude the sediments and greenstone in a northeast-trending belt approximately 2 miles wide through the area.

The deposit is a lens of manganese oxide-stained chert 4 feet wide, 5 feet deep, and 11 feet long, occurring parallel to the bedding planes of a buff, siliceous shale. The lens is exposed at the portal of a 50-foot adit. A few feet west of the lens the siliceous shale grades into dark-gray shale. The strike of the shale varies from N. 36° to 48° E., with a dip of 40° to 49° E. The shale is fractured parallel to the bedding planes.

The chert is dark gray-green. Exposed surfaces, to a depth of one-fourth inch, are altered to limonite and the oxides of manganese.

The absence of chert exposures in the trenches at the north and south ends of the lens demonstrates that the known length of the lens would not be extended more than 6 feet through exploration.

A composite grab sample from the dump and the lens assayed 5.1 percent Mn.

Oregon Caves Prospect

The Oregon Caves prospect is in Josephine County and was known formerly as the Ow Yuen and as the Akers prospect. It is 42 miles from Grants Pass by way of U. S. Highway 199 and the Oregon Caves Highway. A narrow road, impassable to vehicles, extends from the highway to the deposit, a distance of one-fourth mile. The access road originates at the Caves Highway 1.2 miles southeast of Grayback Creek.

The claims are approximately 3,000 feet above sea level in steeply mountainous terrain. Underbrush and moss are moderately dense. Cave Creek crosses the claims near the center of the deposit.

One moderate-size and two small pods of rhodonite and intermixed quartz occur in metasediments of the Applegate formation, a short distance upstream from an
easterly dipping, low-angle, reverse fault called the Cave Creek overthrust. The fault has an estimated net shift of 1 mile or more, and the movement caused considerable jointing and numerous small faults in the vicinity of the deposit.

The country rock is sheared and broken quartzite, much of which is stained rather heavily with manganese oxide. The rhodonite is usually oxidized to a depth of several inches.

Development consists of several small test pits and a hand trench 75 feet long and 8 feet deep (see fig. 13). The quartz-rhodonite mass in the trench is irregular in shape but appears to be striking northeast and dipping steeply southeast. The average width is 3 feet. Apparently the ore is not continuous the full length of the trench. Two smaller pits have exposed rhodonite and heavily stained quartzite in zones varying from 1 to 2 feet in width and 4 to 6 feet in length.

Sunny Mayday Prospect

Access to this deposit in Josephine County is from Grants Pass by way of Murphy, the Water Gap road, and the Powell Creek road. It is about 140 feet west of the Powell Creek road. The roads are paved and graveled, except 3 miles of the Powell Creek road. The deposit is accessible, except in periods of heavy snowfall.

Heavy soil mantle obscures the country rock, which is indicated by float to be gray phyllite in contact with metavolcanics within a hundred feet east and west of the deposit. The phyllite appears to occur in a north-trending belt. The metavolcanics are in contact with serpentine approximately 340 feet east of the deposit.

The deposit is an irregular body of brown chert containing lenticules of hematite, magnetite, and the oxides of manganese. The lenticules are 1/4 inch to 5 inches wide and 2 to 6 inches apart in the west end of the deposit; they are farther apart and of smaller width in the east end of the deposit. White-quartz veinlets intersect the lenticules. A few outcrops are composed predominantly of the ore minerals; a few are barren. Outcrops indicate the length of the deposit to be 215 feet with an average width of 55 feet (see fig. 14).

Wild Deer Prospect

The Wild Deer prospect is in Josephine County and is reached from Grants Pass on a surfaced highway that extends 14 miles to the junction of the Water Gap road near the settlement of Murphy. The Water Gap road is followed for 1-1/2 miles to the Powell Creek road. The deposit is about 4 miles farther on the Powell Creek road. The road is unimproved and is accessible with difficulty during the winter months. A rough access road about 1 mile long extends to the central outcrop.

The deposit is in a quartzite striking N. 20° to 40° E. and varying in dip from 70° E. at the north end of the deposit to 40° E. at the south end. The quartzite varies from 50 to 150 feet in width and crops out more than 1,100 feet along the strike. It is bordered on the east and west sides by metavolcanics of the Applegate formation. Some serpentine is present in the area.

Two moderate-size manganiferous iron bodies crop out in the quartzite. The north shoot is the larger, averaging about 200 feet long and 60 feet wide. The

---

TO CAVE JUNCTION AND U.S. 199

Contours approximate.

Figure 13. - Oregon Caves manganese prospect, Josephine County, Oreg.
Figure 14. - Sunny Mayday prospect, Josephine County, Oreg.
The south outcrop is 75 feet in diameter, with a tonguelike projection to the south 80 feet long and 10 feet wide. Both outcrops stand as much as 15 feet above the surface. A boulder-shaped mass near the road may have rolled down from the south outcrop.

The ore material is laminated with alternating bands of ore minerals and quartz-ite, each averaging about one-fourth inch in thickness. Ore minerals are hematite, magnetite, and mixed manganese oxides. The manganese oxides occur as surface coatings, inclusions in quartz, and in intimate association with the hematite. Rhodonite is present in at least microscopic amounts in most specimens and is the dominant mineral in parts of the north shoot.

Development is limited to several shallow prospect pits and trenches.

The Bureau of Mines conducted electric smelting tests in July 1954 on five bulk samples from the deposit. It was determined that Wild Deer ore is a desirable additive in the manufacture of foundry pig iron from low-manganese iron ores.

The samples consisted of a 500-pound composite sample from the north and center ore bodes and four 6-ton samples from separate parts of the deposit. The area represented by each truckload is shown on the accompanying map (fig. 15). Analyses are as follows in percent:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mn</th>
<th>Fe</th>
<th>SiO₂</th>
<th>CaO</th>
<th>MgO</th>
<th>Al₂O₃</th>
<th>P</th>
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<tr>
<td>500 lb.</td>
<td>5.7</td>
<td>24.5</td>
<td>44.8</td>
<td>4.2</td>
<td>6.2</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Load 1</td>
<td>4.98</td>
<td>23.9</td>
<td>46.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load 2</td>
<td>6.21</td>
<td>22.0</td>
<td>57.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load 3</td>
<td>6.42</td>
<td>19.6</td>
<td>47.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load 4</td>
<td>4.26</td>
<td>15.8</td>
<td>59.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads 1, 2, 3, 4</td>
<td>5.64</td>
<td>21.5</td>
<td>52.4</td>
<td>.35</td>
<td>4.80</td>
<td>2.08</td>
<td>0.58</td>
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</tbody>
</table>

In common with other counties in southwestern Oregon, Jackson County is predominantly mountainous, with limited accessibility. A moderately large area is suitable for agriculture in the Bear Creek Valley, which trends northwest through the central portion of the county. Medford, population nearly 20,000, and Ashland, with an estimated population of 8,000, are in this valley. The valley gives way on the east to the foothills of the Cascades and on the south and west to the Klamath Mountains.

Rainfall is somewhat lighter than in counties to the west. Average winter temperature is appreciably lower; and because of the preponderance of higher elevations, the depth of snow is apt to be greater and can be expected to last longer than in the western counties. The county is forested; however, underbrush is often less dense than Curry and Josephine Counties, allowing greater freedom of movement to prospectors.

Figure 15. - Wild Deer prospect, Josephine County, Oreg.
Access

The Southern Pacific Railroad and U. S. Highway 99 follow essentially parallel courses in the Bear Creek Valley, entering the west-central part of the county and departing from the south-central part. U. S. Highway 62 and State Highway 66 extend to points east of the Cascades, the former crosses the county in the northeast, the latter in the southeast. Access to the area between these highways is provided by a number of secondary roads - some graded, some unimproved. Many of these roads are inaccessible in the winter and spring.

General Geology

The eastern half of the county is overlain by Tertiary lavas and tuffs. The western part is composed principally of metavolcanic rocks of the Triassic (?) Applegate formation containing numerous elongated, northeast-trending lenses of interlayered limestone, argillite, and quartzite. Eocene sandstone and shales of the Umpqua formation occur along the east side of the Bear Creek Valley in contact with the Tertiary volcanics. Small patches of Cretaceous sandstones crop out in the west side of the valley. Serpentine and peridotite cover much of the extreme southwest part of the county. The Applegate formation contains numerous irregular intrusions of granite, granodiorite, and diorite, the largest of which is the Ashland stock - a granodiorite body in the south-central part of the county.

Except for the Lake Creek oxides, which occur in the Tertiary volcanics of eastern Jackson County, all known manganese deposits in the county are in the Applegate formation, usually associated with siliceous, metamorphosed sediments. Almost all of the Jackson County deposits are in the Evans Creek area in the northwest part of the county. Rhodonite deposits in this county apparently are confined to quartzites or quartzitic schists. It seems likely that additional rhodonite deposits may be found by prospecting in the vicinity of siliceous sediments in the Applegate formation.

The Bureau of Mines conducted limited exploration on the Evans Creek and Neathamer rhodonite prospects. These deposits are generally typical of rhodonite occurrences in the Applegate formation.

Ownership, production, and location of the prospects described are listed in table 3.

Deposits

Bailey Prospect

Access to the deposit is from Central Point by 4 miles of alternately paved and graveled country road and 1-1/2 miles of private road. The latter road is unimproved and inaccessible during the winter and spring.

The deposit is in a siliceous, metamorphosed rock; contact effects from a granodiorite stock 400 yards south have masked the original nature of the rock. Jointing is extensive, and most of the joint surfaces are stained with manganese oxide.

There are a number of partly caved pits and hand trenches on the property; two contain small rhodonite pods and heavy manganese oxide stain. One is a circular pit 30 feet wide, 40 feet long, and 6 feet deep. The other is a hand trench 60 feet long, 7 feet wide, and 5 to 8 feet deep. The trench is 50 feet north of the circular pit.
<table>
<thead>
<tr>
<th>Name</th>
<th>Location1/</th>
<th>Production</th>
<th>Type of property</th>
<th>Owner</th>
<th>Address</th>
</tr>
</thead>
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<tr>
<td>Bailey</td>
<td>SE1/4 sec. 1, T. 37 S., R. 3 W.</td>
<td>None</td>
<td>Private land</td>
<td>Unknown</td>
<td>Rogue River, Oreg.</td>
</tr>
<tr>
<td>Burris</td>
<td>Sec. 11, T. 39 S. R. 1 W.</td>
<td>do.</td>
<td>2 claims</td>
<td>J. A. Burris, Fred Lasley</td>
<td>Rogue River, Oreg.</td>
</tr>
<tr>
<td>Erickson</td>
<td>SW1/4SE1/4 sec. 6, T. 35 S., R. 3 W.</td>
<td>do.</td>
<td>Private land</td>
<td>D. D. Erickson</td>
<td>Do.</td>
</tr>
<tr>
<td>Evans Creek</td>
<td>SW1/4 sec. 17, T. 34 S., R. 2 W.</td>
<td>do.</td>
<td>do.</td>
<td>Timber Products Corp.</td>
<td>Medford, Oreg.</td>
</tr>
<tr>
<td>Shamrock</td>
<td>El/2 sec. 19, T. 34 S., R. 2 W.</td>
<td>101.5-ton bulk sample for tests by Bureau of Mines.</td>
<td>1 claim and public land</td>
<td>R. D. Semon, Jackson County</td>
<td>Medford, Oreg. Do.</td>
</tr>
<tr>
<td>Starr</td>
<td>NW1/4 sec. 21, T. 34 S., R. 4 W.</td>
<td>None</td>
<td>Private land</td>
<td>Charles V. Starr</td>
<td>Wimer, Oreg.</td>
</tr>
<tr>
<td>Taylor</td>
<td>SW1/4 sec. 14, T. 39 S., R. 1 W.</td>
<td>do.</td>
<td>Unknown</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Tyrrell</td>
<td>W1/2 sec. 10, T. 37 S., R. 2 E.</td>
<td>200 tons concentrates</td>
<td>3 claims</td>
<td>Tyrrell Manganese Co.</td>
<td>Medford, Oreg.</td>
</tr>
<tr>
<td>Newstrom</td>
<td>NE1/4 sec. 34, T. 36 S., R. 2 E.</td>
<td>None</td>
<td>Private land</td>
<td>Gus Pech</td>
<td>Lake Creek, Oreg.</td>
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<td>Coon Creek</td>
<td>Sec. 9, T. 37 S., R. 2 E.</td>
<td>do.</td>
<td>Unknown</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Fox</td>
<td>Sec. 9, T. 37 S., R. 2 E.</td>
<td>do.</td>
<td>do.</td>
<td>do.</td>
<td></td>
</tr>
<tr>
<td>Bush</td>
<td>SEC. 9, T. 37 S., R. 2 E.</td>
<td>do.</td>
<td>do.</td>
<td>do.</td>
<td></td>
</tr>
</tbody>
</table>

1/ Willamette Meridian.

Rhodonite and the oxides of manganese are exposed in the pit along a vertical fault striking N. 5° W. The ore zone averages 4 feet in width and is 45 feet in length. The maximum known depth is 6 feet. Small pits and outcrops immediately north and south of the large pit show no trace of the manganiferous zone. The mineralized zone consists primarily of manganese oxides filling joints and shear planes adjacent to the fault, plus several small shoots or lenses of rhodonite and quartz. The rhodonite has been altered to the oxides of manganese to a depth of 1 to 3 inches on exposed surfaces.

Another fault, striking N. 10° E. and dipping 85° E., is exposed in a trench about 50 feet north of the pit. The shear zone is characterized by heavy manganese...
oxide stain for most of its exposed length. It contains no visible rhodonite, although a 1-1/2-foot boulder of completely altered rhodonite is in debris near the north end of the trench.

A chip sample 3 feet long, from the manganiferous zone in the south part of the circular pit, assayed 4.9 percent manganese.

**Big Jim Prospect**

Access to the Big Jim prospect (fig. 16) from Grants Pass is by U. S. Highway 99 to Rogue River City, a distance of 9 miles, and the Evans Creek road through Wimer to Meadows, a distance of 24 miles. The prospect is 200 feet north of the Evans Creek road.

The deposit consists of an irregular pod of rhodonite and quartz and a moderate-size area of very low grade oxides in the quartzitic schist. The quartz-rhodonite pod is about 20 feet in 2 dimensions and is exposed to a depth of 7 feet. It occurs at the contact of the quartzite and schist.

The country rocks are a gray quartzite and a quartzitic schist striking north-east and dipping east at a moderate angle. These rocks have been intruded by several pegmatite dikes varying in width from a few inches to 4 feet.

Alteration to the oxides of manganese extends 2 to 3 inches into the exposed rhodonite. Quartz is disseminated through the rhodonite.

Rhodonite occurs under similar geologic conditions at the Shamrock mine (1/2 mile to the south) and at the Evans Creek prospect (1/2 mile east).

Low-grade oxides are exposed 224 feet southeast of the rhodonite in a bulldozer trail. The oxides extend southeast for 280 feet and have an average depth of 40 feet and a known width of 5 feet. Oxides occur as stain in fractures and along foliation planes of the schist in the foot wall of the quartzite-schist contact. The contact strikes N. 26° E. and dips 41° E.

**Burris Prospect**

The Burris prospect is about 500 yards west of Wagner Creek and about the same distance southwest of the Shorty Hope mine. The nearest rail or highway shipping point is at Talent, 5 miles by graveled road. Altitude at the property is 2,500 feet. Slopes in the vicinity of the deposit are steep and very brushy. Access during the winter months is difficult.

Two small quartz-rhodonite pods occur in a quartzite lens in the Applegate formation. The quartzite contacts metamafic rocks 400 feet northeast and granodiorite of the Ashland Stock 3,000 feet southeast. Irregular masses of quartz-rhodonite are distributed in the quartzite, with no apparent orientation or pattern. Outcrops near one pit plus exposures in the pit suggest a trend of about west-southwest.

Development consists of several test pits and six trenches. Bedrock is covered with debris in one trench containing rhodonite on the dump.

The larger rhodonite pod is 12 feet long and 4 feet wide; the smaller is about 2 feet in diameter. The lack of float elsewhere in the area indicates absence of other near-surface ore bodies.
Figure 16. - Big Jim prospect, Jackson County, Oreg.
Some of the rhodonite is altered to manganese oxide to a maximum depth of 2 inches on exposed surfaces. Small amounts of pyrite and possibly chalcopyrite occur along fractures in some of the rhodonite, and the owners report that a little gold occasionally is found. Quartz and yellow and brown garnet are common gangue minerals. Two grab samples assayed 26.8 and 14.1 percent Mn, respectively.

Erickson Prospect

The Erickson prospect is 12 miles from Rogue River by way of the Evans Creek road and 600 feet west of the road. Eight miles of the road is paved; the remainder is graveled. It is accessible throughout the year.

The deposit consists of four small quartz-rhodonite pods in a light-brown mica schist of the Triassic (?) Applegate formation. The strike and dip of the schistosity are N. 14° E. and 44° E., respectively. The schist is in contact with quartzite approximately 35 feet west of the deposit. The quartzite appears to strike N. 80° W. and dips 42° E.

The largest quartz-rhodonite pod observed is estimated to weigh approximately 12 tons. An equal amount is available in other small pods exposed in trenches or in scattered dumps. Alteration to the oxides of manganese extends to a depth of 2 to 4 inches on the exposed surfaces. A small amount of finely disseminated sulfides occurs in some of the rhodonite.

Other rhodonite deposits are found under similar geological conditions at the Neathamer prospect approximately 1/2 mile to the north.

Evans Creek Prospect

The Evans Creek prospect is 1 of 2 rhodonite deposits selected for limited exploration as being typical of the rhodonite deposits in the Applegate formation.

Access to the deposit from Grants Pass is by U. S. Highway 99 to Rogue River City, a distance of 9 miles, and the Evans Creek road through Wimer to Meadows, a distance of 24 miles. A rough access road 2 miles long extends from Meadows to the deposit. The Evans Creek road is oiled to Wimer and graveled from Wimer to Meadows. It is accessible throughout the year. The access road, however, is passable only in summer.

The deposit is in the mountains bordering the northern edge of the Rogue Valley. The mountains are rugged and precipitous, with numerous steep, narrow gorges. The deposit, at an altitude of 2,800 feet, is 1,100 feet above Meadows Valley, which is less than 1 mile southeast.

Exploration was conducted on the property in 1942 by the Pacific Syndicate, Medford, Oreg. The exploration consisted of a 55-foot adit driven on ore and of several hand trenches.

Several small, disconnected quartz-rhodonite lenses and pods occur in a zone 205 feet long and 5 to 15 feet wide. The country rock is a metamorphosed facies of the Triassic (?) Applegate formation.\textsuperscript{16} \textsuperscript{17} Tertiary sediments and basalt occur

\textsuperscript{16} Wells, F. C., and Waters, A. C., Quicksilver Deposits of Southwestern Oregon: Geol. Survey Bull. 850, 1934, p. 6.

\textsuperscript{17} Wells, F. C., Hotz, Preston E., and Cater, Fred W., Jr., Preliminary Description of the Geology of the Kerby Quadrangle, Oregon: Oregon Dept. Geol. and Min. Ind., Bull. 40, 1949, 23 pp.
one-half mile west of the deposit. Small irregular intrusions of quartz diorite are scattered through the area, and small dikes and irregular bodies of pegmatite are common.

The ore mineral is rhodonite that has been superficially altered to the oxides of manganese and is associated with more or less quartz. Oxidation near the surface is normally limited to a 1- to 2-inch penetration on joint surfaces. Barren quartz often grades into rhodonite, resulting in wide variations in grade of the ore.

There are two principal rock types in the vicinity of the deposits: Quartzite, which contains the rhodonite, and quartz-mica schist. Rhodonite is invariably within 125 feet of the quartzite-schist contact.

The schist is tan to rust red and is soft compared with the quartzite. Foliation is well developed and apparently parallels the original bedding. The quartzite is darker, varying from dark red to purple, and quite often black due to manganese stain. Bedding appears to parallel the foliation in the schist. Beds are usually 2 to 3 inches thick.

The attitude of both rock types is similar, with strikes varying from N. 40° to 83° E. and dips from 50° to 65° SE. The predominant trend is about N. 65° E., with a dip of 58° SE. Five north-trending faults of apparently small magnitude transect the ore zone, with strikes of N. 42° W. to N. 8° E. and dips of 75° E. to 65° W.

Three clay zones in the quartzite are considered to be highly altered granite dikes. The clay is light brick red and contains small quartz fragments and larger nodules of a soft white clay. The dikes are 5 to 10 feet wide and appear to be approximately parallel to the trend of the bedding. Similar material is exposed in the short adit, where it is found in two small faults and also in association with rhodonite. The clay is noted also adjacent to rhodonite in the west trench (see fig. 17).

The rhodonite is in lenticular boulderlike, or podlike, bodies in a zone trending approximately parallel to the bedding at N. 75° to 80° E. The dip of the zone at approximately 45° S. appears to be somewhat less than that of the country rock, but this may be due to local variations. No shearing or alteration was noted to distinguish the zone; it is established by the rhodonite masses. Relationships within the ore zone are shown in an idealized longitudinal section in figure 17.

Rhodonite has been exposed intermittently in the mineralized zone for 205 feet, with a difference in elevation of 100 feet between the upper and lower exposures. The zone varies in width from 5 to 15 feet; the rhodonite masses within the zone are 1 to 5 feet wide and 3 to 32 feet long. The maximum exposed depth of any single ore body is 8 feet.

A rhodonite-bearing pod is exposed in the north wall and lower south wall of the adit but not in the back, indicating that it dips south. A second rhodonite pod in the adit is about 3 feet in diameter.

Work done on the deposit by the Bureau of Mines consisted primarily of limited trenching and completion of a 119-foot diamond-drill hole. Access was provided by cleaning and rebuilding the existing road for 2,000 feet. Seven hundred feet of trench was completed, from which an estimated volume of 3,100 cubic yards of rock and overburden was removed. Four acres in the vicinity of the deposit were mapped.
**SAMPLE ASSAYS**

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<thead>
<tr>
<th>No.</th>
<th>Mn %</th>
<th>Fe %</th>
</tr>
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</tr>
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</tr>
<tr>
<td>12</td>
<td>32.20</td>
<td>2.9</td>
</tr>
</tbody>
</table>

**Figure 17. - Evans Creek prospect, Jackson County, Oreg.**
Twelve samples were taken from quartz-rhodonite pods exposed in the trenches by use of a rock drill equipped with a device for collecting drill dust. Holes were drilled parallel to the dip of the ore to a depth of 6 inches and placed on 12-inch centers across the vein. Cuttings from rock-drill holes in 1 line were assayed as 1 sample. The interval between lines varies.

A diamond-drill hole from the south side of the zone, passing 38 feet under the adit, disclosed no manganese minerals. A section parallel to the drill hole is shown in figure 17. The drill log follows:

**Flume Gulch Prospect**

Access to the deposit is from Rogue River City by way of the Wards Creek and Flume Gulch roads, a distance of 5 miles. Three miles of the route is graveled; the remainder is dirt road, of which the last one-half mile is deeply rutted. The road is passable throughout the year. The deposit is 300 feet west of the road.

The country rock is a gray, medium-grained quartzite occurring as a series about a mile wide in metavolcanics of the Applegate formation. The metavolcanic contact is one-quarter mile east.

Development consists of a long, shallow, curving bulldozer trench and several test pits. One quartz-rhodonite boulder, 2.5 feet in diameter, and numerous pieces of manganese oxide float are near a quartzite outcrop. The quartzite strikes N. 25° E. and dips 40° E. Neither the trench nor the test pits contain rhodonite or manganese oxides. A grab sample from the quartz-rhodonite boulder assayed 24.9 percent Mn.

**Neathamer Prospect**

The Neathamer prospect was trenched and sampled by the Bureau of Mines. It is 4 miles northeast of Wimer on the Evans Creek road. A 1/2-mile bulldozer trail leads to the deposit from the Evans Creek road at the Erickson Ranch. The road to Wimer is graveled. The bulldozer trail is passable only during the dry season and then only by tractor or four-wheel-drive vehicle.

The area is one of low mountains bordering the Evans Creek Valley. Slopes are not excessively steep, and crests and ridges are somewhat rounded. The deposit is between 2,050 and 2,300 feet in altitude. Overburden is 2 to 8 feet deep.
A number of small quartz-rhodonite pods occur in quartzite. Manganese was first discovered on this property before World War I. The Oregon Manganese Co., a local company, mined and stockpiled a small quantity of manganese oxides in 1916, but no ore was shipped. Previous development was limited to a 90-foot adit and a 20-foot adit, both of which are accessible, and numerous small pits and trenches. Rhodonite was exposed near the portal of each adit.

The area near the deposit is composed of quartz-mica schist and quartzite of the Triassic (?) Applegate formation. The schist is formed predominantly of quartz with 20 to 40 percent of muscovite and minor amounts of accessory minerals. It is reddish brown when weathered and light to dark gray on the fresh surface. It is soft and easily eroded or excavated when weathered. The quartzite is much harder than the schist and tends to form the more outstanding topographic features. Outcrops are light to dark gray and sometimes a mottled rust color. A little muscovite is usually present, rarely in excess of 5 percent.

The major formational trend is north-northeast to northeast, with the majority of dips to the east at 30° to 60°. Northwest dips are common and indicate close folding as the controlling structure. Numerous faults of small displacement are present in both rock types. Jointing is particularly well developed in the quartzite near the deposit, decreasing in intensity away from the deposit.

The ore mineral is rhodonite that has been superficially altered to the oxides of manganese. The depth of oxidation varies from one-half inch on some of the larger pieces to complete oxidation of the smaller pieces. About half of the rhodonite shoots exposed on the property have been oxidized completely. Unoxidized rhodonite is usually mixed with quartz. A gradual change from rhodonite to nearly barren quartz is noted occasionally. Several deposits of quartz with small nodules of oxide and exceptionally heavy stain contain no visible rhodonite.

The rhodonite and intermixed quartz occur as shoots of varying size and shape in quartzite, at or near the contact of quartzite with quartz-mica schist (fig. 18). The shoots are predominantly kidney shaped or pod shaped, some are tabular or lens shaped, and some are rounded. Size varies from pods approximately 3 feet in diameter to a tabular deposit of low-grade material 30 feet long and 3 feet thick. Most of them are between 3 and 4 feet in width and 8 to 12 feet in length. Exposed depth is usually 2 to 5 feet. The deposits conform to the northeast trend of the country rock.

None of the pods appears to be connected, with the possible exception of a line of 4 outcrops in the southwest part of the area that are 3 to 11 feet long and 12 to 15 feet apart over a total length of 65 feet.

In each instance the rhodonite is in the quartzite and is within 100 feet of the quartzite-schist contact.

The Bureau of Mines completed 1,500 feet of bulldozer trench, from which 1,600 cubic yards of rock and overburden was removed. Two thousand feet of rough bulldozer trail was constructed to gain access to the deposit. Seven and one-half acres was mapped in the vicinity of the deposit.

Shamrock Manganese Prospect

The Shamrock Manganese deposit is exposed in cuts along the Evans Creek road 24 miles from the town of Rogue River. The road is graveled and is accessible throughout the year.
Figure 18. - Neathamer prospect, Jackson County, Oreg.
The Bureau of Mines removed 101.5 tons of rhodonite "ore" from the property during 1952 and early in 1953 for ore-dressing and metallurgical tests. Silico-manganese was produced from it on a test scale.18/

Rhodonite is exposed in the upper bank of the Evans Creek road in three irregular pods. The largest body near the center of the deposit has produced 77 tons of rhodonite "ore". Manganese stain occurs along extensive fractures in the wall rock. Alabandite (MnS) occurs in small quantities near the bottom of the pit.

An elongated mass of quartz rhodonite striking N. 36° E. and dipping 52° E. is 650 feet south of the larger body (fig. 19). It is exposed for 10 feet along the strike, with an average width of 2 feet, and appears to parallel the bedding planes of quartzite. The shoot pinches out to the south. The northward extension is obscured by overburden. The quartzite is in contact with quartz mica schist 4 feet above the ore body on the hanging-wall side. The quartzite-schist contact is obscured by overburden 12 feet to the south. A pegmatite stringer occurs along the contact and pinches out a few feet to the south.

An irregular mass of rhodonite is 660 feet north of the larger body. A few tons of rhodonite and quartz remain in this body, which has yielded approximately 12 tons. Near the ore shoot the quartzite strikes N. 46° E. and dips 38° W. Fractures in the quartzite are 1 to 6 inches apart and parallel fractures in the rhodonite. On the north side of the ore a dike occurs that appears to be an altered pegmatite. It is 2.5 feet wide and approximately parallel to the fractures.

A few boulders of rhodonite 2 to 4 feet in diameter were shoved over the embankment during construction of the Evans Creek road. The boulders evidently were excavated from between the large mass of rhodonite and the rhodonite body to the north.

Other deposits may occur in the quartzite. Rhodonite deposits are found under similar geological conditions at the Big Jim and Little Al prospect 1/2 mile north and at the Evans Creek prospect 3/4 mile north.

Three bulk samples for metallurgical tests were taken from the larger outcrop; a fourth bulk sample was a composite taken from the four outcrops. Analyses of the samples follows:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Amount, tons</th>
<th>Mn, percent</th>
<th>Fe, percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.6</td>
<td>32.3</td>
<td>2.35</td>
</tr>
<tr>
<td>2</td>
<td>48.0</td>
<td>23.1</td>
<td>2.06</td>
</tr>
<tr>
<td>3</td>
<td>18.0</td>
<td>28.8</td>
<td>3.70</td>
</tr>
<tr>
<td>4 (comp.)</td>
<td>9.9</td>
<td>28.2</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Starr Prospect

The property is 14.8 miles from Rogue River City, the nearest rail shipping point. The route to the deposit is by way of Wimer over 7 miles of highway and 7 miles of graveled road that is passable all year. The last three-fourths of a mile to the deposit is by foot trail.

Figure 19. - Shamrock manganese prospect, Jackson County, Oreg.
The workings are near the crest of a moderately sloping ridge at an altitude of 2,100 feet. The area is timbered, portions of it having been logged. Underbrush is moderately thick.

A quartz-rhodonite lens occurs in a bedding plane in sandstone. Metamorphism is not evident in the sandstone; however, metasediments that appear typical of those found in the Applegate formation occur 200 yards to the west. A quartz-diorite intrusion is 400 yards south.

Development consists of several hand trenches and test pits. Rhodonite and quartz occur in a pit 8 to 9 feet in diameter and about 6 feet in depth. The lens strikes N. 10° E. and dips 63° W. It is exposed for 8 feet along the strike with a width of 5 feet. Exposed depth is 3 feet. The lens apparently extends into the north and south walls of the pit.

The rhodonite is superficially altered to the oxides of manganese. Oxides also stain fracture surfaces and bedding planes in the sandstone, extending an average of 1 foot into the wall rock. A 5-foot chip sample from the lens assayed 28.7 percent Mn.

There is no float in the vicinity of the deposit. Before excavation of the pit, the lens was concealed by 1 foot of overburden and 2 feet of sandstone.

Taylor Prospect

The Taylor prospect is on Arrastra Gulch three-fourths mile west of Wagner Creek. It is 6 miles from the town of Talent by way of the Wagner Creek road and Arrastra Gulch road. The latter is a logging road and normally inaccessible during the rainy season. The Wagner Creek road is passable all year. The area is mountainous; slopes are steep.

Rhodonite with intermixed quartz, occurs in quartzite of the Applegate formation, about one-half mile west of the Ashland granodiorite stock. The quartzite is tan and extensively fractured. It strikes northeast to north-northeast, with near-vertical dips.

Development consists of a trench 15 feet long, 5 feet wide, and 5 feet deep and 2 small test pits. A quartz-rhodonite lens 7.5 feet long and 2 feet wide is exposed in the trench to a depth of 3.5 feet. A 3-foot boulder of quartz rhodonite is exposed in a small test pit 115 feet east. Dumps by the trench and test pits contain small piles of rhodonite.

The rhodonite is intermixed with quartz and superficially altered to the oxides of manganese. The lens in the trench strikes N. 25° E. and dips vertically. A 2-foot chip sample assayed 18.2 percent Mn. A grab sample of country rock assayed 1.8 percent Mn.

Deposits of the Lake Creek District

The Lake Creek district, as the term is used in this report, is the area from the Butte Creek Highway south for 8 miles and about 3 miles east and 3 miles west of the Tyrrell prospect. The Tyrrell is 16 air miles east of Medford in Jackson County. The village of Lake Creek, which is approximately one-fourth mile south of the Butte Creek Highway, is the focal point for access roads in the district. The settlement is 23 miles from Medford by way of the Crater Lake and Butte Creek Highways.
Principal access in the district is the Little Butte Creek road, which is gravelled and maintained by the county. A logging road extends south along Lost Creek from Little Butte Creek through the center of the district, and another logging road follows the west edge of the district, originating about one-half mile south of Lake Creek. Travel on the logging roads is difficult during the winter.

The Lake Creek district is underlain by a series of Tertiary flows and interbedded tuffs, flow breccias, and explosive breccias, predominantly of andesite composition. The strata generally strike north to northwest and dip at very low angles to the east. Several high-angle north-trending faults appear to have no relation to ore deposition.

The Tyrrell, Newstrom Ranch, and Coon Creek prospects are similar geologically. The manganese occurs as nodules of mixed oxides in irregular areas of a relatively soft, brick-red tuff. The tuff is at least 100 to 300 feet thick in most places. It is bedded between andesite flows or dark tuffs of low porosity. The general strike northwest, and dip, 5° to 10° E., is in conformance with other formations in the area.

The deposits probably originated through leaching of manganese from overlying lavas and redeposition in the underlying tuff beds. Under this theory the extent and tenor of the deposit would depend largely upon the presence of a permeable layer allowing free circulation of meteoric water, and a water table or underlying impervious layer, or other circumstance, causing precipitation of the manganese from solution. The requirement of permeability is filled by the red tuff layer and locally increased by brecciated and agglomeratic phases in the tuff. The circumstance causing precipitation is not known, but it probably is due to local impervious layers in the tuff or underlying lavas.

Five areas of red tuff are noted on the attached map (fig. 20). Three areas are the site of the Tyrrell, Newstrom Ranch, and Coon Creek prospects. No manganese deposits were seen in the other two areas during a cursory reconnaissance.

**Tyrrell Prospect**

A privately owned dirt access road about one-half mile long extends to the Tyrrell property from the Lost Creek road. The access road is difficult to travel during the dry season.

Small manganese oxide nodules in porous tuff crop out in an area 1,800 feet long and 100 to 200 feet wide. Pardee states:

The ore consists of manganese oxides, chiefly manganite, with a moderate amount of psilomelane and a little soft black and bronze oxides. These minerals have filled cracks and cavities, replacing the tuff very little if at all.

In 1917 the Manganese Metals Co., a local concern, built a 25-ton mill and produced 100 to 200 tons of manganese concentrate. It is reported that 2 carloads of concentrate was shipped in 1918. The concentrate assayed approximately 47 percent.

19/ Wells, F. C., Preliminary Geologic Map of the Medford Quadrangle, Oregon: Oregon Dept. Geol. and Min. Ind., 1939.

Figure 20. - Manganese deposits of the Lake Creek district, Jackson County, Oreg.
Mn; mill heads were 15 to 20 percent Mn. The ore was taken from the open pit near the south end of the property.

In the summer of 1918 Victor Rakowsky is reported to have churn-drilled part of the Tyrrell deposit. Drill-hole locations, logs, or assays are not available.

The property was purchased in May 1942 by George L. deMartini of San Francisco, who excavated a number of bulldozer trenches and several hand trenches at the north end of the property.

In approximately 1950 the property was acquired by the Tyrrell Manganese Co. A lease was obtained by the G.M.C. Co., which constructed a mill with a reported capacity of 500 tons at Eagle Point, 15 miles west of the Tyrrell prospect. No ore was produced and the lease was terminated several years later. The property has been idle since with the exception of assessment work.

The prospect is near the west edge of a crescent-shaped outcrop of red tuff approximately 1-1/4 miles long. The tuff outcrop is on the north end of a northwest-trending ridge between Lost and Little Butte Creeks. The ridge is cuesta shaped, with the dip slope on the east side. The tuff bed is at least 100 feet thick; only the upper 30 to 50 feet is exposed. The strike is north-northwest; the dip is east at a low angle. An overlying andesite flow extends west within 100 feet of the main working pit and north to a line of exploratory trenches.

The workings (fig. 21) include a pit 230 feet long and 30 feet deep a short distance west of the crest of the ridge and 16 shallow bulldozer trenches forming a north line along the crest of the ridge. Three small bulldozer trenches have been excavated on the west slope below the main pit. A road in poor repair extends from the Lost Creek road to the pit and to the trenches.

The main pit is about 110 feet west and 45 feet below the tuff-andesite contact. A zone of breccia or faulting in the north wall of the pit is apparently the foot wall of a small andesite dike striking S. 25° E. and dipping 70° E. Another andesite dike nearly 100 feet wide is exposed in the south wall of the pit and the adjoining road cut. It strikes N. 60° W. and dips 67° E. The tuff in the pit is not noticeably brecciated, and manganese mineralization is very light. The owners report that a rich layer of manganese oxides was encountered a few feet above the present pit floor.

The only appreciable amount of manganese oxide in place in the pit occurs as a coating on fracture surfaces in the andesite dike in the south part of the pit. Apparently the solutions from overlying strata were channeled through several areas of fracturing in the dike and deposited. The manganese oxide coatings are generally about one-fourth inch thick.

Little is known about the mineralization in 600-foot interval between the pit and a line of exploratory trenches on the north slope of the ridge. A few small, caved, hand trenches have low-grade manganese oxides on the dumps, indicating continuation of mineralization.

Manganese oxides occur in the trenches from 2,285 feet to 2,365 feet in altitude in a zone 50 to 150 feet wide. Actual thickness of the manganiferous zone is not known but is indicated by this difference in altitude to be as much as 80 feet.
Figure 21. - Tyrrell prospect, Jackson County, Oreg.
Newstrom Ranch Prospect

The Newstrom Ranch prospect is 1-1/4 air miles northeast of the Tyrrell property. Access is from the Little Butte Creek road by way of a 1-mile-long dirt road and 1/2 mile of foot trail. The access road is not passable during the wet season.

A manganiferous zone 450 feet long and 225 feet wide is on the northwest side of a prominent northwest-trending ridge near the north end of a 3-1/2-mile outcrop of red tuff. Locally the slopes are quite steep, averaging about 20° from the west to east sides of the deposit and approaching 30° near the east side.

The outline of the red tuff outcrop in the vicinity of the deposit is roughly circular, with a diameter of 450 feet. A narrow spur of tuff extends 350 feet southeast (see fig. 22). The attitude of the tuff is somewhat in doubt. Taken locally, the outcrop as a whole trends north and dips east at a low angle. The tuff is in contact on all sides with a gray andesite lava. None of the contacts are clearly exposed; all are inferred on the basis of float.

The mineralization is very similar to that at the Tyrrell, the manganese occurring as mixed oxides in small nodules erratically distributed in vesicles and pore spaces in the tuff. Assays from the Newstrom Ranch tend to be somewhat higher in manganese than the general run of Tyrrell assays.

In general, the mineralization at the Newstrom seems to be confined to the western two-thirds or the lower part of the tuff area. Manganese oxide distribution is more irregular than at the Tyrrell. Some barren areas are adjacent to zones of moderate-grade ore.

Coon Creek Prospect

Access to the Coon Creek prospect is by an unimproved dirt road following Lake Creek. It is not passable during the wet season.

This prospect is on the southeast side of a small domelike hill between Lost and Coon Creeks. The tuff bed crops out on the north, east, and west sides of the hill in the shape of a horseshoe. The overlying and underlying rocks are flow andesites. The surface of the dome is covered with numerous tuff boulders, many of them 12 to 15 feet in diameter.

The mineralization and genesis are apparently identical to those of the Tyrrell prospect. A sample of the best manganiferous material assayed 2.13 percent Mn. This was a grab sample from a dump near the only working, a shallow shaft, which is now flooded. No manganese mineralization was seen beyond a radius of 15 feet around the shaft.

Fox Prospect

The Fox prospect is on the west slope of Lost Creek, overlooking the Tyrrell deposit. It was reported as a manganese prospect, but only andesite with a normal amount of manganese stain was observed.

Woods Prospect

The Woods prospect is 7 miles by dirt road from the nearest town, Rogue River City. Rogue River City is 10 miles from Grants Pass on U. S. Highway 99. The deposit is accessible, except during unusually heavy rain.
Figure 22. - Newstrom Ranch prospect, Jackson County, Oreg.
A 100-yard access road was constructed to the deposit by the Bureau of Mines so that the outcrop could be sampled by collecting cuttings from rock-drill holes.

The area is moderately mountainous; slopes are not excessively steep. The district is forested, except for areas that have been logged. Underbrush is usually thick. The soil mantle varies from 2 to 12 feet in thickness.

A moderate-size, quartz-rhodonite lens occurs in metamorphosed sediments of the Applegate formation. The formation strikes northeast and dips southeast or northwest at moderate to steep angles. The great variation in dip suggests close folding as the principal structure.

The country rock is tan to light gray phyllite, with a fairly well developed secondary cleavage. Cleavage layers are 1/8 to 1/4 inch thick. The phyllite is quartzitic, with small amounts of muscovite and with incipient porphyroblasts of an unidentified mineral on the cleavage surfaces. A white, poorly indurated, quartz sandstone occurs a short distance north of the deposit.

Cleavage planes in the phyllite apparently parallel the bedding, with a strike of N. 10° to 15° E. and a dip of 50° E.

The ore mineral is rhodonite intermixed with quartz and surficially altered to manganese oxides. Quartz is present as small veinlets and irregular masses and is also integrated with the rhodonite in microscopic amounts. Nearly barren quartz gradually changes to essentially pure rhodonite in different parts of the lens.

The ore occurs as a lenslike mass striking N. 8° E. and dipping 54° E. It is exposed in a small, steep-walled gulch that crosses the central part of the lens (fig. 23). Rhodonite and intermixed quartz are exposed for 92 feet along the strike and to a depth of 34 feet downdip on the hanging-wall side. Outcrops and float indicate that apparently barren quartz extends for an additional 70 feet south and 30 feet north along the strike.

The foot wall is exposed in the creek bed where the lens is 7 feet wide. The true width is not exposed north and south of the creek bed.

Relatively little overburden would have to be moved to expose the deposit, as the slope of the surface is approximately 28° compared with the 54° dip of the lens. There is enough room for a good-size waste dump, and the steep slope will allow easy sidecasting of waste by a bulldozer with a relatively short carry.

The lens was sampled by the Bureau of Mines by collecting cuttings from rock-drill holes in the exposed hanging wall. The holes were drilled normal to the dip of the lens to a depth of 52 to 54 inches. Three holes were placed near the middle of the outcrop on 10-foot centers in a line parallel to the dip. An additional sample hole was drilled in each end of the outcrop. None of the holes penetrated the foot wall of the lens. Sample locations are shown in figure 23.
Figure 23. - Woods prospect, Jackson County, Oreg.