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TYRRELL MANGANESE MINE.

SUMMARY.

Notes—As stated in the accompanying Report, a core drilling campaign in desirable to accurately determine the depth and tenor of the ore new known to exist in this property. If this drilling can be started and, after a few holes have been put down with satisfactory results, work on the development, roads, and mill construction can be immediately started, the work and completion to a point of production can be greatly facilitated and the overhead cost considerably reduced by the shortening of the time of completion. In the present war emergency it appears to the writer that such a course is justified rather than to await the completion of the entire drilling program before commencing the construction of the milling and concentration plant, hence I am showing two estimates of the cost of putting this, and adjacent, properties into production, one based on the completion of the drilling prior to applying for a loan sufficient for the equipment for operation; the other based on drilling a few holes to check the estimated depths of the orebody and then being in a position to start the mill construction and other work essential to production while continuing the drilling program to better check the average depths and values of the orebody and aid in planning the extraction to the best advantage.

Based on present indications, before core drilling has been started and a reasonable amount of such work completed, the ore reserves in the Tyrrell Mine may be estimated at some 200,000 tons. The previous work on this property, during the World War, indicated an average value of from 14% to 16% but for the purposes of this report I am estimating on an average content of 7% Mn. and an extraction of 80% of that content as shown by certain concentration tests reported by Minerals Separation North American Corporation appended hereto, making an average recovery of 5.6% Mn. On this we may figure—

Total probable production of 47% Mn. concentrates from the Tyrrell property alone...........................................11,800 tons.  
Total value of this production @ $1.00 per unit...........$11,800.00  
Amortization plant and equipment.................................100,000.00  
Less cost of working 200,000 tons @ $1.45 per ton........290,000.00  
Net....................$136,400.00

Add an approximate 90,000 tons from the adjoining claims,  
Add an approximate 90,000 tons from the Pecho property which we have partially examined and a similar amount from the property of Timber Products and B. B. Bush and other claims in the vicinity which will be tributary to the proposed mill and estimating an additional cost of 85¢ per ton due to hauling to mill, we have an additional 200,000 to 300,000 tons of similar ore which can be mined and milled, which at 5.6% recovery will more than double the total production of the Tyrrell Mine and as the equipment has been amortised from Tyrrell account, we will have but the working cost @ $2.00 per ton with 85¢ per ton ore value from which it is deductible or a profit of 3.60 per ton on all similar ores of the vicinity which may be developed during the Tyrrell operation, a probable 300,000 ton minimum.
TYRELL MANGANESE MINE.

ESTIMATES.

Core drilling .............................................. $8,000.00
Supervision and mapping .................................. 1,000.00
Assaying ..................................................... 750.00
Bulldozing and road work .................................. 1,000.00
Accounting and overhead ................................ 1,250.00
Other miscellaneous work ................................. 1,000.00
Tools and equipment ...................................... 2,500.00
Freight and travelling expense .......................... 500.00
Fuel, lubrication, tires and auto exp. ................. 500.00
Water supply for drill .................................... 500.00
Contingencies ............................................... 1,000.00

$15,000.00

Overhead during period between end of drilling campaign and granting of equipment loan, est. at a minimum of 90 days @ $1000.00 per month $3,000.00 3,000.00

Report etc. to accompany application for loan 500.00 500.00

CONSTRUCTION:

Road building .............................................. $5,000.00
Camp buildings, assay office ............................. 5,000.00
Pumps and piping for water supply ...................... 1,000.00
Building, fans, and labor for same ..................... 750.00
Land for millsite and tailings ponds .................... 1,000.00
Grading for mill fans, 100 cy at $4.00 ................. 400.00
Concrete for same, 30 cy at $10.00 .................... 300.00
500 ton ore bin, wood construction .................... 750.00
Grizzly, crushe, nd feeder ................................ 1,500.00
No. 86 Hayr mill and spares ................................ 16,000.00
1- Symons vibrating screen, products ................. 3,000.00
20- Wemco concentrators or equv ....................... 9,000.00
Power plant, Diesel Elec, 500 H.P. .................... 25,000.00
Assay office equipment .................................. 500.00
Engineering and supervision ............................. 5,000.00
Leathers and piping ....................................... 1,000.00
100,000 gal. water tank .................................. 1,000.00
100 ton dewating tank for concentrates ............... 750.00
1- small dryer for concentrates ......................... 750.00
Sacking and weighing devices ............................ 350.00
100 ton concentrate bin, steel ......................... 4,000.00
Labor for erection ......................................... 4,000.00
Contingencies .............................................. 4,000.00

$59,000.00

1- 1 Cu.yd. Diesel shovel ................................ 16,500.00
1- D8 Tractor and dozer ................................ 10,000.00
1- 5000 gal. fuel tank .................................... 750.00

$72,350.00

1 month payroll and exp ................................ 5000.00
fuel, lubricants, powder etc ........................... 2,350.00

$14,850.00

$15,000.00

The above has been prepared using such price quotations as were available and knowledge of former installations of similar nature. If the entire sum necessary for both drilling campaign and equipment can be available at one time this sum may be materially reduced as shown on succeeding pages.

* Denotes used material.
## TYRRELL MARGANBE MINE

### ESTIMATE NO. 2.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core drilling</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Supervision and mapping</td>
<td>500.00</td>
</tr>
<tr>
<td>Assaying</td>
<td>250.00</td>
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<tr>
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<td>750.00</td>
</tr>
<tr>
<td>Tools and equipment</td>
<td>2,500.00</td>
</tr>
<tr>
<td>Freight and travelling expense</td>
<td>500.00</td>
</tr>
<tr>
<td>Fuel, lubrication, tires and auto.</td>
<td>350.00</td>
</tr>
<tr>
<td>Water supply for drill</td>
<td>500.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$10,350.00</strong></td>
</tr>
</tbody>
</table>

| Road building & stripping                           | 5,000.00 |
| Camp building & assay office                        | 5,000.00 |
| Pumps and piping for water supply                    | 1,000.00 |
| Building, feets., and labor on same                  | 750.00   |
| Land for millsite and tailings                       | 1,000.00 |
| Grading for foundations                              | 400.00   |
| Concrete for same                                   | 300.00   |
| 500 ton ore bin, wood const.                         | 750.00   |
| Grizzly, crusher & feeder                            | 1,000.00 |
| * No. 86 Marcy Mill                                  | 9,000.00 |
| * 20 Wenco concentrators or equiv.                   | 7,000.00 |
| * Power plant, Diesel elect.                         | 20,000.00|
| * Assay office equipment                             | 500.00   |
| * Engineering & supervision                          | 3,500.00 |
| * Launderers and piping                              | 1,000.00 |
| * 100,000 gal. water tank                            | 1,000.00 |
| * 100 ton dewatering tank                            | 550.00   |
| * 1 small dryer for cones                            | 300.00   |
| * Snacking and weighing devices                      | 450.00   |
| * 100 ton ore. bin, steel                            | 350.00   |
| Labor for erection                                   | 3,500.00 |
| **Contingencies**                                    | **3,000.00** |
| **Total**                                            | **$64,500.00** |

| 1- 1 C.Y. Diesel shovel on cats                      | 12,500.00 |
| 1- 9-8 Tractor and dozer                             | 7,800.00  |
| 1- 5000 gallon fuel tank                             | 500.00    |
| **Total**                                            | **$20,500.00** |

| 1- months payroll and exp.                           | 5,000.00  |
| Fuel, lubricants, powder, etc.                       | 2,250.00  |
| spares and supplies                                  | 9,250.00  |
| **Total**                                            | **$14,250.00** |

| **Total**                                            | **$109,550.00** |

This sum may be reduced to an even $100,000.00
or less by purchasing shovel and tractor
on monthly payments.
THE TURRELL MANGANESE MINE

The Tyrrell Ranch and Manganese Mine, properties lying in Sections 3, 9, and 10, Township 37 South, Range Two East, Willamette Meridian, were purchased in May 1942, by George L. delArtini of San Francisco, California and are now owned by him in fee and on record in the Recorders Office of Jackson County, Oregon, in Medford, the County Seat.

These properties comprise the S.W. 1/4 of the S.W. 1/4 of Section 3; the W. 1/2 of the N.W. 1/4 of Section 10, the South 1/2 of the N.E. 1/4 of Sec. 9, and the S. 1/2 of the E.S. 1/4 of the N.E. 1/4 of Sec. 9 of the above Township together with all tenements and hereditaments, water rights, etc. appertaining thereto. It may be mentioned here that the water rights are the first water rights on Lost Creek and together with those of John Walch who owns property to the North and West, are the rights to the entire creek flow at the usual stages of water.

The manganese bearing lands comprise the eastern portion of the property, to wit: The S.W. 1/4 of the S.W. 1/4 of Sec. 3 and the W. 1/2 of the N.W. 1/4 of Sec. 10. The lands in Sec. 9 are apparently free of manganese with the exception of float which has slid down from Sec. 10. The property also holds by lease from the U. S. Government, the grazing privileges on the S. 1/2 of the S.W. 1/4 of Sec. 9, some 50 acres more or less and the W. 1/2 of the S.W. 1/4 of Sec. 10, another 50 acres. On this latter parcel some mineral claims have been located and are now being prospected by other parties.

The manganese, which is the valuable and pertinent deposit on which this report is being written, lies in a layer of red tuff, underlain and at one time overlain by basaltic flows. The ore occurs in the form of manganite in nodules and small particles, together with some pyrolusite, some psilomelane, and some soft, brown oxides of a brassy appearance. The harder, and larger, particles are readily concentrated after grinding, by gravity methods, and the lighter tuff washed away. Some of the softer oxides are light and float away with the tails but a 79% plus concentrate has been made in laboratory tests with a prospect of a still higher extraction when worked on a commercial scale.

HISTORY - The existence of this body of manganese bearing tuff has been known for many years and during World War No. 1 the property was taken over by the Manganese Metals Company and equipped with a crudely constructed mill of small capacity. Tunnels were driven from the West slope into the tuff on the N.W. 1/4 of the S.W. 1/4 of Section 10 and on the S.W. 1/4 of the N.W. 1/4 of Sec. 10. A tramway and track was run along the
West side of the hill at about the elevation of the ore occurrence and the mined ore sent down a chute to an ore bin, crushed with rolls, and concentrated in crude jigs and some very good concentrates were produced. No definite information can now be had as to the exact flow sheet or modus operandi and the ruins of the old mill are in such condition that no pertinent facts may be ascertained from its study. The authorities differ as to capacity of mill and amount of concentrate produced but it seems reasonable to assume, from such information as can be obtained that the flow sheet was approximately as outlined above and that something between 200 tons and 600 tons of concentrate were produced and that the muff capacity was about twenty tons per day, and the ore averaged between 15% and 20% Ni. The analyses of such concentrates are given in the various excerpts from Governmental Department Reports included herewith. A sample of concentrates found in the bottom of the old concentrate bin checked with reasonable accuracy with these former analyses.

DEVELOPMENT - The development, all old work, at the time of my arrival on the ground consisted of a couple of short tunnels close to each other and one of them on the north side of a diabase dike which cuts the formation in the N.W. 1/4 of S.W. 1/4 of Sec. 10. To the South of this dike there is little if any evidence of mineralization for a considerable distance. North of this work a distance of 100 feet or more a tunnel, cross-cut, was driven into the orebody and drifts run to the North and South from this cross-cut. All of these tunnels are caved and inaccessible but are being reopened by parties who have leases on this ground. It is reported that the drifts off the second cross-cut tunnel mentioned extend from 70 ft. to 100 ft. in both directions. There is also a rumor that a shaft some 70 ft. deep was sunk from one of these drifts but I can find no corroboration of this statement and parties who claim to have worked in these drifts do not recall such a shaft. However, these openings will be cleared and accessible for examination in a short time. North of the center of Sec. 10 a similar tunnel was driven into the property under consideration and is similarly caved and but partially reopened to date. Oro from these old workings lies in small piles along the tramway hereinbefore mentioned, considerably altered by exposure to weather. As the work of reopening these old tunnels was progressing slowly and would probably be completed and accessible for examination at a later date, my explorations were mainly carried on towards the north to determine if possible the North-South extent of this orebody. The exposures along the West slope of the ridge were examined and sampled by panning and the orebody traced to approximately 1500 feet north of the South Line of the Tyrrell property. This with the exposure South of the Tyrrell South line and lying between it and the intrusive dike mentioned, gives a total exposure of approximately 2000 feet. Hand trenching was resorted to and some shallow shafts and long crosscut trenches of shallow depth were made and the underlying orebody reached in almost every instance. Owing
to the present scarcity of labor in the vicinity due to a Governmental project lying between here and Medford and on which a large number of men are employed, hand trenching proved too slow. A D-8 Caterpillar tractor and dozer were hired and a series of crosscut trenches 10 ft. wide cut across the surface East - West through the surface material down to the orebody. Owing to logging work on a Government contract for lumber the tractor could only be had for 24 hours but in this time a series of 11 trenches as described above were cut exposing the ore Southward to a point where the basaltic capping still remained and the dozer would not cut through to the orebody. This work demonstrated the existence of the orebody much further to the North than had been formerly been thought and of a greater width than had been assumed. To actually demonstrate and block for measurement and sampling, core drilling must be resorted to in these bulldozed trenches and an accurate survey of the orebody made and plotted. However, from this work it has been shown that a substantial body of ore remains and that it will probably be possible to work it by power shovel and opencut, commencing at the North end of the exposure and working South towards the dikes above mentioned.

DRILLING - Some years ago Mr. Victor Rakowski is said to have had a series of holes drilled at one point to determine the depth of the ore bearing formation. No logs of these holes are obtainable at present date although through the courtesy of Mr. Earl K. Nixon, Director of the Department of Geology and Mineral Industries of the State of Oregon, we obtained photostats of a sketch topographic map and the location of the drill holes and a plotted cross section through one row of such holes. We also found and conversed with the driller who was in charge of the work but who simply drilled, kept no logs, and had but his memory as to the depths. The drill used was a churn drill of an antiquated and obsolete type, formerly operated by horses in a tread mill arrangement but later remodeled to drive with a gasoline engine. It drilled a 6" hole with a 600 pound string of tools and took over a month on four holes as shown by the photostats included in this Report. This drill was entirely unsuited to the work, the sludge recovered by pumping from the holes was probably panned but in such panning it is very probable that all of the pyrolusite and a portion at least of the manganite and the "other soft, branny looking oxides" would be lost as they would float readily. The information obtained by this former drilling was of very little value.

Core drilling should be resorted to and a campaign of drilling carried out to definitely block out and determine the values of this deposit. From the nature of the deposit, a soft tuff with particles and nodules of hard manganite dispersed through it, I am inclined to believe that anything smaller than a 3" core will be badly broken up; also that a drill of the Davis Calyx or the Sullivan type of bit will be more successful.
than diamond drilling. I would advise that at least one drill hole per trench be immediately put down to the strata underly­ing the manganiferous body, to determine depth, character, and tenor of the deposit. Later the drilling should be continued until at least two holes in each of the shorter trenches and three or more in the longer trenches and some holes to the South towards the dike be completed so that the orebody may be accurately measured and valued. The sum of $5,000.00 should provide amply for this work including the supervision and surveying. The indications are that the expenditure of such a sum for this purpose is amply justified; that a large body of workable ore will be developed thereby.

**GEOLOGY** - The geology of this deposit has been covered by Dr. Fardeo and Dr. Wells of the U.S.G.S. to the extent possible at the times of their respective visits. I append herewith a transcript of the pertinent sections of Fardeo's published Report under the caption "Deposits of Manganese Ore in Montana, Utah, Oregon and Washington". A further transcript of the pertinent sections published in the Oregon State Department Bulletin No. 17 on Manganese in Oregon, dated 1942., and a further transcript of the context of the obverse side of the Map of the Preliminary Geology of the Medford Quadrangle by the U.S. Geological Survey and the Department of Geology and Mineral Industries of the State of Oregon and photostatic copies of the Geological and topographical maps of the pertinent region now procurable. These transcripts and maps in themselves show the importance of a complete and thorough development, survey, and reduction of this and other adjacent manganese deposits of similar character so that their metal content may be turned over to the proper channels of industry immediately, or as soon as working conditions will permit.

**TRANSPORTATION** - The mine is reached over a dirt road from an improved highway leading from the Crater Lake Highway near Eagle Point through Brownaboo to Lake Creek Post Office and on to a farm road turning South from this highway at a point near the Little Butte Creek bridge, from which point a mile of rough dirt road fording Lost Creek gives access to the mine. The nearest railroad is at Eagle Point, approximately 13 miles distant. The nearest stockpile for such ores is at Grants Pass which will be slightly over 60 miles distant. It is probable that delivery at Eagle point may be arranged for as a point of acceptance of the concentrated product. In operation, the mine will be reached over a new road leading from a back road near the covered bridge across Lost Creek up a grade to the level of the orebody and along the ridge to the mine.

**MILLING AND DETERMINATION** - I have mentioned the probable flow sheet of the former mill on this property. I append copies of letters from Minerals Separation, San Francisco Laboratory, showing results of some of their tests.
on this ore and in one case an extraction of 70% plus of the manganese content by a very simple treatment. Mr. Earl K. Nixon of the Oregon State Department of Geology and Mineral Industries has recommended that we have further tests made by the U.S. Bureau of Mines, with a probability of betterment of the extraction. This I prefer to leave until after the drilling is either well under way or completed. A 70% extraction is 'good enough' as a basis for calculations at the present. It is very probable that some further treatment which may be worked out will save a goodly portion of the fine, light, pyrolusite and other soft oxides lost in the former treatments. These oxides will be of the grade known as 'battery ores' or chemical ores, and of much higher value per ton than the strictly metallurgical quality, and well worth saving.

A mill site has been selected on a steep, rocky, hillside to the North in the triangular tract bounded by the East-West line bounding the North end of the Tyrrell property and the county road and Lost Creek. An ample tailings deposit site lies adjacent in the same 'quarter quarter' Section between the old county road and the South Fork of Little Butte Creek. A pumping station at this point will provide ample water for milling purposes. The concentrates may be put on trucks from an ore bin adjacent to this old road to which they will be delivered by gravity flow from the mill. An almost level road can be made to the mill ore bin from the mine where power shovel will load to large trucks for transportation of ore to mill.

The mill flow sheet indicated by present experiments on the ore is simple. The shovel will deliver the ore sufficiently finely broken to feed to an 86 Harvey Mill which should have on this ore from 500 to 800 tons daily capacity to 20 mesh. Grinding balls of not too large size not to grind too fine, are indicated as essential. Classification preferably by a vibrating screen separating into three or four classified products from 20 mesh to possible 80 mesh with treatment on Willey tables of each separate product is indicated. The very fine material and the slimes may probably be further treated by some flotation system for the recovery of the soft, porous oxides. All of this is C.I.M.D.

MILL CAPACITY - The recommendation of a mill of this size for an orebody of the size now demonstrated may require further explanation. First: the comparatively low grade of the ore makes quantity production essential to low costs of operation. Second, the Government needs the concentrate as rapidly as it may be produced to meet the present emergencies. Third at least four other, smaller, bodies of similar ore within a reasonable radius will, from present observations, augment the probable ore supply for this mill 50% and possibly 100% when properly explored and developed. Experts have expressed opinions as to the duration of the present war as a minimum of at least three years. To be of use in this emergency production must commence as soon as

5.
possible and at as high a rate as is possible.

Fourth: at least two Marcy Mills of the size indicated are
available now at reduced prices in good, used, condition and
Willey tables, commonly used in the concentration of gold
ores, are also available. Small pumps, used piping or tubing,
and other needs may be procured in good used condition. The
California & Oregon Power Company have indicated a probable
cost of $50,000 for extending a power line to the property
which is of course a sum not to be considered for a probable
three year use of the available energy so a Diesel installation,
with suitable used equipment, is indicated. It is probable that
such a power plant should be in two or three units any one of
which would suffice to drive the 96 Marcy, say 300 H.P., and one
unit at least should be used for driving a generator for electric
power for pumps, concentrators, floodlights in pit, etc. etc.
I estimate that with the sum of $5,000.00 indicated as essential
for drilling and development, a similar sum for roads; some
$40,000.00 for the mill and equipment and $10,000.00 for camp
and office buildings and equipment the property may be put in
production. The power shovels and trucks necessary would be
purchased in good, used and reconditioned shape or on a down
payment and monthly installments on balance to keep within these
figures. The mill and tailings disposal sites will probably
cost in the vicinity of $1000.00 which will be cash prices.

COST OF OPERATIONS - For the Tyrrell property itself, all within
a 3/4 mile distance of the mill, with a
capacity of 500 tons daily, and estimating the ore tenor at
7% or less than half that indicated by former operations, with
an 80% recovery or 5.6% it will be necessary to mine, mill and
concentrate 9 tons into one. At the rate of 500 tons per day,
I estimate costs of mining and milling approximately as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shovelling and loading</td>
<td>30%</td>
</tr>
<tr>
<td>Transportation</td>
<td>15%</td>
</tr>
<tr>
<td>Milling and concentrating</td>
<td>50%</td>
</tr>
<tr>
<td>Overhead</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1.45</strong></td>
</tr>
</tbody>
</table>

9 tons @ $1.45 per ton = $13.05
Produces one ton of concentrates worth $45.00
Net = $32.05

It seems very probable that a higher grade of lead may be
maintained but this is a matter which can only be determined
by drilling campaign suggested herein or by actual mining.
The actual mining should be preceded by the drilling as a
precautionary measure.

MINE IN LIGHT - From the previous records and the amount of
personal study in the field which I have
been able to give this proposition, I deduce: Previous operators
and explorers have seemed to agree on an average workable depth
of deposit of 30 feet. This is an estimate only and must be confirmed by drilling or other means. The previous drilling with churn drill I do not consider as giving much, if any, accurate information. The sketched cross section shows greater depths of overburden than was determined by the dozing operations and other trenching, the line of drill holes cannot be accurately determined either on the ground or on the former maps. The recent trenching by hand and with dozer seems to indicate that the formation extends to a point some 1,000 or 1,400 feet north of the South end line of the property and to a distance of 500 feet or more to the diabase dike to the South. Assuming, prior to the drilling that this ore body is 1,300 feet long and 60 ft. in width (although we know that in places it is a great deal wider), and of the former assumed or perhaps 'determined' depth, and allowing 12 cubic feet in place to equal a ton, would give an estimated 200,000 tons. The extension to the South from the Tyrrell property to the intrusive dike, calculated on the same basis, would give an additional 90,000 tons. Estimating the Tech deposit, a 40 acre tract of similar ore lying approximately 1/2 miles to the N.W. and of which a casual examination has been made, the amount may be augmented by another 90,000 tons. Three other allegedly similar deposits within a two mile radius from the property remain to be examined. It may be stated here that these other deposits, outside of the Tyrrell property proper, are none of them large enough to be worked and milled profitably by themselves, but preferably be worked through the mill contemplated. In the case of the ores lying immediately adjacent to the Tyrrell on the South, the extension of the Tyrrell deposit, they are so situated that a water supply for milling and beneficiation is a vital question. Such water may be taken from Little Butte Creek and pumped to the logical mill site for this ore but the installation and operation would be costly. The Tyrrell property controls all the water of Lost Creek; hence this ore cannot be worked with that water unless worked by the interests owning the Tyrrell. Hence it is apparent that a sufficient quantity can be determined at the start to warrant the construction of a mill of the size indicated.

SAMPLE OF ORE - The grade of ore may better be determined after the drilling program is completed that at present. Samples taken at random over the entire length of the property were submitted to the Minerals Separation Company, San Francisco, California, Laboratory for concentration tests. These samples assayed 10.29% to 20.43% Sn. Other samples taken at random from the surface trenches carried approximately the same values. Forbes states that "The ore treated in the mill is reported to have averaged about 20% Sn." He also mentions a 12 ft. sample in the 'main out' as having been taken by Parks which showed 14.00% Sn., and the minimum as being 8.90% Sn. The evidence seems to show that the lower portions of the orebody are higher grade than at the surface. In my estimates I have taken 75%, app. one half the values shown by such sampling surface exposures, as being a safe average tenor for such estimates of cost and
probable production which, figured on an 80% average extraction basis, shows a 5.0% average recovery which is ample for a profitable operation on a 20 ton per day basis. The former work indicates a concentrate assaying "from 40.5% to 52.0% Mn. with a silica content around 10% to 11% and 1.0% to 3% of iron. Some reports tend to show a gold content in these concentrates of an average of $2,000 per ton but this is probably not recoverable, no work has thus far been done to determine if extraction is possible. All attention has been given to the iron mineral. The letters and details of tests made by Minerals Separation Co. on the samples sent in by me are appended for your study and information.

MAPS - I have prepared and appended maps of the property and the district as follows:

No. 1 - Portion of Township 37 South, Range 2 East, U.S., showing the property and adjoining roads, creeks, etc.

No. 2 - Portions of Secs. 3, 9, and 10 of Twp. 37 S., R. 2 E. showing the property and the adjoining grazing leases, ditches, etc.

No. 3 - Photostat of topography of the vicinity of the Tyrrell Mine made from the Ashland Quadrangle.

No. 4 - Photostat of the topography of the vicinity of the Tyrrell Mine made from the Medford Quadrangle.

No. 5 - Photostat of the areal geology taken from the Medford Quadrangle of preliminary Geology, Medford, Oregon.

No. 6 - Photostat of topographic map prepared for the Hammeron Totals Company showing a portion of the Tyrrell Mine.

No. 7 - Photostat of cross section showing the Rakowski drilling.

No. 8 - Sketch Map prepared from Brunton traverse to show locations of trenches and bulldozer cuts and other mine test pits.

PHOTOGRAPHS - Photographs are appended showing the work in the bulldozer cuts and trenches. Particular attention is called to the massive outcrops shown in photos 5, 6, and 10, and to Nos. 7 and 8. No. 6 shows men at work clearing the tunnel in the open cut on the property lying to the South of the Tyrrell Mine in Sec. 10 and No. 7 was taken from the surface near the top of this cut to show the basalt capping at this point. The other photos are self-explanatory.
A detailed description of Map No. 3 seems desirable. Starting at the North end of the area shown some shallow shafts were put down to determine if the manganese bearing formation extended thus far North. In all of these we find a layer of white tuff a short distance below the surface. This layer of white tuff is said to overlie the red manganese bearing tuff. The white tuff is also exposed in bulldozer cuts No. 1 and No. 2. In No. 3 the red, manganese bearing tuff was exposed at a very little distance below the surface and this was also the case from this point up to cut No. 9. Nos. 10 and 11 found the basalt capping a very short distance below the surface and this cap continues from here to the intrusive dike to the South which cuts off the mineralization.

Along the West rim of the hill from the point marked "Massive Outcrop" we find the ore bearing formation exposed continuously from thence to the dike before mentioned. At the open cut and tunnel shown in Photo No. 5 the basalt cap is some 20 ft. thick and probably increases in thickness towards the crest of the ridge. From this point the capping gradually diminishes in thickness along the ridge until between Nos. Cuts 9 and 10 it practically disappears, having been eroded although traces were found in the cuts in this vicinity.

Pardee mentions the Newstrom, a property 2 miles North of the Tyrrell; The Star F, five miles North; the property of the Sierra Metals Company some three miles Southwest of the Tyrrell; as being worth further investigation. The Tech property lying approx. a mile to the Northeast of the Tyrrell I have looked over casually and found it well worth further examination and development. Other properties in the vicinity, among them the one formerly known as the Garnell, at the head of Coon Creek and 2-1/2 miles distant to the Southwest may also be classes as being one worth further investigation and development to augment the ore tributary to the contemplated 500 ton mill. However, the best plan is to rush production on the Tyrrell and as soon as this work is well under way to start development on the other nearby properties and rush the ore from them to the mill.

A portion of the Tyrrell, overlain by the basaltic capping, will of necessity have to be stripped down to the ore bearing strata. A large part of this stripping should be done in advance of the actual mining and the surface basalt crushed for road metal and concrete for the mill foundations etc. This will both uncover the ore and provide material greatly needed for the road and foundation construction.

In conclusion; From present appearances the Tyrrell Manganese Mine appears to be a property which if developed and operated along the lines indicated should pay handsomely and should produce several thousand tons of excellent grade of manganese concentrates which have a ready market.

All of which is respectfully submitted.
EXCEPT FROM

BULLETIN 725-C

UNITED STATES GEOLOGICAL SURVEY

By

J. T. FARDIE

1921

Page 219 et seq.
Mines and Prospects.

TYRELL

The Tyrrell mine is on the east side of Lost Creek about 15 miles in a straight line east northeast of Medford. The nearest post office is Lake Creek, 5 miles to the northwest, and the nearest shipping place is Eagle Point, on the Pacific & Eastern Railway, 12 miles farther away. The mine is conveniently reached from Medford by automobile over a road 30 miles long that passes through Eagle Point and Lake Creek. Development of the deposit by open cuts and drilling was begun in the fall of 1917 by the Manganese Metals Co., which later built a concentrating mill capable of treating about 20 tons of crude ore in 24 hours. Prior to July 15, 1918, the mill was operated intermittently and produced about 200 tons of concentrate. Late in the summer of 1918 Victor Rakowsky, of Joplin, Mo., prospected by drilling a part of the land controlled by the Manganese Metals Co., on which he had obtained an option.

The mine is about a mile above the junction of Lost Creek and South Fork of Little Butte Creek, on a northward-descending spur that separates the two streams. The altitude of Lost Creek is about 2,000 feet, and the summit above the mine rises from 400 to 600 feet higher.

The rocks are nearly horizontal basaltic flows and tuffs. A dense dark-gray basalt of a platy habit occupies the lower part of the slope east of Lost Creek. With the aid of a hand lens small laths of feldspar and grains of olivine are visible in it. Next above this is a layer of at least 100 feet thick of soft, porous brick-red tuff, and above the tuff, forming the top of the spur, is a basalt generally similar to that on the lower part of the slope. At the south side of the mine the rocks mentioned are cut by a steeply pitching diabase dike 10 feet wide that strikes east.

The main working is an open cut 100 feet long and from 20 to 30 feet deep on the uphill side. It is made on the steep west slope of the spur east of Lost Creek, at a level about 300 feet above the stream. At intervals for 1,000 feet or more northward to the turn or nose of the spur smaller cuts are made on the same level. On the summit, at the same or a slightly higher level, an area of 3 or 4 acres has been prospected by drilling. At a level about 40 feet lower an adit is run part way beneath the main cut.

The ore is found in the upper part of the red tuff as irregular veinlets and nodules. (See Pl. X, B.) The main cut exposes a layer of tuff 16 feet thick, the lower 10 feet of which is rather thickly crowded with these bodies. The other workings, including
the drill holes, show that the ore-bearing layer is practically continuous northward for 1,000 feet and that, at least on the nose of the spur, it extends a considerable distance under the basalt. A minimum thickness of 6 feet is shown in places north of the main cut, and one of the drill holes is said to have passed through 30 feet of manganiferous material. South of the main cut the ore-bearing layer is but by a diabase dike, beyond which for a short distance a little ore-bearing material is exposed here and there, but its extent in that direction is not determined.

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. The manganite is of fibrous to prismatic crystal habit, the aggregates commonly showing plumose forms. Sections of the ore bodies generally show an outer thin shell of psilomelane, succeeded by one or more concentric layers of manganite. In some nodules an unfilled space remains on the center. The soft oxides are practically confined to the upper or weathered parts of the manganiferous layer. Commonly they preserve the outward crystal forms of manganite. Locally a little gypsum occurs with the manganese minerals, and barite is reported in some of the ore. In the manganiferous layer, especially in the upper part, the tuff is more or less altered to a soft clayey material consisting largely of kaolin and iron oxides. A waxy pale greenish-yellow variety of kaolin is commonly associated with the softer manganese oxides.

The crude ore treated at the mill is reported to have averaged about 20 percent of manganese. This material was selected from the lower 10 feet of the manganiferous layer in which most of the harder oxides are found. A sample obtained by Mr. Pai s, representing the lower 12 feet of the layer at one place in the main cut, contained 14.86 per cent of manganese. Other samples most representing the upper part of the layer as exposed in the smaller cuts contained less, the minimum reported by Mr. Parks being 2.13 per cent. Samples of two car lots of concentrate reported by the Manganese Metals Co. carried 47.5 and 43.5 per cent of manganese, other samples of concentrate contained from 46.5 to 52.8 per cent of manganese, 11.1 to 14.5 per cent of silica, 1.4 to 0.9 per cent of iron, 0.09 to 0.20% per cent of phosphorus, and 0.02 to 0.16 ounce of gold to the ton. According to Mr. Rakowsky, the concentrate from a sample treated at Joplin, Mo., showed still more manganese and less silica than the samples mentioned above.

It is reasonably certain that the Tyrrell mine contains a large body of material that carries from 2 or 3 to 15 percent of manganese, the richer parts of which are probably workable under conditions approximating those of 1912. Most of the higher-grade material so
far developed is within 150 north of the diabase dike, though that rock evidently was not the source of the manganese. Probably, however, it shattered somewhat the adjoining mass of tuff, which was thus made more favorable for mineral deposition.
EXCERPT FROM

MANGANESE IN OREGON

Bulletin No. 17

STATE OF OREGON

DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1942

TYRRELL MINE
TYRILL MINES

Lake Creek Area

(formerly known as Manganese Metals Co.)

Owner: B. M. Bush, Lake Creek, Oregon, and others.

Location: W 1/4 SW 1/4 sec. 10, T. 37 S., R. 2E., extending into W 1/4 SW 1/4 sec. 10 and SW 1/4 SW 1/4 sec. 3.

Area: 80 acres.

History: Pardee (21:218-220) says that the Manganese Metals Co. developed the deposit in 1917 and built a 20 ton concentrating mill. Prior to July 15, 1918, some 200 tons of concentrate were produced. Late in the summer of 1918 Victor Rakowsky, of Joplin, Mo., prospected by drilling a part of the land controlled by the Manganese Metals Co. No work has been done on the property since that time.

Development: The main working is an open cut 100 feet long and from 20 - 30 feet deep. At intervals for 1000 feet or more northward smaller cuts were made at the same level along a tram grade. There is a total of 150 feet of tunneling; the main tunnel was forked in three directions. The workings have partially caved.

Equipment: There is no equipment on the property.

Geology: Pardee (21:219) states that "The rocks are nearly horizontal basaltic flows and tuffs. A dense dark gray basalt of a platy habit occupies the lower part of the slope east of Lost Creek. With the aid of a hand lens small laths of feldspar and grains of olivine are visible in it. Next above this is a layer at least 100 feet thick of soft porous brick-red tuff, and above the tuff, forming the top of the spur is a basalt generally similar to that on the lower part of the slope. At the south side of the mine the rock mentioned are cut by a steeply pitching diabase dike 10 feet wide that strikes east.

"The ore is found in the upper part of the red tuff as irregular veinlets and nodules. The main cut exposes a layer of tuff 16 feet thick, the lower 10 feet of which is rather thickly crowded with these bodies. The other workings, including the drill holes, show that the ore-bearing layer is practically continuous northward for 1000 feet and that, at least on the nose of the spur, it extends a considerable distance under the basalt. A minimum thickness of 6 feet is shown in places north of the main cut, and one of the drill holes is said to have passed through 30 feet of manganiferous material. South of the main cut the ore-bearing layer is cut by a diabase dike, beyond which for a short distance, a little ore-bearing material is exposed here and there, but its extent in that direction is not determined."
"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. (see Wells' discussion).

"Manganite is of fibrous to prismatic crystals habit, the aggregates commonly showing plumose forms. Sections of the ore bodies generally show an outer thin shell of psilomelane, succeeded by one or more concentric layers of manganite. In some nodules an unfilled space remains in the center. The soft oxides are practically confined to the upper or weathered parts of the manganiferous layer. Commonly they preserve the outward crystal forms of manganite. Locally a little gypsum occurs with the manganese minerals, and barite is reported in some of the ore. In the manganiferous layer, especially in the upper part, the tuff is more or less altered to a soft clayey material consisting largely of kaolin and iron oxides. A waxy pale greenish-yellow variety of kaolin is commonly associated with the softer manganese oxides."

"Most of the higher-grade material so far developed is within 150 feet north of the diabase dike, though that rock evidently was not the source of the manganese. Probably, 'never, it shattered somewhat the adjoining mass of tuff, which was thus made more favorable for mineral deposition."

Wells (39), in a general discussion of the manganese-bearing area says, -- "solutions permeating the volcanic series leached manganese and silica and transferred them to openings mainly in the breccia member."

Tenor of ore: Pardee's (21:210) examination showed that:

"The crude ore treated at the mill is reported to have averaged about 20 percent of manganese. This material was selected from the lower 10 feet of the manganiferous layer, in which most of the harder oxides are found. A sample -- representing the lower 12 feet of the layer -- contained 14.36 percent manganese. Other samples mostly representing the upper part of the layer -- is reported -- being 2.13 percent. Samples of two car lots of concentrate reported by the Manganese Metals Co. carried 47.5 and 49.5 percent of manganese; other samples of concentrate contained from 46.5 to 52.3 percent of manganese, 11.1 to 14.5 percent of silica, 1.4 - 0.9 percent of iron, 0.09 to 0.207 percent of phosphorus, and 0.03 to 0.16 oz. of gold to the ton."

Samples out by the Hodge survey (37:15) showed:

"#07, a 5-lb. grab sample of concentrates:

<table>
<thead>
<tr>
<th>Manganese</th>
<th>56.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>310</td>
<td>9.36</td>
</tr>
<tr>
<td>FeO 35% FeO</td>
<td>2.40</td>
</tr>
<tr>
<td>Fe 50</td>
<td>0.045</td>
</tr>
</tbody>
</table>

2."
20, 23 lbs. across 8 ft. of small ore body in shorter adit assayed for manganese only:

**Manganese**

12.74

Samples taken by Libbey (Grants Pass State Assay Laboratory) with checks by B. F. Webber (W. A. Markert, Iron River, Michigan):

<table>
<thead>
<tr>
<th>Libbey</th>
<th>Webber</th>
</tr>
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<tbody>
<tr>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>#1</td>
<td>2.47%</td>
</tr>
<tr>
<td>2</td>
<td>0.47</td>
</tr>
<tr>
<td>3</td>
<td>2.41</td>
</tr>
<tr>
<td>4</td>
<td>8.20</td>
</tr>
</tbody>
</table>

#1 - S. Wall, short tunnel from cut about 200 feet south of N. end of old train road bed.

#2 - About 8 feet of red tuff with sparsely disseminated manganese oxides above short tunnel of #1 sample.

#3 - Red Tuff 4 feet thick, middle of cut at N. end of old train road bed.

#4 - Cut 100 feet E. of N. end of old train road bed, 4 feet of tuff just above floor of cut.

**Summary:** This property has had more work done on it than any other manganese deposit in southwestern Oregon. Ore was mined and concentrated here during the first world war. There are 150 feet of underground workings, (now largely caved), a large open cut, and, reportedly, 15 churn holes were drilled. The mill, built in 1917 and now demolished, had a capacity of about 20 tons in 24 hours.

Mined ore is reported to have assayed 14-20 percent manganese for the highest grade and ranged down to 2 percent. Manganese concentrate assayed from 46.5 to 52.8 percent manganese.

The tenor of the rock is low, and probably will not average over 10 percent manganese in hand picked ore as at present exposed. In most of the rock it will average between 1 - 3 percent. In the case of such an irregularly disseminated ore it is impossible to predict economic possibilities in advance of systematic exploration.

The ore consists of manganese oxides filling cracks and cavities, and in part replacing the tuff. The ore zone is poorly defined; the tenor varies markedly in different sections; drilling appears to be most feasible method of exploration.
Some geologists believe that manganese minerals were concentrated near, and originated from, a nearby diabase dike. Others are inclined to agree with Wells (39). Occurrences of manganese at other localities in the Lake Creek area tend to support the opinion of Wells.

If the deductions of Wells (39) are correct, a drilling program might outline commercial ore. But by the same token it is difficult if not impossible to predict ore possibilities from exploration work done to date. A favorable factor is that the manganese minerals present make a metallurgical grade concentrate.

FOX PROSPECT (also known as Sierra Metals Co.) Lake Creek Area

Soft manganese oxides, exposed in shallow cuts and trenches, occur in pores and cavities of tuff. No ore is developed. It is assumed that the Fox prospect is the same as the Sierra Metals Company described by Pardee (21:222)

Location: sec. 17, T. 37 S., R. 2 E., on ridge between Lake Creek and Lost Creeks.

Authority: Wells (39)
Pardee (21:222) describes the claims as follows:

"Several claims belonging to the Sierra Metals Co. are on the wide flat ridge between Lake Creek and Lost Creek, about 3 miles southwest of the Tyrrell mine. They include an area of red tuff that crops out at altitudes ranging from 2500 to 2700 feet. A few shallow pits show a little soft manganese oxides here and there in the pores or cavities of the tuff. In places the red tuff is overlain by remnants of a bed of gray tuff, and in places large boulders of a brown jasper quartz containing seams of manganite are scattered over the surface. No ore is developed".

op. cit. 4.
TRANSCRIPT OF CONTEX TO TERRAIL MINE
On Obverse side of the
BEDFORD QUADRANGLE
PRELIMINARY GEOLOGY
MANGANESE

Two types of manganese deposits are found in the Medford Quadrangle; rhodonite-bearing veins and lenses along bedding or cleavage planes, and deposits of oxides and hydroxides of manganese, which fill open spaces. The rhodonite deposits occur only in the pre-Cretaceous rocks of the western part of the area, and are best illustrated by Bailey's prospect (No. 15). Rhodonite, a manganese silicate, has a vitreous luster, is commonly pink, and cannot be scratched by a knife. In all these veins the rhodonite from the surface to a depth of several feet has been partly or completely changed by weathering to black manganese oxides. As no economic method of obtaining manganese from rhodonite has been devised, deposits of this mineral have no commercial value at present.

Deposits of manganese oxide filling open spaces are found in the Tertiary volcanic rocks of the eastern part of the Medford Quadrangle. All found thus far lie within the Lake Creek district, an indefinitely bounded area that includes the drainage basin of Little Butte Creek east of Eagle Point and the contiguous area just north of the Medford Quadrangle. Outcrops of manganiferous material are scattered throughout the district and the rocks that contain them are commonly colored dark red by iron oxide. The larger deposits are confined to one member, composed in part of flow breccia, and in part of tuff and breccia of explosive origin, and to fault breccia close to this member. Although the manganese was deposited mainly in cracks and irregularly shaped cavities, it has clearly replaced some of the enclosed rocks to a minor degree. In the upper part of the breccia member most of the oxide masses are soft and sooty and in the lower part they are rather hard and compact. Most of the harder material probably consists of manganite with minor quantities of pyrolusite and other oxides. A small part consists of psilomelane. Soft but coherent wad of low specific gravity occurs in places throughout the breccia and powdery or sooty varieties of wad are found generally in cavities in the upper part. A soft, brown, unidentified oxide composed of bronzy-lustered scales is widely distributed in small amounts. Locally kaolin, calcite, gypsum, barite, zeolites, and a trace of gold, are associated with the manganese minerals. In most places the material exposed at the surface is estimated to contain from 0.5 to 3 percent of manganese, but at the Tyrrel Mine (No. 6) and at Newstrom Prospect (No. 5) irregular masses of several tons are known to contain from 10 to 20 percent. Owing to the comparative softness of the tuff it is very easily separated from the harder manganese oxides by gravity separation, but the soft manganese minerals of low specific gravity may be difficult to recover.
The main factor in the localization of ore is the presence of permeable rocks with openings of any kind. Obviously the breccia member is the most favorable place for prospecting and the most favorable places within this member are along faults. This structural control is best illustrated by the Tyrrell mine.

Although these conditions have accounted for the largest deposits, prospects are present in vesicular flows (for example, the Vestal and Black prospects north of the quadrangle), but they are also in the same general part of the volcanic series as the breccia member.

A complete explanation of origin would be premature at present, but certain inferences are appropriate. The character of the altered rocks implies that solutions permeating the volcanic series leached manganese and silica and transferred them to openings mainly in the breccia member. Whether the leaching took place at some distance from or within the breccia member is not clear. The prevalence of iron oxide that has discolored the breccia and other rocks in and around the deposits implies that the solution that brought the manganese oxidized but did not remove much of the iron. The more soluble manganese could have been removed from this rock but the amount of manganese is too great to be accounted for by such local leaching.

Although the manganese deposits have doubtless been modified by circulating groundwater derived from the present surface, the facts enumerated above seemingly imply that the major concentration of manganese took place prior to the formation of this surface. This inference is supported by the facts that the manganiferous layer is overlain in places by unaltered flows and that erosion has been too rapid to permit much concentration of manganese just below the present surface.

The Newstrom (No. 5) and Tyrrell Mine (No. 6) are the two most promising prospects in the area. Other prospects are the Brown (No. 4), Just (No. 7), Fox (No. 8), and Coon Creek (No. 9) prospects.
(Tyrrell Property)

REAGENT LIST

Na$_2$CO$_3$  Soda Ash
           Sodium Silicate
  61 A    Sodium Oleate
  40 E    Commercial Oleic Acid
Sample of Manganese Ore from Tyrrell Property, near Lake Creek, Oregon, sent by Mr. Virgil L. Berardini and Mr. George L. Holmes.

Date: May 26, 1942.

<table>
<thead>
<tr>
<th>Reference: 34-273-1</th>
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</table>

<table>
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<th>Product</th>
<th>% Wt.</th>
<th>% Mn</th>
<th>Assay</th>
<th>DISTRIBUTION %</th>
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</thead>
<tbody>
<tr>
<td>Heads</td>
<td></td>
<td>13.22</td>
<td>Assay</td>
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<tr>
<td>76293 Heads</td>
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<td>12.54</td>
<td>Calc.</td>
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<tr>
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<td></td>
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<tr>
<td>76301 Table Midd.</td>
<td>9.33</td>
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<td>76302 Table Tail</td>
<td>52.83</td>
<td>3.58</td>
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<td>15.08</td>
</tr>
<tr>
<td>76303 Untreated Slimes</td>
<td>22.37</td>
<td>8.32</td>
<td></td>
<td>15.74</td>
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<tr>
<td>Table Tail + Slimes</td>
<td>75.20</td>
<td>5.14</td>
<td></td>
<td>30.82</td>
</tr>
</tbody>
</table>

PROCEDURE: 20 mesh ore was deslimed. Sands were tailed one pass making Concentrate, Middling and Tailing. Middlings were retailed, making Concentrate and Tails. Like products were combined. Combined Concentrates were sized at 65 mesh. Oversize was reground to pass 65 mesh and the whole was then retailed three passes for clean concentrates. Resulting concentrates were combined for assay.

C. F. WILLIAMS

Engineer in charge of testing.
Sample of Manganese Ore from Tyrrell Property, near Lake Creek, Oregon, sent by Mr. Virgil L. Demartini and Mr. George L. Holmes.
Date: May 26, 1942.
TEST NO. 2
Sample No. 76293
Weight tested 190 grams.
Reference: 34-273-2

<table>
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<tr>
<th>Product</th>
<th>% Wt.</th>
<th>% Mn Assay</th>
<th>Mn</th>
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<tbody>
<tr>
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<td>13.25 Calc.</td>
<td>100.00</td>
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<tr>
<td>76319 Flot. Conc.</td>
<td>10.55</td>
<td>39.67</td>
<td>31.59</td>
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<tr>
<td>76320 Table Conc.</td>
<td>9.09</td>
<td>48.23</td>
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<tr>
<td>76321 Flot. Midd.</td>
<td>7.92</td>
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<td>8.93</td>
</tr>
<tr>
<td>76322 Table Tail</td>
<td>47.40</td>
<td>3.52</td>
<td>12.59</td>
</tr>
<tr>
<td>76323 Flot. Slime Tail</td>
<td>25.04</td>
<td>7.29</td>
<td>13.79</td>
</tr>
<tr>
<td>Flot. Conc. + Table Conc.</td>
<td>19.64</td>
<td>43.63</td>
<td>64.69</td>
</tr>
</tbody>
</table>

PROCEDURE: Minus 65 mesh dry-ground ore was treated by flotation, making a rougher flotation concentrate and a tail. The flotation tail was deslimed and the sands tabled, making table concentrate and table tail. The flotation concentrate was recleaned once.

Rougher treatment

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Silicate</td>
<td>1.5 lb/ton</td>
</tr>
<tr>
<td>Na2CO3</td>
<td>1.0 &quot;</td>
</tr>
<tr>
<td>61 A</td>
<td>3.0 &quot;</td>
</tr>
<tr>
<td>40 A</td>
<td>2.5 &quot;</td>
</tr>
</tbody>
</table>
Conditioned 3 minutes. Frothed 7 minutes.

Retreatment

No reagents.
Frothed 3 minutes.

C. F. WILLIAMS
Engineer in charge of testing.
Sample of Manganese Ore from TYRRELL MANGANESE MINE, Lake Creek, Oregon, sent by Mr. Virgil De Martini.
Date: June 10, 1942.
TEST NO. 1
Sample No. 76369
Weight tested 1254 grams.
Reference: 34-277-2

<table>
<thead>
<tr>
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<th>Mn</th>
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</thead>
<tbody>
<tr>
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<td>26.17</td>
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</tr>
<tr>
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<td>30.30</td>
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<tr>
<td>76377 Table Midd.</td>
<td>13.71</td>
<td>29.57</td>
<td>7.59</td>
</tr>
<tr>
<td>76378 Table Tail</td>
<td>35.65</td>
<td>5.57</td>
<td></td>
</tr>
<tr>
<td>76379 Slimes</td>
<td>20.34</td>
<td>17.35</td>
<td>13.49</td>
</tr>
<tr>
<td>Table Conc. + Table Midd.</td>
<td>44.01</td>
<td>46.93</td>
<td>78.92</td>
</tr>
</tbody>
</table>

Ratio of concentration 2.27 to 1

PROCEDURE: Minus 20 mesh dry-ground ore was deslimed. The sands were tabled making a finished Concentrate 1, a Middling and a Final Tail. The Middling was screened at 48 mesh and the oversize stage ground with intermediate screening at 48 mesh until all the pulp passed the screen. The -48 mesh Middling was tabled, making a finished Concentrate 2, and a Middling which in practice could be further sized and tabled for grade.
Bulldozing Surface Trenches on Ore Deposit.
Surface Trenching and Sampling.
Open Cut No. 1 South,
Showing Basalt Capping
and Working Tunnel.
Another Outcrop Along West Rim.

General View of Valley from Mine.
Notes on Tyrell (Manganese) Mine
Address - Tyrell Mine, Lake Cr., Ore.    Wallace J. Lowry
Lake County, Jackson Co.
July-Aug. 1942

Name - Tyrell & associated Mn properties
Lake Cr. District, Jackson Co.

George de Martini - owner
1234 Folsom St.
San Francisco, Cal.

George Holmes - mining engineer
24 California St.
San Francisco, Cal.

Claims located in Secs. 2, 9, 10, T 37 S R 2 E
Medford quadrangle

History - Some ore mined & milled
during World War I. Probably 200 tons -
estimates of produced concentrates (47-52.6 % Mn)
Ore ran about 20% (Holmes)

May 22, 42 de Martini bought property from B. M. Bus
Bush acquired property from Tyrell
who first declared property
Tyrell and assoc. properties, Lake Co. district. July 28, '42
Secs. 3, 4, 9, 10 T. 37 S. R. 2 E. El. 2200'2
Medford quadrangle

Investigation of type, location, and extent of manganiferous ore.

1. Drift south of Tyrell property.

Diagram 1. Plan view

Rock at tunnel entrance is reddish brown fault breccia.
Rock at end of adit is slightly amygdaloidal vesicular reddish gray basalt.

T-1 Tyrell: Manganite, + associated (calcite) carbonate in faulted zone near entrance
T-2: Basaltic rock with carbonate + Mn oxide mineral crystals.

The main enrichment is found along the faulted zone near the entrance and peppers out.
toward the E end of the drift. Some of the
small faults show gouge. The enrichment
in the tumbled zone may be explained by the
resultant greater permeability of the rock.
West sides have moved relatively downward.

To the present, the occurrence seems
associated with the contact between the
capping plate, basalt, and the underlying
tuff. A permeable, lower portion of the
capping basalt may supply the Mn to leaching
solutions which, upon moving downward
to the tuff and meeting possibly less porous
rock, a more acid rock, deposit the Mn in
the form of manganite and associated oxides.
Carbonate (calcite?) is also found with the
manganese oxides and may have a similar origin,
deposited as such from the leaching solution.
If carbonate is present as calcite, then
manganosite should be looked for.

Shakeside above the opening evidence
relative downward movement of the west
side. About 25' inside, the drift on the N
wall is shakeside. Metallic (MnO) smears
may indicate movement after mineralization,
though from lack of commonness of
phenomenon it is more likely slight
recurrence of tainting after mineralization.
Further examination shows that if there be
smearing of Mn oxide, it is of little importance.
A may well not exist at all. Does not exist.
\[ T-3 \quad \text{Porphyritic basalt or diabase from dike. Feldspar is andesine-labradorite. A slight enrichment occurs along the N side of the dike but there is no reason to believe that it has any connection with the Mn deposition as enrichment is more uniform than otherwise both in the brecciated rock and the N + occurrence of Mn is nearly as extensive 3 mi. to the N as here. The diabasic dike is the feeder source for the porphyritic basalt flows which occur on the top of the ridge somewhat to the SE.} \]

\[ T-4 \quad \text{Porphyratic basalt} \]
Several resistant chimney- or pinnacle-like rocks stick up 6' above the slope and above the road-way level. The rock is a scoriaceous basalts, probably preserved above slope level by its tenacity.

T-5 Scoriaceous Basalt

Check T-4 against T-8 and T-9 to prove existence of fault along Lost Cr. The rocks on both sides appear of similar character, sequence and the actual presence of fault, congs, slickensides which indicate movement of the W block down (relatively) strongly support the idea of block faulting in this area.
Manganese, associated properties, tale Cr. District
T-375 R2E Medford quadrangle

SW 1/4 NW 1/4 Sec 10 T 37 E R 2 E El. 2300. July 27, 1942
T-6 Scarious basalt with manganese

pockets

T-7 DK gray platy basalt

SW 1/4 Sec 9 T 37 E R 2 E El. 2450.
T-8 Porphyritic basalt (andesine feldspar

SE 1/4 SE 1/4 Sec 8 T 37 E R 2 E El. 2700.
T-9 Porphyritic basalt. Near it occurs
tuffaceous andesitic basalt.

In the NW 1/4 Sec 16 occurs a fine platy dark
gray basalt which may be the same as
that covering the tuff across the creek to
the NE. A fault may well exist but
actual movement surfaces & definite
correlation of rock types to prove repetition
of sequence are needed to prove this idea.
If reptation is present similar ones may
be located along the contact between
bull tuff & basalt in the surrounding areas.
the manganese is restricted to the lower five or slightly more feet of the scoriaceous basalt. The fact that the mineralization is poor at the lower contact and that the mineralization is restricted to the lower portion of the scoriaceous basalt favors a leaching-deposition mode of origin. Though the manganese enrichment may occur to several or even 10 ft below the contact, it does not appear well developed immediately below the contact here though above, the enrichment is marked. This is evidenced in the cuts some 100 yds to the N where the tuff is almost barren of manganese minerals or stains. Scars of a powdery white mineral slightly soluble hints that at times these tuffs were saturated with water and certain salts precipitated from solution. The mineral may be a massive form of gypsum (CaSO₄·2H₂O) known as alabaster. 

No. 10. White ppt. of dolomite (CaMg(CO₃)₂) + some clay with possible dolomitic clay + carbonates.

S E 1/4 NW 1/4 Sec. 10 T 37 S R 2 E El. 2250 ft.

Again manganese mineralization occurs in the scoriaceous basalt. With it and in close association with the Mn oxides occurs various carbonates (calcite + Mn, Fe carbonate probably gradational).

No. 11. Red vesicular + scoriaceous basalt with Mn oxides + carbonates.
The chemistry of the mineralization is not known, but these suggestions are worth noting. The sponaceous basalt (not manganoferous) allows ready percolation by meteoric waters charged with CO₂. The HCO₃⁻ ion may unite with the Mn⁺⁺ ion (more soluble than Fe⁺⁺) to form soluble Mn(HCO₃)₂. The meteoric waters percolate down through the sponaceous basalt until they lose their motion due to the less pervious underlying tuff layer. Thus the zone of aeration or oxidation may be located for the most part above the zone of saturation. The tuff forms. The O⁻ ions and OH⁻ ions in the solution, due to a slowing of motion of the water, have a chance to react with the Mn⁺⁺ ions which have become concentrated by increased leaching from above. Thus various insoluble manganese oxides and oxy-hydroxides may form. Being insoluble are precipitated where the solutions are found in the rocks, i.e., as fillings in cracks, crevices, and vesicles, likewise the Ca⁺⁺ ions (also leached from the rock by meteoric waters) react with the CO₃⁻ ions to form insoluble CaCO₃. Similarly Mn⁺⁺ and Fe⁺⁺ may form carbonates.
Primary mineral (e.g. scheelite - a manganescopyroxenite [Fe⁺⁺ often present])

\[ R SiO_3 \quad R = Mn^{++} + \text{some Fe}^{++} \]

\[ Mn(Fe) SiO_3 \]

Solution: \( Mn(Fe) SiO_3 + H_2O + CO_2 \rightarrow \)
by metakaolin \( Mn^{++}, Fe^{++} + HCO_3^- + H^+ \rightarrow SiO_2 \text{(colloidal)} \)

\( \text{wetness} \rightarrow Mn(HCO_3)_2 + SiO_2 \text{(colloidal)} \)

Oxidation:

\[ Mn(HCO_3)_2 + O^- + H^+ + OH^- \rightarrow MnO_2 + Mn \text{ oxy-hydrates} \]

Here CO₃⁻ reacts with Ca²⁺ to ppt CaCO₃

NW 7 Sec 15 T 37 S R 2 E El. 2300′

Baker claim:
The N portion of the workings of the N consists of 2 drifts
+ one reported winze which may be seen by the ladder and timbers now largely covered up by back fill.

Diagram 5

Mineralization seems restricted
largely to scarpous + open areas
in the fault zone. The material in
the face of both drift A + B is little
mineralized. The rock is tight and probably a fine-grained slightly porphyritic basalt. The pockets or vugs of manganese oxide are manganese carbonate and have associated calcite. The open centers of many of these fillings in their divergent botryoidal character favors a formation of the manganese minerals by precipitation from solution rather than by volcanic emanations. The lower contact of all the basalt flows is not seen here.

Section of workings

Diagram of location

Mineralization here seems restricted largely to the spongy basalt layers. The stems in the b.l. are poor. The basalt strikes about 105° W of N and dips several degrees to the E.

Outline below Diagram of location
Newstrom Manganese property.  
NE # Sec 34 T36S R2E El. 2500  
Lake Cr. district. Jackson Co.  
Medford quadrangle No.5  

deMartini is purchasing mineral rights from  
Gus Peck (Peck) Lake Cr. Oregon  
Peck purchased land from Brouse  
Kroos got it from Newstrom. Scott  

Sec. 34  
T36S  
Mn mineralization  

did work (prospecting) for Newstrom during  
World War II. No ore mined or milled.  

Location SE # NE # Sec 34 T36S R2E El. 2500  
On west slope of W-facing scarp like  
ridge front made up of basalt flows of  
scoriaceous breccia + flow rock of  
dense character. The 1/2 Section corner is  
ESE of the mine and somewhat SW of  
large dead pine tree near top of ridge.  
The SE section corner is SE of the Peck  
house and some 50' E of the gate  
along the road to the house. A fallen  
laurel witness tree is to the S & a fallen  
ash witness tree to the N. These may be
best means of trying in the survey here.

Mineralization - Stains + open fillings of manganese oxides (pyrolusite -ward) in a scoriaceous basaltic flow breccia or agglomerate. Oxides scattered throughout the agglomerate and mineralization best in lowest 8', continues up 30'. If this agglomerate continues downward (as seems likely.) then the mineralization may improve.

Indicent prospect hampers an evaluation of the mineralization but it may be of economic value as shown. Panning, after grinding, indicates the Manganese separate quite well from the country rock. Grinding would appear to be a relatively simple process. Oxidation appears to have uplifted the No. 12 Mineralized scoraceous rock (basalt) Me from meteoric solution. Mineralization is similar to that of the Tyrrell property to the S.

Workings - Several (3 seen) W-E open cuts into ridge. From 10'-15' long.

Geology - The mineralized rock is a somewhat brecciated scoriaceous to vesicular basalt. This rock + more dense basalt it appears to form the rest of the ridge above. Below 10'4' it appears to be the contact of basalt.
with a possible tuffaceous rock. The decrease in slope and light grey to cream soil indicate, though no exposures could be found, the rocks have a dip of several degrees to the east.

The hill to the SW of this property, immediately W of Peck's house, is made up of a medium grained basalt.

8E 1/4 sec. 13  T 56 S  R 2 E
No. 13869 A25

There is some white tuff occurring well up the road to Peck's. This may be the tuff filling under the basalt flows at the open cuts.
Plan table survey of Tyrrell Manganese

Station 1-0

Middle of Strike N30W 1-1 E end of open cut (height of cut) No. 1

Test pit 24' to N - in soil and light brown tuff 10' deep, 7' N-S, 3' E-W. No Mn mineralization.

Road is between open cuts 1-1 + slightly fault E of E end of cuts

Depth of cut 8' at center to 0' at both ends.

Red brown v gray tuff layers with slight dip (several degrees) to E. Irregular seams (1'-5') wide roughly II to the bedding - probably gypsum (gypsum). 2' layer toward west shows little Mn

Cross section S wall

1-3 Test pit 8' deep, 8' N-S, 4' E-W

In tuff little Mn shown only

Another test pit 8' deep, 8' N-S, 4' E-W

36' N of 1-3 in brown tuff with 5' soil on top. No Mn shown

1-4 Middle E end of open cut No. 2

Test pit 6' N of above cut near center 8' N-S, 2'-3' E-W, 4' deep

No mineralization. West horizon barren

Test pit 4' S of above cut + so of above test pit 8' N-S, 2' E-W, 4' deep
1-5  Middle W end of open cut No. 2  Strike N 80° W
90' long x 12' wide, 0' both ends, 9' deep
at center (3' below elev.  W. end shut (1-5)
Cross section of Swell

E  
Brown tuff with
unorganized white seam (intersecting W)
4' thick
brown tuff
No mineralization
layer
boulders tuff fragment up to 6' in diameter
Mn stains & coatings in this horizon

W

1-6  Middle E end of open cut No. 3
1-7  Middle W end of open cut No. 3
80' long x 12' wide, 0' at both ends deep, 6' deep
near center  Strike N 80° W
Cross section of Swell

E

Brown tuff with white seams + veinlets
Gray tuff
(Rhyolite) tuff breccia
of gray color, stained brown
Mn stains, coatings, small pocket fillings

W

Strike of bed is same 20° W of N + dip 10° 15' to
the E
1-8 End of man-made trench 18' from
1-9 West end of man-made trench Strike N70° W
60' long x 7' to 1' deep 7' 2' wide
Cross section of S wall

E
W

Lt gray, shaly
DK gray, top 2-3
Brown tuff breccia
(Gray breccia)

Same white nearly horizontal breccia
(Nearly barren of Mn mineralization)

This tuff breccia has a pseudo pebbley appearance, as the thin beds to cut outside of gray tuff breccia fragments, staned brown on the outside where Mn oxides haven’t coated them. Mn mineralization is better than at cuts No. 1 & No. 2

1-10 Middle E end of open cut No. 4
1-11 Middle W end of open cut No. 4
80' long x 12' wide x 5' both ends
Cross section

Gray tuff breccia
with Mn mineralization
Tuff largely stained brown
Mineralized fairly uniform in this cut
1-12 Middle E end of Open Cut No. 5

N 100' long x 12' wide x 2' deep

Diagram:

Brown-stained gray tuff breccia
with Mn mineralization. Brown stained
dark unconsolidated gray tuff breccia
with less Mn mineralization.

1-14 To Station 2-0 on E edge of road

2-0

2-1 E end of man-made trench

Open pit 20' to E, 6'4" N-S, 3' E-W, 5' deep

Brown-stained gray tuff breccia with some
Mn across shown throughout horizon of tuff

Trench Strike N-70° W

180' long x 21' wide by 2'9' deep

cross section of S wall

Diagram:

Brown mineralized

Gray tuff breccia

Light brown shale

Gray tuff breccia

Beart Mn mineralization yet
2-2 Middle of E end of Open Cut No. 6
2-3 Middle W end of Open Cut No. 6
Strike N 80° W
100' long x 13' wide x 0.6' max. in ends, ave. depth 6'

E

Gray argillite with reddish brown staining more common than gray color.
Mineralization quite uniform, distributed but shallowness of cut prevents any conclusion idea as to its extent. There hasn't been a sharp break from the 1-7 to the present, i.e., since open cut No. 3

2-4 On road between open cuts to E & to W
2-5 E end (middle) cut No. 7
2-6 W end (middle) cut No. 7

W
Tyrrell Property
Sampling Location
Open cut along old roadway level and where agglomerate pillows are shown. Locate when surveying mark.
Sample 1: 6" channel cut approx. 1" deep in agglomerate in vertical direction for 6.2'. Sample cone quarried. This exposure is the best known ore yet seen.
Send to Grants Pass office of State Dept. of Coal + Min. Ind. for assay.
Below this layer the mineralization rapidly diminishes as shown for 12'. Upwards the decrease is less rapid.

Sample 2
6" channel cut approx. 1" deep and 4' vertical extent. Ground is improving at bottom and that shown near opening floor may dip slightly to E. Open cut along old road S of 1st location. Will be shot in. Sample cut from drift to E about 15' inside adit entrance on S wall. Is mineralization localized to fault line on.
Samples 3

Main drift - Baker claim
6" wide X 1" deep X 4' long vertical channel
on back + N wall 6" wide drift opening.
The ore here is spotted but rich in spots,
being located in a fault zone. The assays
on this 8 oz. high can be expected
from a fair sample of the better
mineralization shown at any of the
workings.
Coon Cr. Manganese
Sec 20 T 37 S R 2 E El. 3100
Lake Cr. district Jackson Co.
Medford quadrangle No. 9

C. H. Herman (vice-pres) Timber Products Co., owner
Medford, Oregon

Working 6x4 shaft 24' deep, windless
Country rock is basaltic scoriaceous agglomerate
and dark gray plagioclase basalt. The agglomerate
contains some manganese in the form of
brenes and cinerose of fayalite, etc.

The breccia or agglomerate is underlain by
plagioclase basalt. Although the rock (agglomerate)
in which the Mn occurs is similar to the
Tyrrell property there is no contact with
another for shown in the vicinity.

Volcanic bombs are found aff'mes in the
breccia. It would appear that no extensive
mineralization has taken place as work may
work through agglomerate to plagioclase
basalt without much loss of velocity.

There is much agglomeratic material,
but everything it showed only very
little manganese. Much SIO3 in basalt veins.

No. T-14 A & B Plagioclase basalt
No. T-15 A Scoriaceous basalt with Manganese
P. Scoria C. Mn oxides
Aug 4, '42
V.S. Cloudy, warm

Continue plane table survey
Open cut No. 7

Strike:

Cross section of sides:

Plan view of cut

125' long x 12' wide x 0' - 2' deep

2-6 On road middle of cut No. 8

Open Cut No. 8 12' wide

Plan view 0' - 2' deep

2-7 Station shot to E end of Open Cut No. 9

3-0
3-1 Middle W end Open Cut No. 9
3-2 Middle E end
Open Cut No. 9. W of road shows very little Mn mineralization. The rock is a mixture of the basalts at the lower end of the cut and the platey basalt higher up to the S of Sta. 3-0, E of road. There is but very little mineralization—only small drops. Mn stains on somewhat more dense basalt.

Between Open Cuts No. 8 & No. 9, the mineralization rapidly peels out.

3-3 On road at Cut No. 10

Strike N 75° W 12' wide x 6' deep

Cut is in dark gray fractured dense basalt (T-7)

No Mn mineralization, but Mn stains (coating) are dendritic.

3-4 On road at Cut No. 11

120' long x 12' wide x 6' deep

In fractured dark gray slightly porphyritic basalt.

3-5 Station short to S

4-0 Dark gray basalt

4-1 Station short to S S E of last cut

5-0 Dark gray basalt
5.1 Station shot to SW, 10' N of road fence

6.0 Dk. grayish basalt

6.1 Station shot to SW, old road level, 40' N of largest open cut (Baker property)

7.0

7.1 Top of E side open cut (18'-25' wide

7.2 S side of phyllic basalt dike.

7.3 N side of phlyritic basalt dike, directly above southermost drift

7.4 To fault bounding E side of open cut at its N end, W block moved relatively down.

Shales side.

Sample No. 3 cut from N wall of this drift 12' inside portal.

Mineralization rapidly dies out 10' inside drift. Mineralization restricted to more.

Anhydrite zone. Reddish-brown iron oxides also restricted to more open (hence more

mineralized) section. The basalt here is very basic, fractured, faulted, much

clay breccia; shale andesite present.
The mineralized zone here is 8' wide (E-W) and runs slightly E of south. Has nearly vertical attitude. Consists of two belts 8" to 12' wide. The mineralization here is confined to a badly faulted zone and the indication of several faults may increase the porosity to permit mineralization. Both drifts E of crosscut to S show no mineralized zone of note. Both are of no commercial interest.

Fault Breccia zone W of portal is some 40' wide. This N 15° W - S 15° E trending fault zone is the main direction of displacement of the zone taken as a whole.
Southernmost drift

Mineralization occurs in basaltic fault breccia.
Some 15' wide, nearly vertical zone. Trend of zone N 15° W.

7-6 To E-W fence. Some mineralized aggregate.
7-7 Station shot to N. on old road (Trimmer).
8-0 Porphyritic dk gray basalt.
8-1 Station shot to N. on old road.
9-0 W of old drift tunnel. Sample No. 2 cut near here.
9-1 Portal opening of drift to east.
Rock is of scoriaceous basaltic fault breccia or agglomorate. Somewhat faulted in a N 20° W direction. Faults dip 80° to W. ½ mile to 2 inch gauge zone. Displacement here are small, esp. in comparison to main fault zone which would be west here. This rock is fairly uniformly mineralized and if the property be of...
economic importance, then this is type of ore rock that must be counted on to give the main tonnage. Sample No. 2 was cut from the drift and is probably slightly below the average of the drift. As the Mn minerals are largely pyrolusite nodules, the recovery may be lowered due to floating of these pyrolusite nodules. The first agglomerate of similar character is seen near face to S (7-6).

9-2 Station shot to N at end of old road

10-0 Rock is a reddish basalt agglomerate. Mineralization is shown to some degree in outcropping pyrolusite rocks but is first of similar occurrence at instrument level at this station (10-0).

10-1 Station shot to N. Sample No. 1 cut 20 ft. to E of station (11-0)

Aug 6, '42

11-1 E to columns of basaltic agglomerate or coarse tuff breccia. Vesicular or conchoidal texture. Sample No. 1 cut here. Here at lowest exposure of contact between agglomerate and red tuff at station (11-0) level.

11-2 Station shot to E

12-0 Here 73% of agglomerate well mineralized. Poor above.

12-1 Tie-in shot to Sta. 3-0

13-16 Shot W to N-S fence, 280 ft. of gate

13-0
Geology of Tyrrell property and environs

The manganese mineralization occurs in an agglomerate of basaltic composition. Overlying the agglomerate, probably gradationally, is a dark gray slightly porphyritic (labradorite phenocrysts) basalt. Spec. No. T-7. These rocks strike slightly west of north and dip 10° to the east. This platy basalt gives way to a coarser ground rock of basaltic character. Spec. No. T-4. A felsidike source is found.

As yet it cannot be said what rock underlies the mineralized agglomerate. It may be a tuff of brownish color. Its composition can be given.

A fault or fault zone fronts the ridge of the mineralized area, etc. to the W. It strikes about N 20°W. A spring about halfway between Station 10 and 13-0 is supporting evidence for its continuation northward. Below the fault, to the W (around St. 13-0), dark gray basalt (equivalent to T-7) No. T-16 is underlain by a brown agglomerate or tuff breccia. No. T-17. The dark gray
fine-grained basalt is thought equivalent to the capping basalt of the mineralized agglomerate of the main ridge. All the coarser-grained basalt and scoriaceous basalt are found around Sta. 13-0, the column may not be repeated here exactly by faulting. The basaltic flow rocks seem to have an E-W nearly vertical, aligned flow structure in places. It is wondered if the brown tuff breccia found along the road slightly NE of the ranch house. There is chance that the tuff underlying the mineralized agglomerate is its correlative.

T-17  Tuff breccia
T-16  Dark gray fine-grained basalt
SE corner Sec 4 T 37 S R 2 E El 1900

Dk gray fine grained platy basalt overlies brown agglomerate. The basalt strikes about

T-19 A Dk gray fine grained platy basalt + B Assoc. scoria.

T-19 Brown - tuff

N-S + dips several (10°) to the E. To the

E (sec. 3) the basalt shows a vertical alignment
which is believed related to faulting rather
than a dke structure (fine grained + no limit).

This area appears to be a portion of a block
moved down in relation to the ridge to
the E where the Mn claims are located.

SW 1/4 NE 1/4 Sec 3 T 37 S R 2 E El 1900

A porphyritic dk gray basalt makes up
this district and that to the S which forms
the back slope of the ridge where the
Mn mineralization is found.

T-20 Dk gray porphyritic basalt

Butte SW 1/4 Sec 10 T 37 S R 2 E El 2500 - 2700

This area is made up largely of dk gray
porphyritic basalt. A white (andesitic?) tuff
is believed to be an inter-flow in the basaltic
series.

T-21 Dk gray porphyritic basalt

T-22 White tuff

SW corner Sec 3 T 37 S R 2 E El 2100

T-23 Agglomerate
Ridge west of Lost Cr. This ridge is made up of basaltic flow rocks. Lots of geodes are found in the upper portions of this series. This reconnaissance was taken to try to check the sequence seen at the McKinney property and also to ascertain if Lost Cr. follows a fault weakness. At the junction of Lost Cr. and Little Butte Cr. agglomerate crops out—not found W of the creek. Basalt was the rock forming the ridge to the W. No other types could be found in place. The several tuffaceous rocks were picked up. Vertical alignment of basalt flowed may support faulting. The strike was roughly NW. One creek has its bed in rock fractured in such a direction.
Tying in of survey:

Sta. 13-0

13-1 Shot to SW to believed quarter corner
13-2 Station shot to N (14-0)
14-0 8' N of E-W fence + 20' N of N-S fence at gate opening
14-1 Shot to brow of ridge (18-0)
15-6

15-1 Shot to section corner (NW corner see 10)
Sec 34 T 36 S R2E El. 2500'

Peach property No. 5 of Medford sheet

Geology

The manganese mineralization occurs in a basaltic agglomerate. It lies on a buff tuff and is overlain by basaltic flows. The lower contact is marked by a change in soil and a break (lessening) in slope.

Basalt flows

Buff tuff

The lowest cut shows the best mineralization. The mineralization above this elevation is poorer and probably of no commercial importance. The depth of mineralization can not be told but estimated probably no lower than the contact with the tuff, some 40' below this cut. The cut shows a depth of some 8'-10' of enrichment. The northward extent of the mineralized agglomerate is some 600', i.e., as far as the ridge continues northward before turning eastward into the main ridge front.

The total thickness of the basaltic agglomerate is several hundred feet. The rock forms rock pinnacles and columns. If on the lower portion only of this thickness that is mineralized.

Basaltic flows dip few degrees to NE.
3½ X 6" x 1" sample cut from E face of lower open cut. Mineralization decreases uniformly from bottom of cut up as it enters one of the mineralization zones. The sample shown in the rock piled up and taken from the cut, some 1200 ft to the S, but no ore was seen. The basaltic oolitic agglomerate extends 8½ ft. Slight mineralization is shown in samples from basaltic flows above.
T-29 Porphyritic andesite (?) Compare with T-13

T-30 Basaltic agglomerate (secondary) with manganese mineralization

T-31 Tuff breccia (kind?) underlining T-30+ with little manganese oxides

T-32 Dark gray fine-grained basalt with possible Mn oxides - may be primary mineral

T-33 White tuff breccia Compare with T-24

T-34 Brown tuff or flow rock

T-35 Basalt Compare with T-2A + T-13
Aug 12, 1942

Clear, hot

Near center Sec 9 T 37S R 26 E1 2300

A long abandoned prospect was the only workings found in the vicinity where Buck prospect - No. 7 Wells Metford Sheet - is shown. The rock here is a dark gray fine-grained basalt. No manganese mineralization (outside that of ordinary basalt) was seen.

Near center Sec 8 T 37S R 26 E1 2500

Fox prospect No. 8 Wells Metford Sheet

No manganese mineralization of importance was shown in either the overlying plagiobasalt or underlying eoceneaceous material. A porphyritic basalt is associated with these rocks.

No. T-36 Gray basalt
T-37 Sericolithic basalt
T-38 Porphyritic basalt

These rocks are badly weathered as compared with the nearly horizontal flow rocks of Tyrrell and Pilot projects. The attitude here is often steeply inclined though nearly flat lying outcrops are present. It is often plastically the porphyritic basalt of this area is plastically folded or believed to have been produced by compression. The strike of the tilted beds is about N-S though close folding into hogbacks makes this less well defined.

These rocks are believed older than the Tuff breccia & basalts found east of noted Cr. Though some of the basalts on the E slope of this ridge
may be of equal age, it is not known + will be hard to prove. Not of an older age will be looked for in the section between Per Lake Cr. and if the brown tuft breccia found on the E bank of Lost Cr. occurs in this section then placing of fault along Lost Cr. may be justified.

If not found, Lost Cr. may be a contact valley, between older basalts + overlying brown tuft breccia. Although one spot along the E side of Lost Cr. a dk gray brown shaded paphitic basalt was believed to underlie the brown tuft breccia, it could not be proved as clumping may have moved this basalt to an apparently underlying position. The youngest basalt with S&W. of Pheas. may be of older age as not only degree of weathering but altitude of beds and similarly to that of areas of the ridge W of the Tippeo property.

T-34 Rock from Open Cut No. 5
Here crop out scoriaceous basalt pillows or columns 20' or more in height. They are not overlain here by any material but short distance to S are probably capped by the dark gray fine-grained basalt exposed there in the old forest cut on the surface. The columns are there probably scoriaceous flow rock. The lower contact is with tuff or a soil zone colored brown to reddish brown either by baking (oxidation) or by iron solutions from above or by both. The mineralization is insignificant though evident in the tuff or soil at the lower contact. It is of probable economic value above the contact and upwards for five feet. Above this it becomes decreasingly poorer. The manganese occurs scattered (hardly disseminated) throughout the scoriaceous basalt in irregular pockets in vesicle fillings or cracks and seam fillings. The main mineral is pyrolusite, possibly manganite. Vug-like pockets of it show a botryoidal-like inner surface. The botryoids are made of radiating fibrous crystal aggregates. The mineralization is quite uniform to a height of five feet above the lower contact. At this spot...
STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

ASSAY REPORT

Grants Pass, Oregon
Baker, Oregon

Sample submitted by Wallace D. Lowry, State Dept., Portland, Oregon

Sample description: [Blank]

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

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

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Market Quotations:

Gold $ per oz.
Silver $ per oz.

STATE ASSAY LABORATORY

Assayer
ASSAY REPORT

Grants Pass, Oregon
Baker, Oregon

Sample submitted by Wallace Lowry, Lake Creek, Oregon

Sample description: Samples cone- and quartered once before crushing to about 8 lbs. each.

August 12, 1942

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

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

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Market Quotations:

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

STATE ASSAY LABORATORY

R.A. Barrett
Assayer
ASSAY REPORT

December 22, 1937

Mr. Earl K. Nixon, Director,
State Department of Geology
and Mineral Industries
704 Lewis Building
Portland, Oregon

Following are the results of assays made on samples submitted to the Assay Laboratory by Mr. Libbey:

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Results of check assays of Libbey samples by A. A. Markert, Iron River, Mich. placed here for comparison.

(signed) Albert A. Lewis
Assayer
MANGANESE DEPOSITS

of

SOUTHEASTERN OREGON.

A short, preliminary study of occurrences of Manganese in Southwestern Oregon was initiated by the State Department of Geology and Mineral Industries because of its industrial importance and because of the interest evidenced by many inquiries to the Department from outside the State. Only a few of the typical known occurrences could be visited in the time allotted. Further studies should be made in order to obtain more complete knowledge of the mineral resources of the State.

Manganese minerals occur rather widely in Southwestern Oregon, especially as accessory minerals in or near gold deposits in Josephine and Jackson counties. To determine whether or not manganese occurs in sufficient concentrations to make an economic deposit requires extensive underground exploration, typically in the form of drilling; and they may not be evaluated from a few surface exposures. In the case of evident small tonnages, or because of chemical combinations which would make beneficiation difficult or industrially impossible, certain deposits can, of course, be at once classed as not worthy of development as manganese deposits. Other occurrences may have a meagre development, but because of probable origin and mineral associations, they give evidence warranting further exploration.
In a general way, the occurrences visited may be divided into two classes characterized mainly by origin. One is made up of those deposits formed by a deposition from circulating surface waters, with the manganese taken into solution from basaltic lavas and precipitated as oxide because of a change in the physical or chemical character of the rock which the solution later penetrated. The second is composed of those in which the essential mineral was rhodonite, derived from a magma and deposited hydrothermally, usually with accessory minerals. The rhodonite has been oxidized superficially to manganese oxides.

In rhodonite the manganese is in chemical combination with the silica and may not be separated by mechanical means; and, since present metallurgical practice requires a manganese low in silica, rhodonite deposits are thus usually ruled out as a source of metallurgical manganese. Should a very large deposit containing rhodonite be found, however, in which reserves could be estimated in many millions of tons, with the percentage of manganese in an economic amount, it is entirely probable that a treatment process could be worked out so as to separate the manganese and silica and to produce the manganese in a marketable form. A large tonnage would be necessary to provide the incentive for extensive metallurgical testing.

The first class of occurrences is represented by the area described as the Lake Creek district and surrounding region. The mineral occurs as an original oxide disseminated usually through a nearly horizontal tuff. Beneficiation to obtain a marketable manganese product would be feasible and the chief problem is whether or not the manganese occurs in concentrations sufficient to make them economic. Only exploration can
determine this, but, in view of the widespread occurrences of the manganese impregnated tuff, a few preliminary test drill holes, at least, seem warranted.

Descriptions of the deposits visited follow.
TYRRELL MANGANESE DEPOSIT.

Location: This occurrence is in the Lake Creek District in the

N1/2 of the NE1/4 of the SE1/4, sec. 10, T. 41 S., R. 2 E.,

about 15 miles in a straight line northeast of Medford,

Jackson county. It is reached by road as follows: by

the Crater Lake Highway from Medford to Eagle Point 11

miles, by the Lake Creek road from Eagle Point to Lake

Creek Post Office 17 miles, and from the Lake Creek Post

Office to the Bush Ranch on Lost Creek, a distance of

about 5 miles, the first four miles of which are by county

road. The last mile is impassable for automobiles during

wet weather. The old mine workings are on the east side of

Lost Creek about 1500 feet southeast of the ranch house and

about 300 feet higher at an elevation of about 2300 feet.

Most of the area covered by the Tyrrell deposit is now owned

by R. M. Bush.

History: The deposit was opened and worked during 1917 and 1918 by

the Manganese Metals Co. Some drilling was done to determine

the extent of the ore, and a concentrating mill with a capacity

of about 20 tons of crude ore in 24 hours was built. Operat-

ing intermittently, the mill produced about 200 tons, of concentrates

said to assay about 46.5% to 52.8% manganese, 11.1% to 14.5% iron,

0.07% to 0.207% phosphorus, and 0.08 to 0.16 oz. gold to the

ton. When the war ended production stopped. The crude ore

treated at the mill was reported to have averaged about 20% manganese.
Topography: The immediate region is hilly to low mountainous with slopes rising several hundred feet to generally rounded or nearly flat summits. The vegetation consists commonly of scrub oaks with less frequent pine, fir and madrone trees and occasional large patches of manzanita. The Tyrrell deposit is at or near the lower part of the flat ridge of the hill which rises 400 to 500 feet above and east of Lost Creek, with the summit rising much higher to the south. The drainage is to Lost Creek and the South Fork of Little Butte Creek, the latter running northwest to join Little Butte Creek and the Rogue River.

Geology: According to Pardee (U. S. G. S. Bulletin 725-C) the rocks of this district belong to the Tertiary volcanic series composing the middle and southern parts of the Cascade Mountains, and consist mostly of nearly horizontal flows of basalts, tuffs and breccias. The Tyrrell deposit is in a red tuff underlain and, where not eroded away, overlain by basalt flows. The thickness of the deposit varies from nothing at the north end to 20 feet or more on the south. This red tuff is wide spread throughout the Lake Creek region and in places is stained and impregnated with oxides of manganese. The impregnations vary from thin staining to irregular seams and veinlets up to a half inch thick.

The manganese minerals, consisting of manganite, psilomelane and pyrolusite were probably deposited from meteoric waters which had taken the manganese into solution from overlying lavas. Some of the upper portions of the tuff show cavities evidently once containing manganese minerals which were dissolved and carried away, perhaps being reprecipitated below in the lower layers of the tuff.
As shown by the accompanying property map, the old workings are about 150 feet south of the south boundary of the Bush ranch and on government land covered by the location. It is doubtful, however, if there is much available ore left here. The main body is covered by the Bush ground and extends east into the Harding ground.

The mine was opened in a north and south opencut about 150 feet long, about 30 feet wide at the top and about 30 feet deep on the high side. The upper contact of the tuff and basalt is irregular. On the south end a thickness of 20 feet or more of tuff without capping is exposed. It is cut off here by a steeply dipping diabase (or coarsely crystalline basalt) dike, striking east, 15 or 20 feet wide. Farther north in the opencut the tuff is capped by basalt and it is possible to see only the upper few feet of tuff because of caving from the sides of the opencut. At the south end two tunnels, close together, were driven; one is about 8 feet long with the face against the dike, the other, about 50 feet long, driven to the east, is partly in basalt, indicating that this level is close to the bottom of the tuff. Little of the better grade of manganiferous tuff is exposed near the diabase dike, but very little is now left in other parts of the opencut.

At the north end, below the basalt, an opencut has been driven east into the red tuff about 20 feet below the contact. It is probable that this cut was continued by tunnelling into the tuff, but caving has covered up all evidence except the ends of timber, probably lagging. The tuff as exposed in this cut is a soft, red, kaolinized material, containing only small amounts of manganese oxides. Faulting here is indicated by slickensides on the face of the basalt over the soft tuff and by fault breccia in the tuff on
the south side of the cut. Above this soft tuff, the basalt is
brecciated and contains fair amounts of manganese oxides. However,
the quantity available here is probably small.

To the north of the opencut, a grade for a mine car track was
made, following the exposure of the red tuff, for a distance of about
830 feet to the north end of the hill. At and near this north end,
better grade material is exposed, and it is evident that the operators
considered this area as favorable for exploitation, and that the ore
available in the large opencut was considered to be exhausted.

At a point about 200 feet south of the north end of this track
grade, an opencut was run into the tuff and a tunnel about 15 feet
in length was driven. The rock in the tunnel appears to be low
grade, but some portions above the portal are of better grade materi-
al. The exposure here is about 20 feet thick. Samples were taken
at the exposures of the tuff as indicated by the accompanying sketches.

On the broad, flat summit of the hill, just above the outcrops
as described above, several drill holes were put down through the
tuff by the operators in 1918. Records of these holes are not now
available. Tardee states that "the other workings, including
drill holes, show that the ore-bearing layer is practically continuous
northward for 1000 feet and that, at least on the nose of the spur,
it extends a considerable distance under the basalt. A minimum
thickness of 6 feet is shown in places north of the main cut, and
one of the drill holes is said to have passed through 30 feet of
manganiferous material." The drilling was reported to have covered
3 or 4 acres.
Economic Factors:

Pardoe states that "It is reasonably certain that the Tyrrell mine contains a large body of material that carries from 2 or 3 to 15 percent manganese, the richer parts of which are probably workable under conditions approximating those of 1913."

Assuming an area of 4 acres underlain by an average of 15 feet of minable ore, there would be a reserve of something over 200,000 tons. It is entirely possible that a greater area than 4 acres could be proved. Judging by the surface exposures, and without a knowledge of the drill hole results, there would be a certain proportion of the whole which would be too low grade to mine even under emergency conditions. The tuff outcrops over some of the northern part of the area with little overburden, and probably could be mined by surface methods. The thickness of capping and the distribution of the minable grade would determine whether surface or underground mining would be necessary for the major part of the deposit.

Except for transportation facilities, operating conditions are favorable. The climate is generally mild. Water is available, although storage in Lost Creek or some other source of supply might be necessary during the dry season. The nearest rail shipping point is Eagle Point, at a distance of about 17 miles by road.

A concentrating or lixiviation plant would be necessary, but it is probable that a good recovery of mineral could be made by combining mechanical and flotation methods; and that, in the case of lixiviation, percolation would be satisfactory with relatively coarse crushing. Should fine grinding be necessary, the texture of the metallized portions of the tuff should allow this with a minimum of wear on the grinding parts.
Any producing operation in this area should be preceded by extensive drilling to determine the extent, grade and distribution of the manganese minerals. Should a sufficient tonnage of minable grade be proved, it would be essential to work out an economic metallurgical process for recovering the manganese in a concentrated form before mining operations were attempted. In this process it would be determined whether or not the gold could be saved economically.
OTHER EXPOSURES OF TUFF IN THE TYRRELL AREA.

South of the Tyrrell mine on the same hill are some outcrops of red tuff showing slight manganiferous metallization. The rock is dense and hard, showing only very low grade material.

At the N. W. Corner of the SE ¼ of sec. 9, T. 37 S., R. 2 E., near the top of a flat ridge on the west side of Lost Creek, about three-quarters of a mile west of the Tyrrell mine, is an exposure of dense red tuff showing traces of manganese oxides. A shallow cut has been run into it a few feet.

About 2 miles south of the Bush ranch and about 100 yards south of the Grissom ranch house, near the center of sec. 21, T. 37 S., R. 2 E., is a basalt scarp, 5 to 10 feet thick, under which is a layer, at least 10 feet thick, of gray basaltic breccia, much altered and iron-stained, containing small cavities lined with soft manganese oxides. The longitudinal extent could not be determined, but it may extend a considerable distance. Sample marked #6 represents the upper 6 feet of the breccia. The elevation of the Grissom ranch house is about 2600 feet.

At and near the top of a broad flat-topped hill, about three-quarters of a mile a little south of west of the Grissom ranch house, in the S.E. ¼ of sec. 20, T. 37 S., R. 2 E., a considerable area of red tuff is exposed at from 3000 to 3100 feet elevation. Most of it is without capping. Some exposures were barren of manganese oxides, but in others, where perhaps the tuff was less dense, manganese oxides were present in the same form as at the Tyrrell mine. Because of transportation difficulties, exploitation in this area would be difficult, but, in case of emergency, prospecting would be warranted.

No. 5 sample (Mar. 1967) was taken from the breccia at a shallow cut on the flat-topped hill.
REESE CREEK MANGANESE OCCURRENCES

Location: This area in Jackson County is about 6 miles north of Eagle Point and is reached by going 5 miles north from Eagle Point on the Crater Lake Highway, then east about 3 miles on the Butte Falls road. It lies between branches of Reese Creek on a broad, flat hill which may be reached by trail about three-quarters of a mile long east from the point where the California Oregon Power Co. transmission line crosses the Butte Falls road.

Geology: As in the Lake Creek area there are nearly horizontal flows of basalts and tuffs, with the tuffs, in places, impregnated with manganese oxides along thin seams or in vesicles.

Occurrences: On top of the flat hill mentioned above and near the center of sec. 7, T. 35 S., R. 1 W. two shallow holes have been sunk. The deeper of the two was full of water, but a thin layer of gray and purplish tuff about a foot thick shows manganese oxides in irregular seams and cavities. A small ore dump thrown out from this layer of tuff shows relatively good grade ore, perhaps from 15 to 20 per cent. manganese. The second hole, about 100 yards west of the first, shows a small amount of similar ore.

This ground was formerly held by location by J. C. Vestal. The latest location notice, dated Dec. 2, 1936, was signed by E. H. Hill, Carrie H. Hill, and Irwin Koenig.

About a quarter of a mile southeast of these holes on the Butte Falls road, some road excavation has exposed both gray and red tuff having a similar deposition of manganese oxides. A few places have
high grade spots about the size of a walnut with narrower irregular seams, but a large proportion of the exposure is barren or very low grade. Only the upper part of the tuff can be seen and is about 25 feet long by 3 or 4 feet thick. It is overlain by platy basalt. This exposure is about 1500 feet northeast of the Harold J. Smith mail box and about five-eighths of a mile east of the Gilfred Jack ranch house. The Pacific and Eastern Railroad is about one-half mile west of the Butte Falls road at this point.
SIMILAR OCCURRENCES REPORTED BY J. S. PARDEE IN U.S.G.S. BULLETIN 723-C.

On the NEUSTROM ranch, about 2 miles north of the Tyrrell mine, there is an area of tuff, like that at the Tyrrell, showing, in places, a deposition of manganese oxides. Outcrops indicate an areal extent of about 1000 feet wide and a mile long. No considerable amount of material rich enough to be classed as ore is exposed.

The STAR P ranch of J. L. Parrar is about 5 miles north of the Tyrrell mine and about 3 miles northeast of the Lake Creek Post Office. The material here is classed as very low in manganese.

The 305 NICHOLS prospect is about 5 miles north of the Lake Creek Post Office on the slope north of Salt Creek. Soft black manganese oxides, regarded as wad, occurs in the lower part of a basalt capping and the upper part of the underlying tuff, but in uneconomic quantities.

The HOMESTAKE claim of T. C. Duly is about a mile west of the Nichols prospect. No ore is developed.

The SIERRA METALS CO. claims and the PARRELL claims lie about 3 miles southwest of the Tyrrell mine. Similar manganiferous tuff is exposed. There are only a few shallow pits and no ore is developed.
A. O. BAILEY MANGANESE DEPOSIT.

Location: This occurrence is about 4 miles west of Central Point, Jackson County, in an air line, on Lane Creek, or the west fork of Willow Creek, in the S3 1, sec. 1, T. 77 S., R. 3 W. By road the distance is approximately 5 miles, traveling west from Central Point over a paved highway for 1.5 miles to the Old Stage Road and on this gravelled road for 1.9 miles to A. O. Bailey's mail box, at which point the Bailey road turns off to the south. The distance to the Bailey house is about 1.5 miles, but the manganese deposit is passed at about 1.5 miles and lies to the east of the road. The ground is held by location.

Topography: Locally, the region is in the foothills of a more mountainous country lying west and south. The vegetation is rather thick, with small pines, fir and madrones common. The drainage is northward to the Rogue River.

Geology: Rock exposures show pre-Tertiary metamorphics and granitic intrusives.

Occurrence: The manganese occurs as oxides derived from rhodonite in a fracture zone in a siliceous, schistose, metamorphosed sediment. Three open-cuts, one above the other and representing a difference in elevation of about 100 feet, have been driven in this zone, apparently on a fault plane which represents the hanging wall side of the fracture zone. Near the hanging wall, there is considerable crushed material and gouge, containing limonitic staining and spots with more or less solid pieces of manganese oxides. This strongly crushed zone is two or three feet wide. On the footwall side of this, the fractured, blocky schist contains manganese oxides as thin layers on the fracture and
cleavage planes, and, less commonly, as solid pieces of hard oxide probably derived from rhodonite. This foot-wall manganese zone is about three or four feet wide at the top of the exposure, with a thin manganese staining extending farther out in to the footwall. Because of caving in the cuts, the strike and dip of the deposit could not be seen clearly, but the strike is probably 3. 20 to 40 degrees W. with a dip of 50 to 70 degrees S. E.

One sample (37) was taken of the best looking material of the hanging-wall section, representing a foot in width, in the lowest cut. A sample (38) representing about 3 feet of the foot-wall section, was taken in the highest cut.

The highest cut shows a greater quantity of manganese oxide deposition in the schist and more solid pieces of hard oxides than the cuts lower down, but the lower cuts expose considerably less of the fracture zone than the highest cut.

Since the manganese oxides were probably derived from rhodonite, the oxidation would be expected to be superficial. As now indicated by the surface development, the quantity of desirable ore available would be small. The fracture zone extends to the south and should be further exposed by cuts and trenches in order to show the economic possibilities of the deposit.
PETERS MANGANESE DEPOSIT

Location: This occurrence, covered by location by W. H. Peters of Glendale, Oregon, in a fraction of a mining claim, 600 feet by 600 feet, is in the NW ¼ of the NE ¼, sec. 17, T. 39 S., R. 1 W. It is reached by road south from Talent, Jackson county, along Wagner Creek to just south of the junction of Arrastra creek, a distance of 5.2 miles from Talent; and then up the hillside west of the junction of Wagner and Arrastra creeks for about a half-mile. The elevation is about 2900 at about 400 feet above the junction of the creeks.

Topography: The area is hilly with fairly steep slopes and a thin soil covering. There is a moderately thick vegetation of second growth pines and fires, with scattered madrone trees and large pines. The underbrush is thick at the lower elevations. The drainage is to Wagner Creek and Bear Creek which flows northerly to the Rogue River.

Geology: The immediate locality shows old metamorphosed sediments with a schistose structure.

Occurrence: This is a quartzose, tabular deposit containing considerable amounts of rhodonite superficially oxidized to manganite and pelomelane, with minor amounts of pyrolusite. Two surface cuts separated by a distance of about 100 feet are the only developments. The north cut is in two benches and here expose the deposit in three sections. The lower cut shows the foot-wall section with a thickness of about 5 feet, and the top cut shows a hanging-wall section about 10 feet thick. Both of these sections show quartz and rhodonite, with the latter more or less completely oxidized. Many pieces on being broken show unaltered rhodonite at the center with hard black oxides on the outside. Other pieces are wholly oxidized but often show silica remnants. Between the footwall and hanging wall sections is a middle
quartzose section, about 5 feet thick, having the texture and appearance of a quartzite. This section is very hard and dense, and contains little or no visible manganese minerals. The walls are metamorphosed sediments, with the hangingwall a much altered, soft, iron-stained schist. The strike of the deposit is approximately N. 50 degrees E. and the dip is about 60 degrees N.W. There is a layer of soft, limonitic, quartz material, about 3 feet thick, along the footwall. At this north open cut, the hangingwall section shows the greater quantity of manganese minerals.

The south open cut is about 30 feet long and exposes similar material to that described for the hangingwall section of the north open cut. A few tons of black oxides were piled on the dump. A sample (39) of this material represents the quality of ore that might be sorted. Outcrops of the schist on the hill to the south showed only a small amount of manganese staining.

The primary manganese mineral is rhodonite, the manganese silicate, and, judging by the present exposures of the deposit, the oxidation has been quite superficial. The quantity of desirable manganese ore here is small.
THE GEORGE McALLISTER-WAY-CAMPBELL MANGANESE PROPERTY.

Location: This occurrence is in sec. 5 (probably), T. 36 S., R. 7 W., near the summit of the slope north of Shan Creek, approximately 12 miles in a straight line west of Grants Pass, Josephine county. The route to the property is by the Redwood Highway west of Grants Pass to the west end of the bridge across the Applegate river, then to the north on the Riverbank Road to the Griffin School, a total distance of 13.2 miles. From the school house the route is over a Forest Service trail, for the most part, northwesterly and then southerly, a distance of about 3½ miles to the property. Four mining claims make up the group and are named Manganese Mystery No. 1, No. 2, No. 3, and Manganese Mystery Extension.

Topography: This is a low mountain area near the top of the south slope between Shan and Pickett creeks, and is characterized by steep wooded slopes with rounded summits. At the upper elevations there are rock slides on the steepest slopes, but in most places there is a soil cover. The elevation of the claims is between 3000 and 3500 feet. The elevation of the Griffin School is about 1200 feet.

Geology: The locality is made up principally of granitic rocks, probably tonalite, as characterized by A. B. Pitchell. The country rock in the vicinity of the deposit is a porphyritic variety, resembling a diorite, in places much altered and having a schistose structure.

Occurrence: The deposit has been explored mainly for gold on the Manganese Mystery No. 1 claim where it has been reported that high grade gold ore has been found. There are several open cuts and two shallow shafts have been sunk. The area thus explored represents about 200 feet by 150 feet in extent.

The outcrop appears to be a siliceous phase in the diorite,
represented by small quartz lenses and stringers with considerable rhodonite now mainly altered to manganese oxides. There are large blocks, up to two or three hundred pounds in weight, at or near the surface, which have the appearance of being nearly pure, hard manganese oxides, but, on being broken, most of them show remnants of unaltered rhodonite with quartz. The largest opencut showed that in sinking 10 or 15 feet below the surface, the manganese oxides were perceptibly smaller in quantity. It seemed probable that exploration to the west of the present openings would show more of the oxidized rhodonite.

The altered porphyry wall rock has been permeated and stained by manganese oxides over the area opened up; and, in places close to the original rhodonite croppings, the oxides have been deposited in irregular small veins and stringers making up from a third to a half of the rock. These oxides decrease in proportion to the distance away from the quartz rhodonite outcrops until it becomes a very thin staining.

A wall on the west side of the outcrop, probably indicating the trend of the deposit, strikes due N. and dips steeply to the N.

Further surface work would probably expose more of these oxidized rhodonite outcrops, but it is improbable that more than a small tonnage of selected manganese oxides could be made available, and that would be a highly siliceous product. A sample (10) of manganese stained porphyry over a thickness of 6 feet was taken in the face of the largest opencut. Hand sorted ore on the largest dump is represented by sample #11.
Location: This occurrence is south of Mungers Creek, Josephine county, in sec. 6, T. 39 S., R. 5 W., about 76 miles by road south of Grants Pass by way of Murphy, Prevolt, and Williams along the west fork of Williams creek. The last three-quarters of a mile is over an old logging road.

Topography: The area is in the low foot hills, with slopes rising to high mountains to the south and southwest. The elevation of the deposit is about 1900 feet. A thin soil covers most of the rock exposures and supports a vegetation of second growth timber, madrones and underbrush.

Geology: The rocks of the locality are old, highly metamorphosed sediments.

Occurrence: The only opening in the deposit is an open cut about 10 feet long with a face about 6 feet high, all in a black, siliceous, metamorphosed sediment, into which hydrothermal solutions have penetrated, depositing quartz, rhodonite and a small amount of rhodochrosite in irregular small seams and lenses. A thin coating of hard manganese oxides covers some fracture planes, and a little soft black oxide occurs in joint cracks near the surface.

The rock may be cobbled to show fairly large pieces of deep pink rhodonite, and several hundred pounds has been sold to collectors and lapidaries. The work done on the deposit has been to obtain rhodonite for this purpose.

The surface indicates a considerable area of similar country rock, and probably trenching would show a greater extent of the rhodonite occurrence. From the standpoint of producing a metallurgical manganese ore, however, the prospect shows little promise.
STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES.

STATE ASSAY LABORATORY.

802 East H Street
Grants Pass, Oregon

ASSAY REPORT

December 22, 1937.

Mr. Earl K. Nixon, Director,
State Department of Geology and
Mineral Industries
704 Lewis Building
Portland, Oregon.

Following are the results of assays made on samples
submitted to the assay laboratory by Mr. Libbey:

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<th>Silver</th>
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(signed) Albert A. Lewis
Assayer
SOME MANGANESE DEPOSITS

OF SOUTHWESTERN OREGON.

A short, preliminary study of occurrences of Manganese in Southwestern Oregon was initiated by the State Department of Geology and Mineral Industries because of its industrial importance and because of the interest evidenced by many inquiries to the Department from outside the State. Only a few of the typical known occurrences could be visited in the time allotted. Further studies should be made in order to obtain more complete knowledge of the mineral resources of the state.

Manganese minerals occur rather widely in Southwestern Oregon, especially as accessory minerals in or near gold deposits in Josephine and Jackson counties. To determine whether or not manganese occurs in sufficient concentrations to make an economic deposit requires extensive underground exploration, typically in the form of drilling; and they may not be evaluated from a few surface exposures. In the case of evident small tonnages, or because of chemical combinations which would make beneficiation difficult or industrially impossible, certain deposits can, of course, be at once classed as not worthy of development as manganese deposits. Other occurrences may have a meagre development, but because of probable origin and mineral associations, they give evidence warranting further exploration.

In a general way, the occurrences visited may be divided into two classes characterized mainly by origin. One is made up of those deposits formed by a deposition from circulating surface waters, with the manganese taken into solution from basaltic lavas and precipitated
as oxide because of a change in the physical or chemical character of
the rock which the solution later penetrated. The second is composed
of those in which the essential mineral was rhodonite, derived from a
magma and deposited hydrothermally, usually with accessory minerals.
The rhodonite has been oxidized superficially to manganese oxides.

In rhodonite the manganese is in chemical combination with the
silica and may not be separated by mechanical means; and, since pres-
ett metallurgical practice requires a manganese low in silica, rhodon-
inite deposits are thus usually ruled out as a source of metallurgical
manganese. Should a very large deposit containing rhodonite be found
however in which reserves could be estimated in many millions of tons,
with the percentage of manganese in an economic amount, it is entirely
probable that a treatment process could be worked out so as to separate
the manganese and silica and to produce the manganese in a marketable
form. A large tonnage would be necessary to provide the incentive for
extensive metallurgical testing.

The first class of occurrences is represented by the area des-
cribed as the Lake Creek district and surrounding region. The mineral
occurs as an original oxide disseminated usually through a nearly
horizontal tuff. Beneficiation to obtain a marketable manganese pro-
duct would be feasible and the chief problem is whether or not the
manganese occurs in concentrations sufficient to make them economic.
Only exploration can determine this, but, in view of the widespread oc-
currence of the manganese impregnated tuff, a few preliminary test drill
holes, at least, seem warranted.

Descriptions of the deposits visited follow.
TYRRELL MANGANESE DEPOSIT.

LOCATION: This occurrence is in the Lake Creek District in the NE^4 of the NW^4 of the SW^4, sec. 10, T. 37 S., R. 23 E., about 15 miles in a straight line northeast of Medford, Jackson County. It is reached by road as follows: by the Crater Lake Highway from Medford to Eagle Point 11 miles, by the Lake Creek road from Eagle Point to Lake Creek Post Office 12 miles, and from the Lake Creek Postoffice to the Bush Ranch on Lost Creek, a distance of about five miles, the first four miles of which are by county road. The last mile is impassable for automobiles during wet weather. The old mine workings are on the east side of Lost Creek about 1000 feet southeast of the ranch house and about 500 feet higher at an elevation of about 6300 feet. Most of the area covered by the Tyrrell deposit is now owned by B. H. Bush.

HISTORY: The deposit was opened and worked during 1917 and 1918 by the Manganese Metals Co. Some drilling was done to determine the extent of the ore, and a concentrating mill with a capacity of about 40 tons of crude ore in 24 hours was built. Operating intermittently, the mill produced about 200 tons of concentrates said to assay about 40.6% to 52.8% manganese, 11.5% to 14.5% iron, 0.06% to 0.20% phosphorus, and 0.06 to 0.15 oz. gold to the ton, when the war ended production stopped. The crude ore treated at the mill was reported to have averaged about 50% manganese.

TOPOGRAPHY: The immediate region is hilly to low mountainous with slopes rising several hundred feet to generally rounded or nearly flat summits. The vegetation consists commonly of scrub oaks with less frequent pine, fir and madrone trees and occasional large patches of mazanita. The Tyrrell deposit is at or near the lower part of the flat ridge of the hill which rises 400 to 600 feet above and east of Lost Creek, with the summit rising much higher to the south. The drainage is to Lost Creek and the South Fork of Little Butte Creek, the latter running northwest to join Little Butte Creek and the Rogue River.

GEOLOGY: According to Bardo (U.S.G.S. Bulletin 725-4) the rocks of this district belong to the Tertiary volcanic series composing the middle and southern parts of the Cascade Mountains, and consist mostly of nearly horizontal flows of basalts, tuffs and breccias. The Tyrrell deposit is in a red tuff underlain and, where not eroded away, overlain by basalt flows. The thickness of the capping varies from nothing at the north end to 20 feet or more on the south. This red tuff is wide spread throughout the Lake Creek region and in places is stained and impregnated with oxides of manganese. The impregnations vary from thin staining to irregular seams and veins up to a half inch thick.

The manganese minerals, consisting of manganite, psilomelane and pyrolusite, were probably deposed from meteoric waters.
which had taken the manganese into solution from overlying lavas. Some of the upper portions of the tuff show cavities evidently once containing manganese minerals which were dissolved and carried away, perhaps being precipitated below in the lower layers of the tuff.

TYPICAL MINE: As shown by the accompanying property map, the old workings are about 150 feet south of the south boundary of the Bush ranch and on government land covered by location. It is doubtful, however, if there is much available ore left here. The main body is covered by the Bush ground and extends east into the harding ground.

The mine was opened in a north and south open-cut about 150 feet long, about 30 feet wide at the top and about 50 feet deep on the high side. The upper contact of the tuff and basalt is irregular. On the south and a thickness of 20 feet or more of tuff without capping is exposed. It is cut off here by a steeply dipping diabase (or coarsely crystalline basalt) dike, striking east, 15 or 20 feet wide. Farther north in the open-cut the tuff is capped by basalt and it is possible to see only the upper few feet of tuff because of caving from the sides of the open-cut. At the south end two tunnels, close together, were driven; one is about 8 feet long, with the face against the dike, the other, about 50 feet long, driven to the east, is partly in basalt, indicating that this level is close to the bottom of the tuff. A little of the better grade of manganiferous tuff is exposed near the diabase dike, but very little is now left in other parts of the open cut.

At the north end, below the basalt, an open-cut has been driven into the red tuff about 20 inches below the contact. It is probable that this cut was continued by tunnelling into the tuff, but caving has covered up all evidence except the ends of timber, probably lagging. The tuff exposed in this cut is a soft red, kaolinized material, containing only small amounts of manganese oxides. Faulting here is indicated by slickenides on the face of the basalt over the soft tuff and by fault breccia in the tuff on the south side of the cut. Above this soft tuff, the basalt is brecciated and contains fair amounts of manganese oxides. However the quantity available here is probably small.

To the north of the opencut, a grade for a mine car track was made, following the exposure of the red tuff, for a distance of about 850 feet to the north end of the hill. At and near this north end, better grade material is exposed, and it is evident that the operators considered this area as favorable for exploitation, and that the ore available in the large opencut was considered to be exhausted.

At a point about 800 feet south of the north end of this track grade, an opencut was run into the tuff and a tunnel about 15 feet in length was driven. The rock in the tunnel appears to be low grade, but some portions above the portal are of better grade material. The exposure here is about
20 feet thick. Samples were taken at the exposures of the tuff as indicated by the accompanying sketches.

On the broad, flat summit of the hill, just above the outcrops as described above, several drill holes were put down through the tuff by the operators in 1918. Records of these holes are not now available. Farde states that "the other workings, including drill holes, show that the ore-bearing layer is practically continuous northward for 1000 feet and that, at least on the nose of the spur, it extends a considerable distance under the basalt. A minimum thickness of 6 feet is shown in places north of the main out, and one of the drill holes is said to have passed through 30 feet of manganeseiferous material." The drilling was reported to have covered 3 or 4 acres.

ECONOMIC FACTORS:

Farde states that "it is reasonably certain that the Tyrrell mine contains a large body of material that carries from 2 or 3 percent manganese, the richer parts of which are probably workable under conditions approximating those of 1918."

Assuming 3 acres an area of 4 acres underlain by an average of 15 feet of mineable ore, there would be a reserve of something over 200,000 tons. It is entirely possible that a greater area than 4 acres could be proved. Judging by the surface exposures, and without a knowledge of the drill hole results, there would be a certain proportion of the whole which would be too low grade to mine even under emergency conditions. The tuff outcrops over some of the northern part of the area with little overburden, and probably could be mined by surface methods. The thickness of capping and the distribution of the mineable grade would determine whether surface or underground mining would be necessary for the major part of the deposit.

Except for transportation facilities, operating conditions are favorable. The climate is generally mild. Water is available, although storage in Lost Creek or some other source of supply might be necessary during the dry season. The nearest rail shipping point is Eagle Point, at a distance of about 12 miles by road.

A concentrating or lixiviation plant would be necessary, but it is probable that a good recovery of mineral could be made by combining mechanical and flotation methods; and that, in the case of lixiviation, percolation would be satisfactory with relatively coarse crushing. Should fine grinding be necessary, the texture of the metallized portions of the tuff should allow this with a minimum of wear on the grinding parts.
Any producing operation in this area should be preceded by extensive drilling to determine the extent, grade and distribution of the manganese minerals. Should a sufficient tonnage of minable grade be proved, it would be essential to work out an economic metallurgical process for recovering the manganese in a concentrated form before mining operations were attempted. In this process it would be determined whether or not the gold could be saved economically.
STAT. DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES.

STATE ASSAY LABORATORY.

802 East 8 Street
Grants Pass, Oregon

ASSAY REPORT

December 22, 1937.

Mr. Earl K. Nixon, Director,
State Department of Geology and
Mineral Industries
704 Lewis Building
Portland, Oregon.

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submitted to the assay laboratory by Mr. Libbey:

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(signed) Albert A. Lewis
Assayer
Microcrystalline groundmass
Feldspar Albite, Turmalin
17° - 15°
12° - 23°
Pyroxene (diopside) and sub
Magnetite grain (carbonate)
Sphene

Texture of groundmass
Trachytic

Texture Vesicular
Filling of openings
Most of fillings are 1 to trachytic structure
Texture - Cellular - tuffaceous
Cell outlines
irregular + rough

Rock - Scoria

Composition
1. Pore space 25% - elongated + aligned
2. Lathe of feldspar 2%
   rough alignment of laths (acicular)
   parallel to many axes of pores - vanes
to undirected
3. Pores often filled with opaque material
   19 mm
4. Feldspar phenocrysts akx blue Y tracing Opt +
   2V small
   Dispersion r > v (?) index > balsam
Manganese oxides
   Occurs as a solid film or ppt. filling
   completely the pores & openings of the scoria
   - with seen in manganese mass
   Dispersion + 2V

Lathe of feldspar
Areka twin. 14° - 28°; 10° - 31°; 32° - 27°;
Serial No. P-846
File No. Pr-689

Amount of alteration — slight
Spinel grains fresh
Texture. Porphyritic, trachytic

Composition
5% Phenocrysts
95% Groundmass — fine grained

Minerals
Phenocrysts
1.1 mm .9 mm 4% 1. Feldspar — subhedral to anhedral
Albite twinning
18° -16°

2% 2. Magnetite — anhedral grains

3% 3. Pyroxene — anhedral

a. Twinned clinopyroxene — Augite
   2V large (moderately)
dispersion V > r (? weak
Opt. +
Small a direction = fast ray

b. Orthopyroxene (? 1 H clinohumite
   2V large believed opt. +

Groundmass
1. Laths of feldspar 50°
2. Phenocrysts 48%
SE 1/4 Sec. 4 T 37S R 2E

Tentative assignment - Eocene member of agglomerate for Bill's Wells brown tuff of Medford quadrangle

Megascopic description

Texture - Tuffaceous
Color - brown
Composition

Feldspar
Zircons, quartz
Calcite

Microscopic

Texture - tuffaceous
Composition

- 2.5 mm 4% f. Feldspar

Fractured in every direction - anhedral
Albite twinning
14°−9°; 19°−27° (28°−40°)
10°−7°;

40/2. Chalcedony - Irregular outlined masses of bordering areas of fiber-like masses + inner spherulitic portions. Most masses lack spherulitic structure

45/3. Groundmass - Devitrified brown glass

1/4: Magnetite - subhedral to anhedral grains
T-23  SW  Sec. 3 T 37 S R 2E

Tentative assignment  —  Eocene agglomerate fm of Butte Falls quadrangle  —  Well's buff buff

Megasopic description

Texture  —  Agglomeratic — vesicular — spongy
Color  —  Variegated — brown
Composition  —  Lithic fragments  feldspar phenocrysts

Microscopic

Feldspar
Albite: 4° – 30°  content based on

Texture

Composition

1.5 mm  5%  1. Felspar subhedral euhedral crackled
          Albite twinning  29° – 26°  
          32° – 28° ;

3-8%  2. Magnetite  subhedral to euhedral grains

Groundmass

3. Devitrified glass + magnetite grains

Index 1535

4. Hemato chrome
Plate 1. Location of Manganese Properties in the Lake Creek District, Oregon.

Accessibility:
This district is 15 mi. ENE of Medford. From Medford it is reached by way of the Crater Lake Highway (Oregon 62) to Eagle Point (11 mi.) thence east by improved road to Brownboro and Lake Creek. The district is about 5 mi. SSE of Lake Creek. The Tyrrell Mine can be reached from there by dirt road, the last one mile being poor, especially in winter months.

Location of properties:
The properties (treated in this report) are shown on the location map, plate 1. They are:

- Tyrrell Mine Sec. 10, T 37 S R 2 E, E1. ca. 2300
- Newstrom Prospect Sec. 34, T 36 S R 2 E, E1. ca. 2600
- Coon Cr. Prospect Sec. 26, T 37 S R 2 E, E1. ca. 2300
- Bush Prospect Sec. 8, T 37 S R 2 E, E1. ca. 2350
- Fox Prospect Sec. 8, T 37 S R 2 E, E1. ca. 2600