October 5, 1964

Mr. K. Nakajima
Coal Department
Ataka New York, Inc.
633 Third Avenue
New York, New York

Dear Mr. Nakajima:

This is in response to your letter of September 29 inquiring concerning magnetite sand at the mouth of the Columbia River.

The Bunker Hill Company investigated these sands earlier this year and reported that there was insufficient tonnage for their purposes. They dropped both the County and State leases and to the best of my knowledge have no intention of returning to continue their work. A very complete report on all of their work - sampling, grain size, beneficiation, and metallurgy - was submitted to this Department by Bunker Hill at the conclusion of their work. This material is on open file in these offices and can be used by you or your representative if you so wish. This report, however, by agreement with Bunker Hill, cannot be taken from the office.

Earlier work by this Department and the U.S. Bureau of Mines in the vicinity of the mouth of the Columbia River appears in U.S. Bureau of Mines Report of Investigations 4011, "Columbia River Magnetite Sands, Clatsop County, Oregon, and Pacific County, Washington, Hammond and McGowan Deposits".

I understand that others are expressing an interest in the black sands but who these companies are and what work they are doing is unknown by me.

Sincerely yours,

Hollis M. Dole
State Geologist

HMD:jr

CABLE ADDRESS: ATAKAYORK, NEW YORK

# ATAKA NEW YORK, INC.

WHOLLY OWNED SUBSIDIARY OF
ATAKA & CO., LTD., JAPAN

633 THIRD AVENUE
NEW YORK, N. Y. 10017
TEL. OXFORD 7-7480
AREA CODE 212

NY-1018-Coal

September 29, 1964

Re: Columbia River Magnetite Sand

Mr. Hollis Dole, Director,
State Department of Geology and
Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Sir:

According to a recent information, it is our understanding that some business concerns are interested in developing and merchandising the magnetite sand from the deposit around Columbia River Delta.

If this deposit is of substantial quantity of reserve, with known quality, we would also be very much interested in this matter.

A) Unfortunately, it seems difficult to obtain geological and technical data here, therefore, our study on this deposit has not progressed as yet.

B) It would be very helpful for us to know who the holders of mining rights are and who the owners of the property are, what the status is in leasing the land and who are the operators of the mining works.

C) Whether or not mining operations are now going on.

Therefore, kindly let us have any available data you might have as outlined in A, B, and C above.

Thanking you for your kind attention to the above, we are,

Very truly yours,

ATAKA NEW YORK, INC.

K. Nakajima
K. Nakajima,
Coal Department



KN/dgr

June 11, 1964

Mr. Georges Pannier
132 3/4 South Carondelet
Los Angeles, California

Dear Mr. Pannier:

Thank you very much for your letter of June 9 concerning the Bunker Hill project at the mouth of the Columbia River.

The idea of this project was not to set up a large steel plant but one to convert black sands into a pelletized product averaging around 56 percent Fe and around 12 percent $TiO_2$. This material would be used as a substitute for scrap, presumably in electric furnaces.

We have received from Bunker Hill a complete file on all their drillings, test work, analyses, and engineering estimates. We are definitely in accord with their findings that insufficient material was available to amortize an operation such as they envisioned.

I am returning the material you enclosed in your letter, as you requested, and thank you very much for the opportunity to review it. I found your work most interesting and am sure that you will continue to find the southwestern Oregon beaches of interest as regards your process.

Sincerely yours,

Hollis M. Dole
State Geologist

HMD:jr
Encl.

GEORGES PANNIER
132¾ SOUTH CARONDELET
LOS ANGELES 57, CALIFORNIA



June 9, 1964

Mr Hollis M. Dole, State Geologist
Department of Geology & Mineral Industries
1069 State Office Building
Portland, Oregon 97201

Dear Mr Dole:

If I am well informed the Bunker Hill project, to set up a large steel plant using the black sands from the mouth of the Columbia River, has been dropped entirely for the combine gave up after the initial drillings.

If so, it must be dishearthening to people of Northwestern Oregon, especially those of Clatsop County, for they are left with the feeling that their black sand reserves are not big enough and, therefore, valueless.

In my opinion, such a thinking would be wrong; indeed, even if the ore reserves have been judged unsufficient in term of the long-range operation of a large steel plant, such reserves still could insure a substantial production of semi-finished products, like pre-reduced iron ores, which are now considered as an ideal feed for steel making and gets adequate premiums.

In fact, a plant to produce such a pre-reduced feed, from the black sand, would not need, by far, to be so large tonnagewise; moreoever, it would be also much simpler by itself and, for long-range contracts could be arranged for this desirable kind of semi-finished product, the local interests should be able to handle the financial aspects of such a more manageable project.

( As one may envision, further development of similar enterprises, where feasible along the coast, could lead to the set up of a steel plant in a more adequate location, like Portland. It would be a case of adapting the project to the actual source of raw material rather than trying the reverse.)

I feel sure the whole project should be reconsidered and would have to go after a product of easier processing on a reasonably sized scale, for the best advantage of the local and regional economy. Along such a line, I would be very glad to help for having the proper qualifications and experience along with a deep interest in such problems.

I am an experienced Engineer and, as an example of past activities, please find attached a couple of letters related to recent works as well as a copy of an article of the World of Coos Bay plus an information sheet regarding recent developments of mine in the field. Note, part of these developments might be advantageously put at work for the profitable beneficiation of fine magnetite.

Should you find it worthwhile, I would appreciate to register your help by making it known to responsible parties at the State or County level. Your people, up there, can not wait for help but from themselves and/or from qualified application of the latest technologies. At this point, I might efficiently help.

I shall wait to hear from you and the return of the attached documents.

Very truly yours,

Pannier

Black sand

# COPY

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES

1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

READ, INITIAL, CIRCULATE AND
RETURN TO JUNE

April 24, 1962

Hgo
DB
VN
RE
RLA
Tom

To: Staff

From: R. S. Mason

Subject: Black sand market

Here is a possible outlet for those miners who have black sand and don't know what to do with it.

Russell Chadwick, Route 1, Box 544, Beaverton - phone MItchell 6-1092 (evenings) or ATlantic 8-4581 (days) will pay $20/ton delivered Beaverton for any black sand or lumps which weigh at least 1850 pounds per 55-gallon steel drum, weight of drum included.

Chadwick can use up to 100 tons a year but must be contacted first before any deliveries are made. This is not a very attractive price and there may be some difficulty in reaching the minimum weight, which calculates out to about a specific gravity of 4, with a theoretical of 5 for pure, solid magnetite.

RSM:lk

Black sand

April 21, 1959

Mr. John MacGinniss, Superintendent
Celtor Chemical Corporation
P.O. Box 656
Arcata, California

Dear Mr. MacGinniss:

Thank you for your letter of April 17 inquiring about the Mineral Sands Company.

Although we have tried for a number of years to obtain information on the Company's operation near Bandon, we have been unsuccessful in learning any more than the most basic facts. We have made numerous visits to the operation and have written to Mr. Wright several times, but the only information we have obtained is that they were going to "take everything out of the black sands". Aside from a brief period when some of the units were being tested we understand that the plant has never been in production.

Normally we are able to supply considerable information about any mineral or metallurgical plant in the State but in this particular instance we regret that no information was volunteered by the Company.

If you are contemplating operating this plant we would appreciate being informed of your plans. If you wish them kept confidential we will be happy to do so, but wish to point out that we can be of service to you in the event you go into operation if we are kept informed.

Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk

# CELTOR CHEMICAL CORPORATION

PHONE VANDYKE 2-3591 P. O. BOX 656

ARCATA, CALIFORNIA

April 17, 1959.

Oregon State Department of Geology and Mineral Industries
702 Woodlark Building
Portland, Oregon.

Gentlemen:

Our company anticipates purchasing the installation at Bandon, Oregon built by Mineral Sands Co.

Would you please send us any data you have and any published reports on the Mineral Sands Co.

Thank you.

Very truly yours -
John MacGinniss
superintendent

BLACK SAND

Bibliography


Oregon State Dept. of Geology & Mineral Industries Bulletin No. 24, "Origin of the Black Sands of the Coast of Southwestern Oregon", by W. H. Twenhofel.

Oregon State Dept. of Geology & Mineral Industries Bulletin No. 30, "Mineralogical and Physical Composition of the Sands of the Oregon Coast from Coos Bay to the Mouth of the Columbia River", by W. H. Twenhofel.

U.S. Bureau of Mines Information Circular 7767, "Potential of Heavy-Mineral-Bearing Alluvial Deposits in the Pacific Northwest" by Kauffman and Baber.

U.S. Geological Survey Atlas (No. 89), Port Orford Folio, by J. S. Diller.

U.S. Geological Survey Circular 8, "Beach Placers of the Oregon Coast" by J. T. Pardee.

U.S. Geological Survey Bull. 945-E, "Chromite-Bearing Sands of the Southern Part of the Coast of Oregon" by A.B. Griggs.

Geological Society of America Memoir 72, "Coastal Sand Dunes of Oregon and Washington" by William S. Cooper.

— Black sand

HB

# DEL MONTE PROPERTIES COMPANY

PEBBLE BEACH, CALIFORNIA

P. O. Box 150 Pacific Grove, California

November 13, 1957

Mr. H. G. Schlicker
Geologist
State of Oregon
1069 State Office Building
Portland 1, Oregon

Dear Mr. Schlicker:

Thank you for sending the sample of Oregon beach sand.

We have been very busy on another project at present and have not had an opportunity to really investigate these sands. We hope, however, to start this investigation early next month.

We are returning to you the sacks under separate cover.

Thank you for your cooperation on this matter.

Yours very truly,

Hugh H. Bein

HUGH H. BEIN
Manager, Sand Plant

HHB/hl

DEL MONTE PROPERTIES COMPANY

PEBBLE BEACH, CALIFORNIA

P. O. Box 150, Pacific Grove, California

September 23, 1957

Mr. Hollis M. Dole, Director
State of Oregon
Dept. of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Hollis:

Thank you for your letter of September 19.

We will be looking forward to the receipt of the samples you mentioned.

Best regards,

Hugh

HUGH H. BEIN
Manager, Sand Plant

HHB:hl

Black Sand

October 29, 1957

Mr. Hugh H. Bein, Manager
Sand Plant
Del Monte Properties Company
P.O. Box 150
Pacific Grove, California

Dear Mr. Bein:

Under separate cover we have sent you 125 pounds of dune sand in two sacks. This material is being sent to you in response to your letter of September 9.

Mr. Dole informed you that we would send three samples from various parts of the Oregon beaches. We will be glad to do this but thought this first sample should be sent as a pilot sample. If, upon examination of the sample, you can inform us what it lacks we will try to examine other parts of the Oregon beaches to determine if the type material you wish is present. We would appreciate your returning the sacks to us as we find them somewhat difficult to come by. We will be awaiting word from you before continuing our sampling.

Very truly yours,

H. G. Schlicker
Geologist

HGS:lk

September 19, 1957

Mr. Hugh H. Bein, Manager
Sand Plant
Del Monte Properties Company
P.O. Box 150
Pacific Grove, California

Dear Hugh:

I have instructed our geologist, Mr. H.G. Schlicker, to obtain three samples of sand from the Oregon beaches for your use. These will come from various localities on the beach and will represent material that can be obtained in quantity. I cannot anticipate when Mr. Schlicker will be able to obtain this material but expect it will probably be within the next six weeks.

If at any time we can offer you any assistance, please do not hesitate to call.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

# DEL MONTE PROPERTIES COMPANY

PEBBLE BEACH, CALIFORNIA

P. O. Box 150, Pacific Grove, California

September 9, 1957

Mr. Hollis Dole
Department of Geology & Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Hollis:

If you will recall, on my visit up there a few years back, you brought to my attention the large area of sand dunes along the southern coast of Oregon and indicated that their mobility was giving the highway department some trouble in keeping the roads clear.

Would it be possible for you to arrange to have someone send us about 100 lbs. of this material - motor freight, collect. Also, if there will be any labor charges please bill us for them.

We would like to have a preliminary look at these sands and then, if they look interesting, could follow up with a trip up to the area.

We are presently pretty busy in our Emmett, Idaho plant and believe, eventually, we will have a fair size operation there.

Entered JR 9-11-57

I enjoy receiving the "ORE-BIN" every month and am enclosing a dollar bill to insure the continuity of my files.

I hope you can arrange for the requested sample as it will save us quite a bit of expense for the preliminary look.

Kindest personal regards.

Yours very truly,

Hugh

HUGH H. BEIN
Manager, Sand Plant

HHB:jmh

# OPERATIONAL COST ESTIMATE
# COOPERATIVE FERROCHROME PLANT AT GRANTS PASS, OREGON
# TO PRODUCE HIGH-CARBON FERROCHROME

ASSUMPTIONS:

(1) The procurement of a 5-year GSA stockpile purchase contract for high-carbon ferrochrome from new domestic ores.

(2) The ability to purchase an average of 65 short tons of chromite ore per day with an average analysis of 46.5 percent $Cr_2O_3$ and 2.6:1 chrome-iron ratio at GSA stockpile prices at Grants Pass, Oregon.

(3) The production of high-carbon ferrochrome in a single stage smelting operation, with an average analysis of 60 percent Cr, 26 percent Fe, 8.0 percent C, and 3.2 percent Si. At the present market price of 27.75¢/lb. of contained Cr, would be $333 per short ton of alloy.

(4) Furnace capacity of 6000 KV-A, 85 percent load factor, 5200 KW load.

(5) $1,500,000 cost of plant, 10 year amortization, continuous operation.

(6) 7.09 mill power rates. 3960 KW-Hrs/ton of FeCr produced. 92 percent smelting efficiency.

Ratio of Concentration: $\frac{60}{46.5 \times .6842 \times .92} = 2.05$ to 1

Tons of ferrochrome produced/day: $\frac{5200 \times 24}{3960} = 31.5$; x 365 = 11,500 TPY

Costs (per ton of ferrochrome produced)

| | | | | |
|---|---|---|---|---|
| Chromite ore, $95.50/LT = $85.30/ST; 85.30 x 2.05 | | | $ 175.00 | |
| Power, 3960 x .00709 | | | 28.10 | |
| Electrodes, 84# x $0.30 | | | 25.20 | |
| Amortization: $1.5M/365x10x31.5 & Int. 1.5Mx.06/2x365x31.5 | | | 16.92 | |
| Labor (per day): 1 Supt. | $ 30.00 | | | |
| 3 Foremen | 75.00 | | | |
| 6 Operators | 120.00 | | | |
| 6 Asst. Oper. | 108.00 | | | |
| 2 Mix & Prep. | 40.00 | | | |
| 1 Chem. & Met. | 25.00 | | | |
| 1 Pur. Agt | 30.00 | | | |
| 1 Bookkeeper | 25.00 | | | |
| Plus 12% taxes | 54.50 | $ 507.50 | | |
| $507.50/31.5 | | | 16.10 | |
| Relining: 25,000/2x11500 | | | 1.09 | |
| Maintenance: .04x.5x1.5M/11500 | | | 2.61 | |
| Ins. & taxes: .02x.75M&500/11500 & .003x1.5M/11500 | | | 1.74 | |
| Quartz: 2.05 x .20 x $8 | | | 3.28 | |
| Limestone: 2.05 x .06 x $8 | | | 0.98 | |
| Coal: 2.05 x .08 x $21 | | | 3.45 | |
| Hogged fuel: 2.05 x 1 x $1.45 | | | 2.92 | |
| Fluorspar: 2.05 x .05 x $40 | | | 4.10 | $ 281.49 |
| Income from 1 ton of Hi-C ferrochrome | | | | 333.00 |
| Net profit from 1 ton of ferrochrome | | | | 51.51 |
| Net profit per day: 51.51 x 31.5 | | | | 1623.00 |
| Short tons of 46.5% $Cr_2O_3$ chromite ore required per day: 31.5 x 2.05 | | | | 64.6 |
| Short tons of chromite ore required per year: 64.6 x 365 | | | | 23,550 |

J. W. Pressler - August 17, 1958
1019 S.E. Fern Street, Grants Pass, Ore.

TABLE 1
GSA Analyses of Chromite Samples from Stockpile

| Source | Weight, Pounds | Analysis, Percent $Cr_2O_3$ | Fe | $SiO_2$ | Cr:Fe Ratio |
|---|---|---|---|---|---|
| Lump | | | | | |
| 1/ | 2,430 | 44.0 | 12.03 | 7.00 | 2.5:1 |
| 2/ | 4,660 | 50.0 | 11.35 | 6.12 | 3.01:1 |
| 3/ | 1,280 | 44.5 | 11.73 | 5.01 | 2.6:1 |
| 4/ | 1,500 | 51.7 | 10.70 | 5.00 | 3.3:1 |
| Total weight | 10,870 | | | | |
| Calculated head | | 48.1 | 11.47 | 6.02 | 2.9:1 |
| Concentrate | | | | | |
| 5/ | 3,100 | 48.0 | 15.16 | 11.12 | |
| 6/ | 11,150 | 50.8 | 11.74 | 6.00 | |
| Total weight | 14,250 | | | | |
| Calculated head | | 50.2 | 12.48 | 7.11 | |
| Composite of lump and conc. | | | | | |
| Total weight | 25,120 | | | | |
| Calculated head | | 49.4 | 12.07 | 6.66 | |

- - - - - - - - -

1/ Section 16, Rattlesnake Mt., Del Norte Co., Calif.
2/ Blue Cr. Mt. Tunnel Mine, Siskiyou Co., Calif.
3/ Iron Mt., Powers, Coos Co., Oreg.
4/ Hi Plateau Mines, Del Norte Co., Calif.
5/ McGuffy Cr., Siskiyou Co., Calif.
6/ Burrow Mine, Elk Cr., Glenn Co., Calif.

TABLE 2
Analyses of Flux and Reductant

| Material | Analysis, Percent Fe | $CaF_2$ | $SiO_2$ | MgO | CaO | Fixed Carbon |
|---|---|---|---|---|---|---|
| Fluorspar | 1.59 | 69.0 | 27.9 | | | |
| Quartz | | | 98.2 | 1.3 | 0.5 | |
| Limestone | | | 2.44 | 0.72 | 52.8 | |
| Coal, dry basis | | | | | | 55.6 |
| Wood chips, as received | | | | | | 19.3 |

TABLE 3
Production of High-Carbon Ferrochrome from Stockpile Chromite

| Period | 1 | 2 | Over-all |
| --- | --- | --- | --- |
| Charge per 100 lb. total chromite | | | |
| Fluorspar (dry) | 5.0 | 5.0 | |
| Quartz (dry) | 20.0 | 20.0 | |
| Limestone (dry) | 6.0 | 6.0 | |
| Coal (dry) | 8.9 | 7.5 | |
| Wood chips (wet) | 95. | 97. | |
| Chromite, lump (dry) | 41.5 | 41.5 | |
| Chromite, conc. (dry) | 58.5 | 58.5 | |
| Total chromite charged | | | |
| Lump | 3,114 | 5,522 | 8,636 |
| Conc. | 4,316 | 7,752 | 12,068 |
| Duration, hr. | 26.3 | 50.5 | 76.8 |
| Feed rate, lb. of chromite/hr. | 283 | 263 | 270 |
| Voltage, phase-to-phase | 120 | 120 | |
| Pounds of product | | | |
| Ferrochrome | 2,230 | 6,861 | 10,797 * |
| Slag | 3,415 | 8,852 | 12,507 ** |
| Energy consumption, kw.-hr. | 7,350 | 14,010 | 21,360 |
| Per lb. of alloy | | | 1.98 |
| Per lb. of Cr produced | | | 3.28 |
| Electrode consumption, lb. | | | 98.1 |
| Per lb. alloy | | | .042 |
| Per lb. Cr | | | .070 |
| Alloy analysis, percent | | | |
| Cr | 58.5 | 60.0 | |
| Fe | 25.0 | 25.6 | |
| Si | 5.16 | 3.24 | |
| C | 7.73 | 7.97 | |
| Slag analysis, percent | | | |
| Cr | 1.62 | 1.62 | |
| Fe | 1.47 | 0.85 | |
| $SiO_2$ | 39.9 | 40.1 | |
| CaO | 9.00 | 10.3 | |
| MgO | 28.7 | 27.2 | |
| $Al_2O_3$ | 20.9 | 20.4 | |
| Cr recovery in alloy, percent | | | 98.1 |

- - - - - - - - - - - -

* Includes 1,706 lbs. of ferrochrome removed from furnace at end of run.
** Includes 240 lbs. of slag removed from furnace at end of run.

1019 S. E. Fern Street
Grants Pass, Oregon
April 3, 1958

Mr. Hollis M. Dole, Director
Oregon State Dept. of Geology & Min. Industries
1069 State Office Building
Portland 1, Oregon

Dear Hollis:

I am anxiously awaiting the preliminary report of Ivan Bloch's study for a ferrochrome plant. I have been interested in this possibility for several years now, especially in the feasibility of alternate campaigns of chrome with rhodonite or siliceous manganese ores, which I feel have enough possible reserves in Southern Oregon and Northern California to justify this consideration.

As they can be smelted and produced in the same type furnace, the stockpile of raw material could be built up during opposite campaigns, assuring adequate supplies when initiated. Of course, this might take somewhat more capital investment in the way of operating capital, which would be an added consideration if privately financed.

Assuming 6860 LT of chrome production from Oregon, which is very close to the average of 6870 LT for the last five years, and continuous 24-hour furnace operation with a load factor of 94% would mean the consumption of 20 LT of chrome per day. Also assuming the production of low-carbon chrome silicide with an estimated power consumption of 6330 KW-HRS per ton of metal produced, this would mean a load of approximately 5200 KW, or, if operating at 85% of capacity, would mean a 6000 KV-A installation.

Pyrometallurgical experts have said in the past that the minimum economic size furnace for the production of ferroalloys such as ferrochrome or ferromanganese is the 6000 KV-A installation. Savings would be very apparent in labor, electrode consumption, and plant amortization(this in comparison to a smaller furnace). In addition, the production of the two N. California counties of Del Norte and Siskiyou would supplement the yearly chrome supply with approximately 2500 LT each. On the above basis, it appears that there is sufficient chrome ore supply(from past production) to more than justify a 6000 KV-A installation.

This ferrochrome smelter operation would be hindered in the near future by the depressed ferroalloy markets. They are directly dependent upon the steel industry, which is currently at 46% of capacity. A good sales force should be maintained, and a sales budget of at least 10% of the gross revenues should be planned. Careful market surveys and analyses should be made to determine the best products feasible for production.

Chemical processing for the production of chromium chemicals including the end product of chromium metal shows a very promising profit on paper, even with paying $100 per ton for chrome, but due to the limited West Coast markets, it is possible that only a very small operation would be successful. Here again, a careful market survey and analysis should be made. Bulletin 556 lists all chemical chrome consumers on the East Coast where the South African 44% chrome is available on long-term contract at $21 per ton. The ordinary treatment of chrome with soda ash and lime or soda ash alone could possibly be changed to a sulfuric acid treatment locally. This suggestion is because the price of soda ash would be somewhat prohibitive shipped in to Josephine County, and some fairly large deposits of pyrite ore are available here, such as the Queen of Bronze, Blue Ledge, Silver Peak, Blue Creek, and others.

In trying to secure any cheaper committment for power from Mr. Moyer of Copco such as the rates Hanna is getting at Riddle, the attempts have been unsuccessful. Their rates are scheduled at 6.9 mills with a 10,000 KW consumption and a 95% load factor, on an up and down cost basis. As they pay 24% Federal, State, & County taxes, the rate could be lowered that much if the taxes were subsidized or exempted. As the power consumption of this suggested ferrochrome plant will amount to approx 14% of the gross income, any reduction in this rate would be an appreciable saving, and would make the proposition that much more attractive from a private standpoint. Roughly, each mill saving in power rate would increase the net profits by 2% of the gross income.

Enclosed please find a rough estimate I have prepared on a proposed smelting operation. I have here considered the production of low-carbon ferrochrome-silicon, which is quite attractive, especially in that it consumes approx 1.5 tons of cheap silica rock raw material per ton of alloy produced, materially reducing costs, and at the same time, holding the value of the finished alloy at approx the same level as low-carbon ferrochrome.

I do not know what chance we have of Govt participation in this ferrochrome plant, but I do think that it would cost considerably more, operating costs would be somewhat higher, and chances of success might be measurably higher. However, I do think that the most healthy approach would be private financing with an organizational set-up such as the co-op, which would mean very low taxes, proportionately increasing the dividends from net profits. Indications from several interested people are that private financing is possible. At least, I think it should be attempted before Government participation.

We had a very enthusiastic chrome meeting at Cave Jcn last Saturday. I hope that we can maintain this enthusiasm by recommending a positive approach with the continuance of chrome mining in the future. Sincerely,

Jean Pressler

Jean W. Pressler

Encl.

ESTIMATE OF FERROCHROME PLANT
TO PRODUCE LOW-CARBON FERROCHROME-SILICON

ASSUMPTIONS: 1. The ability to purchase an average of 20 LT of chrome ore per day of avg analysis of 47% $Cr_2O_3$ and 2.6/1 Cr/Fe ratio.
2. The production of low-carbon ferrochrome-silicon with an average analysis of 35% Cr, 45% Si, & 0.05% C. Present mkt quotation @ 45¢/# Cr equals $315/short ton.
3. 88% Smelting recovery. 2-stage smelting operation.
4. 6000 KV-A Demand, 85% load factor, 5200 KW load.
5. $350,000 cost, amortized over 5 years, 300 Days/Yr.
6. 7 mill power. 6330 KW-HRS/Ton FeCr-Si produced.

Ratio of Concentation: $\frac{35}{47 \times .88 \times .88}$ = 0.95 to 1 .96 to 1

Tons FeCr-Si produced per day: $\frac{5200 \times 24}{6330}$ = 19.7

Costs: (Per ton of FeCr-Si produced)

| | | | |
|---|---|---|---|
| Chromite, $100/.95 | | $105.00 | |
| Power, 6330 x .007 | | 44.30 | |
| Electrode Consumption: 98# x $0.27 | | 26.40 | |
| Plant Amortization: 350,000/(300x5x19.7) | | 11.70 | |
| Labor: 1 Supt | $30.00 | | |
| (Per Day) 3 Foreman | 75.00 | | |
| 6 Operators | 120.00 | | |
| 6 Helpers & Mixers | 108.00 | | |
| 2 Salesman | 50.00 | | |
| 1 Metallurg. | 25.00 | | |
| secretary 1 Pur. Agt | 30.00 | | |
| 1 Bkkper | 25.00 | | |
| | 463.00 | | |
| Plus 12% Tax | 55.50 518.50 | | |
| 518.50/19.7 = | | 26.30 | |
| Quartz: 2900# @ $8/ton | | 11.60 | |
| Hogged Fuel: 9670# @ $2.95 | | 14.25 | |
| Sales, Research & Development | | 31.50 | $271.05 |

| | |
|---|---|
| Income from 1 T. of FeCr-Si | $315.00 |
| Net Profit per ton of FeCr-Si (NOTE: Equals 14% of Gross Income) | 43.95 |
| Net Income per day | $865.00 |
| Tons, short, required per day (47% $Cr_2O_3$): 19.7 x 0.95 | 18.7 ST |

Depreciation?
an op-chge-

J. W. Pressler - Apr. 3, 1958

COPY

February 18, 1958

Mr. Glenn L. Jackson
Medford, Oregon

Dear Mr. Jackson:

At the request of Mr. Howard Grover, we are giving you information below that will show how the government chrome buying program has affected the local Southern Oregon economy, as far as our own operations are concerned.

During the 6½ years of the program through December 31, 1957, our own operations have paid out a total of $733,349.98 in direct labor, or a yearly average of $112,823.07. In addition we have paid out to one local truck operator $205,906.53 in trucking costs. His average labor per dollar of freight revenue is 26.29¢, or a total of $54,132.82 in direct truck labor, a yearly average of $8,328.12.

In addition we have expended thousands of dollars for supplies and materials in the local area, a portion of which is labor involved in furnishing these supplies.

A conservative estimate would show in excess of $250,000.00 in income taxes returned to the federal government on labor and profits involved in our own operations.

Had the program been of longer range we would have expended considerable more money. One operation was closed down at the end of 1955 because it would have involved the expenditure of some $50,000.00 in development work. As the mine could only be worked four or five months of the year, the end of the program, at that time, did not warrant the expenditure of such a sum. The program was subsequently extended but too late for us to go back into this operation.

Our present operations will close down very shortly due to the scheduled ? closing of the program in mid 1957. We have not spent any money on development in several months due to this scheduled closing. This one operation spent in excess of $145,000.00 in direct labor during the year 1957 and the unfavorable impact, under present conditions, towards the Southern Oregon economy, of this closing can readily be seen. This operation had an average of 21 employees during 1957 and 35 during 1956.

If we can be of any other service please feel free to call on us at any time.

Very truly yours,

William S. Robertson

State of California
Department of Natural Resources
DIVISION OF MINES
Headquarters Office
Ferry Building, San Francisco 11

March 21, 1958

Mr. Ralph S. Mason, Mining Engineer
State of Oregon
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Mr. Mason:

Sorry for the delay in answering your letter regarding chromite reserves, but I've been in the field.

This is going to be more of a discussion than an answer to your question, mainly because I can't give a reasonable pat answer. As far as California is concerned, any simple statement listing chromite reserves would be misleading. The use of such terms as "probable", "indicated", and "inferred" does not modify that statement. Chromite is different from most other ores when it comes to useful reserve estimates, largely because the ore-bearing zones are very difficult to delimit, very little exploration is done by the miners during production, and even very small ore bodies can be mined about as profitably as large ones.

Prior to 1950 the Geological Survey conducted an extensive study of California chromite deposits, and made statements regarding reserves in their reports. Their estimates naturally appeared conservative because they listed only specific reserves for which there was reasonable evidence. Any dreamy statements regarding specific deposits probably would have resulted in large losses to hopeful miners during the current stockpiling program. Actually the bulk of the chromite produced in California during this program has come from newly discovered ore bodies, the largest being quite remote from any previous large mines. Those deposits listed by the U.S.G.S. as containing the largest reserves, such as the Pillikin and Seiad Creek deposits, still contain those stated reserves; apparently they could not be economically worked under the leap frog time limitation conditions of the program.

Since the current program started in 1951, production from California has been about 145,000 short tons; this in spite of the rather unfavorable location of the purchasing depot and the time limit uncertainties. But this amount is considerably in excess of excellent probable reserve estimates available in 1951, if those deposits are excluded which have not contributed to the recent production.

Yet known reserves at the present would be larger than ever if examinations were up to date. We haven't made detailed studies, but good ore bodies are visible at the working faces of many of the mines. However, good evidence of this is the notable rise in production during the last couple of years as development work has begun to pay off.

Many U.S.G.S. reports make vague statements, regarding chromite reserves, that at least as much ore can be expected from a given area as has been already mined there, granting sufficient incentive. I think that this is about as reasonable a statement as can be made, and that it will remain true as mining progresses. We have a certain number of square miles of outcrop of ultrabasic rocks in which there are a certain number of known chromite-rich zones. Ore mined to date has been almost entirely from ore bodies exposed at the surface, roughly those occupying the first 50 feet or so of depth. The nature of chromite being what it is, there are at least as many ore bodies in the next 50 feet, and so on. In addition, many of our outcrop areas of ultrabasic rocks have not been prospected, at least not adequately. Whenever there is incentive, chromite will be produced in California in amounts roughly proportional to the various conditions of the incentive.

On the other hand, I do not expect that in the foreseeable future our deposits will be able to supply entirely the U.S. industrial demand. There is no evidence that we have sufficient tonnage that can be mined as cheaply as many of the large foreign deposits, regardless of labor costs.

I know you are aware of the conditions mentioned in this letter, but it is the only way I can answer your letter honestly.

Yours very truly,

Gordon B. Oakeshott, Chief, Division of Mines

By Salem J. Rice
Assistant Mining Geologist

sjr-ld

# CHROME STOCKPILE STUDY

## Tax Sources

| | |
|---|---|
| Taxes on $5,000,000 plant investment[1] . . . . . . . . . . . . . | $ 1,000,000 |
| Taxes on 200,000 tons delivered to stockpile . . . . . . . . | 6,000,000[2] |
| Taxes on supplies and labor used in looking for ore unsuccessfully . . . . . . . . . . . . . . . . . . . . | 2,000,000[3] |
| Taxes on rail freight from Grants Pass to storage . . . . . . | 150,000[4] |
| Taxes on labor and services related to stockpile operation, sampling, assaying, loading, unloading, etc.[5] . . . . . . . . . . . . . . . . . . . . | 87,500 |
| Total primary taxes . . . . . . . . . . . . . . . . | $ 9,237,500 |
| Total secondary taxes[6] . . . . . . . . . . . . . | 7,360,000 |
| Total primary and secondary taxes . . . . . . . . | $16,597,500 |

## Stockpile Costs

| | |
|---|---|
| Direct purchase costs[7] . . . . . . . . . . . . . . . . . . . . . | $19,562,000 |
| Overhead, supervision[8] . . . . . . . . . . . . . . . . . . . . | 1,956,200 |
| Freight and miscellaneous . . . . . . . . . . . . . . . . . . | 1,000,000 |
| Total cost . . . . . . . . . . . . . . . . . . . . | $22,518,200 |
| Less taxes . . . . . . . . . . . . . . . . . . . . | 16,597,500 |
| | 5,920,700 |
| Net cost per ton . . . . . . . . . . . . . . . . . . | $29.60 |

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1 Holman testimony before Senate, p. 46.
2 $30/ton estimated by Holman; $20.40/ton for Oregon chrome; $35.21/ton theoretical primary and secondary taxes on average value of ore delivered to G.S.A. stockpile to date.
3 Estimated at one-third of cost of ore shipped.
4 Estimated at $5/ton and 15% tax.
5 Ten men, 7 years at $5000/yr. x 25%.
6 Estimated on basis of 20% tax on 80% of primary tax.
7 Estimate based on purchase costs through March 31, 1958 of $97.81/L.D.T.
8 Estimated at 10% of direct costs.

333 Kearny Street
SAN FRANCISCO 8
GArfield 1-7866

WALKER'S WEEKLY NEWSLETTER
Published by WALKER'S MANUAL, INC., Established 1909

215 West 7th Street
LOS ANGELES 14
MAdison 7-1591



# AMERICAN CHROME COMPANY

Traded
Over-the-counter.

Outstanding:
Common ($1 par) - 1,872,000 shs.

## Highlights

Ferrochromium Pilot Plant to Start Operations Shortly - American Chrome Co. is currently producing chromite concentrate at its mine in Montana under a long term government contract extending into 1961. This concentrate is being delivered to the U.S. stockpile. Virtually the entire domestic consumption of chrome ore is supplied by imports of high grade ore from foreign countries generally involving long shipping distances. Presently no domestic smelters of ferrochromium are using the lower grade U.S. ores to produce this product.

American Chrome Co. has made careful studies and tests to determine the feasibility of using ores at its Montana mine to make ferrochromium. For more than one year, company conducted ferrochromium smelting tests with the help and cooperation of the U.S. Bureau of Mines at Albany, Ore. These test runs were successful in producing high carbon ferrochromium of commercial grades and with good recoveries, according to company. Still to be determined are production and marketing costs and the sales potential of the product in competition with ferrochromium made from foreign ores.

As a result of its studies and tests, the company is investing $500,000 in a pilot plant at Nye, Mont., for the production of high carbon ferrochromium using ores from its mine. The plant is scheduled to begin operation about Dec. 1, about 2 months after the original target date, due to slowness of certain suppliers in delivering equipment. Initial output is expected to be about 5 tons daily and this can be stepped up to 15 tons as desired. The principal purpose of the pilot plant is to accurately ascertain production costs and then determine selling costs including freight charges to the consuming areas which are in Chicago and points to the east of Chicago.

If the results of the pilot plant operation prove successful in all respects, then company would construct a commercial plant for the production of ferrochromium at a cost of several million dollars, according to management.

Earnings and Financial Position - For the 6 months to June 30, 1958 net income was $399,514 or $0.21 a share, up from the $259,832 or $0.14 a share recorded in like year earlier period. For the full year 1958, net is expected to be between $700,000 and $750,000, equal to $0.37 to $0.40 a share. This would compare with 1957 net of $529,725 or $0.28 a share.

During 1957, company paid off the remaining balance of its V-loan which originally stood at $1,500,000. In addition, company reduced its loan payable to GOLDFIELD CONSOLIDATED MINES CO. (which owns 65% of American Chrome's stock) to $388,996. This was the only long term liability of the company and it is being repaid at rate of $2 per ton of concentrate shipped to the government. At Aug. 31, 1958, this loan had been further reduced to $236,308.

At Dec. 31, 1957, current assets were $1,185,000 including cash of $691,000 and receivables from the U.S. government of $307,000. Current liabilities were $484,000. Company has paid for its pilot plant entirely out of funds on hand.

Current Mining Operations - American Chrome operates the Mouat Chrome mine in Stillwater County, Montana under a 10-year lease expiring in 1960 but with renewal options for two additional 10-year terms. The ore as it comes from the mine averages 20-21% $Cr_2O_3$--chromic oxide--and this is then concentrated by the company to 38%-plus chromic oxide for the government stockpile. During 1957, company delivered 114,298 tons to the government and shipments this year are expected to approximate this figure.

(continued on reverse side of page)



October 13, 1958

SUMMARY OF EARNINGS

| YEAR TO DEC. 31 | OPER. & OTHER INC. | PRODUCTION COSTS | INCOME TAXES | NET INCOME* | ERNGS. PER SHARE |
|---|---|---|---|---|---|
| 1957 | $3,938,987 | $2,460,149 | $182,009 | $529,725 | $0.28 |
| 1956 | 3,807,531 | 2,611,725 | 114,929 | 344,246 | 0.18 |
| 1955 | 3,732,937 | 2,882,227 | 1,246 | 110,819 | 0.06 |
| 1954 | 4,133,464 | 2,875,754 | - - - | 460,887 | 0.25 |

* BEFORE DEPLETION OF VALUE MINING RIGHTS CHARGED DIRECTLY TO SURPLUS IN YEARS 1954, 1955 AND 1956. IN 1957, VALUE OF MINING RIGHTS REDUCED TO $19,218, THE COST TO PARENT COMPANY. DEPLETION AT COST TOTALED $1,722 FOR 1957.

PRICE RANGE - 1958 THROUGH OCT. 9: 2 1/2 - 5/8.

U. S. Government Contract - The contract with the government calls for the delivery of 900,000 tons of the concentrate over an 8-year period expiring in December 1961. By the end of 1957, company had shipped 486,588 tons, leaving a balance of 413,412 tons to be delivered. Shipments for the first 9 months of 1958 have brought total cumulative deliveries to 574,000, thus leaving a balance of 326,000 tons to be delivered.

The company delivers the concentrate to the government at a base price of $33.32 per ton which is subject to escalation provisions based on Bureau of Labor indices. For the first 8 months of 1958, company received an average of $35.05 per ton while the price in effect at the end of September was $34.95. A slight reduction is anticipated by company for the final quarter of this year.

Ore Reserves - Although the company has not entirely blocked out its ore reserves, management believes that it can reasonably see 5,000,000 tons averaging 20-21% $Cr_2O_3$ content. The company is taking about 250,000 tons annually out of the mine so that at the end of the government contract, American Chrome would have remaining more than 4,000,000 tons. It has been estimated that the Mouat Chrome mine contains some 80% of the known U.S. reserves.

Pilot Plant Operations - The company has an agreement with the government under which it can produce 40,000 tons of the 38%-plus concentrate for use in the pilot plant. This tonnage will have a relatively low cost to the company. The concentrate will be fed into an electric furnace using 3 carbon electrodes to melt and smelt the ore. After smelting, the furnace will be tapped and the resulting product will be ferrochromium which will have a 50-55% chromium content. It will then be ready for shipment to users.

This product is known in the metal trade as "charged chrome" and it has only come into use in the past several years. It is currently being produced by 3 other smelters in this country but they are all using foreign ores.

Chrome Ore - Supply, Demand, Uses - In 1957 chrome ore imports totaled about 1,800,000 tons with the Union of South Africa, the Philippines, Southern Rhodesia and Turkey accounting for 92% of the imports. Domestic consumption in 1957 totaled 1,572,000 tons while production within this country was only 147,000 tons.

In 1957 approximately 67% of U.S. consumption went into metallurgical uses, principally stainless steel, 25% to refractory uses and the balance of 7% for chemical uses.

Management - Willis A. Swan, Pres. & Dir.; John Bley, V.P. & Gen. Mgr.; Wm. K. Woodburn, V.P.; T. L. Willcox, V.P.; Geo. M. Spradling, Sec., Asst. Treas. & Dir.; John L. Lukens, Treas.; Irving Guberman, Dir.

Messrs. Swan and Spradling are also officers and directors of Goldfield Consolidated Mines Co. while Mr. Guberman is a director of Goldfield.

Administrative Offices - No. 1 Montgomery St., San Francisco.

From the office of Congressman Al Ullman

For Immediate Release - July 22, 1958

WASHINGTON, D.C. -- The Grant County Miners Association was today notified by Congressman Al Ullman that the House Mining Subcommittee added a chrome mining assistance program to the Senate passed Mining Stabilization Bill.

In a letter to William Gardner, President of the Association, Ullman reported that a provision for incentive payments for chrome had been included in the omnibus Senate bill which deals with lead, zinc, copper, tungsten and acid-grade fluospar. Representative Ullman, who is a member of the Mining Subcommittee, lead the fight in obtaining subcommittee approval of the amendment which had the support of Western miners.

"The domestic mining industry is badly in need of a long-range program," Ullman stated. "The chrome program approved by the Subcommittee is definitely a step in the right direction and one which will help to keep alive an industry of critical importance to the Nation's defense. If the position of the small miner in the West is to be maintained, legislation such as that adopted today is essential."

Representative Ullman reported that incentive payments provided in the bill will amount to $46 per long dry ton for 46% ore. The program is limited to 50,000 long dry tons annually for a period of five years. Individual operators in any area are limited to 10,000 long dry tons per year.

- # -

April 24, 1962

TO: HMD
FROM: RSM

Mel Succhi of the FS called this morning. They are examining Clint Haight's application on his chrome claims in Baker County. They want to know if 53% ferrochrome is marketable and if so how much is it worth. It seems that they have a report by Banning of the BM that 53% is the maximum that can be made from Clint's ore. I told Mel I would have to do some checking and would call him later. In your absence I put in a call to Clint and finally reached him. He said, "It looks like the Forest Service is trying to pull the rug out from under me." It seems that GSA is trying to sell the PNWA plant at Mead and are using Clint's ore as bait for possible buyers. Clint is going to get busy and see what he can do.

I have checked several references and can't find any that even quote ferrochrome in the $3% range. Jean Pressler did use the figure of 35% Cr in his April 3, 1958 letter to you, but in his Aug. 17, 1958 memo he used 60% Cr.

AMERICAN CHROME COMPANY

NYE, MONTANA

May 15, 1962



Mr. Hollis M. Dole, Director
State of Oregon
Department of Geology & Mineral Industries
1069 State Office Building
Portland, Oregon

Dear Hollis:

We are glad to give you the information we have gathered on the use of a 53 percent chromium contained ferrochrome produced from domestic ore.

Our company has conducted a continuous market investigation and evaluated the results periodically from the time of the company's inception ( December 1950 ). From these studies and other sources, it is concluded that there is a growing interest in the United States industries for development of domestic supplies of chromite and chromium alloys.

The market investigation, among other things, included potential market for 53 percent chromium contained ferrochrome, prices, services and trends. The survey was made of ferrochrome consumption in all major steel companies and foundries ( except West Coast ). From this study we found that 88 percent of high carbon ferrochrome in the United States is used by twelve steel companies. All of these companies could use a low chromium contained high carbon ferrochrome like that made by our company of the following analysis: Chromium: 50-55 % Carbon: 4 - 5 % Silicon: 1.5 to 2.5 %. In fact, several of the major companies had authorized their purchasing departments to list us as one of their suppliers. Accordingly, we have sold 2500 tons of our alloy with another 400 tons committed to be sold in the next few months.

Presently the price is 22 to 24 cents per pound of chromium contained. We are of the opinion that a well designed, automated plant with quantity production can operate profitably under the present price structure.

There is a growing trend to use a lower chromium contained ferrochrome in the United States. From our studies and sales of our ferrochrome to major steel companies ( Allegheny Ludlum Steel Corporation; United States Steel; Youngstown Sheet & Tube Company ) the growing interest of the domestic industries in the development of an uninterruptible supply of chromium alloys has been evident. In other words, our industries are becoming more cognizant of the necessity for domestic supplies.

Obviously our government has a similar interest. In addition, it is vitally concerned for an uninterruptible supply for defense and national emergencies.

Yours very truly,

John Bley

JOHN BLEY
Vice President &
General Manager

JB/mbd.

April 10, 1958

Mr. William S. Robertson
P.O. Box 475
Grants Pass, Oregon

Dear Bill:

Hollis is still trying to develop information that will strengthen the case for chrome. This information he is submitting through Oregon's Congressional Delegates. He has asked me to obtain data on actual (not apparent) cost of the present chrome purchasing, as one of the most telling arguments we can bring to bear against the opposition is that the net cost to the Government is substantially less than the published schedule of prices paid per ton. This reduction is in the form of taxes recovered from labor, suppliers, operating profit, truckers, rail freight, etc. We are sure that we can make a good case and the information that you, Joe Holman and other producers have given us has been most helpful. Your letter of February 18 to Glenn Jackson contained a lot of good basic data, particularly on the amount of taxes.

To strengthen our arguments could you give us some figures on the amount of taxes derived per ton of ore produced by you. This would include income taxes paid by laborers, truckers, suppliers and yourself on all of your exploration, development and mining operations during the present stockpile program. We feel that it would be inaccurate to simply include only the taxes obtained from the production of the ore that is sold since a fairly large item of expense is involved in the search for and development of possible ore bodies. I realize that I don't have to tell you that looking for chrome is costly, but I just wanted to make my position abundantly clear.

Any figures you can send us will be helpful. There seems to be no good in waving the flag, crying wolf, wringing the crying towel, pointing with pride, getting mad, or being sarcastic when we go to Washington. Perhaps if we can show them that the net cost of domestic chrome is close if not equal to the cost of foreign ore, <u>when taxes are deducted</u>, they may listen to us.

With kindest personal regards,

Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk

GRANTS PASS COURIER
Oct. 28, 1958

# New California-Oregon Chrome Producers Group Formed; Officers Picked

CAVE JUNCTION (Special) — The California-Oregon Chrome Producers association took conclusive steps toward the formation of a chrome miners' co-op by electing to adopt such a program and naming a slate of officers to head the new organization at the October meeting Saturday held in Cave Junction at the American Legion hall.

Bruce Manley, C-OCPA president is to serve as the co-op president; Harry Hawks of Ashland, vice president; J. W. Pressler, Grants Pass, secretary; Gene Brown, O'Brien, treasurer. Jack Eggers, Cave Junction, director. It is expected the John Day and Los Angeles districts will appoint representatives to serve on the board.

A business meeting of the board of directors will be called shortly to discuss business matters and to draw a set of by laws for the organization. A co-op brokerage firm, designed along the lines of the agricultural co-op, will provide means of stockpiling ore as well as aid in finding market outlets.

Such an organization will have a two-fold purpose: It will enable the small miner with as little as one load per week to stay in business along with the larger producers, thereby keeping the industry alive. Secondly, the force of an organized group will present more strength in gaining governmental recognition at the next sessio of Cogress.

An intensive membership drive is now underway. To this end, questionnaires are now being mailed which should be completed and brought back or mailed back in time for the November general meeting. These completed forms will be helpful to the chrome miners' representatives in Washington in presenting their case. The co-op questionnaries are not to be confused with the cards being mailed out by Hollis Dole. Both should be completed and returned.

A committee was also formed to petition the Tariff Commission for relief through the escape clause of the Reciprocal Trade agreement designed for appeal where injury to an industry can be shown.

McClendon gave an informative talk on chemical chrome development.

The next meeting of the California Oregon Chrome Producers will be Saturday, Nov. 29 in Cave Junction.

4-23-58

# CHROME STOCKPILE STUDY

## Tax Sources

| | |
|---|---|
| Taxes on $5,000,000 plant investment[1] . . . . . . . . . . . . . . | $ 1,000,000 |
| Taxes on 200,000 tons delivered to stockpile . . . . . . . . | 6,000,000[2] |
| Taxes on supplies and labor used in looking for ore unsuccessfully . . . . . . . . . . . . . . . . . . . . . | 2,000,000[3] |
| Taxes on rail freight from Grants Pass to storage . . . . . . | 150,000[4] |
| Taxes on labor and services related to stockpile operation, sampling, assaying, loading, unloading, etc.[5] . . . . . . . . . . . . . . . . . . . . . | 87,500 |
| Total primary taxes . . . . . . . . . . . . . . . . . | $ 9,237,500 |
| Total secondary taxes[6] . . . . . . . . . . . . . . | 7,360,000 |
| Total primary and secondary taxes . . . . . . . . | $16,597,500 |

## Stockpile Costs

| | |
|---|---|
| Direct purchase costs[7] . . . . . . . . . . . . . . . . . . . . . . | $19,562,000 |
| Overhead, supervision[8] . . . . . . . . . . . . . . . . . . . . . | 1,956,200 |
| Freight and miscellaneous . . . . . . . . . . . . . . . . . . | 1,000,000 |
| Total cost . . . . . . . . . . . . . . . . . . . . . . | $22,518,200 |
| Less taxes . . . . . . . . . . . . . . . . . . . . . . | 16,597,500 |
| | 5,920,700 |
| Net cost per ton . . . . . . . . . . . . . . . . . . . | $29.60 |

---

1 Holman testimony before Senate, p. 46.
2 $30/ton estimated by Holman; $20.40/ton for Oregon chrome; $35.21/ton theoretical primary and secondary taxes on average value of ore delivered to G.S.A. stockpile to date.
3 Estimated at one-third of cost of ore shipped.
4 Estimated at $5/ton and 15% tax.
5 Ten men, 7 years at $5000/yr. x 25%.
6 Estimated on basis of 20% tax on 80% of primary tax.
7 Estimate based on purchase costs through March 31, 1958 of $97.81/L.D.T.
8 Estimated at 10% of direct costs.

ORIG WAGE $100 TAXES

TAX 20 — $20.00

NET INCOME 80

2NDARY TAXES 16 16.00

64

$36.00 or 36%

$9,237,500

.20

1,847,500.00

4 4

97.81

× 36

58686

29343

35.2116

9,237,500

1,847,500

7,360,000

.20

1,472,000.00

29.60

200,000 ) 5,920,700

# TAXES DERIVED FROM CHROME STOCKPILE PROGRAM

| | |
|---|---|
| 1. PLANT INVESTMENT — $5,000,000 (HOLMON) p 46 & DEV COSTS | |
| TAXES ON MILLS CONSTRUCTED | $1,000,000 |
| 2. TAXES ON 200,000 TONS @ $30/TON (1) = | $6,000,000 |
| TAXES ON SUPPLIES & LABOR USED IN LOOKING FOR ORE UNSUCCESSFULLY (2) — — — | 2,000,000 |
| TAXES ON RAIL FRT FROM G.P. TO STORAGE (3) | 150,000 |
| TAXES ON LABOR & SERVICES RELATED TO STOCKPILE OPERATION - SAMPLING, ASSAYING, LOADING, UNLOADING ETC (4) — — — | $87,500 |
| TOTAL PRIMARY TAXES | $9,237,500 |
| " SECONDARY " | 7,360 000 |
| AV COST OF 144,397 TONS DLVD G.P. STOCKPILE — — | $97.81 LDT |
| COST OF 144,397 TONS DLVD G.P. STOCKPILE — — — | $14,124,339.74 |
| 36% OF TOTAL COST — — — | $5,084,762.04 |
| 36% OF AV COST/TON | $35.21 |
| NET COST LESS TAXES | $62.60 |

(1) EST OBTAINED FROM HOLMAN. FIGURE FOR OREGON CHROME $20.40 (EST)
TOTAL PRIMARY & SECONDARY TAXES (THEORETICAL) 36%

(2) EST AT 1/3 OF COST OF ORE SHIPPED

(3) EST @ $5.00/TON x 15%

(4) 10 MEN - 7 YRS @ $5000 x 25%

WILLIAM S. ROBERTSON
P. O. BOX 475
PHONE GR 6 4548
GRANTS PASS, OREGON

April 23, 1958

Mr. Ralph S. Mason, Mining Engineer
Department of Geology and Mineral Industries
1069 State Office Building
Portland 2, Oregon

Dear Ralph:

In accordance with your letter of April 10, we have made a complete audit and analysis of all our chrome operations fro the period from 1951 through 1957, to determine as closely as possible the taxes paid. It is rather difficult to arrive at an exact figure, however, I believe that we have come up with fairly accurate figures on the taxes.

As you know I have been interested, with 16 associates, in several properties in an attempt to develop a continuing program. From all properties we have received an average price of $105.03 per long ton from the General Service Adminstration. On the basis of long tons I am listing below the expenditure per ton and taxes per ton:

| | | |
|---|---|---|
| Royalties | $ 8.17 | |
| Labor | 31.31 | |
| Transportation | 9.75 | |
| Supplies & Other Expenses | 21.43 | 70.66 |
| Taxes: | | |
| Direct taxes on business | 1.84 | |
| Indirect taxes on employees Expenditures | 4.70 | |
| Indirect Taxes on supplies | 4.33 | |
| Employees Income Taxes | 5.32 | |
| Income taxes on Royalties | 2.45 | |
| Partners Income Taxes | 6.65 | |
| Transportation Taxes | .29 | |
| Taxes-truck owners income | .14 | 25.72 |

This shows a return in taxes to the government of $25.72 per long ton, or 24.49 per cent of the amount paid per ton.

I blieve that the above figures are very conservative. You will also note that almost 92 per cent of the amount received was distributed for expenses and taxes, leaving 8 per cent f or the investors, who incidentally invested almost $200,000.00 before any production. The impact on the economy of the area probably produced far more taxes than we are able to estimate.

If anything more can be furnished to you please call on me.

Very truly yours,

Wm. S. Robertson

Wm. S. Robertson

OREGON CHROME
+ CYCLONE GAP

LABOR $733,350 (21.6%) ~~102,500~~
TRUCK 205,906 (6%)
INCOME TAX 250,000 (ON LABOR & PROFITS)
SUPPLIES $1,565,000 (46%) (BOTH EST)

TONS SHIPPED 34,000 ± (EST)

TONS SHIPPED 1956 (ORE CHROME OIL) 2,944 - $307,049
AV VALUE - $104/TON

34,000 T × $100 = $3,400,000 SALE VALUE
~~LABOR (21% - $733,350) = 2,710,000~~

| | | | |
|---|---|---|---|
| TRUCK | 205,906 | TAXES | |
| SUPPLIES | 1,565,000 | $390,000 | 25% |
| LABOR | 733,350 | 102,500 | 14% |
| TRUCK | 205,900 | 51,000 | 25% |
| TAXES | 150 000 | 150,000 | |
| PROFIT | 745,750 | 6½ Yrs $693,500 | |
| | 3 400 000 | DIRECT TAXES $20.40/TON | |

HOLMAN

1150 TONS LOT

EMPLOYEE INCOME TAX 14%
TAX ON SUPPLIES 25%
INDIRECT TAX ON EMP 15%
TAX ON ~~NET~~ GROSS LESSEE INC 8%
TAX ON ROYALTIES 20%

| | | |
|---|---|---|
| LABOR | \$27,042 | 27% |
| SUPPLIES | \$46,927 | 46% |
| ROYALTIES | \$26,882 | 27% |
| TOTAL COST | \$100,851 | 100% |

TOTAL SALES \$127,112
AV. PRICE \$110.70 LOT
NO OF TONS 1150
AV COST/TON \$87.50
TAXES PER TON \$29.65

State Department of Geology and Mineral Industries

1069 State Office Building
Portland 1, Oregon
January 8, 1959

Tabulation of records covering purchases of chromite from Eastern Oregon sources during 1958

A total of 1,507 dry long tons of both lump and concentrate chromite, valued at $176,140, were purchased from eastern Oregon sources during 1958, according to settlement records on file in this department. This production was made by seven operators from six properties. The Haggard and New Mine, operated by the Gardner Mining Company, led in sales with a record of 1,026 tons. The Carlsen Mine, operated by Al Dunn, placed next with 428 tons. The remaining production originated from the Dry Camp and Kingsley Mines, an occurrence on the Gardner ranch known as the Al Dunn lease and a prospect known as the "Top of the World" claim. There were 19 carload rail shipments involving an approximate total of 1,167 dry long tons and approximately 20 truck-trailer shipments covering about 340 dry long tons.

The recorded total of chromite shipments made from eastern Oregon sources during the period the government stockpile program was in force is 7,361 dry long tons, valued at $789,332.00. With the addition of approximately 200 tons which are known to have been shipped but for which settlement records are lacking, the grand total of eastern Oregon chromite production is approximately 7,500 dry long tons with a value in excess of $800,000.00.

N. S. Wagner
January 8, 1959

State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Branch Office
2033 First Street
Baker, Oregon
February 21, 1957



~~Ralph - I want to see this again~~

TO: Hollis M. Dole

FROM: N. S. Wagner

Attached is my report summarizing the eastern Oregon chrome production from the time the depot started through December 31, 1956.

Sincerely,

Wag g.e.

COPY

STATE DEPARTMENT OF
GEOLOGY & MINERAL INDUSTRIES
2033 FIRST ST. - BAKER, OREGON

<u>Attention:</u> Mr. Hollis M. Dole

February 21, 1957

John Day Chrome Miner's Association
c/o B. A. Bailey, Secretary-Treasurer
John Day, Oregon

Dear Mr. Bailey:

Enclosed is an advance copy of my report summarizing eastern Oregon chrome production between the time the depot opened for business and January 31, 1956. This contains a summary of the production figures which I have gathered over the years from the different operators, which summary I had promised to make available to the various operators at the earliest opportunity. Will you please therefore see to it that the enclosed report is brought to the attention of those interested?

Yours very truly,

N. S. Wagner
Geologist

NSW:gl
enc.

State Department of Geology and Mineral Industries

1069 State Office Building
Portland 1, Oregon



EASTERN OREGON CHROME PRODUCTION
August 3, 1951, through December 31, 1956

The General Service Administration's chrome-purchasing depot at Grants Pass, Oregon, opened for business August 3, 1951,[1] for the purpose of purchasing domestic-mined chromite ores in accordance with the government's defense materials procurement program. Depot operation was predicated on a support price designed to make possible the operation of domestic chrome occurrences.

~~While~~ Although the first ore purchased at the depot originated from the nearby Oregon Chrome Mine, Josephine County, subsequent depot purchases have included a considerable tonnage of ores and concentrates from many distantly located properties in California and eastern Oregon. This shows that the opening of the depot ~~did~~ stimulated the development and operation of domestic chrome properties in the intended manner. However, due to the fact that the ore-purchasing schedule contains no provisions for equalizing mine-to-depot transportation costs, except to the extent of provisions made August 10, 1956,[2] (see Ore.-Bin Dec., 1956) for purchases of carload lots, f.o.b., approved rail-siding nearest the mine, the operators of properties located far from the depot have been faced ~~from the outset~~ with high mine-to-depot delivery costs, ~~compared with the delivery costs faced by~~ to operators of ~~properties situated~~ close to the depot. As a consequence of this delivery situation, prospect development in the outlying chrome areas has lagged. ~~in comparison to what might have prevailed had this delivery cost inequality not existed.~~

The operators in the John Day chrome area of east-central Oregon represent a group which has had to absorb mine-to-depot delivery costs ranging from ~~sixteen to eighteen dollars~~ $16 to $18 a ton, on top of their base operational costs. This has constituted a serious deterrent to the development of the John Day area for the reason that most investors have been prone to spend their speculative capital on prospects located ~~in~~ closer ~~proximity~~ to the depot in order to gain the advantage of the more favorable delivery costs. Production from the John Day area is nevertheless impressive, despite the transportation penalty and the resultant reluctance of operators to tie up any very great capital outlay in extensive amounts of preliminary exploration work in such a remote locality.

~~With this background, it can now be pointed out that~~ the first eastern Oregon shipment was ~~not~~ made ~~until~~ in mid-summer of 1952, practically a year ~~to within a matter of days~~ after the Grants Pass depot had opened ~~its doors~~. Once ~~they were~~ started, however, eastern Oregon deliveries ~~were~~ continued steadily. ~~with the result that~~ approximately 4,616 dry long tons were delivered to the depot by ~~the close of business~~, December 31, 1956. ~~Tonnagewise, this~~ representing approximately one-eighth of the recorded Oregon production, notwithstanding the fact that the depot had been in operation for nearly a year before the first eastern Oregon shipment was delivered.

Before proceeding further, it might be well to mention that the data from which the foregoing tonnage figure was calculated consists of copies of actual settlement shipment records for 4,415 dry long tons of the shipped ore and concentrates, plus closely controlled operators' record book figures for 201 tons for which the official settlement records were not available at the time the latest records were secured. Furthermore, this basic data is believed to cover approximately 99 percent of all chrome shipments made from eastern Oregon sources, thanks to the cooperation given by the many shippers and property owners in making this data available. Production not represented in the above figures, or in the value figures given in the ensuing paragraphs, is believed to include not more than four small shipments involving an estimated total of not more than 35 tons. el

NO ¶

~~From a dollar standpoint, the settlement~~ value received by eastern Oregon chrome producers for the recorded 4,616 tons shipped was $481,064. ~~An interesting sidelight here is that~~ the average value of ~~the~~ eastern Oregon's chrome ~~is~~ was $104.20 per ton, as compared with a reported average of $81.60[3] per ton for all chrome purchased from the state as a whole since the depot opened. The ~~great~~ difference ~~in value~~ undoubtedly reflects the purchase of greater amounts of crude lump ore from western Oregon shippers. ~~as essentially 99 percent of the~~ eastern Oregon shipments have ~~of necessity~~ been largely concentrates, due in part to the prevalence of concentrating-type ores in eastern Oregon, and in part to the greater delivery costs faced by the eastern Oregon operator.

Most of the eastern Oregon chrome shipments ~~have~~ originated from the Haggard & New and Dry Camp Mines, both of which have a previous production record. The old Ward Mine, which has a World War I production record of between 2000 and 2500 tons,[4] and which has been idle ever since, is the third largest producer. It was reactivated during the summer of 1956. In all, the production (~~as recorded~~ above) originated from thirteen different deposits and was made by fifteen different operators. Several of the smaller properties represent deposits having no previous record of ~~attempted~~ operation.

NO ¶ Five concentrating mills were erected in the John Day area during the period ~~under discussion~~, the first being a small pilot plant constructed by Burt Hayes in the summer of 1952. Three of the five mills were intact at the close of 1956; all were in operation at various times during the 1956 season. These are (1) the Tri-County mill operated on a custom basis (2) the

Al Dunn mill, operated part-time on ore from the Dunn lease and part-time on a custom basis, and (3) the Haggard & New mill operated exclusively on ore from the Haggard & New ~~M~~ine.

In addition to the shipments cited in the previous paragraphs, there was on hand in the John Day area at the end of 1956 an estimated 260 tons of ore ready to be milled and 50 tons of concentrates ready to be shipped as soon as weather conditions moderated. There were also 9 operators who announced plans for continued and expanded operation in 1957.

Such is the picture of eastern Oregon chrome mining at the close of 1956. Whether the 1956 production record of 1533 dry short tons and $167,390 settlement value will be maintained during 1957, remains to be seen, but the year is in any event starting out strong, and the new carlot shipment plan should be a help to those operators who can afford to hold back their concentrates long enough to amass a carload.

N. S. W.

---

References:
1. Chrome News Item: Ore.-Bin, Vol. 13, no. 8, 1951.
2. Carlot Purchase Program for Chrome: Ore.-Bin, Vol. 18, no. 12, 1956.
3. Mason, R. S., Ore.-Bin, Vol. 19, no. 1, 1957.
4. Thayer, T. P., U.S.G.S. Bull. 922-D.

Report by: N. S. Wagner, February 21, 1957.

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

RECEIVED
JAN 12 1959
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

January 9, 1958

Ralph S. Mason
1069 State Office Bldg.
Portland 1, Oregon

Dear Ralph:

During the years I recorded vital statistics from the settlement certificates covering payment for eastern Oregon chromite shipments, my practice was to record the settlement date only, and not the shipment date. I did this in order to save time and space.

The procedure proved entirely usable for yearly production calculating during all years from the beginning thru 1956, as the operators all closed down each year for the winter by about November and didn't resume again till about April of the following year. The resultant break in production permitted absolute identification of any single year's production at a glance.

The applecart was upset during the winter of 1957-1958 as the operators took advantage of moderately mild weather conditions to force wintertime operations due to the impending termination of the purchasing program. Because of this ~~here~~ situation, my settlement date records run thru December 1957 and January 1958 without a break. I was able to calculate the 1957 production last year because my records at that time did not include any entries for shipments made in 1958. The way the situation is today, however, I can't calculate the 1958 production with absolute reliability, because my usage of the settlement date in recording shipment statistics. In other words, I can't make any absolutely accurate distinction between shipments made in 1958 and those made in 1957 but paid for in 1958.

In view of the above described situation there was little else I could do other than to total my records of shipments paid for in 1958. The resultant figures approximate the shipment figures quite closely, but they nevertheless err in the direction of being a little high due to the inclusion of some ore shipped in late 1957 and settled for in early 1958. For this reason, the attached review is based on purchase records and not on shipment records. Please note this and be sure to not use the figures and then call them production statistics as they ain't such. Use of the "purchased" or "sold" thought is essential for accuracy's sake.

Sincerely Way

NSW:mr

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

February 14, 1957

Mr. Ralph Mason
1069 State Office Building
Portland 1, Oregon

Dear Ralph:

The chrome production from eastern Oregon for the year 1956 was 1,533 dry long tons, valued at $167,390.00.

These figures represent the totals for 99 percent of all chrome shipped from eastern Oregon during 1956.

Sincerely,

Ray.

N. S. Wagner

NSW:gl

R. S. Mason
Chrome Production
File

## U. S. CONSUMPTION OF CHROME ORE AND CONCENTRATES IN 1957[1]

| | Short tons | | Short tons | Short tons | Pounds | Tariff | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ore + conc. | % $Cr_2O_3$ | $Cr_2O_3$ | Cr metal[2] | Cr metal | 1/4¢/lb. | 1/2¢/lb. | 3/4¢/lb. | 1¢/lb. |
| Metal-lurgical | 1,177,073 | 47.0 | 553,224 | 378,404 | 756,808,000 | $1,892,020 | $3,784,040 | $5,676,060 | $7,568,080 |
| Refractory | 434,922 | 34.8 | 151,362 | 103,531 | 207,062,000 | 517,655 | 1,035,310 | 1,552,965 | 2,070,620 |
| Chemical | 148,474 | 45.0 | 66,813 | 45,700 | 91,400,000 | 228,500 | 457,000 | 685,500 | 914,000 |
| Total | 1,760,469 | 43.8 | 771,400 | 527,635 | 1,055,270,000 | $2,638,175 | $5,276,350 | $7,914,525 | $10,552,700 |

1 Source - USBM Mineral Industry Surveys, Chromite Report No. 95, March 12, 1958.

2 Factor for reducing $Cr_2O_3$ to Cr metal (152:104 = .684).

R. S. Mason
Chrome Production
File

## U.S. CONSUMPTION OF CHROME ORE AND CONCENTRATES IN 1956[1]

| | Short tons | | Short tons | Short tons | Pounds | Tariff | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ore + conc. | % $Cr_2O_3$ | $Cr_2O_3$ | Cr metal[2] | Cr metal | 1/4¢/lb. | 1/2¢lb. | 3/4¢/lb. | 1¢/lb. |
| Metal-lurgical | 1,212,000 | 46.8 | 567,250 | 388,000 | 776,000,000 | $1,940,000 | $3,880,000 | $5,820,000 | $7,760,000 |
| Refractory | 474,560 | 34.4 | 163,250 | 111,600 | 223,200,000 | 558,000 | 1,116,000 | 1,674,000 | 2,232,000 |
| Chemical | 160,120 | 45.4 | 72,700 | 49,700 | 99,400,000 | 248,500 | 497,000 | 745,500 | 994,000 |
| Total | 1,846,600 | 43.5 | 803,270 | 549,440 | 1,098,880,000 | $2,747,200 | $5,494,400 | $8,241,600 | $10,988,800 |

1 Source - USBM Mineral Market Reports MMS No. 2654.
2 Factor for reducing $Cr_2O_3$ to Cr metal (152:104 = .684).

By way of comparison, consumption for first 11 months of 1956 = 1,670,385 short tons.
" " " " " " 1957 = 1,611,164 " " .

Stanford Research Institute
**WESTERN RESOURCES HANDBOOK**

Reissued April 195

# CHROMITE SHIPPED FROM MINES IN THE WEST
# 1920 - 1953

(short tons)

| Year | Calif. | Idaho | Mont. | Ore. | Wash. | Wyo. | Total West | Total U.S. | West as a % of U.S. |
|---|---|---|---|---|---|---|---|---|---|
| 1920 | 1,586 | --- | --- | 1,070 | --- | 147 | 2,802 | 2,802 | 100.0 |
| 1921 | 138 | --- | --- | 178 | --- | --- | 316 | 316 | 100.0 |
| 1922 | 183 | --- | --- | 88 | --- | --- | 271 | 398 | 68.1 |
| 1923 | 77 | --- | --- | 87 | --- | --- | 165 | 254 | 65.0 |
| 1924 | 211 | --- | --- | 112 | --- | --- | 322 | 322 | 100.0 |
| 1925 | 93 | --- | --- | --- | --- | --- | 93 | 121 | 76.9 |
| 1926 | 101 | --- | --- | --- | --- | --- | 101 | 158 | 63.9 |
| 1927 | 225 | --- | --- | --- | --- | --- | 225 | 225 | 100.0 |
| 1928 | 730 | --- | --- | --- | --- | --- | 730 | 739 | 98.8 |
| 1929 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1930 | 90 | --- | --- | --- | --- | --- | 90 | 90 | 100.0 |
| 1931 | 300 | --- | --- | --- | --- | --- | 300 | 300 | 100.0 |
| 1932 | 174 | --- | --- | --- | --- | --- | 174 | 174 | 100.0 |
| 1933 | 944 | --- | --- | --- | --- | --- | 944 | 944 | 100.0 |
| 1934 | 413 | --- | --- | --- | --- | --- | 413 | 413 | 100.0 |
| 1935 | 577 | --- | --- | --- | --- | --- | 577 | 577 | 100.0 |
| 1936 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1937 | 2,277 | --- | --- | 323 | --- | --- | 2,600 | 2,600 | 100.0 |
| 1938 | 909 | --- | --- | --- | --- | --- | 909 | 909 | 100.0 |
| 1939 | 3,936 | --- | --- | 112 | --- | --- | 4,048 | 4,048 | 100.0 |
| 1940 | 2,713 | --- | --- | 269 | --- | --- | 2,982 | 2,982 | 100.0 |
| 1941 | 13,419 | --- | --- | 840 | --- | --- | 14,259 | 14,259 | 100.0 |
| 1942 | 44,873 | 25 | 65,238 | 2,683 | 57 | --- | 112,876 | 112,876 | 100.0 |
| 1943 | 62,495 | --- | 75,691 | 16,363 | --- | --- | 154,549 | 154,551 | 99.9+ |
| 1944 | 34,715 | --- | 1,251 | 7,818 | --- | --- | 43,784 | 43,784 | 100.0 |
| 1945 | 9,607 | --- | --- | 4,366 | --- | --- | 13,973 | 13,973 | 100.0 |
| 1946 | (a) 4,107 | --- | --- | (a) | --- | --- | 4,107 | 4,107 | 100.0 |
| 1947 | 948 | --- | --- | --- | --- | --- | 948 | 948 | 100.0 |
| 1948 | 274 | --- | --- | 3,345 | --- | --- | 3,619 | 3,619 | 100.0 |
| 1949 | 433 | --- | --- | --- | --- | --- | 433 | 433 | 100.0 |
| 1950 | 404 | --- | --- | --- | --- | --- | 404 | 404 | 100.0 |
| 1951 | 6,302 | --- | --- | 754 | --- | --- | 7,056 | 7,056 | 100.0 |
| 1952 | 14,713 | --- | --- | 6,591 | --- | --- | 21,304 | 21,304 | 100.0 |
| 1953 | 26,512 | --- | 26,089 | 6,216 | --- | --- | 58,817 | 58,817 | 100.0 |

NOTES: Dash (---) indicates zero.

(a) Oregon included with California in 1946.

SOURCES: 1920 - U.S. Geological Survey, "Mineral Resources of the United States, 1920."
1921 to 1928 - Bureau of Mines, "Mineral Resources of the United States," yearly.
1929 to 1951 - Bureau of Mines, "Minerals Yearbook," yearly.
1952 - Bureau of Mines, "Chromium," preprint from "Minerals Yearbook," 1952.
1953 - Bureau of Mines, "Chromium in 1953," Mineral Market Report, MMS No. 2307.

Stanford Research Institute
**WESTERN RESOURCES HANDBOOK**

# CHROMITE SHIPPED FROM MINES IN THE WEST
# 1920 - 1953

(short tons)

| Year | Calif. | Idaho | Mont. | Ore. | Wash. | Wyo. | Total West | Total U.S. | West as a % of U.S. |
|---|---|---|---|---|---|---|---|---|---|
| 1920 | 1, 586 | --- | --- | 1, 070 | --- | 147 | 2, 802 | 2, 802 | 100.0 |
| 1921 | 138 | --- | --- | 178 | --- | --- | 316 | 316 | 100.0 |
| 1922 | 183 | --- | --- | 88 | --- | --- | 271 | 398 | 68.1 |
| 1923 | 77 | --- | --- | 87 | --- | --- | 165 | 254 | 65.0 |
| 1924 | 211 | --- | --- | 112 | --- | --- | 322 | 322 | 100.0 |
| 1925 | 93 | --- | --- | --- | --- | --- | 93 | 121 | 76.9 |
| 1926 | 101 | --- | --- | --- | --- | --- | 101 | 158 | 63.9 |
| 1927 | 225 | --- | --- | --- | --- | --- | 225 | 225 | 100.0 |
| 1928 | 730 | --- | --- | --- | --- | --- | 730 | 739 | 98.8 |
| 1929 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1930 | 90 | --- | --- | --- | --- | --- | 90 | 90 | 100.0 |
| 1931 | 300 | --- | --- | --- | --- | --- | 300 | 300 | 100.0 |
| 1932 | 174 | --- | --- | --- | --- | --- | 174 | 174 | 100.0 |
| 1933 | 944 | --- | --- | --- | --- | --- | 944 | 944 | 100.0 |
| 1934 | 413 | --- | --- | --- | --- | --- | 413 | 413 | 100.0 |
| 1935 | 577 | --- | --- | --- | --- | --- | 577 | 577 | 100.0 |
| 1936 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1937 | 2, 277 | --- | --- | 323 | --- | --- | 2, 600 | 2, 600 | 100.0 |
| 1938 | 909 | --- | --- | --- | --- | --- | 909 | 909 | 100.0 |
| 1939 | 3, 936 | --- | --- | 112 | --- | --- | 4, 048 | 4, 048 | 100.0 |
| 1940 | 2, 713 | --- | --- | 269 | --- | --- | 2, 982 | 2, 982 | 100.0 |
| 1941 | 13, 419 | --- | --- | 840 | --- | --- | 14, 259 | 14, 259 | 100.0 |
| 1942 | 44, 873 | 25 | 65, 238 | 2, 683 | 57 | --- | 112, 876 | 112, 876 | 100.0 |
| 1943 | 62, 495 | --- | 75, 691 | 16, 363 | --- | --- | 154, 549 | 154, 551 | 99.9+ |
| 1944 | 34, 715 | --- | 1, 251 | 7, 818 | --- | --- | 43, 784 | 43, 784 | 100.0 |
| 1945 | 9, 607 | --- | --- | 4, 366 | --- | --- | 13, 973 | 13, 973 | 100.0 |
| 1946 | (a) 4, 107 | --- | --- | (a) | --- | --- | 4, 107 | 4, 107 | 100.0 |
| 1947 | 948 | --- | --- | --- | --- | --- | 948 | 948 | 100.0 |
| 1948 | 274 | --- | --- | 3, 345 | --- | --- | 3, 619 | 3, 619 | 100.0 |
| 1949 | 433 | --- | --- | --- | --- | --- | 433 | 433 | 100.0 |
| 1950 | 404 | --- | --- | --- | --- | --- | 404 | 404 | 100.0 |
| 1951 | 6, 302 | --- | --- | 754 | --- | --- | 7, 056 | 7, 056 | 100.0 |
| 1952 | 14, 713 | --- | --- | 6, 591 | --- | --- | 21, 304 | 21, 304 | 100.0 |
| 1953 | 26, 512 | --- | 26, 089 | 6, 216 | --- | --- | 58, 817 | 58, 817 | 100.0 |

NOTES: Dash (---) indicates zero.

(a) Oregon included with California in 1946.

SOURCES: 1920 - U.S. Geological Survey, "Mineral Resources of the United States, 1920."
1921 to 1928 - Bureau of Mines, "Mineral Resources of the United States," yearly.
1929 to 1951 - Bureau of Mines, "Minerals Yearbook," yearly.
1952 - Bureau of Mines, "Chromium," preprint from "Minerals Yearbook," 1952.
1953 - Bureau of Mines, "Chromium in 1953," Mineral Market Report, MMS No. 2307.

# U.S. CHROMITE CONSUMPTION

| | LONG TONS | SHORT TONS |
|---|---|---|
| 1925 | 149,739 | 167,500 |
| 6 | 215,464 | 241,000 |
| 7 | 222,360 | 249,000 |
| 8 | 216,592 | 242,500 |
| 9 | 317,630 | 356,000 |
| 1930 | 326,697 | 366,000 |
| 1 | 212,796 | 238,400 |
| 2 | 89,298 | 100,000 |
| 3 | 117,354 | 131,300 |
| 4 | 192,666 | 215,800 |
| 5 | 259,578 | 290,000 |
| 6 | 324,527 | 363,500 |
| 7 | 556,237 | 624,000 |
| 8 | 352,897 | 395,900 |
| 9 | 321,125 | 360,000 |
| 1940 | 660,351 | 742,000 |
| 1 | | 786,110 |
| 2 | | 891,952 |
| 3 | | 964,600 |
| 4 | | 848,449 |
| 5 | | 808,120 |
| 6 | | 734,759 |
| 7 | | 833,357 |
| 8 | | 875,033 |
| 9 | | 672,773 |
| 1950 | | 980,369 |
| 1 | | 1,212,480 |
| 2 | | 1,185,460 |
| 3 | | 1,335,755 |
| 4 | | 913,973 |
| 5 | | 1,583,983 |
| 6 | | 1,846,600 |
| 7 | | |

SLIDE RULE CONVERSION

~~U.S. CONSUMPTION OF CHROME 1925-56~~

$$50.\overline{)2,000,000}\quad 40,000$$

U.S. Consumption of Chrome ore and concentrates in 1956*[1]

| | Short tons ore + conc. | % $Cr_2O_3$ | Short Tons $Cr_2O_3$ | Short Tons Cr Metal[2] | Pounds Cr Metal | Tariff $\frac{1}{4}$c/lb | $\frac{1}{2}$c/lb | 3/4c/lb | 1c/lb |
|---|---|---|---|---|---|---|---|---|---|
| ~~total~~ | ~~1,846,600~~ | ~~43.5~~ | ~~803,270~~ | ~~549,440~~ | ~~1,098,880,000~~ | ~~\$2,747,200~~ | ~~\$5,494,400~~ | ~~\$8,241,600~~ | ~~\$10,988,800~~ |
| Metalur | 1,212,000 | 46.8 | 567,250 | 388,000 | 776,000,000 | \$1,940,000 | \$3,880,000 | \$5,820,000 | \$7,760,000 |
| Refrac | 474,560 | 34.4 | 163,250 | 111,600 | 223,200,000 | 558,000 | 1,116,000 | 1,674,000 | 2,232,000 |
| Chem | 160,120 | 45.4 | 72,700 | 49,700 | 99,400,000 | 248,500 | 497,000 | 745,500 | 994,000 |
| total | 1,846,600 | 43.5 | 803,270 | 549,440 | 1,098,880,000 | \$2,747,200 | \$5,494,400 | \$8,241,600 | \$10,988,800 |

1* Source: USBM Mineral Market Reports MMS No. 2654

2* Factor for reducing $Cr_2O_3$ to Cr METAL (152:104 = .684)

By way of comparison, Consumption for first 11 months of 1956 = 1,670,385 Short Tons

" " " " " 1957 = 1,611,164 " "

CHROMITE PRODUCTION
SHORT TONS

| | CALIF. | MONT. | ORE | [illegible] |
|---|---|---|---|---|
| 1954 | 30,661 | 118,172 | 6,655 | |
| 5 | 22,105 | 118 703 | 5,341 | |
| 6 | 27 082 | 118,780 | 8,330 | |
| 7 | 32,000 | 119,371 | 7,800 | |
| | 346,929 | 643,295 | 79,341 | GRAND TOTAL 1920–1957 |

Stanford Research Institute
**WESTERN RESOURCES HANDBOOK**

Reissued April 1955

# CHROMITE SHIPPED FROM MINES IN THE WEST
## 1920 - 1953

(short tons)

| Year | Calif. | Idaho | Mont. | Ore. | Wash. | Wyo. | Total West | Total U.S. | West as a % of U.S. |
|---|---|---|---|---|---|---|---|---|---|
| 1920 | 1,586 | --- | --- | 1,070 | --- | 147 | 2,802 | 2,802 | 100.0 |
| 1921 | 138 | --- | --- | 178 | --- | --- | 316 | 316 | 100.0 |
| 1922 | 183 | --- | --- | 88 | --- | --- | 271 | 398 | 68.1 |
| 1923 | 77 | --- | --- | 87 | --- | --- | 165 | 254 | 65.0 |
| 1924 | 211 | --- | --- | 112 | --- | --- | 322 | 322 | 100.0 |
| 1925 | 93 | --- | --- | --- | --- | --- | 93 | 121 | 76.9 |
| 1926 | 101 | --- | --- | --- | --- | --- | 101 | 158 | 63.9 |
| 1927 | 225 | --- | --- | --- | --- | --- | 225 | 225 | 100.0 |
| 1928 | 730 | --- | --- | --- | --- | --- | 730 | 739 | 98.8 |
| 1929 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1930 | 90 | --- | --- | --- | --- | --- | 90 | 90 | 100.0 |
| 1931 | 300 | --- | --- | --- | --- | --- | 300 | 300 | 100.0 |
| 1932 | 174 | --- | --- | --- | --- | --- | 174 | 174 | 100.0 |
| 1933 | 944 | --- | --- | --- | --- | --- | 944 | 944 | 100.0 |
| 1934 | 413 | --- | --- | --- | --- | --- | 413 | 413 | 100.0 |
| 1935 | 577 | --- | --- | --- | --- | --- | 577 | 577 | 100.0 |
| 1936 | 301 | --- | --- | --- | --- | --- | 301 | 301 | 100.0 |
| 1937 | 2,277 | --- | --- | 323 | --- | --- | 2,600 | 2,600 | 100.0 |
| 1938 | 909 | --- | --- | --- | --- | --- | 909 | 909 | 100.0 |
| 1939 | 3,936 | --- | --- | 112 | --- | --- | 4,048 | 4,048 | 100.0 |
| 1940 | 2,713 | --- | --- | 269 | --- | --- | 2,982 | 2,982 | 100.0 |
| 1941 | 13,419 | --- | --- | 840 | --- | --- | 14,259 | 14,259 | 100.0 |
| 1942 | 44,873 | 25 | 65,238 | 2,683 | 57 | --- | 112,876 | 112,876 | 100.0 |
| 1943 | 62,495 | --- | 75,691 | 16,363 | --- | --- | 154,549 | 154,551 | 99.9+ |
| 1944 | 34,715 | --- | 1,251 | 7,818 | --- | --- | 43,784 | 43,784 | 100.0 |
| 1945 | 9,607 | --- | --- | 4,366 | --- | --- | 13,973 | 13,973 | 100.0 |
| 1946 | (a) 4,107 | --- | --- | (a) | --- | --- | 4,107 | 4,107 | 100.0 |
| 1947 | 948 | --- | --- | --- | --- | --- | 948 | 948 | 100.0 |
| 1948 | 274 | --- | --- | 3,345 | --- | --- | 3,619 | 3,619 | 100.0 |
| 1949 | 433 | --- | --- | --- | --- | --- | 433 | 433 | 100.0 |
| 1950 | 404 | --- | --- | --- | --- | --- | 404 | 404 | 100.0 |
| 1951 | 6,302 | --- | --- | 754 | --- | --- | 7,056 | 7,056 | 100.0 |
| 1952 | 14,713 | --- | --- | 6,591 | --- | --- | 21,304 | 21,304 | 100.0 |
| 1953 | 26,512 | --- | 26,089 | 6,216 | --- | --- | 58,817 | 58,817 | 100.0 |

NOTES: Dash (---) indicates zero.

(a) Oregon included with California in 1946.

SOURCES: 1920 - U.S. Geological Survey, "Mineral Resources of the United States, 1920."
1921 to 1928 - Bureau of Mines, "Mineral Resources of the United States," yearly.
1929 to 1951 - Bureau of Mines, "Minerals Yearbook," yearly.
1952 - Bureau of Mines, "Chromium," preprint from "Minerals Yearbook," 1952.
1953 - Bureau of Mines, "Chromium in 1953," Mineral Market Report, MMS No. 2307.

PSM CHROME PRODUCTION FILE

GOODWIN J. KNIGHT
GOVERNOR

BRANCH OFFICES

LOS ANGELES
STATE BUILDING
217 W. FIRST STREET, ROOM 402B
ZONE 12

SACRAMENTO
STATE OFFICE BUILDING No. 1
ZONE 14

REDDING
NATURAL RESOURCES BUILDING
P. O. BOX 445

DEWITT NELSON
DIRECTOR OF NATURAL RESOURCES

OLAF P. JENKINS
CHIEF, DIVISION OF MINES
STATE MINERALOGIST

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

# DIVISION OF MINES

HEADQUARTERS OFFICE
FERRY BUILDING, SAN FRANCISCO 11

January 23, 1956

Mr. Ralph S. Mason, Mining Engineer
Oregon Department of Geology and Mineral Industries
1059 State Office Building
Portland 1, Oregon

Dear Mr. Mason:

In reply to your letter of January 18, we can only give an estimate of 110 for the number of chrome mines worked during 1955 in California. Production was recorded from 127 separate deposits during 1954, but we do not have final data for last year.

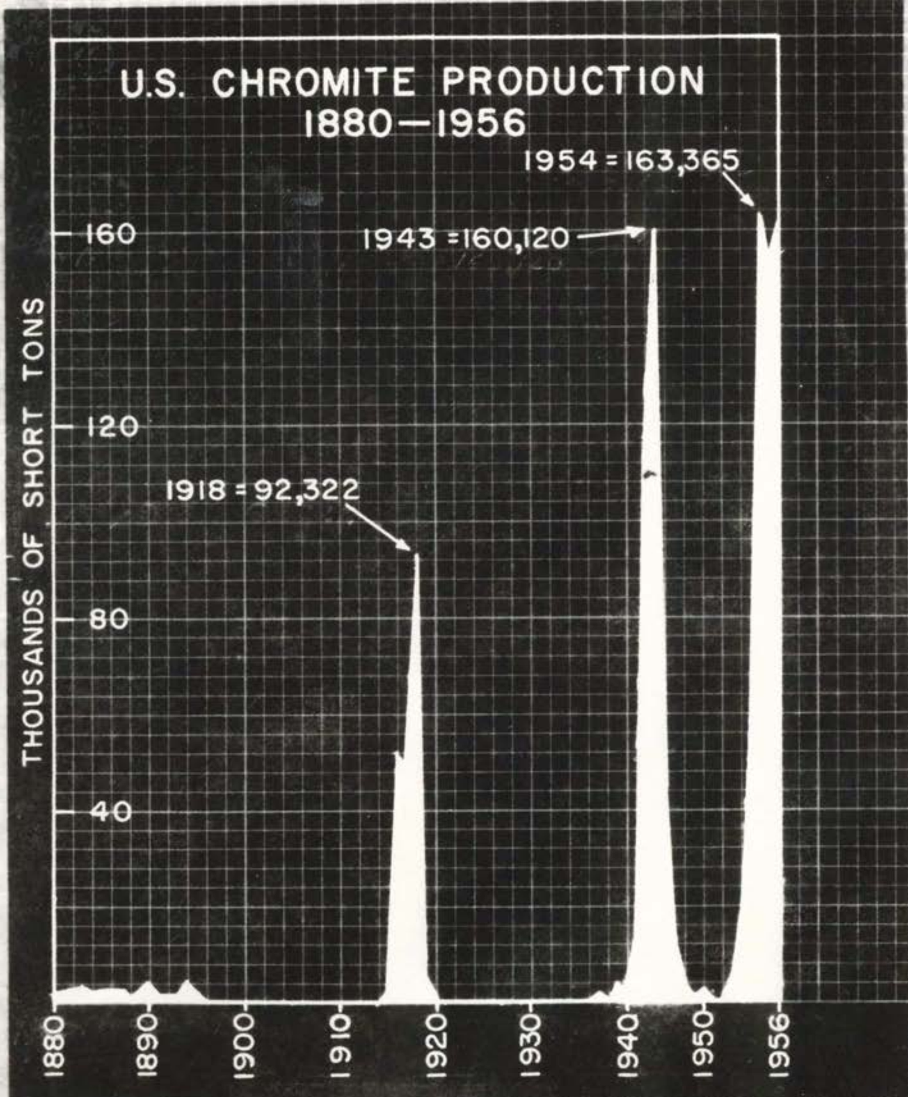
The figure given includes many small deposits from which only a few tons were obtained. It is estimated that about 35 of these mines yielded 100 long tons or more during 1955.

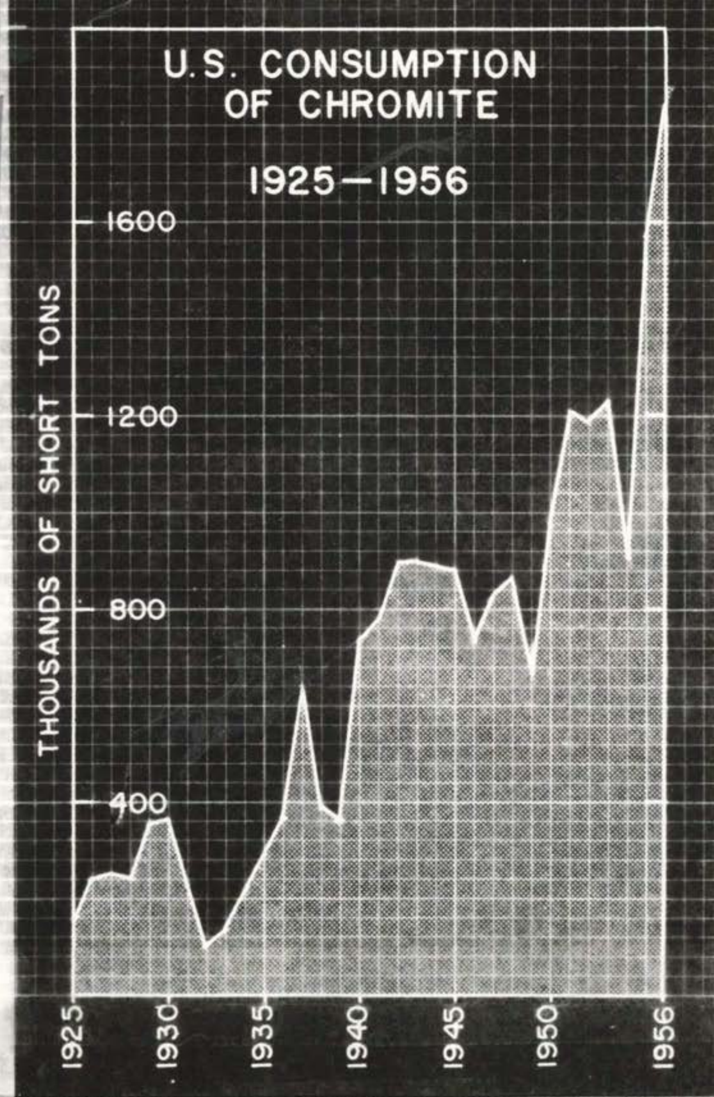
During 1955 there were 23 chromite mills in operation in California.

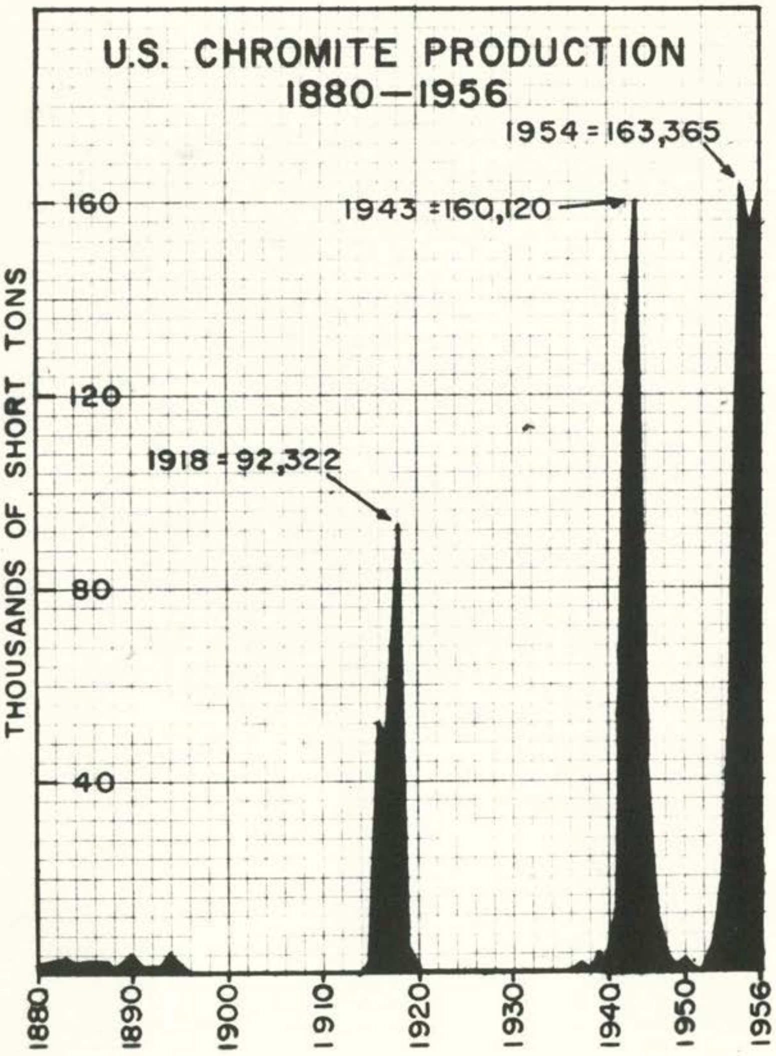
Yours very truly,

OLAF P. JENKINS
CHIEF, DIVISION OF MINES
By
Salem J. Rice
Salem J. Rice
Assistant Mining Geologist

sjr-ld


U.S. CHROMITE PRODUCTION
1880—1956
1954 = 163,365
1943 = 160,120
1918 = 92,322
THOUSANDS OF SHORT TONS
160
120
80
40
1880
1890
1900
1910
1920
1930
1940
1950
1956


U.S. CONSUMPTION
OF CHROMITE
1925—1956
THOUSANDS OF SHORT TONS
1600
1200
800
400
1925
1930
1935
1940
1945
1950
1956



U.S. CHROMITE PRODUCTION
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160
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THOUSANDS OF SHORT TONS
1880
1890
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1910
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1930
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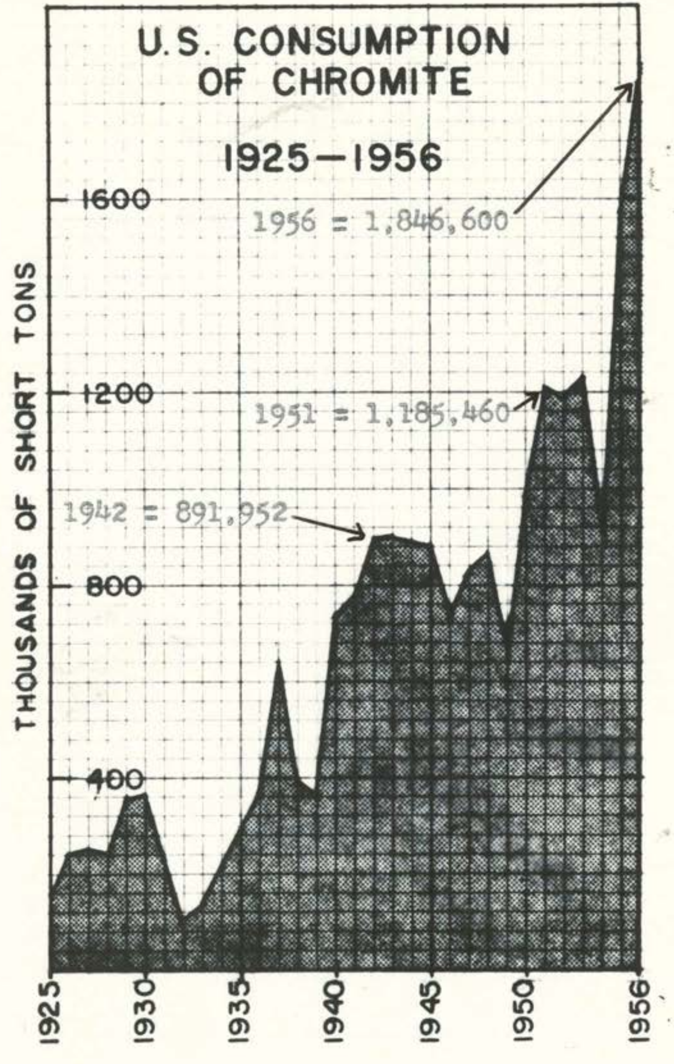
1950
1956

U.S. CONSUMPTION
OF CHROMITE
1925—1956
1956 = 1,846,600
1951 = 1,185,460
1942 = 891,952
1600
1200
800
400
THOUSANDS OF SHORT TONS
1925
1930
1935
1940
1945
1950
1956

# CHROMITE

By

F. W. Libbey[1]

According to a preliminary report of the U. S. Bureau of Mines, domestic metallurgical-grade chromite produced in 1955 was as follows:

| | Short tons | Value |
|---|---|---|
| California | 22,500 | $1,800,000 |
| Oregon | 5,000 | 400,000 |
| Alaska | 7,067 | 552,000 |
| Total | 34,567 | $2,752,000 |

In addition, Montana produced 108,000 short tons of low-grade concentrates which were sold to the Government under a special contract.

Shippers to the Grants Pass Depot totaled 108, of which 62 were in California, 45 in Oregon, and 1 in Alaska. There were 23 active concentrating mills in California and 10, all small, in Oregon.

A plant built by Pacific Northwest Alloys, Inc., produced concentrates of chromite, ilmenite, magnetite, garnet, and zircon by electrostatic methods from the chromite sand stockpile of the old Defense Plant Corporation near Coquille, Coos County. Another plant, designed to recover a high-grade chrome product from "black sands", was built near the Seven Devils road about 8 miles north of Bandon, Coos County by the Mineral Sands Company and is scheduled to get into operation in 1956.

---

[1] Mining Engineer, formerly Director of Oregon Department of Geology and Mineral Industries.

As reported by the Federal Register, up to September 30, 1955, the Government had purchased 93,985 long tons of chromite under the 1951 Purchase Program. By the end of 1955 this amount would be increased to more than 50 percent of that authorized (200,000 long tons). The program is scheduled to end June 30, 1957.

Consumption of chromite for the first 10 months of 1955 was:

| | Short tons |
|---|---|
| Metallurgical grade . . . . . . . . | 777,553 |
| Refractory grade . . . . . . . . . | 349,553 |
| Chemical grade . . . . . . . . . | 130,721 |
| Total . . . . | 1,257,827 |

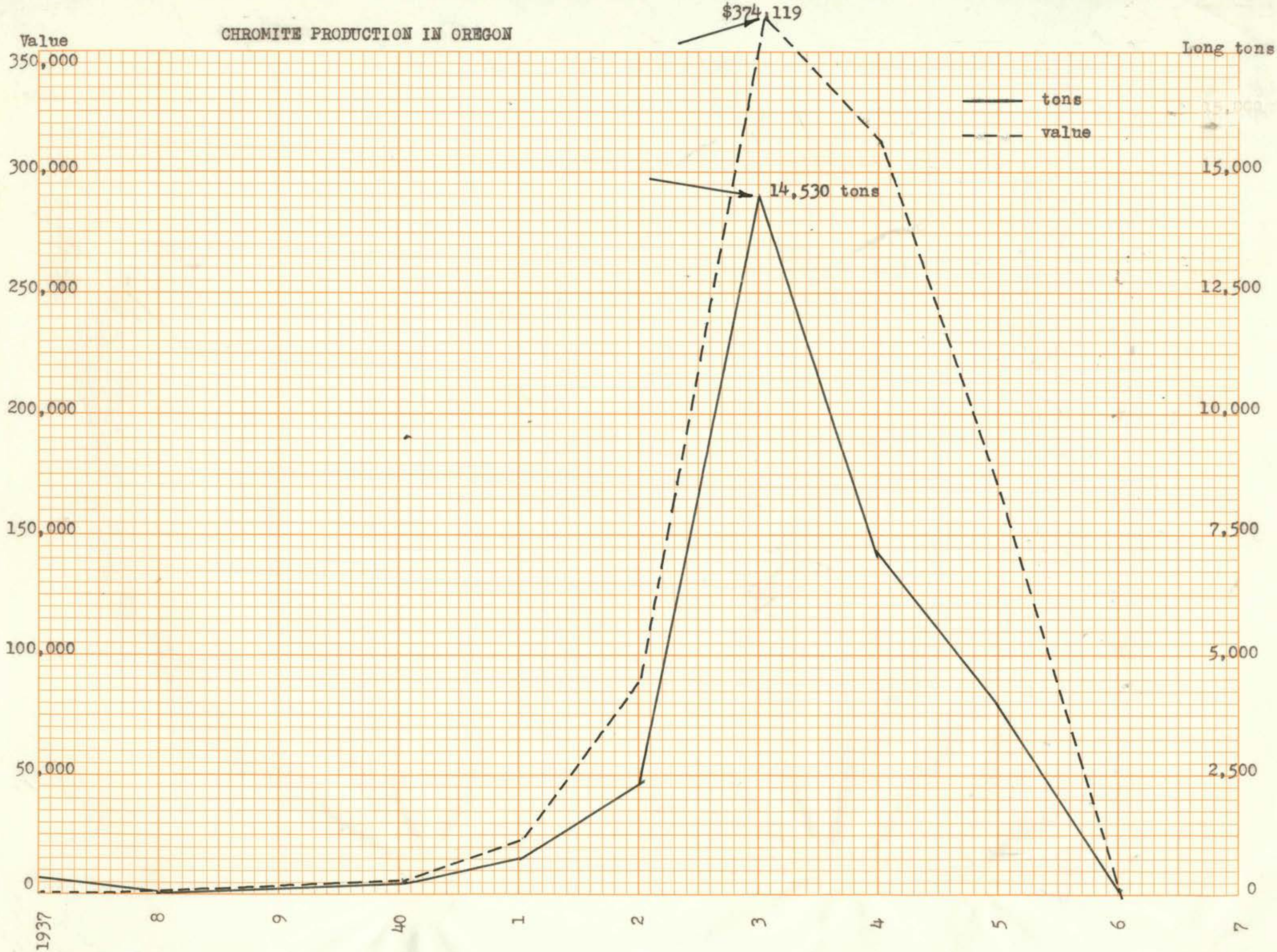
If this amount is prorated for the full year the total would be approximately 1½ million tons.

Chrome is a vital war material and imports on which this country depends would surely be cut off by a hot war. Otherwise the domestic producer could be written off as an economic casualty and forgotten. If he is, we are subject to the same liability as in World War I, World War II, and at the beginning of the Korean War when, each time, those in authority suddenly realized that domestic chrome production was needed immediately. People who have been close to the picture in the past know that maintaining a live producing industry, even though small but ready to expand, would be cheap insurance against the possibility of a frightening shortage. Also, such an industry would be part of a sound mobilization base.

Official delegates of the Governors of Western States and Alaska, meeting in Sacramento November 7-9, 1955, advised their respective governors to seek adequate tariffs as a long-range policy to stabilize and insure survival of some segments of the mining industry. A minimum tariff for chrome of 5/8 cent a pound of contained chromium in imported ore was recommended, with proceeds of the tariff to be distributed to domestic producers in proportion to their production. Until some such long-range assistance program can be set up the delegates recommended that the Government Purchase Program be continued.

Although little incentive for long-range exploration of chromite ore bodies was offered by the Government Purchase Program, more metallurgical-grade ore is known to occur in California and Oregon now than when the program started. Some substantial new ore bodies have been found and new knowledge of chromite ore emplacement has been gained. Over the past three years the Oregon Department of Geology and Mineral Industries has been carrying on studies of structure of serpentinized peridotite in ore zones and will issue a preliminary report in 1956.

CHROMITE PRODUCTION IN OREGON



## RESERVES OF CHROMITE IN OREGON AS REPORTED BY U.S.G.S.

| Mine | Maximum tons | Minimum tons | Date | Remarks |
|---|---|---|---|---|
| Chambers | | | | |
| Iron King | 130,000 | 80,000 | 1940 | +25% $Cr_2O_3$ |
| Dry Camp | | | | |
| John Day District | 200,000 | - - - | 1940 | +25% $Cr_2O_3$ |
| Sourdough | 100,000 | 50,000 | 1940 | Milling grade |
| Briggs Creek | ? | | | Milling grade |
| Oregon beach | 1,445,000 | - - - | 1944 | Measured, +5% |
| | 468,000 | - - - | 1944 | Indicated, +5% |

## NORTHERN CALIFORNIA

| Mine | Maximum tons | Minimum tons | Date | Remarks |
|---|---|---|---|---|
| Seiad | 49,000 | 38,000 | 1944 | Probable, 35% |
| | 67,000 | 51,500 | 1944 | Possible, 35% |
| Fairview | 1,800 | - - - | 1944 | 35% |
| McGuddy Creek | 5,000 | - - - | 1944 | +35% |
| Dolbear | 2,000 | - - - | 1944 | 35% |
| High Plateau | 2,000 | - - - | 1942 | +50% |

Albany, Oregon
October 12, 1955

File No: DMI 3100 D

Mr. Hollis M. Dole, Director
Oregon State Department of Geology
and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Mr. Dole:

A small error has been found in the annual chromite tabulation for 1954 which was transmitted to you by our letter dated September 16, 1955. Under Douglas County, the following changes should be made on the line showing production by Harry and Lester Shippen from the Triple "L" mine: Total wet weight, 65 long tons (previously 74); concentrates containing 45% $Cr_2O_3$ and over, 53 long tons (62); $Cr_2O_3$ content, 25 long tons (30); and value, \$6,406 (\$7,184). As a result of these revisions, the County totals will read: total wet weight, 235 long tons; concentrates containing 45% $Cr_2O_3$ and over, 138 long tons; $Cr_2O_3$ content, 96 long tons; and value \$19,803. The State totals should be changed as follows: total wet weight, 5,942 long tons or 6,655 short tons; dry weight, 5,428 long tons or 6,079 short tons; $Cr_2O_3$ content, 2,567 long tons; and value, \$535,609.

With regard to the mercury tabulation, our Washington office has advised that the production of two flasks valued at \$529 by Northwest Mining Co. in Josephine County probably should be classified as reclaimed mercury and therefore not included in the State total, which should show only primary production. Consequently, the State total that will be used in Minerals Yearbook chapters is 489 flasks valued at \$129,287.

We will appreciate your making these changes to your copies of the tabulations.

Very truly yours,

Frank B. Fulkerson for
A. J. Kauffman, Jr., Chief
Division of Mineral Industries
Region I

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

Ralph — I have glanced over this but would like to see it again
GHS

February 7, 1957

Mr. Hollis M. Dole
1069 State Office Building
Portland 1, Oregon

Dear Hollis:

The enclosed chromite property reports are being sent you to give you some idea as to the nature and extent of the data I have been recording for these properties, and also for the purpose of distributing copies of this data between offices for safety reasons -- meaning consideration of the possibility of a loss by fire here.

Although these reports have green paper covers, I have for convenience sake, included the records of two currently active operators in the instance of the Dry Camp and Haggard-New properties, doing so for the sake of bringing the production record to a uniform and convenient stopping date (December 31, 1946). The inclusion of the records for the active Stinett Bros. and Comstock lessees is actually contrary to what I state about the status of lessees on the cover page of these reports, so these reports should therefore be held as confidential until such time as it is known that the present lessees no longer hold an active operating interest in the properties. 1956

After it is known that these operators no longer have a financial interest in the properties, these reports can be treated as fully open in the manner outlined on the cover page paragraph dealing with usage. In short, I am just jumping the gun a bit for safety reasons in submitting them now, as in the instance of these two operations (Dry Camp and Haggard-New), it would be difficult, if not impossible, to secure copies of the data for the older periods of operation.

Please see to it that those who may file these reports understand fully that they are temporarily confidential despite the green paper cover.

I might add that I am retaining here in Baker the reports covering the Ward and Al Dunn operations for the reason that these operations are both currently alive and because the past tonnage record will still be intact and available to me in John Day, should there ever be any loss of the Baker records. I will of course be submitting final reports for these operations when the occasion becomes propitious.

Sincerely,

Wag

N. S. Wagner

NSW:gl
enc.

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........

611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 24, 1958

Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
Portland 1, Oregon

Dear Hollis:

We trust that the attached report will be suitable for your purposes. We have kept generally within the outline with some minor changes in emphasis.

I feel confident that our calculations are well in range of what might be the actual operating set-up for plants in the West. However, you will note the remarkable differences in power prices if these are compared to what might be available directly from Bonneville or from some public power organization.

Although delivered prices are greater than present market prices for three locations, I don't feel these are so great as to be discouraging. This is particularly true if you consider the calculation for a plant operating in a low-power-cost area. This plant would possibly be on tidewater and represents favorable operating conditions. It shows a considerable excess of market price over production price. For this reason I feel that you are safe to assume that a cooperative or non-profit ferrochrome operation could provide stockpiles with ferrochrome without any changes in the present price structure on chrome ore and concentrates. By cutting corners on plant costs and really doing a job on operations, it might be even possible to cut the subsidy support prices. However, I'm not willing to go that far at this time. Of course, we've made no allowances for extra beneficiation or ores or further processing of concentrates, but I'm not sure these would be critical. The variables in ore, in processing and all of that are so many that, "in the time available", we can only go so far.

All in all, I think the whole idea is very meritorious, and further refining of approach should make it look pretty good. If you have any questions, call me. I look forward to hearing "all about it" when you get back.

With kindest regards,

Ivan Bloch

Ivan Bloch

cc: Julius Jensen

IVAN BLOCH AND ASSOCIATES
611 PARK BUILDING
PORTLAND 5, OREGON

# SUMMARY ANALYSIS OF THE FEASIBILITY OF FERROCHROME PRODUCTION FROM A PLANT LOCATED IN THE WEST TO UTILIZE DOMESTIC CHROME ORES

Prepared For The

State of Oregon
Department of Planning and Development
and
Department of Geology and Mineral Industries

By

Ivan Bloch and Associates
Portland, Oregon

March 24, 1958

FERROCHROME CONSUMPTION BY SOME STEEL MILLS AND FOUNDRIES IN THE WEST

| Plant | Location | Tons of High Carbon Standard Ferrochrome 1/ | Tons of Other Types of Ferrochrome |
|---|---|---|---|
| Kaiser | Fontana, California | None | 528 2/ |
| Pacific States Steel | Niles, California | None | 50 3/ |
| Isaacson Iron Works | Seattle, Washington | 42 | 174 4/ |
| Bethlehem Pacific Coast Steel | Seattle, Washington<br>San Francisco<br>Los Angeles | None | None |
| Columbia-Geneva | Geneva, Utah<br>Pittsburgh, California<br>Torrance, California | 20 5/ | 440 6/ |
| Colorado Fuel and Iron | Pueblo, Colorado | None | None |
| Electric Steel Foundry | Portland, Oregon | 300 | 1,100 7/ |
| Total of above | | 362 | 2,292 |

1/ 65-70% Cr, 5-9% C

2/ Exothermic ferrochrome, 49-50% Cr, 6.5% C, 25% Fe

3/ 50% to 55% high carbon ferrochrome

4/ Low carbon ferrochrome

5/ Includes some low carbon ferrochrome

6/ 440 tons of ferrosilicon chrome

7/ Includes medium and low carbon ferrochrome and ferrochrome silicon.

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 24, 1958

Mr. Julius R. Jensen, Director
Department of Planning and Development
Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
Portland 1, Oregon

Gentlemen:

In accordance with your authorization of March 4, 1958, attached are copies of a summary analysis of the feasibility of ferrochrome production from a plant located in the West that would utilize domestic chrome ores.

As pointed out in the text of this summary analysis, time limitations precluded a comprehensive review of various processing techniques which might be desirable due to the inherrent characteristics of western chrome ores. Thus, for comparative purposes, standard electric furnace operations were employed in our calculations.

We would like to acknowledge the excellent cooperation received from various individuals, groups and agencies regarding data for specific locations.

Respectfully submitted,

Sincerely yours,

Ivan Bloch

Ivan Bloch

TABLE OF CONTENTS

# I. EXPLANATORY; SUMMARY CONCLUSIONS

## A. EXPLANATORY

The following summary analysis is directed to the concept of producing ferrochrome, for government stockpiling purposes as well as for sales to appropriate consumers, at a production plant suitably located in the West to minimize transportation of western ores and concentrates, to stimulate the stabilization and expansion of local chrome ore mining and beneficiation by providing a western outlet, and to provide for the local employment and "stockpiling" of manpower, electric power and other ferrochrome production components.

Due to limitations on the time available for the preparation of this summary analysis, it was not possible to delve into the many techniques required for the appropriate concentration of western chrome ores, or beneficiation which might be required to adjust chrome-iron ratios, or pelletizing or otherwise preparing concentrates for effective electric furnace processing to ferrochrome. Nor was it possible to examine the various methods which are or might be available to produce the various alloys such as low-carbon or exothermic ferrochrome.

For comparative purposes, and to obtain a range of production costs (excluding profits), two approaches were selected. The first involves plant locations at San Luis Obispo, California; Grants Pass, Oregon; Spokane, Washington, and employed what might be considered higher ranges of overall operating costs. The other approach refers to a location at which low-cost Federal electric power supplies might be available from the U. S. Bonneville Power Administration system, and using what might be considered lower ranges of operating costs. Although not reflected in this analysis a tidewater location might be especially advantageous for the future waterborne transportation of ores, input materials and end-product ferrochrome to world markets.

The above approaches provide cost estimates (including capital costs but excluding profit considerations) which generally will bracket those costs which might be obtained from actual operations.

B. SUMMARY CONCLUSIONS

Based upon the various assumptions detailed in the body of this analysis, it may be concluded that ferrochrome production operations at plants located in the West could produce a high-carbon ferrochrome at prices (exclusive of profit) very close to present market prices.

On the basis of somewhat higher operating levels of total costs, with purchases of chrome ore at levels equivalent to those of the U. S. General Service Administration stockpiling depot at Grants Pass, Oregon, the excess of delivered prices (exclusive of profit) over market prices at various consuming centers over present market prices would range between $74.30 to $21.50 per ton depending upon the ore source, plant location, and market considered.

On the other hand, utilizing lower operating levels of total costs (especially those of low power costs as might be attainable from the U. S. Bonneville Power Administration system), but with purchases of chrome ore at the G.S.A. levels, the delivered price (exclusive of profits) would be less than present market prices by $32.90 to $52.70 per ton depending upon the ore source and market considered.

## II. BASIC ASSUMPTIONS

In order to provide a reasonable degree of validity for comparative analytical procedures, the following assumptions were used as a basis for all calculations of production costs:

A. Average grades or ores (including concentrates) for the proposed ferrochrome operation will:

1. Remain within present average stockpile specifications.
2. Be suitable for ferrochrome production, from a metallurgical point of view, for the end production of 65-70% Cr; 4-9% C.

B. One grade of ferrochrome will be produced (65-70% Cr; 4-9% C) at all production locations.

C. Production cost components such as labor, including superintendence and management; capital costs, electrodes and water supply will be virtually the same at all locations.

D. Production cost components such as electric power, metallurgical carbon, fluxing materials will represent controlling variables at each alternative location, representing local conditions and freight rates. In the case of a tidewater location, lower ranges of production costs would be possible to provide minimum possible estimates.

E. Produced ferrochrome will be available for shipment to western steel-making centers such as Southern California, Salt Lake and Denver, and to Chicago (as the epicenter for Eastern markets).

F. The following alternative production centers were considered for plant location: San Luis Obispo, California; Grants Pass, Oregon; Spokane, Washington and one un-named location in the Pacific Northwest, possibly on tidewater, and supplied with electric power from the U.S. Bonneville Power Administration system.

## III. PRODUCTION PRACTICES FOR FERROCHROME PRODUCTION

### A. GENERAL DESCRIPTION

The production of ferrochrome is accomplished by means of electric furnaces. In these, a properly balanced mixture of chrome ore or suitably prepared chrome ore concentrates, fluxing materials (such as limestone or silica), and carbon materials (such as coke, coke breeze or other carbonaceous material) are subjected to the high temperature of the electric furnace. The resulting smelting operation, entailing complex chemical reactions within the molten mass, produces ferrochrome and slag.

In general, this type of operation produces what is known as "high carbon" ferrochrome having typical analyses on the order of 68-72% Cr, 4-6% carbon, 1-2% Si.

In order to produce low-carbon ferrochrome, a more complex procedure is necessary. It consists of two steps: the first results in a high silicon ferrochrome, produced in an electric furnace operation generally similar to that briefly described above. The second step might be termed a refining step in which electric furnacing of the high silicon ferrochrome reduces the silicon content, proportionately raising the chromium content and reducing the carbon content of the finished ferrochrome. Such low-carbon ferrochrome will have an analysis of about 68-72% Cr, less than 1% Si, and carbon content as low as 0.03% C. There are a number of processes for producing low-carbon ferrochrome which are held in great confidence by various ferroalloy producers.

Because of the time limitations upon this summary analysis, no consideration is given to the production of low-carbon ferrochrome. Instead, what might be considered a standard high-carbon ferrochrome operation has been selected for comparative analysis.

As might be expected, the characteristics of the chromium-bearing input materials have very great bearing upon both the techniques and economics of ferrochrome production. These characteristics refer both to the physical state of the chromium-bearing materials as well as its chemical composition. Normally, the preferred chrome ore should be hard and lumpy. Other ores or concentrates require various degrees of preparation such as pelletizing or sintering so as to result in a chromium-bearing material which is suitable for electric furnacing. Also because of time limitations upon this summary analysis, no consideration was given to the techniques and economics of such preparation.

Regarding the chemical characteristics of the chromium-bearing materials, preferred ores must be high in chrome metal content, and the chrome-to-iron ratio should be close to 3 to 1 although in recent years, the commercial practice has been to accept ores with somewhat lower chrome-to-iron ratios. Quite frequently, various mixtures or blends of ores are utilized so that lower "grade" materials can be "sweetened" by the addition of higher-grade ore. Also, there are a number of processes which offer means for increasing the chrome-to-iron ratios. These include processes devised by the U. S. Bureau of Mines, the Krupp-Renn process and others. In these, beneficiation in suitably designed and operated kilns make possible the reduction of iron oxide portions to metallic iron which is then removed in a number of ways, providing a chrome-bearing residue with desired chrome-to-iron ratios. Time did not permit analysis of such processes for comparative purposes.

The composition of other substances contained in the chrome-bearing material are also influential in the acceptance and suitability of the ore. Alumina, magnesia and silica content must be in proper proportions although addition of limestone and silica (as the case may be) can provide appropriate fluxing combinations.

The carbonaceous material required as reducant in the furnace charge can vary to some extent with respect to physical and chemical characteristics. However, this variation is somewhat critical depending on other input raw materials and the type of ferrochrome to be produced. Coke or coke breeze are usually the preferred materials although petroleum coke and charcoal can be used in the input carbon mixture. Waste wood has been studied as a direct addition to the charge to increase porosity and contribute carbon.

A typical ferrochrome furnace operation consists of appropriate buildings for housing the electric furnace or furnaces and appurtenant electrical equipment. Raw material storage, mixing and handling facilities must also be provided. The electric furnace shell is lined with insulated firebrick and carbon block lining. During beginning or starting operations, a rammed chrome ore lining is provided. Normally, under good furnace practices, the lining need not be replaced until after two years of operations.

B. INPUT MATERIAL BALANCES

As might be expected, variations in input material quantities, power requirements and the like are quite substantial. Each type of ferrochrome and each general type of ore mix will result in different ranges in the requisite composition of fluxing materials, electrode consumption and overall losses in the total operation.

In order to simplify calculations of this summary analysis, because of the limited time available, certain arbitrary ranges were selected which represent normal practice applicable to the production of high-carbon ferrochrome from ores such as those which have been acceptable for Government stockpiling practices in the West.

In order to provide an adequate summary of possible production costs, one operation (that relating to a Pacific Northwest location, served with Federal $17.50 per kilowatt-year power) has been calculated on the basis of what would appear to be favorable material and power consumption balances as well as capital investment bases. However, it should be pointed out that, even in this case, further savings of substantial effect might be accomplished through the use of waterborne rather than railborne facilities.

The following tabulation indicates the approximate input material balances utilized in the following production cost analyses.

QUANTITIES PER TON OF FERROCHROME 1/

| | Higher Range | Lower Range |
|---|---|---|
| Ore/Concentrates | 4,800 Lbs. | 4,800 Lbs. |
| Coke | 900 Lbs. | 1,030 Lbs. |
| Silica | --- | 300 Lbs. |
| Limestone | 200 Lbs. | --- |
| Electrodes | 80 Lbs. | 55 Lbs. |
| Electric Power | 7,000 Kwh | 4,600 Kwh |

1/ High carbon: 65-70% Cr; 4-9% C

Other specifications regarding labor, maintenance, plant capital costs and the like are described in further sections of this analysis.

C. SIZE OF PLANT; CAPITAL COSTS

For the purposes of this analysis, a standard 3500 KVA electric furnace operation was selected. Such an operation would be capable of producing between 4000 to 6500 tons of high-carbon ferrochrome per year, depending on ranges of material input mixes and power consumption.

A plant such as this, completely equipped with buildings, furnace and appurtenant electrical equipment (including appropriate substations and controls), materials handling, etc. etc. would probably require a capital investment ranging between \$1 million for the lower range to \$2 million for the higher range of estimates. This would not include any facilities for pre-treatment or additional beneficiation of chrome-bearing materials.

## IV. SUMMARY ANALYSIS OF TOTAL PRODUCTION COSTS FOR VARIOUS LOCATIONS (EXCLUDING PRICE FOR ORE)

The following tabulations and supporting appendices relate to a 35,000 KVA electric furnace plant operation at various strategic locations in the West.

Table 1 summarizes conditions which would pertain to the plant's location at San Luis Obispo, California; Grants Pass, Oregon and Spokane, Washington. All material costs include freight. These three comparative cases should be regarded as a conservative estimate of the cost of producing ferrochrome using conventional techniques. They represent the higher operating ranges, especially in power consumption at 7000 kwh per ton of ferrochrome. Plant investment is computed at the midpoint of the range of various estimates, and as such is higher than can be achieved under more favorable circumstances. The annual ferrochrome production would be on the order of 4,200 tons.

Table 2 summarizes conditions which could be obtained by a plant favorably situated in the Pacific Northwest. The input materials, power requirements, and capital costs are conservative adaptations of the modern practices recommended by an electric furnace manufacturer and represent a lower operating range than summarized in Table 1. Power costs are computed on the Bonneville Power Administration's $17.50 per kw-year rate. Power costs would be increased no more than 10 or 15% over this rate if service were from almost any of the publicly owned distributors in the Northwest.

All material costs include freight. It is possible that a suitable location would permit water transportation which would further reduce production costs through transportation savings.

The annual ferrochrome production from this operation would be on the order of 6400 tons.

TABLE 1

COSTS OF PRODUCTION (LESS CHROME ORES) OF
STANDARD HIGH-CARBON FERROCHROME 1/ AT VARIOUS LOCATIONS 2/

| COST ELEMENTS (LESS CHROME ORES) | PRICE PER NET TON AT PLANT | QUANTITY IN LBS PER NET TON | COST PER NET TON OF PRODUCT |
|---|---|---|---|
| Grants Pass Plant | | | |
| Coke | $21.00 | 900 | $ 9.50 |
| Limestone | 5.00 | 200 | .50 |
| Electrodes | 746.00 | 80 | 29.80 |
| Power | 7.075 mills/kwh | 7000 kwh | 49.50 |
| Relining | ----- | --- | 2.40 |
| Labor | ----- | --- | 30.60 |
| Capital Recovery | ----- | --- | 46.30 |
| Maintenance | ----- | --- | 6.20 |
| Insurance | ----- | --- | 3.70 |
| Employer Contributions | ----- | --- | 3.10 |
| Taxes | ----- | --- | 1.10 |
| Total (less chrome ore) | | | $182.70 |
| San Luis Obispo Plant | | | |
| Coke | 21.00 | 900 | 9.50 |
| Limestone | 5.00 | 200 | .50 |
| Electrodes | 746.00 | 80 | 29.80 |
| Power | 8.63 mills/kwh | 7000 kwh | 60.30 |
| Relining | ----- | --- | 2.40 |
| Labor | ----- | --- | 30.60 |
| Capital Recovery | ----- | --- | 46.30 |
| Maintenance | ----- | --- | 6.20 |
| Insurance | ----- | --- | 1.90 |
| Employer Contributions | ----- | --- | 3.10 |
| Taxes | ----- | --- | 2.10 |
| Total (less chrome ore) | | | $192.70 |
| Spokane Plant | | | |
| Coke | 21.00 | 900 | 9.50 |
| Limestone | 5.20 | 200 | .50 |
| Electrodes | 746.00 | 80 | 29.80 |
| Power | 5.63 mills/kwh | 7000 kwh | 39.40 |
| Relining | ----- | --- | 2.40 |
| Labor | ----- | --- | 30.60 |
| Capital Recovery | ----- | --- | 46.30 |
| Maintenance | ----- | --- | 6.20 |
| Insurance | ----- | --- | 1.90 |
| Employer Contributions | ----- | --- | 3.10 |
| Taxes | ----- | --- | 1.40 |
| Total (less chrome ores) | | | $171.10 |

1/ 65-70% Cr, 4-9% C
2/ See Appendix I for explanation of various cost elements.

TABLE 2

COSTS OF PRODUCTION (LESS CHROME ORES) OF STANDARD HIGH-CARBON FERROCHROME 1/ UNDER FAVORABLE CIRCUMSTANCES 2/ 3/

| COST ELEMENTS (LESS CHROME ORES) | PRICE PER NET TON AT PLANT | QUANTITY IN LBS PER NET TON | COST PER NET TON OF PRODUCT |
|---|---|---|---|
| Plant in Low-Power-Cost Area | | | |
| Coke | $21.00 | 1030 | $ 10.80 |
| Silica | 6.00 | 300 | .90 |
| Electrodes | 746.00 | 55 | 20.60 |
| Power | 2.3 mills/kwh | 4600 kwh | 10.60 |
| Relining | ----- | --- | 1.60 |
| Labor | ----- | --- | 20.10 |
| Capital Recovery | ----- | --- | 20.20 |
| Maintenance | ----- | --- | 2.10 |
| Insurance | ----- | --- | .90 |
| Employer Contributions | ----- | --- | 2.00 |
| Taxes | ----- | --- | .50 |
| Total (less chrome ore) | | | $ 90.30 |

1/ 65-70% Cr, 4-9% C

2/ In low-cost-power area

3/ See Appendix 2 for explanation of various cost elements.

## V. SUMMARY ANALYSIS OF POSSIBLE FERROCHROME PRICES (EXCLUSIVE OF PROFIT) DELIVERED TO VARIOUS CONSUMING LOCATIONS

Tables 3 and 4 summarize possible ferrochrome prices, delivered to various consuming locations but excluding profit considerations.

In these analyses, the cost of ore/concentrates delivered to the various ferrochrome producing locations are those which would apply on the basis of the present purchasing schedules at the U.S. General Services Administration stockpile depot at Grants Pass. (As detailed in Appendix 3 of the tabulations). To these prices, reflected into the plant unit requirements for the production of high carbon ferrochrome, are added the costs of production described in foregoing Tables 1 and 2 and their supporting Appendices 1 and 2. This addition results in a total cost of production (excluding profits) at the various plant locations. Freight costs (by rail) from such locations to various consumer centers provide a total delivered price (exclusive of profits) to these centers.

The total delivered price (exclusive of profits) is then compared with the present commercial market price equivalent to $388 per ton of high-carbon ferrochrome.

It will be noted, therefore, that for the three plant locations indicated, using higher operating and cost levels, delivered prices (exclusive of profits) are somewhat higher than present market prices.

On the other hand, for the location which would be served by the U.S. Bonneville Power Administration, and employing lower operating and cost levels, delivered prices (exclusive of profits) are somewhat lower than present market prices. These prices are based on the use of rail transportation and could possibly be further reduced if water transportation were utilized.

TABLE 3

COSTS OF FERROCHROME PRODUCTION AND TRANSPORTATION 1/ TO SERVE VARIOUS CONSUMING LOCATIONS

(Figures in dollars per net ton)

| Source of Ore and Destination of Ferrochrome | Cost of Chrome Ore at Plant 2/ Per Ton of Ore | Per Ton of Product 3/ | Cost of Production Less Chrome Ore | Total | Transportation of Ferrochrome | Delivered Cost | Excess of Production Cost Over Market Price 4/ |
|---|---|---|---|---|---|---|---|
| Plant at Grants Pass | | | | | | | |
| Ore from Grants Pass | $86.60 | $207.80 | $182.10 | $390.50 | | | |
| Market in Fontana, Calif. | | | | | $20.70 | $411.20 | $23.20 |
| Salt Lake | | | | | 20.40 | 410.90 | 22.90 |
| Denver | | | | | 20.40 | 410.90 | 22.90 |
| Chicago | | | | | 25.80 | 416.30 | 28.30 |
| Ore from San Luis Obispo | 97.40 | 233.80 | 182.70 | 416.50 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 437.20 | 49.20 |
| Salt Lake | | | | | 20.40 | 436.90 | 48.90 |
| Denver | | | | | 20.40 | 436.90 | 48.90 |
| Chicago | | | | | 25.80 | 442.30 | 54.30 |
| Ore from John Day area | 95.60 | 229.40 | 182.70 | 412.10 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 432.80 | 44.80 |
| Salt Lake | | | | | 20.40 | 432.50 | 44.50 |
| Denver | | | | | 20.40 | 432.50 | 44.50 |
| Chicago | | | | | 25.80 | 437.90 | 49.90 |
| Plant at Spokane | | | | | | | |
| Ore from Grants Pass | 97.40 | 233.80 | 171.10 | 404.90 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 425.60 | 37.60 |
| Salt Lake | | | | | 16.20 | 421.10 | 33.10 |
| Denver | | | | | 20.40 | 425.30 | 37.30 |
| Chicago | | | | | 25.80 | 430.70 | 42.70 |

TABLE 3 (Cont'd)

COSTS OF FERROCHROME PRODUCTION AND TRANSPORTATION [1/] TO SERVE VARIOUS CONSUMING LOCATIONS

(Figures in dollars per net ton)

| Source of Ore and Destination of Ferrochrome | Cost of Chrome Ore at Plant [2/] Per Ton of Ore | Cost of Chrome Ore at Plant [2/] Per Ton of Product [3/] | Cost of Production Less Chrome Ore | Cost of Production Total | Transportation of Ferrochrome | Delivered Cost | Excess of Production Cost Over Market Price [4/] |
|---|---|---|---|---|---|---|---|
| Plant at Spokane (Cont'd) | | | | | | | |
| Ore from San Luis Obispo | 102.60 | 246.20 | 171.10 | 417.30 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 438.00 | 50.00 |
| Salt Lake | | | | | 16.20 | 433.50 | 45.50 |
| Denver | | | | | 20.40 | 437.70 | 49.70 |
| Chicago | | | | | 25.80 | 443.10 | 55.10 |
| Ore from John Day area | 93.60 | 224.60 | 171.10 | 395.70 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 416.40 | 28.40 |
| Salt Lake | | | | | 16.20 | 411.90 | 23.90 |
| Denver | | | | | 20.40 | 416.10 | 28.10 |
| Chicago | | | | | 25.80 | 421.50 | 33.50 |
| Plant at San Luis Obispo | | | | | | | |
| Ore from Grants Pass | 97.40 | 233.80 | 192.70 | 426.50 | | | |
| Market in Fontana, Calif. | | | | | 9.00 | 435.50 | 47.50 |
| Salt Lake | | | | | 20.40 | 446.90 | 58.90 |
| Denver | | | | | 20.40 | 446.90 | 58.90 |
| Chicago | | | | | 25.80 | 452.30 | 64.30 |
| Ore from San Luis Obsipo | 86.60 | 207.80 | 192.70 | 400.50 | | | |
| Market in Fontana, Calif. | | | | | 9.00 | 409.50 | 21.50 |
| Salt Lake | | | | | 20.40 | 420.90 | 32.90 |
| Denver | | | | | 20.40 | 420.90 | 32.90 |
| Chicago | | | | | 25.80 | 426.30 | 38.30 |

TABLE 3 (Cont'd)

COSTS OF FERROCHROME PRODUCTION AND TRANSPORTATION 1/ TO SERVE VARIOUS CONSUMING LOCATIONS
(Figures in dollars per net ton)

| Source of Ore and Destination of Ferrochrome | Cost of Chrome Ore at Plant 2/ | | Cost of Production | | Transportation of Ferrochrome | Delivered Cost | Excess of Production Cost Over Market Price 4/ |
|---|---|---|---|---|---|---|---|
| | Per Ton of Ore | Per Ton of Product 3/ | Less Chrome Ore | Total | | | |
| Plant at San Luis Obispo (Cont'd) | | | | | | | |
| Ore from John Day area | 101.60 | 243.80 | 192.70 | 436.50 | | | |
| Market in Fontana, Calif. | | | | | 9.00 | 445.50 | 57.50 |
| Salt Lake | | | | | 20.40 | 456.90 | 68.90 |
| Denver | | | | | 20.40 | 456.90 | 68.90 |
| Chicago | | | | | 25.80 | 462.30 | 74.30 |

1/ Includes transportation tax. All shipments considered to be by truck or rail.

2/ See Appendix 3

3/ Based on 4,800 Lbs of chrome ore/ton ferrochrome.

4/ Considered at $388 per ton. See Appendix 4.

TABLE 4

COSTS OF FERROCHROME PRODUCTION AND TRANSPORTATION 1/ FROM LOW-POWER-COST AREA TO VARIOUS CONSUMING LOCATIONS
(Figures in dollars per net ton)

| Source of Ore and Destination of Ferrochrome | Cost of Chtome Ore at Plant 2/ Per Ton of Ore | Per Ton of Product 3/ | Cost of Production Less Chrome Ore | Total | Transportation of Ferrochrome | Delivered Cost | Excess of Production Cost Over Market Price 4/ |
|---|---|---|---|---|---|---|---|
| Plant in Low-Power-Cost Area | | | | | | | |
| Ore from Grants Pass | $93.60 | $224.60 | $90.30 | $314.90 | | | |
| Market in Fontana, Calif. | | | | | $20.70 | $335.60 | $52.40 |
| Salt Lake | | | | | 20.40 | 335.30 | 52.70 |
| Denver | | | | | 20.40 | 335.30 | 52.70 |
| Chicago | | | | | 25.80 | 340.70 | 47.30 |
| Ore from San Luis Obispo | 99.60 | 239.00 | 90.30 | 329.30 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 350.00 | 38.00 |
| Salt Lake | | | | | 20.40 | 349.70 | 38.30 |
| Denver | | | | | 20.40 | 349.70 | 38.30 |
| Chicago | | | | | 25.80 | 355.10 | 32.90 |
| Ore from John Day area | 93.60 | 224.60 | 90.30 | 314.90 | | | |
| Market in Fontana, Calif. | | | | | 20.70 | 335.60 | 52.40 |
| Salt Lake | | | | | 20.40 | 335.30 | 52.70 |
| Denver | | | | | 20.40 | 335.30 | 52.70 |
| Chicago | | | | | 25.80 | 340.70 | 47.30 |

1/ Includes transportation tax. All shipments considered to be by truck or rail.
2/ See Appendix 3.
3/ Based on 4,800 Lbs of chrome ore per ton of ferrochrome. See Appendix 3.
4/ Considered at $388/ton. See Appendix 4.

## APPENDIX 1: ANALYSIS OF PRODUCTION COSTS SHOWN IN TABLE 1

### 1. COKE

Coke and coke breeze is produced in Utah and British Columbia. Petroleum coke is produced in the Los Angeles and San Francisco areas. Prices on coke delivered to the plant locations will range between $20 to $22 per ton. An average delivered price of $21 per ton was utilized in the calculations of all Tables.

### 2. LIMESTONE

Sources of limestone are available adjacent to Grants Pass and San Luis Obispo. Price delivered to a plant at each of these locations is assumed to be $5.00 a ton. Estimates of the quarry price range from $2.50 to $4.00 per ton.

The electric furnace plant at Spokane has been paying $5.17 per net ton for limestone. A price of $5.20 a ton for limestone has been assumed for a Spokane plant.

### 3. ELECTRODES

The range of price (depending on size) for carbon electrodes is from $31.50 to $37.00 per 100 Lbs. Freight on this amount is $2.30 per 100 Lbs from a plant in North Carolina. Delivered price to any of the three locations is $746 per ton.

### 4. POWER

Power costs for each location were based on the schedules appropriate for a 4000 kw demand and 2,500,000 kwh per month, with service taken at 13 kv. Rates are as follows:

| Area | Company | Schedule | Rate |
|---|---|---|---|
| Grants Pass | California-Oregon Power Company | 30 | 7.075 mills/kwh |
| Spokane | Washington Water Power Company | 21 | 5.63 mills/kwh |
| San Luis Obispo | Pacific Gas and Electric | A-13 | 8.63 mills/kwh |

5. RELINING

Cost is typically $20,000 to $25,000 every 24-30 months. Assume $23,000 every 27 months. This is $10,200/year for 4200 tons or $2.43/ton of output. Cost is the same at all locations.

6. LABOR

Cost is approximately the same at all locations.

| Title | Hourly Pay | Monthly Pay | Total Annual Pay |
|---|---|---|---|
| Manager | | 1000 | 12,000 |
| Superintendent | | 700 | 8,400 |
| Bookkeeper | | 350 | 4,200 |
| Secretary | | 280 | 3,360 |
| Chemist | | 600 | 7,200 |
| 4 furnace operators | 2.78 | | 23,128 |
| 4 assistant furnace operators | 2.46 | | 20,468 |
| 4 helpers | 2.00 | | 16,640 |
| 2 material handling | 2.19 | | 9,110 |
| 3 laborers | 2.00 | | 12,480 |
| 2 maintenance | 2.78 | | 11,564 |
| | | Total | $128,550 |

At 4200 tons of ferrochrome production per year, the labor cost would be $30.60 per ton.

7. CAPITAL RECOVERY

Based on various estimates the cost of a complete plant would range from $1,000,000 to $2,000,000. The cost is assumed to be $1,500,000. Considering 10 year amortization and interest of 6% on the average amount of borrowed capital, the annual costs are as follows:

| | |
|---|---|
| Amortization @ 10% | $150,000 |
| Interest @ 6% | 45,000 |
| | $195,000 |

For 4200 tons annual ferrochrome production, this is $46.30 per ton.

8. MAINTENANCE

For the purposes of this estimate, it is assumed that annual maintenance will amount to 5% of half of the total capital cost of $1,500,000. From this amount of $37,500 is subtracted the annual wages of the two regular maintenance workmen to leave an annual charge of $26,000. For 4200 tons, this is $6.20 per ton.

9. INSURANCE

It is estimated that fire insurance on $750,000 investment would be sufficient and that public liability insurance payments at $500 per year would be adequate.

| Area | Fire Insurance Rate | Liability | Total | Per Ton |
|---|---|---|---|---|
| Grants Pass | $2/100 | 500 | $15,500 | $3.70 |
| Spokane | $1/100 | 500 | 8,000 | 1.90 |
| San Luis Obispo | $1/100 | 500 | 8,000 | 1.90 |

10. EMPLOYER CONTRIBUTIONS

This includes such items as industrial accident insurance, unemployment compensation, social security, medical, etc. Computed as 10% of total wages. This would be $12,855 or $3.10/ton.

## 11. TAXES

Income taxes or taxes on gross sales are not considered. Real and personal property taxes in Oregon and California are comparable, with Washington only about 60% as great. Oregon real and personal property taxes are estimated at 0.3% of capital cost. These will vary, of course, depending upon the taxing requirements of the specific area in which the plant is located. For Oregon and California, this amounts to $4500 a year or $1.10 per ton. In Washington this would be $0.60 per ton.

In addition to the above, a sales tax, on new plant and operating supplies for which the industry is the ultimate consumer, is applied in Washington and California. For the purposes of this summary analysis only the tax on the new plant will be considered. Although this tax is assumed to be written off over a 10 year period, no interest is charged. The sales tax rate for California is 4% in most localities and the rate in Washington is 3-1/3%. It is assumed that the new plant cost subject to sales tax is $1,000,000.

| | Sales Tax | | | Total |
|---|---|---|---|---|
| | Total | Annual | Per Ton | Tax/Ton |
| California | $40,000 | $4,000 | $1.00 | $2.10 |
| Washington | $33,000 | $3,300 | $ .80 | $1.40 |
| Oregon | --- | --- | --- | $1.10 |

## APPENDIX 2: ANALYSIS OF FERROCHROME PRODUCTION COSTS SHOWN IN TABLE 2

1. Coke: Same as for Table 1.
2. Silica: Assumed to be the same as limestone in cost, or $6.00 per ton.
3. Electrodes: Same as Table 1.
4. Power: BPA rate is 17.50 per Kw year. At 87% load factor, this is 2.3 mills/kwh. At 4600 Kwh per ton the annual ferrochrome output is 6380 tons per year.
5. Relining: From Table 1 data, cost is $10,200 per year, or $1.60/ton.
6. Labor: From Table 1 data, cost is $128,550 per year, or $20.10/ton.
7. Capital Recovery: Plant cost estimated at $1,000,000.

| | |
|---|---|
| Amortization @ 10% | $100,000 |
| Interest @ 6% | 30,000 |
| | $130,000 |

   For 6380 tons of annual ferrochrome production, is is $20.20 per ton.

8. Maintenance: Based on assumptions of Table 1, this would amount to 5% of half of $1,000,000 less $11,500, or $13,500. For 6380 tons of annual ferrochrome production, this is $2.10/ton.
9. Insurance: Assume a $1/100 rate on $500,000, plus $500 of liability. This would total $5600 per year, or $0.90/ton.
10. Employer Contributions: Annual amount same as Table 1: $12,855. Amount per ton is $2.00.
11. Taxes: Same basis as Table 1, or 0.3% of $1,000,000. This is $3000 per year or $0.50/ton.

## APPENDIX 3: CHROMITE ORE STOCKPILE PRICES

The price paid for ore sold to the U.S. General Services Administration stockpile at Grants Pass, Oregon depends on the grade of ore presented. The base price for less than carload lots is only available for ore delivered to Grants Pass. For carload lots, the base price is available at the loading point.

The base price is $115 per long dry ton of lumpy ore and $110 for fines or concentrates with 48% $Cr_2O_3$ and a Cr-Fe ratio of 3 to 1. A premium of $4 per ton is paid for each percent of additional $Cr_2O_3$ or each increase of 0.1 in the Cr-Fe ratio up to a ratio of 3.5 to 1.

Below the base price specifications, a penalty of $3 per ton is charged for each percent of $Cr_2O_3$ under 48% or 0.1 decrease in the Cr-Fe ratio below 3 to 1. Ore is only accepted down to a 2 to 1 ratio of Cr-Fe.

Typical ore grades recently received at the Grants Pass depot are described as follows:

Minimum: 42% $Cr_2O_3$, 2.0 Chrome-iron ratio

Average: 46% $Cr_2O_3$, 2.6 Chrome-iron ratio

Usual range: 42-52% $Cr_2O_3$, 2.2 - 3.5 Chrome-iron ratio

$SiO_2$: 2-1/2 to 8%

For the computation of ferrochrome production costs in this summary analysis, the average grade of lumpy ore was used. This grade is purchased for $97.00 a long ton or $86.60 a short ton.

The usual prices paid at the Grants Pass depot vary from $73 to $151 a long ton depending upon the grade of ore. The usual range of ore grades are described above.

## APPENDIX 4: COMPUTATION OF MARKET PRICE

The market price of standard high carbon ferrochrome (65-70% Cr, 5-9% C) is currently stated to be 28-3/4 cents per pound of contained chromium. Assuming a content of 67.5% Cr, this amounts to $388 per ton of ferrochrome. This price is the delivered price for carload lots.

AL ULLMAN
2D DISTRICT, OREGON

CHARLES J. BERNS
ADMINISTRATIVE ASSISTANT

RON AHERN
FIELD ASSISTANT

MRS. IRENE BURTON
SECRETARY

COMMITTEE ON INTERIOR
AND INSULAR AFFAIRS

IRRIGATION AND RECLAMATION
PUBLIC LANDS
MINES AND MINING
INDIAN AFFAIRS

Congress of the United States
House of Representatives
Washington, D. C.

March 18, 1959

Mr. Ivan Bloch
611 Park Building
Portland, Oregon

Dear Ivan:

Thank you very much for your advice and suggestion on the chrome matter. I am contacting the delegation from Alaska and anticipate that they will join us in our chrome fight.

With best personal regards,

Sincerely yours,

Al

Al Ullman, M. C.

Veilfrecc to Hollis Dole
Orgn DGMI



h3
3/23/59

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 4, 1959

Honorable Al Ullman
Congressman from Oregon
U. S. House of Representatives
U. S. House Office Building
Washington 25, D. C.

Dear Al:

In chatting with Hollis Dole of the Oregon Department of Geology and Mineral Industries, he waxed most enthusiastic about your interest in the survival of the chromite mining industry. I'm most happy to hear that you are doing battle on it.

A thought occurred to me which I pass on to you. As you know, one of the most promising chromite districts in the United States is in the Kenai Peninsula of Alaska. For some years, this district has produced substantial quantities of good ore for the stockpile. At the present time, of course, the district shares the doldrums with most if not all other chrome producing areas. Thus, I wonder whether you have exchanged points of view with our Alaskan delegation i.e. Senators Bartlett and Gruening and Representative Rivers? I know they are keenly interested in all those things which might facilitate Alaska's development.

For some years I have followed the events surrounding the chrome and chromite industry. You may recall that last year we prepared an analysis of possible ferrochrome production for Dole's Department. You've probably seen it. Anyway, if there is anything we can do on this, please let me know.

With kindest regards,

Sincerely yours,

Ivan Bloch

IB:ns

CC: Hollis Dole
Karl Bauchner-Anchorage

April 2, 1958

Mr. Ivan Bloch
Ivan Bloch & Associates
611 Park Building
Portland, Oregon

Dear Ivan:

Herewith is a copy of my testimony. I thought you would be interested.

Still think this chrome process plant has a lot of merit and should be pushed as hard as possible.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
Encl.

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........ 611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300



March 26, 1958

MEMORANDUM

TO: Hollis M. Dole, Dept. of Geology and Mineral Industries
Julius R. Jensen, Dept. of Planning and Development

FROM: Ivan Bloch

SUBJECT: Visit of Representatives of Electro Metallurgical Company

Messrs. Edward L. Hix, superintendent Portland Works and Herman J. Pfeifer, District Manager (San Francisco office) of that Company called on me today, March 26, 1958.

They wanted to know something about the study we had completed for the State regarding the utilization of local chrome-bearing materials for the production of ferrochrome.

I indicated that our study had been completed, that it was directed toward a preliminary and summary analysis of production costs on the basis of various pertinent assumptions regarding ore grades, suitability for high-carbon ferrochrome, location, plant investment and operating costs, etc. I pointed out that we selected assumptions to bracket what might be actual operating conditions, and that the results of the summary analysis were interesting.

Messrs. Hix and Pfeifer stated that their company, having a Portland furnace operation now 50% idle, they would be interested in the possibilities of participating in a program for the production of ferrochrome from western ores for stockpiling.

I stated that, in my opinion, the entire matter rested upon a determination of government policy regarding support or subsidy of domestic chrome mining. It appeared to me, I stated, that depending on such policy, there might be room for the utilization of existing private ferrochrome plants.

Upon my question, Mr. Hix stated that the Company had not used local ores except for some Montana concentrates and some California ores some twenty years ago. We all agreed that opportunities for production would require considerable analysis of ores, methods of concentration and beneficiation. It was also agreed that, at this time, western consumption of ferrochrome materials was rather small in comparison with national requirements.

Ivan Bloch

Ivan Bloch

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 26, 1958

Mr. Hollis Dole
Dept. of Geology and Mineral Industries
Mr. Julius R. Jensen
Dept. of Planning and Development
Oregon State Office Building
Portland, Oregon

Dear Messrs. Dole and Jensen:

In support of our billing for the just completed study on feasibility of production of ferrochrome, we are submitting the following schedule of expenses:

| | Hrs. | Rate | Amount |
|---|---|---|---|
| Professional services | | | |
| Ivan Bloch | 26 | $15. | $390.00 |
| John H. Davidson | 62 | 12. | 744.00 |
| Donald W. Hirschberger | 11 | 12. | 132.00 |
| Typing, clerical, etc. | | | 50.00 |
| | Total | | 1,316.00 |
| | Amount billed | | 1,000.00 |

Sincerely,

Ivan Bloch

Ivan Bloch

Ivan Bloch and Associates
611 PARK BUILDING
PORTLAND 5, OREGON

March 24, 1958

Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
Portland 1, Oregon

Dear Hollis:

We trust that the attached report will be suitable for your purposes. We have kept generally within the outline with some minor changes in emphasis.

I feel confident that our calculations are well in range of what might be the actual operating set-up for plants in the West. However, you will note the remarkable differences in power prices if these are compared to what might be available directly from Bonneville or from some public power organization.

Although delivered prices are greater than present market prices for three locations, I don't feel these are so great as to be discouraging. This is particularly true if you consider the calculation for a plant operating in a low-power-cost area. This plant would possibly be on tidewater and represents favorable operating conditions. It shows a considerable <u>excess</u> of market price over production price. For this reason I feel that you are safe to assume that a cooperative or <u>non-profit</u> ferrochrome operation could provide stockpiles with ferrochrome <u>without</u> any changes in the present price structure on chrome ore and concentrates. By cutting corners on plant costs and really doing a job on operations, it might be even possible to cut the subsidy support prices. However, I'm not willing to go that far at this time. Of course, we've made no allowances for extra beneficiation or ores or further processing of concentrates, but I'm not sure these would be critical. The variables in ore, in processing and all of that are so many that, "in the time available", we can only go so far.

All in all, I think the whole idea is <u>very</u> meritorious, and further refining of approach should make it look pretty good. If you have any questions, call me. I look forward to hearing "all about it" when you get back.

With kindest regards,

Ivan Bloch

cc: Julius Jensen

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 24, 1958

Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
Portland 1, Oregon

Dear Hollis:

In order to provide you with more flexibility in the presentation of data regarding the ferrochrome analysis we are submitting separately data concerning present western markets for ferrochrome. The attached tabulation summarizes the data we have received so far from steel mills and foundries in the West. Although this tabulation includes all the major steel mills, there are a number of foundries that use sizable quantities of ferrochrome for which we have not been able to receive data.

We hope this tabulation will be of assistance to you.

Sincerely,

Ivan Bloch

Ivan Bloch

Attachment

cc: Jensen

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 25, 1958

Mr. Julius Jensen, Director
Department of Planning & Development
Oregon State Office Building
Portland, Oregon

Dear Julius:

Attached is copy of our "Summary Analysis of the Feasibility of Ferrochrome Production From a Plant Located in the West to Utilize Domestic Chrome Ores" for your files.

Three copies, including one original, were airmailed special delivery to Mr. Dole in Washington last night shortly after five.

One copy has been mailed to Mr. Ralph Mason of Mr. Dole's office.

Your comments on this report will be appreciated.

Sincerely,

Ivan Bloch

Attachment

CC: Mr. Ralph Mason

IVAN BLOCH & ASSOCIATES

INDUSTRIAL AND ECONOMIC CONSULTANTS........

611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

April 11, 1958

Mr. Karl A. Bachner
Kenai Chrome Co.
545 East 4th Ave.
Anchorage, Alaska

Dear Karl:

At my suggestion, Hollis Dole has sent you a copy of our summary analysis of ferrochrome production. Attached is a copy of Hollis' testimony before the Senate Interior Committee.

The next time I'm in Anchorage, perhaps we can discuss this matter. In the meantime, if you have any ideas or questions, let me know.

With kindest regards to you and yours,

Sincerely yours,

Ivan

Ivan Bloch

Encl.

CC: Hollis Dole

March 12, 1958

Mr. Ivan Bloch
Ivan Bloch & Associates
611 Park Building
Portland, Oregon

Dear Ivan:

Enclosed are three replies received by this office in answer to the request sent out last week concerning use of ferrochrome.

As others are received they will be forwarded to you.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
Encl.

Suggested draft of letter under signature of Hollis Dole, Oregon Department of Geology and Mineral Industries: re ferrochrome study.

To be sent to the attached list of firms.

Dear Sirs:

We are in the process of making a very rapid study of ferrochrome requirements in the Western states. We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this, we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that time will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely,

Kaiser Steel Corp.
Fontana, California with cc Kaiser Steel Corp.
1924 Broadway
Oakland, California

Columbia-Geneva Steel Division
U. S. Steel Corp.
Pittsburgh, Calif. with cc Torrance, Calif.

Bethleham Pacific Coast Steel Corp.
South San Francisco, Calif.

Pacific States Steel Co.
Niles, Calif.

Judson Steel Corp.
Emeryville, Calif.

U. S. Steel Corp.
Geneva, Utah

Colorado Iron and Ind. Corp.
Pueblo, Colo.

Bethlehem Pacific Coast Steel Corp.
3631 E. Marginal Way
Seattle, Washington

Isaacson Iron Works
8531 E. Marginal Way
Seattle, Washington

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS........
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300

March 10, 1958

Mr. Allan Markley
Secretary
Illinois Valley
Chamber of Commerce
Cave Junction, Oregon

Dear Mr. Markley:

We have received your letter of March 8, 1958 concerning a possible meeting in your area with the chrome operators. Such a meeting with us at this time is not practical because of the very limited amount of time we have to prepare our report. However, we would like to point out that the purpose of the study is to find a way to continue the utilization of these local ores. Our study is limited to an examination of the feasibility factors relating to the production of ferrochrome. Data regarding sources of chrome ores and concentrates are being supplied by the State of Oregon Department of Geology and Mineral Industries. The study is financed and sponsored by this agency in conjunction with the State Department of Planning and Development.

I have discussed your letter with Mr. Hollis Dole, Director of the Department of Geology and Mineral Industries. He has indicated that the Governing Board of the Department is holding a meeting at Grants Pass with the Chamber of Commerce on March 22nd. He has suggested that you might wish to attend this meeting by arranging with the Grants Pass Chamber of Commerce.

We hope this information will be of assistance to you, and appreciate your suggestion for a meeting with us.

Sincerely,

J. H. D.

John H. Davidson
Industrial Consultant

CC: Hollis Dole

March 4, 1958

Mr. Ivan Bloch
Ivan Bloch & Associates
611 Park Building
Portland, Oregon

Dear Mr. Bloch:

This is to authorize and direct you to make a feasibility study for the State Department of Planning and Development in cooperation with the State Department of Geology and Mineral Industries on a ferrochrome plant located in the West that would utilize domestic ores. Discussions concerning this study were held with you and Hollis M. Dole, Director of the Department of Geology and Mineral Industries, on February 24 and March 3 in your office. The main points to be covered by your study were embodied in your letter to Mr. Dole of February 25, 1958, a copy of which is attached. In addition, possibility of low-carbon ferrochrome production and need of a pelletizing plant should be referred to.

Cost of the study is to be borne equally by the Department of Planning and Development and the Department of Geology and Mineral Industries and is to be done under the agreement between your organization and the Department of Finance and Administration (on behalf of the Department of Planning and Development) dated October 7, 1957. Your fee is to be paid on a basis of $15 per hour as set forth in the agreement but total cost is not to exceed one thousand dollars ($1,000.00).

Deadline for submission of the report was established as:

(1) Rough draft to be submitted to Mr. Dole by March 21.

(2) Final report (in five copies) is to be completed by March 26.

Sincerely yours,

Julius R. Jensen, Director
Department of Planning and Development

Hollis M. Dole, Director
Department of Geology and Mineral Industries

HMD:jr
cc Governing Board
cc Julius R. Jensen

COPY

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

March 4, 1958

Mr. Ivan Bloch
Ivan Bloch & Associates
611 Park Building
Portland, Oregon

Dear Mr. Bloch:

This is to authorize and direct you to make a feasibility study for the State Department of Planning and Development in cooperation with the State Department of Geology and Mineral Industries on a ferrochrome plant located in the West that would utilize domestic ores. Discussions concerning this study were held with you and Hollis M. Dole, Director of the Department of Geology and Mineral Industries, on February 24 and March 3 in your office. The main points to be covered by your study were embodied in your letter to Mr. Dole of February 25, 1958, a copy of which is attached. In addition, possibility of low-carbon ferrochrome production and need of a pelletizing plant should be referred to.

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Sincerely yours,

Julius R. Jensen

Julius R. Jensen, Director
Department of Planning and Development

Hollis M. Dole

Hollis M. Dole, Director
Department of Geology and Mineral Industries

HMD:jr
cc Governing Board
cc Julius R. Jensen

COPY

IVAN BLOCH & ASSOCIATES
Industrial and Economic Consultants
611 Park Building
Portland, Oregon

February 25, 1958

Mr. Hollis Dole, Director
Oregon Dept. of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Mr. Dole:

This will confirm the substance of our discussions of February 24, 1958 regarding a domestic chrome mining and processing program, with special emphasis on the Oregon situation.

It is my understanding that the State will make formally a presentation before the forthcoming Hearings of the Senate Interior and Insular Affairs Committee, commencing around March 24, 1958. This presentation will deal with various alternatives to sustain domestic chrome mining of which the most significant reserves are in the States of Oregon, California, Montana and the Territory of Alaska.

A major proposal to be made embodies the concept of producing ferrochrome for government stockpiling purposes as well as for sales to appropriate consumers at a western location suitably selected to minimize the present expensive transportation of western ores and concentrates, to stimulate the stabilization and expansion of local chrome ore mining and beneficiation by providing a western outlet, and to provide for the local employment of manpower, electric power and other ferrochrome production components.

Pertinent to the development of this proposed program will be an examination of feasibility factors relating to the production of ferrochrome. It may be that western ferrochrome production from western domestic ores can result in a material of such production costs as to be competitive for western alloy steel and related utilization, or for other pertinent markets. It may be that a form of subsidy may be required either at the mining operator level (as to the purchase price of ore or concentrates) or at the ferrochrome production level (as to the purchase price of finished ferrochrome). It is therefore necessary to determine what the costs of production may be for a western ferrochrome operation, based on western chrome ores and concentrates, and for a number of pertinent plant locations and markets. Such costs of production would provide a basis for developing appropriate policies regarding possible subsidies or other forms of support to maintain the western chrome mining industry in the event the stockpiling of ferrochrome (instead of chrome ores or concentrates) appeared desirable and acceptable.

We are in a position to prepare, on your behalf, a summary analysis in five copies of production feasibility factors for $1,000. Because of the great limitation of time, all details of feasibility cannot be presented. However, critical and governing factors can be analyzed to provide sound and factual bases for the State's proposed presentation. An outline of the type of study which we could prepare for you prior to March 24, 1958 is shown as follows:

I. Assumptions:

A. It will be assumed that the average grade of ores and concentrates for the proposed ferrochrome operation will:

1. Remain within present average stockpile specifications.
2. Be suitable for ferrochrome production from a metallurgical point of view for the production of 65%-70% Cr.; 4-9% C.

B. It will be assumed that one grade of ferrochrome (65%-70% Cr.; 4-9% C) will be produced for the purposes of comparative cost analyses at various production locations.

C. It will be assumed that unit production costs components such as labor, including superintendence and management; capital costs, electrodes and water will be virtually the same at all locations.

D. It will be assumed that production costs components such as electric power, metallurgical carbon, fluxing materials will represent controlling variables at each alternative location, reflecting local conditions and freight rates.

E. It will be assumed that produced ferrochrome will be available for shipment to western steel-making centers such as Seattle, San Francisco, Los Angeles, Salt Lake and Denver, Colorado; and to Chicago as the epicenter for Eastern markets.

F. It will be assumed that the following alternative production centers will be logical: Spokane, Washington; the Grants Pass-Klamath Falls, Oregon area; the San Luis Obispo, California area.

II. Production Practices for Ferrochrome:

A. General description of electric furnace processing for ferrochrome.

B. Description of input balances (minimum-maximum) for ferrochrome production (65-70% Cr.; 4-9% C):

1. Chrome ore quantities per unit of end-product
2. Electric power quantities per unit of end-product.
3. Electrode quantities per unit of end-product.
4. Fluxing material (limestone) quantities per unit of end-product.
5. Other components: labor, water etc. (in general).
6. Capital costs for minimum sized furnace plant.

III. Analysis of Major Production Cost for Various Locations (Excluding ore/concentrate costs, and capital costs.)

1. Locations: Spokane, Wash.; Grants Pass-Klamath Falls, Oregon; San Luis Obispo

2. Freight costs on chrome ore and concentrates from production centers (generalized) to each location.

3. Delivered costs on other material components to each location.

4. Costs of power for each location.

5. Comparative production costs at each location (based on major variables as described under "Assumptions"), excluding costs of ores or concentrates at points of origin.

IV. Summary Analysis of Total Production Costs for Various Locations and Ranges of Ore Concentrate Prices at Producing Mines.

V. Summary Analysis of Possible Market Prices for Ferrochrome, delivered to Selected Consuming Centers

1. Freight costs to consuming centers (from each ferrochrome production location) to Seattle, San Francisco, Los Angeles, Salt Lake, Denver, Chicago.

2. Possible delivered prices of ferrochrome to each consuming center.

VI. Summary Analysis of Subsidy or Support Price Ranges: (Based on current price range for commercial ferrochrome, 65%-70% Cr.; 4-9% C).

1. Range at producer level for various chrome-producing centers, for various ferrochrome plant locations, for various consuming centers.

2. Range at ferrochrome production level for various chrome-producing centers, for various ferrochrome producing centers, for various consuming centers.

May we have your comments at your earliest convenience.

Sincerely yours,

/s/ Ivan Bloch

IVAN BLOCH & ASSOCIATES
INDUSTRIAL AND ECONOMIC CONSULTANTS
611 PARK BUILDING
PORTLAND, OREGON
PHONE CA 2-3300



7th of Oct.
with Div. of Dept of Finan & Adm
[illegible] or [illegible] whichever is the lesser

February 25, 1958

Rough Draft 21st
Absolute deadline 26th

Mr. Hollis Dole
Director
Oregon Dept. of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Mr. Dole:

This will confirm the substance of our discussions of February 24, 1958 regarding a domestic chrome mining and processing program, with special emphasis on the Oregon situation.

It is my understanding that the State will make formally a presentation before the forthcoming Hearings of the Senate Interior and Insular Affairs Committee, commencing around March 24, 1958. This presentation will deal with various altern-tives to sustain domestic chrome mining of which the most significant reserves are in the States of Oregon, California, Montana and the Territory of Alaska.

A major proposal to be made embodies the concept of producing ferrochrome for government stockpiling purposes as well as for sales to appropriate consumers at a western location suitably selected to minimize the present expensive transportation of western ores and concentrates, to stimulate the stabilization and expansion of local chrome ore mining and beneficiation by providing a western outlet, and to provide for the local employment of manpower, electric power and other ferrochrome production components.

Pertinent to the development of this proposed program will be an examination of feasibility factors relating to the production of ferrochrome. It may be that western ferrochrome production from western domestic ores can result in a material of such production costs as to be competitive for western alloy steel and related utilization, or for other pertinent markets. It may be that a form of subsidy may be required either at the mining operator level (as to the purchase price of ore or concentrates) or at the ferrochrome production level (as to the purchase price of finished ferrochrome). It is therefore necessary to determine what the costs of production may be for a western ferrochrome operation, based on western chrome ores and concentrates, and for a number of pertinent plant locations and markets. Such costs of production would provide a basis for developing appropriate policies regarding possible subsidies or other forms of support to maintain the western chrome mining industry in the event the stockpiling of ferrochrome (instead of chrome ores or concentrates) appeared desirable and acceptable.

We are in a position to prepare, on your behalf, a summary analysis in five copies of production feasibility factors for $1,000. Because of the great limitation of time, all details of feasibility cannot be presented. However, critical and governing factors can be analyzed to provide sound and factual bases for the State's proposed presentation. An outline of the type of study which we could prepare for you prior to March 24, 1958 is shown as follows:

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B. It will be assumed that one grade of ferrochrome (65%-70% Cr.; 4-9% C) will be produced for the purposes of comparative cost analyses at various production locations.

C. It will be assumed that unit production costs components such as labor, including superintendence and management; capital costs, electrodes and water will be virtually the same at all locations.

D. It will be assumed that production costs components such as electric power, metallurgical carbon, fluxing materials will represent controlling variables at each alternative location, reflecting local conditions and freight rates.

E. It will be assumed that produced ferrochrome will be available for shipment to western steel-making centers such as Seattle, San Francisco, Los Angeles, Salt Lake and Denver, Colorado; and to Chicago as the epicenter for Eastern markets.

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3. Electrode quantities per unit of end-product.
4. Fluxing material (limestone) quantities per unit of end-product.
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6. Capital costs for minimum sized furnace plant.

III. <u>Analysis of Major Production Cost for Various Locations</u>
(Excluding ore/concentrate costs, and capital costs.)

1. Locations: Spokane, Wash.; Grants Pass-Klamath Falls, Oregon; San Luis Obispo.

2. Freight costs on chrome ore and concentrates from production centers (generalized) to each location.

3. Delivered costs on other material components to each location.

4. Costs of power for each location.

5. Comparative production costs at each location (based on major variables as described under "Assumptions"), excluding costs of ores or concentrates at points of origin.

IV. <u>Summary Analysis of Total Production Costs for Various Locations and Ranges of Ore Concentrate Prices at Producing Mines</u>.

V. <u>Summary Analysis of Possible Market Prices for Ferrochrome, delivered to Selected Consuming Centers</u>

1. Freight costs to consuming centers (from each ferrochrome production location) to Seattle, San Francisco, Los Angeles, Salt Lake, Denver, Chicago.

2. Possible delivered prices of ferrochrome to each consuming center.

VI. <u>Summary Analysis of Subsidy or Support Price Ranges</u>:
(Based on current price range for commercial ferrochrome, 65%-70% Cr.; 4-9% C).

1. Range at producer level for various chrome-producing centers, for various ferrochrome plant locations, for various consuming centers.

2. Range at ferrochrome production level for various chrome-producing centers, for various ferrochrome producing centers, for various consuming centers.

May we have your comments at your earliest convenience.

Sincerely yours,

Ivan Bloch

Ivan Bloch

AGREEMENT

THIS AGREEMENT, made and entered into this 7th day of October, 1957, by and between the Director of the Department of Finance and Administration, hereinafter designated as the Director, and Ivan Bloch, of Portland, Oregon, doing business as Ivan Bloch and Associates, and hereinafter designated as Bloch,

W I T N E S S E T H:

That the parties hereto, with the knowledge that they are subject to, and bound by, the provisions of chapter 624, Oregon Laws 1957, and in all details obliged to conform with the requirements of that act, hereby agree:

1. SERVICES

The Director hereby engages Bloch to render for, and under the guidance and supervision of, the director of the Department of Planning and Development of the State of Oregon such advisory and consultation services as may be required by that department. Bloch shall compute certain data and prepare such data for publication in the form of seven (7) folders or pamphlets, as described in Exhibit "A" hereto attached and by this reference made a part of this agreement. Bloch also shall attend and assist in the conduct of public meetings, as requested by the Department of Planning and Development and shall arrange and attend area meetings at such times as the director of said department may approve, for the purpose of obtaining advice and information from local sources, and shall make reports and summaries of the opinions, findings and suggestions derived from such meetings and deliver such reports and summaries to the director of the Department of Planning and Development.

## 2. PAYMENT

Payment for all services required by the Department of Planning and Development, pursuant to this agreement, shall be made from funds of that department, as approved by the Director. Payment for preparation of the seven (7) folders or pamphlets shall be made for each thereof as it is completed to the satisfaction of the director of the Department of Planning and Development and delivered by Bloch to said department in final form for printing, at the rate of ONE THOUSAND TWO HUNDRED EIGHTY-FIVE and 70/100 DOLLARS ($1,285.70) for each of the first six (6) folders and ONE THOUSAND TWO HUNDRED EIGHTY-FIVE and 80/100 DOLLARS ($1,285.80) for the seventh (7th), or final folder of the series. Payment shall include compensation for preparatory work performed by Bloch prior to the execution of this contract and after July 1, 1957.

Bloch shall be reimbursed for his actual and necessary expenses in attending the area meetings, and for other travel as required by the director of Planning and Development, in accordance with the schedule applicable to state officers and employes in the transaction of state business.

Payment for services of Bloch as a general consultant shall be based upon the following fee schedule:

Ivan Bloch, $15.00 per hour;

Donald W. Hirschberger or John Davidson, $12.00 per hour. This schedule of payment shall be subject to review at the end of each 90 days and may be revised as determined by the parties to this agreement.

## 3. TERMINATION

The continuation and effectiveness of this agreement will be subject to review by the director of the Department of Planning and Development every 90 days, which 90-day periods will coincide with the review of the schedule of payments as stipulated in paragraph 2 above. If the director determines at the end of 90 days that cancelation of this contract is desirable, this agreement will be canceled by the Director by giving Bloch 10 days' notice in writing; provided, that no termination or cancelation will affect the completion of, or payment for, the seven (7) folders or pamphlets described in paragraph 1 of this agreement, or the completion of assignments for holding area meetings described in paragraph 1 of this agreement.

It is the intention and understanding of the parties hereto that this agreement shall terminate in any event on or before June 30, 1939.

4. COSTS INCURRED

The costs of printing the folders, and other costs incurred in connection with services authorized generally by chapter 624, Oregon Laws 1957, shall be paid from funds appropriated to the Department of Planning and Development. The cost of supplies and materials necessary to the performance of services ordered pursuant to this agreement and authorized by the Director shall likewise be paid from said funds and shall not be borne by Bloch.

IN WITNESS WHEREOF, the parties to this agreement have hereto set their hands and seals on the day and date first hereinabove written.

Director of the Department of
Finance and Administration of
the State of Oregon

Ivan Bloch

| | Bloch Report | Testimony |
|---|---|---|
| | | Al Ullman (4-1-58 |
| | | Charles O. Porter (4-1-58 |
| | | C. Girard Davidson (4-2-58) (4-17-58) |
| | | Guy Cordon (4-2-58) |
| | | Harry Swanson (4 copies) 4-2-58 |
| 1 | Robert M. Dreyer | Robert M. Dreyer<br>Kaiser Aluminum, Oakland (4-14-58) |
| | | C.D. Cameron<br>(4-14-58) |
| 10 | State Department of Planning & Dev.<br>(4-14-58) | |
| 1 | Clint P. Haight, Jr. (4-16-58) | 4-16-58 |
| | | Paul Lea, Medford (4-17-58) |
| 1 | Douglas Tipton (4-23-58)<br>Chrome Mining & Smelting Co.<br>13550 S. Indiana Ave., Chicago | |
| | | Niel Allen (4-25-58) |
| | | Austin Dunn (4-25-58) |
| 1 | J.M. Gillet (5-6-58)<br>Victor Chemical Works, Chicago | |
| 1 | Mr. Hutchinson (5-12-58)<br>Rare Earth Mining Co., Seattle | Mr. Hutchinson |
| 1 | Charles Brooks<br>Office of Senator Wayne Morse | |
| | | Otto Frohnmayer (5-19-58 - req. by Niel A<br>Cooley Theatre Bldg., Medford, Oregon. |
| 1 | U.S. Dept. of Interior<br>(Mr. Ross, Solicitor's Office) HMD<br>(Wash,DC 5-58) | |
| | A. J. Curzon (6-4-58) | |
| 1 | E. L. Hix (6-27-58)<br>Electro Met, Portland | |

TOTAL 55 copies

BLOCH REPORT SENT TO FOLLOWING:

| | | Testimony | |
|---|---|---|---|
| 1 | F.W. Libbey (Dole)<br>(4-8-58) | | |
| 5 | Ivan Bloch<br>(4-9-58 | 4-2-58 | |
| 3 | Governing Board<br>(4-9-58) | 4-2-58 | |
| 2 | Field offices<br>(4-9-58) | 4-11-58 | |
| 1 | Chester Sterrett | 4-11-58 | |
| 1 | Glenn L. Jackson | 4-11-58 | |
| 1 | Senator Dan Dimick | 4-11-58 | |
| 1 | Wm. S. Robertson | 4-1-58 | |
| 1 | Wm. W. Gardner | 4-1-58 | |
| 1 | Earl Mollard | 4-11-58 | |
| 1 | Bob Janssen | 4-11-58 | |
| 1 | Jean Pressler | 4-1-58 | 4-14-58 (Gave first copy to Len) |
| 1 | Phil Holdsworth | 4-11-58 | |
| 1 | Karl Bachner | 4-11-58 | |
| 1 | Joe Holman<br>(4-11-58) (4-28-58 HMD CvJnctn) | 4-11-58 | |
| 1 | L.C. Hansen (GP Ch of Comm)<br>(4-11-58) | 4-11-58 | |
| 1 | A.L. Atherton<br>(4-11-58) | 4-11-58 | |
| 1 | F.I. Bristol<br>(4-11-58) | 4-11-58 | |
| 1 | Allan Markley (Ill.Valley Ch.Comm)<br>4-11-58 | 4-11-58 | |

FERROCHROME CONSUMPTION BY SOME STEEL MILLS AND FOUNDRIES IN THE WEST

| Plant | Location | Tons of High Carbon Standard Ferrochrome 1/ | Tons of Other Types of Ferrochrome |
|---|---|---|---|
| Kaiser | Fontana, California | None | 528 2/ |
| Pacific States Steel | Niles, California | None | 50 3/ |
| Isaacson Iron Works | Seattle, Washington | 42 | 174 4/ |
| Bethlehem Pacific Coast Steel | Seattle, Washington<br>San Francisco<br>Los Angeles | None | None |
| Columbia-Geneva | Geneva, Utah<br>Pittsburgh, California<br>Torrance, California | 20 5/ | 440 6/ |
| Colorado Fuel and Iron | Pueblo, Colorado | None | None |
| Electric Steel Foundry | Portland, Oregon | 300 | 1,100 7/ |
| Total of above | | 362 | 2,292 |

1/ 65-70% Cr, 5-9% C

2/ Exothermic ferrochrome, 49-50% Cr, 6.5% C, 25% Fe

3/ 50% to 55% high carbon ferrochrome

4/ Low carbon ferrochrome

5/ Includes some low carbon ferrochrome

6/ 440 tons of ferrosilicon chrome

7/ Includes medium and low carbon ferrochrome and ferrochrome silicon.

# Nature and Origin of Southwestern Oregon Chromite Deposits

by Len Ramp

CHROMITE deposits in southwestern Oregon occur along definite zones or horizons in sill-like ultramafic intrusions. These horizons are here referred to as *ore zones* and are distinguishable only by relatively thin and scattered, discontinuous chromite occurrences. The zones are tabular in shape but are usually folded and faulted by the intensive post-intrusion deformation the ultramafic rocks have undergone. A single zone may contain disseminated, nodular, banded, or pods of massive chromite. The typical chromite deposit is composed of a series of thin lens-shaped bodies that lie along a definite plane and generally show evidence of magmatic flow with their long dimensions aligned in the direction of flow. A body of chromite often pinches down to a narrow wisp only a fraction of an inch thick. This thin streak of chromite may point to or be connected with another body of chromite. In some deposits the orebodies have a definite rake. The depth at which chromite may be found can be predicted by its position in a folded intrusive, provided that adequate structural evidence is available. Although the ore shoots are characteristically discontinuous, there is theoretically no limit to the depth at which chromite may be found.

**Origin:** All the chromite deposits examined in southwestern Oregon are of magmatic origin, that is, the chromite was an original constituent of the peridotite magma and became segregated in varying degree from the magma to form the ore deposits. Examples of early, intermediate, and late magmatic chromite have been recognized in the area. Crystallization of the principal minerals (olivine, pyroxene, and chromite) was apparently near completion at the time of intrusion of the peridotite magma. The magma acted as a viscous crystal mush stringing out aggregates of pyroxene and chromite in the direction of flow. These streaky accumulations are termed *schlieren*.

L. RAMP is Field Geologist, Grants Pass Office, State of Oregon Department of Geology and Mineral Industries.

**Structural Varieties:** Different structural varieties of chromite attest to a variation in genesis. Four different varieties—disseminated, nodular, banded, and pods of massive ore—are recognized in the area.

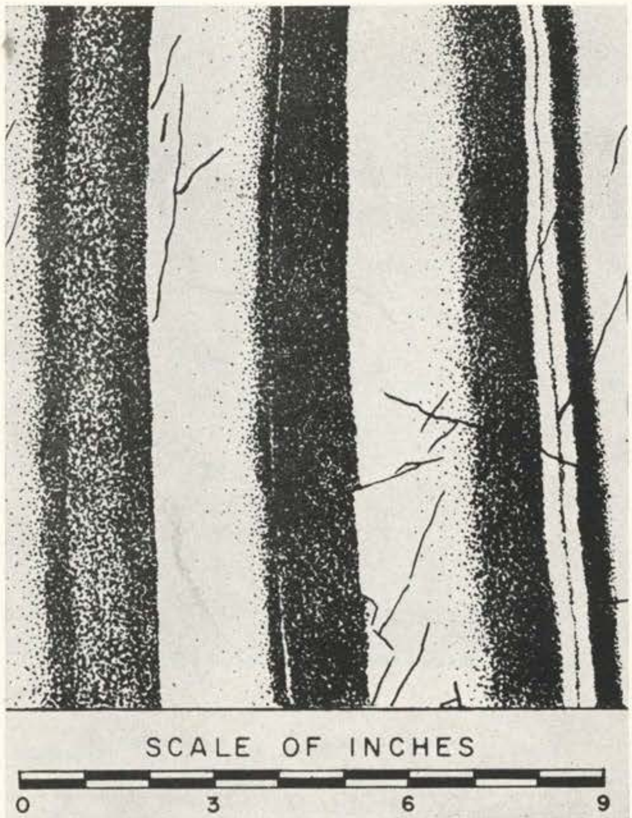
Disseminated: Evenly scattered disseminated grains of chromite in dunite demonstrate lack of segregation. Crystallization of the magma had probably advanced to a point where the heavier chomite grains were unable to accumulate by settling.

Nodular: Nodular chromite consisting of aggregates of spherical or ellipsoidal chromite as much as ¾ in. diam disseminated in the dunite or serpentine occurs at several places in the area. Those examined appear to have been large, probably euhedral crystals of chromite that have been rounded by abrasion and/or re-solution. Kromer[1] advanced such a theory for the origin of nodular chromite in Turkey. Subsequent movement of the magma or movement of the rock during serpentinization or other deformation has resulted in crushing of the nodules. The fractures are healed serpentine or chlorite.

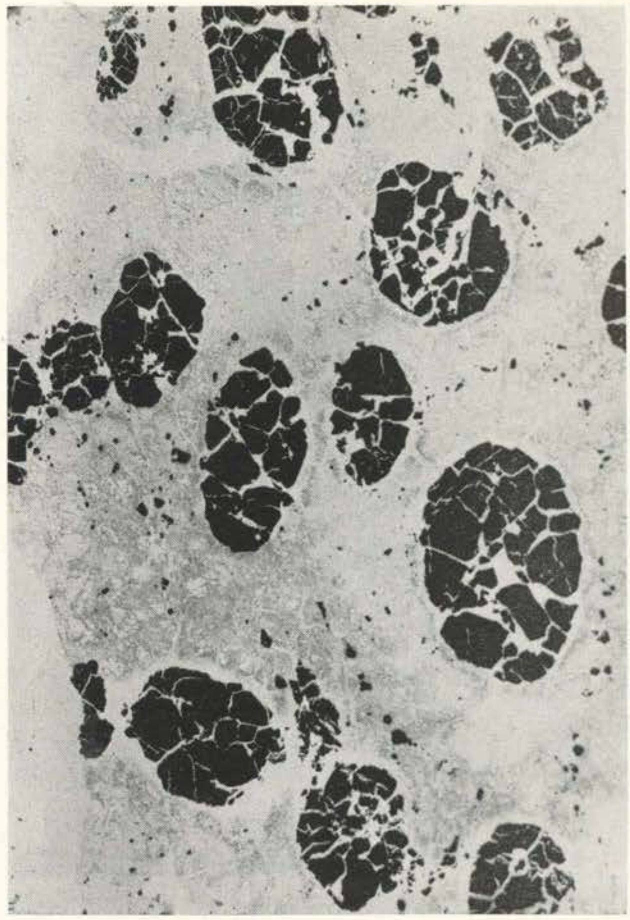
Banded: Banded chromite is fairly common. Both planar and linear-banded chromite are found but the planar-banded or layered ore is more frequently seen.

Planar bands of chromite are formed as layers by means of gravitational settling of chromite crystals onto a horizontal floor of olivine and/or pyroxene crystals. Periodic crystallization of chromite, in a system where the crystallization of olivine is more or less continuous, is the most logical explanation for the formation of a series of closely spaced chromite layers. Subsequent movement, whether magmatic flow or other deformation, has usually erased good evidence of layering.

At the Lower Violet mine on Chrome Ridge the thin closely spaced layers of chromite in altered dunite strike north and have a nearly vertical dip.



Layered chromite exposed in vertical north wall of glory hole at Lower Violet Mine. Note composite nature of layers and gradational west edges. Layers strike N 10°E and dip 85°E.


Micrograph of thin section of nodular chromite in serpentine from Shade Mine Illinois River district, Josephine County, (X4, largest nodule is 0.3 in. long). Note *halos* of chromite fragments and *sheaths* of chlorite surrounding nodules.

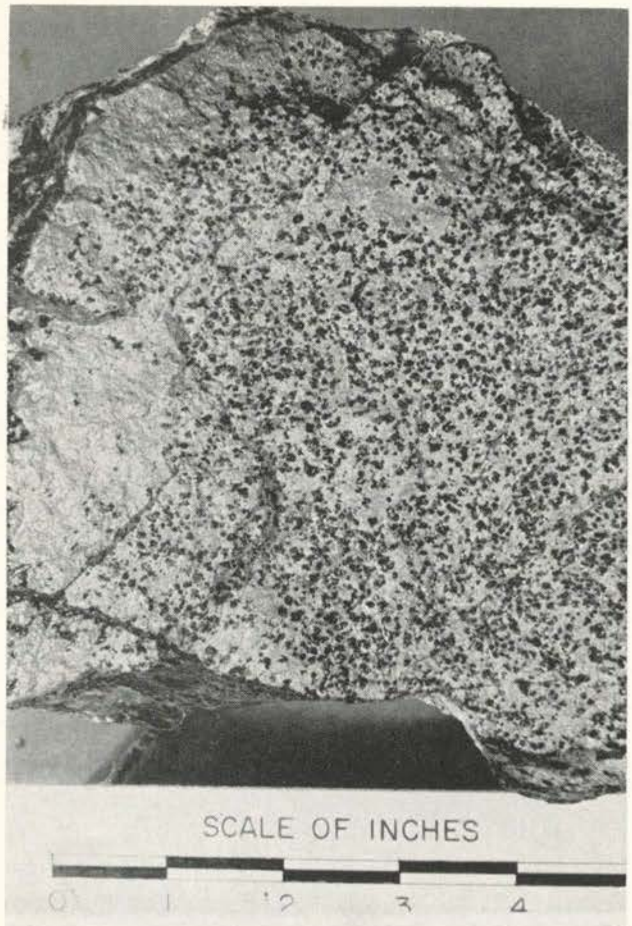
Their eastern edges, interpreted as the base, are consistently fairly sharp while the western edges, or tops of the layers, grade into almost barren dunite. The chromite crystals are slightly larger and more closely spaced near the base of the layers. It is believed that precipitation of the chromite in such a system begins more rapidly than it ceases. A sensitive balance due to a deficiency in the magma of one or more of the essential oxide components of chromite is suggested as an explanation for the intermittent manner of chromite crystallization. The banded structure suggests that the magma became saturated periodically with chromite. Crystallization of chromite was then triggered by some upset of the balance. Rapid crystallization would soon use up the necessary but deficient oxide or oxides, causing the precipitation to taper off until the supply could again build up to a point where the cycle is repeated.

Linear-banded ore is characterized by rod-shaped schlieren of chromite which show lineation in one direction only. Observed examples of linear banding can be explained by directional flowage following accumulation of chromite to form a scattering of aggregates, clots, nodules, or orbicules. A sample of nodular chromite partially strung out to form linear-banded structure by flowage or shearing was found at the Gray Buck deposit in the Illinois River district.

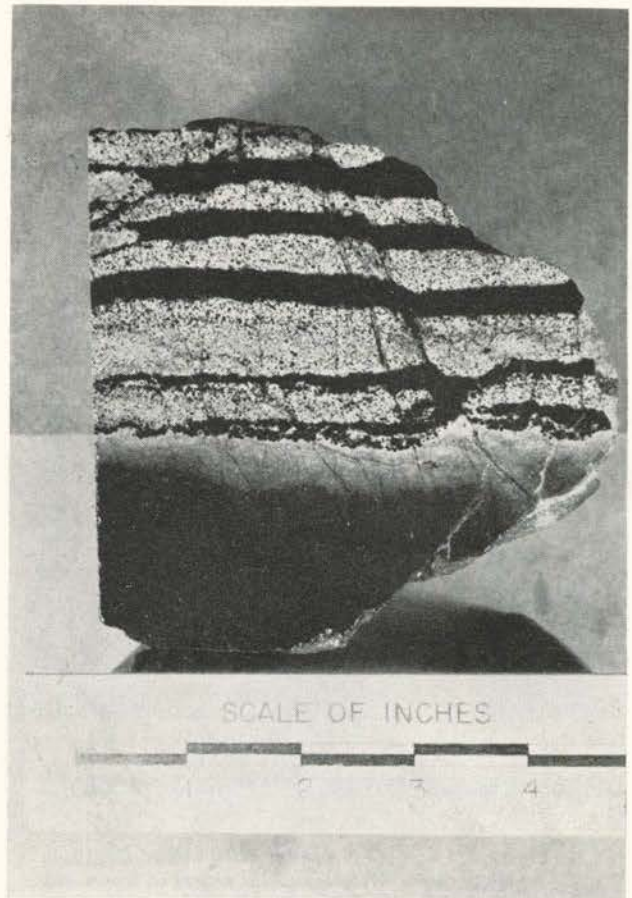
Massive: Pods of massive chromite have been found in various shapes. The most common are roughly elliptical in plan and lenticular in section. Others are ellipsoidal. Irregularly shaped bodies of massive chromite with sharp angular boundaries have also been observed. These angular pods of massive ore are believed to have been segregated at depth by early crystallization and settling of chromite into a solid mass. Subsequent intrusion of the peridotite magma resulted in breaking up these chromite layers or solid pool-shaped masses into angular segments. The liquid magma then filled fractures in the chromite and crystallized.

Ellipsoidal and lens-shaped pods of massive chromite are often found in highly sheared and altered serpentine, sometimes referred to as *slickentite*, a coined name for pulverized, fish-scalelike serpentine. The movement necessary to produce slickentite is undoubtedly responsible for the resultant lens shape of the chromite pods. Fragments of crushed chromite can generally be found tailing off into the serpentine from the larger hard body of chromite. These tails of crushed chromite may lead to other pods of ore. Fairly large and massive chromite schlieren may have formed by the breaking up of a chromite layer and its stringing out during the intrusion of magma while in the crystal mush stage.

The basic form achieved in the more complete stages of segregation of massive chromite appears to be the layer. It may form as a single layer or multiple layers. Slow cooling and therefore slow crystallization of the magma which may take place at great depths and under stable conditions is believed conducive to the formation of thick and massive layers or *pools* of chromite crystals. The larger massive bodies of chromite, as at the Oregon Chrome mine (Oregon's largest chromite producer) where lenses as much as 15 ft thick occur, were




Disseminated chromite in dunite from Horse Mountain, Illinois River district, Josephine County.




Planar-banded, disseminated chromite from Chrome Ridge, Josephine County. Note evidence of flowage.

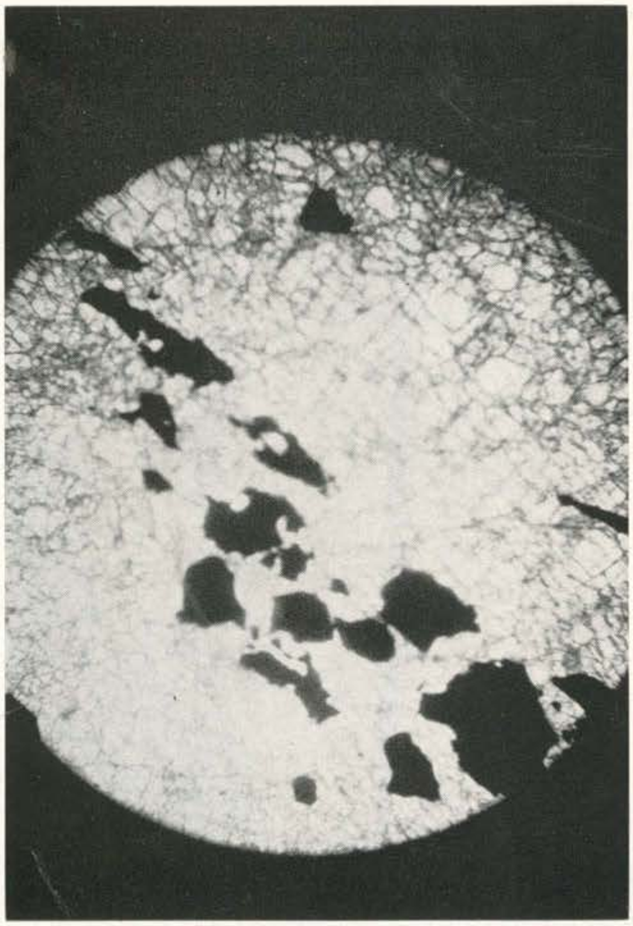
probably formed under such favorable conditions. At this mine the chromite apparently has suffered less thinning during intrusion and deformation than at other points along the same ore zone where much thinner bodies of ore are found.

**Range of Precipitation.** Chromite may crystallize at different times during a fairly wide range in the period of injection and cooling of the peridotite magma. Thin sections of chromite-bearing ore show corroded chromite grains in dunite and inclusions of olivine in chromite grains, illustrating that chromite may crystallize earlier than the surrounding olivine and also that olivine may start crystallizing earlier than the chromite. Examples of late magmatic chromite were found in the Illinois River area (sec. 25, T. 37 S., R. 10 W.). Thin fracture fillings in the peridotite contain disseminated grains of anhedral chromite in a matrix of antigorite with minor talc, calcite, and magnetite. A sample of material from a ½-in. fracture assayed 16.01 pct $Cr_2O_3$. These fracture fillings undoubtedly represent the very last stages of residual magmatic material. The disseminated grains of chromite showed no apparent resolution textures.

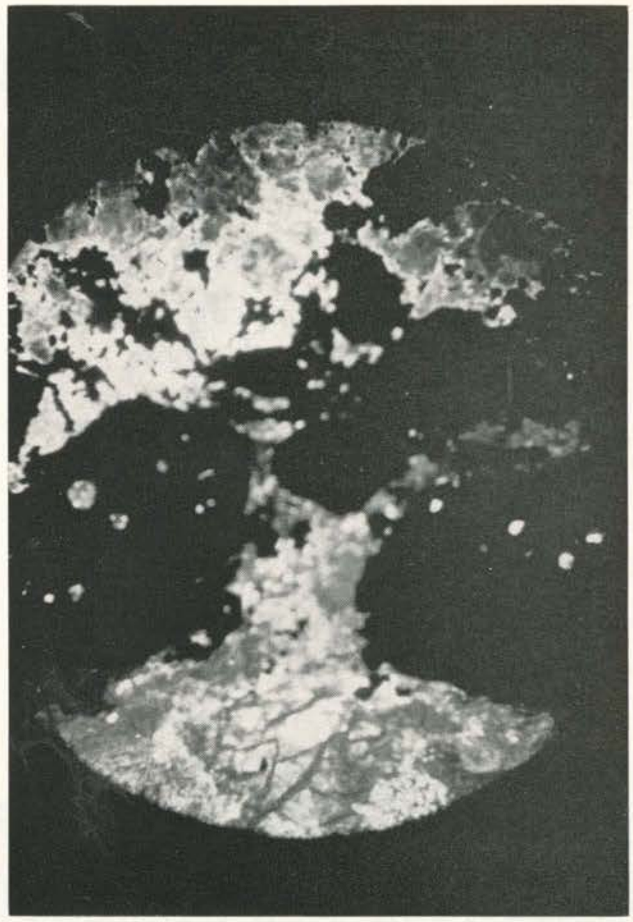
The position of the ore zones in the sill-like intrusions of peridotite or serpentine is also a significant factor in interpreting whether the chromite crystallized early or late. Zones found near the base of a sill formed earlier than zones higher in the intrusion. Ore zones in southwestern Oregon have been found near the base of a sill, near the top, and at intermediate positions. The zones nearly always trend approximately parallel to the nearest contact.

**Nature of Precipitation:** Considerable research has been done by various workers in an attempt to determine the factors giving rise to the precipitation of chromite. The fact that crystallizaion of chromite apparently took place simultaneously over a fairly large area is believed significant. Zones containing chromite at various points along a definite horizon in ultramafic intrusions have been traced for as much as 20 miles in southwestern Oregon. More or less continuous layers of chromite have been traced for greater distances in Montana and the Union of South Africa. It is believed that a widespread chemical and physical balance existed in the peridotite magma that enabled this to happen. Minor amounts of chromite are scattered through the mass of peridotite, but segregation of the chromite to form workable deposits apparently occurred only at a time when ideal conditions for crystallization of chromite existed in the magma. Very little can be determined about the physical conditions (temperature and pressure) that existed at the time chromite was crystallizing most rapidly, but some interesting chemical data have been gathered.

Role of Alumina: Chemical analyses indicate that alumina, which is always present in chromites (from 8 to 33 pct in southwestern Oregon), is at times nearly lacking in the peridotite country rock (from a trace to nearly 3 pct). Either or both alumina and chromic oxide may be the critical oxides giving rise to the discontinuous crystallization of chromite as seen in layered deposits. Peridotite from Nickel Mountain,[2] for example, contains 0.76 pct $Cr_2O_3$ and 0.04 pct $Al_2O_3$. This is a ratio of 19 to 1. The average ratio of chromic oxide to



Micrograph showing corroded chromite grains in thin section of dunite from Nickel Mountain, Douglas County (X10, longest grain is 2 mm).



Micrograph showing inclusions of olivine in chromite crystals in serepentine from Last Drink prospect, Waldo district, Josephine County. Note later-formed small chromite crystals. (X10 large grains about 3 mm diam).

alumina in 18 analyses of southwestern Oregon chromite is 3.7 to 1. It varies from 1.1 to 1 up to a maximum of 7.5 to 1. Other serpentines and peridotites that have a slightly higher alumina than chromic oxide content are located either near chromite deposits or near contacts with rocks of relatively higher alumina content. Work by Thayer[3] in the John Day area; Bateman[4] in the Bird River district, Manitoba; and Smith[5] at the Bay of Islands, Western Newfoundland, placed significance in the position of chromite layers near the overlying gabbros, feldspathic rocks, or other alumina-rich rocks.

A look at the geochemistry of chromium gives added significance to the role of alumina in the crystillization of chromite. According to Goldschmidt[6] metallic constituents with smaller ionic radii form a tighter bond than the larger ions and are concentrated in the early crystals of an isomorphous series. The trivalent cations of chromite ($Al'''$, $Cr'''$, and $Fe'''$) have similar ionic radii and consequently may replace each other readily. Since the ionic radii of $Al'''$ (0.57 Å) and $Cr'''$ (0.64 Å) are smaller than that of $Fe'''$ (0.67 Å) they tend to be more abundant in the early-formed chromite, while $Fe'''$ usually is concentrated in the later-formed chromites.

The same is true of the divalent cations MgO and FeO. Since $Mg''$ has an ionic radius of 0.78 Å and $Fe''$ a radius of 0.83 Å, the early-formed chromites contain relatively higher concentrations of MgO.

Work by Van der Walt[7] stresses principally the reciprocal influence of the formation of chromite and orthopyroxene in the Bushveld complex in Union of South Africa, where the chromite has formed in layers in pyroxenite. Van der Walt was able to prove by chemical analysis that the chromite and pyroxenes crystallized simultaneously from the same melt. He was able to prove that one influx of magma may be responsible for a series of chromite bands. His proof lay principally in the reciprocal relationship of MgO and FeO content in the chromites and silicate minerals.

Chemical analyses made thus far on ultramafic rocks in southwestern Oregon are insufficient to determine conclusively the significance in variation of alumina content and its relation to the chromite deposits. However, the position of ore zones near inclusions or contacts of rocks containing appreciably more alumina than the peridotite and the apparent enrichment of the peridotite in alumina adjacent to these rocks indicate that alumina influenced the crystallization of chromite in southwestern Oregon.

## References


[1] H. Ferid Kromer: Chrome Ore Mining in Turkey. *Engineering and Mining Journal*, April 1954, vol. 155, no. 4.

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[3] T. P. Thayer: Preliminary Chemical Correlation of Chromite with the Containing Rocks. *Economic Geology*, 1946, vol. 41, no. 3.

[4] J. D. Bateman: Bird River Chromite Deposits, Manitoba. *Trans.*, Canadian Institute of Mining and Metallurgy, 1943, vol. 46.

[5] C. H. Smith: Origin of the Chromite Deposits of the Bay of Islands Igneous Complex, Western Newfoundland. *Economic Geology*, 1953, vol. 48, no. 5.

[6] V. M. Goldschmidt: The Principles of Distribution of Chemical Elements in Minerals and Rocks. *Journal of the Chemical Society*, 1937, pp. 655-673.

[7] C. F. J. Vanderwalt: Chrome Ores of the Western Bushveld Complex. *Trans.*, Geological Society of South Africa, 1941, vol. 44, Chem. Ser. 167.

[8] L. Ramp: Structural Data from the Chrome Ridge Area, Josephine County, Oregon. Oregon Department of Geology and Mining, *Ind. Ore Bin.*, March 1956, vol. 18, no. 3.

March 21, 1942

Professor George W. Gleeson
Professor of Chemical Engineering
Oregon State College
Corvallis, Oregon

Dear Professor Gleeson:

I have been down to the Bureau of Mines and seen Mr. Ralston at College Park. I asked him what he meant by stating that electrostatic separation was not economically feasible or yet in commercial operation. I felt certain that there was something that was not fully understood in his advising the Southwestern Engineering Company and the Krome Corporation this, and he told me that he must have been misunderstood. He referred to his own dust electrostatic separator which can handle a few grams only. He told me he was writing you on this subject, and would advise me when he had done so. Will you please let me know in a week or so if you have received such a letter?

I have been more or less waiting on the H. A. Brassert interests before I proceed to Oregon. I will let both you and Mr. Nixon know very shortly about my plans.

Very truly yours,

? Separations Engr. Co.

President

G.W.Jarman,Jr.
ei

SEPARATIONS ENGINEERING CORPORATION

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February 13,1942.

Mr. E.K.Nixon,
State Geologist,
Portland, Oregon.

Dear Mr. Nixon:

I was delighted to have the chance to have the extremely interesting evening we had last night to go over the different points concerning the various concentration opportunities in Oregon.

I do not know whether you wrote to Mr. Brassert about the necessity of doing some closing with Mr. R.W.Michael pretty soon or putting him on a waiting retainer because I know he has been approached by others. I think he would be the ideal man to go out to Oregon for investigation because he is very familiar with the entire operations of diamond mining which is very similar to the type of beach sand concentration that they have including stripping calculations as well as delineating, if possible, the deposits.

I am enclosing three copies of the Sutton, Steele & Steele Air Table catalogue and also a copy of the paper which I read on Electrostatic Separation which, of course, supersedes the older type of catalogue that we now have.

Very truly yours,

GW Jarman, Jr lp

President

G.W.Jarman, Jr.
lp/encs.

THE DIFFERENTIAL FLOTATION OF CHROMITE AND ILMENITE FROM BANDON BLACK SANDS. — by James A. Adams

Object: To ~~further~~ beneficiate further chromite and ilmenite concentrates produced by the electrostatic separation of Bandon black sands.

Conclusion: The crude sand is more responsive to the differential flotation of ilmenite and chromite than the electrostatically separated concentrates. A concentrate with a grade of 45.5% chromic oxide was obtained from the crude sand. No improvement in the grade of the electrostatic concentrates was obtainable by flotation. The sands may be concentrated by a combination gravity and flotation process (see attached Flow Sheet) or by electrostatic means. A combination of flotation and electrostatic separation does not appear feasible. Gravity and flotation eliminates the cost of the thorough drying required in the electrostatic process. Electrostatic separation eliminates grinding costs. A combination of the two processes would mean the retention of both these expensive steps. The conclusions are based mainly on microscopic examination of the products. Chemical or spectroscopic analyses of the various products are recommended if additional flotation work is undertaken.

Test Procedure: When test work was first started, an insufficient amount of ilmenite concentrates and chromite concentrates were available; consequently the following sands were used:

(1) A mixture of Florence dune sand with equal amounts of ilmenite and chromite concentrates (produced by electrostatic separation of beach sand);

(2) Crude black sand from the Pioneer Mine tailings;

(3) Sand brought in by Mr. Nixon from the Bandon (?) area; Later, sands

(4) and

(5) were tested — the electrostatic concentrates of chromite.

Sand No. 1 was used in the preliminary tests because the high percentage of ilmenite present made it easy to determine by microscopic examination if the chromite was being floated preferentially.

Sand No. 2 was used to further substantiate what appeared to be the correct procedure for treating the beach sands.

Sand No. 3 was used in the final tests preceding the flotation of the electrostatic concentrates because it was considered a more nearly representative sample of the beach sands which may be treated commercially.

Sand No. 4 is the electrostatic chromite concentrate.

Sand No. 5 is the electrostatic ilmenite concentrate.

Nature of Problem: Ilmenite tends to float with the same reagents as chromite; therefore, the chief phase of the problem was the determination of a flotation procedure which would act preferentially.

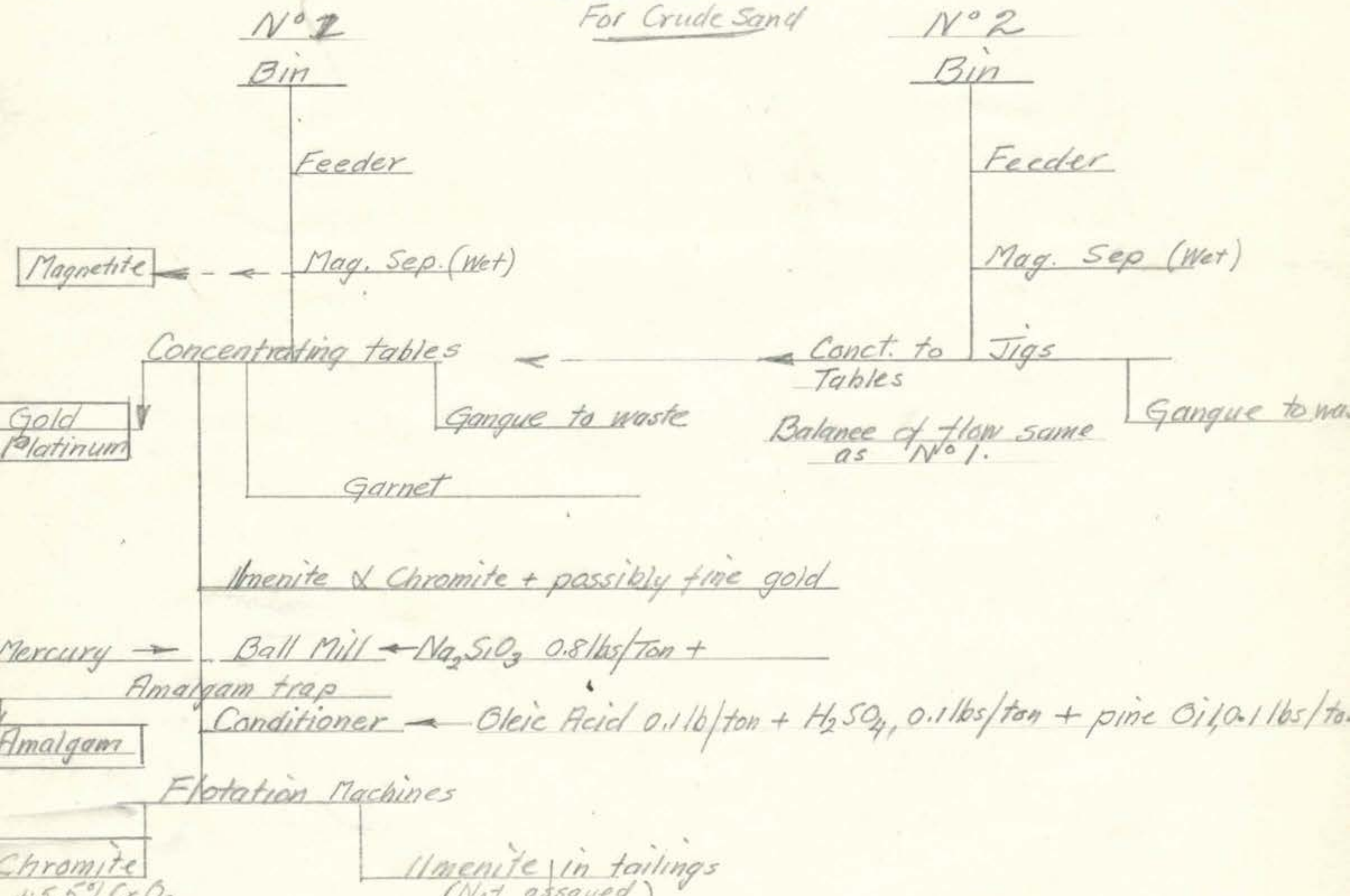
Description of Tests: The ore was split up into 500-gram portions. Each portion was ground with 250 cc. of water for 20 minutes in a small laboratory rod mill. The ground product was floated in a small laboratory G.E. flotation machine. The length of flotation period was governed by the appearance of the froth. Flotation was stopped when it was apparent that no further useful separation was possible. The rougher concentrate was cleaned once.

Sodium silicate was used to inhibit slime and gangue. It appeared to have a very beneficial effect on the froth, producing a clear brittle bubble which became heavily mineralized on the addition of a collecting agent such as oleic acid and sodium oleate. The optimum amount of $Na_2SiO_3$ seems to be approximately 0.8 lbs. per ton of ore. However, it was found that the effects of an excess of sodium silicate could be modified by the use of sulphuric acid. In fact, test work indicated that the best procedure involved grinding the ore in a slight excess of $Na_2SiO_3$ or, in other words, the best procedure involved grinding the ore in sufficient sodium silicate to insure a very brittle clear bubble which would not produce sufficient froth, and then adding sulphuric acid instead of frothing oils until sufficient froth was produced to insure flotation. This procedure--that of balancing sodium silicate and sulphuric acid--to obtain a satisfactory froth with minimum amounts of frothing and collectin reagents seems to offer the best possibilities for separating chromite from ilmenite. Both minerals float with the same reagents, but may be selectively floated by balancing with sodium silicate and $H_2SO_4$. Once the proper balance of these two reagents is obtained, very small amounts of collecting reagents are necessary. Selective action between chromite and ilmenite seems to depend on a paucity of reagents. If the pulp is not properly conditioned with a proper balance of sodium silicate and sulphuric acid, a greater amount of reagent is required to insure flotation and this larger amount is not selective in action.

The above procedure was not successful in improving the grade of either the ilmenite or chromite concentrates produced by the electrostatic machine. The froth was not responsive to additions of sodium silicate or sulphuric acid as in the case of the crude sands. Evidently the gangue minerals in the crude sands have a good deal to do with the effectiveness of these reagents.

of balancing sodium silicate and sulphuric acid - to obtain a satisfactory froth with minimum amounts of frothing and collecting reagents seems to offer the best possibilities for separating chromite from ilmenite. Both minerals float with the same reagents, but may be selectively floated by balancing with sodium silicate and $H_2SO_4$. Once the proper balance of these two reagents is obtained, very small amounts of collecting reagents are necessary. Selective action between chromite and ilmenite seems to depend on a paucity of reagents. If the pulp is not properly conditioned with a proper balance of sodium silicate and sulphuric acid, a greater amount of reagent is required to insure flotation and this larger amount is not selective in action.

PROPOSED FLOW-SHEETS




A concentrate produced using the reagents and amounts shown above appeared satisfactory. This sample of chromite concentrate has been submitted to the Grants Pass laboratory. If a satisfactory grade of chromite has been attained, further work on more of a quantitative basis is indicated.

James A. Adams
James A. Adams

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES BG-581

ASSAY REPORT

Grants Pass, Oregon
~~Baker, Oregon~~

June 27, 1941 19__

Sample submitted by Adams, James A. , State Dept., Portland, Oreg.

Sample description: Flotation concentrate.

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

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

| | GOLD | | SILVER | | chromic oxide | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Number | Ounces per ton | Value | Ounces per ton | Value | Percent | Value | Percent | Value | Total Value |
| | | | | | 45.5 | | | | |

Market Quotations:
Gold $ per oz.
Silver $ per oz.
$ per lb.
$ per lb.

STATE ASSAY LABORATORY
Albert C. Lewis
Assayer

## PROPOSED FLOW-SHEETS

Recommendations:

(1) Additional test work on a combination gravity and flotation process for beneficiation of the crude black sands.

(2) After obtaining complete data on gravity-flotation and electrostatic separation, study the relative economic efficiencies of both methods.

COPY

SOUTHWESTERN ENGINEERING COMPANY

METALLURGICAL LABORATORY

DECEMBER 8, 1942

Report of testing conducted on a
sample of Chromite ore from the
Chambers Property received from:

RUSTLESS MINING CORPORATION
504 FARMERS & MECHANICS BLDG.
SACRAMENTO, CALIFORNIA

Southwestern Engineering Company
4800 Santa Fe Avenue
Los Angeles, Calif.

Sample No. 2963

SOUTHWESTERN ENGINEERING COMPANY

METALLURGICAL LABORATORY

DECEMBER 8, 1942

Report of testing conducted on a sample of chromite ore from the Chambers Property received from Rustless Mining Corporation, 504 Farmers and Mechanics Building, Sacramento, California.

Sample No. 2963

Sample

The total sample comprised 16 sacks of ore weighing approximately 500 pounds. The ore consisted chiefly of coarse fragments ranging in size from 1 to 6 inch pieces.

Our 'head' for testing was derived from the total submitted ore after thorough mixing and reduction as follows:

The contents of the sacks were dumped into a single pile and screened on a one inch screen. The oversize was stage crushed in a jaw crusher until the whole sample was reduced to minus one inch. In this crushing operation the jaws of the crusher were set so as to allow approximately one-half of the discharge to pass the one inch screen in a single pass. The oversize was then mixed with some of the uncrushed feed and again passed through the crusher. This crushing and screening procedure finally yielded a minus one inch product containing a minimum of fines.

The crushed sample was then thoroughly mixed by coning five times with shovels on a steel plate. By quartering and combining the opposite quarters, duplicate halves were obtained, one of which was set aside. The other half was alternately crushed and screened to minus one-half inch and divided into two parts by riffling through a Jones Splitter. One part was set aside and the other was stage crushed as before to minus 1/4 inch. Again this product was halved by riffling with one part being set aside and the other being stage rolled to minus 6 mesh. This final product was our representative 'head' sample, the assay of which was 21.50% $Cr_2O_3$.

The chromite occurs finely disseminated in serpentine. Our tests indicated only partial liberation was accomplished at grinds coarser than 35 mesh, also, the microscope revealed considerable unliberated chromite at 100 mesh.

Object of Testing

The object of testing was to develop a simple treatment for the ore which could be carried out in a semi-portable plant.

Our tests included a combination jig and table test, one all table test and a magnetic separation test conducted on a concentrate composite.

# C O N C L U S I O N S

The results of testing show that treatment of the ore by a combination jig and table procedure, namely, separating jig and table concentrates at progressively reduced stages of grind, produced combined concentrates which amounted to 48.91% by weight of the feed, assayed 31.99% $Cr_2O_3$ and accounted for a recovery of 75.85% of the total $Cr_2O_3$. The calculated head was determined as 20.63% $Cr_2O_3$.

A treatment which consisted of separating table concentrates at progressively finer grinds, namely, at 35 mesh, 48, 65 and 100 mesh, resulted in the production of combined concentration products which amounted to 38.68% by weight of the feed. The grade calculated 33.97% $Cr_2O_3$ which indicated a recovery of 65.06% of the total $Cr_2O_3$ based on a calculated head of 20.2% $Cr_2O_3$. Magnetic treatment of the combined concentration products raised the assayed grade from 33.80% to 35.2% $Cr_2O_3$ with an accompanying loss of about 8% in recovery.

One purpose of the all table test was to produce the maximum grade of concentrate and it was to this effort that closer sizing and elutriation of some of the finer table concentrates was applied. In practice our relatively complicated procedure followed in testing would not be necessary as any efficiently operated sizer would produce an equal number or more sizes of table feed.

## Combination Jig and Table Test

A sample of the ore previously stage rolled to minus 1/4 inch was fed to a laboratory jig fitted with a screen having openings of approximately 20 mesh. The jigging operation produced a hutch concentrate and a jig tailing. The tailing was wet rolled in stages through 6 mesh and rejigged with the production of a hutch concentrate and a tailing. The rejigged tailing was wet rolled similarly as before through 10 mesh and rejigged again. The resulting hutch concentrate was added to the other hutch concentrates and the product was reconcentrated by tabling with retabling the middling once. This concentrate is designated as concentrate #1 on the attached metallurgical sheet.

The tailing which resulted from the third jigging step was stage ground in a ball mill in 4 minute intervals with screening after each interval until all passed 20 mesh. This pulp was then treated for removal of the minus 65 mesh fraction by elutriation in a graduate and the remaining sands were tabled with the production of concentrate #2.

The table tailings which corresponded to concentrates #1 and #2 were combined and stage ball milled to minus 35 mesh, hydraulically classified as before and the sands tabled.

Similar operations were performed on the table tailing at a grind of minus 48 mesh and lastly at minus 65 mesh. After hydraulic classification, all the slimes and all the minus 65 mesh sands were combined. The sands were tabled producing a finished concentrate and the middlings were retabled twice with the concentrates being added to the finished concentrate. The slimes were tabled producing a rough concentrate and a middling, the former of which was retabled once with the production of a finished concentrate and a middling. The two middlings were combined and retabled with the production of a finished concentrate which was combined with the initial finished concentrate.

The combined concentrates of this test amounted to 48.91% be weight of the feed, assayed 31.99% $Cr_2O_3$ and accounted for a recovery of 75.83% of the total $Cr_2O_3$ based on a calculated head of 20.63% $Cr_2O_3$.

The combined middlings and the combined tailings assayed 18.95% $Cr_2O_3$ and 7.29% $Cr_2O_3$ respectively, and combined into a single product, assayed 9.76% $Cr_2O_3$.

## ALL TABLE CONCENTRATION

Examination of the concentrate products of the foregoing test disclosed much unlocked grains of chromite and gangue especially in sizes coarser than 35. mesh. Present also were considerable fine transparent silicates. For these reasons we decided to conduct a test with finer grinding and to apply more effective means for the elimination of the fine silicates. The latter was accomplished by classifying each grind into coarse sand, fine sand and slime instead of simply sand and slime.

A sample of 6 mesh ore was ground in a ball mill in 5 minute stages with screening at the end of each stage until all passed 35 mesh. The pulp was then transferred to a 2000 cc graduate and hydraulic water introduced so as to overflow an approximate 100 mesh fraction. This fraction was deslimed by decantation and the resulting sands and slimes set aside. The remaining plus 100 mesh sands were further classified under stronger hydraulic pressure into ranges of approximately minus 48 mesh and minus 35 plus 48. This latter fraction was tabled with retabling of the middling once. The concentrate resulting from the retabling was added to the initial concentrate and the whole designated concentrate #1. All the table products were combined in the table tailing. The table tailing was stage ground to minus 48 mesh and hydraulically classified with removal of the 100 mesh fraction which was subsequently separated into fine sand and slimes as before. The plus 100 mesh fraction was combined with the approximate minus 48 mesh material derived from the classification above and the whole reclassified into approximately a minus 65 mesh fraction and a minus 48 plus 65 mesh fraction. The latter fraction was tabled with the production of concentrate #2. The above procedure applied at grinds of 65 mesh and 100 mesh.

The table concentrate of the total 100 mesh sand was further treated by elutriation with overflow being combined with the slimes for tabling. The slimes were tabled and the rough concentrate was treated by elutriation with the production of a slime concentrate and a slime overflow product.

The combined concentrates plus the sand middling and the slime overflow amounted to 38.68% by weight of the feed, calculated 33.97% $Cr_2O_3$ and accounted for a recovery of 65.06% of the total $Cr_2O_3$ based on a calculated head of 20.2% $Cr_2O_3$. The combined middling and tailings assayed 11.51% $Cr_2O_3$.

A weighted composite of the concentrates plus the sand middling and the slime overflow was made and assayed with the following results:

| Weighted Composite | Chromic Oxide | Iron | Phosphorus | Sulphur | Silica |
|---|---|---|---|---|---|
| 2963-2 | 33.80 | 14.60 | .02 | None | 5.30 |

## Magnetic Separation

Microscopic examination disclosed some quartz and transparent silicates present in the above composite and it was decided to treat this material by magnetic separation to determine the optimum grade which could be produced from this grade of concentrate. Accordingly, a representative sample was treated with the production of a magnetic concentrate which amounted to 92.21% by weight of the magnetic feed, assayed 35.20% $Cr_2O_3$ and indicated a magnetic recovery of 96.03% based on the assayed feed of 33.80% $Cr_2O_3$. The grade of the magnetic tailing was computed as .17% $Cr_2O_3$.

SOUTHWESTERN ENGINEERING COMPANY

By (s) E. L. MOORE
Mining Division

12-15-42

# COMBINATION JIG AND TABLE TEST

Test #2963-1

| Product | % Weight of Feed | % $Cr_2O_3$ | Distribution of $Cr_2O_3$ Units | % Recovery |
|---|---|---|---|---|
| Tabled Hutch Conct. #1 | 13.51 | 32.40 | 4.37724 | 21.21 |
| Table Conct. #2 | 7.12 | 32.05 | 2.28196 | 11.06 |
| Table Conct. #3 | 7.89 | 33.60 | 2.65104 | 12.85 |
| Table Conct. #4 | 12.90 | 30.05 | 3.87645 | 18.79 |
| Table Conct. #5 | 6.28 | 33.05 | 2.07554 | 10.06 |
| Slime Conct. | 1.21 | 31.75 | .38418 | 1.86 |
| Sand Middling | 7.11 | 22.90 | 1.62819 | 7.89 |
| Slime Middling | 3.72 | 11.40 | .42408 | 2.06 |
| Sand Tails | 19.32 | 4.35 | .84042 | 4.07 |
| Slime Tails | 20.94 | 10.00 | 2.09400 | 10.15 |
| Calculated Head | 100.00 | | 20.63310 | 100.00 |
| Combined Concts. | 48.91 | 31.99 | 15.64641 | 75.83 |
| Combined Middlings | 10.83 | 18.95 | 2.05227 | 9.95 |
| Combined Tailings | 40.26 | 7.29 | 2.93442 | 14.22 |
| Combined Middling and Tailings | 51.09 | 9.76 | 4.98669 | 24.17 |

## ALL TABLE CONCENTRATION

Test #2963-2

| Product | % Weight of Feed | % $Cr_2O_3$ | Distribution of $Cr_2O_3$ Units | % Recovery |
|---|---|---|---|---|
| Table Conct. #1 | 4.29 | 35.20* | 1.51008 | 7.48 |
| Table Conct. #2 | 2.66 | 35.60* | .94696 | 4.69 |
| Table Conct. #3 | 5.47 | 35.90* | 1.96373 | 9.72 |
| Table Conct. #4 | 11.71 | 35.10* | 4.11021 | 20.35 |
| Slime Conct. | 4.19 | 35.10* | 1.47069 | 7.28 |
| Sand Middling | 8.03 | 29.25* | 2.34877 | 11.63 |
| Slime Middling | 5.68 | 22.90 | 1.30072 | 6.44 |
| Slime Conct. O'Flow | 2.33 | 33.90* | .78987 | 3.91 |
| Sand Tails | 35.54 | 10.60 | 3.76724 | 18.65 |
| Slime Tails | 20.10 | 9.90 | 1.98990 | 9.85 |
| Calculated Head | 100.00 | | 20.19817 | 100.00 |
| *Combined Products | 38.68 | 33.97 | 13.14031 | 65.06 |
| Combined Tailings | 55.64 | 10.35 | 5.75714 | 28.50 |
| Combined Slime Middling & Tailings | 61.32 | 11.51 | 7.05786 | 34.94 |

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON



CHROMITE SAMPLES

IRON KING #1 (P1219) Chromite and antigorite.

The chromite shows some segregation, the grains varying from less than 0.1 mm to 1 mm or more, but the larger masses appear to be groups or clumps of smaller crystals. There does not appear to be any continuous vein or body of the ore, although there is a segregation which gives the rock a banded appearance.

The interstices are filled with antigorite and vary, in maximum dimension, from about 0.2 mm to possibly 1.5 mm, although fine grains of chromite are disseminated even throughout these chiefly serpentinous areas.

The antigorite is a light, pale green.

IRON KING#2 (P1220)--

The chromite grains are in small crystals, but are very abundant. The interstices are much smaller, cover much less total area, and are more scattered (show no streaked or banded effect) than in #1 (P1219). They range generally from 0.2 to 0.4mm, a few possibly being somewhat smaller and a few being larger. They (the interstices--antigorite) are well scattered. The chromite has the appearance of a segregation of small crystals, rather than of an amorphous mass.

The antigorite is again a light, pale green.

IRON KING #3 (P1221)--

This specimen appears almost vesicular. The "vesicles" are filled with a soft, light brownish material, probably a serpentine stained by limonite. These areas are usually elongated and vary in size from extremely small to a few 2mm wide and 4 mm long. The chromite is again in segregations or clumps of small crystals, but seem to form a much smaller percentage of the rock than in #1 of #2. None of the clumps is large----(0.5 mm).

The serpentinous material is a much darker green and what chromite is present seems to be associated with this mineral rather than with the altered material.

IRON KING #4 (P1222)--

This specimen has a sort of speckled appearance, the specks of chromite ranging from minute grains to some 1.5mm or 2mm long and 0.75 mm or 1 mm wide. In general they seem to be about 0.5 mm across. The serpentine has much greater extension but no greater general width. It is the matting or background in which the clumps of chromite are scattered--the distance between clumps varying from 0.2 mm to 0.5 mm.

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON

CHROMITE SAMPLES

DRY CAMP #1 (P1223)--

There are segregations or clumps of chromite 0.5 mm to 1.5 mm scattered throughout a yellow-gray-green serpentine (chrysotile?) Sometimes these smaller clumps are grouped together in an area where they are but 0.3 mm or 0.4 mm apart, but generally they are much more widely scattered, the distances separating them ranging from 1 mm to 3 or 3.5 mm. However, these predominately serpentinous interspaces are not free from chromite, for fine grains are disseminated throughout.

DRY CAMP #2 (P1224)--

Small clumps of chromite (crystalline groups) about 0.3 mm to to 0.5 mm in diameter are scattered throughout a serpentinous mass. In certain bands which, in this specimen, may be a centimeter or two wide, these clumps are close together, sometimes in loose, sprawling segregations, sometimes in a finely speckled pattern, the interstices varying from 0.2 mm or 0.3 mm to 1 mm. Between these "bands" are areas where the distance between clumps is generally 2 or 2.5 mm.

The serpentine is usually some shade of green, but in places is brownish. It is probably antigorite, at times stained by limonite.

DRY CAMP #3 (P1225)--

This is mostly chromite. Crystal faces are common. A pale green serpentine (antigorite) fills in the interspaces between crystals occasionally. These patches are generally small, usually about 0.2 mm by 0.5 mm. Some are microscopically small. Some range up to 2.5 mm in length and about 0.5 mm in width.

CELEBRATION (P1226)

Chromite crystals are segregated into orbicular clumps. These orbicles vary in size, but they are usually about 4 or 5 mm in the long diameter. They touch each other usually, leaving only small interstitial areas to a pale, green serpentine (antigorite).

COPY

July 22, 1952

MEMORANDUM:

Mr. Walter J. Scott,
City.

## Beneficiation of Chromite Ore

With reference to a shipment of chrome ore received at the Grants Pass Stockpile, of which you obtained a 5 lb. sample and by treatment in your magnetic separator produced both a magnetic and a non-magnetic fraction, together with an analysis by the Northwest Testing Laboratories of Portland, and herewith included, viz,:

| Sample Mark | $Cr_2O_3$ | Fe | Cr/Fe |
|---|---|---|---|
| 1M1 | 40.2% | 20.2% | 1.35 |
| 2N4 | 45.5% | 14.1% | 2.21 |

Cert. No. 15628-29

In a casual interpretation of the above, a little computation develops the following, based upon the relationship indicated by the reported weights and as being approx. correct, namely:

HEADS, (Calculated Value):

44.44% $Cr_2O_3$ 15.4% Iron (Fe) Cr/Fe Ratio 1.97

and being derived and distributed, as follows:

| | | | Assays | | DISTRIBUTION | | | |
|---|---|---|---|---|---|---|---|---|
| No. | Weight | Wt.% | $Cr_2O_3$ | Fe | Chrome Content | | Iron (Fe) Content | |
| 1M1 | 1.0 lb. | 20.0% | 40.2% | 20.2% | 8.04% | 18.1% | 4.1% | 26.7% |
| 2N4 | 4.0 " | 80.0% | 45.5% | 14.1% | 36.40% | 81.9% | 11.3% | 73.3% |
| Total | 5.0 " | 100.0% | | | 44.44% | 100.0% | 15.4% | 100.0% |

And corresponding Cr/Fe Ratio ...................... 1.97

The foregoing shows that a marketable grade concentrate has been made by raising the chrome content about 1 percent, or from 44.44% to 45.5%, and likewise the chrome/iron ratio some 24 points, or from 1.97 to 2.21, and this amount applicable to and representing 80.0 percent of the original lot.

However it must be borne in mind that this gain is at the expense of some 18.1% of chrome, $Cr_2O_3$, and going to waste with the 20.0% loss represented in the magnetic fraction rejected.

Careful consideration must be given to the economic factors involved, to determine the desirability of this method of treatment, rather than by the addition or blending with higher grade chromite ore, in order to make an acceptable product.

Respectfully submitted,

/s/ John F. Beede

cc to C. P. Venstrand

September 29, 1958

Mr. Lloyd H. Banning
Mr. Jean W. Pressler

Gentlemen:

Thanks so much for your letters regarding the draft of the letter to the chrome miners of the West Coast.

I will send the letter out as noted except for two changes. The sentence will be added at the end of the first paragraph on page 3 stating, "Chemical analyses of fluxes and reductants are shown in table 2." The third sentence in the second paragraph on this page will be changed to read, "Trapped metallic prills in the slag were not accounted for in this sample."

Thanks so much to both of you for your editing and your comments.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

September 9, 1958

Mr. Lloyd H. Banning, Project Coordinator
Pyrometallurgical Laboratory
U.S. Bureau of Mines, Region I
P.O. Box 492
Albany, Oregon

Dear Lloyd:

I am in receipt of a letter from Jean Pressler concerning your letter to him under date of August 5 giving results of the electric smelting test on the chromite from the stockpile at Grants Pass, Oregon.

Jean informs me that I should not send your letter to the chrome producers of the West Coast in the original form. This can be arranged all right but there is no way that we can change tables 1, 2, and 3. I presume, then, that it will be all right to reproduce these as is.

When prepared I will send you a copy of the material as we propose to send it out in order that you may check it and clear it.

Regards.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
cc Jean W. Pressler

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION I

NORTHWEST ELECTRODEVELOPMENT
EXPERIMENT STATION

P. O. BOX 492
ALBANY, OREGON

September 23, 1958

Mr. Hollis M. Dole, Director
Dept. of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oreg.

Dear Mr. Dole:

This is in regard to your letter of September 18 and the enclosed letter which you expect to send to the chrome miners of the West Coast.

I would suggest that you add a sentence at the end of the first paragraph on page 3 stating: "Chemical analyses of fluxes and reductants are shown in table 2." The third sentence in the second paragraph on this page should be changed to read as follows: "Trapped metallic prills in the slag were not accounted for in this sample."

Your letter contains information that should be of much value to the chrome miners and we have no objection to its distribution.

Sincerely yours,

Lloyd H. Banning

Lloyd H. Banning
Project Coordinator
Pyrometallurgical Laboratory
Region I

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION I

NORTHWEST ELECTRODEVELOPMENT
EXPERIMENT STATION

P. O. BOX 492
ALBANY, OREGON

August 29, 1958

Mr. Hollis M. Dole, Director
Oregon State Dept. of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oreg.

Dear Mr. Dole:

This is in answer to your letter of August 27 concerning results of our smelting test on Southern Oregon and Northern California chrome ores.

We have no objection to this information being made available to the chrome producers of the West Coast. However, I would appreciate it if you would add two footnotes to table 3. Footnote number 1 should refer to the weight of the ferrochrome in the overall column and state: "Includes 1,076 lbs. of ferrochrome removed from furnace at end of run." Footnote number 2 should refer to the over-all slag weight and state: "Includes 240 lbs. of slag removed from furnace at end of run."

Sincerely yours,

1,706

Lloyd H. Banning
Lloyd H. Banning
Project Coordinator
Pyrometallurgical Laboratory
Region I

August 27, 1958

Mr. Lloyd H. Banning, Project Coordinator
Pyrometallurgical Laboratory
U.S. Bureau of Mines, Region I
Albany, Oregon

Dear Lloyd:

I have seen your letter-report to Jean Pressler on the results of the Bureau's testing of chrome ore from southern Oregon - northern California.

Would you or the Bureau have any objection to my sending a copy of your letter, plus Jean Pressler's cost analysis, to the chrome producers of the West Coast?

I would appreciate hearing from you at an early date concerning this.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
cc Jean Pressler

# We Have to Waste Just So Much Time

Earl Voorhies' Editorial Courier 1/13/42

What is happening to synthetic rubber seems to be a part of the same dish that is being handed out to southern Oregon chrome, and comes from about the same source.

The timing is a little different.

It was announced yesterday that Federal Loan Administrator Jesse H. Jones is moving to construct great synthetic rubber plants at a cost of many millions to produce rubber substitutes at a rate of 400,000 tons a year.

Work on the plants will be rushed, it was declared, because at the best they will not start to produce until the last half of 1943. And when they are in full production, they will furnish only enough synthetic rubber for military use, leaving nothing to make the civilians' tires of 1943 and 1944 with, at a time when there will most likely be no civilian auto tires left at all.

What was NOT announced about this synthetic rubber is that the rubber companies begged and pleaded with Jones to build the plants a year and a half ago, and that federal banker Jones wouldn't do it, preferring to wait like a good banker until he was SURE we had to have them.

He is sure enough now. He will provide the plants and the war may be over before they produce. If he had acted when he was asked to, the synthetic rubber would be starting to come just about now, and our rubber tire rationing situation would be a lot different from what it is.

Will it be the same way with chrome? It begins to look that way.

War makes chrome a vital defense material, used for hardening and rustproofing steel. But the war has cut off 80 per cent of all of our foreign chrome supplies, and made it extremely necessary that we develop whatever chrome deposits we have in this country, to make up some small portion of the missing 80 per cent now needed for armaments.

Will the government help southern Oregon miners provide this chrome? No, it won't, in a way that will do our miners any good.

It says yes, we'll buy your chrome, provided you contract to supply 1,000 tons of it, load two or three freight cars at a time with it, hold the freight cars on the track while samples are selected and sent in to Washington for analysis, and only then send the cars to an unannounced destination IF the analysis is satisfactory, the payment to come later. What would be done if the loaded freight cars are unsatisfactory is not revealed.

In other words, the government acts as if it didn't want the chrome particularly nor need to care whether freight cars are tied up, or at whose expense.

There will come a time when the government will care, we believe, and care very greatly. We will hazard a guess as to when that time will be.

It will come, if the synthetic rubber schedule is followed, in about a year and a half.

Just about a year and a half too late.

Those who attended the meeting at Granst Pass from Coos county were H. H. Schultz of North Bend, Chas. Grandby of Marshfield, J. A. Stankavich of Bandon, Les Childs of Coquille and Arthur R. Jones of Myrtle Point.

The following release from the state mining office on December 29 goes into some detail regarding the new specifications for purchase of chromite ore by the government and will be of interest to miners:

For purchases of chromite ore for Government stockpiles, higher prices and much more favorable purchase conditions have just been announced, whereby small individual producers can come into the picture. This is announced by the Oregon Department of Geology & Mineral Industries as a result of information just received from H. DeWitt Smith, president of Metals Reserve Co., Government buying agency in Washington.

# US Chromite Agreements Wiped Out

Courier 1/13/42 Rut. quoted

The Metals Reserve company will not buy chromite from domestic producers except on its own terms, and will not tell miners where to deliver it until they have it ready to ship, T. A. Hamilton, traffic manager of the RFC subsidiary, was told Earl K. Nixon, state mining director.

Nixon, himself a miner and proficient in the colorful language of the occupation, found difficulty in conveying his "disgust" at the reply, he confessed in releasing Hamilton's letter today.

More than 99 per cent of the United States chromite, essential for war, has been supplied from foreign sources, and Oregon is one of the four states having supplies of chromite of usable quality, Nixon said.

The letter reversed a telegram Hamilton sent Dec. 29, announcing plans to arrange stockpiles of chromite "at railroad points near source of production," revealing he was "now planning one at North Bend," and thanking Nixon for offers of assistance along lines now rejected.

Hamilton wrote Jan. 5, that "you are working at the matter from the wrong end." He said no information would be given about stockpiles until chromite is contracted and ready to ship. "We will not set up a great number of local stockpiles."

Miners of the northern California-southern Oregon district, meeting here a week ago, declared that they could not meet Metals Reserve terms.

Hamilton's letter follows:

"I have your letter of the 3rd instant regarding prospective stockpile locations.

"So far as Metals Reserve Company is concerned you are working at the matter from the wrong end. Any contracts that we may make for domestic ores will require that the seller of the ore deliver into cars at the Railroad station most convenient for him.

"Where we will locate our stockpile is highly dependable upon the rail point or points at which the seller loads his ore into cars. Freight charges to our stockpile are for our account. Until the contracts begin to come in and the sellers are ready to ship, giving us due notice under their contract provision, we will not advise them as to our stockpile location.

"We will not set up a great number of local stockpiles but intend to centralize, offsetting against freight costs the savings from centralized sampling, etc.

"With all due courtesy, we want to advise you firmly that this is not a matter which can be handled in any other way then the one stated above."

Chrome

Questionaire
Names of Operators etc.



STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON



December 30, 1941

Portland, Oregon

Dear Sir:

In order to bring about immediate and substantial increase in chromite ore production this Department is working with chrome miners, mining groups, bankers, and local and county agencies.

All efforts can be coordinated best if one central agency is fully informed about mining activities so it can act as a clearing house between buyer and producers. The Department is pleased to carry on this duty in an effort to aid miners in their operations.

Timing is extremely important. Some deposits are opened up; some have been located but not explored; and some require that roads be built before the ore can be shipped out. The amount of ore that should be moving in six, nine, and twelve months from now cannot be estimated unless we have FACTS on which to base estimates and plans.

We ask you then to fill in just as fully and just as accurately as possible for the use of this Department the blank that is attached hereto and return it at once in the self-addressed envelope. This questionnaire covers chromite only. Letters will be sent out later in regard to other strategic ores, such as manganese, antimony, etc.

We recognize that some chrome owners and miners cannot produce chromite without financial assistance in the way of road building, etc. We are working on a formula or scheme whereby some assistance might possibly be given especially in the case of properties having good prospects of early production of important tonnages of ore. However it should be clear that exploration such as test pitting, trenching, and uncovering the ore for inspection by engineers must be done by the property or chrome owners themselves.

The Department is in communication with the Metals Reserve Co. in Washington, Government buyers of chrome ore, and will keep ore producers constantly informed of any news, changes in policy or specifications that will aid them in their operations.

Attached hereto is copy of information obtained by long distance telephone from Washington this morning - outlining new and more favorable terms and purchase conditions for chromite ore. Note advanced prices.

Sincerely yours,

Earl K. Nixon

| Assay No. | Name & Address | Location Sec., T. S., R. W. | Assay Value |
|---|---|---|---|
| Y-52 | W. C. Snook, Box 587, Grants Pass, Oregon | 19 - 34 - 5 | 31.3 |
| Y-579<br>580 | Barton W. Stone, 8990 N. Druid Ave., Portland, Oregon | 27 - 37 - 9 | 49.2<br>42.7 |
| Y-1405 | Sheridan H. Croy, Camas Valley, Ore. | 12 - 32 - 10 | 49.5 |
| Z-112 | R. P. Thompson, O'Brien, Oregon | 24- 40 - 9 | 36.5 |
| Z-662 | G. A. Hyde, Palace Hotel, Grants Pass, Oregon | 15 - 41 - 11 | 37.5 |
| Z-1200 | Arley L. Beasley, Jacksonville, Ore. | 18 - 41 - 1 | 47.5 |
| Z-1201 | Claud Coverd, Bullards, Oregon | | 44.8 |
| Z-1338 | E. L. Beeson, Rt. 2, Ashland, Oregon | 5 & 6 - 40 - 1 | 51.0 |
| Z-1339 | Richard G. Warthen, Elmira, Oregon | Lies about 6 miles N.E. of Chrome King Mine | 39.5 |
| Z-1508 | J. L. Taylor, Gen. Delivery, Applegate, Oregon | 15 - 31 E. | 37.8 |
| Z-1509 | James G. Gallaher, 1711 Oregon St., Bakersfield, Calif. | 33 - 36 - 8 | 47.9 |
| AG-66 | H. W. Ward, 628 Dakota Ave., Medford, Oregon | 24 - 34 - 3 | 52.5 |
| AG-141<br>147 | H. S. Wieder, Marshfield, Oregon | 26 & 27 - 13 & 14 | 22.8<br>5.6 |
| AG-230 | Sigmund Dilsheimer, c.o Washington Hotel, Portland, Oregon | 16&21 - 37 - 9 | 38.2 |
| AG-231 | D. C. Goddard, Talent, Oregon | 26 - 40 - 4 | 55.9 |
| AG-472 | G. E. Cockman, Provolt, Oregon | 6&1 - 34 - 5&6 | 31.5 |
| AG-473 | C. M. Van Houten, Gold Hill, Ore. | 7 - 39 - 1 | 39.6 |
| AG-1010<br>1011 | C. W. Campbell, 202 W. E St., Grants Pass, Oregon | 40 - 9 | 35.7<br>39.1 |
| AG-1012<br>1013 | C. S. Fisher, c.o Oak Flats, Selma, Oregon | 3 - 37 - 9 | 49.7<br>44.8 |
| AG-1014 | H. W. Ward, 628 Dakota Ave., Medford, Oregon | 17 - 40 - 1 | 47.1 |
| AG-1181<br>1182 | Mrs. Julia Curtis, 302 W. D St., & Booth St., Grants Pass, Oregon | 19 - 38 - 8 | 54.1<br>1.4 |
| AG-1183<br>1184 | R. L. Bumby, Cave Junction, Oregon | 7 - 41 - 9 | 20.1<br>37.8 |
| AG-1245 | L. F. Camp, Selma, Oregon | 36 - 38 - 7 | 28.5 |
| AG-1287 | R. L. Bumby, Cave Junction, Oregon | 7 - 41 - 9 | 34.4 |
| AG-1288 | George L. Ice, 821 Dakota Ave., Medford, Oregon | 9 - 41 - 4 | 43.1 |
| AG-1289 | Grin Smith, 304 W. K St., Grants Pass, Oregon | 10 - 41 - 8 | 42.2 |
| AG-1290 | John H. Helman, 420 Pearl St., Medford, Oregon | 36 - 36 - 15 | 29.8 |
| AG-1293 | R. B. Coulter, Rt. 2, Box 593, Grants Pass, Oregon | 30 - 37 - 9 | 42.5 |
| AG-1294 | Sigmund Dilsheimer, 2133 N.W. Glisan St., Portland, Oregon | 37 - 8 | 40.0 |
| AG-1341 | Pete Neubert, 1111 Riverside Ave., Grants Pass, Oregon | 21 - 37 - 9 | 35.6 |
| AG-1453<br>1454 | J. H. McClung, Rt. 2, Box 792 Grants Pass, Oregon | 21 - 37 - 9 | 48.7<br>46.1 |
| BG-35 | C. L. Robinson, Rt. 3, Box 301 Grants Pass, Oregon | 26 - 38 - 7 | 28.9<br>28.3 |

| Assay No. | Name & Address | Location Sec., T. S., R. W. | Assay Value |
|---|---|---|---|
| BG-36 | L. B. Coosn, 5315 N.E. 38th Ave., Portland, Oregon | 31 - 36 - 9 | 45.9 |
| BG-147<br>148 | Sigmund Dilsheimer, 2058 W. Flanders St., Portland, Oregon | 16 - 37 - 9 | 44.6<br>40.0 |
| BG-149 | C. L. Hathaway, Selma, Oregon | 20 - 37 - 9 | 40.7 |
| BG-150 | Max E. Krueger, 4642 N.E. Halsey, Portland, Oregon | 16&21 - 37 - 9 | 45.3 |
| BG-205 | C. M. Zachary, Selma, Oregon | 30 - 37 - 9 | 40.1 |
| BG-254 | Nelson W. Cole, Selma, Oregon | 21 - 37 - 9 | 41.6 |
| BG-255 | Sigmund Dilsheimer, 2058 N.W. Flanders St., Apt. 4, Portland, Oregon | 16&21 - 37 - 9 | 44.8 |
| BG-256 | Sigmund Dilsheimer, 2058 N.W. Flanders St., Apt. 4, Portland, Oregon | 16 - 37 - 9 | 44.5 |
| BG-257 | M. C. Athey, Cave Junction, Oregon | 18 - 39 - 8 | 55.4 |
| BG-258 | Wm. Dailey, Grants Pass, Oregon | 11 - 41 - 5 | 41.2 |
| BG-259 | Willie Jobe, Days Creek, Oregon | | 45.6 |
| BG-307 | R. L. Bumby, Cave Junction, Oregon | 8 - 41 - 9 | 29.5 |
| BG-308 | F. C. Culpepper, Rt. 2, Box 673, Grants Pass, Oregon | 10 - 34 - 4 | 32.4 |
| BG-309 | R. C. Wilmot, c/o Bonanza Mine, Sutherlin, Oregon | 11 - 32 - 14 | 0.83 |
| BG-458 | D. R. Tucker, Selma, Oregon | 4 - 39 - 6 | 47.2 |
| BG-775 | J. E. Bartlett, Rt. 2, Box 488, Grants Pass, Oregon | 32 - 41 - 7 | 37.0 |
| BG-776 | R. L. Bumby, Cave Junction, Oregon | 7 - 41 - 9 | 41.6 |
| BG-777 | F. H. Johnson, 612 J St., Grants Pass, Oregon | 2 - 34 - 5 | 36.3 |
| BG-778 | F. H. Johnson, 612 J St., Grants Pass, Oregon | 34 - 41 - 8 | 32.4 |
| BG-779 | Wm. Robertson, 629 N. 8th St., Grants Pass, Oregon | 13 - 41 - 11 | 4.9 |
| BG-780<br>781 | C. C. Somers, 4734 N. Willis Blvd, Portland, Oregon | 27 - 33 - 5 | 21.6 |
| BG-831 | F. H. Johnson, 612 J St., Grants Pass, Oregon | 34 - 41 - 8 | None |
| BG-833<br>834 | C. A. Henshaw, Box 24, Kerby, Oregon | 39 - 10 | 42.6<br>45.3 |
| BG-872 | H. L. Griffin, Powers, Oregon | 19 - 32 - 12 | 50.07 |
| BG-885<br>886 | R. E. McCaleb, Selma, Oregon | 32 - 9W | 38.2<br>43.2 |
| BG-891 | La More & Johnson, 611½ G St., Grants Pass, Oregon | 14 - 41 - 7 | 41.7 |
| BG-923 | W. A. Shutt, Coquille, Oregon | 3 - 28 - 12 | None |
| BG-931 | Fred Langley, Box 182, Grants Pass, Oregon | 35 - 41 - 9 | 21.8 |
| BG-936 | Kal M. Chronic, Selma, Oregon | 14 - 36 - 9 | 35.1 |
| BG-988 | E. C. Ahlstrom, Lakeview, Oregon | 36 S - 21 W | |
| BG-1011 | J. A. Rice, Box 125, Myrtle Creek, Oregon | 20,16,17 - 29 - 5 | 47.21 |
| BG-1013 | Sigmund Dilsheimer, Selma, Oregon | 11 - 37 - 9 | 46.69 |
| BG-1021 | J. L. Kellond, Marshfield, Oregon | 21&15 - 31 - 12 | 51.51 |
| BG-1024 | A. E. Deason, Selma, Oregon | 5 - 38 - 9 | 44.44 |

| Assay No. | Name & Address | Location Sec., T. S., R. W. | Assay Value |
|---|---|---|---|
| BG-1029 | J. E, Bartlett, Rt.2, Box 488, | | 49.46 |
| 1030 | Grants Pass, Oregon | 9 - 36 - 8 | 44.13 |
| BG-1056 | R. B. Coulter, P. O. Box 133, Grants Pass, Oregon | 19 - 37 - 9 | 40.5 |
| BG-1058 | J. C. Gutherie, Gen. Delivery, | | 44.6 |
| 1059 | Grants Pass, Oregon | 13 - 33 - 5 | 48.7 |
| BG-1060 | S. S. Simpson, 710 Main St., Klam- | | 34.6 |
| 1061 | ath Falls, Oregon | 38 S - 10 W | 38.8 |
| BG-1062 | H. A. Buick, Cascade Apts., Klam- | | 21.5 |
| 1063 | ath Falls, Oregon | 11 - 38 - 10 | 5.0 |
| BG-1064 | F. I. Bristol, Grants Pass, Oregon | 8 - 41 - 1 | 37.7 |
| BG-1067 | J. G. Gallaher, 1008 E. I St., Grants Pass, Oregon | 34 - 36 - 9 | 40.3 |
| BG-1088 | R. L. Bumby, Cave Junction, Oregon | 9 - 41 9 | 37.88 |
| 1089 | | | 35.76 |
| BG-1098 | J. N. Grissom, Selma, Oregon | 32 - 38 - 9 | 45.28 |
| BG-1100 | Herman Messenger, Provolt, Oregon | 1 - 37 - 5 | 39.73 |
| BG-1104 | Gus Dunn, Gen. Delivery, Grants Pass, Oregon | 13 - 33 - 5 | 45.00 |
| BG-1108 | W. E. Jarman, Selma, Oregon | 30 - 37 - 9 | 54.52 |
| BG-1110 | Hollis Clarno, Wedderburn, Oregon | 3 - 36 - 13 | 47.12 |
| BG-1131 | N. P. Truchot, 1427 N. Bryant, | | |
| 1132 | Portland, Oregon | | 0.3 |
| BG-1166 | Charles Angle, Sams Valley, Oregon | 13 - 34 - 3 | 46.84 |
| BG-1182 | J. E. Bartlett, Rt. 2, Box 488, Grants Pass, Oregon | 9 - 36 - 8 | 51.56 |
| BG-1184 | W. L. Baker, 6805 11th St., Med- ford, Oregon | 33 - 33 - 12 | 22.65 |
| BG-1189 | Earl White, Selma, Oregon | 16 - 34 - 9 | 38.53 |
| 1190 | | | 40.85 |
| BG-1191 | Sigmund Dilsheimer, Selma, Oregon | 16 - 37 - 9 | 48.30 |
| BG-1192 | Austin Pond, 838 W. 2nd St., Med- ford, Oregon | 5 - 41 - 2 E. | 0.2 |
| BG-1195 | L. E. Lewis, c/o Sherrif's Office, | | 43.95 |
| 1196 | Grants Pass, Oregon | 8 - 40 - 9 | 39.21 |
| BG-1202 | Ed Cox, c/o Colonial Hotel, Grants Pass, Oregon | 1 - 38 - 8 | 12.40 |
| BG-1211 | J. G. Gallaher, 1008 E. I St., Grants Pass, Oregon | 4 - 37 - 9 | 31.74 |
| BG-1212 | R. E. McCaleb, Selma, Oregon | 7 - 38 - 9 | 23.71 |
| 1213 | | | 23.21 |
| BG-1327 | E. E. Hanscam & R. E. McCaleb, Har- bor, Oregon | 11 - 38 - 10 | 39.3 |
| BG-1337 | R. U. Waterman, Box 632, Grants Pass, | | |
| 1340 | Oregon | 18 - 13 - 25 | 23.5 |
| BG-1344 | M. J. Breunig, Cave Junction, Oregon | 3 - 37 - 8 | 39.5 |

July 31, 1942

Mrs. Viola Mae Benson
1429 Hill Street
Bend, Oregon

Dear Mrs. Benson:

Receipt is acknowledged of your letter dated July 27 addressed to the Bureau of Mines, Salem. This Department has no information concerning legal entanglements of the U. S. Chromium, Inc. with property reported to be in sections 19, 20, 21, and 22, township 32 S., range 12 W. about 10 miles southwest of Powers in Coos County. There could be complications in claim ownership since our records show that in 1937 the company claimed over 1000 acres held by location. Since that time, this company has been in difficulties occasioned by Federal indictments against Dr. Muchow for violations of the Securities and Postal Law.

We understand that there has been no activity in the property in the past two or three years. It is possible that you could obtain some information concerning the status of the claims by writing the County Clerk of Coos County, Coquille, but I suppose in order to get a complete picture it would be necessary for you to have a search made by a lawyer.

We have no assay records of samples taken from this property. The U. S. Chromium Co. built a mill to treat gold ore, but it is reported that the material to be mined would be quite low grade in gold. Various reports of chromite occurring in commercial quantities on this ground have not been verified.

Yours very truly,

F. W. Libbey
Mining Engineer

FWL:ac

Bend. Oregon.
July. 27. 1942

Bureau of Mines -
Salem, Ore.
Dear Sirs:

Please advise me if there are any legal entanglements against the following property. Also I would appreciate any assay which the state has recorded in regard to the chrome - If this is not available in your office advise me as too the proper office.

Section 32 S - Range 12, Siskiyou National Forest. Ore. 10 miles from Powers. Coos County - The U.S. Chromium, Inc. claim 1000 acres, part by paid up purchase contracts, and the rest by location - Would your office kindly check this

I will certainly appreciate any cooperation your office may be able to offer -

Sincerly yours,
Viola Mae Benson.
1429 - Hill St
Bend. Ore.

Sec 19, 20, 21, 22

RECEIVED
JUL 30 1942

December 12, 1941

Major R. F. Bessey, Counselor
National Resources Planning Board
Federal Courthouse
Portland, Oregon

Dear Major Bessey:

The following is in reply to your letter of December 11th to which you attach a letter written by Dr. DeLee to Mr. Frederic A. Delano.

This all pertains to the operations of the U. S. Chromium Company. The Dr. Wm. Mark Muchow "in charge" is a high pressure promoter with whom the Securities Exchange Corporation finally caught up. He was "taking" widows, orphans, laymen, doctors and dentists in small towns, principally in Illinois until he finally over-played his hand. Two or three reports have been written on the property by engineers, but the negative reports, according to my understanding, were never publicized by Muchow.

We have considerable information about the property in question and do not hold it in very high regard.

We might suggest that Mr. Delano or Dr. DeLee write to the Seattle Office of the Securities Exchange Corporation addressing their communication to the attention of Mr. Wright, attorney.

Cordially yours,

Director

EKN:ac

NATIONAL RESOURCES PLANNING BOARD
FIELD OFFICE
FEDERAL COURTHOUSE
PORTLAND, OREGON

December 11, 1941

Mr. Earl K. Nixon
Department of Geology
Woodlark Building
PORTLAND, OREGON

Dear Mr. Nixon:

The attached copy of letter and enclosures, addressed to Mr. Delano, Chairman of the National Resources Planning Board, has been referred to this office.

Any information that you may be in a position to supply would be very greatly appreciated.

Very truly yours,

R F Bessey

R. F. BESSEY
Counselor

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B
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F
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W

ENC

RECEIVED
DEC 21 1941
STATE DEP'T OF GEOLOGY
& MINERAL INDS.

U.S. Chromium

FRANK HOART, MANAGER

The Brown Palace Hotel

"ONE OF AMERICA'S HOTEL ARISTOCRATS"

Denver

September 24, 1937.

Senator Johan Waage,
Attorney, U S Chromium, Inc.,
Chicago, Illinois.

Dear Sir:-

In accordance with your request and supplementing my Report to U S Chromium, Inc., permit me to supply you the following:

Was born and raised in Geneva, Switzerland. Received Bachelor es Sciences and Doctor es Sciences degrees from the University of Geneva; took a post graduate course at the School of Mines of Paris, France. Was for five years on the Geological Survey of France and two years on the Geological Survey of Algeria. Came to the Cripple Creek Mining District, Colorado, in 1899; was Consulting Engineer for the Zenobia Mine and Superintendent of the Monte Cristo Mine. In 1902 became the Mining Engineer of the Pikes Peak Fuel Company, Colorado Springs; then of the Routt County Coal Company and the Rugby Coal Company.

Became an American Citizen in 1904.

Since 1907, have been in general practice as a Mining Engineer and Geologist, with offices, first, in Colorado Springs, and since 1912 in Denver.

Have been employed by many of the leading Mining Operators of Colorado and other places.

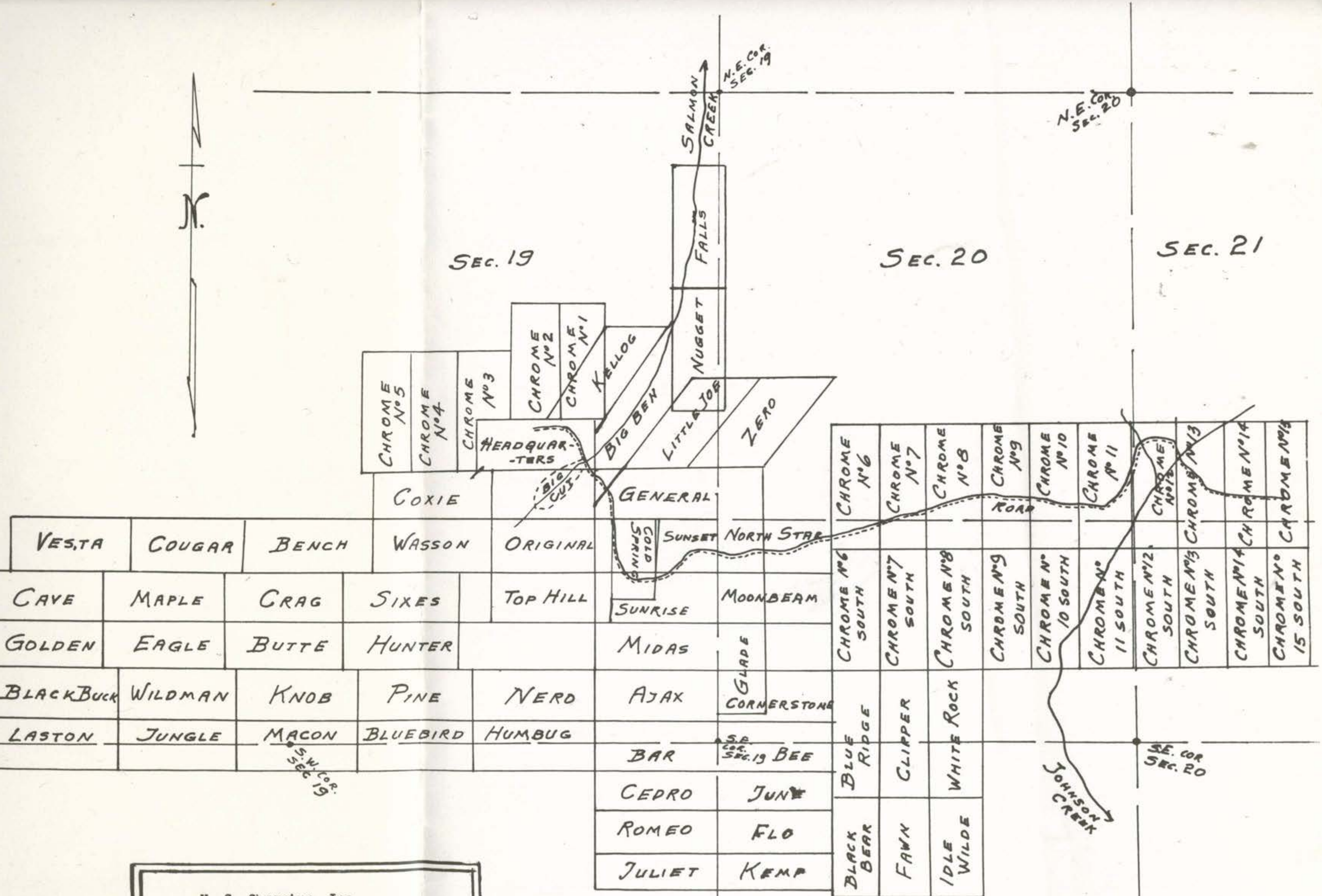
Am now Consulting Geologist for the Cameron Gold Mines, Inc., and Consulting Mining Engineer for the Hamlet-Dexter Mines Corporation, and the Gold King Mining Syndicate, all three Companies operating Cripple Creek Mines.

Am a member of the American Institute of Mining and Metallurgical Engineers, the Institution of Mining and Metallurgy of London, the Societe' Geologique de France, and the Colorado Scientific Society. Am a registered Mining Engineer of the State of Colorado.

Have published a number of books on Geology and Mining, numerous articles in the Mining and Engineering Journal, the Mining World, the Mining and Scientific Press, and other publications.

Very truly yours,

Etienne A. Ritte




U. S. Chromium, Inc.,

1713 Mallers Bldg., Chicago.

## CONCLUSIONS

U. S. Chromium has acquired some very important mining properties in Southwestern Oregon, containing an enormous deposit of low grade gold ore, accompanied by chronite. It is the ore body for the exploitation of which you are now building your pilot mill.

Besides this deposit there are a number oc chromite deposits of a good concentrating grade of ore. Their development should lead to important chromium mining and metallurgical operations, which would prove a great additions to your gold mining operations.

Respectfully submitted,

ETINNE A. RITTER.

Joseph B. DeLee, M.D.
5841 Maryland Avenue
Chicago

At the Chicago Lying-in Hospital

November 10, 1941.

Mr. Frederic A. Delano,
220 State Department Bldg.,
Washington, D. C.

Dear Mr. Delano:

A few years ago one of my high school chums, whom I had not seen for fifty years, came to me and for old lang syne I invested $800 in a chromium mine that he was promoting, out in Oregon on the Pacific Ocean.

It seems that there is chromium on the land but the company has not been very successful financially. Indeed the SEC would not give it a clean bill of health.

I am enclosing herewith some literature which I hope you will be able to pass on to the proper authority.

Last year I sent a letter similar to this to the Office of Production Management which referred me to the U. S. Geological Survey of the Department of Interior.

I am not trying to salvage my investment but am anxious that the country get the chromium if it is lying right on our doorstep.

If you will refer the matter to someone in Chicago I will be glad to coöperate in searching this matter out.

Hoping you are well and with kindest regards,

I am

Yours truly,

J. B. DeLee.

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

# GEOLOGIC ATLAS

OF THE

# UNITED STATES

# PORT ORFORD FOLIO

## OREGON

1903

Old price of Gold.

GOLD.

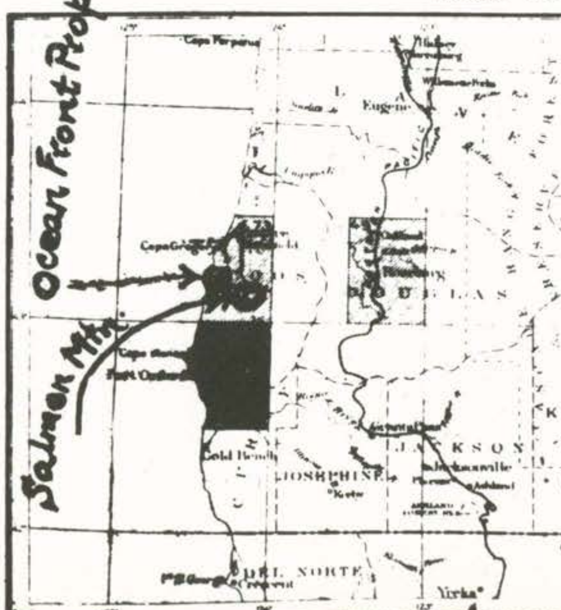
Nearly all of the gold which has thus far been obtained in the Port Orford quadrangle has come from placer mines, some of which are along beaches in marine deposits and the rest in river gravels, especially along the South Fork of the Sixes and at the heads of Salmon and Johnson creeks, with a smaller area at the head of Boulder and Rock creeks near the south end of Iron Mountain. There is one quartz mill in the region.

The gold belt of the Port Orford quadrangle has long been the most active mining region of the Oregon coast. It has yielded considerable gold in the past, and is yet a moderate producer. The total product from the quadrangle since 1852 is probably not far from a million.

The belt runs approximately N. 70°–80° W. from the mouth of Johnson Creek on the South Fork of the Coquille, and has a width of several miles. West of Johnson Creek it crosses the head of Salmon Creek, passes along the South Fork of the Sixes, and reaches the coastal plain south of Denmark. On this belt the principal formation is the Myrtle, composed of more or less altered sandstones and shales which locally contain veins of quartz. It is penetrated by serpentine, gabbro, basalt, and dacite-porphyry, and it is probable that the mineralization of the belt occurred in connection with one or more of these igneous intrusions. Some of the dacite-porphyry dikes are too small to be represented on the map.

*Placer mining.*—Placer mines were once active along Johnson Creek throughout the greater part of its course, and paid moderately, but in the severe weather of the spring of 1890 landslides so filled up the stream bed that mining has since been unprofitable. A number of years must pass before this mass of material can be carried away and the gold sufficiently concentrated to make mining profitable, if indeed it ever becomes so again. Some of the miners believe that the bed of Johnson Creek, which is chiefly mined out, is not fed with gold now. The placers extended a short distance up Sucker Creek and Poverty Gulch from the main stream of Johnson Creek, and in nearly all cases the mining was confined to the present stream bed, although some of the benches were worked in the early days to 50 and 75 feet above the stream bed. The most successful mines have been near the head, close to the belt of dacite-porphyry which crosses the divide toward the Salmon Mountain mine.

INDEX MAP




PLATINUM MINERALS.

The recent demand for platinum has increased its value so greatly that the metal becomes of greater economic interest. The Klamath Mountains of southwest Oregon and northwest Cali-

Note - This article on Platinum does not relate to the property of U S Chromium, Inc., It is to serve only to show the peculiar occurence of platinum in the Southwestern part of Oregon. However, the Ocean Front Property does have Platinum and Gold with the Chrome Sands located near Bandon and can be easily sampled.

sents, so that the value of the platinum per ton of gravel is unknown. Besides magnetite, the other minerals are chiefly chromite and ilmenite, with much zircon, epidote, and garnet and a trace of cinnabar.

Another sample of concentrates from the same mine, weighing 60 ounces, contained platinum at the rate of about $17 a ton, and the gold was about seven times as abundant as the platinum, but in this case as in the first the amount of gravel represented by these concentrates is unknown.

The Salmon Mountain mine, on the north slope of Salmon Mountain, at an elevation of 2100 feet, is hydraulic, using water with nearly 200 feet head, brought across the divide from the upper part of Johnson Creek. The cut is about 50 feet deep, the same in width, and 500 feet long, with a range of 200 feet in height. It is in rather fragmental material of igneous origin, except at the lower end, where Eocene shales and sandstones occur. Although closed at the present time, it has been worked during the rainy season at intervals for a number of years. When running under good head the mine paid $75 to $100 a day, and the gold is said to be rather uniformly distributed through the whole mass. This fragmental material of volcanic origin forms a bench with small depressions on the steep slope of Salmon Mountain, and appears to be due to a slide.

The rock is dark, often purplish or greenish, sometimes brecciated, much fractured, and easily goes to pieces. Although much altered, it retains traces of its ophitic structure which connects it with the basalts. Near the upper limit of its exposure, above the bulkhead, it is more solid and is associated with a rock rich in glaucophane, with sandstones and indurated shales bounding it on both sides.

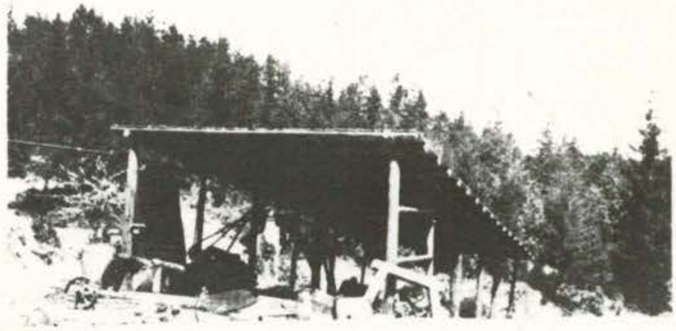
The gold of the mine appears to be derived from small quartz veins, such as have been prospected in the immediate vicinity. Its intimate association with this igneous rock is exceptional and unlike anything else seen in the region. The branch of Salmon Creek which heads near the mine contains much of the same sort of débris in its bed and yields a small amount of gold annually to several miners.

A short distance southwest of the Salmon Mountain placer mine a quartz mine was opened by several tunnels running in a southerly direction into the hill. One of these showed a 2-inch quartz vein, with smaller veinlets, containing besides some pyrite occasional visible traces of free gold. Veins of this sort are found in the pebbles of Cretaceous sandstone which occur in the adjacent Eocene conglomerate, so that the formation of the veins belongs near the close of the Cretaceous.

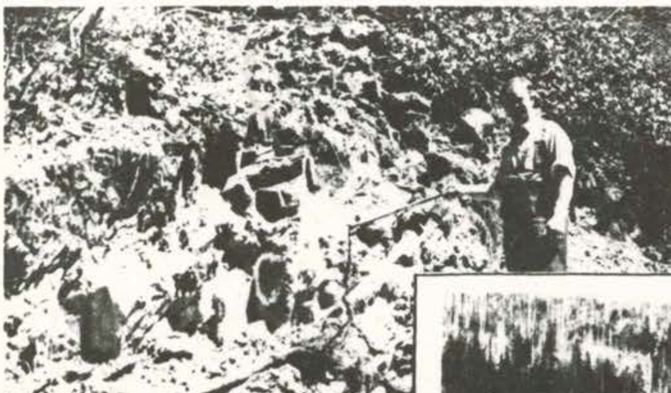
REPRODUCTION of COVER of Geologic Atlas and Contents referring to the Salmon Mountain Mine - property of U S Chromium, Inc., Powers, Ore.

Tel Dea 9233.
1713 Mallers Bldg.,

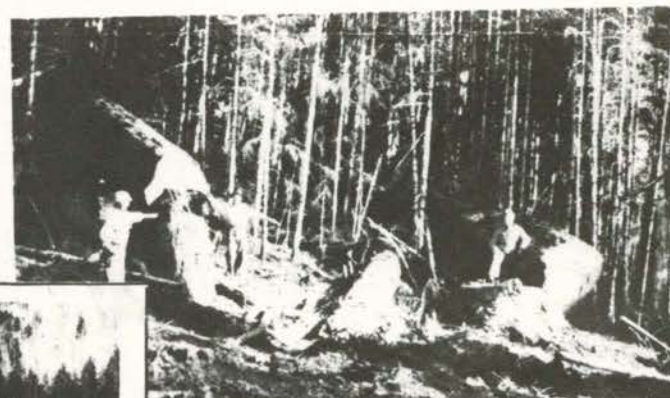

Main St - Powers, Oregon
Salmon Mtn 12 miles South



Temporary Test Mill- for Chrome and Gold



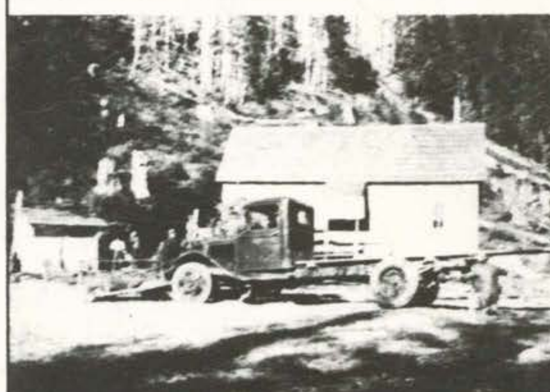
300 ft. wide Serpentine Chrome Ore



6 Ft. Diameter -Fir and White Cedar common

The Large Slide
Millions of Tons- Gold and Chrome

Giant Cedar - Value $100 each



The Bryant Camp

Chrome and Gold ore newly discovered

Proposed Damsite Johnson Creek- Narrow Gorge 20 ft. High

November 13, 1939

Dr. Guy B. Ellis
Main and Elm Avenues
Norwood, Ohio

Dear Doctor Ellis:

Replying to your letter of November 4th, it is my understanding that the scrutiny by the S.E.C. of the operations of the U. S. Chromium Company is based on allegation of misrepresentation by Dr. Muchow. Whether or not I am correctly informed I am not certain, but that is my impression.

An engineer of this Department has called at the property twice and failed to find anyone in authority who would make it possible for him to get competent and complete information. At the moment our mining engineer, in whose territory your property is located, has left to accept other employment and will be replaced about January 1st by a competent field geologist from our staff. As soon as it is convenient, we will be pleased to have him go over the property and make a report for us from which we can form an opinion as to the feasibility of an operation.

I know considerable about the property from hearsay but have not personally visited it.

I do not know what engineers have reported on this property with one or two exceptions, but I can say as a general statement without indicting any one of them that the fact that any engineer is registered does not guarantee his competence any more than the registration on the part of a doctor or dentist will guarantee that a patient will receive the highest possible grade of attention. I can say that there are engineers in this State who are of the highest grade and whose recommendation or diagnosis would probably be accepted by the S.E.C. or anyone else. It is possible that the property had the wrong "doctor".

We are interested in lending all possible encouragement to sound mining enterprises in this State and are prepared to give what is commonly classified as sound advice in such matters. It is possible that I may be able personally to visit this property within the next month or two and, if so, I would like to have you write me meantime and secure for me authority to make an examination. I shall give you my frank opinion--whether it be good or bad--and trust that it will be received in the spirit it is given.

Respectfully yours,

EKN:vm

Director

GUY B. ELLIS, D.D.S.
MAIN AT ELM AVE.
2110 FELDMAN AVE.
MELROSE 3430

NORWOOD, OHIO

Nov. 4, 1939.

State Department of Geology,
Portland, Oregon,

Dear Mr. Nixon,

Eight months & S.E.C. is still "scrutinizing" operations of U.S. Chromium Inc. While they are dealing with legal technicalities U.S.A. is looking for Chromium, manganese & titanium. they are all suspected of being in this property & various Engineer's have made tests. Even Registered Oregon mining Engineers.

Being in your state, I should think that your department would have authority to test samples of ore from this claim. Especially since the government is anxious to obtain these materials.

If claim can be proved I see no reason why registration should not be completed.

P.S. (over) Guy B Ellis DDS

As I am considering investments in your state I should like to see the registration completed if claim can be proven. But it will never be proven unless it can be tested by accepted authorities

I would appreciate your cooperation to this end.

Please write me of latest information.

Guy B Ellis [illegible]

STATE OF OREGON

CORPORATION DEPARTMENT

SALEM

RECEIVED
JUL 14 1937
STATE DEP'T OF GEOLOGY
& MINERAL INDS.

J. H. HAZLETT
Corporation Commissioner

July 13-37.

Mr. Earl K. Nixon, Director,
State Dept. of Geology & Mineral Industries,
704 Lewis Bldg.
Portland, Ore.

Dear Mr. Nixon:

Acknowledgment is made of the receipt of your letter of July 12th, and I am unable to find that U. S. CHROMIUM COMPANY is of record as a corporation in this Department either as a foreign or a domestic corporation, and I am therefore unable to furnish the information you desire.

Yours very truly,

J H Hazlett

J. H. Hazlett
CORPORATION COMMISSIONER.

LW

July 12, 1937

Corporation Commission
Salem
Oregon

Gentlemen:

We have an inquiry from an investor we assume asking about a syndicate which is being incorporated in this state under the name "U. S. Chromium Company" which is alleged to be planning to develop all chromium deposits in the Salmon Mountain region inland from Port Orford .

If it will not be too much trouble, I would like to know something about who these people are and what evidence they offer to justify their promotion of a mineral deposit in this area.

Thanking you, I am

Very truly yours,

Earl K. Nixon, Director

EKN:L

letter filed under
S. C. Potter

March 8th, 1938

Dr. L. K. Minshall,
201 Security National Bank Bldg.,
Rockford, Illinois.

Dear Sir:

Replying to your recent letter, asking for information in regard to the U. S. Chromium Co., I can advise you as follows:

This, I believe, is an operation on Salmon Mountain near Powers, Oregon, which is being promoted by a Dr. Muchow. If they represent that they have the only deposit of chromite in the United States, the representation is misleadingly exaggerated. There are small deposits of chrome, most of them non-commercial, scattered all over this country.

As to the gold mine, it is my understanding that they have put up an experiment plant in the hope of handling landslide material with a power shovel in such a manner as to recover free gold at a profit. In any such operation as this, the amount of free gold present is the determining factor. Whether they have enough information to justify any exaggerated claims I do not know, but I am inclined to doubt it, for the reason that I understand the tunnels in which the alleged ore is present are mainly caved at this time. Understand, I do not mean to disparage this or any other allegedly sound mining operation in this State, but it is our policy to ask that operators properly represent the conditions, because investors in foreign states are apt not to be able to analyze properly the profit possibilities.

Any mineral investor should demand assay maps and tonnage estimates based on actual assays; or with even a purely development and promotional proposition should satisfy himself thoroughly of the character and capacity of the men in charge of the operation.

Very truly yours,

the investor

Earl K. Nixon, Director

EKN:fas

L. K. MINSHALL, D. D. S.
201 SECURITY NATIONAL BANK BUILDING
MAIN 1105
ROCKFORD, ILLINOIS



Dear Sirs:

What information can you give me in regard to The U.S. Chromimum Co. They claim to have a mine in Salm Mt. which they have purchased and which is supposed to have the only deposit of chromium in the U.S.

Also is there a gold mine in connection with this?

They claim to be able to take the ore by natural landslide & not have to mine it but only to grind & wash.

Your information will be greatly appreciated.

Yours truly,
Dr. L. K. Minshall

CHROMITE
GRANT CO.

May 16, 1968

Mr. Dale L. Hoekstra
805 Redbud Hill Apt.
Bloomington, Indiana 47401

Dear Mr. Hoekstra:

Thank you for your letter inquiring about chromite. We have never made a precise evaluation of the remaining tonnage of chromite in Grant County. The problem revolves partly around the definition of "ore," both as to contained chromium, the chrome-iron ratio, and the reliability of the exploratory work. Very probably the figure you quote has been obtained from one of the several federal surveys that have been made here in the State. We have no reason to doubt the figure since we have never attempted a survey. The number of mines is also a very uncertain figure. If a "mine" must have a record of sugstantial production, then the number is rather small--possibly a dozen or so. Prospects can be almost anything and 70 is within reason.

No chrome mines have been operating since the shut-down of the stockpile program. Unfortunately the California-Oregon Chrome Producers Assoc. never really got going.

Here are the only production figures for Grant County that I can lay my hands on. We have no departmental production records for the years prior to the "last" stockpile program. Total production from Grant County during the "last" stockpile program amounted to 7,500 long tons valued at $800,000. The production for the last three years of the program is:

| | | |
|---|---|---|
| 1956 | 1533 long tons | $167,390 payments |
| 1957* | 1377 | 142,796 |
| 1958 | 1507 | 176,140 |

*Figure arrived at by subtacting subtotals for period up through 1956 and for the year 1958 from the grand total.

We regret that we have no aerial coverage for your study area. We would greatly appreciate receiving a copy of your paper upon completion. I regret the inability to provide some of the data but our expert on Grant County is out of the State for a time.

Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk

805 Redbud Hill Apt.
Bloomington, Indiana
May 6, 1968

Mr. Ralph S. Mason
Mining Engineer
State of Oregon
Department of Geology and Mineral Industries
Portland, Oregon 97201

Dear Mr. Mason:

Thank you for your letter of March 13.

After exhaustive research, I find there are a couple of questions which still need answring regading the Chromite Industry of Oregon.

(1) The 1962 U.S. Business and Defense Service Administration study entitled "Materials Survey: Chromium" indicated 70 known deposits of chromite in Grant County with atotal reserve of 225,000 long tons. What are the figures which your department carries as to number of mines and total reserves?

(2) Are any of the above mines operating? If so, is the ore being used in benefication process or shipped direct for use?

(3) Vol. 21, Issue number 1, of the Ore-Bin mentions the establishment of the "California-Oregon Chrome Producers Association. This body was to work toward the establishment of a ferrochrome plant. Is the body still active? Has such aplant been established? If so--where? Does Grant County fit into this particular operation or is it solely a Southwestern Oregon chrome producers concern?

(4) Do you have available the yearly production figures for Grant County from 1917 (when it is first mentioned in the U.S. Bureau of Mines report in the Thayer 1940 paper and the Westgate paper) until the present time? I would greatly appreciate receiving these figures if at all available?

(5) Another aspect of my work would be assisted immensely by a stereo-pair of the John Day-Canyon City area. Dr. Wilkinson did not have such available but thought that maybe your office might have a set which could be borrowed for three or four days; If so, I would appreciate these greatly!

If your office would be interested, I would be happy to forward a copy of my chromite paper when it is completed. The paper will deal primarily with the Strawberry-Aldrich uplift chromite deposits.

Thank you for any information or assistance which you might be able to give. As an Oregonian--I'm certainly eager to be on my way home--just 4 weeks from now!

Sincerely yours,

Dale L. Hoekstra

Dale L. Hoekstra

# SOLON SEES DEFENSE VALUE IN CHROME ORE PROJECT

WASHINGTON (AP) -- Senator Warren G. Magnuson, Democrat, Washington, said Saturday there is defense justification for giving a chrome ore processing contract to the Pacific Northwest Alloys plant at Spokane, Wash.

He said in a letter to Gordon Gray, director of the office of defense mobilization (ODM) that there would be ample justification for giving the plant a contract to process 35,000 tons of low-grade domestic chrome ores now stockpiled along the Pacific coast. The plant has shut down chrome operations and released 275 men, he said.

Magnuson recalled that officials of the company, the Spokane chamber of commerce and other interested persons had met with Gray in mid-December. He wrote Gray:

"You promised to take the question under advisement and up to this time, I at least, have heard nothing further about it.

"Pacific Northwest Alloys, Inc., is the only company that has demonstrated the ability and the willingness to handle low grade domestic ores and to do this on an economic or commercial basis.

"The plant in which the company operates is a government owned plant - is a part of the industrial reserve. The personnel and know-how the company has assembled are certainly an important part of our defense potential.

"In the event we were cut off from foreign sources of high-grade chrome ores, it would be tragic if there were no company in the United States capable and willing to operate on the lower grade domestic ores."

- - - - - - - - - - - -

THE OREGONIAN, January 12, 1958.

Chrome

May 21, 1962

Mr. John Bley, Vice President & General Manager
American Chrome Company
Nye, Montana

Dear John:

Just a note of appreciation for your fine letter of May 15 in reply to my inquiry.

You have given me the information I needed and I thank you sincerely for your accommodation.

My best regards.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

AMERICAN CHROME COMPANY
NYE, MONTANA
May 15, 1962



Mr. Hollis M. Dole, Director
State of Oregon
Department of Geology & Mineral Industries
1069 State Office Building
Portland, Oregon

Dear Hollis:

We are glad to give you the information we have gathered on the use of a 53 percent chromium contained ferrochrome produced from domestic ore.

Our company has conducted a continuous market investigation and evaluated the results periodically from the time of the company's inception ( December 1950 ). From these studies and other sources, it is concluded that there is a growing interest in the United States industries for development of domestic supplies of chromite and chromium alloys.

The market investigation, among other things, included potential market for 53 percent chromium contained ferrochrome, prices, services and trends. The survey was made of ferrochrome consumption in all major steel companies and foundries ( except West Coast ). From this study we found that 88 percent of high carbon ferrochrome in the United States is used by twelve steel companies. All of these companies could use a low chromium contained high carbon ferrochrome like that made by our company of the following analysis: Chromium: 50-55 % Carbon: 4 - 5 % Silicon: 1.5 to 2.5 %. In fact, several of the major companies had authorized their purchasing departments to list us as one of their suppliers. Accordingly, we have sold 2500 tons of our alloy with another 400 tons committed to be sold in the next few months.

Presently the price is 22 to 24 cents per pound of chromium contained. We are of the opinion that a well designed, automated plant with quantity production can operate profitably under the present price structure.

There is a growing trend to use a lower chromium contained ferrochrome in the United States. From our studies and sales of our ferrochrome to major steel companies ( Allegheny Ludlum Steel Corporation; United States Steel; Youngstown Sheet & Tube Company ) the growing interest of the domestic industries in the development of

Mr. Hollis M. Dole May 15, 1962

an uninterruptible supply of chromium alloys has been evident. In other words, our industries are becoming more cognizant of the necessity for domestic supplies.

Obviously our government has a similar interest. In addition, it is vitally concerned for an uninterruptible supply for defense and national emergencies.

Yours very truly,

John Bley

JOHN BLEY
Vice President &
General Manager

JB/mbd.

SHIPPERS OF CHROME TO GRANTS PASS

Southwestern Oregon

Ashland Mining Company
835 No. Main Street
Ashland, Oregon

Victor Bag
806 S.E. 8th Street
Grants Pass, Oregon

Ben Baker
42 S.W. Eastern Avenue
Grants Pass, Oregon

J. W. Cruse
Rt. 1, Box 161
Gold Hill, Oregon

Howard Beasley
Box 15
Takilma, Oregon

Herbert Cameron
1881 S.E. "N" Street
Grants Pass, Oregon

Fred Baumgartner
Box 168
Brookings, Oregon

Chrome Industries
1100 N.W. "F" Street
Grants Pass, Oregon

T. E. Collins
P.O. Box 622
Central Point, Oregon

Stephen Blevins
Box 622
Central Point, Oregon

C. C. Wikstrom
P.O. Box 238
Powers, Oregon

Robert S. Dolard
Rt. 3, Box 721
Grants Pass, Oregon

Albert Dunn
Canyon City, Oregon

W. B. Freeman
Cave Junction, Oregon

Harold T. Funk
711 S.W. Greenwood Dr.
Grants Pass, Oregon

J. G. Gallaher
716 N.E. "A" Street
Grants Pass, Oregon

Fred Gardener
Harbor, Oregon

Wm. W. Gardener
Box 176
Canyon City, Oregon

J. N. Grissom
Selma, Oregon

Roy Hansen
Selma, Oregon

R. D. Hicks
Kerby, Oregon

Holiday Mines
P.O. Box 1037
Brookings, Oregon

Dorothy Kartes
Glendale, Oregon

Guy Kelly
Myrtle Creek, Oregon

Fred Langley
S.E. 6th Street
Grants Pass, Oregon

C. W. Dean
S.E. 6th Street
Grants Pass, Oregon

Larry Lee
Cave Junction, Oregon

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Southwestern Oregon

Louis Lively
Cave Junction, Oregon

D. H. Loyd
Selma, Oregon

Arthur Moothart
3919 S.W. Bourne St.
Roseburg, Oregon

B. A. McCaleb
Selma, Oregon

M. J. McShane
590 East Park Street
Grants Pass, Oregon

E. K. McTimmonds
~~600 N.W. "F" Street~~
~~Grants Pass, Oregon~~ Selma

C. E. Nichols
Box 242
Selma, Oregon

James L. Perry
Box 32
Cave Junction, Oregon

Thomas M. Petrie
930 Grandview Avenue
Grants Pass, Oregon

R. W. Radcliffe
Star Route
Merlin, Oregon

Ruth Robertson
Box 475
Grants Pass, Oregon

Wm. S. Robertson
Box 475
Grants Pass, Oregon

Sidney H. Sanders
Grants Pass, Oregon

Loren Schmid
Gold Hill, Oregon

J. C. Smith
Wilderville, Oregon

Sherman Smith
N.W. "D" Street
Grants Pass, Oregon

Carl Stevens
Grandview Avenue
Grants Pass, Oregon

J. D. Stinette
Canyon City, Oregon

George Tulare
Route 2
Gold Hill, Oregon

L. W. Tulare
731 Burgess Street
Grants Pass, Oregon

E. R. Brown
O'Brien, Oregon

D. W. Bowers
48 Rose Avenue
Medford, Oregon

W. D. Bowser
1504 West Main
Medford, Oregon

28

Fay Bristol
Rogue River, Oregon

Jack D. Brownell
S.W. Oak St.
Grants Pass, Oregon

Ed Carlson
416 N.W. "A" St.
Grants Pass, Oregon

E. A. Foster
Selma, Oregon

Roy Hillis
210 S.W. Pine Street
Grants Pass, Oregon

Southwestern Oregon

27
28
5
60

S. B. Lewis
Rt. 3, Box 678
Grants Pass, Oregon

Jean Presslar
S.E. Fern Street
Grants Pass, Oregon

Harry L. Shippen
Box 260
Canyonville, Oregon

Bob Oliphant
Cave Junction, Oregon

Dean S. Axtell
2000 S.W. "G" Street
Grants Pass, Oregon

## Eastern Oregon

Joe Anderson
Ironside, Oregon

Paul Towell
Ironside, Oregon

William Wright
John Day, Oregon

Comstock Uranium & Tungsten Co.
John Day, Oregon

Burt Hayes
John Day, Oregon

H. G. Heathman
John Day, Oregon

Harland Jones
John Day, Oregon

CHROMITE DELIVERED TO GRANTS PASS STOCKPILE

| Quarter ending | Ore delivered during quarter (long tons) | Cumulative deliveries (long tons) | Federal Register reference |
|---|---|---|---|
| 9-30-53 | 9,280 | 37,400 | 10-4-53, p. 6979 |
| 12-31-53 | 9,240 | 46,640 | 2-18-54, p. 962 |
| 3-31-54 | 6,448 | 53,088 | 5-7-54, p. 2644 |
| 6-30-54 | 7,391 | 60,479 | 8-28-54, p. 5526 |
| 9-30-54 | 9,561 | 70,040 | 10-6-54, p. 7245 |
| 12-31-54 | 7,359 | 77,399 | 2-15-55, p. 963 |
| 3-31-55 | 5,003 | 82,402 | 5-10-55, p. 3178 |
| 6-30-55 | 5,431 | 87,833 | 8-27-55, p. 6307 |
| 9-30-55 | 6,152 | 93,985 | 11-29-55, p. 8768 |
| 12-31-55 | 7,649 | 101,634 | 2-14-56, p. 1041 |
| 3-31-56 | 4,018 | 105,652 | 5-19-56, p. 3332 |
| 6-30-56 | 6,971 | 112,623 | 9-1-56, p. 6623 |
| 9-30-56 | 13,908 | 126,531 | 11-29-56, p. 9335 |

CHROMITE
by
F. W. Libbey*

Domestic Production[1]

| State | 1955 | | 1956 | | Remarks |
|---|---|---|---|---|---|
| | Short Tons | Value | Short Tons | Value | |
| Alaska | 7,082 | $ 625,340 | 7,200 | $ 704,000 | |
| California | 22,105 | 1,834,277 | 25,000 | 2,074,500 | |
| Montana | 118,703 | 3,718,882 | 121,000[2] | 3,790,930[2] | Value for 1956 estimated by author |
| Oregon | 5,341 | 463,514 | 8,330 | 709,000 | |
| Washington | 22 | 1,706 | 25 | 2,000 | Tons and value for 1956 estimated by author |
| TOTALS | 153,253 | $6,643,719 | 161,555 | $7,280,430 | |

1 Estimates for 1955 by U.S. Bureau of Mines. Preliminary estimates for 1956 by Bureau of Mines except those under "Remarks".

2 Tonnage and value for Montana not included in government purchase program involving 200,000 long tons; tonnage delivered under this program amounts to about 40,550 short tons for 1956 or approximately 36,500 long tons, leaving about 62,000 long tons to be purchased after January 1, 1957.

Published statistics on chromite by the Bureau of Mines (to February 19, 1957) cover only 11 months of 1956. During that time, imports totaled 1,987,942 short tons compared with 1,827,960 short tons for all of 1955. Consumption for 11 months of 1956 amounted to 1,670,385 short tons compared with 1,583,983 for all of 1955.

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* Mining engineer, Portland, Oregon.

Alaska

Phil R. Holdsworth, Commissioner of Mines, reports that the average grade shipped by Kenai Chrome Company, the only producer, was about 45 percent $Cr_2O_3$ and 2.6 to 1 chrome-iron ratio. The company's new mill to concentrate disseminated ore is scheduled to start early in 1957.

California

The State Division of Mines reports that the government's carlot buying program is an important factor in maintaining production of chromite in California. Chrome producers in the State believe that the program benefits both the producers and the government.

Montana

The Bureau of Mines statistics show that since start of operations in August 1953, the American Chrome Company has delivered 373,000 tons on its government contract to deliver 900,000 short tons of concentrates by December 31, 1961. A renegotiation of contract price from $34.97 to $32.62 per ton was effected late in 1955.

Oregon

The State Department of Geology and Mineral Industries reports that a new chrome ore body in the Oregon Chrome mine in Josephine County was discovered by the owner, W. S. Robertson, and put in production. The John Day district of Grant County produced 1,533 long dry tons of ore and concentrates valued at $167,390 or an average of $109.00 a long ton.

Summary

It was announced in May 1956 by the Office of Defense Mobilization that the chrome purchase program would be extended to June 30, 1959. By the end of 1956 it is estimated that approximately 138,000 long tons of the 200,000 long tons originally scheduled had been delivered, leaving a balance of about 62,000 long tons to be purchased. At the present rate of production the axe would fall about October 1958.

The case-hardened chrome miner has little hope that anything of benefit to him will come out of the long-awaited long-range government plan to stabilize the mineral industry. Also it appears unlikely that official Washington, in the absence of an emergency, will get down through the various upper-crust layers of the industry to the little fellows like the chrome miners.

May 8, 1962

Mr. John Bley, Vice President & General Manager
American Chrome Company
Nye, Montana

Dear John:

I wonder if you would kindly help us out on a problem we are faced with here in Oregon.

One of our chrome miners is trying to patent his land and the Forest Service is contesting it on the grounds that the ore is not economic. This in the face of the U.S. Bureau of Mines drilling the property and showing the presence of in excess of 50,000 tons of ore. The Bureau has also run metallurgical tests on it showing that it will produce a 53 percent ferrochrome. Contention of the Forest Service is that 53 percent chrome is not marketable.

I know that you have made studies on the marketability of this type of ferrochrome at great expense to yourself. However we hope that you will see your way clear to advise us on whether or not this can be sold and to whom. Also have you been able to market any of your material that runs around this percentage of chrome in ferrochrome? In other words, what we are trying to determine is: Is there a market for 53 percent ferrochrome and if so, what would the price be?

I realize that this is a great imposition upon you. Nevertheless I do not hesitate to make the request as my feelings toward the Forest Service are such that I have no qualms in asking.

Regards.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

COSTS OF PRODUCTION (LESS CHROME ORES) OF
STANDARD HIGH-CARBON FERROCHROME* AT VARIOUS LOCATIONS

| Cost Elements (Less Chrome Ores) | Price per Net Ton at Plant | Quantity in lbs. per Net Ton | Cost per Net Ton of Product |
|---|---|---|---|
| Grants Pass Plant | | | |
| Coke | $21.00 | 900 | $ 9.50 |
| Limestone | $5.00 | 200 | .50 |
| Electrodes | $746.00 | 80 | 29.80 |
| Power | 7.075 Mills/kwh | 7000 kwh | 49.50 |
| Relining | - - - | - - - | 2.40 |
| Labor | - - - | - - - | 30.60 |
| Capital Recovery | - - - | - - - | 46.30 |
| Maintenance | - - - | - - - | 6.20 |
| Insurance | - - - | - - - | 3.70 |
| Employer Contributions | - - - | - - - | 3.10 |
| Taxes | - - - | - - - | 1.10 |
| Total (less chrome ore) | | | $ 182.70 |

- - - - - - - - - - - -

* 65-70% Cr, 4-9% C.

"Summary Analysis of the Feasibility of Ferrochrome Production from a Plant Located in the West to Utilize Domestic Chrome Ores", prepared for the State of Oregon Department of Planning & Development and Department of Geology & Mineral Industries by Ivan Bloch & Associates, Portland, Oregon, March 24, 1958, p. 10.

Chrome

| Name & Address | Mine Name | County & District |
|---|---|---|
| L.E. Chesser & Fred Baumgartner | Rosie Chrome | Curry County - Chetco Dist. |
| * Robert S. Doland | Twin Ridge | California near High Plateau |
| Burt S. Hayes John Day | | Grant County |
| Harry G. Heathman John Day | Haggard & New | Grant County |
| Harland W. Jones John Day | | Grant County |
| E.K. McTimmonds | Rancherie | Josephine County - Illinois River Di |
| Waldo Milling Co., Inc. | Collard-Nylund | Josephine County - Waldo Dist. |

- - - - -

* Doland not owner - built road and received payment through shipment. Owners are "Pop" Miller and Walt Freeman.

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Burt Hayes, address John Day. During 1956, Mr. Hayes leased a showing of shipping grade lump ore on the ranch property of Wayne Stewart, Dayville. The showing was located on the South Fork of the John Day River about 3 or 4 miles south of the John Day - Prineville highway. Hayes couldn't tell me the sections, and since a range line runs right down the river here it is difficult to estimate the location with any reliability beyond its being T. 13 S. and an appropriate section in either R. 33 or 34 E. Hayes shipped one shipment of lump ore from this property August 9, 1956, 13.7857 dry long tons, $1,244.89, but then gave up the lease.

Harry G. Heathman, address unknown. Mr. Heathman has functioned as contract trucker during 1955 and 1956 for many of the eastern Oregon shippers, and during the last few months of 1956 he was superintendent for the Comstock Uranium-Tungsten Company, operators of the Haggard and New mine. Insofar as is known, Mr. Heathman never had any operational lease of his own on any property at any time. It is understood, however, that he did make a practice of signing himself as "shipper" for many of the shipments he delivered for others as contract hauler. It is also reported that he may have collected on a few shipments made in his own name from ore lifted from some of his customer's shipments and stockpiled in Prineville until he accumulated enough for a shipment. It is also understood, and commonly discussed openly in John Day by various of the interested parties, that Heathman shipped the last three rail cars of 167 tons of the Comstock Company's concentrates to some private buyer in his own name and collected personally for same. These comments represent comments for which I cannot vouch other than to say that they are oft-repeated stories heard from many different informants over a period of considerable time in sufficient volume to suggest a certain measure of truth. I can however say that the Comstock Uranium-Tungsten Company shipped 923.1750 dry long tons of concentrates between March 19, 1956 and December 31, 1956, as per the property owners' copies of the official settlement sheets. This represents all known Haggard and New shipments for 1956, except for the 167 ton gross wet weight rail shipments that <u>are known</u> to have been made also.

<u>Harlan Jones</u>, address John Day, made one small shipment of concentrates early in 1956. This originated from a prospect on the William Gardner ranch and in the vicinity of the Al Dunn lease on Dog Creek - T. 14 S., R. 32 E., probably section 8. The shipment represented development rock from a prospect that milled about 4 or 5 to 1 and which didn't pan out too encouraging on development so there was no follow through work by Jones.

Eastern Oregon chrome shipments for 1956 total 1533 dry long tons valued at $167,390.00 as per copies of a ctual settlement records for about 99 percent of all chrome shipped. I can furnish the details tabulated by shippers, shipments, properties, locations, owners and full settlement sheet weight, assay and settlement figures if desired.

February 11, 1975

Mr. Norman S. Wagner
2624 First Street
Baker, Oregon 97814

Dear Wag:

I am enclosing the proposal for making the evaluation of chromite deposits in Oregon.

I hope you won't want to make any drastic changes in it but if so, let me know as soon as possible. Otherwise please sign the original title page and return it to me as is. (We are sending you a complete xerox copy of the proposal for your files.)

I have also included an outline for a resume as the Bureau of Mines has requested that these accompany any such proposal. You may already have such a resume in your files but if not, would you please put one together.

If you have any further questions, please call me.

Best regards.

Sincerely yours,

Raymond E. Corcoran
State Geologist

REC:jr
Encl.

APPLICATION FOR GRANT

PROPOSAL SUBMITTED TO

THE U.S. BUREAU OF MINES

by

OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1069 State Office Building
Portland, Oregon 97201

TITLE OF PROPOSED PROJECT:

CHROMITE DEPOSITS IN OREGON

Principal Investigator: Norman S. Wagner, Consulting Geologist
Department of Geology and Mineral Industries
1069 State Office Building
Portland, Oregon 97201

PROPOSED STARTING DATE: March 1, 1975

PROPOSED COMPLETION DATE: December 1, 1975

AMOUNT REQUESTED FROM U.S. BUREAU OF MINES . . . . . . . . . . . . $ 16065

OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES . . . . . . . 3054

TOTAL PROJECT COST . . . . . . . . . $ 19,119

E N D O R S E M E N T S

| | Principal Investigator: | Approving Administrative Official: |
|---|---|---|
| Name: | Norman S. Wagner | Raymond E. Corcoran |
| Signature: | | |
| Title: | Consulting Geologist<br>Oregon Department of Geology<br>and Mineral Industries | State Geologist<br>Oregon Department of Geology<br>and Mineral Industries |
| Date: | | |

PROJECT PROPOSAL

FOR A

STUDY OF CHROMITE DEPOSITS IN OREGON

This is an unsolicitied request to make a study of the chromite deposits in Oregon.

## Objective

The objectives of the study are as follows: (1) obtain up-to-date resource, mining, and metallurgical information on chromite deposits in the State; (2) develop this information for input into the U.S. Bureau of Mines Materials Availability System (MAS); (3) submit the information in the form of completed MAS data record sets for the deposits investigated; and (4) prepare a final report on the chromite deposits of central Oregon for publication by the State of Oregon as a bulletin. This report will complement Department Bulletin 52 (Chromite in Southwestern Oregon) by Len Ramp.

## BACKGROUND

The chromite deposits in Oregon are of two kinds:

(1) Irregular to tabular bodies of the ~~powder-form~~ podiform type in or associated with peridotite and serpentine. The chromite can occur as massive accumulations and also as discrete crystals or grains in the ultramafic rocks. Such deposits are found in the Blue Mountains ~~in the~~ of central and northeastern Oregon ~~part of the State~~ and the Klamath Mountains in the southwestern part of the state.

(2) Mineable concentrations of chromite in beach sands along the coast in Coos and Curry counties.

The known ~~powder-form~~ podiform chromite deposits in Oregon range in size from a few pounds to nearly 100,000 tons. All of the known deposits have been found by surface exposures or by exploration and mining close to known ore bodies. Despite long and continued research, no reliable economic method has been devised for finding "blind" deposits concealed just below the ground, especially in areas of moderate or high relief.[1/]

Chromite Deposits in Southwestern Oregon

Most of the chromite deposits of southwestern Oregon occur in lens-shaped bodies with pseudotabular form. A single layer of massive chromite may have

Bull 52 p. 15

Bull 52 p. 15

been folded, cut by faults, and sheared during serpentinization so that the resulting forms are a group of lens-shaped pods, none of which are thicker than the original layer.[2/]

The largest bodies of massive metallurgical grade ore mined in Oregon were from the Robertson (Oregon Chrome) mine in the Central Illinois River area, where single lenses as much as 15 to 20 feet thick and groups of closely spaced smaller bodies of massive chromite have yielded more than 5,000 tons each. Total production from this mine, Oregon's largest chromite producer, has been about 32,000 long tons of ore which averaged near 46 percent $Cr_2O_3$, with 2.7:1 chrome-iron ratio. Development work has been carried to a depth of about 500 feet.[1/]

Bull 64 p. 112

The majority of known deposits in the areas studied have relatively small dimensions. Lenses or discontinuous layers of massive chromite generally vary from a few inches to 3 or 4 feet in thickness. The exceptionally well exposed Prospectors Dream deposit south of Pearsoll Peak in the Chetco district, Curry County, is probably typical of the majority of southwestern Oregon deposits as they were prior to late deformation during serpentinization. This deposit

Bull 52 p. 16

Bull 58 p. 16

consists of an unsheared "layer" of chromite in dunite which enlarges from a barely perceptible wisp to a maximum exposed thickness of about 3 feet in a distance of less than 200 feet. In places it completely disappears on the surface, then reappears along the strike.[2/]

Chromite ~~Podiform~~ Deposits in Northeastern Oregon

Bull 64 p. 113

Probably at least 200 chromite mines and prospects could be identified in eastern Oregon; their total production is about 30,000 long tons. Most of the prospects are in Grant County[3/][4/] and concentrated in two areas; in Canyon Mountain, south and southeast of John Day, and in the Fields Creek - Deer Creek belt 20 miles to the west. All seven of the mines that have yielded more than 1,000 tons each are in peridotite of the Canyon Mountain Complex, which has yielded at least 90 percent of the production from the region. The Canyon Mountain Complex is 12-13 miles long by 4-5 miles wide; the northern part consists of chromite-bearing peridotite, and the southern half of gabbroic and dioritic rocks. Three of the largest deposits or groups of deposits, the Iron King, Haggard and New - Present Need Group, and Chambers, are near the gabbro[4/] but the others are scattered at random. All the larger deposits are now accessible from maintained forest roads.

Possibly half a dozen mines outside the Canyon Mountain Complex have yielded more than 100 tons apiece.1/

The eastern Oregon deposits range from high-chromium ore containing at most about 55 percent $Cr_2O_3$ and having a maximum chrome-iron ratio of 3.25:1 to high-alumina ore containing about 32 percent $Cr_2O_3$, 32 percent $Al_2O_3$, and having a chrome-iron ratio of about 1.75:1. Except for about 13,500 tons of low-grade, high alumina ore mined in 1916-17, mining has been limited to high chromium ores that met specifications of the Government purchase programs.

Bull 64 p. 113

## Beach Sands 1/

Chromiferous black sands occur in the present beaches and on raised marine terraces along the coast in Coos and Curry counties.5/ The black sands occur in lenses and layers from a few inches to 42 feet thick, from a few tens of feet to 1,000 feet or more wide, and from a few hundred feet to more than a mile long. The overburden ranges up to 75 feet of sand, clay, and gravel. Besides chromite, the minerals of possible economic interest in the sands are zircon, ilmenite, garnet, magnetite, and rutile, together with minute quantities of gold and platinum. The proportion of chromite in the sands varies widely

Bull 64 p. 113

from place to place. Although some high-grade layers contain as much as 26 percent $Cr_2O_3$ (53 percent chromite), the average grade of minable sand is believed to be about 5 percent $Cr_2O_3$, or 10 percent chromite. The chromite in the black sands originally was eroded from peridotite and serpentine in the Klamath Mountains, distributed by along-shore currents, and concentrated by wave action. The chromite is believed, however, to have been deposited first in Tertiary sedimentary rocks, then released by erosion and redeposited in the beaches.[5]

Bull 64 p. 118

Systematic exploration of the sands was undertaken in 1940 by the State of Oregon Department of Geology and Mineral Industries and the U.S. Geological Survey, and later by the U.S. Bureau of Mines which also investigated means of recovering the chromite. In 1943 the Humphreys Gold Corporation, with the newly invented Humphreys spiral, and the Krome Corporation by conventional tables, recovered about 78,000 long tons of rougher concentrates averaging 24-25 percent $Cr_2O_3$ from nearly 450,000 tons of crude sand. From part of the rougher concentrates a special plant erected at Coquille by the Defense Plant Corporation produced 10,641 tons of final concentrates in 1943, averaging 39.3 percent $Cr_2O_3$

Bull 64 p. 114

Bull 64 p. 114

with a chrome-uron ratio of approximately 1.6:1. In 1955 and 1956, 40,813 tons of concentrates averaging about 37 percent $Cr_2O_3$ was recovered from the remaining rougher concentrates and smelted to ferrochromium for the National stockpile. Separation of the chromite from magnetite and ilmenite is difficult because the magnetic properties and densities of the three minerals overlap within a restricted range. Electromagnetic and electrostatic methods were used in 1955 and 1956.

# PLAN OF WORK

## Preliminary Study

(1) Utilizing information and map coverage available, the following will be completed:

(a) Outline as accurately as possible all known and potential areas of chromite in the State.

(b) List all known occurrences

(c) List available reference material

(2) Analyze the information gained from the preliminary study and decide how best to develop the reserves, mining system, deposit characteristics, and geographic and environmental characteristics for inclusion into the MAS file. Select the areal unit that best fits in the MAS requirements.

## Field Work

(1) On the basis of a preliminary study, visit those areas in central and eqstern Oregon where additional information is required. Obtain representative samples and complete necessary reconnaissance mapping to increase the accuracy of grade and tonnage estimates. Field work in southwestern Oregon will probably not be required because of the extensive survey that was completed by Ramp in that part of the State in 1961.

(2) During the period of the field work, photographs will be taken suitable for inclusion in the State bulletin.

## Preparation of Data

(1) The data accumulated in the preliminary study and field work sampling and reconnaissance will be coded and entered in the MAS record sets.

(2) The U.S. Bureau of Mines will supply blank record sets, MAS Resource Classification Manuals, and will provide technical advice and assistance if problems arise in coding.

(3) Preparation of maps and tonnage estimates for the State publication will be reported in the areal units prepared for the MAS coded record sets, and detail that cannot be included in the coded record sets will be included in the State bulletin. Preparation and publication of the State bulletin will have to be delayed until funds are allocated to the Department during the State Legislative Session, January - May, 1975.

## Submission of Data and Report Printing

Data obtained in the study will be submitted to the U.S. Bureau of Mines in the form of the completed MAS coded data record sets for all the deposits investigated. The publication for the State will carry a charge to the general public. The copies desired by the Bureau for internal distribution will be furnished without charge.

Completed MAS coded data records covering most of the deposits in southwestern Oregon will be submitted on or before May 1, 1975. Data records on chromite occurrences in central and northeastern Oregon will be submitted on or before October 1, 1975. The final report will be ready for publication on or before December 1, 1975.

## REFERENCES

1/ Thayer, T.P., and Ramp, L. Mineral and Water Resources of Oregon, Chapter on Chromite. Oregon Dept. of Geology and Mineral Industries Bulletin 64, 1969.

2/ Ramp, L. Chromite in Southwestern Oregon. Oregon Dept. of Geology and Mineral Industries Bulletin 52, 1961.

3/ Thayer, T.P. Chromite Deposits of Grant County, Oregon, A Preliminary Report. U.S. Geol. Survey Bulletin 922-D, 1940.

4/ Thayer, T.P., Preliminary Geologic Map of the John Day Quadrangle, Oregon. U.S. Geol. Survey Mineral Inv. Field Studies Map MF-51, 1956.

5/ Griggs, A.B. Chromite-Bearing Sands of the Southern Part of the Coast of Oregon. U.S. Geol. Survey Bull. 945-E, 1946.

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## U. S. Geological Survey


Bull. 725-A Chromite in the Klamath Mountains, California and Oregon: J. S. Diller, 1921.

Bull. 846-A Some mining districts of eastern Oregon: Gilluly, Reed and Park, 1933.

Bull. 846-B Geology and ore deposits of the Takilma-Waldo district, Oregon: Shenon, 1933.

Bull. 922-D Chromite deposits of Grant County, Oregon: T. P. Thayer, 1940.

Bull. 922-P Chromite deposits in the Sourdough area, Curry County and the Briggs Creek area, Josephine County: Wells, Page and James, 1940.

Bull. 945-E Chromite bearing sands of the southern part of the coast of Oregon: A. B. Griggs, 1945.

Bull. 725 Deposits of chromite in eastern Oregon: L. G. Westgate, 1921.

Circular 48 Beach placers of the Oregon coast: J. T. Pardee, 1934.

File 2-12

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### State Department of Geology and Mineral Industries

| | | | |
|---|---|---|---|
| Ore.-Bin | | April 1951 | Chromite (survey of U. S. imports). |
| " | " | ____________ | Chromite occurrences in southwestern Oregon (table and map). |
| " | " | June 1951 | Government's program for purchase of chrome ores and concentrates at Grants Pass, Oregon. |
| " | " | ____________ | Meeting of chrome miners at Grants Pass. |
| " | " | ____________ | Graph showing scale of prices paid by government for chromite. |
| " | " | May 1952 | Government allows increased tonnage. |
| " | " | ____________ | Government contracts for Montana concentrates. |
| " | " | July 1952 | California-Oregon chrome producers. |
| " | " | November 1952 | Chromite, an immediate national need. |
| " | " | ____________ | List of chrome mills. |

Bulletin 52, Chromite in southwestern Oregon, 1961 ($3.50)

Bulletin 80, Geology and mineral resources of Coos County, 1973

# OREGON CHROMITE AND BLACK SAND BIBLIOGRAPHY

## War Minerals Reports

49 John Day district, Grant County, Oregon.

69 Sourdough mine, Curry County, Oregon.

204 John Day chromium deposits, Grant County, Oregon.

279 Sourdough chrome property, Curry County, Oregon.

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## U. S. Bureau of Mines


R.I. 3668 Mineral dressing of Oregon beach sands: John Dasner et al, 1942.

R.I. 3675 (Recapitulation of R.I. 3668).

R.I. 3814 Magnetometer surveys on black sands of the Oregon coast: E. L. Stephenson, 1945.

R.I. 3694 Brief mention of Esterley mine.

R.I. 4011 Columbia River magnetite sands, Clatsop County, Oregon, and Pacific County, Washington, Hammond and McGowan deposits: J. V. Kelly, 1947.

R.I. 4001 Chromiferous sand deposits in the Coos Bay area, Coos County, Oregon: R. J. Hundhausen, 1947.

T.P. 196 Notes on the black sand deposits of southern Oregon and northern California: R. R. Horner, 1918. (Chiefly for Au and Pt)

CHROME

| Legal Description | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Baker County: | | | | | | | |
| T. 7 S., R. 35 E., Sec. 35 | | Paul Van Arsdale | MB-2 | Jan. 23, 1952 | 0.10 | 12.10 | |
| T. 10S., R. 35½E., Sec. 14 | Brandenthaler | Baker Office | OB-51 | Mar. 29, 1954 | 34.60 | 28.76 | Winterville Placer |
| T. 10S., R. 35½E., S. | | Anthony Brandenthaler | CB-195 | May 8, 1942 | 47.8 | | " " |
| " " | | " " | CB-217 | May 19, 1942 | 48.8 | | " " |
| No legal | | " " | CB-246 | June 6, 1942 | 45.6 | | " " |
| " " | | " " | CB-247 | " " | 40.0 | | " |
| " " | | " " | CB-321 | July 1942 | 44.5 | | |
| T. 10 S., R. 35E, Sec. 15 | | Jess Edwards | OB-110 | June 21, 1954 | 53.75 | 10.85 | Greenhorn |
| T. 9S., R. 36E., Sec. 22 | | Clark Allen | NB-95 | June 22, 1953 | 1.10 | 0 | Granite Road |
| T. 9S., " " | | " " | NB-130 | July 14, 1953 | .086 | 0 | |
| T. 13S., R. 36E. Sec. 12 | | Ralph Walker | | June 1938 | 48.7 | | Unity |
| T. 13 S., R. 36E., Sec. 14 | | Frank Miller | BB-876 | Oct. 20, 1941 | 51.10 | | |
| T. 14S., R. 36E., Sec. 9 | | Prescott Lilley | BB-1005 | Dec. 1941 | 42.9 | | |
| " " " | | " " | BB-1006 | Dec. 1941 | 42.2 | | |
| T. 14S, R. 36E., Sec. 9 | | Edward Hiller | OB-228 | Sept. 7, 19 | 38.30 | 10.18 | Lyons Ridge Road |
| " " " | | " " | OB-145 | July 16, 1954 | 47.44 | 9.95 | Upper Burnt River |
| T. 14S., R. 36E., Sec. 11 | | John Hoopes | MB-76 | May 28, 1952 | 42.67 | 0.10 | near Mud Springs |
| " " " | | " " | MB-104 | June 12, 1952 | 38.40 | 10.90 | |
| " " " | | Paul Remaley | OB-202 | Aug. 19, 1954 | 35.10 | 11.34 | |

CHROME

| Legal | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| T. 14S., R. 36E., Sec. 11 | | James M. Thompson | OB-218 | Aug. 31, 1954 | 43.17 | 11.73 | Barney Creek Road |
| T. 14S., " " | | " " | OB-219 | " " | 49.73 | 10.84 | " " " |
| T. 14S., R. 36E., Sec. 20 | | C. B. Heaton | QB-239 | Oct. 1, 1956 | 52.90 | 10.50 | Upper Burnt River |
| T. 11 S., R. 39E., Sec. 36 | | O. R. Sipp | OB-64 | Apr. 15, 1954 | 37.063 | 8.62 | |
| T. 11S., R. 39 E. Sec. 35 | | Chas. Berry | FB-124 | June 8, 1955 | 36.90 | 14.96 | |
| T. 12S. R. 39 E., Sec. 4 | | Anthony Brandenthaler | CB-196 | May 9, 1942 | 43.0 | | |
| T. 12S., R. 39 E., Sec. 6 | | John M. Swenson | NB-195 | Sept. 10, 1953 | 39.6 | 14.55 | |
| T. 12S, R. 39E, Sec. 8 | | A. L. Olsen | MB-53 | May 14, 1952 | 42.77 | 9 | |
| T. 12S., R. 39E. Sec. 9 | | " " | NB-248 | Nov. 4, 1953 | 43.40 | 15.07 | |
| T. 13S., R. 40E., Sec. 12 | | John Pittman | TB-150 | Oct. 13, 1959 | 47.33 | 10.80 | |
| T. 12S., R. 40E., Sec. 30 | | Bill Mead | BB-416 | June 16, 1941 | 50.6 | | |
| T. 13S., R. 40E, Sec. 24 | | Henry Ruff | PB-57 | Apr. 12, 1955 | 53.98 | 8.95 | |
| T. 13S., R. 40E. | | Merrit O. Griffith | 760 | June 13, 1940 | 55.8 | | |
| T. 9S., R. 41E., Sec. 10 | | Andy Murray | RB-157 | Aug. 18, 1957 | 35.60 | 0 | Tungsten .26 |
| T. 12S., R. 41E, Sec | | Walter Givens | CB-484 | Dec. 21, 1942 | 29.8 | | Lower Burnt River |
| T. 12S., R. 41E, Sec. 34 | | A. G. Blomster | NB-65 | May 13, 1953 | 47. | 12.78 | Upper " " |
| T. 12S., R. 41E, Sec. 35 | | C. E. Stauffer | 654 | May 29, 1940 | 56.7 | | |
| T. 12S., R. 41E, Sec. 36 | | B. F. Kulis | OB-147 | Dec. 6, 1954 | 49.5 | 9.52 | |
| T. 13S., R. 41E., Sec. 2 | | Harold C. Smith | CB-134 | Mar. 24, 1942 | 55.6 | | |

CHROME



| Legal Description | Mine | Sender | Number | Date | Cr | FE | Remarks |
|---|---|---|---|---|---|---|---|
| T. 7S., R. 37E., Sec. 17 | | E.L. Ryan | BB-882 | Oct. 21, 1941 | 52.8 | | |
| T. 9 S., R.37E., Sec. 17 | | G.P. Lilley | BB-303 | May 15, 1941 | 53.7 | | |
| T.10S., R. 37E., Sec. 19 | | H.C. Collins | | Aug. 3, 1941 | 53.9 | | |
| no legal | | Thornton E. Peeples | 147 | Sept. 13,1939 | 39.8 | | |
| T. 7S., R. 38E. Sec. 28 | | Mrs. Lloyd Sherred | OB-159 | July 30, 1954 | 36.92 | 9.67 | Rock Creek D. |
| T. 8S., R. 38 E., Sec. 8 | | Oliver D. Markle | XB-140 | Sept. 20, 1963 | 0.20 | | Maganese 0.10 |
| T. 10S., R.38E., Sec. 7 | | W. A. McMillan | MB-216 | Sept. 15, 1952 | 13.08 | | |
| T. 11S., R. 38E., Sec. 26 | | J. A. Anderson | PB-45 | Apr. 4, 1955 | 30.70 | 9.06 | |
| T. 13S., R. 38E., Sec. 22 | | Charles Berry | PB-131 | June 3, 1955 | 40.66 | 10.58 | |
| T. 11S., R. 39E., Sec. 28 | | A. L. Olsen | QB-91 | June 6, 1956 | 43.50 | 14.10 | |
| T. 11S., R. 39E., Sec. 34 | | L. B. Larson | TB-126 | Sept. 17, 1959 | .50 | | |
| T. 11S., R. 39E., Sec. 22 | | Chas. R. Sipp | NB-79 | June 1, 1953 | 29.93 | 10.33 | Stices Gulch |
| T. 9S., R.45E., Sec. 23 | | G. J. Turnbow | CB-269 | June 9, 1942 | 34.1 | | Love Creek |
| T. 9S., R. 43E., Sec. 23 | | Culley Trickel | BB-244 | Apr. 22, 1941 | 43.3 | | Glasgow Butte |
| T. 9S., R. 43E. | | Irving Rand | CB-299 | June 29, 1942 | 33.3 | | " " |
| no legal | | Anthony Brandenthaler | CB-305 | July 6, 1942 | 37.7 | | " " |
| no legal | | " " | CB-335 | Aug. 5, 1942 | 45.9 | | |
| " " | | " " | CB-336 | " " " | 41.5 | | |
| " " | | " " | CB-337 | " " " | 43.3 | | |
| " " | | " " | CB-338 | " " " | 40.1 | | |

| Legal | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Baker County: | | | | | | | |
| No, legal | | Anthony Brandenthaler | CB-285 | June 22, 1942 | 33.9 | | Love Creek |
| " " | | " " | CB-286 | " | 35.6 | | " " |
| " " | | " " | CB-374 | Aug. 1942 | 31.8 | | Unity |
| " " | | " " | CB-375 | " | 47.2 | | " |
| T. 8S., R. 43E. | | " " | CB-245 | Aug. 5, 1942 | 48.2 | | Upper Burnt River |
| T. 9S., R. 43E., Sec. 15 | | Thomas Linton | BB-874 | Oct. 16, 1941 | 24.4 | | |
| T. 12S, R. 43E., Sec. 14-23 | | Forrest Dunnington | LB-207 | Aug. 16, 1951 | .22 | | Rye Valley Road |
| T. 14S. R. 43E. | | H. F. Dye | GB-390 | Aug. 1942 | 43.8 | | |
| T. 10S., R. 44E., Sec. 5 | | Jim Berrie | | June 1948 | 42.8 | | |
| T. 11S., R. 44E., Sec. 12 | | Roy Rockwell | MB-132 | July 9, 1952 | 55.44 | 12.91 | Trail, head of/ Hubbard |
| T. 14S., R. 44E. | | Joseph Miller Dean | CB-393 | Aug. 1942 | 45.7 | | |
| No legal | | Wallace Blackwell | CB-422 | Sept. 28, 1942 | 35.8 | | Connor Creek |
| T. ___S, R. 45E. | | Leverett Davis | 171 | Jan. 1940 | 18.4 | | CC Reed property |
| T. 11S., R. 45E. Sec. 27 & 33 | | Roy Rockwell | LB-77 | May 26, 1951 | 41.89 | | Connor Creek |
| " " " | | " " | LB-78 | " " | 36.65 | | " " |
| T. 11S., R. 45E. Sec. 30 | | Fred Still | OB-335 | Nov. 23, 1954 | 54.78 | | Hubbard C. Rd. |
| T. 11S., R. 45E., Sec. 28 | | H. A. Brockman | CB-331 | July 27, 1942 | 31.2 | | Connor Creek |
| T. 12S., R. 45E., Sec. 3 | | Elmer V. Boyer | OB-22 | Feb. 24, 1954 | 38.85 | 10.64 | " " |
| T. 12S., R. 45E., Sec. 5 | | Mrs. S. F. Taylor | 577 | Dec. 11, 1940 | 52.8 | | |
| no legal | | Jim Hutchinson | UB-70 | June 29, 1960 | 43.60 | | |

| Legal Description | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Baker County: | | | | | | | |
| no legal | | Jim Hutchinson | UB-71 | June 29, 1960 | 58.90 | | |
| " " | | Anthony Brandenthaler | CB-405 | Sept. 11, 1942 | 47.2 | | Lyons Mine |
| " " | | " " | CB-406 | " " | 31.3 | | |
| " " | | Arthur L. Coggins | CB-251 | May 29, 1942 | 33.1 | | |
| " " | | Ned Thomas | CB-379 | Aug. 25, 1942 | 43.6 | | Sumpter District |
| " " | | " " | CB-480 | Nov. 1942 | 49.2 | | Northey Ranch |
| " " | | " " | BB-844 | Oct. 6, 1941 | 51.7 | | Sumpter District |
| " " | | " " | CB-371 | Aug. 18, 1942 | 32.4 | | " " |
| Grant County: | | | | | | | |
| No legal | | " " | CB-213 | May 18, 1942 | 41.2 | | " " |
| " " | | Daniel Dimmick | JB-90 | Aug. 1943 | 39.2 | | 2 mi. from road |
| " " | | N. H. Stevens | CB-133 | Mar. 23, 1942 | 33.2 | | |
| " " | | C. W. Hackney | 1391 | Oct. 5, 1940 | 23.6 | | |
| " " | | Jack Isgrid | CB-191 | May 5, 1942 | 36.0 | | Potato Patch |
| " " | | Arthur W. Cox | CB-327 | July 21, 1942 | 25.5 | | Barry Hauser Prop |
| " " | | Max Hoffman | CB-341 | Aug. 5, 1942 | 34.8 | | |
| T. 16S., R. 27E., Sec. 25 | | Dan Gleason | CB-281 | June 12, 1942 | 37.3 | | Murder's Creek |
| T. 17S., R. 27E., Sec. 3 | | J. S. Frary | BB-996 | Oct. 15, 1941 | 43.2 | | |
| T. 17S., R. 27E., Sec. 3 | | 2 " | BB-997 | " " | 35.3 | | |
| T. 13S., R. 28E., Sec. 1 | | Roy Glassook | CB-456 | Oct. __, 1942 | 33.1 | | |

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 15S., R. 28 E., Sec. 21 | | William Wade | CB-445 | Oct. 8, 1942 | 43.2 | | Murder's Creek |
| T. 16S., R. 28E., Sec. 23 | | Horace K. Johnson | CB-450 | Oct. 29, 1942 | 40.0 | | |
| " " " | | " " | CB-451 | " " | 40.5 | | |
| " " " | | " " | CB-452 | " " | 1.5 | | |
| No legal | | G. P. Lilley | CB-3 | Jan. 5, 1942 | 49.3 | | |
| " " | | " " | CB-4 | " " | 42.4 | | |
| " " | | " " | CB-5 | " " | 32.7 | | |
| " " | | " " | CB-6 | " " | 33.2 | | |
| " " | | " " | CB-7 | " " | 31.0 | | |
| " " | | " " | CB-8 | " " | 31.3 | | |
| " " | | " " | CB-9 | " " | 28.9 | | |
| " " | | " " | CB-10 | " " | 28.9 | | |
| " " | Eddy Mine | " " | CB-233 | May 22, 1942 | 34.0 | | |
| " " | " " | " " | CB-234 | " " | 44.1 | | |
| " " | " " | " " | CB-235 | " " | 31.0 | | |
| " " | | " " | CB-248 | June 6, 1942 | 41.0 | | |
| " " | | " " | CB-249 | " " | 41.7 | | |
| " " | | " " | CB-250 | " " | 39.0 | | |
| " " | | " " | CB-275 | June 15, 1942 | 28.6 | | |
| " " | | " " | CB-276 | " " | 38.3 | | |
| " " | | " " | CB-277 | " " | 38.4 | | |

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| No Legal | | G. P. Lilley | CB-294 | June 27, 1942 | 24.0 | | |
| T. 15S., R. 29E., Sec. 7 | | Walter Givens | CB-322 | July 1942 | 37.4 | | |
| T. 15S., R. 28E, Sec. 28 & 29 | | Mrs. Pearl Moore | | June 1938 | 49.2 | | |
| T. 15S., R. 28E, Sec. 28 & 29 | | " " | | " " | 37.6 | | |
| T. 13S., R. 30E | | R. Lee Thiesen | | Sept. 1938 | 49.6 | | |
| T. 13S., R. 30E. Sec. 22 | | Phillip O. Leetheir | 235 | Mar. 5, 1940 | 30.2 | | |
| T. 13S, R. 30E., Sec.123 | | Willard Houston | PB-61 | Apr. 15, 1955 | 53.24 | 9.65 | |
| T. 14S., R. 30E., Sec.23 | | Arbie Stockdale | CB-295 | June 24, 1942 | 32.0 | | |
| No. legal | | Anthony Brandenthaler | CB-358 | Aug. 11, 1942 | 39.2 | | |
| T. 13S., R. 31E., Sec. 6 | | Ira Barnard | CB-312 | July 10, 1939 | 47.2 | | Beech Creek |
| No. Legal Description | | " " | EB-17 | Feb. 25, 1944 | 79.8 | | on Beggs deeded |
| " " | | " " | EB-28 | May 30, 1944 | 30.44 | | John Silvers " |
| T. 13S., R. 31E., Sec. 29 | | Ira Raymond Cox | CB-260 | June 1, 1942 | 24.7 | | |
| T. 13S, R. 31E, Sec. 29 | | Chas. Trowbridge | LB-48 | April 18, 1951 | 34.61 | 11.36 | 2 mi. from JohnD |
| T. 13S, R. 31E | | Harold Cox | CB-392 | Aug. 1942 | 25.6 | | |
| T. 13S., R. 31E, Sec. 34 | | Harold A. Culp | Lb-269 | Sept. 24, 1951 | 40.31 | | |
| T. 14S., R. 31E, Sec. 3 | | J. B. Isgrid | CB-109 | Mar. 5, 1942 | 44.6 | | |
| T. 14S, R. 31E, Sec. 3 | | " " | CB-110 | " " | 32.6 | | |
| T. 14S, R. 31E, Sec. 3 | | B. F. Frary | CB-111 | " " | 24.99 | | |
| T. 14S., R. 31E, Sec. 3 | | Paul Remaley | PB-75 | May 3, 1955 | 45.95 | | |

| Location | Mine | Sender | Number | Date | Cr | Re | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 14S., R. 31E, Sec. 3 | | Paul Remaley | PB-76 | May 3, 1955 | 33.04 | | |
| T. 14S., R. 31E, Sec. 5 | | Patricia Tracy | CB-290 | June 19, 1942 | 33.7 | | |
| T. 14S., R. 31E, Sec. 6 | | Dan Gleason | CB-411 | Sept. 14, 1942 | 32.0 | | |
| T. 14S., R. 31E, Sec. 14 | | Hugh Jackson | CB-88 | Feb. 9, 1942 | 18.2 | | |
| T. 14S., R. 31E, Sec. 14 | | Mrs. Erma Bartlett | CB-108 | Mar. 5, 1942 | 54.3 | | |
| T. 14S., R. 31E, Sec. 21 | | Wallace Tracy | CB-270 | June 8, 1942 | 34.2 | | |
| T. 14S, R. 31E, Sec. 22 | | W. K. Thompson | | Jan 10, 1939 | 46.8 | | |
| T. 14S, R. 31E, Sec. 23 & 24 | | Charles W. Brown | CB-212 | May 14, 1942 | 48.3 | | |
| T. 14S, R. 31E, Sec. 26 | | Clint Haight | OB-321 | Nov. 10, 1954 | 34.96 | 9.20 | |
| T. 16S., R. 31E, Sec. 2 | | Charles W. Brown | CB-396 | Aug. 31, 1942 | 30.2 | | |
| T. 16S, R. 31E, Sec. 2 | | Charles W. Brown | BB-990 | Dec. 2, 1941 | 50.7 | | |
| T. 16S, R. 31E, Sec. 2 | | Michael Arlen Kepper | SB-22 | Feb. 3, 1958 | 47.20 | 10.75 | West of Dry Soda |
| " " " | | " " " | SB-23 | " " | 43.00 | 10.56 | " |
| T. 16S, R. 31E, Sec. 10 | | C. W. Brown | BB-497 | June 26, 1941 | 49.7 | | Silvies |
| T. 16S, R. 31 E. | | C. W. Brown | BB-775 | Sept. 9, 1941 | 33.8 | | " |
| T. 16S, R. 31E. | | " " | BB-776 | " " | 36.1 | | " |
| no legal | | Schrier-Judge Allen | CB-324 | July 19, 1942 | 37.0 | | Fall Mtn. |
| " " | | " " | CB-298 | July 2, 1942 | 32.0 | | |
| T. 13S, R. 32E, Sec. 33 | | Harland Willard Jones | RB-22 | Feb. 29, 1957 | 45.3 | | Marysville |
| T. 13S, R. 32E, Sec. 33 | | James Boyd Berry | QB-94 | June 11, 1956 | 47.5 | 8.84 | " |
| T. 14S, R. 32E, Sec. 5 | Ward | Elsworth Wood Cresap | CB-278 | June 12, 1942 | 32.4 | | |

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 14S., R. 32, Sec. 5 | Ward Mine | Elsworth Wood Cresap | CB-279 | June 12, 1942 | 40.4 | | Marysville D. |
| T. 14S., R. 32, Sec. 5 | " " | " " | CB-280 | " " | 35.6 | | " |
| T. 14S., R. 32, Sec. 5 | | Wm. F. Gardner | | Octo. 1, 1942 | 23.6 | | " |
| T. 14S., R. 32E., Sec. 5 | | " " | CB-462 | Nov. 9, 1942 | 33.7 | | |
| T. 14S, R. 32E, Sec. 5 | | " " | CB-463 | Nov. 9, 1942 | 28.4 | | |
| no location | | " " | CB-161 | Apr. 9, 1942 | 46.3 | | |
| " " | | " " | CB-162 | " " | 46.9 | | |
| T. 14S, R. 32 E. Sec. 5 | | " " | LB-306 | Oct. 3, 1951 | 44.47 | 11.38 | on Dog Creek |
| T. 14S, R. 32E, Sec. 5 | | " " | LB-307 | " " | 34.03 | 10.37 | " " |
| T. 14S., R. 32E, Sec. 5 | Ward Mine | " " | NB-8 | Jan. 26, 1953 | 36.64 | 10.30 | |
| T. 14S, R. 32E., Sec. 6 | | " " | CB-386 | Aug. 26, 1942 | 30.4 | | |
| T. 14S, R. 32E., Sec. 7 | | Mrs. Grace Nelson | CB-39 | Jan. 20, 1942 | 45.8 | | |
| T. 14S, R. 32E. Sec. 8 | | C. H. Conlee | CB-414 | Sept. 14, 1942 | 40.7 | | |
| T. 14S, R. 32E, Sec. 8 | | " " | CB-415 | " " | 31.6 | | |
| T. 14S. R. 32E. Sec. 8 | | Harland W. Jones | PB-244 | Aug. 10, 1935 | 37.83 | 9.10 | |
| T. 14S, R. 32E, Sec. 8 | | V. L. Babington | RB-238 | Nov. 25, 1947 | 52.02 | | |
| T. 14S, R. 32E, Sec. 8 | | " " | RB-239 | " " | 37.40 | | |
| T. 14S, R. 32E, Sec. 8 | | Herman Everidge | RB-233 | Nov. 18, 1957 | 40.80 | 8.80 | |
| T. 14S, R. 32E, Sec. 8 | | " " | RB-234 | " " | 37.80 | 9.30 | |
| T. 14S, R. 32E, Sec. 8 | | John Tinsley | QB-193 | Aug. 30, 1956 | 23.10 | 7.90 | |
| " " | | " " | QB-194 | " " | 17.20 | 7.40 | |

CHROME

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| no legal description | | Alva Tinsley | RB-154 | Aug. 30, 1956 | 23. 10 | 8.80 | |
| " " | | " " | RB-155 | " " | 17.20 | 7.40 | |
| 14S, R. 32E, Sec. 9 | | " " | RB-101 | July 5, 1957 | 43.83 | | |
| " " | | " " | RB-102 | " " | 22.52 | | |
| 14S., R. 32E, Sec. 9 | | Ray E. Summers | MB-139 | July 14, 1952 | 38.21 | 10.38 | |
| T. 14S, R. 32E, Sec. 9 | | Wm. Gardner | OB-165 | Aug. 2, 1954 | 28.85 | 7.60 | |
| " " " | | " " | OB-174 | Aug. 4, 1954 | 28.65 | 6.93 | |
| T. 14S, R. 32E, Sec. 9 | | John Sinclair | pB-86 | May 10, 1955 | 46.96 | 9.12 | |
| T. 14S, R. 32E, Sec. 9 | | Grace Nelson | PB-87 | May 13, 1955 | 48.18 | 9.12 | |
| T. 14S, R. 32E, Sec. 9 | | Baker Office | QB-127 | July 20, 1956 | 43.10 | 10.98 | Bill Gardner Ranch |
| T. 14S, R. 32E, Sec. 5 | | Wm. Gardner | LB-213 | Aug. 23, 1951 | 40.92 | 10.00 | |
| T. 14S, R. 32E, Sec. 8 | | " " | LB-214 | " " | 46.50 | 10.33 | |
| T. 14S, R. 32E, Sec. 8 | | " " | EB-82 | Sept. 27, 1944 | 18.54 | | |
| T. 14S, R.32E, Sec. 9 | Wm Gardner | Baker Office | | Aug. 11, 1954 | 22.09 | 6.93 | |
| T. 14S, R.32E, Sec. 11 | | Alva Tinsley | PB-12 | Feb. 1, 1955 | 34.06 | 8.28 | |
| " " | | " " | PB-13 | " " | 44.20 | 9.06 | |
| T. 14S, R.32E, Sec. 9 | | C.W. Brown | EB-86 | Sept. 28, 1944 | 18.45 | 10.2 | |
| T. 14S, R.32E, Sec. 11 & 12 | | Wm. F. Gray | CB-289 | June 20, 1942 | 44.9 | | |
| T. 14S, R. 32E, Sec. 14 | | Wm. Gardner | OB-126 | July 6, 1954 | 53.01 | 10.40 | |
| " " " | | " " | CB-127 | " " | 35.10 | 7.14 | |
| " " " | | " " | PB-2 | Jan. 24, 1955 | 26.45 | 10.05 | |

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 14S, R. 32E, Sec. 14 | | Wm. Gardner | PB-3 | Jan. 24, 1955 | 42.16 | 9.40 | |
| " " " | | " " | OB-269 | Oct. 11, 1954 | 25.35 | 10.15 | |
| " " " | | " " | OB-285 | Oct. 22, 1954 | 30.00 | 11.74 | |
| T. 14S, R. 32E. Sec. 14 | | Lars Larson | LB-82 | May 28, 1951 | 40.52 | | |
| " " " | | " " | LB-83 | " " | 40.30 | | |
| T. 14S, R. 32E, Sec. 9 & 16 | | Ray E. Summers | LB-235 | Sept. 4, 1951 | 52.01 | 11.60 | |
| " " " | | " " | LB-227 | Sept. 1, 1951 | 37.25 | 10.66 | |
| " " " | | " " | LB-209 | Aug. 20, 1951 | 44.27 | 10.33 | |
| " " " | | " " | LB-210 | " " | 35.35 | 10.33 | |
| " " | | " " | RB-12 | Jan. 25, 1957 | 34.00 | 8.28 | |
| T. 14S, R. 32E, Sec. 16 | | Chas. W. Brown | EB-107 | Oct. 10, 1944 | 21.3 | 9.6 | |
| T. 14S, R. 32E, " | | Bert Hayes | RB-127 | Aug. 1, 1957 | 47.0 | 11.72 | |
| T. 14S, R. 32E, Sec. 16 | Earl Lyman | Baker Office | OB-177 | Aug. 6, 1954 | 22.09 | 6.93 | |
| T. 14S, R. 32E, Sec. 17 | | Wm. Gardner | CB-403 | Sept. 1942 | 46.2 | | |
| " " " | | " " | CB-404 | " " | 36.7 | | |
| T. 14S, R. 32E, Sec. 18 | | J. B. Frary | CB-12 | Jan. 1942 | 46.8 | | |
| " " " | | " " | CB-13 | " " | 26.6 | | |
| T. 14S, R. 32E., Sec. 18 | Iron King | Baker Office | P-30672 | Nov. 5, 1965 | 0.14 | 6.53 | |
| " " " | " " | " " | P-30673 | " " | 0.14 | 6.97 | |
| " " " | " " | " " | P-30674 | " " | 0.14 | 5.87 | |

| Location | Mine | Sender | Number | Date | Cr | Re | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 14S, R. 32E, Sec. 18 | Iron King | Baker Office | P-30675 | Nov. 5, 1965 | 0.14 | 6.53 | |
| T. 14S, R. 32E, Sec. 18 | | Clinton P. Haight | ZB-147 | Oct. 28, 1965 | 0.07 | | Ni. 0.30 |
| T. 14S, " " | | " " | ZB-148 | Nov. 1, 1965 | 0.10 | | Ni 0.10 |
| T. 14S, R. 32E, Sec. 18 | | Grace Nelson Irving | BB-427 | June 19, 1941 | 42.9 | | Pine Creek |
| T. 14S, R. 32E, Sec. 23 | | Wm. Gardner | OB-229 | Sept. 9, 1954 | 31.28 | 10.06 | W. Pine Creek |
| T. 14S, R. 32E, Sec. 23 | | " " | OB-230 | " " | 21.80 | 10.62 | |
| T. 13S, R. 32E, Sec. 25 | | C. H. Conlee | CB-175 | Apr. 23, 1942 | 45.2 | | |
| " " " | | " " | CB-176 | " " | 35.3 | | |
| T. 13S, R. 33E. | | Irving Hazeltine | CB-284 | June 22, 1942 | 30.2 | | |
| " " | | " " | CB-285 | " " | 30.0 | | |
| no legal | | " " | CB-197 | May 13, 1944 | 51.1 | | Hall Property |
| " " | | " " | CB-244 | May 28, 1942 | 28.1 | | Ridgeway $1\frac{1}{2}$ mile |
| " " | | " " | CB-245 | " " | 43.1 | | |
| T. 10S, R. 33E | | Judge J. H. Allen | CB-296 | June 27, 1942 | 35.6 | | |
| T. 14S, R. 33E, Sec. 5 | | J. B. Isgrid | CB-23 | Jan. 16, 1942 | 45.6 | | |
| " " " | | " " | CB-24 | " " | 26.5 | | |
| T. 13S, R. 33E, Sec. 19 | | Burt S. Hayes | LB-144 | July 14, 1951 | 49.34 | 12.11 | |
| T. 14S, R. 33E, Sec. 8 | | Ara C. Smith | CB-211 | May 12, 1942 | 30.0 | | |
| T. 14S, R. 33E, Sec. 8 | | Arthur L. Coggins | CB-303 | July 6, 1942 | | | |

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Grant County: | | | | | | | |
| T. 14S, R. 33E, Sec. 9 | | John B. Isgrid | BB-998 | Dec. 15, 1941 | 17.3 | | |
| T. 14S, R. 33E, Sec. 9 | | " " | BB-999 | " " | 24.4 | | |
| T. 14S, R. 33E, Sec. 10 | | Culley Trickel | NB-3 | Jan. 13, 1953 | 35.22 | 12.96 | |
| T. 14S, R. 33E, Sec. 10 | | Clint Haight | OB-113 | June 24, 1954 | 35.20 | 10.06 | |
| " " " | | " " | QB-177 | Aug. 22, 1956 | 26.50 | 10.62 | |
| " " " | | " " | QB-178 | " " | 24.30 | 8.20 | |
| " " " | | " " | TB-76 | July 29, 1959 | 0.90 | 8.30 | |
| T. 14S, R. 33E, Sec. 17 | | Paul Remaley | OB-82 | May 17, 1954 | 30.48 | 12.75 | |
| " " " | | " " | OB-83 | " " | 31.00 | 11.95 | |
| T. 14S, R. 33E, Sec. 21 | | Clint Haight | OB-114 | June 24, 1954 | 39.75 | 11.20 | |
| T. 14S, R. 33E, Sec. 20 | | James A. Wyllie | BB-288 | Apr. 28, 1941 | 47.2 | | |
| T. 14S, R. 33E, Sec. 22 | | Clint Haight | VB-129 | Spet. 5, 1961 | 25.55 | 10.10 | |
| T. 14S, R. 33E, Sec. 22 | | J. J. Kinsella | PB-298 | Oct. 10, 1955 | 20.63 | 9.78 | |
| T. 14S, R. 33E, Sec. 30 | | I. B. Hazeltine | CB-346 | Aug. 6, 1942 | 32.6 | | |
| " " " | | " " | OB-318 | Nov. 8, 1954 | 41.6 | 14.94 | |
| T. 8 R. 33E, Sec. 4 | | Anthony Brandenthaler | EB-45 | July 5, 1944 | 24.23 | 15.31 | |
| " " " | | " " | EB-46 | " " | 31.06 | 14.65 | |
| T. 9S, R. 34E, Sec. 5 | | R. W. Dougharity | LB-171 | July 31, 1951 | 0.61 | 8.33 | |
| T. 9S, R. 34E | | Claude Scrivener | | June 1938 | 46.8 | | |
| T. 9S, R. 34E, Sec. 9 | | George Williams | 251 | Mar. 11, 1940 | 27.7 | | |
| T. 9S, R. 34E, Sec. 9 | | John Temple | 767 | June 3, 1940 | 26.8 | | |

## CHROME

| Location | Mine | Sender | Number | Date | Cr | Fe |
|---|---|---|---|---|---|---|
| Grant County: | | | | | | |
| T. 10 S, R. 34E, Sec. 6 | | R. D. Carson | LB-120 | July 2, 1951 | trace | 22.74 |
| T. 10 S, " " | | " " | LB-121 | " " | 34.07 | 10.70 |
| T. 10 S, R. 34 | | George Dodson | 669 | May 31, 1940 | 49.6 | |
| T. 9 S., R. 34E, Sec. 33 | | B. Carson | LB-122 | July 2, 1951 | 39.21 | 11.92 |
| T. 12S, R. 34E, Sec. 14 | | E. W. Pryun | LB-88 | June 5, 1951 | 26.80 | |
| T. 11S, R. 34E, Sec. 17 | | F. D. Baird | BB-247 | Apr. 22, 1941 | 41.6 | |
| T. 10S, R. 34E, Sec. 12 | | John A. Barham | NB-179 | Aug. 28, 1953 | 37.01 | |
| T. 10S, R. 34E, Sec. 29 | | Bill Gardner | CB-224 | May 21, 1942 | 51.6 | |
| T. 8 S., R. 35½E, Sec. 35 | | L. C. Lane | ABB-105 | Oct. 1967 | 0.05 | |
| T. 9 S, R. 35½E, Sec. 12 | | Jim McEnroe | CB-238 | May 26, 1942 | 41.6 | |
| T. 10S., R. 35E. Sec. 8 | | Sig Dilsheimer | CB-21 | Jan. 6, 1942 | 34.5 | |
| T. 10S., R. 35E, Sec. 11 | | T. J. Thompson | DB-74 | July 9, 1942 | 40.4 | |
| T. 10S, R. 35E., Sec. 17 | | Frank Roberts | OB-363 | Aug. 1942 | 39.0 | |
| T. 11S, R. 35E, Sec. 12 | | Paul Remaley | OB-48 | Mar. 22, 1954 | 43.75 | 11.09 |
| T. 11S, R. 35E., Sec. 12 | | " " | OB-49 | " " | 50.54 | 9.96 |
| T. 11S., R. 35E, Sec. 15 | | " " | OB-152 | July 10, 1954 | 39.55 | 13.30 |
| T. 14S, R. 3_E., Sec. 35 | Range ? | Jesse Tiffin Iler | AB-1587 | Dec 11, 1940 | 28.2 | |

CHROME

| Location | Mine | Sender | Number | Date | Cr | Fe |
|---|---|---|---|---|---|---|
| Malheur County: | | | | | | |
| T. 15S., R. 43E, Sec. 19 | | Lloyd E. Dinger | QB-13 | Jan 26, 1956 | 37.1 | 9.30 |
| T. 13S., R. 41E | | Harten Worsham | CB-464 | Nov. 18, 1942 | 32.5 | |
| T. 13S., R. 41E, Sec. 14-15 | | Frank Dean | PB-13 | Feb. 7, 1955 | 40.34 | 9.82 |
| T. 13S, R. 41E, Sec. 17 | | " " | IB-65 | May 19, 1948 | 54.84 | 13.08 |
| T. 13S, R. 41E, Sec. 17 | | " " | IB-66 | " " | 31.07 | 12.53 |
| T. 13S, R. 41E, Sec. 17 | | William McMills | CB-164 | Apr. 10, 1942 | 24.9 | |
| T. 13S, R. 41E, Sec. 17 | | A. I. Belden | CB-300 | June 29, 1942 | 20.3 | |
| T. 10S., R. 41E, Sec. 12 | | George Bieber | RB-179 | Sept. 4, 1957 | 0.50 | 10.30 |
| T. 11S, R. 42E, Sec. 20 | | Ben Bramley | 590 | May 17, 1940 | 40.8 | |
| T. 12S, R. 42E, Sec. 4 | | Thomas J. Linton | BB-752 | Aug. 1941 | 54.8 | |
| T. 13S, R. 42E, Sec. 21 & 22 | | Raleigh Chadwell | WB-105 | Aug. 7, 1961 | 38.50T | |
| T. 14S, R. 42E. Sec. 5 | | Carl Suksdorf | BB-628 | Aug. 1941 | 38.2 | |
| T. 14S, R. 42E., Sec. 20 | | A. E. Schroeder | MB-254 | Oct. 28, 1952 | 29.43 | 10.20 |
| T. 13S., R. 42E. Sec. 20 | | Floyd Brown | PB-107 | May 26, 1955 | 50.36 | 13.62 |
| T. 14S, R. 42E., Sec. 17 | | Anthony Brandenthaler | CB-438 | Sept. 1942 | 41.3 | |
| no legal | | " " | CB-448 | Oct. 1942 | 22.9 | |
| " " | | " " | CB-454 | Oct. 1942 | 52.8 | |
| T. 14S., R. 42E, Sec. 17 | | Clyde Macy | NB-91 | June 18, 1953 | 35.04 | 9.89 |
| T. 14S., R. 42E, Sec. 19 | | Neal R. Isaacson | P-32306 | Oct. 17, 1967 | 2.5 | |

CHROME

| Location | Mine | Sender | Number | Date | Cr | Fe | Remarks |
|---|---|---|---|---|---|---|---|
| Josephine County: | | | | | | | |
| T. 37, R. 9W, Sec. 16 & 21 | | Sigmund Dilsheimer | AB-157 | Dec. 4, 1949 | 45.3 | | |
| T. 37, R. 9W | | " " | 1310 | Sept. 13, 1940 | 43.9 | | |
| Crook County: | | | | | | | |
| T. 17S., R. 7E, Sec. 30 | | Leo E. Shelley | 1314 | Sept. 16, 1940 | 51.2 | | |
| Tillamook County: | | | | | | | |
| T. 2N., R. 6W, Sec. 16 and 21 | | N. H. Chartrey | TB-16 | Mar. 10, 1959 | 33.85 | 7.60 | |
| Jackson County: | | | | | | | |
| T. 14S, R. 1W, Sec. 3 | | Beryl Vance Ham | MB-231 | Oct. 6, 1952 | 53.10 | 19.40 | |
| Umatilla County: | | | | | | | |
| T. 5N., R. 29E., Sec. 5-6 | | Clifton Reynolds | TB-18 | Mar. 10, 1959 | 0.10 | 64.10 | |
| Union County: | | | | | | | |
| T. 5S., R. 37E, Sec. 11 | | Clyde Macy | MB-19 | Mar. 27, 1952 | 38.60 | 0.50 | |
| T. 4N., R. 39E, Sec. ? | | Keith Roe | NB-178 | Aug. 26, 1953 | 31.03 | 12.89 | |

Chromite beneficiation

Flowsheet of sulphuric acid leach method for producing electrolytic chromium from Oregon beach sands in E&MJ Vol 159, No. 6a Mid-June 1958

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON



PRESS RELEASE 29 CHROMITE IN OREGON MARINE SANDS DECEMBER 11, 1941

A report on tonnage explored and the economic importance of chromite-bearing black sands in the Coos Bay district is released by the Oregon Department of Geology and Mineral Industries and the U. S. Geological Survey.

The estimates of tonnage are based on results of field exploration by churn drilling and test pitting during 1941 mainly under a W. P. A. project sponsored by the Oregon Department with supervision mainly furnished by, and in cooperation with, the U. S. Geological Survey. Coos County authorities also aided in the investigation by contributing funds. Forty-four holes were drilled with an Empire drill, eight holes were put down with a standard Keystone type drill, and thirty-five test pits were sunk, the latter at points where the black sand lens was shallow. Estimates of tonnage of chromite are given under three classifications, namely, "proved", "probable", and "possible". For the purpose of this estimate, "proved" ore is taken to indicate that quantity of ore lens material located in areas bounded by drill holes; "probable" ore includes known extensions or fringes beyond the drilled areas, the exact dimensions, or some of the boundaries of which, are uncertain; and the "possible" classification is used for the chromite-bearing black sand lens in one area outside that already estimated as "probable". The "possible" tonnage was estimated by taking an arbitrary but reasonable length, a width, evidence of which was obtained at one locality only, and a thickness and chromic oxide content as determined by four churn drill holes.

Only three general areas of back-beach deposits, about seven to nine miles north of Bandon in Coos County, were explored. The total tonnage and chromic oxide content of the material estimated in the three areas under the above named classification are given below:

Tonnage and Chromic Oxide in Chromite Sand North of Bandon

| PROVED | | | PROBABLE | | | POSSIBLE | | |
|---|---|---|---|---|---|---|---|---|
| Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons |
| 239,100 | 7.6 | 45,739 | 104,039 | 7.1 | 18,104 | 196,220 | 5.8 | 28,452 |

It was recognized at the beginning of the work that all the chromite sand in the area could not be explored with the funds available; therefore, the object of this exploratory work was to ascertain by attacking a few known and probably representative deposits whether or not important tonnages of commercial chromite exist in the district. The answer seems to be definitely yes, especially in the light of the war emergency that recently developed wherein shipments of chromite from across the Pacific have been interfered with or cut off. The exploration by drilling and test pitting and the results in terms of tonnage and grade of material in the lenses at various points may serve as a yardstick for further mining development in the black sand areas of Coos and Curry Counties.

The figures given above relate not to the present ocean beach, but to a portion only of a back-beach lens or deposit, which is only one of a series of such deposits, along a stretch of country from Coos Bay to beyond Port Orford on the south, a matter of about forty-two miles. This series of deposits has been mined at various points in years gone by for the gold and platinum metals content of the black sand. In recent months exploration has been carried on in one or more of these deposits between Bandon and Port Orford with the idea in mind of developing them for their chromite content. No definite report may now be made on the future of the whole coastal area of chrome-bearing deposits; however taking into account also the possible additional present-beach deposits and the demonstrated content of additional minerals contained in the sand, including zircon, garnets for abrasives, and possibly ilmenite, there is a very good chance that such deposits may become important.

During the past year, Professor George W. Gleeson, head of the Department of Chemical Engineering at Oregon State College, has carried out in partial cooperation with the Oregon Department a large amount of metallurgical work on the treatment of the black sands from the properties covered by estimates above. This work has gone far toward demonstrating the commercial feasibility of developing the black sand deposits, especially in the light of the demand for chromite as a strategic mineral under the war emergency.

TONNAGE AND CHROMIC OXIDE CONTENT IN CHROMITE SAND NORTH OF BANDON

| | PROVED | | | PROBABLE | | | POSSIBLE | | |
|---|---|---|---|---|---|---|---|---|---|
| AREA | Long Tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons. | Long Tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons |
| Lagoons | 113,800 | 8.9 | 25,320 | 27,576 | 9.3 | 6,415 | | | |
| Shepard | 125,300 | 6.5 | 20,419 | 22,683 | 7.8 | 4,404 | | | |
| Eagle | | | | 53,780 | 5.4 | 7,285 | 196,220 | 5.8 | 28,452 |
| TOTALS | 239,100 | 7.6 | 45,739 | 104,039 | 7.1 | 18,104 | 196,220 | 5.8 | 28,452 |

COOS BAY, WORLD'S SEAPORT

ON SCENIC COAST HIGHWAY



# HOTEL GOING

STRICTLY MODERN : POPULAR RATES

MARSHFIELD, OREGON

July 22, 194

Dear Mr. Libbey,

I believe that one of the black sand samples you took from Marshfield was labeled hole number 9a. This is a mistake. The correct hole is number 10a. This hole is not shown on the section as it was drilled only two feet from hole number 10 and is identical in all respects with number 10.

Respectfully yours,

R. H. Cowie

Estimates accompanying letter E K H to
Humphreys, M A Hanna Co - (H B Johnson)

Assumptions: 12 yds. overburden to 2 yds. black sand lens.

Black sand lens averages 7% $Cr_2O_3$.

Plant recovery 75%.

Final concentrates average 42% $Cr_2O_3$.

Cost of stripping . . . . . . . . . . . . . . 10¢ per yd.

Cost of mining and delivery . . . . . . . . 60¢ per yd.

Cost of milling . . . . . . . . . . . . . . . 50¢ per ton

Capacity of plant . . . . . . . . . . . . . . 1000-1200 tons per day.

Concentration ratio = 8 to 1 (75% recovery)

| | Cost per long ton of <u>42% concentrate</u> |
|---|---|
| Exploration . . . . . . . . . . . . . . | .15 |
| Stripping and mining . . . . . . . . | 6.40 |
| <u>Plant</u> | |
| Metallurgy . . . . . . . . . . . . . . | .05 |
| Milling . . . . . . . . . . . . . . . . | 4.00 |
| Transportation to stockpile . . . . | 1.50 |
| Royalty . . . . . . . . . . . . . . . . | 1.85 |
| Amortization . . . . . . . . . . . . . | 2.25 |
| | 16.20 |

Government price for 42% $Cr_2O_3$ concentrates
(Low Grade B classification) . . . . . . . . . $25.20

Indicates gross profit for chromite . . . . . $9.00 per ton of concentrates

Allen & Libbey

March 13, 1940
Allen - Libbey

FRANZEN CLAY SAMPLES

Top of Cut

| | | |
|---|---|---|
| 1 & 2 | 8'6" | Weathered gravel |
| 3 | 1'6" | Grey layered clay |
| 4 | 2'4" | Massive blue-grey sandy-looking |
| 5 | 2' | Massive blue-grey sandy-looking<br>About 2' above bottom of cut<br>(See Photos SPP 4 & 5) |

CLATSOP BEACH SAMPLES

March 14, 1940

From bow of Ireton Wreck:

A. Samples from edge of fore-beach

1. N 55 E - 310' 2' deep - Water
2. N 30°W -1000' of #1
   S 7°E - To Ireton prow.
3. N 19°E - North Light 1000' N. 27° W of #2
   Due E - South light
   S. 20°E- Treton prow.

B. Samples of Dune Sand

4. N 60°E fo #2, 200' on back side of first dune ridge

5. 1.0 m. N of #2 Sand Bank 8.5
   (1.1 Mi N. of Ireton)

C. S. of Ireton

6. .5 M. 3'
7. 1.0 M. Ireton = N 30°W. of T.P. 3'
8. 285' N. 70° E. of #7 2.5'
9. 1.5 M. S. 30 E. of Ireton 2.5'
10. 2.0M " " 2.5'

S. 85° E. to sign on high sand-hill (only one on back-beach)

11. Road cut on W. side of road 100 yds.

N. of forks, in center of SW$\frac{1}{4}$ Sec. 8, T. 8N., R. 10 W; 3/4 M. S. of Hammond. 5' deep.

$$\frac{5000 \times \cancel{5} \times 2000 \times 2\cancel{0}}{\cancel{10}} = 10{,}000{,}000$$

13 m. tons

"Useful Minerals in the Black Sands of the Pacific Slope"

D.T. Day and R.H. Richards

U.S.G.S. Mineral Resources of U.S., 1905. pp. 1175-1258

Mineral composition of black sands: Oregon pp. 1206-1214.

Percentages referred to natural sand

| Locality | Chromite % | Ilmenite % | Olivine % | Zircon % | Miscellaneous | Remarks |
|---|---|---|---|---|---|---|
| aker Co. | | | | | | |
| Anthony | -- | -- | -- | 1.5 | | [1] from conc of 100:1 |
| Baker City | -- | 38.4 | -- | Tr | Cassiterite 1/8 [1] | |
| Sumpter | -- | 43.2 | -- | Tr | | |
| latsop Co. | | | | | | |
| Hammond | -- | 6.2 | | | | |
| Warrenton | 12.8 | -- | 16.8 | .25 | | |
| Hammond | 7.2 | -- | 9.2 | .45 | | |
| Warrenton | Tr | -- | 23.0 | .35 | | |
| Hammond | 1.2 | -- | 28.2 | Tr | | |
| " | 8.7 | -- | -- | .25 | | |
| " | 8.1 | -- | -- | .25 | | |
| " | 8.7 | -- | 10.9 | .3 | | |
| Carnahan Sto. | Tr | -- | 19.0 | Tr | | |
| " | Tr | -- | 20.0 | Tr | | |
| Clatsop Spit | 4.2 | -- | 23.3 | .2 | | |
| oos Co. | | | | | | |
| Marshfield | 8.2 | -- | -- | .6 | | from conc. of 3.5:1 |
| S.Fk Coquille R. | 2.5 | -- | -- | .6 | | |
| Randolph Dist. | 29.2 | -- | -- | 2.2 | | Pay streak(?) Old Lane mine |
| " | 10.1 | -- | 11.0 | .8 | | |
| Whiskey River | 11.2 | .6 | -- | .9 | | |
| ? (P 727) | 23.5 | 11.4 | -- | 2.7 | | |
| urry Co. | | | | | | |
| Chetco | 14.2 | -- | 5.5 | .2 | | |
| Port Orford | 3.5 | -- | 45.9 | .2 | | |
| Rogue River | 5.3 | -- | 39.0 | .1 | | |
| osephine Co. | | | | | | |
| Waldo | 1.1 | -- | -- | 1.4 | | |
| incoln Co. | | | | | | |
| Yaguina | 5.3 | 27.0 | -- | 4.2 | | |
| " | 6.4 | 28.6 | -- | 3.9 | | |
| Newport | 6.8 | 33.1 | -- | 5.3 | | |
| ltnomah Co. | | | | | | |
| Fulton | -- | 45.5 | 3.0 | Tr | | |

Prof. W.P. Blake (Am. Jour. of Sci., 2d ser., vol. 18, 1854) found that platinum could frequently be lifted by a magnet. Prof. B. Silliman (Trans A. I. M. E., vol 1, 1873) studied iridosmium content of sands. Mr. J.A. Edman (Min. & Sci. Press., N 10 '94) described mineralogy of sands and suggested shaking tables for treatment.

A great deal of work was done on concentrating methods and identifications of minerals in Portland and Boston.

"Electric Smelting of Magnetite from Black Sands".

D.T. Day, C.E. Wilson, G.H. Clevenger.

Magnetite sand concentrates, coke, and limestone were smelted and produced steel in October, 1905. Difficulties of the usual experimental sort were encountered; but in spite of the negative results, the process was proven as practicable.

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND 5, OREGON

October 13, 1948

MEMORANDUM

Subject: Coast black sand data in Portland office files.

(1) Index map showing Cape Blanco area.

(2) Index map showing Baker Mine owned by Krome Corporation.

(3) Complete logs of holes drilled by Krome Corporation on Baker Mine property.

(4) Exploration drilling by the Department using Empire drill in coastal area, by Wesley Paulsen.

(5) Ownership plat, T. 27 S., R. 14 W, including Pioneer Mine.

(6) List of samples and assays obtained by Paulsen on state park ground, Curry County.

(7) Logs of drill holes by Paulsen, state park ground.

(8) Map showing location of holes drilled by Krome Corporation on Baker Mine property, also traverses and location of drill holes by Paulsen on state park ground.

(9) Maps of Humphries' Coal Corporation submitted as an exhibit to Metals Reserve Company in 1943.

(10) F.W. Libbey file on black sand.

(11) Department file on black sand.

RECORD OF SAMPLES OF BLACK SAND MATERIAL
SUBMITTED TO
STATE DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES

Deemy

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Sample No. 1 -This material taken from Section 13, Township 26, Range 14, and the deposit of the sand runs from 3 to 15 feet; width and length of the deposit unknown.

---

Sample No. 2- This material taken from Section 25, Township 26, Range 14; depth of the deposit 3 to 25 feet in thickness; width 150 to 300 feet; length unknown.

---

Sample No. 3 - This material taken from Section 26, Township 26, Range 14; depth of deposit 3 to 12 feet; width 100 to 300 feet and length estimated at 1500 feet.

---

Sample No. 4 - This material taken from Section 21, Township 27, Range 14; depth of deposit 3 to 15 feet, width 100 to 300 feet; length not known.

---

X Sample No. 5 - This material taken from Section 33, Township 27, Range 14; depth of the deposit 3 to 12 feet; width 50 to 300 feet, length unknown.

---

X Sample No. 6 - This material taken from a lagoon or old lake bed in Section 32, Township 27, Range 14, and the quantity or extent of the deposit seems unlimited.

---

Sample No. 7 - This material taken from Section 4, Township 28, Range 14 and is 3 to 20 feet in thickness; width and length of deposit not known.

---

All of the above samples of material were taken from properties described above in western Coos County. Samples were gathered without extensive investigation and are merely suggestive of the general character of the material existing in the described locations.

A map designating approximate locations submitted herewith.

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON



PRESS RELEASE 29 — CHROMITE IN OREGON MARINE SANDS — DECEMBER 11, 1941

A report on tonnage explored and the economic importance of chromite-bearing black sands in the Coos Bay district is released by the Oregon Department of Geology and Mineral Industries and the U. S. Geological Survey.

The estimates of tonnage are based on results of field exploration by churn drilling and test pitting during 1941 mainly under a W. P. A. project sponsored by the Oregon Department with supervision mainly furnished by, and in cooperation with, the U. S. Geological Survey. Coos County authorities also aided in the investigation by contributing funds. Forty-four holes were drilled with an Empire drill, eight holes were put down with a standard Keystone type drill, and thirty-five test pits were sunk, the latter at points where the black sand lens was shallow. Estimates of tonnage of chromite are given under three classifications, namely, "proved", "probable", and "possible". For the purpose of this estimate, "proved" ore is taken to indicate that quantity of ore lens material located in areas bounded by drill holes; "probable" ore includes known extensions or fringes beyond the drilled areas, the exact dimensions, or some of the boundaries of which, are uncertain; and the "possible" classification is used for the chromite-bearing black sand lens in one area outside that already estimated as "probable". The "possible" tonnage was estimated by taking an arbitrary but reasonable length, a width, evidence of which was obtained at one locality only, and a thickness and chromic oxide content as determined by four churn drill holes.

Only three general areas of back-beach deposits, about seven to nine miles north of Bandon in Coos County, were explored. The total tonnage and chromic oxide content of the material estimated in the three areas under the above named classification are given below:

Tonnage and Chromic Oxide in Chromite Sand North of Bandon

| PROVED | | | PROBABLE | | | POSSIBLE | | |
|---|---|---|---|---|---|---|---|---|
| Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | Long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | long tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons |
| 239,100 | 7.6 | 45,739 | 104,039 | 7.1 | 18,104 | 196,220 | 5.8 | 28,452 |

It was recognized at the beginning of the work that all the chromite sand in the area could not be explored with the funds available; therefore, the object of this exploratory work was to ascertain by attacking a few known and probably representative deposits whether or not important tonnages of commercial chromite exist in the district. The answer seems to be definitely yes, especially in the light of the war emergency that recently developed wherein shipments of chromite from across the Pacific have been interfered with or cut off. The exploration by drilling and test pitting and the results in terms of tonnage and grade of material in the lenses at various points may serve as a yardstick for further mining development in the black sand areas of Coos and Curry Counties.

The figures given above relate not to the present ocean beach, but to a portion only of a back-beach lens or deposit, which is only one of a series of such deposits, along a stretch of country from Coos Bay to beyond Port Orford on the south, a matter of about forty-two miles. This series of deposits has been mined at various points in years gone by for the gold and platinum metals content of the black sand. In recent months exploration has been carried on in one or more of these deposits between Bandon and Port Orford with the idea in mind of developing them for their chromite content. No definite report may now be made on the future of the whole coastal area of chrome-bearing deposits; however taking into account also the possible additional present-beach deposits and the demonstrated content of additional minerals contained in the sand, including zircon, garnets for abrasives, and possibly ilmenite, there is a very good chance that such deposits may become important.

During the past year, Professor George W. Gleeson, head of the Department of Chemical Engineering at Oregon State College, has carried out in partial cooperation with the Oregon Department a large amount of metallurgical work on the treatment of the black sands from the properties covered by estimates above. This work has gone far toward demonstrating the commercial feasibility of developing the black sand deposits, especially in the light of the demand for chromite as a strategic mineral under the war emergency.

TONNAGE AND CHROMIC OXIDE CONTENT IN CHROMITE SAND NORTH OF BANDON

| | PROVED | | | PROBABLE | | | POSSIBLE | | |
|---|---|---|---|---|---|---|---|---|---|
| AREA | Long Tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons. | Long Tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons | Long Tons | $Cr_2O_3$ % | Equivalent to 40% $Cr_2O_3$ long tons |
| Lagoons | 113,800 | 8.9 | 25,320 | 27,576 | 9.3 | 6,415 | | | |
| Shepard | 125,300 | 6.5 | 20,419 | 22,683 | 7.8 | 4,404 | | | |
| Eagle | | | | 53,780 | 5.4 | 7,285 | 196,220 | 5.8 | 28,452 |
| TOTALS | 239,100 | 7.6 | 45,739 | 104,039 | 7.1 | 18,104 | 196,220 | 5.8 | 28,452 |

1920 ÷ 4 = 480/3 5760 28 24 20 480 4 1920

# PACIFIC COAST MINING AND REFINING COMPANY

HOME OFFICE
BANDON
OREGON

CALIFORNIA OFFICE
~~504 ROWAN BLDG.~~
LOS ANGELES

RECEIVED
AUG 21 1940
STATE DEPT OF GEOLOGY
& MINERAL INDS.

P. O. Box 5,
Sixes, Oregon,
August 19th, 1940.

State Department of Geology
and Mineral Industries,
702 Woodlark Building,
Portland, Oregon.

Dear Sirs. Attention of Mr. E. K. Nixon or Mr. F. W. Libbey.

Mr. Frank Seal has informed me that you wish me to give you an approximate estimate of the tonage of Chromite and Magnetite which the concentrating plant we intend to erect on our Cape Blanco property, will produce.

Our plans and flow sheet are designed to serve four Cottrell Roto Tables, each of which, the makers claim, will handle twenty tons of minus ten mesh material per hour or 1920 tons per day of twenty four hours. We estimate that 40% of pluss ten mesh material will be scalped off before the minus ten mesh material will reach the Cottrell machines, so that I think it is conservative to estimate that our plant will have a handling capacity of 1,500 cubic yards of common sand and gravel per day of twenty four hours.

From numerous samples taken at different times over a period of years, we estimate that our average yearly production of Chromite and Magnetite will be about 15% of each mineral of the total yardage handled. On this basis 1,500 cubic yards would weigh about 2,250 tons and 30% would amount to 675 tons per day of black sand minerals. These minerals will pass over our Cottrell machines as tailings and then be separated each from the other by High Intensity Magnetic Separators into clean marketable products.

After our plant has been in operation for thirty days we will be able to determine the average quality and quantity of each mineral. We, ofcourse, know that the Chromite on all beach deposits consists of grains of low as well as high grade and we estimate that the average product from our Cape Blanco property will be between 30% and 40% $Cr_2O_3$.

Mr. F. E. Weldon, chief engineer of the Chromium Mining and Smelting Corporation informs us that Chromite of 30% $Cr_2O_3$, is of great interest to them by reason of the development of the Udy patents, and Mr. Schulein of the Oregon State College has asked us to submit a price for our entire production of 20% $Cr_2O_3$, or less.

Three large steel Companies desire us to submit samples of our product to them as soon as we are in a position to make deliveries but lack of shipping facilities at Port Orford will prevent our quoting prices f.o.b. destination, and that is the only way they will purchase.

From our other property located immediately south of Cape San Sebastian, we could deliver several millions of tons of Magnetite which assays 76.63% FeO. This iron ore has been concentrated between 80% and 90% by the ocean. As there are no shipping facilities at Gold Beach we would need to truck this iron ore to Port Orford.

It is our opinion that an excellent land-locked harbor could be made in Garrison Lake, at Port Orford, where industries could own in fee whatever water frontage land they may require, and where each industry could construct piers suitable for their requirements. As an example, the trestle over our loading bunkers could be on a level with the bluff surrounding the lake, and our trucks could dump directly into these bunkers, which in turn could unload by gravity into the holds of vessels. Unless we can secure an inexpensive means of loading our iron ore into ocean-going vessels we cannot compete in price with ores from other localities where shipping facilities are available.

In considering these matters it must be remembered that our source of supply is practically inexhaustible and will continue to be as long as the mainland and the sea exist.

As soon as our first plant is in successfull operation we will install plants on similar properties. Other operators will also erect plants on their properties so that with adequate shipping facilities an immense total tonage of Chromite and Magnetite could be shipped from Port Orford giving employment to a large number of men.

I shall be pleased to show our properties to the Government engineers when they are here on August 28th, and if they were given an opportunity of digging a few shovelfulls of this high-grade Magnetite they would be convinced of our ability to deliver tonnage.

Sincerely yours,

PACIFIC COAST MINING & REFINING COMPANY.

By E.R. Marshall President
E. R. Marshall

DISPOSAL OF SANDS

The method of recovering gold from black sands on the claim has been described. If it is desired to sell the sand without taking out any gold, it should be concentrated to the least possible bulk. Pan samples may give an idea of the gold and platinum content, but the safest procedure is to send a carefully taken sample to one of the many reliable assayers in the West. If the sands are valuable enough, send them by parcel post or by express to one of the buyers listed.

Buyers of Black Sands and Platinum

Following is a list of buyers of black sands and crude platinum grains, but no shipments should be made without first ascertaining that the minerals are worth shipment and writing for information as to freight or express and treatment charges. The compiler of this report has been told by the larger works that in general they have found the sands to be of low grade.

Black Sands

American Metal Co., Ltd., Carteret, N. J. (United States Metals Refining Co.). (Write to company at 61 Broadway, New York City; platinum payment depends upon assay of sands.)

American Smelting & Refining Co., Selby, Calif.; Tacoma, Wash.; Garfield, Utah; East Helena, Mont.; Leadville, Colo.; Omaha, Nebr.; El Paso, Tex.; Hayden, Ariz. (Write to nearest smelter; platinum not paid for.)

Baker & Co., Inc., Newark, N. J. (If the precious metals are in payable quantity and the sands are of suitable amount. Concentration to small bulk advised.)

International Smelting & Refining Co., Tooele, Utah. (No large quantity could be handled; platinum not paid for.)

Johnson Matthey & Co. (Canada), Ltd., 198 Clinton Street, Toronto, Ontario, Canada. (Concentration to small bulk advised. This firm would make assays at $10 for the platinum-group metals and negotiate for the sale of black sands to its parent company in London, England.)

E. L. Newsome, 525 33rd Avenue, San Francisco, Calif. (Buys black sands from individuals and dredges and treats them in a new plant near Smartsville, Yuba County.)

Western Gold & Platinum Works, 589 Bryant Street, San Francisco, Calif.

Wildberg Bros. Smelting & Refining Co., 742 Market Street, San Francisco, Calif.

Following is a list of buyers of crude platinum grains:

Platinum

American Platinum Works, 225 New Jersey Railroad Avenue, Newark, N. J.

Baker & Co., Inc., 54 Austin Street, Newark, N. J.

J. Bishop & Co. Platinum Works, Malvern Pa.

Goldsmith Bros. Smelting & Refining Co., 1300 West 59th Street, Chicago, Ill.

Handy & Harman, 82 Fulton Street, New York City.

Irvington Smelting & Refining Works, Irvington, N. J.

Pacific Platinum Works, Inc., 814 South Spring Street, Los Angeles, Calif.

Platinum Metals Corporation, 261 Fifth Avenue, New York City.

Shreve & Co., Bryant and Zoe Streets, San Francisco, Calif.

Western Gold & Platinum Works, 589 Bryant Street, San Francisco, Calif.

S. S. White Dental Co., Philadelphia, Pa.

Wildberg Bros. Smelting & Refining Co., 742 Market Street, San Francisco, Calif.

Hints to Sellers. - Returns received from the sale of crude platinum are disappointing to miners who are unaware that quotations usually refer not to the price of the metallic content of crude platinum but to that of the pure metals that have been subjected to treatment, which is costly.

Pure platinum does not occur as such. The tin-white malleable grains and flakes that occur in some placers and lag behind the gold in the pan are crude platinum-group metals which contain probably not more than 65 percent of platinum. Therefore, cash transactions are frequently made at a price several dollars - as much as $10 - an ounce less than the market price for platinum, whose average price in 1937 was $52.

The present per-ounce price of the platinum metals (refined) is: Platinum, $34; iridium, $82, palladium, $24, osmium, $47; rhodium, $122; rhuthenium, $37. During 1937 the prices were much higher. The respective rounded average prices during 1936 were $42, $88, $23, $47, $65, and $34.

Iridium has been the most valuable of the platinum metals. It is harder and heavier than platinum, and its grains are sharper and more angular than the softer, purer platinum. The crude platinum product may contain iron, which reduces its selling price.

The actual value of the crude platinum, if all the metals are paid for, depends on the proportion of each in the crude material, less the difficulty and cost of separating and refining them.

## BEACH AND DUNE SAND SAMPLES

taken 14 March 1940

by F.W. Libby and J.E.Allen

Location: Clatsop County, T. 8 N, R. 10 and 11 W. in sections 8,19,30, R. 10 W., and 12 and 13 R.11 W.

Landmark from which all the samples were measured was the wreck of the Ireton, located near the center of the E. ½ of Sec. 13, T. 8 N., R. 11 W.W.M. Clatsop County, Oregon.

Samples as follows:

#1 Beach sand, pit 2 feet deep (water). 310' N.55°E. from bow of Ireton, back of forebeach.

#2 Beach sand, pit3' deep. 1000' N.30°W. of #1 (paced). N.7° W. from bow of Ireton. Back of forebeach.

#3 Beach sand, pit 2½ feet deep. 1000' N.27°W. of #2. Navigating markers to N.19°E. and due E. N.20° W. from Ireton prow.

#4 200' N.60°E. of #2, on back side of first dune ridge. Four feet deep pit.

#5 (This and following samples were not paced, but were measured with speedometer on Ford coupe, which runs about .1 mile slow.) 1.1 miles along beach northwards of Ireton prow, at point where foebeach narrows. Cut in first dune by last storm, sample across 8.5 feet.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| #6 | Pit | 3 | feet | deep, | 0.5 | miles | S.30°W. | of | Ireton | prow. |
| #7 | Pit | 3 | " | " | 1.0 | " | " | " | " | " |
| #9 | " | 2.5 | " | " | 1.5 | " | " | " | " | " |
| #10 | " | " | " | " | 2.0 | " | " | " | " | " |

The foregoing four samples were all taken at the back side of the forebeach, just in front of the first dune ridge, at the lowest point.

#8 Pit 2.5 feet deep on back side of first dune ridge 285 feet N.70°E. of #7.

#11 Sample across 5 feet (vertical) of sand in road cut on W. side of road 100 yards N. of forks towards Hammond (3/4 north) in center of S.W.¼ of sec.8.

Sand reserves 3 miles long, 2000 feet wide by 10 feet deep should give over 10 million tons.

John Eliot Allen , geologist

BLACK SANDS

Pioneer Samples

1. Banks
2. Tailings below sluice
3. Trailings near race
4. Average bunker sample

Screen Analysis

| Mesh Thru | On | 1 % | 1 % Cum. | 2 % | 2 % Cum. | 3 % | 3 % Cum. | 4 % | 4 % Cum. |
|---|---|---|---|---|---|---|---|---|---|
| | 48 | 6.6 | 6.6 | 7.3 | 7.3 | 8.2 | 8.2 | 15.8 | 15.8 |
| 48 | 65 | 27.9 | 34.5 | 27.2 | 34.5 | 25.5 | 33.7 | 32.0 | 47.8 |
| 65 | 100 | 50.0 | 84.5 | 52.8 | 87.3 | 52.3 | 86.0 | 44.5 | 92.3 |
| 100 | | 15.5 | 100.0 | 12.7 | 100.0 | 14.0 | 100.0 | 7.7 | 100.0 |

Chromic Acid ($Cr_2O_3$) Analysis

| Mseh Thru | On | 1 % | 1 % Total | 2 % | 2 % Total | 3 % | 3 % Total | 4 % | 4 % Total |
|---|---|---|---|---|---|---|---|---|---|
| | 48 | 6.7 | 2.0 | | | | | | |
| 48 | 65 | 13.8 | 17.4 | 20.2 | 21.2 | 17.5 | 19.3 | 17.7 | 25.0 |
| 65 | 100 | 20.4 | 46.5 | 27.4 | 56.1 | 25.9 | 58.7 | 28.3 | 55.5 |
| 100 | | 28.8 | 19.2 | 29.5 | 14.5 | 29.3 | 17.8 | 27.2 | 9.3 |
| $Cr_2O_3$ Acc't'd. for | | | 85.8 | | 91.8 | | 95.8 | | 89.8 |
| Original | | 22.4 | | 25.9 | | 23.1 | | 22.7 | |

Dear Mr. Swartley:

MAR 30 1939

Mr. Lester E. Bundy, Bullards, Oregon has a gold license and purchases gold from the Beach Miner's.

In 1938 he made the following shipments to the mint:

| 1938 | OUNCES | FINENESS | VALUE |
|---|---|---|---|
| | 12.90 | 867¼ | $372.43 |
| | 13.35 | 849½ | 395.10 |
| | 10.74 | 859 3/4 | 321.47 |
| | 10.35 | 873 | 314.52 |
| | 11.42 | 878½ | 349.31 |
| | 11.44 | 862½ | 343.64 |
| | 8.87 | 868 3/4 | 268.14 |
| | | | $2360.61 |
| 1939 | 9.57 | 871½ | 290.27 |
| | 12.32 | 871 3/4 | 374.07 |
| | 15.16 | 877¼ | 463.44 |
| | 11.125 on hand | | 337.32 |
| | Total to March 25,1939 | | $1465.10 |

The above gold came from small beach operations in Coos County.

## BLACK SAND STUDIES

The State Department of Geology & Mineral Industries has recognized for some time the importance of obtaining information as to the feasibility of treating the black sands of the Oregon Coast Area. Previous investigators [1] had considered gold and platinum, magnetite, or chromite and ilmenite as separate products to be considered alone; but the Department felt the economics of the various separate mineral products credited as a whole to the operation should be investigated. Table 4 presents the mineral contents of sands from several localities. As a consequence, preliminary panning tests (performed at Baker early in 1938) were conducted; but the results were not conclusive since sufficient time could not be given the matter then. Late in 1939, however, the problem was seriously considered since opportunity for such work would result from contemplated personnel changes. It has felt that magnetic or electrostatic separation would accomplish the desired results. With this is mind, several companies were contacted with regard to testing samples to be sent them.

The Ritter Products Company of Rochester, New York was selected to do the work, and a sample of black sand was sent them in December of 1939. This sample was taken from a composite of four samples from the Pioneer Mine, and the chemical analysis is given in table 1. A report dated January 3, 1940 was made on three products as follows:

| | |
|---|---|
| Sand on 30-mesh | 1.4% |
| Sand thru 30-mesh | 98.6% |

Sand thru 30-mesh:

| | |
|---|---|
| 1st Tailing | 32.1% |
| 2nd Tailing | 18.5% |
| Concentrate | 49.4% |

The concentrate did not appear as clean as was desired, so a portion was panned for the elimination of gangue minerals. The chemical analyses of these three products are given below:

Table 1 Ritter Products

| | $Cr_2O_3$ % | (Cr) % | $Al_2O_3$ % | Fe % | $SiO_2$ % | P % | $TiO_2$ % | Assayed by |
|---|---|---|---|---|---|---|---|---|
| Composite-heads | 22.4 | 15.3 | 27.22 | 12.6 | 18.80 | .52 | 5.46 | |
| No. 1 Electrostatic Tails | 25.9 | 17.7 | | | | | | |
| | 3.8 | 2.6 | | | | 2.6 | | Lancaster |
| No.2 " " | 5.0 | 3.4 | | | | 3.9 | | Lancaster |
| Electrostate Concentrate | 42.7 | 29.2 | 2.8 | 20.1 | 3.1 | .22 | .48 | Lancaster |
| Elect. Conc. panned, magnetite-free | 39.8 | 27.2 | 2.6 | 19.6 | 5.4 | .17 | .34 | Lancaster |

Table 4
Abstract From
"Useful Minerals in the Black Sands of the Pacific Slope"; by
D.T. Day and R. H. Richards
U.S.G.S. Mineral Resources of U.S., 1905. pp. 1175-1258
Mineral composition of black sands: Oregon pp. 1206-1214

| Locality | Magnetite % | Chromite % | Ilmenite % | Olivine % | Zircon % |
|---|---|---|---|---|---|
| | (Percentages referred to natural sand) | | | | |
| Baker Co. | | | | | |
| Anthony | 8.4 | -- | -- | -- | 1.5 |
| Baker City | 10.4 | -- | 38.4 | -- | Tr |
| Sumpter | 10.4 | -- | 43.2 | -- | Tr |
| Clatsop Co. | | | | | |
| Clatsop Beach | 26.9 | 2.3 | -- | -- | -- |
| Hammond | 14.2 | -- | 6.2 | -- | -- |
| Warrenton | 56.2 | 12.8 | -- | 16.8 | .25 |
| Hammond | 59.3 | 7.2 | -- | 9.2 | .45 |
| Warrenton | -- | Tr | -- | 23.0 | .35 |
| Hammond | 3.1 | 1.2 | -- | 28.2 | Tr |
| " | 32.2 | 8.7 | -- | -- | .25 |
| " | 34.2 | 8.1 | -- | -- | .25 |
| " | 33.3 | 8.7 | -- | 10.9 | .3 |
| Carnahan Sto. | Tr | Tr | -- | 19.0 | Tr |
| " | Tr | Tr | -- | 20.0 | Tr |
| Clatsop Spit | 2.6 | 4.2 | -- | 23.3 | .2 |
| Coos Co. | | | | | |
| Marshfield | -- | 8.2 | -- | -- | .6 |
| S.Fk Coquille R | -- | 2.5 | -- | -- | .6 |
| Randolph Dist. | 1.0 | 29.2 | -- | -- | 2.2 |
| " | Tr | 10.1 | -- | 11.0 | .8 |
| Whiskey River | -- | 11.2 | .6 | -- | .9 |
| ? (P 727) | 3.2 | 23.5 | 11.4 | -- | 2.7 |
| Curry Co. | | | | | |
| Chetco | 76.0 | 14.2 | -- | 5.5 | .2 |
| Port Orford | 1.5 | 3.5 | -- | 45.9 | .2 |
| Rogue River | 43.3 | 5.3 | -- | 39.0 | .1 |
| Josephine Co. | | | | | |
| Waldo | -- | 1.1 | -- | -- | 1.4 |
| Lincoln Co. | | | | | |
| Yagina | 6.2 | 5.3 | 27.0 | -- | 4.2 |
| " | 6.1 | 6.4 | 28.6 | -- | 3.9 |
| Newport | 8.0 | 6.8 | 33.1 | -- | 5.3 |
| Multnomah Co. | | | | | |
| Fulton | 41.5 | -- | 45.5 | 3.0 | Tr |

Prof. W. P. Blake (Am. Jour. of Sci., 2d ser., vol. 18, 1854) found that platinum could frequently be lifted by a magnet. Prof. B. Silliman (Trans A. I. M. E., vol 1, 1873) studied iridosmium content of sands. Mr. J. A. Edman (Min. & Sci. Press., N 10 '94) described mineralogy of sands and suggested shaking tables for treatment. A great deal of work was done on concentrating methods and identifications of minerals in Portland and Boston in 1905 as a preliminary study of these sands

"Electric Smelting of Magnetite from Black Sands". by
D. T. Day, C. E. Wilson, G. H. Clevenger.
Magnetite sand concentrates, coke, and limestone were smelted and produced steel in October, 1905. Difficulties of the usual experimental sort were encountered; but in spite of the negative results, the process was proven as practicable.

It was suggested to this company that the sand be screened into two sizes, and these should be treated separately. Consequentely, on Feb. 7, 1940 the Department received a report as follows:

| | |
|---|---|
| Sand on 30-mesh | 1.4% |
| Sand thru 30-mesh retained on 60 mesh | 26.4% |
| Sand thru 60-mesh | 72.2% |

| | Thru 30 on 60 | Thru 60 |
|---|---|---|
| Tailing | 50.3% | 32.7% |
| Middling | 19.4% | 14.3% |
| Concentrate | 30.3% | 53.0% |

Chemical analyses of these products were not made since the products were visually inspected and were found to be substantially the same as the previous products. In all cases, the first tailings were composed mostly of garnet, rutile, quartz, and some chromite. The concentrates were composed principally of chromite with some garnet and quartz, while the second tailings and middlings were mixtures of all minerals.

Mr. Lewis of this Department had made late in 1939 screen and chemical analyses of Pioneer samples and obtained the following results:

Table 2 - Lewis Screenings

Pioneer Samples

1. Banks
2. Tailings below sluice
3. Tailings near race
4. Average bunker sample

Screen Analysis

| Mesh Thru | On | 1 % | 1 % Cum. | 2 % | 2 % Cum. | 3 % | 3 % Cum. | 4 % | 4 % Cum. |
|---|---|---|---|---|---|---|---|---|---|
| | 48 | 6.6 | 6.6 | 7.3 | 7.3 | 8.2 | 8.2 | 15.8 | 15.8 |
| 48 | 65 | 27.9 | 34.5 | 27.2 | 34.5 | 25.5 | 33.7 | 32.0 | 47.8 |
| 65 | 100 | 50.0 | 84.5 | 52.8 | 87.3 | 52.3 | 86.0 | 44.5 | 92.3 |
| 100 | | 15.5 | 100.0 | 12.7 | 100.0 | 14.0 | 100.0 | 7.7 | 100.0 |

Chromic Acid ($Cr_2O_3$) Analysis

| Mesh Thru | On | 1 % | 1 % Total | 2 % | 2 % Total | 3 % | 3 % Total | 4 % | 4 % Total |
|---|---|---|---|---|---|---|---|---|---|
| | 48 | 6.7 | 2.0 | | | | | | |
| 48 | 65 | 13.8 | 17.4 | 20.2 | 21.2 | 17.5 | 19.3 | 17.7 | 25.0 |
| 65 | 100 | 20.4 | 46.5 | 27.4 | 56.1 | 25.9 | 58.7 | 28.3 | 55.5 |
| 100 | | 28.8 | 19.2 | 29.5 | 14.5 | 29.3 | 17.8 | 27.2 | 9.3 |
| $Cr_2O_3$ Acc't'd. For | | | 85.8 | | 91.8 | | 95.8 | | 89.8 |
| Original | | 22.4 | | 25.9 | | 23.1 | | 22.7 | |

In order to determine the chromium-iron ratio of the chromite grains, Mr. Lowell of this Department and Dr. Staples of the Department of Geology at University of Oregon handpicked from the concentrates--chromite grains. These were assayed and showed the following analyses:

Table 3 Chromite Grains

| | $Cr_2O_3$ % | (Cr) % | Fe % | Assayed by |
|---|---|---|---|---|
| Lowell picked gr. | 41.9 | 28.7 | 18.4 | Lewis |
| Staples picked grs. | 55.5 | 38 | 19 | |
| | 67.3 | 46 | 25 | Stafford |

The Department acquired a laboratory electrostatic machine from Horse Heaven Mines through the courtesy of Mr. S. H. Williston. It consists of two units: the hoppers, dryer, and electrodes; and the rectifier. An inclined drying tube wound with resistance wire revolves in ball bearing suspensions by means of a geared motor. The wet feed enters the upper end through a hopper and feed roller, while the dry material drops from the lower end into another hopper. Under this hopper are located the electrostatic electrodes, one is the feed roller while the other is a brass tube of slightly larger diameter suspended on high voltage insulators in such a manner that the distance between the two electrodes may be adjusted. The roller is 1 3/16" in diameter and rotates at a speed of one revolution every eleven seconds. This roller feeds minus 65-mesh sand at the rate of 450 grams (1 lb.) per minute. A movable aluminum divider is provided for dividing products into two pans. The rectifier is a 7,500-volt full-wave or 15,000-volt half-wave neon-type built by Mr. M. H. Morris for Mr. Williston. A rheostat controls the voltage impressed on the electrodes. The two units operate on 110 volt a.c. This laboratory machine was installed in the laboratory of Mr. P. R. Hines, Mining Engineer in Portland.

Johnson's[2] work in determining mineral conductivity showed that separations of the individual minerals was possible. It was therefore decided that in order to best determine the characteristics of the laboratory separator, Johnson's basic procedure should be followed; so the following outline for standardized tests was adopted:

Take sample of about 2 lbs.
Screen sample thru 35- and 65- mesh sieves (Tyler). Weigh portions.
Take out magnetite with magnet.
Dry in oven at 300° F for 20 minutes. (The dryer tube was dismantled because it proved a bottleneck on this material.)
Turn on roller motor and rectifier.
Transfer hot sample immediately to the feed hopper of the separator.
Allow feed to run thru machine, recording conditions.

No assays were made on these products as adjustments of conditions were made on sight and on comparison with known samples.

Samples for the work conducted on this laboratory machine were obtained by Messrs. Nixon and Lowell on a field trip extending from January 27 to February 2, 1940. Description of these samples follows:

Mr. Lewis assayed these samples and obtained the following results:

#1. Yaquina Beach. Sample consists of present beach sand from a pit, 2 feet deep, located 500 feet north of shore end of breakwater. The beach is approximately 200 feet wide by 600-800 feet long and extends some distance up the river. These shore deposits do not contain much black sand. Panning shows about 5% content of black sand.

#2. Sample of dune sand taken 1.5 miles north of Tahkenitch Lake at U. S. Bench Mark 5G12. These sands may be a possible source of silica or glass sands. The sample location is 10.00 miles north of the north end of the Umpqua River bridge and on the west side of the highway.

#3. The Lagoons (north of Bandon). Sample taken from material removed from a test-pit just in front of the cabins. Test-pit was apparently in black sand lense from top to bottom. Extent of lense not known, but is thought to be tailings from placer mines up the creek.

#4. Whiskey Run Creek. Sample of beach sands at mouth of Whiskey Run Creek. Sample represents surface section of beach normal to shoreline. This sample does not contain much black sand.

#5. U. S. Mining Co. (Ohlmstead). Located north of the Pioneer Mine. The sample was taken from a well-cemented lense of at least 20 feet in thickness. The lense has considerable extent but is overlain by from 10 to 30 feet of overburden. Overburden is also firmly cemented. This channel (6" wide x 5' long) sample was taken in main pit just east of mine shed.

A sample of concentrated tailings was also collected from a pile at the mine shed.

#6. Chickamin Mine (South Slough). Charleston, who showed us over the area.

Channel sample 8 feet long by 6 inches wide in lense of cemented black sands. The entire thickness of lense not exposed. A 35 foot tunnel follows the dip of the lense. A 35 foot hole was reported to have been drilled from the face of the tunnel without leaving the lense. There is an excellent possibility that this lense is extensive and croppings might be located by following the hill slopes in either direction from the tunnel. Excellent prospects for large tonnage.

Across the valley (to the north) is an old placer mine. The cemented lense, described in above paragraph, thins and peters out on the north side. Small boats (2' draft) can approach, by south slough, to within a 1000 feet of this location. A channel could be dredged to the prospect at no large expense. A dike across the valley prevents water from backing into the valley at high tide.

Location is 2.06 miles from junction on Seven Devils Road where the car must be left. Take left hand turn after crossing bridge and continue beyond school house 1/4 mile. Trail leads down hill to valley. Main tunnel (sampled) is almost directly across valley from old placer workings and approximately 75 feet above valley floor.

#7. Butler Mine. 1.5 miles north of the Madden Mine on the highway. A small area (less than 100 feet across) has not been mined. The area may contain continuations of this lense, especially on west side of highway. Old workings are on east side of highway and old plant on west side.

#8. Madden Mine. Sample was collected from channels in three sections representing a thickness of 19 feet. Samples marked: top, 5 ft.; middle, 7ft.; and bottom, 7 ft. One sack of test material was taken from lense (5 ft. thick) 30 feet west of bridge at entrance to pit. Also a sample ( (channel 5 ft. long) from same lense.

#9. Cape Blanco. Mr. Marshall, Port Or ord, Oregon has a small gold recovery outfit at Cape Blanco. Handling 6 yard/day, 52% gold recovery. Three samples collected here. One of beach sands about ½ mile south of Marshall's setup. Another sample of beach sands at the setup, and a sample of concentrate that had passed through the sluices.

#10. Cape Blanco Road. Sample collected from road cut just below cattle guard near end of main road. Lense 3 to 4 feet thick.

#11. Cape Blanco Road, 3 miles from main highway. Sample from lense, at leat 7 feet thick, exposed by road cut. L nse has possibility of considerable extent.

#12. Humbug State Park entrance. Sample collected from beach on a line normal to the shoreline and just south of creek mouth.

#13. Hunter's Creek. This sample is mostly small gravel from south side of stream and just west of the south end of the bridge. Very little black sand present. Met Mr. J. H. Turner, Gold Beach, Oregon, who has a manganese prospect near Hunter's Creek.

#14. Myer's Creek. Sample taken near mouth of creek. Sands are not very black. The beach here has considerable extent on the north and the south of the creek.

#15. Windchuck Creek. Property of R. W. Lemon. Sands are not very black, can drive through Lemon ranch to beach.

#16. Mouth of Rogue River. Estate of MacCleay Beach sands are quite black. Sample taken parallel to beach and represents a considerable extent of black sand. Large tonnage available. One of best areas visited.

Mr. Lewis assayed these samples and obtained the following results:

| Sample Number | Description | $Cr_2O_3$ % | Sample Number | Description | $Cr_2O_3$ % |
|---|---|---|---|---|---|
| 1 | Beach | 0.5 | 9 | ½ mile south | 24.3 |
| 3 | Lagoons | 21.2 | 9 | At set-up | 13.3 |
| 4 | Sand | 1.5 | 9 | Concentrate | 21.3 |
| 4 | Lens | 0.3 | 12 | Sand | 0.1 |
| 5 | Lens | 22.3 | 13 | Sand | 0.5 |
| 5 | Concentrate | 26.0 | 14 | Sand | 0.4 |
| 6 | Sand | 4.2 | 15 | Sand | 0.1 |
| 6 | Concentrate | 2.2 | 16 | Sand | 12.4 |
| 8 | Bottom 5' | 2.0 | 16 | Concentrate | 3.3 |
| 8 | Middle 7' | 1.5 | | | |
| 8 | Top 7' | 0.7 | | | |

From the above analyses it is seen that samples 3, 5, 9, and 16 show the most promise. Sample 5 is a consolidated sand, cemented with limonite. The other samples are loose sands, free of cementing material and dust. In addition to these samples, Mr. J. W. Deemy of Marshfield submitted several samples early in February, 1940. Only two of these samples were unconsolidated so they were the only ones considered. These samples are from the same locality as sample #3 "The Lagoons" taken by Nixon-Lowell.

Screen analyses of the samples considered are as follows:

Table 6

| Mesh Tyler Thru | On | SAMPLE Department #3 % | Department #16 % | Deemy 5 % | Deemy 6 % |
|---|---|---|---|---|---|
| | 35 | 6.8 | 1.0 | --- | 0.9 |
| 35 | 65 | 44.2 | 60.0 | 38.0 | 28.2 |
| 65 | | 49.0 | 39.0 | 62.0 | 70.9 |
| | 35 | | | --- | |
| 35 | 48 | | | 6.3 | |
| 48 | 65 | | | 31.7 | |
| 65 | | | | 62.0 | |
| | | Magnetite | | | |
| 35 | 65 | | 6.9 | --- | 1.0 |
| 65 | | Tr | 12.0 | Tr | 4.5 |
| | | Concentrate | | | |
| 35 | 65 | 40.1 | | | 42.5 |
| 65 | | 52.6 | | | 53.0 |
| 48 | 65 | | | 33.2 | |

Sample 16 yielded 10% magnetite which assayed 56.7% iron, 4.4% silica, 0.00% phosphorous, and 4.3% titania.

Although many separate tests were made, few products were saved since they were run over and over again. Table 7 represents data on tests conducted from February 2 to 25, 1940. The purpose of this investigation was to determine the characteristics of the laboratory separator and to determine in a preliminary manner the feasibility of separating the various samples. As a consequence, conditions and adjustments were governed by the appearance of products. For all the tests recorded, the constant conditions were speed of feed, electrode gap, drying time, and stationary electrode charged positively. Preliminary experiments on the machine included changing electrode position and reversing polarity, but inherent weaknesses in the machine itself did not allow much latitude.

Two methods of attack are possible: one to make a clean tailing and a rougher concentrate in the first pass, and a middling from the rougher concentrate; or to make a clean concentrate and a rougher tailing in the first pass, and then to make a clean tailing and a middling product from the rougher tailing. The first method is the one usually employed in concentrati n processes and proved the better in this instance after the first few tests.

The separator is so arranged that the front of a stream of particles falling freely from the revolving feed roller just touches the divider when it is set two points to the left (L2). Zero divider is vertically under the forward face of the feed roller. Each division is $\frac{1}{4}$ inch.

Table 7 - Experimental Data

| Sample | Test | Line | Voltage Regulator | Divider | Remarks |
|---|---|---|---|---|---|
| Series I: 7500 v. full-wave. Electrode gap 3/4" ~~wave~~, centers level | | | | | |
| Ritter Head | 1 | 115 | 10 | L 4 | Clean tail ) As good as Ritter |
| | 2 | 120 | 17½ | L 2 | Clean Conc.) Slightly better. |
| N-L 3 | 3 | 120 | 17½ | L 1½ | Good red tail |
| | 4 | 96 | 0 | L 3 | Some black in tail, red in conc. |
| | 5 | 115 | 10 | L 3 | No better |
| N-L 5 | 6 | 96 | 0 | L 3 | Too much dust- |
| | 7 | 106 | 5 | L 3 | Washed sand - still dust |
| | 8 | 114 | 10 | L 3 | " again - no improvement |
| | 9 | 119 | 15 | L 3 | " " " " |
| N-L 16 | 10 | 96 | 0 | L 3 | Small black in red tails |
| | 11 | 120 | 17½ | 0 | " " " " " |
| | 14 | 106 | 5 | R 2 | Much red in concentrate |
| N-L 3 | 12 | 96 | 0 | L 4 | Black in Tails |
| | 13 | 114 | 10 | R 1 | Red in conc. |
| | 15 | 120 | 17½ | L 2 | Fair balance |
| | 16 | 119 | 17½ | L 1½ | No better |
| | 17 | 120 | 17½ | L ½ | No better |
| Series II: 15,000 v. in half-wave. Electrode gap 3/4" ~~wave~~ centers level | | | | | |
| N-L 3 | 35 | 92 | 0 | L 3 | 1st Tail |
| | 36 | 104 | 5 | L 2½ | Not too clean |
| | 40 | 120 | 17½ | L 2½ | Cleaner conc. |
| N-L 16 | 37 | 100 | 5 | L 2 | Few small black in tails |
| | 38 | 100 | 5 | L 1½ | Fewer black in tails |
| | 39 | 100 | 5 | L ½ | Still fewer black |
| Deemy 5 | 47 | 100 | 5 | L 1 | Some red to right |
| | 48 | 100 | 5 | 0 | Little red to right |
| -48+65 | 49 | 100 | 5 | R 1 | Black to left |
| | 50 | 100 | 5 | 0 | 10 passes for conc. |
| Deemy 5 | 64 | 100 | 5 | L 3 | Black to right |
| | 65 | 100 | 5 | R 3 | Still black in left |
| -65 | 69 | 100 | 5 | L2-R2(Two) | Black lt and rt. red middle |
| | 75 | 100 | 5 | R 1 | Red close to divider |
| | 76 | 100 | 5 | L 1 | Red close to divider |
| Deemy 6 | 77 | 100 | 5 | L 4 | Wh & bl left, bl and wh right |
| | 78 | 100 | 5 | L 2½ | Red to left |
| -35+65 | 82 | 100 | 5 | R 3 | Wh & bl right, too much to left. |
| | 86 | 100 | 5 | L 2½ | Fair rougher middling |
| | 87 | 100 | 5 | L 3½ | 5 passes, good conc. |
| Deemy 6 | 89 | 100 | 5 | L 4 | Black conc. |
| | 96 | 100 | 5 | L 1 | About same grade |
| -65 | 97 | 100 | 5 | R 2 | Red tail, Middling 7 passes |
| | 105 | 100 | 5 | L 4 | Good conc. |

Test 6, 7, 8, and 9 - Sample 5 contains considerable dust even after washing several times. Dust coats particles; and since surface conditions control separation, all particles are acted upon equally. This, therefore, does not lend itself readily to separation.

Test 10 - 10% magnetite taken out.

Test 69 - A compound divider was installed.

Test 77 - The plus 65-mesh material contains considerable coarse quartz so that screening results in a partial concentration in the -65-mesh material.

CONCLUSIONS ON EXPERIMENTAL WORK

This investigation has shown the unconsolidated sands amenable to electrostatic separation. In order to avoid changing too many factors and since they are difficult to adjust, the electrodes were set and not changed. With this setting good rougher concentrates were obtained, but better concentrates would result if rougher concentrates would be re-treated in a machine with different electrode positions. Commercial machines are built with several electrodes in a cascading arrangement so that several products are produced with the varying conditions thus obtained.

Although these studies have shown the feasibility of electrostatic separation, it is probable the process would be more efficiently operated as a combination of several methods - magnetic, electrostatic, and screen, air, or water classification.

* * * * * *

Electrostatic separation during the past few years has not found application to any great extent in the minerals separation field. However, around 1910-17, several plants were in operation treating zinc-lead table and jig concentrates. The notable example was the Midvale plant of the U. S. Smelting Company in Utah. This concentrator treated for several years close-bracketed screened mixtures of sphalerite and galena, but the advent of flotation altered the picture; and the plant was dismantled. The exciting unit, a 3-horsepower motor-driven mechanical rectifier producing 18,000 to 22,000 volts, treated 65 tons per day at a cost of $2.10 per ton. The following table presents estimated costs of electrostatic and magnetic operation.

Table 8

ESTIMATED COST OF ELECTROSTATIC SEPARATION
(H. B. Johnson: Electrostatic Separation. E & M J D'38 p. 44)

Assumed:
Plant operates 24 hours per day, 300 days per year
Supervision, per hour $0.75
Power, per kw-hr. 0.02
Fixed charges, 10% of installed value.

| | | | |
|---|---|---|---|
| Tons per hour | 5 | 25 | 50 |
| Tons per year | 36,000 | 180,000 | 360,000 |
| Separating equipment installed | $9,000 | $39,700 | $79,400 |
| Drying equipment installed (Double-shell indirect-heat) | $10,000 | $22,500 | $40,000 |

| Charges: | per ton | per ton | per ton |
|---|---|---|---|
| Fixed (Amortization) | $0.025 | $0.022 | $0.022 |
| Power | .012 | .006 | .004 |
| Supervision | .150 | .030 | .015 |
| Repairs, supplies, maintenance etc. | .007 | .007 | .007 |
| Total Separating Cost per ton | $0.194 | $0.065 | $0.048 |
| Fixed (Amortization) | $0.042 | $0.019 | $0.017 |
| Operating expenses | .304 | .144 | .093 |
| Total Drying Cost per ton | $0.346 | $0.163 | $0.110 |
| TOTAL OVERALL COST | $0.540 | $0.228 | $0.158 |

MAGNETIC CONCENTRATION COSTS, IC 6624 P. 2 4 Witherbee, Sherman & Co. Mineville, N. Y.

Operating in 1930 at hourly capacity of 100 tons

| Charges: | |
|---|---|
| Fixed and superintendence | $0.069 |
| Power | .070 |
| Transporting, elevating | .194 |
| Drying (Shaft furnace) | .061 |
| TOTAL ACTUAL OVERALL COST | $0.394 |

References:

1. Day and Richards: "Useful Minerals in the Black Sands of the Pacific Slope: U. S. G. S. Mineral Resources of the U. S., 1905
   Pardee: Beach Placers of the Oregon Coast; U. S. G. S. Circular 8. (1934).
   Hornor: Notes on the Black Sand Deposits of S uthern Oregon and Northern California; U. S. Bureau of Mines, Tech. Paper 196. (1918).

2. Johnson: Selective Electrostatic Separation; A. I. M. E. Milling Methods, 1939.
   Johnson: Electrostatic Separation; E. & M. J., Oct., Nov., Dec., 1938.

Portland, Oregon
February 28, 1940

Leslie L. Motz

Metallurgical Chemist

RESULTS OF THE CHROMIUM DETERMINATIONS MADE ON THE SAMPLES OF SAND FROM THE OREGON COAST:

| Office number | Sample number | Description | Chromic Oxide percent |
|---|---|---|---|
| AG 148 | 1 | Yakuina Beach | 0.5 |
| AG 149 | 3 | Lagoons | 21.2 |
| AG 150 | 4A | Whisky Run, beach sand | 1.5 |
| AG 151 | 4B | Whisky Run, lens sample | 0.3 |
| AG 152 | 5B | U.S. Mining Co. (Ohlmstead) Concentrate | 26.0 |
| AG 153 | 5A | U.S. Mining Co. (Ohlmstead) 20 inches seam | 22.3 |
| AG 154 | 6A | South Slough Sand Ritter | 4.2 |
| AG 155 | 6B | South Slough concentrate | 2.2 |
| AG 156 | 8A | Madden Mine, bottom 5 feet, main pit | 2.0 |
| AG 157 | 8C | Madden Mine, top 7 feet, main pit | 0.7 |
| AG 158 | 8B | Madden Mine, middle 7 feet, main pit | 1.5 |
| AG 159 | 9C | Cape Blanco, conc't from Marshall set-up | 21.3 |
| AG 160 | 9A | Cape Blanco, farthest S. on beach from Marshall | 24.3 |
| AG 161 | 9B | Cape Blanco, Marshall set-up, beach sand | 13.3 |
| AG 162 | 12 | Humbug State Park entrance N, mouth of creek | 0.1 |
| AG 163 | 13 | Hunters Creek | 0.5 |
| AG 164 | 14 | Mouth of Myers Creek, 100 yards south | 0.4 |
| AG 165 | 15 | Mouth of Wind chuck | 0.1 |
| AG 166 | 16 A | Gold Beach sand as taken | 0.7 |
| AG 167 | 16 B | Gold Beach sand, jig concentrate | 3.3 |
| D5 | | Deemy | 26.6 |
| D6 | | Deemy | 27.6 |

RESULTS OF THE CHROMIUM DETERMINATIONS MADE ON THE SAMPLES OF SAND FROM THE OREGON COAST:

| Office number | Sample number | Description | Chromic Oxide percent |
|---|---|---|---|
| AG 148 | 1 | Yakuina Beach | 0.5 |
| AG 149 | 3 | Lagoons | 21.2 |
| AG 150 | 4A | Whisky Run, beach sand | 1.5 |
| AG 151 | 4B | Whisky Run, lens sample | 0.3 |
| AG 152 | 5B | U.S. Mining Co. (Ohlmstead) Concentrate | 26.0 |
| AG 153 | 5A | U.S. Mining Co. (Ohlmstead) 20 inches seam | 22.3 |
| AG 154 | 6A | South Slough Sand Ritter | 4.2 |
| AG 155 | 6B | South Slough concentrate | 2.2 |
| AG 156 | 8A | Madden Mine, bottom 5 feet, main pit | 2.0 |
| AG 157 | 8C | Madden Mine, top 7 feet, main pit | 0.7 |
| AG 158 | 8B | Madden Mine, middle 7 feet, main pit | 1.5 |
| AG 159 | 9C | Cape Blanco, conc't from Marshall set-up | 21.3 |
| AG 160 | 9A | Cape Blanco, farthest S. on beach from Marshall | 24.3 |
| AG 161 | 9B | Cape Blanco, Marshall set-up, beach sand | 13.3 |
| AG 162 | 12 | Humbug State Park entrance N, mouth of creek | 0.1 |
| AG 163 | 13 | Hunters Creek | 0.5 |
| AG 164 | 14 | Mouth of Myers Creek, 100 yards south | 0.4 |
| AG 165 | 15 | Mouth of Wind chuck | 0.1 |
| AG 166 | 16 A | Gold Beach sand as taken | 0.7 |
| AG 167 | 16 B | Gold Beach sand, jig concentrate | 3.3 |
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|---|---|---|---|
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| AG 149 | 3 | Lagoons | 21.2 |
| AG 150 | 4A | Whisky Run, beach sand | 1.5 |
| AG 151 | 4B | Whisky Run, lens sample | 0.3 |
| AG 152 | 5B | U.S. Mining Co. (Ohlmstead) Concentrate | 26.0 |
| AG 153 | 5A | U.S. Mining Co. (Ohlmstead) 20 inches seam | 22.3 |
| AG 154 | 6A | South Slough Sand Ritter | 4.2 |
| AG 155 | 6B | South Slough concentrate | 2.2 |
| AG 156 | 8A | Madden Mine, bottom 5 feet, main pit | 2.0 |
| AG 157 | 8C | Madden Mine, top 7 feet, main pit | 0.7 |
| AG 158 | 8B | Madden Mine, middle 7 feet, main pit | 1.5 |
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| AG 160 | 9A | Cape Blanco, farthest S. on beach from Marshall | 24.3 |
| AG 161 | 9B | Cape Blanco, Marshall set-up, beach sand | 13.3 |
| AG 162 | 12 | Humbug State Park entrance N, mouth of creek | 0.1 |
| AG 163 | 13 | Hunters Creek | 0.5 |
| AG 164 | 14 | Mouth of Myers Creek, 100 yards south | 0.4 |
| AG 165 | 15 | Mouth of Wind chuck | 0.1 |
| AG 166 | 16 A | Gold Beach sand as taken | 0.7 |
| AG 167 | 16 B | Gold Beach sand, jig concentrate | 3.3 |
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| AG 154 | 6A | South Slough Sand Ritter | 4.2 |
| AG 155 | 6B | South Slough concentrate | 2.2 |
| AG 156 | 8A | Madden Mine, bottom 5 feet, main pit | 2.0 |
| AG 157 | 8C | Madden Mine, top 7 feet, main pit | 0.7 |
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| AG 162 | 12 | Humbug State Park entrance N, mouth of creek | 0.1 |
| AG 163 | 13 | Hunters Creek | 0.5 |
| AG 164 | 14 | Mouth of Myers Creek, 100 yards south | 0.4 |
| AG 165 | 15 | Mouth of Wind chuck | 0.1 |
| AG 166 | 16 A | Gold Beach sand as taken | 0.7 |
| AG 167 | 16 B | Gold Beach sand, jig concentrate | 3.3 |
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| AG 151 | 4B | Whisky Run, lens sample | 0.3 |
| AG 152 | 5B | U.S. Mining Co. (Ohlmstead) Concentrate | 26.0 |
| AG 153 | 5A | U.S. Mining Co. (Ohlmstead) 20 inches seam | 22.3 |
| AG 154 | 6A | South Slough Sand Ritter | 4.2 |
| AG 155 | 6B | South Slough concentrate | 2.2 |
| AG 156 | 8A | Madden Mine, bottom 5 feet, main pit | 2.0 |
| AG 157 | 8C | Madden Mine, top 7 feet, main pit | 0.7 |
| AG 158 | 8B | Madden Mine, middle 7 feet, main pit | 1.5 |
| AG 159 | 9C | Cape Blanco, conc't from Marshall set-up | 21.3 |
| AG 160 | 9A | Cape Blanco, farthest S. on beach from Marshall | 24.3 |
| AG 161 | 9B | Cape Blanco, Marshall set-up, beach sand | 13.3 |
| AG 162 | 12 | Humbug State Park entrance N, mouth of creek | 0.1 |
| AG 163 | 13 | Hunters Creek | 0.5 |
| AG 164 | 14 | Mouth of Myers Creek, 100 yards south | 0.4 |
| AG 165 | 15 | Mouth of Wind chuck | 0.1 |
| AG 166 | 16 A | Gold Beach sand as taken | 0.7 |
| AG 167 | 16 B | Gold Beach sand, jig concentrate | 3.3 |
| D5 | | Deemy | 26.6 |
| D6 | | Deemy | 27.6 |

Tonnage and Chromic Oxide Content
in Chromite Sand North of Bandon, Oregon

| Area | Proved | | | Probable | | | Possible | | |
|---|---|---|---|---|---|---|---|---|---|
| | Long tons | $Cr_2O_3$% | 40% $Cr_2O_3$ equivalent long tons | Long tons | $Cr_2O_3$% | 40% equivalent | Tonnage | % | 40% equiv |
| Lagoons | 113,800 | 8.9 | 25,320 | 27,576 | 9.3 | 6,415 | | | |
| Shepard | 125,300 | 6.5 | 20,419 | 22,683 | 7.8 | 4,404 | | | |
| Eagle | | | | 53,780 | 5.4 | 7,285 | 196,220 | 5.8 | 28,45 |
| Totals | 239,100 | 7.6 | 45,739 | 104,039 | 7.1 | 18,104 | 196,220 | 5.8 | 28,45 |

Gleeson

Added remarks relevant to the proposed access road from The Lagoons

The Humphreys Gold Corp. plans to make a roughing concentrate containing 20% or more $Cr_2O_3$, which will be hauled to the Defense Plant Corporation Separation Plant for final concentration and separation. There will be 62,500 L. tons of these roughing concentrates from the Humphreys Gold Corp. holdings at The Lagoons. In addition there is also another small section the The Lagoons, which is owned by the Pioneer Mine Co., and is as yet unexplored and probably contains from 10,000 to 20,000 L. tons of 5% plus $Cr_2O_3$ sand.

That portion of this proposed access road east of the Seven Devils Road is the logical outlet for possible concentrates from the Eagle and Pioneer mines area and the Shepard mine area. The following table shows the reserves of these two areas:

Table(Confidential - U.S.G.S.)

| | Measurable | | Indicated | |
|---|---|---|---|---|
| Deposit | L. tons | %$Cr_2O_3$ | L. tons | %$Cr_2O_3$ |
| Eagle and Pioneer mine area | 246,000 | 8.8 | 145,000 | 7.5 |
| Shepard mine area | 128,000 | 6.2 | 33,200 | 8.6 |

The Eagle and Pioneer mines area is controlled by the Porter Bros. and the Shepard mine area is controlled by the Humphreys Gold Corp. Porter Bros. are still in the exploration stage. Humphreys Gold Corp. are planning to work the Shepard mine area.

It is further recommended that that portion of the Krome Corp. access road south and east of the junction with the proposed access road to the North Bank road, a distance of 4.5 miles, be made a two way road instead of a single road with turnouts, as it is now, because of much greater traffic than was first planned for.

The subsidy per ton was based upon 4.1 miles of road, at an estimated cost of $5000.00 per mile for the Humphreys Gold Corp. holdings at The Lagoons.

cc: Mr. Lynch
Mr. Peoples

Signed________________

Allan B. Griggs
Assistant Geologist

December 15, 1942

CHROME SAMPLES TAKEN IN CANYON AREA.

| Sample No. | Description | Percent $Cr_2O_3$ |
|---|---|---|
| Iron King 1 | Eight feet of chrome and serpentine on west end of main cut. | 15.4 |
| Iron King 2 | Twelve feet of chrome and serpentine twenty feet east of No. 1 | 15.9 |
| Iron King 3 | Fourteen feet of chrome and serpentine 40 feet east of No. 1 | 18.8 |
| Iron King 4 | Twelve feet of chrome and serpentine 70 feet east of No. 1 | 13.0 |
| Iron King sorted | Chrome pieces sorted from serpentine. | 31.8 |
| Celebration Ore | Celebration ore taken at random from ore bin. | 28.9 |
| Celebration tunnel | Sample cut in ore underground. | 37.3 |
| Dry Camp 1 | Sample taken in open cut 40 feet from tool shed. | 21.8 |
| Dry Camp 2 | Sample cut in upper tunnel. Fifteen feet from end of timber to face. | 19.2 |
| Dry Camp 3 | Lower deposit. Taken from cut at side of road. | 24.9 |

Hugh K. Lancaster

Hugh K. Lancaster,
Assayer

Black Sand

November 17, 1941

Mr. Howland Bancroft,
22 East 36th Street
New York, N.Y.

Dear Mr. Bancroft:

Pursuant of our conversations upon your recent visit, the following material is submitted as memorandum.

A. The Vanadium Oxide residues expected from treatment of Portland Gas and Coke Company oil are definitely out of the picture. Extended research has indicated that the deashing of the oil is uneconomical, hence no oxide may be anticipated.

B. I have requested my Mr. R. K. Meade to prepare a brief report on the Canadian antimony deposit. This will be forwarded to you at some time in the immediate future.

C. The company supporting our efforts at the college is the Martin Dennis Company, 859 Summer Avenue, Newark, New Jersey. Mr. Clyde D. Marlatt, Vice-President, has been the person to receive our reports. Most recent information from Mr. Marlatt indicates that his company is definitely not interested at the present time in any mining venture due to the fact that any domestic ore mined would reflect upon their purchases and preferences for foreign ore, hence the imposed condition is really production for stock pile. Definitely, they are not interested in such an arrangement, and I am certain could be approached by any reliable group which might hold reserves or otherwise arrange backlog supply for the company.

D. <u>Report upon Chromite Bearing Sands</u>.

D-1 Bibliography: The following references may be consulted for the best description of the sand deposits:

a. D.T.Day and R.H.Richards. Useful Minerals in the Black Sands of the Pacific Coast. Mineral Resources of the U.S.,1905, U.S.G.S.1906, pp.1175-1228.

g. U.S.B.M. Report of Investigations No. 3668, Mineral dressing of Oregon beach sands. Nov. 1942.

b. J.S.Diller. Geologic Atlas of the U.S. Coos Bay Folio No.73.

c. J.S.Diller. Geologic Atlas of the U.S. Port Orford Folio no.89.

f. Allan B Griggs, Chromite sands of the coast of southwest Oregon, U.S.G.S. (manuscript in preparation 1944)

d. R.R.Hornor. Notes on the Black Sand Deposits of Southern Oregon and Northern California. U.S.B.M. Tech. Paper No.196, 1918.

e. Allan B. Griggs (and Francis G. Wells) Origin of some chromiferous sands along the Southwestern Oregon coast. (Abstract) Geol. Soc America Bull. Vol. 53, No. 12, pt. 2, p. 1802, Dec. 1, 1942, + Econ. Geology. Vol 38 No. 1, p. 83 Jan-Feb. 1943

e. J.T.Pardee. Beach Placers of the Oregon Coast. Circular No.8, U.S.G.S., 1934.

D-2 General Topography of the Coast.

Only a narrow coastal plain exists between the Coast Range and the Pacific Ocean. In general, the elevation of the Range increases southward from the Columbia River and varies from 2000 feet to 4000 feet. The coastal plain (excepting the off-shore bars at river outlets) is a series of elevated marine terraces. The only portion of the Oregon coast of any economic significance as far as back beach deposits are concerned lies south of Coos Bay and north of Port Orford. In direct line north and south the area is approximately 40 miles long and from 1 to 4 miles in width, the greatest widths being just south of Bandon, and adjacent to Cape Blanco. The total number of terraces is questionable, but they have been traced to as high an elevation as 2,200 feet. At least 5 if not more terraces are evident.

Starting at Coos Bay on the north and at the designation of South Slough, a terrace composed entirely of marine sediments exists to a width of 1 to 2 miles. Elevations are from 8 to 150 feet. Between this plain and the so-called "third beach" exists the Seven Devils, Cape Arago and a ridge approximately 500 feet maximum elevation. The major "back beach" or terrace may be described as contacting the Pulaski formation (Eocene sandstone and shale) between the 200 and 300 foot levels with the actual back beach line existing at or near the 170 foot level. Proceeding south on this "third beach" and from the Seven Devils to Bandon, the so-called black sands can be traced through several properties until the alluvial deposits of the Coquille River are encountered. Directly on the south side of the Coquille, the back beach widens in a very definite terrace and again a series of old properties indicates the back beach line. South of Bandon some 8 to 10 miles, the terrace starts to narrow until in the region of the Coos-Curry county line, it narrows to under 2 miles. Subsequently, it expands to possibly its maximum width to the east of Cape Blanco and holds this width in a rather broken manner due to stream erosion until suddenly terminated at Port Orford.

The foreshore deposits being subject to wave action are quite variable. The writer has at times seen forebeaches completely black. Within a short period, such deposits have been swept clean to bedrock and within an equally short period replaced with grey sand. There is no question but that at times, large tonnages of black sand are in place upon the forebeach, but such deposits are entirely undependable.

It might be assumed that the back beach deposits would be uniform, but such is not the case. Backshore deposits start and end rather abruptly where one deposit has been cut into by another or where, due to peculiar wave action at the time of formation, the transportation of black sands to a particular spot causes rich lenses followed by barren sands.

All in all, the area which has been considered most promising is the so-called "third beach" at the 170 foot level. This beach appears continuous from north to south over the entire 40 miles. It is considered that this level would be the locale of any operations expected to prove quantities of black sand. The following list of properties all lie at or near this beach line and indicate the continuous character of black sand deposits, some rich, some poor. In general, these Pleistocene sediments consist of alternate layers of black and grey sand with some rock and boulders, and driftwood. The black areas are at times cemented with iron oxide and at other times are very loosely consolidated. Overburden varies from two or three feet to as much as sixty feet. The writer's examination of the various back beach deposits leads to the same conclusion as expressed by Pardee, namely, that the beds will not average more than 3 to 4 feet thick at maximum and not more than 300 feet in width. The length is questionable, but certainly should be a reasonable portion of the 40 mile length.

D-3 Various Properties Described from North to South

A. Chickamin Mine

S.E.1/4 of S.W.1/4 Sec.25 T.26S - R.14W.
Exposure 10 ft. thick-40 feet long. Consolidated with oxides of iron. Several other exposures in this immediate region. Magnetite, chromite, ilmenite, garnet. Small zircon content. Marine sediments, probably in former lagoon. Present owner or reported operator, C.W.Nalder - 1681 Hays Street, San Francisco, California.

Two carloads machinery taken into territory last spring. As of recent date not yet assembled. To be operated for values.

B. Brown Slough

S.W.1/4 of S.E.1/4 Sec.25 T.26 S R.14W.
NE 1/4 of S.W.1/4 Sec.26 T.26 S. R.14W.
N.W.1/4 of S.W.1/4 Sec.25 T.26 S.R.14W.
Several deposits outcrop at various locations. Bed 2.5 feet to 4.5 feet thickness with overburden from 2 to 50 feet. Heavy consolidated material, iron oxide bound. No operations. Owners never contacted. Sample of 5 foot exposure gave 11.5% $Cr_2O_3$.

C. Talbott Slough

S.E.1/4 N.E.1/4 Sec.25 T.26 S.,- R.14W.
5 feet exposed black sand. Consolidated. 6 foot overburden. No work being done. Owners not contacted. As suggested by Pardee's cross-section of South Slough, each inlet or arm of the slugh shows exposures of black sand. These beds average about 5 feet thick and are covered with variable depth of overburden. Exposures are reported at N.W.1/4 of S.W.1/4 - S.36; N.W.1/4 of N.W.1/4 - S.36.

Continuation of these same beds are reported in sections 1 and 12, T. 27 S., - R. 14 W. at higher elevations.

All of the foregoing are marine sediments and not considered back beach.

D. Rose Mine (Most northern back beach)
N.E. ½ of Sec. 21 - T. 27 S., - R. 14 W. located on Twomile Creek. Elevation 150 feet. 4 foot black sand lens. 20-25 feet overburden. Extent of deposit unknown.

E. Old Fletcher-Myers Property-More recently Sheppard Mine.
S.W. ½ of Sec. 16 - T. 27 S. - R. 14 W. On main stream and branch of Twomile Creek. Elevation 130-150 feet. This is the property drilled by the state survey. Sketch and drill hole results are appended, hence will not be described here. Pertinent to mention a 95 foot drift on the black sand lens in a direction N. 55° E. Thickness of lens in drift about 6 foot average. From memory, the entrance to the drift is between test pits 9 and 11 on the side of the ravine of two mile creek. Sand at present being optioned by Mr. Joseph Schulein.

F. Eagle Mine
19 plus acres N.W. ¼ of N.E. ¼ - Sec. 33 - T. 27 S. - R. 14 W. and 80 acres N.W. ¼ - Sec. 28. On Cut Creek. Elevation 150 - 180 feet. Drilled by G.W. Bradford and also by J.D. Mereen some years ago. Drill results are not available. Black sand lens reported 6 to 8 feet in depth, 250 feet wide and several hundred feet long. Tunnels and drifts were run. Overburden 30 to 60 feet. Some drill holes put down by State survey. Hole locations unknown but assume near center of property. The following gives a summary of the hole results.

| Hole No. | Depth to Lens | Thickness Lens | $Cr_2O_3$ - % Lens Sample Max. | Min. | Ave. |
|---|---|---|---|---|---|
| C.D. 1 | 45.0 | 10.0 | 4.3 | 0.3 | 2.8 |
| C.D. 2 | 53.0 | 7.0 | 13.5 | 1.0 | 8.8 |
| C.D. 2a | 50.0 | 6.0 | 6.1 | 2.1 | 4.1 |
| C.D. 5 | 55.0 | 9.0 | 12.8 | 4.7 | 8.8 |
| C.D. 6 | 53.5 | 9.5 | 6.1 | 0.9 | 4.2 |

Property is owned by Mrs. D. C. Ridle of Foster, Oregon and leased to Mr. Frank L. Cooper and R. A. Lewis of Vancouver, Washington.

G. Pioneer Mine

19.5 acres adjoining the Eagle on the south. Conditions the same as Eagle and operations same. Owner reported as C. W. Smith of San Francisco. Messrs. Lewis and Cooper are at present attempting to obtain option from Mr. Smith to hold the Pioneer along with the Eagle as well as a small property directly south of the Pioneer and known as the Independence. Pioneer deposit under about 60 feet overburden. Not known how much of deposit has been removed. Drifts and tunnels now caved. Sample from exposed lens (selected from 3 ft.) showed 21.4% $Cr_2O_3$. A concentrate of 41.5% $Cr_2O_3$ was produced. Second sample of approximately 600 lb. from lens showed 22.4% $Cr_2O_3$, 27.2% $Al_2O_3$. 12.6% Fe, 18.8% $SiO_2$. 0.52% P and 5.46% $TiO_2$,

H. Lagoons

Secondary deposit from operations of Pioneer and Eagle Mines. Land owned by Charlie Ned and C. W. Fahey. Upper portion under option to a Mr. Bowman and lower portion to Mr. Joseph Schulein. Most recently reported that Mr. Bowman's option and an option on Charlie Ned's property (U.S. Indian Agency) was taken by a Mr. Ziedrich. Not verified. State drilling program included this property. Map and hole values are appended. No overburden. Schulein's option estimates at about 25,000 tons of 40% $Cr_2O_3$ concentrate. Values of $Cr_2O_3$ as high as 26% experienced. Most experimental work done with sand from this property.

Nothing further has been developed between the foregoing properties and the Coquille River. The next property is south of the river.

I. Geiger Mine

S.E. $\frac{1}{4}$ of N.E. $\frac{1}{4}$ - Sect. 32 - T. 28 S., R. 14 W. About 2 acres worked over. 2 foot lens exposed. Overburden about 35 feet. No samples taken from this property. The region between Bandon and the Curry County workings has never been studied.

J. Refuge Mine

The exact location has not been checked, but the location is about 3 miles below Denmark and approximately in the same location as the previously named Butler mine or at 200 feet and about on line between Sect. 27-28 - T. 31 S., R. 15 W. Exposure varies from 3 to 5 feet. Sample from 3.8 foot face gave 15.3% $Cr_2O_3$.

and one hole contacted black sand at 22 and ran to 25 feet with 18.0% $Cr_2O_3$ and a second at 10.0 and ran to 17.0 with 6.3% $Cr_2O_3$. Operating under a Mr. Patterson who was reported to have come from New Mexico, a Mr. Klineman of Bandon did extensive drilling on this property. Results are not known, but the extent of the drilling indicated some results being obtained.

K. Madden Mine

S.E. ¼ of N.E. ¼ - Sec. 4, T. 32 S. - R. 15 W. on Crystal Creek which is a tributary of the Sixes River. Elevation 150 feet. Black sand very stratified in shallow layers between iron cemented gray sands. Some indication of 3 to 4 foot of lens material. Previous placer operation to a depth of 25 feet. No sampling done.

L. Peck Mine

N.W. ¼ - Sec. 2 - T. 32 S. - R. 15 W. on tributary of Crystal Creek. Ownership J. N. Watt of California. Operated as placer and about 1½ acres of ground excavated to depth of 8-10 feet. Exposure of 2.5 to 3 feet black sand in same stratified layers as Madden Mine. No sampling done.

M. Cape Blanco Mine

Foreshore beach operation just south of Cape Blanco. Variable concentration of black sand on beach at times being very black and at other times barren. There is little doubt but that large quantities of black sand lie off shore and behind the barrier reef. It is not known just how much black sand might be accumulated over a period of a year. Mr. E. A. Marshall claims sufficient material to produce 1000 long tons of concentrate per month, but the writer would question that this much material exists. The off shore sands no doubt result from many years of erosion of ferro-magnesium rocks.

Concluding the description of deposits on the back beaches, it would appear that the 150 to 170 foot shore line over the entire 40 miles from Cape Arago to Port Orford contains some back sands. Far too little is known as regards the extent of the deposits, but it appears highly probable that any consistent drilling program might block out appreciable tonnages, although the economics of recovery might even so be the controlling factor. Specifically, the possibility of appreciable tonnages exists in three regions, the South Slough and Brown Slough areas in the old Marine Sediments of Coos Bay; the northern backbeaches embracing the Rose, Sheppard, Eagle, Pioneer, Independence and Lagoons; and the southern backbeaches in the vicinity of the Refuge, Madden, and Peck mines. For any custom concentrating plant, it is quite possible that forebeach operations for gold and platinum might add an appreciable tonnage of material.

General maps are included with back beach areas and properties roughed in.

D-4 Drill Results

In addition to the drill results already presented for the Eagle property, results are available for the Lagoons area and the Sheppard Mine. Cross-sections have not been calculated but results are available as drill hole record sheets and are reported as follows. The hole numbers refer to the maps of the respective areas which are appended. In various cases, test pit results give but one sample and the thickness of lens in such cases is not known, since notes for such test pits are not complete. Such pits are referred to as letters TP before the number. Holes will not necessarily be reported in number sequence, but as they occur in line on the deposit. Analyses were made for Chromic Oxide only.

LAGOONS AREA

| Hole No. | Depth to Lens | Thickness Lens | $Cr_2O_3$ - % Lens Sample Max. | Min. | Ave. |
|---|---|---|---|---|---|
| 5 | 0.0 | 10.0 | 7.9 | 0.7 | 3.4 |
| 6 | 0.0 | 12.2 | 15.7 | 2.6 | 6.9 |
| 7 | 0.0 | 8.4 | 13.7 | 1.0 | 5.3 |
| 1 | 0.0 | 14.0 | 14.6 | 0.5 | 5.5 |
| 2 | 0.0 | 16.6 | 20.00 | 0.5 | 5.7 |
| 3 | 0.0 | 8.6 | 19.1 | 0.4 | 6.4 |
| 4 | 0.0 | 27.1 | 1.3 | 0.3 | 0.9 |
| 18S | 0.0 | 17.0 | 0.7 | Tr | 0.3 |
| 18N | 0.0 | 30.00 | 0.6 | Tr | 0.3 |
| NE | 0.0 | 13.0 | 5.2 | 0.3 | 2.7 |
| ME | 0.0 | 28.7 | 3.8 | 0.1 | 0.9 |
| SE | 0.0 | 8.0 | 4.3 | 4.3 | 4.3 |
| 11 | 0.0 | 14.5 | 20.9 | 6.2 | 11.0 |
| 12 | 0.0 | 7.1 | 0.7 | 0.7 | 0.7 |
| 8 | 0.0 | 9.0 | 19.2 | 10.3 | 14.9 |
| 9 | 0.0 | 19.8 | 18.9 | 8.9 | 13.4 |
| 10 | 0.0 | 10.7 | 16.1 | 2.8 | 9.0 |
| SSW | 0.0 | 7.6 | 10.5 | 10.5 | 10.5 |
| NSW | 0.0 | 9.5 | 16.1 | 16.1 | 16.1 |

## SHEPPARD MINE

| Hole No. | Depth to Lens | Thickness Lens | $Cr_2O_3$ - % Lens Max. | Min. | Sample Ave. |
|---|---|---|---|---|---|
| TP 2 | - | 1.5 | - | - | 7.6 |
| TP 3 | - | 10.1 | - | - | 8.8 |
| TP 4 | - | 7.4 | - | - | 7.7 |
| TP 5 | - | 4.2 | - | - | 8.7 |
| TP 6 | - | 4.5 | - | - | 9.2 |
| TP 7 | - | 1.8 | - | - | 3.9 |
| TP 8 | - | 5.8 | - | - | 8.0 |
| TP 9 | - | 5.1 | - | - | 1.4 |
| TP 10 | - | 3.5 | - | - | 5.1 |
| TP 11 | - | 7.3 | - | - | 2.5 |
| TP 12 | - | 4.1 | - | - | 2.7 |
| TP 14 | - | 1.0 | - | - | 12.1 |
| TP 18 | - | 6.0 | - | - | 6.9 |
| TP 19 | - | 5.2 | - | - | 12.4 |
| TP 20 | - | 6.9 | - | - | 3.2 |
| TP 21 | - | 2.5 | - | - | 1.6 |
| TP 25 | - | 8.0 | - | - | 3.9 |
| TP 31 | - | 3.5 | Not marked on map | | 19.3 |
| TP 33 | - | 6.0 | " " | " " | 15.1 |
| Old Dump | - | - | - | - | 8.9 |
| 19a | 41.3 | 7.0 | - | - | 1.7 |
| 19 | 30.0 | 9.6 | 11.9 | 3.9 | 7.6 |
| 22 | Outside lens or fault | | | | |
| 21a | 39.6 | 10.4 | 1.3 | 1.0 | 0.1 |
| 21 | 32.5 | 10.0 | 11.0 | 1.8 | 6.6 |
| 20a | 12.8 | 4.1 | 6.8 | 6.8 | 6.8 |
| 23 | 37.0 | 4.8 | 13.5 | 10.1 | 11.9 |
| 26 | Outside lens or fault | | | | |
| 26a | 39.0 | 4.6 | 7.7 | 4.0 | 6.4 |
| 25 | 32.6 | 5.4 | 4.4 | 0.2 | 2.5 |
| 24a | 20.0 | 8.1 | 5.9 | 3.0 | 3.2 |
| 24 | 10.0 | 3.2 | 3.4 | 2.3 | 2.8 |
| 27 | 37.6 | 4.5 | 9.4 | 2.1 | 7.0 |
| 27a | 38.7 | 12.4 | 15.8 | 0.4 | 6.9 |
| TP 29 | - | 24.2 | - | - | 0.8 |
| 30a | 0.0 | 9.0 | 12.5 | 11.9 | 12.2 |
| 32 | 26.6 | 9.2 | 4.2 | 1.1 | 2.6 |
| TP 24 | 10.0 | 3.2 | 4.2 | 2.5 | 3.1 |

## VARIOUS HOLES OR SAMPLES

| | | | | | |
|---|---|---|---|---|---|
| TPRM | Refuge Mine | 3.8 | - | - | 15.3 |
| RM 1 | " " | 3.0 | 26.9 | 3.7 | 15.3 |
| RM 2 | " " | 7.0 | 7.2 | 6.5 | 6.8 |
| Channel | Lost Chance Mine Sec. 10-T27S-R14W | 5.0 | - | - | 11.5 |
| 16 | Covert Mine Sec. 21-T27S-R14W | 6.7 | 1.3 | 1.2 | 1.2 |
| Channel | Chickamin | 7.0 | | | 6.5 |

D-5 Representative Analysis of Concentrate
Our Sample 146

| | % by Wt. |
|---|---|
| $Cr_2O_3$ | 44.72 |
| $SiO_2$ | 0.64 |
| $Fe_2O_3$ | 29.89 |
| $Al_2O_3$ | 14.90 |
| $TiO_2$ | 2.38 |
| CaO | 0.24 |
| MgO | 9.26 |

D-6 Concentration

It is not necessary to dwell upon the concentration procedures at this time. Suffice to say that a 40-45% $Cr_2O_3$ concentrate can be produced by combine electromagnetic and electrostatic separation at approximately 80% recovery of the $Cr_2O_3$. content of the heads. The non-magnetic tailings from electrostatic separation average about 2.6% by weight zircon which could easily be recovered by subsequent treatment. The recovery has been checked by Bureau of Mines tests, the average of our recoveries being almost exactly equal to theirs.

It is not considered that our present system is the best or most reasonable. It does produce consistent results. Possibly the electrical separation procedures should be incorporated with preconcentration and possibly flotation to cheapen the plant investment.

A single flow diagram out of the many is included to give an idea of evaluation as we have conducted the tests.

Samples 211-219 from "Lagoons" heads containing 25.7% $Cr_2O_3$. Concentration by Magnetic Separation and 3 roll electrostatic operation. Feed concentrates from first two rolls of electrostatic to third roll as cleaner. Third roll tails not recirculated. See Progress Report 10, July 10, 1941.

Magnetic Separation

| Designation | Sample No. | Lb. | % $Cr_2O_3$ | lb. $Cr_2O_3$ |
|---|---|---|---|---|
| Heads | Original | 258 | 25.7 | 66.5 |
| Magnetite | 211 | 9.3 | 15.0 | 1.4 |
| Garnet | 212 | 201.0 | 31.8 | 63.9 * |
| Olivene | 213 | 15.1 | 23.5 | 3.5 |
| Tails | 214 | 32.6 | 0.0 | 0.0 |
| | | 258.0 | | |

* Recovery ~~63.9 x 92.9% of $Cr_2O_3$~~

$$\frac{63.9 \times 100}{66.5} = 92.9\% \text{ of } Cr_2O_3$$

Mr. Howland Bancroft--10
November 17, 1941

## Electrostatic Separation

| Designation | Sample No. | Lb. | % $Cr_2O_3$ | Lb. $Cr_2O_3$ |
|---|---|---|---|---|
| Heads | 212 | 201.0 | 31.8 | 63.9 |
| Concentrate | 219 | 118.1 | 42.9 | 50.7 ** |
| 2nd Roll Tails | 216 | 48.8 | 8.3 | 3.8 |
| Retreat Tails | 218 | 33.8 | 24.1 | 8.1 |
| | | 199.0 | | 62.6 |
| Losses | | 2.0 | | 1.3 |
| | | 201.0 | | 63.9 |

** Recovery $\frac{50.7}{66.5} \times 100 = 75.5\%$

Assuming recirculation of tails from retreat at approximately same recovery.

$\frac{(50.7 \quad 6.3)}{665} 100 = 86,1\%$ Recovery

Hence, we assume 80% as reasonable at 42% $Cr_2O_3$ concentrate. In some instances, we have done better and we are led to believe that a commercial operation would do better than the laboratory equipment by virtue of better heat and moisture control.

D-7 Economy

We have made some very rough estimates of plant cost and operation. Complete a plant to produce 500 tons of 40 plus % $Cr_2O_3$ concentrate per month should approximate $50,000 as top figure. This figure is safe. Operation cost complete including 5 year amortization of plant will be less than $8 per ton of finished concentrate. Current quotations on the material are reported as 50 cents per unit for 40% minimum $Cr_2O_3$ with 2 cents per unit premium for each per cent over 40. Additional premium for chrome iron ratio cannot be expected.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

It is hoped that the foregoing serves the intended purposes, since it was hurriedly assembled. It does not answer any questions definitely, but is as factual as present information affords. Accept the contents as a memorandum with the compliments of the writer.

Respectfully submitted,

George W. Gleeson,
Professor of
Chemical Engineering

March 6, 1958

AIRMAIL

Bethlehem Pacific Coast Steel Corporation
3631 E. Marginal Way
Seattle, Washington

Dear Sir:

We are in the process of making a very rapid study of ferrochrome requirements in the western states.

We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron, and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that time will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

COPY

THE COLORADO FUEL AND IRON CORPORATION
P.O. Box 316
Pueblo, Colorado

WB

March 18, 1958

State of Oregon
Department of Geology &
Mineral Industries
1069 State Office Bldg.
Portland 1, Oregon

Gentlemen:

Replying to your letter of March 6, regarding our usage of Ferro-Chrome, we wish to advise that our usage is very infrequent.

We have from time to time produced special heats of steel for chrome-vanadium rails and for chrome molle grinding balls in which we used ferro-chrome having from 47.5% to 51% chrome and 3.60% to 4.30% carbon.

For the purpose of your study, we feel that we should emphasize that we are not normally a consumer of ferro-chrome.

Very truly yours,

L. C. ROSE
Director of Purchases

/s/ By W. L. Reid

Gave original to John Davidson 3-21-58

COPY

COLUMBIA-GENEVA STEEL
UNITED STATES STEEL CORPORATION
120 Montgomery Street
San Francisco 6, California

March 13, 1958

Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
1069 State Office Building
Portland 1, Oregon

Dear Sir:

As a supplement to our letter of March 12, 1958 concerning Ferrochrome requirements and specifications, one of our plants uses Ferrosilicon Chrome and we believe this may be of interest to you.

Ferrosilicon chrome requirements and specifications are as follows:

A. Normal Annual Requirements - 440 Tons

B. Specification -

| | | |
|---|---|---|
| Carbon | 2.25 % |
| Chrome | 44.00 |
| Iron | 30.00 |
| Manganese | 1.25 |
| Silicon | 22.00 |
| Others | .50 |

Yours very truly,

/s/ J. E. Butler

Comptroller

COPY

COLUMBIA-GENEVA STEEL
120 Montgomery Street
San Francisco, California

March 12, 1958

Mr. Hollis M. Dole, Director
Department of Geology and Mineral Industries
State of Oregon
Portland 1, Oregon

Dear Sir:

In reply to your request of our Pittsburg, Torrance and Geneva Plants concerning normal requirements of Ferrochrome and specifications regarding such Ferrochrome information is as follows for Columbia-Geneva Steel Division, United States Steel Corporation:

A. Normal Annual Requirements - 20 Tons

B. Specification

| | High Carbon | Low Carbon |
|---|---|---|
| Chromium | 67-70% | 67-71% |
| Carbon | 4-6 % | 1% Max. |
| Silicon | 1-2 % | .3 to 1% |

Yours very truly,

/s/ J. E. Butler

Comptroller

March 6, 1958

AIRMAIL

Columbia-Geneva Steel Division
U.S. Steel Corporation
Pittsburgh, California

Dear Sirs:

We are in the process of making a very rapid study of ferrochrome requirements in the western states.

We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron, and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that t ime will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
cc U.S. Steel Corp.
Torrance, Calif.

March 6, 1958

**AIRMAIL**

Bethlehem Pacific Coast Steel Corporation
South San Francisco
California

Dear Sirs:

We are in the process of making a very rapid study of ferrochrome requirements in the western states.

We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this, we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron, and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that time will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

COPY

BETHLEHEM PACIFIC COAST STEEL CORPORATION
P. O. Box 3494 Rincon Annex
San Francisco 19, Calif.

March 11, 1958

FERRO CHROME

State of Oregon
Department of Geology & Mineral Industries
1069 State Office Building
Portland 1, Oregon

Attention: Mr. Hollis M. Dole, Director

Gentlemen:

Your letter of March 6, 1958 requests information regarding our ferro chrome requirements.

Our West Coast plants do not use this material in any of their operations.

Very truly yours,

BETHLEHEM PACIFIC COAST STEEL CORPORATION

/s/ L. W. O'Donnell

Asst. Purchasing Agent

| DOMESTIC SERVICE | | $ |
|---|---|---|
| Check the class of service desired; otherwise this message will be sent as a full rate telegram | | S |
| FULL RATE TELEGRAM | | |
| DAY LETTER | | E |
| NIGHT LETTER | | |

# WESTERN UNION

W. P. MARSHALL, PRESIDENT

1206 10-51

| INTERNATIONAL SERVICE | |
|---|---|
| Check the class of service desired; otherwise the message will be sent at the full rate | |
| FULL RATE | |
| LETTER TELEGRAM | |
| SHIP RADIOGRAM | |

| NO. WDS.-CL. OF SVC. | PD. OR COLL. | CASH NO. | CHARGE TO THE ACCOUNT OF | TIME FILED |
|---|---|---|---|---|
| | | | | |

*Send the following message, subject to the terms on back hereof, which are hereby agreed to*

MARCH 12, 1958 - OAKLAND, CALIFORNIA

HOLLIS M. DOLE, DIRECTOR
STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND, OREGON

SUBJECT: FERROCHROME STUDY - YOUR LETTER OF 3/6/58.

DURING THE CALENDAR YEAR 1957 THE OPEN HEARTH CONSUMED 1,062,580 POUNDS OF CHROME-X (EXOTHERMIC FERROCHROME). CHROME CONTENT 44 TO 49 AND CARBON 6 TO 7 PERCENT. IF ADDITIONAL INFORMATION IS REQUIRED PLEASE FEEL FREE TO REQUEST SAME.

W. H. KINNEY, ASST TO VICE PRESIDENT OPERATIONS
KAISER STEEL CORP.

COPY

KAISER STEEL CORPORATION
P.O. Box 217
Fontana, California

March 12, 1958

Mr. Hollis M. Dole, Director
State of Oregon
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Dear Mr. Dole:

In answer to your request of March 6 regarding our ferrochrome requirements we believe that our 1957 usage would be typical. In 1957 we used, in our open hearth department, 528 net tons of Chrom Ex. This is a specially prepared exothermic ferrochrome with an analysis of 49-50% Cr., carbon approximately 6.5%, and approximately 25% Fe.

As you know we are in the process of constructing three 65-ton capacity oxygen furnaces. These probably will require an approximate doubling of our usage. I cannot be sure of this estimate until we build up some experience with the oxygen furnaces.

For your personal files I am enclosing one of our general information booklets.

Sincerely yours,

/s/ Les Harrold

Public Relations

March 6, 1958

AIRMAIL

Kaiser Steel Corporation
Fontana
California

Dear Sirs:

We are in the process of making a very rapid study of ferrochrome requirements in the western states.

We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this, we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron, and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that time will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr
cc Kaiser Steel Corp.
Oakland, California

COPY

PACIFIC STATES STEEL CORPORATION

General & Sales Office
Niles, California
Telephone Niles 3311

Branch Offices
LosAngeles Portland
Salt Lake New York
Mill: Niles, California

March 10, 1958

State of Oregon
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

Attention: Hollis M. Dole, Director

Gentlemen:

With reference to your inquiry as to our use of ferrochrome, at the present time we are using approximately 50 tons annually of the 50% to 55% high carbon ferrochrome.

We are attaching a bulletin with the prices and analysis of the material we are using.

We hope this information will prove useful.

Very truly yours,

PACIFIC STATES STEEL CORPORATION

/s/ Frank Carcot

Director of Purchases

PRICE BULLETIN NO. 200
Effective Oct. 1, 1957

CHROMIUM MINING AND SMELTING CORPORATION
13550 South Indiana Avenue
Chicago 27, Illinois

Sales Offices

13550 S. Indiana Ave.
Chicago, Illinois

455 Washington Avenue
Bridgeville, Penna.

## HIGH CARBON FERROCHROME

| | Lump | 8Mxd | 20Mxd |
|---|---|---|---|
| Carload Lots (Bulk) . . . . . . . . | 25.00 | 26.75 | 27.20 |
| Carload Lots (Packed) . . . . . . . | 27.00 | 28.75 | 29.20 |
| Ton Lots up to C/L (Packed) . . . | 29.25 | 31.10 | 31.55 |
| Less than Ton Lots (Packed) . . . | 31.00 | 33.25 | 33.70 |

Analysis:

| | | | |
|---|---|---|---|
| Cr | 50 - 55% | Cr | 50 - 55% |
| C | 7 - 8.50% | C | 7 - 8.50% |
| Si | 3 - 6% | Si | under 3% |

PRICES are cents per pound contained Chrome F.O.B. destination United States.
Exception: On LCL shipments west of the Mississippi River, the price is F.O.B. Riverdale, Illinois - Freight allowed to St. Louis, Mo.

PACKED - Prices shown above include packing in standard 30 gallon steel drums - minimum weight 500 lbs. net.

IDENTIFICATION - Material will be painted for identification purposes where specified.

CONTAINER CARS - Shipment will be made in container cars upon request.

TERMS: NET 30 DAYS

March 6, 1958

AIRMAIL

Pacific States Steel Company
Niles
California

Dear Sirs:

We are in the process of making a very rapid study of ferrochrome requirements in the western states.

We are interested in having from you some recent approximate annual data regarding your own requirements for ferrochrome. In this, we would appreciate your indicating approximately the specifications regarding such ferrochrome as to its chrome, iron, and carbon contents in terms of the tonnages for various grades which you have consumed.

Inasmuch as our study must be completed by March 15th, your reply prior to that time will be appreciated. Whatever information you care to submit to us will be maintained in strictest of confidence.

Sincerely yours,

Hollis M. Dole
Director

HMD:jr

COPY

ISAACSON IRON WORKS
Box 3625
Seattle, Washington

March 10, 1958

State of Oregon
Department of Geology & Mineral Industries
1069 State Office Building
Portland 1, Oregon

Attention: Mr. Hollis M. Dole,
Director

Gentlemen:

In reply to your letter of March 6, 1958 we submit the following information which we trust will be helpful to you in making your survey.

Ferro Chrome Used in 1957

| | | | | |
|---|---|---|---|---|
| Std. Ferro Chrome | 70% | - | C4-L% Sil. 28 Fe.Bal. | 42 N.T. |
| L.C. Ferro Chrome | 72% | - | C.02% Si .49 Fe.Bal. | 172 N.T. |
| L.C. Ferro Chrome | 69% | - | C.06 Si 1.20 Fe.Bal. | 2 N.T. |

Yours very truly,

ISAACSON IRON WORKS

/s/ Frank Hartman

Lewis

Travel

Air - 2 - Trips LA + Port 285.00

Auto - R. Trip Pasadena 80 mi @ 7¢ 5.60

Spokane + Port 2 - R.T. Spokane Wen 57.32

Pullman 13.76

Taxi 15.00

Per diem - 10 day @ 14 140.00

Misc — 50.00

566.68

Libbey

Trip to Albany, Riddle + G.P.

550 @ 7¢ 38.50

Per diem 4 days @ 14 56.00 94.50

661.18

Fee $2400 for job 2400.00

(Each man $1200.00)

Total 3061 —

Estimate 3000 —

Air {LA to Pd (roundtrip) — twice {120.00
120.00
{Pd to Spokane (" ) — 45.00

Car {Pd to GP (rtip) 600mi@7¢ = 42.00

Per diem = 168.00

Travel in Cities = 40.00

Telephone & Misc = 50.00

585.00

Places to visit:

LA, S.F., — Calif

Wash — Sp., ~~Wen~~. Tac

Oreg — Pd, Albany, Riddle

Days: (investigating)

LA = 3 da.

SF = 3 da.

Sp = 1 da

Wen = 1 da

Pd = 2 da.

Albany = 1 da.

Riddle = 1 da

12 da.

$14/diem

$168

Invest = 12 da.

Report = 12 da

24 da. total for report

27
75
135
189
2025

Air travel = 285.00

Car travel = 42.00

Per diem
12 da @ $14 = 168.00

Travel in cities = 40.00

Telephone & Misc = 50.00

Total = $585.00
→ 1350.00

$1935.00 = Est. Total cost of invest

Travel days = 8
Invest. " = 12
Rept " = 7

Total days = 27

27 days @ 100 = 2700
" " @ 75 = 2025
" " @ 50 = 1350

$2000.00

$1,000 - Plan & Develop
1,000 - G.&M.I.

Outline

1 Object of study

(a) Investigate possibility of making commercial ferrochrome economically on west coast and thus provide a market for chromite production that has previously been sold to G. S. A at Grants Pass depot. main attention to met. grade but some attention to other grades as far as markets are concerned

2. Background material

(a) History of government incentive purchase programs as outgrowth of emergency need for chrome (chiefly met. grade)

(b) Comparison of foreign and domestic chrome.

(1) Quality, quantity available, cost of production, market, U S Gov't assistance to foreign production

(2) U. S metallurgical concerns mainly interested in getting cheap chrome and therefore do not want domestic production

~~3. Technical data - domestic production under G.S.A program - feasibility~~

3- Technical Data - quantity produced under G.S.A program - grade - cost per ton to G.S.A
Feasibility of making commercial ferrochrome from domestic ores - Kinds of commercial ferrochrome - methods of manufacture high carbon - low carbon - high silicon - Costs -

4 - West coast markets for ferrochrome - Cal. Oreg. Wash - Prices - Profit possibilities.

5 - Conclusions - Cooperatives - Probable difficulties - Possible Gov't assistance -

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

PRESS RELEASE NO. 134 FOR IMMEDIATE RELEASE MARCH 5, 1958

## FERROCHROME PLANT STUDY TO BE MADE

A study on the feasibility of a western plant to make ferrochrome from domestic ores was authorized March 4 in a cooperative arrangement between two organizations within the Executive Department of the State of Oregon. The two organizations cooperating on the study are the Department of Geology and Mineral Industries and the Department of Planning and Development. Purpose of the study is to determine if local processing of domestic ores could sustain mining of chrome in Oregon.

Metallurgical-grade chromite in the United States is found only in Oregon, California, Washington, and Alaska. Domestic mining has been restricted to periods of international stress when chrome shipments from overseas were cut off and incentive prices paid by the Government. At the present time Oregon's chrome mining is for the Government stockpile of strategic materials. The chrome program was established during the Korean crisis. The amount of domestic chrome allocated for stockpile purchase is expected to be obtained within the next few months and as a result chrome mining will cease unless a market can be established.

Both the Department of Geology and Mineral Industries and the Department of Planning and Development recognize that loss of this basic industry would be detrimental to the State's economy and hope that some plan can be worked out that will prevent the loss. The ferrochrome plant feasibility study is only one of several plans under consideration by the State departments and West Coast chrome miners.

The U.S. Department of Interior proposed a plan for subsidization of domestic chrome mining when the National Long-Range Minerals Program was presented to Congress last summer. The Secretary of Interior in presenting the plan, which is considered unrealistic and not workable by the chrome miners, stated "The basically short world supply coupled with the strategic nature of (chrome) as well as the heavy dependence of the United States on distant overseas sources of supply, underscore the desirability of making every effort to develop and maintain some production from domestic sources." It has been announced that the Department of Interior is preparing another Long-Range Minerals Program for presentation to the Senate Committee on Interior and Insular Affairs.

If it appears that a ferrochrome plant would benefit Oregon chrome mining, the plan will be presented to the Senate Committee.

Ivan Bloch and Associates, Industrial and Economic Consultants, Portland, Oregon, have been retained to make the study.

I. Assumptions

B. It seems to me that consideration should be given to producing also a low-carbon alloy unless a competent metallurgist states that there is no demand or little demand on the West Coast. Even so, the government stockpile would want some low-carbon ferrochrome.

II. Production practices

B. Here again I think should also consider low-carbon alloy. Consumption of low-carbon alloy appears to be more than twice high-carbon alloy.

1. It will need to be determined if a pelletizing or nodularizing furnace will be a necessary part of the ferroalloy plant as this would add to the capital cost. Believe concentrates would need to be pelletized in order to use in electric furnace.

IV. Mining and concentrating unit costs given here?

VI. This is not clear. After costs of making ferrochrome are known, the amount of subsidy required could be determined in order to maintain mine production at current support price.

NOTE:

Raymond Miller wrote a bulletin on possibility of making ferroalloys on West Coast back in 1937 for the Army Engineers. Have forgotten what he said about ferrochrome but you should look it over.

I had thought it worthwhile to look into the economics of chrome refractories in the West to see if there were any possibilities along those lines. It seems unlikely that there would be any chance to do anything with chrome chemicals. Joe Schulein made a study of demand for chrome chemicals back in 1942 or 43. He has or had a patented process for getting electrolytic chrome.

RECEIVED
MAR 4 1958
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

OUTLINE

(1) Object of study

(a) Investigate possibility of making commercial ferro-chrome economically on the West Coast and thus provide a market for chromite production that has previously been sold to GSA at Grants Pass depot. Main attention to metallurgical grade but some attention to other grades as far as markets are concerned.

(2) Background material

(a) History of government incentive purchase programs as outgrowth of emergency need for chrome (chiefly metallurgical grade).

Dogami X

(b) Comparison of foreign and domestic chrome.

1) Quality, quantity, available cost of production, market, U.S. Government assistance to foreign production.

2) U.S. metallurgical concerns mainly interested in getting cheap chrome and therefore do not want domestic production.

(3) Technical data - quantity produced under GSA program, grade,

? cost per ton to GSA. Feasibility of making commercial ferro-
chrome from domestic ores. Kinds of commercial ferrochrome.
Methods of manufacture - high carbon - low carbon - high silicon -
costs.

(4) West Coast markets for ferrochrome - California, Oregon, Washington. 1/2
Prices. Profit possibilities. 1/2

(5) Conclusions - cooperatives. Probable difficulties. Possible
Government assistance.

From Green



Death Notices 1 Funeral Notices 2

funds.

3-2-61
Oregonian

# Chromite Data Report Asked

WASHINGTON (AP)—A review of the nation's supply and source of domestic chromite was asked Tuesday by Reps. Al Ullman, D-Ore., and B. F. Sisk, D-Calif.

They requested the review in a letter to Secretary of the Interior Stewart L. Udall and also asked for a study of the economic situation of small domestic chromite producers. Ullman and Sisk suggested that Udall make recommendations for remedial legislation affecting the industry.

Ullman said in a statement that current domestic output of chromite is insufficient to meet U.S. needs and leaves the nation dependent on foreign sources for a metal important to defense.

CHROMITE DATA REPORT ASKED

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Ullman said in a statement that current domestic output of chromite is insufficient to meet U.S. needs and leaves the nation dependent on foreign sources for a metal important to defense.

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THE OREGONIAN, Thursday, March 2, 1961.

#

Nuclear

T.S. Ary - Union Carbide, Gnd Jc

#

$83,000 - Feb (One from Apex Min

to Lkvw. mining.

5-13-60

# # # # #

Phone Call - S.H. Williston

There is some 5/13/60

Cr, Beryl, Cb, Ta

Dept of Int - have given

a favorable rpt at request

of Nixon

#

less than 1/2 M $

Amend for Hg (Tom Marti

a subsidy of $19/bottle - which is

equal to present tariff.

May hold U.S. Hg

prod to 1/2 of U.S.

Consum (around 25,000 flas

Ha 212-215

#200

U.S. Prod

38,000 58
30,600 59
25,000 60 —
'61

3 op. mines

WH 8-2618

1st Session

HR 5023 - 86th Cong.
S 1245 - "

QUALITY AND QUANTITY OF OREGON CHROME

During the last chrome stockpile program (1952-1958) Oregon supplied approximately 50,000 tons of the total 200,000 ton quota. The bulk of the remainder came from California. Of the 50,000 tons supplied by Oregon, approximately 10,000 tons came from central Oregon. The bulk of eastern Oregon's production was submitted the last two years of the program when the carlot principle was established. Previous to this, central Oregon producers had to pay an additional $16-18 a ton haulage cost from central Oregon to the Grants Pass depot. In addition to the production of chrome during the 1952-1958 stockpile program, chrome was mined during World War I and World War II. One mine in eastern Oregon, the old Ward mine, has a World War I production record of between 2,000 and 2,500.

Although there are nearly 100 known occurrences of chromite in central Oregon, the bulk of its production has come from approximately a half dozen mines. The U.S. Bureau of Mines has drilled one property in central Oregon because of its refractory grade. The U.S. Geological Survey has stated that there is 130,000 tons of ore in this district. From past experience it has been found that the Survey's figures are extremely optimistic.

The quality of Oregon's chrome ores, as submitted to the stockpile program, is higher than the ores submitted by California. Of all the ores submitted to the stockpile from Oregon, those from the central Oregon area maintained the highest chromic oxide content, averaging around 46 percent $Cr_2O_3$ with a 2.9 - 1 chrome-iron ratio. Complete analyses of Oregon chrome ores from southwestern Oregon are appended to this report. Ores as high as 57 percent $Cr_2O_3$ have been found in southwestern Oregon. It is doubtful, however, that there is any quantity of this type ore and a better average for material from Oregon would be around 46 percent $Cr_2O_3$ with a 2.65 - 1 chrome-iron ratio.

## SIGNIFICANCE TO THE COMMUNITY

In 1958, William S. Robertson of the Oregon Chrome Mine, Oregon's largest producer, submitted the following statement to the Department on the significance of his operation to the southwestern Oregon area:

> "During the 6½ years of the program through December 31, 1957, our own operations have paid out a total of $733,349.98 in direct labor, or a yearly average of $112,823.07. In addition we have paid out to one local truck operator $205,906.53 in trucking costs. His average labor per dollar of freight revenue is 26.29¢, or a total of $54,132.82 in direct truck labor, a yearly average of $8,328.12.
>
> "In addition we have expended thousands of dollars for supplies and materials in the local area, a portion of which is labor involved in furnishing these supplies.
>
> "A conservative estimate would show in excess of $250,000.00 in income taxes returned to the Federal Government on labor and profits involved in our own operations."

One operation from central Oregon in one year had an income of over $80,000 and an expenditure of around $69,000. The bulk of these expenditures was made in the John Day area.

It should be pointed out that mining is a basic industry. It creates wealth. The American Mining Congress Journal recently quoted an officer of the Battelle Memorial Institute in saying 3 percent of the employees in the nonferrous metallurgical industry are employed at the mine, 13 percent are employed in reducing the metal to its metallic state, and 84 percent are involved in finishing the material to its completed state.

10-28-59

ATTENTION OF HOLLIS DOLE

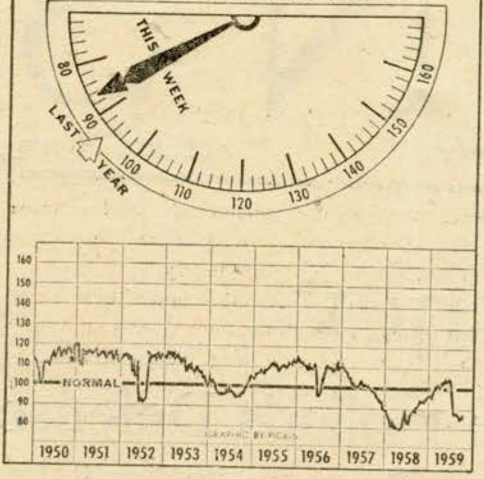
I was reading this at lunch today see p
page 22, re chrome in Africa.

I don't know what the source of the
authors' information is but this is news
to me of a half billion tons of
chrome reserves in Southern Rhodesia?

B arrons writers are generally
reliable

P. R. Hines.

## BARRON'S BUSINESS GAUGE




*Barron's Business Index dropped off 0.5 in the latest week to 86.5. This reflected declines in steel, coal and petroleum output and in miscellaneous and total carloadings, which were due largely to effects of the steel strike. Only electric power production showed a gain for the week. Current level of the Index of 86.5 compares with the year's high of 106.1 just prior to the steel strike and with 93.3 a year ago. For details see "Pulse of Industry and Trade," Page 54.*

# In This Issue

## ARTICLES



## DEPARTMENTS



## STATISTICAL SECTION




BARRON'S

*National Business and Financial Weekly*





October 12, 1959 Vol. XXXIX No. 41

Robert M Bleiberg, Editor

BARRON'S is published every Monday at 388 Newbury Street, Boston 15, Mass. Editorial and General Offices are located at 40 New Street, New York 4, N Y. Entire content of this publication copyrighted by Barron's Publishing Co., Inc., and must not be reproduced in whole or in part without special permission. Subscription rate (U. S and possessions and Canada) $15 yearly. 35 cents a copy. Other countries, $18 yearly. By air mail (U. S. and possessions and Canada) $39 yearly. All subscriptions payable in U. S. funds. Subscriptions and changes of address should be sent to Boston office. With change of address give old address. Second-class postage paid at Boston, Mass. Unsolicited manuscripts are given careful attention, but should be accompanied by self-addressed envelope with proper return postage.

# Quickening Drumbeat

## The Economies of Tropical Africa Are on the March

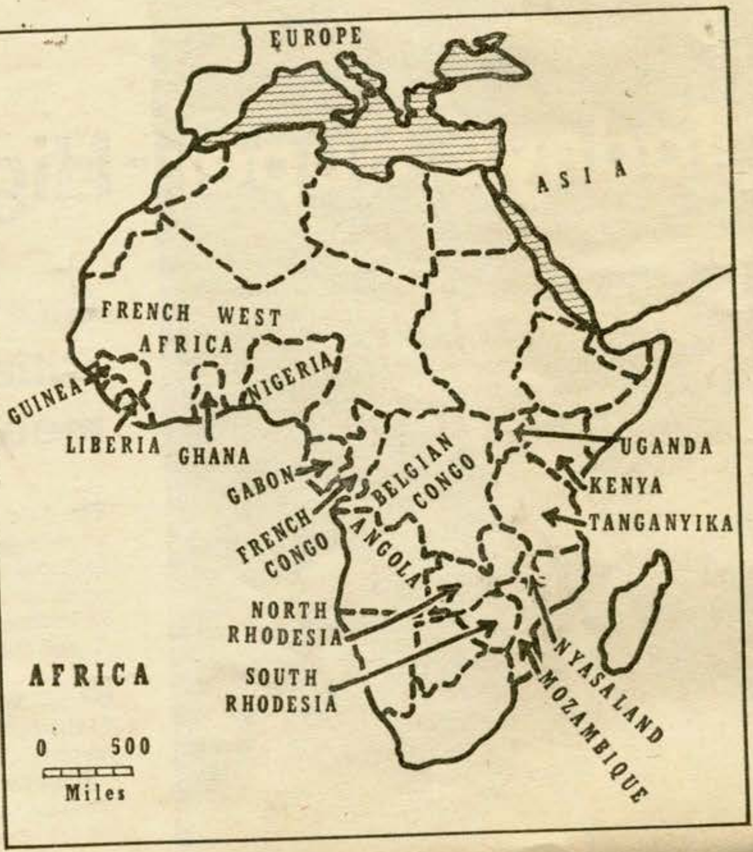
By MILDRED RENDL MARCUS and EDWARD MARCUS

FROM the Inga Rapids in the Belgian Congo to Kariba in the Rhodesian Copperbelt, from the coastal city of Daka in French West Africa to the bustling rail center of Kampala in Uganda, the drumbeat of economic progress is sounding throughout Tropical Africa. The great rivers of the region—which stretches roughly from the Sahara to the borders of the Union of South Africa—are being harnessed for power, its plains cultivated, new industries hacked out of its jungles, its vast mineral resources tapped. Economically speaking, in short, the once-slumbering giant not only has been aroused, but also is striding swiftly to exploit its massive wealth.

* * *

Already, the area supplies over 80% of the free world's cobalt, a fifth of its copper, 20% of its manganese and a substantial proportion of its platinum. Bauxite and chrome are abundant and, ultimately, this roster of metal riches will include increasing quantities of aluminum and iron ore. In the relatively brief span since the end of World War II, African coffee has captured a quarter of the world's market, while the continent's tea, tobacco and bananas have emerged as steadily more formidable competitors of the traditional sources of those commodities. The region's natural rubber industry no longer consists solely of Firestone's famed venture in Liberia—plantations have sprung up all over the continent. Not least, the beginnings of what may prove to be substantial oil reserves have been uncovered.

Behind this rapid and far-ranging development stand several factors. For one thing, wartime shortages strongly stimulated the expansion of both mineral and agricultural production. More important, paradoxically, was the postwar political upheaval elsewhere in the world. For example, the bitter struggle in Indonesia sparked an exodus of Dutch investment, much of which eventually was channeled into African rubber plantations. The result: the continent's natural rubber output today is ten times the prewar level. In like manner, Brazil's ill-fated attempt to rig the global coffee market proved




All-important, too, has been the much-abused "colonialism." Indeed, whether English corporations in British West Africa, French companies in Equatorial Africa or the Belgians in the Congo, the stepped-up investment has played a vital role in quickening the tempo of development. Over the past decade, moreover, American interest in Tropical Africa has been expanding briskly. In addition to Firestone, U. S. companies with a stake in the region include U. S. Steel, Union Carbide, Bethlehem Steel, American Metal Climax, Olin Mathieson, U.S. Plywood, Socony Mobil, Esso and Caltex.

* * *

Fundamentally, the willingness of private foreign investors, whatever their nationality, to make sizable commitments in Tropical Africa reflects the sound bases on which the region is pursuing its development. First, in protectorate and new republic alike, by and large there has been no reckless recourse to the printing press and, accordingly, no ravaging inflation. Then, too, the area has shown a commendable reluctance to indulge in the kind of outsized national industrial ventures which have proved so troublesome in other emerging economic territories. Finally, Tropical Africa is striving for full awareness of the necessity of a flourishing agriculture.

On this solid foundation, the region, as noted, is building a diversified economic structure, the enormous breadth and variety of which precludes detailed description. Nonetheless, a closer look at some of the individual projects provides an insight into the huge potential of Tropical Africa and the direction in which it is developing.

Perhaps the most striking aspect of the area's natural wealth is the abundance of those sinews of a modern economy — sources of power. While some headway has been made in the past three or four decades in utilizing Africa's waterpower resources, notably by Union Miniere in the Belgian Congo, the possibilities only now are beginning to be really exploited.

Thus, this spring, in Northern Rhodesia, the finishing touches were put on construction of the Kariba Dam across the Zambesi River. The dam has created a huge lake, the waters of which are slated to turn the first turbo-generator early next year. Kariba, which ranks as Africa's largest hydro plant, represents a joint effort of private interests and public agencies. The project is one of the largest ever financed by the World Bank: that institution lent approximately a third of the $225 million spent to complete the first, and most costly, stage. The mining companies of the Rhodesian copper belt contributed $56 million; in addition, they are obligated to pay surcharges of $28 million for their power in the 1960s. Although Kariba's planned capacity totals 1.2 million kilowatts, only half that amount will be installed at the start.

Far more ambitious is the hydro project proposed for the Inga Rapids in the Belgian Congo. To be built at a cost of

*Continued on Page 22*

# Quickening Drumbeat

*Continued from Page 9*

more than $3 billion over 25 years, the installation eventually would boast a generating capacity of some 25 million kilowatts. According to the blueprints, the first of three stages would be completed by 1965 and would supply between 400,000 and 800,000 kilowatts. In the estimate of Belgian engineers, Inga power in its early stages will cost 2½ mills, and half that much when the entire project is brought on stream. This compares with 6-8 mills in the U. S.

By way of customers, the designers of this vast undertaking envisage an aluminum industry which would make use of huge, nearby bauxite deposits. Towards this end, an international consortium, called "Aluminga," currently is studying the scheme. The group includes the Syndicate Belge de l'Aluminium, France's Pechiney-Ugine, a Swiss aluminum concern, Montecatini of Italy, the government-controlled aluminum works of West Germany, Canada's Aluminium, Ltd., and Reynolds Metals. If the project comes to fruition, it would dwarf any other hydro-electric installation in the world.

* * *

Aluminum — "packaged power" — and hydro plants, of course, have a natural affinity, and the metal represents the key to similar projects which have been proposed in Ghana, Guinea and the French Community Republic of the Congo, among other places. Obviously, the ability of Western aluminum producers to finance new African ventures is not unlimited, nor, for that, matter, are their markets. Consequently, some of the suggested projects may be a very long time in coming. Nonetheless, the irresistible combination of ample raw materials and cheap power make it inevitable that an aluminum industry of impressive proportions will arise in Tropical Africa.

The surging rivers of the region are not, as indicated, its only source of potential power. Oil and natural gas also have been found. Just last week, in fact, two affiliates of Socony Mobil and the Societe des Petroles de l'Afrique Equatoriale Francaise (SPAEF) announced discovery of a new field in the Republic of Gabon. This partnership, incidentally, has budgeted some $90 million for prospecting and drilling in Gabon and the Republic of the Congo. For its part, SPAEF already is producing some 10,000 barrels a day of crude.

A like rate of production has been achieved in Nigeria by a joint subsidiary of Shell and British Petroleum, following about $100 million worth of exploratory work. Oil also has been struck in Angola at Luanda. In Portuguese Mocambique, subsidiaries of Gulf and Indiana Standard have acquired prospecting concessions and Shell and British Petroleum are pressing the search in British East Africa. In the Belgian Congo, too, crews busily are hunting the black gold.

* * *

In one form or another, then, power to an extent undreamed of for centuries is being uncovered in Tropical Africa. At the same time, its long-buried mineral treasures are being brought to light. Those ubiquitous symbols of affluence—gold and diamonds—have for many years, to be sure, powerfully attracted Western investment. Then, too, the rich mines of the Copperbelt have been worked for decades. Here, it might be noted, American interest is by no means new: the Rhodesian Selection Trust, one of the two big copper holding companies of Northern Rhodesia, is controlled by American Metal Climax. Of late, however, the area's mineral spectrum has been extended measurably. In Southern Rhodesia, to illustrate, no less than half a billion tons of chrome ore reserves have been discovered. By contrast, Turkey, which currently serves as a primary supplier, is believed to have reserves of only 6 million tons.

In like vein, manganese and iron ore have been added to the list of Tropical Africa's known mineral wealth. In Gabon, the Compagnie Miniere de l'Ogooue (COMILOG), in which U.S. Steel holds a 49% interest, plans to pour nearly $90 million into development of a rich manganese deposit which, it is expected, will yield half a million tons a year. The World Bank this year extended a $35 million loan to help launch the project. In order to market the ores, COMILOG will build a 180-mile rail branch which will hook up with the existing line leading into Pointe Noire, the Congo republic's Atlantic port.

Two hundred miles north of the COMILOG find, the Societe des Mines de fer de Mekambo, half-owned by Bethlehem Steel, is drawing up plans to exploit Gabon's iron ore deposits, the third largest in the world. French interests hold a 34%

stake in the Mekambo concern and members of the European Coal and Steel Community, it is anticipated, will take down the remaining 16%. Cost of the venture probably will run in the neighborhood of $280 million, spread over eight years. Reserves in the field are believed to approximate 1 billion tons and the project's sponsors look for annual output of 10 million tons. Around 435 miles of track will have to be laid to carry out the ore.

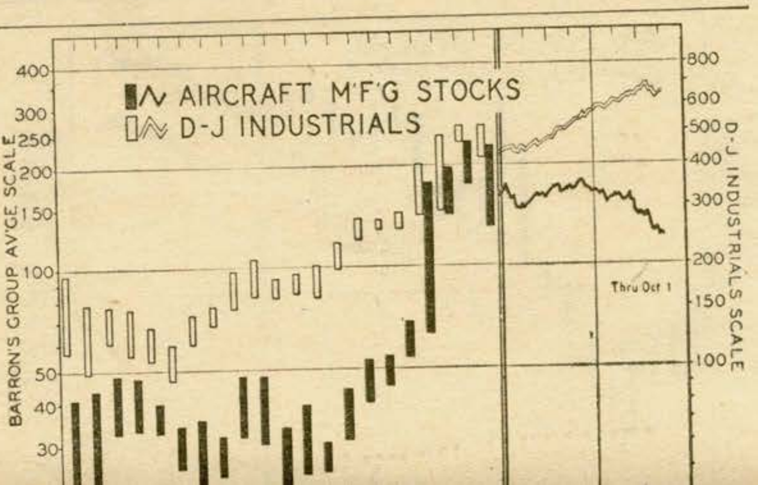
Liberia, thanks to Harvey Firestone, long synonymous with rubber, also is the site of considerable iron ore activity these days. The Liberian Mining Co., in which Republic Steel holds an interest, has brought mines into production at Bomi Hills, roughly 40 miles north of the country's capital, Monrovia. At present, in fact, the company is shipping some 3 million tons annually. More recently, the Liberian-American-Swedish Mineral Co. was organized to mine iron ore in the republic's Eastern Province. The new company has ticketed $150 million for the mining operation, rail construction and the development of a port.

Tropical Africa, then, is blessed with a combination of extensive deposits of metallic ores and virtually unlimited supplies of energy, a combination which offers a springboard for industrialization equaled in few other areas. Nor has this prospect gone unnoticed by the region's economic planners. Along with aluminum, for example, the Kariba hydro-electric installation holds promise of stirring expansion or creation of a wide sweep of industries — the mining of asbestos, steel smelting, textile mills, chemical plants. Similarly, the vision of the Inga Rapids project encompasses steel mills, fertilizer plants, pulp and paper mills, and cement kilns, to mention but a few.

Such industrial constellations, of course, will not spring into being overnight; at best, they are several generations off. Meanwhile, more tangible progress is being forged. One of the world's largest plywood industries, for instance, is located at Port Gentil, Gabon; U. S. Plywood acts as its North American distributor. The same company, moreover, operates its own mills in the Belgian Congo. As for light industry, those effervescent dispensers of Americana, Coca-Cola and Pepsi-Cola, are aggressively licensing bottling plants throughout the region.

If Tropical Africa is sending, in rapidly increasing amount, its riches to the far reaches of the globe, it also steadily is becoming a bigger customer for foreign goods. For the economic awakening of the region has had a pronounced impact on the kind and variety of its people's wants. Instead of the manioc, beer and cotton piece-goods which traditionally constituted the bulk of "trade" with the African interior, there is a brisk and growing demand for such merchandise as Western-style clothing, shoes, and electrical appliances. Overall, the region's imports are on the order of $3 billion annually—not very large, true, on a per capita basis ($26). Nonetheless, they are rising and will continue to do so, as more and more development projects move from the drawing board, in the process steadily boosting the general standard of living.

The great social lag of the region—low levels of education and technical skill—which stands as the single greatest impediment to its development will take many years and considerable effort to correct. But here, too, a significant start has been made. Without minimizing the area's problems, they hardly seem insurmountable in the light of its economic gains. Perhaps no better symbol of Tropical Africa's progress can be found than the decision of Nigerian census-takers this year to classify bicycles as consumer goods rather than, as hitherto-fore, as capital goods used in transportation.



The U.S. Bureau of Mines has furnished me with some statistics on mineral production in the western states that have me greatly concerned. The Bureau reports that the total dollar value of mineral production in the twelve western states (including Alaska) has fallen from $4,132 million in 1956 to $4,110 million in 1957, to $3,773 million in 1958. The Bureau adds that the value of the metallic mineral production portion of the total dropped from $1,300 million in 1956, to $980 million in 1957, to $890 million in 1958. This trend, to me, is frightening and I know you must share my views.

* * * *

IDLE MINES IN NEVADA
CAUSE BIG INCOME TAX LOSS TO STATE

Nevada's economy is being impaired by the deplorable condition of the state's mining industry; as, in addition to all other taxes, Nevada mines pay a net proceeds tax. In the year 1955, this amounted to $1,083,745.02; in 1956 $1,160,601.65; in 1957, $452,087.50. For the year 1958, it is doubtful if the net proceeds tax will total as much as $250,000 - probably less; and about 2500 less miners are now employed than in June of 1956.

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THE WALLACE MINER, Idaho, March 12, 1959

From: CHICAGO SUNDAY TRIBUNE
March 30, 1958

PRESIDENT AND TARIFF

Speaking before a trade policy conference Thursday, Mr. Eisenhower gave perhaps his most comprehensive plea for the extension of the reciprocal trade agreements act.

The administration's proposal, facing a battle in Congress, would extend the 1934 act for another five years. It would permit the President during this period to make further tariff cuts of up to 25 per cent in exchange for concessions from other countries, and would enlarge his authority to raise the rates where imports are hurting domestic industries.

Because of the recession and increasing imports, opposition to the reciprocal trade program is probably stronger now than at any time in the act's history. Even as the President spoke, a protectionist group held a rally in another Washington hotel and charged that small business men and their workers are being robbed of a living by "cheap imports" that are assessed low tariffs or none at all. There are few congressional districts in which at least one industry, however small, is not pressing for protection.

The general good of the country, both economically and politically, justifies the extension proposed by the administration.

Protectionists claim that 338,000 employes have lost their jobs because of competition from imports. The President replied with an estimate that 4½ million men and women in this country owe their jobs to our export trade and would lose them if foreigners could not earn dollars by selling goods to us. Altho some unions, such as the flint glass workers, are crying for protection, the AFL-CIO as a whole is behind the President's plan.

It is true that our imports are large - some 13 billion dollars a year; but our exports are larger, and account for 20 billion dollars a year. It is true, also, that our tariffs are lower than ever before; in the last 26 years the average rate on dutiable goods has dropped from 59 per cent to 11 per cent, as the accompanying chart shows. Yet customs receipts last year were the highest in history.

Some vital industries such as precision instruments are threatened by foreign competition. But vastly greater defense industries, such as steel, automobiles, and aircraft, thrive on their exports. In fact the President has received a good deal of advice in favor of low tariffs from a leading steel man, Clarence Randall, of Chicago.

In cases of proved injury, such as the clock and watch industry, the President has raised the tariff as high as the present law will permit - to 50 per cent above the rate of 1945. Under the proposed extension, he could raise it further to 50 per cent above the rate of 1934 - or as high as under the arch-protectionist Smoot-Hawley act of 1930.

The Democrats launched the reciprocal trade program in 1934 as one means of getting us out of the depression. How effective it might have been is hard to tell, for the war boom was soon on; and in the last 12 years prosperity has minimized the importance of the tariff as a protective measure. It is interesting to note, however, that while the Trade Agreements act was enacted to fight a depression, it is now being attacked as bad medicine in a recession.

In his recent speech to a group of Republican women, the President asked, "If we do not buy from (foreign nations) and pay them in dollars, where will they get the dollars to buy our goods?" The implication is that if the trade act is extended, Mr. Eisenhower will not persist in his demands for foreign aid.

If the President will pledge himself and his party to a massive reduction in foreign aid in return for the extension of his tariff powers, much of the opposition to his program will evaporate.

The Northern Miner, Toronto, Nov. 2, 1957



# Strategic, Gunnar Combine Forces On Chrome Project

**Gunnar Mines is adding another string to its money-making bow. It is a project being undertaken jointly with Strategic Materials Corp., of New York.**

The big uranium producer's large chromite deposits in the Cat Lake-Bird River area of southeastern Manitoba are shaping up as the foundation for what promises to be the establishment of a new branch of the mining industry in Canada.

As a result of recent metallurgical work, which appears to have solved the riddle of a difficult ore, exploitation of these deposits now has the earmarks of becoming a highly profitable venture. The Northern Miner gathers in conversation with principals associated in the project. It can be said that plans currently are being ...

**... process will produce chrome products at less cost than the standard process now being emp'oyed by other companies using imported ores which come primarily from Turkey and Africa, an official of Strategic tells The Northern Miner.**

It is also pointed out that the present project will mean the first domestic production of chrome products using domestic chrome ores. The proposed plant will be designed to turn out all grades of ferrochrome. It will also probably produce a magnesia chrome spinel which is the base for the production of various chrome salts used in the chemical and paint manufacturing industries.

**The project and plans have reached the stage where the intention is to get under way with a full scale plant construction program next spring, the official says.**

### Bulk Testing

The concrete plans for exploitation of the deposits have followed on the favorable results of laboratory test work on the ore using the Udy process. The process was developed by Dr. Marvin J. Udy and it has been incorporated into a \$2,000,000 prototype metallurgical plant built some time ago at Niagara Falls, Ont., by the Strategic Materials interests.

# *Strategic, Gunnar Combine Forces On Chrome Project*

(Continued from Page One)

proceeding to bring them to production.

**It can also be said that it is a multi-million dollar project and that negotiations for the necessary financing have reached a stage where success is reasonably assured.**

To set up the undertaking, a new company recently has been formed, **Strannar Mines.** This company will be a joint venture of Gunnar Mines and Strategic Materials Corp. The latter organization has a wholly-owned Canadian subsidiary which is the owner of the Udy process for the treatment of low grade chromite bearing ores. Exclusive Canadian rights for the use of the process will be granted to Strannar.

In addition to the Gunnar properties, the holdings of **Nesbitt LaBine Uranium Mines** and those of **Chromite Mining Corp.** will also be turned over to the new company for share considerations. The Nesbitt LaBine group adjoins Gunnar's Blind River property, while Chromite Mining is associated with Gunnar in the Bird River property.

Under the agreements being drawn up, it is proposed that the mine management of Strannar will be under the direct ...

... will be subjected to full scale pilot plant testing. An additional 500 tons of a direct smelting grade of ore has also been shipped direct to the Niagara Falls plant for treatment tests.

The full scale pilot plant work on the processing of these ores will enable Koppers Co., Inc., of Pittsburgh, to gather definite engineering data as a background for designing and estimating costs of a mining and smelting plant. It is understood from officials that plans include the erection of the smelting plant at the Lac du Bonnet mining property. The Koppers Co. is a large and well-known American engineering and construction firm and is associated with Strategic Materials Corp.

### Large Reserves

The Gunnar properties in the Cat Lake area have been indicated to contain what are probably the largest known chromite deposits in the country. These have been known for many years, and Gunnar carried out its last drilling on the Euclid Lake property during the summer and fall of 1952.

Following the above work, calculations based on that drilling, as well as the original drilling of about 20 years ago, resulted in an estimate of an indicated 11,000,000 tons in the main deposit having an average grade of 4.6% chromic oxide. A secondary deposit was also calculated to contain an indicated 675,000 tons averaging 6.7% chromic oxide. The main deposit was shown to have dimensions of about 1,000 ft. in length and an average width of 100 ft. or more. It was tested by the drilling to a vertical depth of 1,000 ft.

While no estimates have been pub-

333 Kearny Street
SAN FRANCISCO 8
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WALKER'S WEEKLY NEWSLETTER

Published by WALKER'S MANUAL, INC., Established 1909

215 West 7th Street
LOS ANGELES 14
MAdison 7-1591



# AMERICAN CHROME COMPANY

Traded Over-the-counter.

Outstanding:
Common ($1 par) - 1,872,000 shs.

## Highlights

Ferrochromium Pilot Plant to Start Operations Shortly - American Chrome Co. is currently producing chromite concentrate at its mine in Montana under a long term government contract extending into 1961. This concentrate is being delivered to the U.S. stockpile. Virtually the entire domestic consumption of chrome ore is supplied by imports of high grade ore from foreign countries generally involving long shipping distances. Presently no domestic smelters of ferrochromium are using the lower grade U.S. ores to produce this product.

American Chrome Co. has made careful studies and tests to determine the feasibility of using ores at its Montana mine to make ferrochromium. For more than one year, company conducted ferrochromium smelting tests with the help and cooperation of the U.S. Bureau of Mines at Albany, Ore. These test runs were successful in producing high carbon ferrochromium of commercial grades and with good recoveries, according to company. Still to be determined are production and marketing costs and the sales potential of the product in competition with ferrochromium made from foreign ores.

As a result of its studies and tests, the company is investing $500,000 in a pilot plant at Nye, Mont., for the production of high carbon ferrochromium using ores from its mine. The plant is scheduled to begin operation about Dec. 1, about 2 months after the original target date, due to slowness of certain suppliers in delivering equipment. Initial output is expected to be about 5 tons daily and this can be stepped up to 15 tons as desired. The principal purpose of the pilot plant is to accurately ascertain production costs and then determine selling costs including freight charges to the consuming areas which are in Chicago and points to the east of Chicago.

If the results of the pilot plant operation prove successful in all respects, then company would construct a commercial plant for the production of ferrochromium at a cost of several million dollars, according to management.

Earnings and Financial Position - For the 6 months to June 30, 1958 net income was $399,514 or $0.21 a share, up from the $259,832 or $0.14 a share recorded in like year earlier period. For the full year 1958, net is expected to be between $700,000 and $750,000, equal to $0.37 to $0.40 a share. This would compare with 1957 net of $529,725 or $0.28 a share.

During 1957, company paid off the remaining balance of its V-loan which originally stood at $1,500,000. In addition, company reduced its loan payable to GOLDFIELD CONSOLIDATED MINES CO. (which owns 65% of American Chrome's stock) to $388,996. This was the only long term liability of the company and it is being repaid at rate of $2 per ton of concentrate shipped to the government. At Aug. 31, 1958, this loan had been further reduced to $236,308.

At Dec. 31, 1957, current assets were $1,185,000 including cash of $691,000 and receivables from the U.S. government of $307,000. Current liabilities were $484,000. Company has paid for its pilot plant entirely out of funds on hand.

Current Mining Operations - American Chrome operates the Mouat Chrome mine in Stillwater County, Montana under a 10-year lease expiring in 1960 but with renewal options for two additional 10-year terms. The ore as it comes from the mine averages 20-21% $Cr_2O_3$--chromic oxide--and this is then concentrated by the company to 38%-plus chromic oxide for the government stockpile. During 1957, company delivered 114,298 tons to the government and shipments this year are expected to approximate this figure.

(continued on reverse side of page)

October 13, 1958

SUMMARY OF EARNINGS

| YEAR TO DEC. 31 | OPER. & OTHER INC. | PRODUCTION COSTS | INCOME TAXES | NET INCOME* | ERNGS. PER SHARE |
|---|---|---|---|---|---|
| 1957 | $3,938,987 | $2,460,149 | $182,009 | $529,725 | $0.28 |
| 1956 | 3,807,531 | 2,611,725 | 114,929 | 344,246 | 0.18 |
| 1955 | 3,732,937 | 2,882,227 | 1,246 | 110,819 | 0.06 |
| 1954 | 4,133,464 | 2,875,754 | - - - | 460,887 | 0.25 |

* BEFORE DEPLETION OF VALUE MINING RIGHTS CHARGED DIRECTLY TO SURPLUS IN YEARS 1954, 1955 AND 1956. IN 1957, VALUE OF MINING RIGHTS REDUCED TO $19,218, THE COST TO PARENT COMPANY. DEPLETION AT COST TOTALED $1,722 FOR 1957.

PRICE RANGE - 1958 THROUGH OCT. 9: 2 1/2 - 5/8.

U. S. Government Contract - The contract with the government calls for the delivery of 900,000 tons of the concentrate over an 8-year period expiring in December 1961. By the end of 1957, company had shipped 486,588 tons, leaving a balance of 413,412 tons to be delivered. Shipments for the first 9 months of 1958 have brought total cumulative deliveries to 574,000, thus leaving a balance of 326,000 tons to be delivered.

The company delivers the concentrate to the government at a base price of $33.32 per ton which is subject to escalation provisions based on Bureau of Labor indices. For the first 8 months of 1958, company received an average of $35.05 per ton while the price in effect at the end of September was $34.95. A slight reduction is anticipated by company for the final quarter of this year.

Ore Reserves - Although the company has not entirely blocked out its ore reserves, management believes that it can reasonably see 5,000,000 tons averaging 20-21% $Cr_2O_3$ content. The company is taking about 250,000 tons annually out of the mine so that at the end of the government contract, American Chrome would have remaining more than 4,000,000 tons. It has been estimated that the Mouat Chrome mine contains some 80% of the known U.S. reserves.

Pilot Plant Operations - The company has an agreement with the government under which it can produce 40,000 tons of the 38%-plus concentrate for use in the pilot plant. This tonnage will have a relatively low cost to the company. The concentrate will be fed into an electric furnace using 3 carbon electrodes to melt and smelt the ore. After smelting, the furnace will be tapped and the resulting product will be ferrochromium which will have a 50-55% chromium content. It will then be ready for shipment to users.

This product is known in the metal trade as "charged chrome" and it has only come into use in the past several years. It is currently being produced by 3 other smelters in this country but they are all using foreign ores.

Chrome Ore - Supply, Demand, Uses - In 1957 chrome ore imports totaled about 1,800,000 tons with the Union of South Africa, the Philippines, Southern Rhodesia and Turkey accounting for 92% of the imports. Domestic consumption in 1957 totaled 1,572,000 tons while production within this country was only 147,000 tons.

In 1957 approximately 67% of U.S. consumption went into metallurgical uses, principally stainless steel, 25% to refractory uses and the balance of 7% for chemical uses.

Management - Willis A. Swan, Pres. & Dir.; John Bley, V.P. & Gen. Mgr.; Wm. K. Woodburn, V.P.; T. L. Willcox, V.P.; Geo. M. Spradling, Sec., Asst. Treas. & Dir.; John L. Lukens, Treas.; Irving Guberman, Dir.

Messrs. Swan and Spradling are also officers and directors of Goldfield Consolidated Mines Co. while Mr. Guberman is a director of Goldfield.

Administrative Offices - No. 1 Montgomery St., San Francisco.

Compiled by Hollis for Hix of Electro Met
July 24, 1958

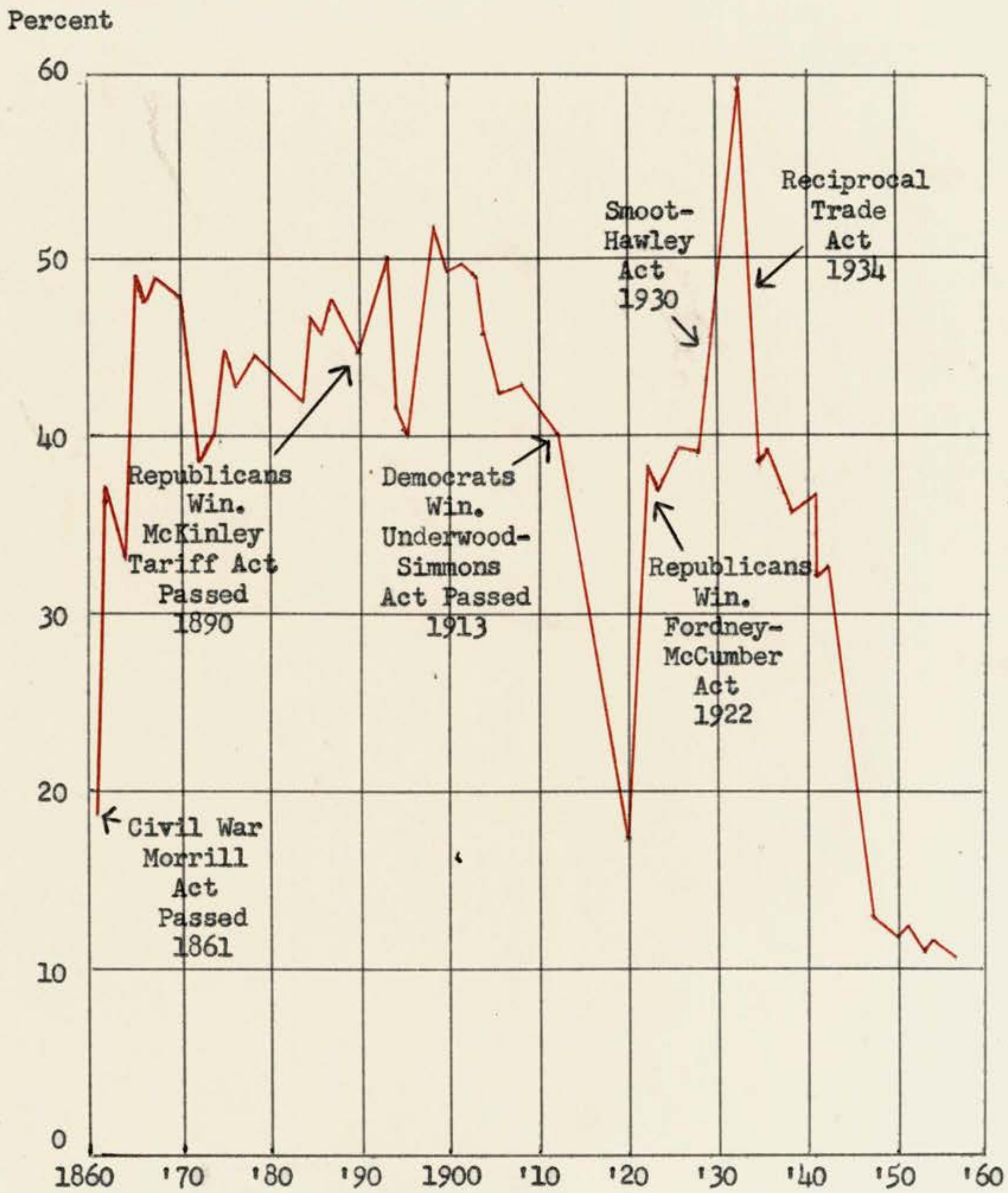
## ANALYSES OF OREGON CHROME ORES

| Sample Number | $Cr_2O_3$ | Fe | $SiO_2$ | CaO | MgO | FeO* | $Fe_2O_3$* | Description |
|---|---|---|---|---|---|---|---|---|
| P-17891 | 48.86% | 13.82% | 2.33% | | 10.98% | | | Fractured massive coarse-grained chromite. |
| P-16366 | 47.55% | 12.20% | 4.30% | 0.76% | 14.40% | 13.76% | 2.14% | Sheared chromite with dark and pale green serpentine, minor talc, chrome chlorite, and calcite along shears. |
| P-16367 | 39.20% | 13.20% | 7.30% | 0.70% | 16.22% | 14.79% | 2.43% | Aggregate of chromite with pale green interstitial serpentine and soft pearly white saponite (?) along fractures. |
| P-16368 | 47.96% | 12.75% | 6.23% | 0.60% | 17.82% | 14.34% | 2.28% | Schlieren banded chromite in dunite. |
| P-16207 | 49.20% | 10.97% | 4.83% | 0.66% | 17.27% | 10.37% | 4.16% | Medium-grained chromite with interstitial dark serpentine; some green glassy serpentine and thin films of talc on fractures. |
| P-16208 | 52.96% | 12.43% | 1.46% | 0.66% | 13.34% | 12.82% | 3.41% | Sheared chromite with white interstitial serpentine. |
| P-16209 | 50.60% | 9.52% | 6.63% | 0.56% | 19.43% | 11.11% | 1.26% | Schlieren banded chromite in fresh (unserpentinized) dunite. |
| P-16210 | 43.40% | 9.40% | 9.56% | 4.10% | 15.10% | 10.39% | 1.88% | Fine-grained chromite with uvarovite and antigorite along shears. |
| P-16141 | 53.36% | 15.85% | 2.56% | 0.20% | 12.16% | 17.11% | 3.64% | Disseminated and schlieren banded chromite in serpentinized dunite matrix. |
| P-16794 | 46.43% | 14.31% | 2.50% | 0.11% | 14.49% | | | Sheared massive coarse-grained chromite with minor interstitial serpentine. |
| P-16795 | 41.37% | 9.67% | 10.13% | 0.16% | 19.78% | | | Disseminated and rudely banded chromite in altered dunite. |
| P-16796 | 52.80% | 12.99% | 5.00% | 0.10% | 15.14% | | | Coarse-grained sheared massive chromite from small isolated pods. |

From: CHICAGO SUNDAY TRIBUNE
March 30, 1958

A CENTURY OF TARIFF LEGISLATION

Average Tariff Rate on Dutiable Goods
Imported into the United States



U. S. CONSUMPTION OF CHROME ORE AND CONCENTRATES IN 1957[1]

| | Short tons | | Short tons | Short tons | Pounds | Tariff | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ore + conc. | % $Cr_2O_3$ | $Cr_2O_3$ | Cr metal[2] | Cr metal | 1/4¢/lb. | 1/2¢/lb. | 3/4¢/lb. | 1¢/lb. |
| Metal-lurgical | 1,177,073 | 47.0 | 553,224 | 378,404 | 756,808,000 | $1,892,020 | $3,784,040 | $5,676,060 | $7,568,080 |
| Refractory | 434,922 | 34.8 | 151,362 | 103,531 | 207,062,000 | 517,655 | 1,035,310 | 1,552,965 | 2,070,620 |
| Chemical | 148,474 | 45.0 | 66,813 | 45,700 | 91,400,000 | 228,500 | 457,000 | 685,500 | 914,000 |
| Total | 1,760,469 | 43.8 | 771,400 | 527,635 | 1,055,270,000 | $2,638,175 | $5,276,350 | $7,914,525 | $10,552,700 |

1 Source - USBM Mineral Industry Surveys, Chromite Report No. 95, March 12, 1958.

2 Factor for reducing $Cr_2O_3$ to Cr metal (152:104 = .684).

TONNAGE (L.D.T.) LEFT IN CHROME STOCKPILE PROGRAM

| Date | Grants Pass | Carload (San Francisco) | Seattle | Total |
|---|---|---|---|---|
| Feb. 7 | 10,562 | 6,130 | ? | 16,692 ± |
| 14 | 9,919 | 5,711 | 1,000 (approx.) | 16,630 ± |
| 21 | 10,216 (527 L.D.T. on hand but not paid for) | 5,335 | 800 to 900 | 15,874 ± |
| 28 | 9,979 (634 L.D.T. on hand but not paid for) | 4,750 ("Large" quantity on hand but not paid for) | 808 | 14,903 |
| March 7 | 9,707 (516 L.D.T. on hand but not paid for) | 3,905 | 808 | 13,904 |
| 14 | Grants Pass, Carload, and Seattle tonnages combined | | | 12,885 |
| 21 | | | | 11,978 |
| 28 | | | | 11,269 |
| April 4 | | | | 10,527 |
| 11 | | | | 10,239 |
| 18 | | | | 9,278 |
| 25 | | | | 8,587 |
| May 2 | | | | 7,577 |
| 9 | | | | 5,806 |
| 19 | Quota filled - chrome program closed on May 19 | | | |

SPOKANE CHRONICLE

June 5, 1958



# Senate Action Could Expand Metal Works

Action taken in the United States senate today may pave the way for boosting Spokane's Pacific Northwest Alloys, Inc., magnesium plant to full capacity operation.

Senator Warren G. Magnuson (D-Wash.) advised the Chronicle today by telegram that an appropriation measure approved by the senate appropriations committee today contains $10,500,000 for the office of defense mobilization to start processing stockpiled chrome and manganese ore during fiscal 1959.

Magnuson said his independent offices subcommittee of the appropriations committee added the funds to the general services administration budget so that the ODM could reopen the Pacific Northwest Alloys plant to begin processing 152,000 tons of stockpiled chrome ore.

The plant, which employs about 450 when operating at capacity, laid off its last 100 men in February and recalled them a month later.

THE OREGONIAN

January 12, 1958

1/12/58

# Solon Sees Defense Value In Chrome Ore Project

WASHINGTON (AP) — Senator Warren G. Magnuson, Democrat, Washington, said Saturday there is defense justification for giving a chrome ore processing contract to the Pacific Northwest Alloys plant at Spokane, Wash.

He said in a letter to Gordon Gray, director of the office of defense mobilization (ODM), that there would be ample justification for giving the plant a contract to process 35,000 tons of low-grade domestic chrome ores now stockpiled along the Pacific coast. The plant has shut down chrome operations and released 275 men, he said.

Magnuson recalled that officials of the company, the Spokane chamber of commerce and other interested persons had met with Gray in mid-December. He wrote Gray:

"You promised to take the question under advisement and up to this time, I at least, have heard nothing further about it.

"Pacific Northwest Alloys, Inc., is the only company that has demonstrated the ability and the willingness to handle low grade domestic ores and to do this on an economic or commercial basis.

"The plant in which the company operates is a government owned plant—is a part of the industrial reserve. The personnel and knowhow the company has assembled are certainly an important part of our defense potential.

"In the event we were cut off from foreign sources of high-grade chrome ores, it would be tragic if there were no company in the United States capable and willing to operate on the lower grade domestic ores."

Sent copy to Gov. Bd.
copy sent to Bill [illegible]
2-14-58

# Chrome Ore Industry's Revival Aim of Bill

2/18

The Chamber of Commerce board of directors has approved a recommendation of its legislative committee, which if acted on favorably by Congress, will mean a revival of the now dormant chrome ore production business of Southern Oregon and Northern California.

Similar recommendations are expected to be sent to U.S. senators and representatives from many other sources.

The recommendation was for passage of U.S. Senate Bill 1245, which would provide for "incentive payments by the federal government for commercial grade metallurgical chromite. Identical bills also are before the House of Representatives.

The bill was explained to the legislative committee Tuesday by J. W. Pressler, secretary of the California-Oregon Chrome Producers Association of Medford. Payments, Pressler told the group would amount to $46 per long, dry ton for the first 1,000 tons produced each year by an individual producer and $35 per ton for each additional ton that year.

The incentive payments would be limited to 50,000 tons by all producers and to 5,000 tons for any one producer. The program proposed by the senate bill would be limited to a five-year period.

While the bill was under discussion by the Chamber of Commerce board Thursday, President Wally Martin said that the present price of chrome on the open market is about $45 a ton. He explained that the subsidy payments would apply over and above the open market price and would be payable on proof by the producer that he sold the chrome ore on the domestic market.

The government's cost under the terms of the proposed bill, Martin said, would be considerably less than under the former government chrome "stockpile program, discontinued last year. That program called for purchase of 46 per cent chrome ore at a base price of $110 per ton, with premiums paid or deductions made according to quality.

It was stated at the meeting that in recent years the chrome industry had meant an income in Josephine county amounting to about a half-million dollars annually. Also, that no chrome is being produced now because the open market price would leave producers operating at a loss.

The open market price, it was explained, is held down by low-cost ore shipped in from Africa and other parts of the world where labor costs are only a fraction of those in the United States.

P. 61
Box

THE SATURDAY EVENING POST

May 3, 1958

# Our In-and-Out Policy on Minerals Could Hamper America's Defenses

By EDMUND CHRISTOPHERSON

Today the minerals segment of our economy is in trouble. World prices of copper, zinc, lead, tungsten and other metals essential to our industries have toppled to the point where U.S. producers, who pay miners from five to twenty times what foreign miners receive, just can't compete.

In Butte, long famed as the "richest hill on earth," 5300 men were working in the mines in January of 1957. Today fewer than 2000 are employed, with more lay-offs expected. It's a sort of chain reaction. With a smaller ore output, the smelter in Anaconda needs fewer men and the refinery in Great Falls lays off workers too.

This current crisis in the feast-and-famine minerals industry is a result of the patch, mend and improvise Government policy on U.S. mining. During World War II, when enemy submarines were sinking a shockingly high percentage of the ships bringing strategic minerals from Africa and South America, we depended on our ability to produce these minerals at home. The industry's response was a decisive contribution to winning the war.

After the war, in 1946, Congress passed a Strategic and Critical Materials Stockpiling Act, but failed to implement it with necessary appropriations. Since then, Government agencies have spent some billion dollars to aid and develop minerals production abroad while doing little for domestic producers.

The Korean crisis again put metals mining on a crash basis, and U.S. producers came to the rescue. After Korea, in 1953, Congress passed measures and appropriations to continue buying strategic minerals, and the General Services Administration operated this program. Congress voted in 1956 to continue the program, but was slow about putting up the money. In the absence of immediate appropriations, minerals producers were encouraged to continue production on the assumption that deficiency appropriations would be forthcoming. They ended up holding the sack.

Tungsten is the key component of heat-resistant alloys vital in jets and missiles. With unlimited use of tungsten for aircraft engines, Russian designers turned out a hotter-burning jet, which gave their MIG-15 better climbing and altitude capabilities than our F-86's showed over Korea. It was only because of other design faults in the MIG that we came out ahead. Our designers were handicapped by limitations on the use of tungsten because the Defense Department rated it short. At the same time another Government agency was trying to shut down domestic tungsten production because there was too much! It wasn't until December, 1956, that our aircraft engineers were told to use all the tungsten they wanted in engine design. This delay may have played a part in putting us behind the U.S.S.R. in the missile race.

When the Korean crisis caught us unprepared, tungsten prices soared from $25 a unit to $100. The current price on the world market is $13. While this low price has shut down even our most efficient domestic producers and put miners and processors out of work, the Government continues with contracts to buy another $60,000,000 worth of this product abroad at $55.

We need a long-range minerals program which will enable the industry to operate with reasonable continuity and stability.

This does not mean that we should shut off all minerals imports, nor should we bail out obviously inefficient producers. We should determine realistic price and volume levels which will keep efficient U.S. mines in operation and encourage needed exploration. We should then set import bases that will permit the importation of needed mineral products without forcing our producers to shut down.

Hollis -

The attached letter came here for Mr. Bingham. I read it to him over the telephone and he asked me to make a copy of it for you.

J.

COPY

OST
MPANY

Dear Mr. Bingham

We are glad to give you permission to reprint in The Ore.-Bin our May 3 editorial on the mineral industry. Please attach the following credit acknowledgment:

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Sincerely,

/s/ Morton D. Hull

Mr. Mason L. Bingham
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon

# Definite Minerals Policy Agreed Upon by Chrome Producers' Organization

A definite policy in demands for governmental recognition and support to be presented in the next session of Congress, was agreed on at the Saturday afternoon meeting of the California-Oregon Chrome Producers Association held in the American Legion hall in Cave Junction Sept. 27.

In addressing the group, Bruce Manley, association president had this to say, "At the present time, we have no national minerals policy, but at the recent San Francisco conference of Western Miners, the feeling of confidence indicates everyone is optimistic that when the 86th Congress convenes they will work on a long range mineral policy. With that in mind, now is the time to press our demands that this policy will include chrome. Our friends in Washington want to know the facts on what the miners want, we must have a definite program."

Two formal demands were formulated and will be sent to the representatives and senators. The first was a resolution for a subsidy that would keep the small operator in business and be able to carry on the experimental and development work so necessary. In effect, the demand reads "the organization favors a chrome incentive payment in the sum of base payments of $46 per ton for $46 percent ore with penalties and premiums as fixed by GSA Grants Pass stockpile prices with a minimum grade of 35 percent CR202." The second demand is an appeal be made to the Tariff Commission for relief through the escape clause of the Free Reciprocal Trade agreement designed for miners in distress. A demand for $10 per ton import tariff be placed on foreign chrome shipments.

Harry Hawk of Ashland in a report of the San Francisco conference pointed out that the zinc, lead and copper operators already have such an embargo. "These are all old established markets and need only the labor differential to compete with the foreign markets, whereas chrome is still in the exploration and development field. Our representatives in Congress should be made to realize this more clearly."

Ed Gardner of John Day said the one resolution at the San Francisco conference called attention to the fact that continuing to stockpile strategic minerals would be a safety factor in National defense; a stockpile of strategic minerals would not perish through storage, and would be ready in the face of a National emergency.

A meeting of the chrome miners with Congressman Charles O. Porter has been arranged for 7:30 p.m. in the Illinois Valley high school library, on Monday, Sept. 29. Porter will be in the Valley all day.

The next meeting of the association will be on Saturday, Oct. 25 at 2 p.m. in the American Legion hall at Cave Junction.

# Miners Cooperative Planned

CAVE JUNCTION (Special) — A movement was made at the California-Oregon Chrome Producers meeting Saturday, August 30 at Cave Junction to form a miner's cooperative. The plan, designed along the same set up as the Grange co-ops, will extend from Central California through Oregon.

The legal papers drawn up for the non-profit organization were prepared by Bruce Manley, Medford attorney and president of the association. They will be filed this week. Jack Eggers of Cave Junction, Gene Brown of O'Brien and Hawk of Ashland signed the papers.

The purpose of this meeting was mainly to organize and get a co-op underway in order to be able to present more strength at the next session of Congress in January. It is hoped that the force of an organized group will have a better chance to gain government help than individual miners.

Fay Bristol of Grants Pass and Elwood Hussey of Cave Junction, who will attend the Western Miners Conference in San Francisco, will give their reports at the next Chrome Producers Association meeting the last Saturday in September, when it is hoped that Oregon's leading Congressmen will be present.

# Bingham Warns Of Mining Loss

## Defeat of Program For Chrome Is Noted

It was confirmed here today by Miss Nadie Strayer, member of the state mining board, that the bill for a minerals program was killed by the house of congress shortly before adjournment last week, carying with it the hopes of Oregon's chrome miners for reactivation of their mines and the hopes of the whole western metal mining industry for subsidy aid.

Mineral resources leaders described its defeat as a blow to national preparedness.

The measure, worked out by the senate interior committee, would have provided subsidy aid for copper, lead, zinc, tungsten and several other defense minerals as well as chrome. It had passed the senate with the strong support of Senator Morse, who introduced the chrome amendment, and Senator Neuberger, who was a member of the interior committee. Both the senators and Congress Al Ullman had fought hard to get passage of the bill through the house.

Its defeat there, by about 70 votes, is attributed by mining leaders to failure of administration, republican and eastern industrialist forces to recognize the need to maintain domestic mining and anxiety to bolster assistance to foreign countries, build their mines and buy their cheaply produced ores.

Secretary Seaton of the Interior Department had given last minute approval of the changes made by the senate committee to meet industry objections to his subsidy program and provide more mining assistance.

The president is reported this week to have signed the bill for extension of the D.M.E.A. program. However, with no aid for mining and no market for defense ores, mining representatives are unable to see how this exploration program can be supported by the industry.

Mason L. Bingham, chairman of the state mining department said Monday that he agrees that the defeat of this bill means the complete shut-down of the chrome mining industry in Oregon and in California.

"For your information, regardless of stock piling procedures, the United States is artificially a have-not nation as regards chromite. Ninety-eight percent of our requirements is imported from overseas. This metal is particularly important as an alloy in industry, and particularly in defense requirements. The government, in World War I, World War II, and the Korean "Police Action", urged all chrome producers to develop and produce all they could for purposes of national defense. What the stock-piling advocates overlook, when an industry such as this is closed down, is they you not only lose the mines, but you drive away the miners who have the know-how and the necessary skills to produce this essential ore.

"Aside from being a loss to the economy of our state, the closure of this industry is a blow to adequate preparedness."

"If there should be another national crisis, I trust we will have a few "Tommy Atkinses" left in the mining industry."

# Chrome Figures Said Incorrect

Figures on chrome ore prices, as reported recently, contained inaccuracies, according to Len Ramp, manager of the Grants Pass Geology and Mineral Industries field office.

Local miners were receiving $115 per long ton for 48 per cent chrome ore with a 3-1 ratio, instead of the 44 per cent grade, as reported, Ramp explained. Currently the market price on 44 per cent chrome ore, f.o.b. Atlantic ports, ranges from $22 to $23, while the 48 per cent grade with a 3-1 ratio runs from $44 to $55, according to the latest edition of the Engineering and Mining

# The Chrome Mines Are Down

No chrome now is being mined in Southern Oregon because quotas under the federal subsidy program have been exhausted and Congress refused to enact legislation that would provide for further stockpiling.

Under the former program Southern Oregon chrome brought $115 per long ton for 48 per cent chrome ore. The highest price for this same grade of ore, on the open market, is $55 f.o.b. Atlantic ports. Thus it is understandable why all local chrome mining operations have been forced to shut down.

Here again a basic problem in world trade and domestic economics is involved. Chrome ore, produced by foreign labor that is paid only a few cents an hour, can be landed at Atlantic seaboard ports for far less than the American cost of production. The same is true of copper, lead, zinc and other strategic minerals.

We dislike government subsidies in any form, unless they are necessary for national security. Yet President Eisenhower had a point when he noted that the United States does not produce sufficient minerals of strategic importance to meet national requirements if war should cut normal shipping movement.

It might be cheaper to keep some mines operating than to defray the cost of getting them back into production if an emergency should arise, the president indicated. Congress still did not see fit to act.

Complicating the situation is the fact that there is a vast amount of American capital invested in foreign mining development. This is especially true in Canada, Chile and Africa. In the case of Chile any increase in tariffs that would hit copper, the major export of that country, probably would have to be offset by foreign aid payments to keep Chile's economy from collapsing

Canada, the best customer of the United States, also is a big producer and exporter of minerals. Recent quota allocations on Canadian oil are irritating to our northern neighbors, who already are talking of plans to increase trade within the British Commonwealth and reduce purchases from the U.S. If restrictions were imposed on other mineral imports—such as nickel, for instance—this irritation might increase to the point of drastic retaliation.

Yet there is much low-grade nickel that could be mined in Southern Oregon if only a protected market were available for this ore.

So it goes—all around the circle. The United States must also import if it is to provide other free nations with the dollar exchange that is essential if they are to buy our exports. This country is committed, as a matter of official policy, to a program of expanding world trade and gradual elimination of tariff barriers.

Whenever we start building a fence around our own market Soviet Russia eagerly steps in—even to the point of buying fish from Iceland! So the only apparent alternative is to submit to foreign imports that damage certain sectors of American economy, on the premise that over-all trade benefits offset individual losses.

This is little consolation to owners of closed chrome mines, or the men who were working in them. They just happen to be unfortunate victims of the grim struggle now in progress between the communist countries and the free

GRANTS PASS COURIER
May 20, 1958

# Chrome Producers Plan Letters to Congressmen

CAVE JUNCTION (Special) — Over 50 persons responded to the special meeting of the California-Oregon Chrome Producers called by President Bruce Manley to write letters voicing their approval in favor of a ferro-chrome plant in this area.

Manley stated to the group of miners gathered at the American Legion building in Cave Junction Saturday, May 17 that Oregon senators and representatives in Washington are interested and will work toward establishing such a processing plant, provided they can be assured the people concerned really want it.

It is with this purpose in mind that letters have already been secured from several mining companies and technicians pointing up the advantages of such an undertaking. The individual mine owners were urged to add their voice and to contact others not attending the meeting to also write. All letters should be addressed to Bruce Manley, Leverette Bldg., Medford, Oregon.

Manley distributed printed matter which explained the six-point program that a cooperative processing plant will achieve.

1. Create a new industry in Southern Oregon which would in turn attract others.

2. Give the chrome miners an opportunity to continue. Thousands of dollars already invested in roads and mine development will be lost if the mines are closed.

3. Bolster a faltering economy. Every man at work in a mine creates jobs for others. A depression is ended by either making improvements in the economy or by creating confidence in the people. A cooperative processing plant would accomplish both.

4. Enable our people to meet foreign competition and still pay American wages.

5. Conserve our minerals and stop high-grading our mines. To meet foreign competition we are now forced to leave the lower grade ores. The amount of ore that has been forever lost to us through workings cave-in and tunnels is incalculable. The amount of ore recovered by a practical, long term operation using the lower grades with the higher grades would pay for the plant many times.

6. Processing plants are moving into foreign countries. They will be ready, willing, and able to charge us any price they choose unless we have the people's own plants to keep the foreign operator on some kind of reasonable price list.

Manley pointed out that this last advantage should be reason enough from a patriotic standpoint. Keep the American miner in business.

Durand Hall of Castro Mining Co., in his letter of endorsement, wrote: "The short time nature of the government support program since 1942 has virtually precluded long-range exploration progress for chromite by prudent capital. Any program for a Western ferro-alloy industry sponsored by the government or private m o n e y must have behind it a strong backlog of raw material. It is my firm belief that there is a good backlog in California and Oregon."

Joseph Holman of Pasadena, in his letter heartily endorsing Senator Morse's recommendations and expressing his opinion that such a move would be a sound undertaking to develop chromite on a long range mining program, had this to say: "Cooperative ownership of such a plant is the best insurance for the miner to provide a continuing market. I will be more than happy to share a financial interest in such a plant if it can be assisted by government backing with assured contracts for the finished product."

Thad W. Hatten, secretary of Northwestern mining council, in voicing his approval said: "The feasibility appears to me to be the answer to a sound chrome producing industry which would be a new, year-around industry for our area which we all realize is badly needed."

Gene Brown, owner of H i g h Plateau mines, said he was ". . . in-favor of the plant and would give it his wholehearted support."

Plans for financing a ferro-chrome plant are still in the nebulous stage. It could be done from private money, or on a cooperative share basis according to the state laws, or by contracts for specified shipments of ferro-chrome on which banks will loan money, or it could be handled as the government has subsidized uranium plants and the nickle plant in Riddle.

In answer to the question of how much chrome ore it would take to produce a ton of ferro-chrome, J. W. Pressler, secretary of the Association and consulting Mineral and Metallurgical engineer, replied: "It will take 2½ tons of ore to make one ton of ferro-chrome."

A brief discussion of the new chrome bill to be presented to the Department of Interior on Monday by Fred Seaton, Secretary of Interior, brought out that the bill is similar to the one recommended last year, with the difference that the subsidy on chrome will be raised from \$21 per ton to \$46 per ton. However, this bill will be another short-term one, with the total amount of \$4½ million which will cover a period of from one to two years. It is understood this bill provides for the sale to industry in large tonnage quantities only, and payment from the government will not be made until industry provides a "satisfactory proof of sale." This bill would only benefit the large operators as the smaller operator would not be financially able to withstand the delay in payment for his product. 'Since this bill appears to be defective for the small operators, we are attending the hearings in hopes of obtaining an extension of time or some other concession to make it possible for American chrome miners to keep operating on a sustained long range basis, it was stated.

Bruce Manley, Medford attorney, with William Gardner of John Day, State Geologist Hollis Dole and Joseph Holman of Pasadena, Calif., were to fly to Washington on Monday, to be present for the three-day hearing on chrome industry at the Department of Interior.

# Local Chrome Purchase Program Ends

The end of the chrome purchasing program by the General Services Administration c a m e abruptly to the Grants Pass purchasing depot yesterday when a telephone call was received by the depot manager Dan Beyer from GSA offices in San Francisco instructing him to make no more committments for chrome purchases and to refuse any uncommitted offerings.

As of last week a backlog of some 9,000 long tons remained unfilled under the support program Beyer said but heavy receipts at the San Francisco depot swallowed up the entire quota.

Beyer stated that he would continue to receive some 400 tons on which he had previously given committment to purchase to local producers. However, he said, the sudden closure will mean that some local producers will be caught with ore they cannot dispose of.

The local depot has been in operation since 1951.

BAKER RECORD COURIER

July 3, 1958

# Ullman Seeks Bill For Gold Miners

## Regulation Without Benefit, Hard on Industry

Congressman Al Ullman has asked for the appointment of a 16-member joint committee to investigate the depressed state of the gold mining industry. Under the terms of the joint resolution introduced by Ullman, members of the committee would be appointed by both the legislative and executive branches of the Government.

"It is abundantly clear that the importance of the gold mining industry has been overlooked during the last several decades," Ullman stated, "despite the fact that our monetary system is at least supposedly based on this metal. Domestic gold production has fallen off alarmingly and chronic unemployment has become the normal state for most of the nation's gold miners."

"Gold mining has all the disadvantages of being a regulated industry—with none of the advantages," Ullman continued. "Essentially the Government is the only legal buyer of gold and the domestic gold miner is denied the right to sell his product in the free world market. The gold miner still receives the same controlled price for his product that he received 25 years ago. Many producers have been the victim of a serious cost-price squeeze but I doubt if any have suffered as badly or for as prolonged a period as has the average gold miner."

"Clearly a full study is required. It would give to Congress needed information for a sound gold program."

Congressman Ullman added that he had today raised the gold issue before the mining subcommittee of the House Interior committee. Following discussion of the matter, the Subcommittee passed a resolution directing the chairman to bring this matter before the full Committee in an effort to expedite early action by the Banking & Currency Committee which has jurisdiction over gold legislation.

GRANTS PASS COURIER
May 16, 1958

## Chrome Picture Declared Some Brighter

"The chrome picture, at the Washington end, looks brighter."

That was the statement made Thursday bf Bruce Manley, Medford attorney and president of the California-Oregon Chrome Producers, on the eve of two developments:

1. The Chrome Producers, an old organization reactivated recently, will meet at 2 p.m. Saturday at the American Legion hall in Cave Junction to exchange information and perfect plans. All interested persons are invited to attend.

2. Manley, Hollis Dole, Joseph Holman and William Gardner will go to Washington next week to see what they can do there.

The object, of course, is to get an extension of time or some other concession from the federal government that will make it possible for American chrome miners to keep operating.

Manley said he could not be specific in commenting on the information he had, but he said there had been indications that key officials in Washington had recently turned to a more favorable attitude.

At least one major topic at the Cave Junction meeting will be in connection with working toward establishing a ferro-chrome plant in this area.

Dole, state geologist, and Manley will leave Monday by air for Washington. Manley was not sure of the travel plans for Holman and Gardner, producers who live at Pasadena, Calif., and John Day, respectively.

GRANTS PASS COURIER
June 25, 1958

## Federal Chrome Stockpiling Program Urged

A five-year Federal program for stockpile purchase of ferrochrome to prevent severe dislocation of the domestic chrome mining industry was urged before the Senate Interior Committee by Senator Richard L. Neuberger of Oregon.

Neuberger told the committee that chrome mines, of which about 40 are located in Oregon, face "almost inescapable" closure unless the Federal program is revived, since domestic producers are unable to compete with foreign imports. The Oregon Senator told the Committee he supported the proposals of Hollis M. Dole, director of the Oregon Department of Geology and Minerals Industries, for establishment of a cooperative ferrochrome processing plant by chrome miners through a Federal loan.

"Chrome mining in the past few weeks has come to a standstill," Neuberger declared. "Unless there is action by Congress, the domestic chrome mining industry, for the present at least, will make no further contribution to the nation's economy. In view of the decline in lumber markets, it is imperative to states of the West that the mining industry be given every opportunity to fill the gap which has been created in our economy."

Neuberger said he had conferred with William Gardner of Canyon City and Bruce Manley of Medford about legislation needed to revive the chrome mining industry. He emphasized that continuance of mine operations was necessary to keep skilled workers and mine facilities available in the event emergency conditions cut off the supply of foreign chromite. At another session of the Senate Interior Committee, Neuberger questioned Interior Secretary Fred Seaton about failure to include aluminum in the minerals stabilization program proposed by the Administration. Because of Soviet efforts to undermine the world market for aluminum, Neuberger said it was "incongruous" that it was left out of Administration plans for stabilizing the mineral-producing industry.

OREGONIAN
May 26, 1958

### Chrome Mines Closed

To the Editor: One more Oregon industry is shut down. The sudden closure of chrome receiving by the U.S. government from domestic production is working a real hardship to producers and processors of this mineral.

What started out two years ago to be a program to subsidize chrome in this country until June 30, 1959, has fallen short by more than a year and left those who developed mines and concentrating plants holding indebtedness.

Needless to say, it has caused an immediate closure of the two other chrome concentrating plants, as well as our own, right here in the vicinity of John Day. Unless something is done quickly to insure a continuation of chrome production, the chrome mining industry will be abandoned, mill and mine equipment scattered, experienced personnel dispersed and in time of crisis no chrome to be had. That would leave this nation in a precarious position.

The number thrown out of employment because of this will be shocking, especially in the western states.

Why not use a percentage of the foreign aid to carry on the mining industry here instead of developing the mining in foreign countries and then shipping it here at a fraction of our cost of production?.

J. A. CURZON,
President,
Tri-County Minining & Concentrating Corp., John Day.

GRANTS PASS COURIER

July 2, 1958

# Representatives Report On Progress Made For Local Chrome Miners

CAVE JUNCTION (Special) — A report from the representatives of the Cal-Ore Chrome Producers Association, who have been in Washington since May 19, reveals the work done and still to be done on behalf of the chrome miners.

Bruce Manley, Medford attorney, and president of the association, is still in Washington expending every effort to expedite the preparation of the revised bill on a ferrochrome co-op plant for presentation in the House.

The framework for this bill was developed by Joe Holman, Bruce Manley and Hollis Dole. They have altered and expanded Dole's original suggestions made in Washington in March when he appeared as an industry witness. At that tiime, Dole made a proposal for a ferrochrome plant using newly mined domestic ores to maintain chrome mining on the West Coast. The original plan was based on a feasibility study which the Department of Geology and Mineral Industries and the Oregon Department of Planning and Development had made by Ivan Block & Associates of Portland.

Considerable time has been spent in trying to put over the revised plan. In brief this is the idea: It assumes that the chrome producers will form a co-op group which will become a sound legal corporate entity along the established plans approved for such ventures. It will require an act of Congress which will provide for the government to buy a rea-

(Continued on page 3)

sonable amount of ferrochrome from the co-op over the period of the next five years. It suggests that the total amount of the purchase be not less than $25 million. Such a purchase over this period of time would guarantee a market and would provide a credit background for the co-op through normal banking channels for immediate operations.

The plan has been discussed with other segments of the mining industry and has been accepted enthusiastically. It will take no more money to handle this plan than Senator Murray's adaptation bill calling for a bonus payment of $46 per ton and it has the advantage of giving the taxpayer something of value for his money. Best of all, it permits actual long-range planning and assures a degree of permanence which neither Secretary of Interior Seaton's stabilization plan nor Murray's adaptation does. It also permits the co-op to pay the miners the same price for ore that was paid under the GSA stockpiling plan.

At the present time a bill is being prepared on the ferrochrome plan for presentation to the House. It was found more desirable to go through the House, as other bills presented by Senators Morse and Neuberger met with considerable resistance in the Senate Interior Committee as well as in the Department of Interior. Senator Clair Engle of California has been asked to present the bill within the next week or ten days and will call for hearings on it in the House Interior and Insular Affairs Committee immediately thereafter.

If this bill clears the House Interior Committee, it will then go to the House floor and if passed, will then go on to the Senate. A tremendous amount of work remains to be done if anything is to be accomplished this session of Congress. It is believed the effort is worth seeking a market for our minerals as a processed metal alloy instead of bucking the raw material outlet where the United States costs present a wide gap with foreign costs. Bruce Manley will remain in Washington to assist in carrying the bill through.

If chrome mining is to continue on a firm basis in the West, a better plan must come out of Congress than the bonus plans proposed by the Interior Department of the Senate Committee.

The delegation sent to Washington by the Chrome Producers Association in May were Hollis Dole, director of the Oregon Department of Geology and Mineral Industries, Bruce Manley, president, and Joe Holman of Pasadena. Dole returned to Portland May 30 and Holman returned home June 24 after he and Manley had testified on the Seaton and Murray bills before the Senate Interior Committee.

GRANTS PASS COURIER

March 24, 1958

# Efforts To Be Made To Get Extension Of Chrome Program

By GEORGE CURTIS

Plans for an effort to save the chrome mining industry of Southern Oregon and Northern California by inducing the federal government to continue the chrome buying program through its depot here, were outlined at a Saturday noon luncheon meeting of mining people and others, held at the Redwoods hotel dining room.

Mason Bingham of Portland, a director of the First National bank and chairman of the State Board of Geology and Mineral Industries, outlined briefly the history of the local depot, established in 1951, during the Korean war.

"Now we are approaching the end of the buying program, unless something is done," Bingham continued.

Bingham said that domestic chrome always becomes important during a war and that unfortunately a chrome mine can't be "put in mothballs" because the owner or operator loses too much in various ways.

**Long-Time Operation**

Referring also to tungsten, manganese, and other metals, as well as chrome, Bingham said:

"We recognize their economic importance to the communities where they are produced. The mining of these metals, because of the tremendous volume involved, is a long-time operation, not just a matter of gouging out a pocket and moving on."

Hollis Dole, director of the State Department of Geology and Mineral Industries, who will be in Washington this week to testify at hearings being conducted by the interior and insular affairs committees on the future of government programs in chrome and other metals, was the next speaker.

Commenting on the impossibility of domestic chrome competing with the foreign product, Dole said:

**Dole Quoted**

"Here we pay our men in the mines as much per hour or day as theirs (in certain foreign countires) are paid per week or per month.

"Some foreign mines are highly mechanized, some better equipped than our own, because they have been making money. Many of them have been financed by the U. S. government.

"Finally, certain United States senators and representatives, chiefly from the mining states from the West, have recognized that the U. S. mining industry has been neglected; so they have set up these meetings to see what can be done.

"We must have a lobby in Washington and we need the support of the miners back home and of organizations such as the Chamber of Commerce . . .

"Governors and key representatives of the mining industry of the West will be among the witnesses at the hearings. It will help if it can be shown that the mining area out here really wants the chrome program continued. In part this is a struggle between the industrial East and the raw materials West."

Dole prefaced his talk by saying that the chances of success in Washington may be dim but he cited that as all the more reason why support from the home people is needed. He said letters to Oregon's congressional delegation will help.

F. I. Bristol, prominent local mining man who has visited Washington in past years as a representative of the mining industry, commented that:

"Hollis (Dole) will work harder and meet more people than he has in a long time. One of the best possibilities of the situation is that some new idea will come out of the hearings. If it's good, it might be just what the mining industry needs.

"It will not be enough to show that there will be a lot of unemployment among miners in Oregon. We have to have a program that will fit with what the alloy industries need."

**Other Segments Suffer**

Noting that other segments of the mining industry are suffering, too, Dole said that of more than 600 tungsten mines that were operating in 1956, only three are running now.

Speaking again, Bingham commented that:

"We know that mining is not your major industry here now, but it seems to me that it can be the cherry on top of the frosting on the cake. It's important to your economy the same as the last 10 per cent of any business, where it is said the profit comes from.

"We can't overlook mining in Oregon, because in the 20 years from 1937 through June, 1957, income from Oregon mines has amounted to $54,000,000."

W. M. Ausland, local contractor and member of the Chamber of Commerce mining committee, noted that the government is taking great interest now in unemployement and that since it is worst in mining states, that may be a big factor in what the government is willing to do.

Other speakers included Jack Brownell, local business man and member of the city council; Walt Freeman, O'Brien mining man; L. C. Hansen, manager of the Chamber of Commerce; State Senator Don Cameron, the chamber's mining committee chairman; Rep. Allen Tom of Rufus, Sherman county; Miss Nadine Strayer of Baker and Les Child of Grants Pass, members of the State Board of Geology and Mineral Industries, and Bill Gardner, John Day mining man.

Wally Martin, vice-president of the Chamber of Commerce, presided.

BAKER RECORD COURIER
March 13, 1958

# Ferrochrome Study Begun by Oregon

## Two Departments Are Under Governor Holmes

A study on the feasibility of a Western plant to make ferrochrome from domestic ores was authorized March 4 in a cooperative arrangement between two organizations within the office of Governor Robert D. Holmes. The Department of Geology and Mineral Industries and the Department of Planning and Development cooperating in the study will determine if local processing of domestic ores could sustain mining of chrome in Oregon.

Metallurgical-grade chromite in the United States is found only in Oregon, California, Washington and Alaska. Domestic mining has been restricted to periods of international stress when chrome shipments from overseas were cut off and incentive prices paid by the Government. At the present time Oregon's chrome mining is for the Government stockpile of strategic materials. The amount of domestic chrome allocated for stockpile purchase is expected to be obtained within the next few months and as a result chrome mining will cease unless a market can be established.

Both the Department of Geology and Mineral Industries and the Department of Planning and Development recognize that loss of this basic industry would be detrimental to the State's economy.

GRANTS PASS COURIER
March 17, 1958

# Chrome Miners Meeting Set

A meeting of chrome miners will be held Saturday, March 29, starting at 2 p.m. at the American Legion hall in Cave Junction, it is announced by the Chrome Miners Committee.

All miners who have been or plan to be interested in chrome mining are being invited. The purpose of the meeting is to consider methods of getting an extension of the purchase program by the government and to make long range plans, possibly to form an organization of miners in the West Coast area.

Local miners, with the help of the Chambers of Commerce of the Illinois Valley and Grants Pass, have arranged for Hollis Dole, head of Oregon Geology and Mineral Industries, to attend the Washington, D.C., hearing on Defense Metals on March 24, 25 and 26, to work in their behalf.

BAKER RECORD COURIER
March 30, 1958

# Chrome Problem

Chrome miners will have their problems completely considered when Governor Holmes' development department and the state board of geology and mineral industries meet with the Grants Pass and Josephine county chambers of commerce, southwestern Oregon chrome interests, Northern California miners and Eastern Oregon chrome mining meet at Grants Pass March 22.

Leaving tonight for the meeting will be Miss Nadie Strayer, member of the mineral industries department governing board who will be joined in Portland by Member Mason Bingham and wife and Hollis Dole, department director.

Bill Gardner of Grant county is organizing a group from Eastern Oregon to attend.

Plans are shaping up and will be brought to a head at Grants Pass to send a representative to Washington, D. C. with probably a representatative of the planning and development department to testify at strategic minerals hearings. Dole will confer in San Francisco March 23 and be in Washington for a conference with Senator Neuberger March 24 and has been asked by Senator Murray to testify before the mining sub-committee March 28 on the chrome marketing problem.

An answer on the Western chrome study initiated by the Oregon governor and his departments is expected to be available.

THE OREGONIAN
March 29, 1958

# Chrome Appeal Given Senators

WASHINGTON (AP) — Continuation of federal stockpiling of chrome ore was recommended to a Senate interior subcommittee Friday by Hollis M. Dole, of Portland, Ore. Dole offered a statement for Oregon Gov. Robert D. Holmes.

The subcommittee is holding a hearing on mining legislation, including bills to impose import taxes and quotas.

Marshal T. Huntting presented a statement for Washington Gov. Albert D. Rosellini, recommending price floors established by flexible import taxes to protect domestic mineral producers.

THE OREGONIAN

April 3, 1958



# Chrome Group Sends Appeal to Congress

CAVE JUNCTION (Special) An organization intended to to protect the southern Oregon and northern California chrome mining industry was formed Saturday afternoon at Cave Junction when some 150 miners gathered to discuss (1) getting a temporary extension of the government's chrome buying program for the stockpile, and (2) plans for establishment of a ferro-chrome refining plant in southern Oregon.

Elected to a fact finding committee were Fayette Bristol, Grants Pass, owner of the Rogue River Silica plant and member of the State Legislature; Eugene Brown, O'Brien and E. V. Cooke, Cave Junction, Illinois Valley chrome miners; Bruce Manley, Medford attorney; J. W. Pressler, Grants Pass consulting mining engineer; and Colin McClendon, Crescent City, who is experimenting in the reduction of chromite into chemicals for paint pigments.

Members of a committee which will work toward formation of a permanent organization are Elwood Hussey, ex-mayor of Cave Junction; Bruce Manley, J. W. Pressler, Les Childs, Grants Pass, a member of the State Board of Geology; Dorothy Kartes, Canyonville, Roy Gardner, Eureka; Frank Grover, Grants Pass; A. L. Roy, Gold Beach, J. Hogue, Yreka, and Walter Freeman, Cave Junction.

Chairman for the Saturday meeting was Bruce Manley, while J. W. Pressler served as secretary.

**All Sign Petition**

At the suggestion of Les Childs, a petition asking the U.S. government to retain a program which will enable chrome mining to continue as a profitable industry in the west, was drawn up and signed by every person present. The petition has been sent to Congress.

Miners were urged to write senators and representatives emphasizing the necessity for an extension of government chrome buying until a long-range program could be worked out.

State Sen. Dan Dimmick, Roseburg, chairman of the Senate Mining Interim Committee announced a feasibility survey for a ferro-chrome plant in southern Oregon was authorized March 4 the Department of Geology and Mineral Industries and the Department of Planning and Development. Ivan Block of Portland has been retained to make the survey.

A committee to investigate the possibilities of establishing a ferro-chrome plant in this area was named, with Eugene Brown as chairman.

Another meeting has been scheduled for Saturday, April 26 at 2 p.m. at the American Legion Hall in Cave Junction.

GRANTS PASS COURIER
March 31, 1958

# Chrome Miners Hold Cave Junction Meeting To Discuss Problems

CAVE JUNCTION (Special) — Some 150 miners and others interested in a continued market for chrome, met at Cave Junction Saturday afternoon to join in a united front for the southern Oregon and northern California chrome mining industry. Acting as temporary chairman of the group was Bruce Manley, Medford attorney, while J. W. Pressler, consulting mining engineer, Grants Pass, served as acting secretary. Jack Eggers, local miner, working with the Illinois Valley Chamber of Commerce, made arrangements for the meeting.

With two main objectives in mind, (1) getting a temporary extension of the government's chrome buying program for the stockpile; and (2) discussing plans for the establishment of a ferro-chrome refining plant in southern Oregon, the crowd unaminously elected six members to an interim or fact finding committee, and 10 members to a committee which will lay the groundwork for a permanent miners' organization in this area.

On the interim committee are Fayette Bristol of Grants Pass, owner of the Rogue River silica plant, and a member of the state legislature; Eugene Brown, O'Brien, and E. V. Cooke, Cave Junction, Illinois Valley chrome miners; Bruce Manley, Colin McClendon, Crescent City; and J. W. Pressler.

**Committee Listed**

Members of the organization committee are Elwood Hussey, owner of Browntown, a historic gold mining area near Holland; Bruce Manley, J. W. Pressler, Les Child, Grants Pass, a member of the State Board of Geology; Dorothy Kartes, Canyonville; Roy Gardner, Eureka; Frank Grover, Grants Pass; A. L. Roy, Gold Beach, J. Hogue, Yreka, and Walter Freeman, Cave Junction.

Committee reports, and the formation of a permanent organization will be made at the next miners' meeting, to be held at the Cave Junction American Legion hall, Saturday, April 26 at 2 p m.

At the suggestion of Les Child a petition asking the U. S. government to retain a program which will enable chrome mining to continue as a profitable industry in the west, was formulated at the meeting and signed by every person present. The petition has been sent to the Executive Department of Congress.

**Bristol Talks**

Fayette Bristol, as first of a series of speakers, urged miners to write not only their own Senators and Representatives in Washington, but also Congressmen from other parts of the United States. A flood of letters, telling of each individual's personal problems, the number of men he can employ, the equipment loss he faces with even a temporary shut-down, and the necessity for an extension until a long-range program can be worked out, are, said Bristol, the miners' only hope of getting some 30,000 to 50,000 additional tons thrown into the stockpile.

"Mineral producers are the most independent people in the world, Bristol said. "It is only when we have a crisis like this, that they get together and do something about it."

State Senator Dan Dimmick of Roseburg, chairman of the Senate Mining Interim Committee, said a feasibility survey for a ferro-chrome plant in southern Oregon was authorized March 4 by the Department of Geology and Mineral Industries and the Department of Planning and Development. Ivan Block of Portland was retained to make the study.

**Support Pledged**

In pledging his full support to the chrome miners' cause, Senator Dimmick said he and his committee would meet with the miners here whenever invited.

He suggested a committee be appointed locally to investigate the possibilities of a ferro-chrome plant, and to contact State Senator Don Cameron who was unable to attend Saturday's meeting because of illness. Eugene Brown of O'Brien was named chairman of the three-man committee.

"Chrome mining will cease unless a market can be developed," Dimmick concluded.

Acting secretary J. W. Pressler stressed the necessity of a shift in emphasis from raw materials to finished metals. The stockpiling of immediately available finished metals he said, would result in stockpiling of labor, power and time. This could be accomplished by construction of a chrome reduction plant here.

Pressler was formerly associated with the technical staff of the U.S. Bureau of Mines.

**Power Supply Adequate**

William J. Moyer of the California-Oregon Power company assured miners of a more than adequate power supply to support a ferro-chrome plant in this area.

Les Child of the State Board of Geology, announced a preliminary report on the feasibility of a chrome reduction plant had been submitted last week to Hollis Dole director of the Oregon Department of Geology and Mineral Industries, who was sent to Washington, D. C. to represent chrome miners at the March 24-26 mineral hearings.

Child pointed out the United States buys 1½ million tons of chromite per year from foreign counties, while only 40,000 to 50,000 tons are purchased locally. "The government, with its reciprocal trades program, can import raw minerals to the industrial east cheaper than to the west, so the 11 western states suffer —we are actually 11 provinces of the east," said Child.

Urging miners to band together for protection of their industry, Child said the State Department of Geology will "work for the little fellows in Oregon."

Cliff Driscoll, chairman of the Josephine County Democratic Central Committee, read a telegram he sent to Governor Robert Holmes at the recent conference of 11 Western governors.

The communication stressed acute unemployment as another reason why favorable consideration should be given to the chrome extension program. He also urged everyone connected with the industry to write Washinton, D. C.

Speaking of the long range minerals program, Fay Bristol told of one recommendation which could lessen the chrome operator's financial problems. He said a small tariff of excise tax, $10 of one per cent per ton, might be levied on foreign produced minerals, all money from the tariff to be used as a subsidy to benefit miners of that particular mineral. This would keep local mines operating, and would not make the United States wholly dependent on foreign countries for strategic metals. At present only about three per cent of the chrome used in the U. S. comes from mines within the country, although considerable deposits have not been developed.

**Cooperation Offered**

Alllan Markley, secretary of the Illinois Valley Chamber of Commerce, offered the cooperation of al chambers in the chrome mining area, and expressed the hope that a permanent organization would grow out of this initial meeting.

Idle equipment belonging to the Henry Kaiser company is available in northern California, Markley said, adding, "This might be secured to operate in a chrome capacity here to produce a finished product."

E. V. Cooke, Cave Junction miner, stated emphatically money is available to build a chrome reduction plant in this area. "Let's put it on the table and find out how much low or high grade chrome we can put out at a plant all through the year," he urged.

Colin McClendon of Crescent City told of his experimental work with chromite to produce pigments for use in paint manufacture. Stating results so far were promising, he said he hoped eventually to have a small chemical plant in the bay area, if the chrome program continues.

L. C. Hanson, secretary of the Grants Pass and Josephine County Chamber of Commerce, said his Chamber was working with others to back a local ferro-chrome plant.

A suggestion from Elwood Hussey that the miners' organization join the Western Mining Council was tabled until a later meeting.

Acting chairman Bruce Manley asked everyone to bring answers from their Congressmen to the next meeting scheduled for April 26 in Cave Junction.

Over $50 was contributed by the miners toward secretarial expenses.

GRANTS PASS COURIER

March 27, 1958

# Chrome Miners Meet Set At Cave Junction

CAVE JUNCTION (Special) — Chrome miners and Chamber of Commerce representatives from as far away as Yreka and Crescent City have written they will attend the chrome miners' planning session in Cave Junction Saturday, March 29.

This is the word from Walter Freeman, acting chairman of the chrome committee, who with the Illinois Valley Chamber of Commerce, has made arrangements for the meeting. It will start at 8 p.m. at the American Legion hall, Cave Junction.

Purpose of the meeting is to get temporary extension of the government's buying program for the stockpile. Plans for the future including support of the establishment of a ferro-chrome refining plant in Southern Oregon, will be discussed. All miners in southern Oregon and northern California will be welcomed.

Bruce Manley, Medford attorney, acting for chrome miners in this district, Monday sent a telegram to Washington, D.C., urging extension of the government buying program.

Hearings on defense metals were started March 24 by a Senate sub-committee on Interior and Insular Affairs. Hollis Dole, director of the Oregon Department of Geology and Mineral Industires, will plead the chrome miners' cause at the hearings. Arrangements for his trip were made through jcint efforts of the Illinois Valley and Grants Pass Chambers of Commerce and the State Planning and Development Commission.

Numerous telegrams to Oregon Congressmen and Senators have been sent by chrome miners and Chambers of Commerce in this area.

# Chrome Miners Gather Here To Plan Fight To Preserve Their Industry

Chrome miners of southern Oregon and northern California met at the American Legion hall in Cave Junction Saturday and set up an organization to fight for the preservation of the industry.

The objectives are to attain:

(1) an extension of the government's chrome buying as a temporary means of keeping the industry going, and

(2) secure a long range policy which would enable the industry to develop in this country, either by a subsidy for domestic production, or the establishing of a smelter and marketing the finished product as ferro-chrome.

There was a suggestion that the organization "look into" the possibility of getting a smelter which is now idle, owned by the Henry Kaiser interests, moved from Shasta county California to this area.

Bruce Manley, Medford attorney, was chairman of the meeting and will continue to head the organization. Gene Pressler, of Grants Pass, a geologist and former employee of the U. S. Bureau of Mines is secretary, and Eugene Brown, of O'Brien is treasurer.

Several special committees were set up. One of these will be to rally chrome miners in all the areas to join in the organization and its work. This included men from Crescent City, Yreka, Gold Beach, Brookings, Medford, Roseburg and Grants Pass. Collins McLendon, of Crescent City heads the group of that area. E. V. Cooke and Walt Freeman head the work here. William Gardner represents the Grant county miners, Roy Gardner of Eureka heads those from Humboldt county California. A. L. Roy from Curry county, and Don Cameron, State Senator from this area who was unable to attend because of illness in the family will serve on this committee and Fay Bristol, state representative from Josephine county.

Fay Bristol pointed out that there would be little chance to get an extension of the chrome buying by administrative action under the present 1949 stockpile act. He said the only way this can be accomplished is for Congress to take some action, in the form of a resolution directing the transfer of funds already appropriated for purchase of metals, or to pass a new law directing the purchase.

Bristol said that the government has purchased in its domestic buying program and by barter with friendly countries abroad between five and six million tons of chromite ore.

The State representative who has been in close touch with the government's metal program, said that in many cases the United States has made it possible for foreign operators to have modern equipment for mining through economic aid program. He also pointed out that the mining picture not only for chrome but many other strategic metals in the United States is in "sad state". He said that one third of the mines in the state of Nevada are now closed and the miners are unemployed.

A letter was read from Hollis Dole, head of the state's Geology and Mineral Resources Department, asking that individual miners write to members of the Congress making a personal plea, and pointing their own personal situation.

The response to this letter was a resolution directing all miners present to immediately write these letters.

It was suggested that a request be made for an additional 50,000 tons to be purchased.

State Senator Dan Dimick, of Roseburg, who is chairman of the Senate interim committee on mining, told the group that his committee will hold hearings in southern Oregon, if requested, for the purpose of gathering factual data for presentation in a memorial to Congress. He said he would be glad to get the facts "on the record."

The agent in charge of the GSA depot at Grants Pass, who had been invited to the meeting, made a statement but indicated that he was serving as a Federal employee and while sympathetic to the purpose of the meeting could take no active part in the work.

Another committee was authorized to gather facts and to determine best methods of presenting them to the Federal authorities. This group is headed by Eugene Brown, of O'Brien, who was asked to name two others to serve. This group will also make a study of the feasibility of trying to get a plant located in the area to produce the finished product, whether ferro-chrome or other as the Government may prefer.

On the matter of the feasibility study of the possibility of establishing a ferro-chrome plant in southern Oregon, which is now being made at the reuest of the State Planning and Development Commission, R. G. Moyer, of the California Oregon Power Company reported, his office has had an inquiry about supplying the necessary power. He said that he was able to report favorably and that ample power for full time operation can be furnished.

Les Child, member of the governing board of the State Department of Geology and Mineral Industries, reported that the Ivan Bloc firm, of Portland, engineers making the feasibility survey, have already formulated a preliminary report. This, he said, will be followed by a more detailed one to be made later. This preliminary report, Child said, is now in the office of the Department at Salem and will be the first item of business when Dole returns from his trip to Washington. Child said he had no information as to its contents.

In his talk Child pointed out that the large industrial concerns of the East, particularly those using strategic minerals, have been given the funds to buy equipment and develop foreign mines. This has been done, he said, in some of the remote corners of the earth, where local mining had not progressed to the point that the people of these countries could be depended upon to supply the minerals on their own initiative.

As a result, Child said about one and half million tons of chrome has been coming to the United States from foreign lands while our own domestic production has been down to 40,000 to 50,000 tons annually.

"The eleven western states", Child said," which are the mineral producers of this nation, are no longer states, but provinces of the East."

"All of these western states," he said,"must now work together to let the East know we are a part of the Union. We have to work for subsidies." He went on to tell of a conference seven or eight years ago when the chrome miners wanted help from the miners of Utah. At that time they didn't get it because Utah is not a chrome producing state. Later, he said, when the copper and lead miners were idle these fellows from Utah were asking the Coast states for help. "Now we need to get together and pull together".

Clifford Driscoll said he felt that favorable conditions can now be gained by asking an extension because of the national employment picture. He read a copy of the telegram which the Josephine County Democratic Central Committee sent to Governor Holmes at the time of the conference of western governors at Colorado Springs.

Bristol took the floor again to tell of the work done by the mining advisory committee. He said the members had generally agreed that it was unwise to ask for high tariffs on imported minerals, but had agreed that there should be some tariff and that this money be diverted to provide subsidies where needed for domestic development.

Collins McLendon, of Crescent City, spoke of some experiments he has been conducting on the use of chrome salts. He said that chemical chrome offers many new avenues of utilization. He also said he felt it would be possible to establish a small chemical chrome plant in the producing area.

Secretary Hanson of Grants Pass Chamber of Commerce said he felt one of the necessary steps at this time is to have a fact finding committee, and be prepared with facts and figures when an opportunity comes to make effective use of them. The idea was accepted and a committee set up including: Fay I. Bristol, E. V. Cooke, Collins McLendon, and Eugene Brown.

A petition to the Executive Branch of the Federal Government and the Congress of United States was drawn up and read. Copies are being made and signatures gathered for presentation.

Another meeting is to be held on the last Saturday in April. No definite place was specified but it is expected that it will be in Cave Junction.

# So. Oregon Chrome Mining At Standstill

Chrome mining virtually nas come to a halt in Southern Oregon now that the federal subsidy program has terminated, it was reported today at the Grants Pass field office of the Oregon Department of Geology and Mineral Industries.

Until the government stockpile shut down last May local miners were receiving $115 per long ton for 44 per cent chrome ore. Now, with no west coast market, the highest price for this same grade on the open market ranges from $24-$25 f.o.b. Atlantic ports. At this price western miners are unable to mine and ship chrome, according to Len Ramp, local field office manager.

Gold and other minerals are being mined in this area, however, with four lode mines and 22 placer mines in active operation in Josephine county. The four gold lode mines include the Daisy mine, the Humdinger mine, the Reno mine, and the Greenback mine and mill.

Ramp stated that most of the gold placer mines are seasonal operations working when water is available, usually November through March.

Silver and copper are the other major minerals being mined in this area. Last year minerals produced in Josephine county were valued at $930,740.

BAKER RECORD COURIER

March 27, 1958

# Bakerites to Spur Mining Program

## Baker Member Returns And Urges Support

Oregon businessmen, particularly from Southern Oregon, are sending a representative to Washington, D. C., to attend the hearings this week on the domestic mining program.

The Oregon mining industry is protesting the near-end of the federal chrome stockpiling program. The Oregonians have learned that there is no reason to believe the administration will extend by administrative action the chrome purchase program.

The administration is assuming a three-year stockpile rather than a five-year period previously anticipated for national defense, Senator Richard L. Neuberger wrote March 21.

It is felt that the $21 per long dry ton chromite bonus expected to be established at the end of the purchase program, according to Secretary of Interion Seaton's plan, would be inadequate.

Miss Nadie Strayer, member of the governing board of the state mining department, returned Monday morning from the Grants Pass conference.

**Local Miners Aid**

Government assistance to establish the domestic mining industry, particularly in respect to chrome is being urged by the Grant County chrome miners as well as the Oregon industry generally.

A strong peril-point program on copper is needed, with the tariff applying when the price drops below a certain point, said Oregon Copper Company of Baker.

Both the chamber of commerce and commercial club have gotten out telegrams on behalf of the domestic mining industry.

The club's mining committee raised hob with the administration for neglecting the basic industry at a time when employment is dropping and for completely relying upon foreign ore.

**Mining Is Basic**

"From a defense standpoint," Governor Robt. D. Holmes said at the recent governor's conference at Colorado Springs, "the nation must always be in the position of depending on its own mineral deposits as a raw material source, for past experience has demonstrated how quickly complete reliance on foreign imports can be turned to our disadvantage both in periods of a shooting war and a cold war.

"Domestic mining of basic minerals must be kept alive."

He observed that free trade is of great merit, along with the accompanying low tariffs but that national defense is not a matter of economics and aside from economic and defense considerations there is the need for a healthy mining industry for its self-preservation.

Cutting off exploration results from pruning the incentive to mine, he said.

What is desperately needed is a sound formula, which will give strength and stability in peacetime to our very essential minerals extractive industry and provide a mobilization base for quick expansion in time of emergency," said Senator Neuberger in a letter late last week to the Eastern Oregon Mining and Mineral association.

**Stockpile Too Small**

Bill Gardner, president of the Grant County miners, says that the government is mis-estimating its chrome stockpile. Both Miss Strayer and Mr. Gardner indicated they feel the government is including sub-marginal ore along with metallurgical grades in its estimates.

The U. S. is importing 98 percent of its chrome used, so that the Oregon production is actually the only high-grade production domestically available, except for Alaska, and in event of national emergency this grade is vital.

Gardner says they feel they could well mine smaller quantities and develop more tonnage, if the program is properly set up. He said the government should get over its idea of "crash programs."

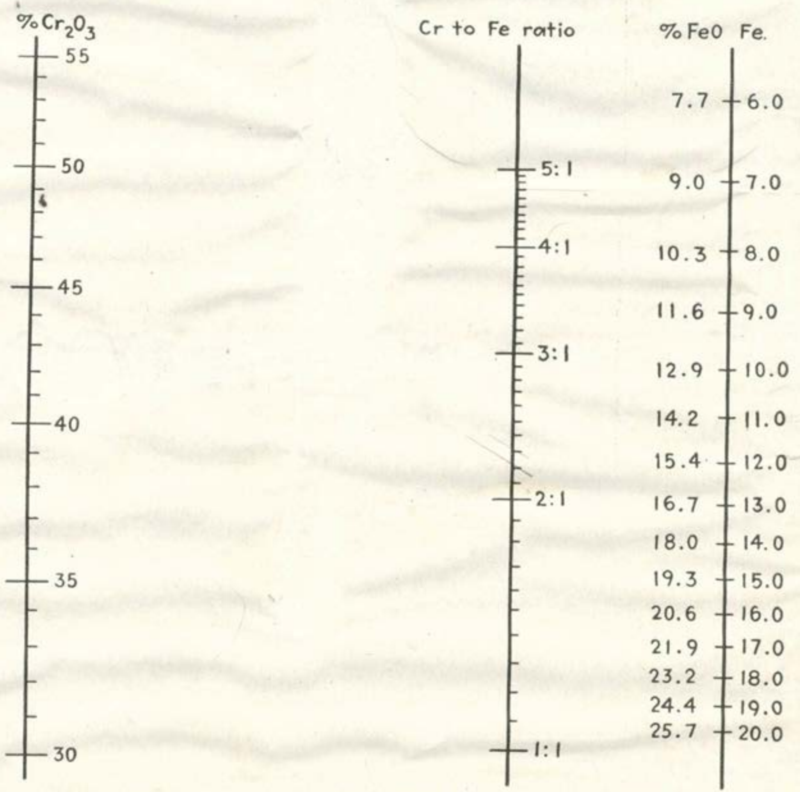
SCHEDULE OF PRICES PER LONG TON FOR LUMP CHROME ORE

CHROME : IRON RATIO

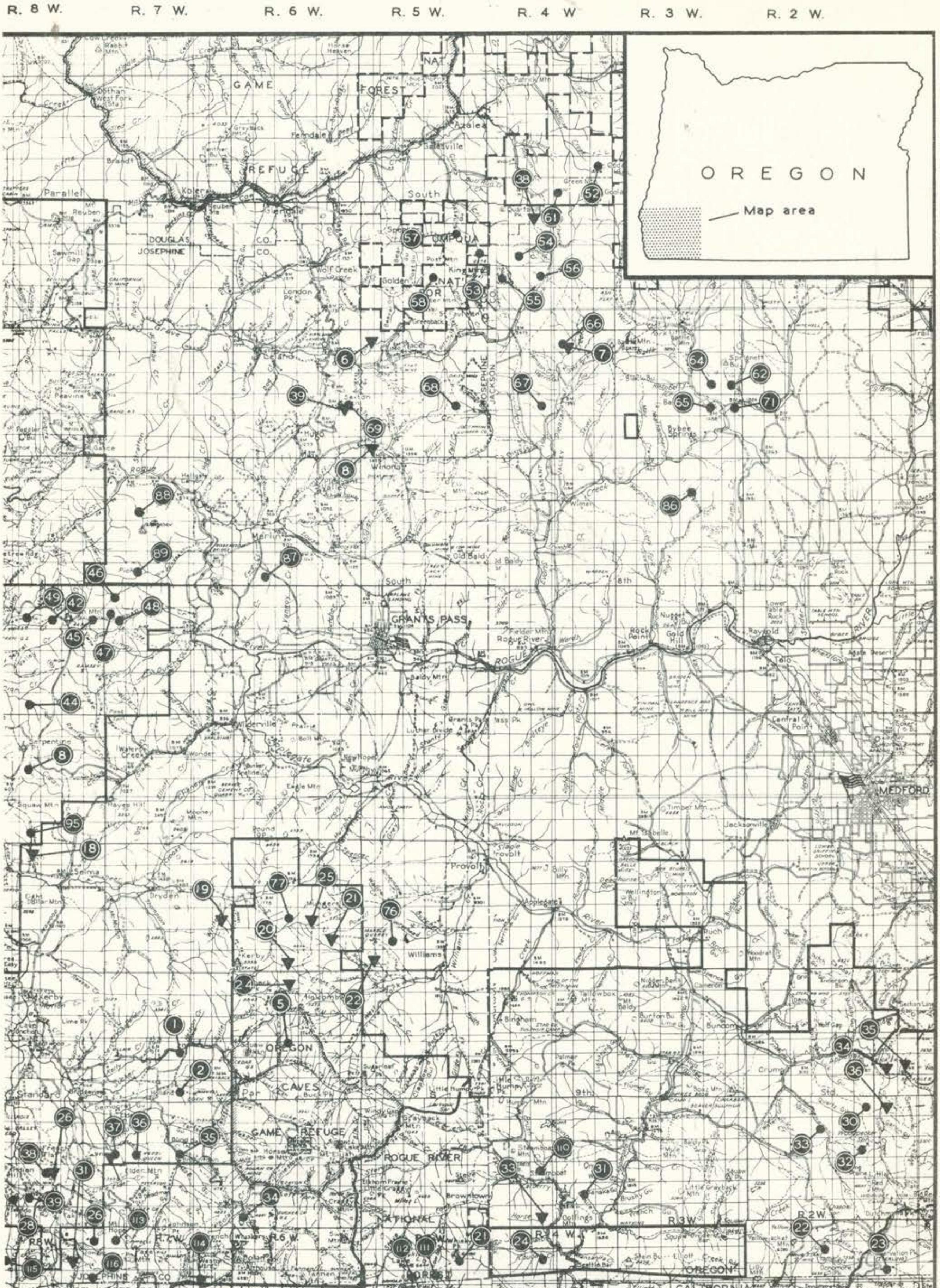
| Percent $Cr_2O_3$ | 3.5 | 3.4 | 3.3 | 3.2 | 3.1 | 3.0 | 2.9 | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.3 | 2.2 | 2.1 | 2.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 167 | 163 | 159 | 155 | 151 | 147 | 144 | 141 | 138 | 135 | 132 | 129 | 126 | 123 | 120 | 117 | 56 |
| 55 | 163 | 159 | 155 | 151 | 147 | 143 | 140 | 137 | 134 | 131 | 128 | 125 | 122 | 119 | 116 | 113 | 55 |
| 54 | 159 | 155 | 151 | 147 | 143 | 139 | 136 | 133 | 130 | 127 | 124 | 121 | 118 | 115 | 112 | 109 | 54 |
| 53 | 155 | 151 | 147 | 143 | 139 | 135 | 132 | 129 | 126 | 123 | 120 | 117 | 114 | 111 | 108 | 105 | 53 |
| 52 | 151 | 147 | 143 | 139 | 135 | 131 | 128 | 125 | 122 | 119 | 116 | 113 | 110 | 107 | 104 | 101 | 52 |
| 51 | 147 | 143 | 139 | 135 | 131 | 127 | 124 | 121 | 118 | 115 | 112 | 109 | 106 | 103 | 100 | 97 | 51 |
| 50 | 143 | 139 | 135 | 131 | 127 | 123 | 120 | 117 | 114 | 111 | 108 | 105 | 102 | 99 | 96 | 93 | 50 |
| 49 | 139 | 135 | 131 | 127 | 123 | 119 | 116 | 113 | 110 | 107 | 104 | 101 | 98 | 95 | 92 | 89 | 49 |
| 48 | 135 | 131 | 127 | 123 | 119 | 115 | 112 | 109 | 106 | 103 | 100 | 97 | 94 | 91 | 88 | 85 | 48 |
| 47 | 132 | 128 | 124 | 120 | 116 | 112 | 109 | 106 | 103 | 100 | 97 | 94 | 91 | 88 | 85 | 82 | 47 |
| 46 | 129 | 125 | 121 | 117 | 113 | 109 | 106 | 103 | 100 | 97 | 94 | 91 | 88 | 85 | 82 | 79 | 46 |
| 45 | 126 | 122 | 118 | 114 | 110 | 106 | 103 | 100 | 97 | 94 | 91 | 88 | 85 | 82 | 79 | 76 | 45 |
| 44 | 123 | 119 | 115 | 111 | 107 | 103 | 100 | 97 | 94 | 91 | 88 | 85 | 82 | 79 | 76 | 73 | 44 |
| 43 | 120 | 116 | 112 | 108 | 104 | 100 | 97 | 94 | 91 | 88 | 85 | 82 | 79 | 76 | 73 | 70 | 43 |
| 42 | 117 | 113 | 109 | 105 | 101 | 97 | 94 | 91 | 88 | 85 | 82 | 79 | 76 | 73 | 70 | 67 | 42 |

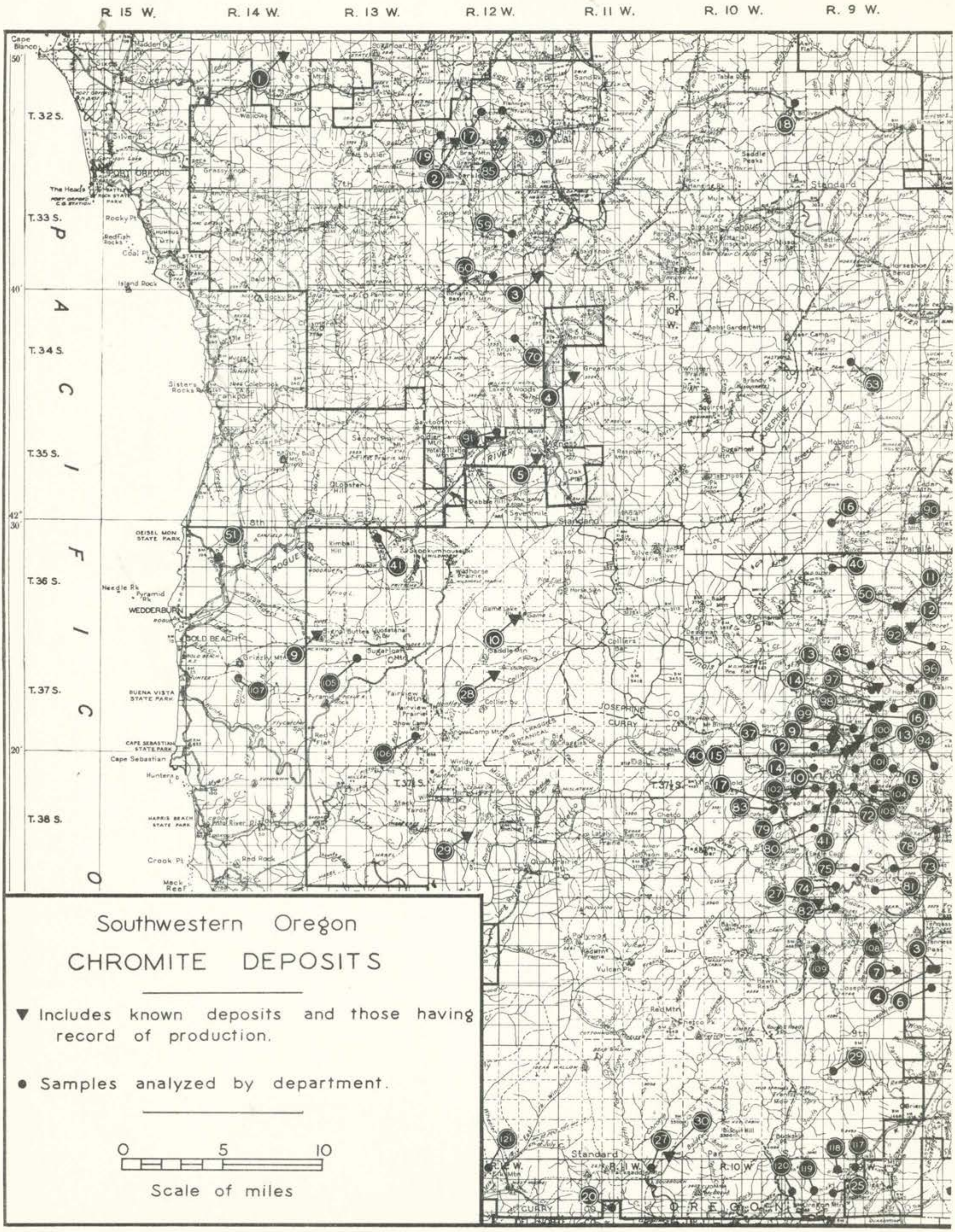
# Computing a Chromium-to-Iron Ratio

**Ray C. Treasher R. G. Bassett**
*Field Geologist Analyst*
*Department of Geology and Mineral Industries*
*Grants Pass, Oregon*




**Nomographic chart for determination of chrome-to-iron ratios from assay data**


R. 8 W.
R. 7 W.
R. 6 W.
R. 5 W.
R. 4 W
R. 3 W.
R. 2 W.
OREGON
Map area
GAME
REFUGE
DOUGLAS
JOSEPHINE
UMPQUA
NAT'L
FOREST
GRANTS PASS
ROGUE RIVER
MEDFORD
Jacksonville
Central Point
Williams
Kerby
OREGON
CAVES
GAME REFUGE
NATIONAL
FOREST
JOSEPHINE CO
DEL NORTE CO
SISKIYOU CO
OREGON
CALIFORNIA



R. 15 W.
R. 14 W.
R. 13 W.
R. 12 W.
R. 11 W.
R. 10 W.
R. 9 W.
T. 32 S.
T. 33 S.
T. 34 S.
T. 35 S.
T. 36 S.
T. 37 S.
T. 38 S.
Cape Blanco
Port Orford
Gold Beach
Wedderburn
Cape Sebastian
Crook Pt.
Mack Reef
P A C I F I C O
Southwestern Oregon
CHROMITE DEPOSITS
▼ Includes known deposits and those having record of production.
• Samples analyzed by department.
0 5 10
Scale of miles

COPY

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

Ralph

Feb. 6, 1958

Mr. F. W. Libbey
2269 NW Everett Street
Portland 10, Oregon

Dear Fay:

I sent a letter to Ralph (1/8/58) with information similar to that you requested, so it won't require much time to comply.

I should make a few additions and comments on the copy which is enclosed.

On the first item: The Waldo Milling Co. has begun mining activity at the Ali Baba.

On the second item: (This was short lived) The McShanes and Carl Stevens are now setting up to operate at the Big Bear Mine, sec. 35, T. 36 S., R. 8 W., up Slate Creek.

Joe Inman and Nick Heller were previously employed at the Oregon Chrome Mine are operating the Deep Gorge Mine.

At the Oregon Chrome Mine they are cleaning up what ore is in sight and plan to discontinue operations soon. (Bill has been ill for a couple of weeks.)

In general the chrome mining activity is less than last year with merely a last minute rush to get their shipments in under the 200,000 ton quota. A few persons are, however, gambling on a possible extension of the stockpiling program. There has been some interest by the larger companies in the possibility of locating large low grade chromite deposits. However, they would probably figure on an unsupported open market price .

F. W. Libbey
2/6/58

COPY

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON



According to Dean Axtell, whom I just talked to on the phone, by Jan. 1st 30,000 tons remained to go on the quota. By Jan. 13th 33 carloads had been shipped by southern California operators. Some of this had been held up from 1957 for tax reasons.

I hope that this in addition to Ralph's comments in the January Ore-Bin will be of some help. I also sent to Ralph a list of the active mines in 1957. The principal new shipper in southwestern Oregon was theThunderbird Mining Corp., Medford.

Best regards.

Sincerely yours,

Len

LR:amj
cc:RSM
encl.

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

Feb. 15, 1956

Mr. Ralph S. Mason
1069 State Office Building
Portland 1, Oregon

Dear Ralph:

I have made a revised copy of the list of chrome mills which includes only those that shipped concentrates in 1955. Several of them shipped only a very small amount and are at present inactive.

Also please add to the list of chrome mines the following:

| | |
|---|---|
| ✓ Black Boy<br>T. M. Petrie & G. T. Pointon<br>Grants Pass, Oregon | Douglas County<br>Sec. 5<br>T. 33 S., R. 4 W. |
| ✓ Black Otter Mine<br>Ernest R. McTimmonds<br>Selma, Oregon | Josephine County<br>Sec. 20<br>T. 37 S., R. 9 W. |
| ✓ Nickel Ridge<br>Bill J. Evitt<br>O'Brien, Oregon | Josephine County<br>Sec. 31<br>T. 40 S., R. 9 W. |
| ✓ Uncle Sam<br>R. E. McCaleb<br>Selma, Oregon | Curry County<br>Sec. 11<br>T. 38 S., R. 10 W. |

Also inclosed is your summary of Oregon's mineral industry for 1955 with a few minor corrections and additions.

Sincerely,

Len

Len

LR:ams
incls.

MAKE NEW CARDS FOR THOSE WITH A ✓

February 1956

(The following shipped concentrates in 1955)

CHROME MILLS -- SOUTHWESTERN OREGON

| Mill & Owner | Location |
|---|---|
| HAVE CARD Ashland Mining Co. Mill<br>Van Curler Bros.<br>Ashland, Oregon | Jackson County<br>Sec. 6<br>T. 39 S., R. 1 E. |
| Bowers Mill<br>D. W. Bowers<br>Medford, Oregon | Josephine County<br>Sec. 3<br>T. 35 S., R. 8 W. |
| Fitzpatrick Mill*<br>Umpqua Cottages<br>Canyonville, Oregon | Douglas County<br>Sec. 18<br>T. 30 S., R. 5 W. |
| Foster Mill*<br>Ernest Foster<br>Grants Pass, Oregon | Josephine County<br>Sec. 29<br>T. 37 S., R. 9 W. |
| Gallaher Mill<br>Jim G. Gallaher<br>Grants Pass, Oregon | Josephine County<br>Sec. 2<br>T. 37 S., R. 7 W. |
| Grants Pass Chrome Mill<br>E. E. Mayfield, Sr.<br>Grants Pass, Oregon | Josephine County<br>NW "F" St.<br>Grants Pass |
| McTimmonds*<br>Everett McTimmonds<br>Selma, Oregon | Josephine County<br>Sec. 21<br>T. 37 S., R. 9 W. |

*Production very small, intermittent operation.

| Mill & Owner | Location |
| --- | --- |
| McCaleb Mill<br>R. E. McCaleb<br>Selma, Oregon | Curry County<br>Sec. 11<br>T. 38 S., R. 10 W. |
| Radcliffe Mill*<br>R. W. Radcliffe<br>Merlin, Oregon | Josephine County<br>Sec. 26<br>T. 34 S., R. 8 W. |
| Six Mile Mill*<br>Jean Pressler<br>Grants Pass, Oregon | Josephine County<br>Sec. 2<br>T. 38 S., R. 9 W. |
| Sourdough Mill<br>Fay Bristol, Ben Baker<br>Grants Pass, Oregon | Curry County<br>Sec. 2<br>T. 41 S., R. 11 W. |
| Triple L Mill<br>Davenport, Meyers, Shippen<br>Canyonville & Myrtle Crk., Ore. | Douglas County<br>Gazley, Oregon |
| Waldo Milling Co. Mill<br>Waldo Milling Co.<br>Cave Junction, Oregon | Josephine County<br>Sec. 22<br>T. 40 S., R. 8 W. |
| Wonder Mine Mill*<br>J. R. Holman | Curry County<br>Sec. 11<br>T. 38 S., R. 10 W. |

| Map No. | Name | Sec. | T(S) | R(W) | Percent $Cr_2O_3$ |
|---|---|---|---|---|---|
| 42 | Deep Gorge | 32 | 37 | 9 | 45.56 |
| 43 | Black Beauty | 21 | 37 | 9 | 47.61 |

## POSTED BUT NOT SPOTTED ON MAP

| Map No. | Sec. | T(S) | R(W) | Percent $Cr_2O_3$ |
|---|---|---|---|---|
| 124 | 24 | 34 | 5 | 39.93 |
| 125 | 1 | 41 | 7 | 45.06 |
| 126 | 29 | 37 | 9 | 51.69 |
| 127 | 21 | 37 | 9 | 46.39 |
| 128 | 34 | 40 | 8 | 42.00 |
| 129 | 33 | 33 | 4 | 46.03 |
| 130 | 1 | 38 | 10 | 39.95 |
| 131 | 6 | 41 | 6 | 49.49<br>~~43.92~~ |
| 132 | 17 | 40 | 7 | 44.04 |
| 133 | 34? | 37 | 6 | 48.48<br>~~46.36~~ |
| 134 | 33 | 36 | 9 | 43.34<br>~~43.04~~ |
| 135 | 32 | 37 | 9 | 52.11 |
| 136 | 23 | 34 | 6 | 39.71 |
| 137 | 30 | 37 | 9 | 53.21 |
| 138 | 31 | 37 | 9 | 47.47 |
| 139 | 33 | 40 | 1 | 51.27 |
| 140 | 12 | 33 | 5 | 54.56<br>~~45.44~~ |
| 141 | 22 | 37 | 9 | 49.24<br>~~48.73~~ |
| 142 | 32 | 40 | 7 | 41.38 |
| 143 | 10 | 39 | 9 | 44.09 |
| 144 | 26 | 36 | 8 | 48.90 |
| ~~145~~ | ~~12~~ | ~~38~~ | ~~9~~ | |
| 145 | 20 | 29 | 5 | 46.83 |
| 146 | 5 | 41 | 4 | 45.35 |
| 147 | 31 | 37 | 9 | 47.89 |
| 148 | 14 & 23 | 36 | 9 | 45.86<br>~~44.20~~ |
| 149 | 6 | 36 | 8 | 56.04 |
| 150 | 21 | 32 | 12 | 42.63 |
| 151 | 32 | 32 | 4 | 42.03 |
| 152 | | | | |
| 153 | 9 | 34 | 5 | 45.46 |
| 154 | 21 | 37 | 9 | 43.24 |
| 155 | 11 | 28 | 4 | 42.11 |
| 156 | 32 | 40 | 1 | 44.45 |
| 157 | 34 | 40 | 4 | 46.49 |
| 158 | 27 | 40 | 9 | 48.83 |
| 159 | 8 | 38 | 9 | 47.10 |
| 160 | 20 | 29 | 5 | 47.74 |
| 161 | 17 | 33 | 4 | 43.23 |
| 162 | 6 | 41 | 6 | 44.15 |
| 163 | 7 | 38 | 5 | 44.85 |
| 164 | 6 | 38 | 9 | 47.68 |
| 165 | 33 | 38 | 9 | 45.25 |
| 166 | 6 | 36 | 8 | 52.81 |
| 167 | 21 | 33 | 4 | 43.64<br>~~43.44~~ |
| 168 | 24 | 39 | 9 | 44.85 |
| 169 | 33 | 37 | 9 | 51.91 |
| 170 | 21 | 37 | 9 | 48.28 |

| Map No. | Sec. | T(S) | R(W) | Percent $Cr_2O_3$ |
|---|---|---|---|---|
| 171 | 3 | 38 | 13 | 56.15 |
| 172 | 11 | 41 | 8 | 41.03 |
| 173 | 34 | 40 | 8 | 44.14 |
| 174 | 5 | 33 | 4 | 47.60 |
| 175 | 12 | 41 | 8 | 40.88 |
| 176 | 16 | 41 | 9 | 44.86 |
| 177 | 25 | 40 | 8 | 41.72 |
| 178 | 4 | 40 | 7 | 52.74 |
| 179 | 31 | 37 | 9 | 50.24 |
| 180 | 25 | 38 | 6 | 48.08 |
| 181 | 17 | 33 | 5 | 46.89 |
| ~~182~~ | | | | |
| 182 | 14 | 38 | 9 | 46.15 |
| 183 | 4 | 39 | 6 | 40.86 |
| 184 | 36 | 35 | 9 | 44.44 |
| 185 | 20 | 39 | 9 | 41.32 |
| 186 | 21 | 29 | 5 | 51.89 |
| 187 | 9 | 39 | 9 | 47.81 |
| 188 | 33 | 32 | 7 | 41.27 |
| 189 | 8 | 34 | 5 | 40.37 |
| 190 | 24 | 36 | 9 | 51.69 |
| 191 | 14 | 41 | 7 | 45.37 |
| 192 | 20 | 37 | 9 | 47.61 |
| 193 | 2 | 40 | 7 | 42.31 |
| 194 | 13 | 39 | 9 | 53.12 |
| 195 | 25 | 40 | 8 | 45.47 |
| 196 | 14 | 40 | 8 | 49.14 |
| 197 | 3 | 34 | 7 | 46.28 |
| 198 | 28 | 37 | 9 | 41.33 |
| 199 | 33 | 38 | 9 | 49.06 |
| 200 | 28 | 33 | 5 | 42.55 |
| 201 | 27 | 26 | 3 | 44.48 |
| 202 | 1 | 38 | 10 | 46.01 |
| 203 | 6 | 36 | 8 | 41.83 |
| 204 | 21 | 33 | 5 | 40.82 |
| 205 | 15 | 40 | 7 | 51.91 |
| 206 | 12 | 34 | 10 | 43.36 |
| 207 | 23 | 36 | 9 | 41.73 |
| 208 | 23 | 36 | 9 | 40.92 |
| 209 | 20 | 29 | 5 | 44.79 |
| 210 | 32 | 40 | 7 | 47.43 |
| 211 | 21 | 33 | 4 | 44.38 |
| 212 | 19 | 28 | 4 | 47.33 |
| 213 | 11 | 38 | 9 | 49.27 |
| 214 | 11 | 38 | 9 | 46.82 |
| 215 | 21 | 33 | 5 | 46.31 |
| 216 | 3 | 40 | 7 | 42.54 |
| 217 | 16 | 14 | 32 | 48.82 |
| 218 | 17 | 33 | 4 | 43.16 |
| 219 | 29 | 37 | 9 | 46.21 |
| 220 | 2 | 36 | 9 | 46.00 |
| 221 | 14 | 41 | 11 | 52.60 |

| Map No. | Sec. | T(S) | R(W) | Percent $Cr_2O_3$ |
|---|---|---|---|---|
| 222 | 16 | 37 | 9 | 46.40 |
| 223 | 26 | 39 | 5 | 54.10 |
| 224 | 26 | 38 | 9 | 55.10 |
| 225 | 13 | 33 | 5 | 42.84 |
| ~~226~~ | ~~5~~ | ~~14~~ | ~~32~~ | ~~44.47~~ |

ANALYSES OF CHROMITE FROM SOUTHWESTERN OREGON DEPOSITS

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 1 | 39 | 7 | 3 | 37.66 |
| 2 | 37 | 8 | 16 | 42.57 |
| 3 | 35 | 9 | 29 | 44.03 |
| 4 | 39 | 7 | 34 | 40.18 |
| 5 | 32 | 12 | 16 | 45.19 |
| 6 | 37 | 9 | 17 | 41.88<br>42.82 |
| 7 | 35 | 3 | 6 | 39.94 |
| 8 | 37 | 9 | 32 | 44.15 |
| 9 | 41 | 9 | 5 | 35.63 |
| 10 | 40 | 8 | 35 | 38.43 |
| 11 | 39 | 8 | 18 | 42.60 |
| 12 | 41 | 11 | 16 | 40.83 |
| 13 | 41 | 5 | 11 | 48.99 |
| 14 | 40 | 8 | 29 | 56.08 |
| 15 | 36 | 9 | 5 | 31.42<br>40.37 |
| 16 | 31 | 12 | 16 | 51.5 |
| 17 | 32 | 10 | 12 | 49.5 |
| 18 | 32 | 12 | 19 | 50.1 |
| 19 | 33 | 12 | 33 | 22.7 |
| 20 | 33 | 5 | 27 | BG 781* |
| 21 | 33 | 5 | 13 | 45. |
| 22 | 34 | 5 | 7 | 31.5 |
| 23 | 34 | 5 | 2 | BG 777* |
| 24 | 34 | 4 | 10 | 32.4 |
| 25 | 34 | 3 | 13 | 46.8 |
| 26 | 34 | 3 | 24 | 52.5 |
| 27 | 34 | 5 | 19 | 31.3 |
| 28 | 34 | 9 | 16 | 40.8 |
| 29 | 36 | 13 | 3 | 47.1 |
| 30 | 36 | 8 | 10 | 49.1 |
| 31 | 36 | 9 | 34 | 40.3 |
| 32 | 36 | 8 | 33 | 47.9 |
| 33 | 37 | 9 | 4 | 31.7 |
| 34 | 37 | 9 | 11 | 46.7 |
| 35 | 37 | 8 | 3 | 39.5 |
| 36 | 37 | 5 | 1 | 39. |
| 37 | 37 | 9 | 19 | 40.5 |
| 38 | 37 | 9 | 22 | 48.3 |
| 39 | 37 | 9 | 30 | 42.5 |
| 40 | 37 | 9 | 26 | 49.2 |
| 41 | 37 | 9 | 30 | 40.7 |
| 42 | 38 | 9 | 5 | 44.4 |
| 43 | 38 | 9 | 7 | 23.7 |
| 44 | 38 | 9 | 23 | 54.1 |
| 45 | 38 | 7 | 26 | 28.3 |

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 46 | 38 | 9 | 29 | 45.3 |
| 47 | 38 | 7 | 36 | 28.5 |
| 48 | 39 | 8 | 18 | 55.4 |
| 49 | 39 | 6 | 4 | 47.2 |
| 50 | 40 | 9 | 8 | 43.9 |
| 51 | 40 | 9 | 24 | 36.5 |
| 52 | 40 | 9 | 35 | BG 931* |
| 53 | 41 | 9 | 7 | 37.8 |
| 54 | 41 | 11 | 15 | 37.5 |
| 55 | 41 | 9 | 9 | 37.9 |
| 56 | 19N | 6E (Calif.) | 7 | BG 775 & 778* |
| 57 | 41 | 7 | 35 | BG 891* |
| 58 | 38 | 10 | 12 | 34.6 |
| 59 | 40 | 2 | 1 | 51.0 |
| 60 | 40 | 4 | 26 | 55.9 |
| 61 | 40 | 2 | 13 | 47.1 |
| 62 | 41 | 2 | 10 | 42.2 |
| 63 | 41 | 1 | 12 | 37.7 |
| 64 | 41 | 1 | 18 | 47.5 |
| 65 | 41 | 5 | 11 | 25.8 |
| 66 | 41 | 4 | 9 | 43.1 |
| 67 | 27 | 14 | 1 | 22.8 |
| 68 | 29 | 5 | 19 | 47.2 |

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 69 | 41 | 9 | 8 | 47.69<br>50.73 |
| 70 | 39 | 8 | 19 | 48.14<br>32.98 |
| 71 | 40 | 8 | 25 | 35.01<br>34.22 |
| 72 | 39 | 5 | 18 | 31.62<br>27.11 |
| 73 | 31 | 14 | 31? | 49.07 |
| 74 | 34 | 5 | 24 | 39.93 |
| 75 | 38 | 9 | 21 | 40.04 |
| 76 | 33 | 4 | 17 | 46.72<br>45.84 |
| 77 | 31 | 14 | 26 | 47.89 |
| 78 | 39 | 9 | 14 | 41.81 |
| 79 | 41 | 8 | 1 | 40.92 |
| 80 | 41 | 11 | 2 | 52.60 |
| 81 | 36 | 8 | 12 | 57.87 |

*Old Grants Pass assay, not available

CHROMITE PROPERTIES IN SOUTHWESTERN OREGON

(Includes known producers and reported occurrences)

| No. | Sec. | T(S) | R(W) | $Cr_2O_3$ | Fe | Cr/Fe Ratio | Name |
|---|---|---|---|---|---|---|---|
| 1 | 35 | 31 | 14 | | | | Trails End |
| 2 | 20? | 32 | 12 | | | | Salmon Mt. |
| 3 | 36 | 33 | 12 | | | | Independence |
| 4 | 29 | 34 | 11 | 48. | | | Illahe |
| 5 | 13 | 35 | 12 | | | | Agness |
| 6 | 6 | 34 | 5 | 35. | | | Graves Creek |
| 7 | 3 | 34 | 4 | | | | Chrome King |
| 8 | 31 | 34 | 5 | | | | Hammersley |
| 9 | 31 | 36 | 13 | 50. | | | Signal Buttes |
| 10 | 27 | 36 | 12 | | | | Game Lake |
| 11 | 14 | 36 | 9 | 40. | | | Sordy (Briggs Cr.) |
| 12 | 24 | 36 | 9 | 47. | | | Elkhorn |
| 13 | 3 | 37 | 9 | 35. | | | Horse Mt. |
| 14 | 10 | 37 | 9 | | | | Black Rock |
| 15 | 21 | 37 | 9 | 36.55-47.01 | 9.62-12.06 | 2.33-2.80 | Oregon Chrome |
| 16 | 21 | 37 | 9 | | | | Shade |
| 17 | 36 | 37 | 10 | 43.27-44.73 | 11.14-11.32 | 2.64-2.75 | Dailey Creek |
| 18 | 4 | 38 | 8 | | | | Squaw Creek |
| 19 | 24 | 38 | 7 | | | | |
| 20 | 33 | 38 | 6 | | | | |
| 21 | 26 | 38 | 6 | | | | Mungers Creek |
| 22 | 31 | 38 | 5 | | | | |
| 23 | 22 | 38 | 6 | | | | |

| No. | Sec. | T(S) | R(W) | $Cr_2O_3$ | Fe | Cr | Name |
|---|---|---|---|---|---|---|---|
| 24 | 4 | 39 | 6 | | | | |
| 25 | 18 | 40 | 7 | 49. | | | Chollard |
| 26 | 22 | 40 | 8 | | | | Esterley |
| 27 | 31 | 38 | 9 | | | | |
| 28 | 9 | 37 | 12 | | | | Windy Valley |
| 29 | 8 | 38 | 12 | | | | Chetco |
| 30 | 36 | 40 | 11 | 43.03 | 10.54 | 2.79 | Sourdough |
| 31 | 11 | 41 | 8 | | | | Owen |
| 32 | California | | | 48.84-54.98 | 9.53-11.56 | 2.94-3.74 | High Plateau |
| 33 | 33 | 40 | 4 | | | | |
| 34 | 30 | 39 | 1 | | | | |
| 35 | 29 | 39 | 1 | | | | Cass Ranch |
| 36 | 6 | 40 | 1 | | | | Horseshoe |
| 37 | 3 California | 19N | 2W (opposite Oregon) | | | | Sally Ann |
| 38 | 5 | 33 | 4 | 40. | | | Starveout Creek |
| 39 | 24 | 34 | 6 | | | | Sexton Peak |
| 40 | 21 | 37 | 9 | 42.91-45-59 | 10.70-19.99 | 2.74-2.84 | Black Beauty |
| 41 | 32 | 37 | 9 | 41.40-45.17 | 12.05-13.12 | 2.16-2.56 | Deep Gorge |
| 42 | 30 | 37 | 9 | 35.84 | 10.89 | 2.25 | Burro Claim |
| 43 | 20 | 37 | 9 | 44.32 | 12.26 | 2.47 | Oregon Chromite #1 |

CHROMITE PROPERTIES IN SOUTHWESTERN OREGON

(Includes known producers and reported occurrences)

| No. | Sec. | T(S) | R(W) | $Cr_2O_3$ | Fe | Cr/Fe Ratio | Name |
|---|---|---|---|---|---|---|---|
| 1 | 35 | 31 | 14 | | | | Trails End |
| 2 | 20? | 32 | 12 | | | | Salmon Mt. |
| 3 | 36 | 33 | 12 | | | | Independence |
| 4 | 29 | 34 | 11 | 48. | | | Illahe |
| 5 | 13 | 35 | 12 | | | | Agness |
| 6 | 6 | 34 | 5 | 35. | | | Graves Creek |
| 7 | 3 | 34 | 4 | | | | Chrome King |
| 8 | 31 | 34 | 5 | | | | Hammersley |
| 9 | 31 | 36 | 13 | 50. | | | Signal Buttes |
| 10 | 27 | 36 | 12 | | | | Game Lake |
| 11 | 14 | 36 | 9 | 40. | | | Sordy (Briggs Cr.) |
| 12 | 24 | 36 | 9 | 47. | | | Elkhorn |
| 13 | 3 | 37 | 9 | 35. | | | Horse Mt. |
| 14 | 10 | 37 | 9 | | | | Black Rock |
| 15 | 21 | 37 | 9 | 36.55-47.01 | 9.62-12.06 | 2.33-2.80 | Oregon Chrome |
| 16 | 21 | 37 | 9 | | | | Shade |
| 17 | 36 | 37 | 10 | 43.27-44.73 | 11.14-11.32 | 2.64-2.75 | Dailey Creek |
| 18 | 4 | 38 | 8 | | | | Squaw Creek |
| 19 | 24 | 38 | 7 | | | | |
| 20 | 33 | 38 | 6 | | | | |
| 21 | 26 | 38 | 6 | | | | Mungers Creek |
| 22 | 31 | 38 | 5 | | | | |
| 23 | 22 | 38 | 6 | | | | |

CHROMITE PROPERTIES IN SOUTHWESTERN OREGON

(Includes known producers and reported occurrences)

| No. | Sec. | T(S) | R(W) | $Cr_2O_3$ | Fe | Cr/Fe Ratio | Name |
|---|---|---|---|---|---|---|---|
| 1 | 35 | 31 | 14 | | | | Trails End |
| 2 | 20? | 32 | 12 | | | | Salmon Mt. |
| 3 | 36 | 33 | 12 | | | | Independence |
| 4 | 29 | 34 | 11 | 48. | | | Illahe |
| 5 | 13 | 35 | 12 | | | | Agness |
| 6 | 6 | 34 | 5 | 35. | | | Graves Creek |
| 7 | 3 | 34 | 4 | | | | Chrome King |
| 8 | 31 | 34 | 5 | | | | Hammersley |
| 9 | 31 | 36 | 13 | 50. | | | Signal Buttes |
| 10 | 27 | 36 | 12 | | | | Game Lake |
| 11 | 14 | 36 | 9 | 40. | | | Sordy (Briggs Cr.) |
| 12 | 24 | 36 | 9 | 47. | | | Elkhorn |
| 13 | 3 | 37 | 9 | 35. | | | Horse Mt. |
| 14 | 10 | 37 | 9 | | | | Black Rock |
| 15 | 21 | 37 | 9 | 36.55-47.01 | 9.62-12.06 | 2.33-2.80 | Oregon Chrome |
| 16 | 21 | 37 | 9 | | | | Shade |
| 17 | 36 | 37 | 10 | 43.27-44.73 | 11.14-11.32 | 2.64-2.75 | Dailey Creek |
| 18 | 4 | 38 | 8 | | | | Squaw Creek |
| 19 | 24 | 38 | 7 | | | | |
| 20 | 33 | 38 | 6 | | | | |
| 21 | 26 | 38 | 6 | | | | Mungers Creek |
| 22 | 31 | 38 | 5 | | | | |
| 23 | 22 | 38 | 6 | | | | |

| No. | Sec. | T(S) | R(W) | $Cr_2O_3$ | Fe | Cr | Name |
|---|---|---|---|---|---|---|---|
| 24 | 4 | 39 | 6 | | | | |
| 25 | 18 | 40 | 7 | 49. | | | Chollard |
| 26 | 22 | 40 | 8 | | | | Esterley |
| 27 | 31 | 38 | 9 | | | | |
| 28 | 9 | 37 | 12 | | | | Windy Valley |
| 29 | 8 | 38 | 12 | | | | Chetco |
| 30 | 36 | 40 | 11 | 43.03 | 10.54 | 2.79 | Sourdough |
| 31 | 11 | 41 | 8 | | | | Owen |
| 32 | California | | | 48.84-54.98 | 9.53-11.56 | 2.94-3.74 | High Plateau |
| 33 | 33 | 40 | 4 | | | | |
| 34 | 30 | 39 | 1 | | | | |
| 35 | 29 | 39 | 1 | | | | Cass Ranch |
| 36 | 6 | 40 | 1 | | | | Horseshoe |
| 37 | 3 California | 19N | 2W (opposite Oregon) | | | | Sally Ann |
| 38 | 5 | 33 | 4 | 40. | | | Starveout Creek |
| 39 | 24 | 34 | 6 | | | | Sexton Peak |
| 40 | 21 | 37 | 9 | 42.91-45-59 | 10.70-19.99 | 2.74-2.84 | Black Beauty |
| 41 | 32 | 37 | 9 | 41.40-45.17 | 12.05-13.12 | 2.16-2.56 | Deep Gorge |
| 42 | 30 | 37 | 9 | 35.84 | 10.89 | 2.25 | Burro Claim |
| 43 | 20 | 37 | 9 | 44.32 | 12.26 | 2.47 | Oregon Chromite #1 |

( ● SYMBOL)

ASSAYS BY G.M.I

| MAP No. | S | T(S) | R(W) | $Cr_2O_3$% | ~~FE~~ ~~FEO~~ |
|---|---|---|---|---|---|
| 1-15 | S/R | | | | |
| 16 | 16 | 31 | 12 | 51.5 | |
| 17 | 12 | 32S | 10W | 49.5 | |
| 18 | 19 | 32 | 12 | 50.1 | |
| 19 | 33 | 33 | 12 | 22.7 | |
| 20 | 27 | 33 | 5 | BG 784 × | |
| 21 | 13 | 33 | 5 | 45. | |
| 22 | 7 | 34 | 5 | 31.5 | |
| 23 | 2 | 34 | 5 | BG 777 | |
| 24 | 10 | 34 | 4 | 32.4 | |
| 25 | 13 | 34 | 3 | 46.8 | |
| 26 | 24 | 34 | 3 | 52.5 | |
| 27 | 19 | 34 | 5 | 31.3 | |
| 28 | 16 | 34 | 9 | 40.8 | |
| 29 | 3 | 36 | 13 | 47.1 | |
| 30 | 10 | 36 | 8 | 49.1 | |
| 31 | 34 | 36 | 9 | 40.3 | |
| 32 | 33 | 36 | 8 | 47.9 | |
| 33 | 4 | 37 | 9 | 31.7 | |
| 34 | 11 | 37 | 9 | 46.7 | |
| 35 | 3 | 37 | 8 | 39.5 | |
| 36 | 1 | 37 | 5 | 39. | |
| 37 | 19 | 37 | 9 | 40.5 | |
| 38 | 22 | 37 | 9 | 48.3 | |

10

(◎ SYMBOL)

| No | S | S T | W R | $Cr_2O_3$ | ~~FeO~~ | ~~$SiO_2$~~ |
|---|---|---|---|---|---|---|
| 39 | 30 | 37 | 9 | 42.5 | | |
| 40 | 26 | 37 | 9 | 49.2 | | |
| 41 | 30 | 37 | 9 | 40.7 | | |
| 42 | 5 | 38 | 9 | 44.4 | | |
| 43 | 7 | 38 | 9 | 23.7 | | |
| 44 | 23 | 38 | 9 | 54.1 | | |
| 45 | 26 | 38. | 7 | 28.3 | | |
| 46 | 29 | 38 | 9 | 45.3 | | |
| 47 | 36 | 38 | 7. | 28.5 | | |
| 48 | 18 | 39 | 8 | 55.4 | | |
| 49 | 4 | 39 | 6W | 47.2 | | |
| 50 | 8 | 40 | 9 | 43.9 | | |
| 51 | 24 | 40 | 9 | 365 | | |
| 52 | 35 | 40 | 9 | BG 931 | | |
| 53 | 7 | 41 | 9 | 37.8 | | |
| 54 | 15 | 41 | 11 | 37.5 | | |
| 55 | 9 | 41 | 9 | 37.9 | | |
| 56 | 7 | 19N | (CALIF) 6E | BG 775 & 778 | | |
| 57 | 35 | 41 S | 7W | BG 891 | | |
| 58 | 12 | 38 | 10 | 34.6 | | |
| 59 | 1 | 40 | 2 | 51.0 | | |
| 60 | 26 | 40 | 4W | 55.9 | | |
| 61 | 13 | 40 | 2 | 47.1 | | |
| 62 | 10 | 41 | 2 | 42.2 | | |
| 63 | 12 | 41 | 1 | 37.7 | | |

(⊙ SYMBOL)

| No | S | $\overset{S}{T}$ | $\overset{W}{R}$ | $Cr_2O_3$ | ~~FE~~ | ~~$SiO_2$~~ |
|---|---|---|---|---|---|---|
| 64 | 18 | 41 | 1 | 47.5 | | |
| 65 | 11 | 41 | 5 | 25.8 | | |
| 66 | 9 | 41 | 4 | 43.1 | | |
| 67 | 1 | 27 | ~~29~~ 14 | 22.8 | | |
| 68 | 19 | 29 | 5 | 47.2 | | |

| | S | T | R | $Cr_2O_3$ | ~~FE~~ | ~~$SiO_2$~~ | ~~P- No~~ |
|---|---|---|---|---|---|---|---|
| 1-15 | | | | | | | |

× OLD GRANTS PASS ASSAY, NOT AVAILABLE

## RESERVES OF CHROMITE IN OREGON AS REPORTED BY U. S. G. S.

| Mine | Maximum tons | Minimum tons | Date | Remarks |
|---|---|---|---|---|
| Chambers | | | | |
| Iron King | 130,000 | 80,000 | 1940 | +25% $Cr_2O_3$ |
| Dry Camp | | | | |
| John Day District | 200,000 | - - - | 1940 | +25% $Cr_2O_3$ |
| Sourdough | 100,000 | 50,000 | 1940 | Milling grade |
| Briggs Creek | ? | | | Milling grade |
| Oregon beach | 1,445,000 | - - - | 1944 | Measured, +5% |
| | 468,000 | - - - | 1944 | Indicated, +5% |

## NORTHERN CALIFORNIA

| Mine | Maximum tons | Minimum tons | Date | Remarks |
|---|---|---|---|---|
| Seiad | 49,000 | 38,000 | 1944 | Probable, 35% |
| | 67,000 | 51,500 | 1944 | Possible, 35% |
| Fairview | 1,800 | - - - | 1944 | 35% |
| McGuddy Creek | 5,000 | - - - | 1944 | +35% |
| Dolbear | 2,000 | - - - | 1944 | 35% |
| High Plateau | 2,000 | - - - | 1942 | +50% |

## ANALYSES OF CHROMITE FROM SOUTHWESTERN OREGON DEPOSITS

( • )

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 1 | 39 | 7 | 3 | ~~37.66~~ 41.5 |
| 2 | 37 | 8 | 16 | 42.57 |
| 3 | 35 | 9 | 29 | 44.03 |
| 4 | 39 | 7 | 34 | 40.18 |
| 5 | 32 | 12 | 16 | 45.19 |
| 6 | 37 | 9 | 17 | 41.88<br>42.82 |
| 7 | 35 | 3 | 6 | 39.94 |
| 8 | 37 | 9 | 32 | 44.15 |
| 9 | 41 | 9 | 5 | 35.63 |
| 10 | 40 | 8 | 35 | 38.43 |
| 11 | 39 | 8 | 18 | 42.60 |
| 12 | 41 | 11 | 16 | 40.83 |
| 13 | 41 | 5 | 11 | 48.99 |
| 14 | 40 | 8 | 29 | 56.08 |
| 15 | 36 | 9 | 5 | ~~31.42~~<br>40.37 |
| 16 | 31 | 12 | 16 | 51.5 OFF MAP |
| 17 | 32 | 10 | 12 | 49.5 |
| 18 | 32 | 12 | 19 | 50.1 |
| 19 | 33 | 12 | 33 | 22.7 |
| 20 | 33 | 5 | 27 | BG 781* |
| 21 | 33 | 5 | 13 | 45. |
| 22 | 34 | 5 | 7 | 31.5 |
| 23 | 34 | 5 | 2 | BG 777* |
| 24 | 34 | 4 | 10 | 32.4 |
| 25 | 34 | 3 | 13 | 46.8 |
| 26 | 34 | 3 | 24 | 52.5 |
| 27 | 34 | 5 | 19 | 31.3 |
| 28 | 34 | 9 | 16 | 40.8 |
| 29 | 36 | 13 | 3 | 47.1 |
| 30 | 36 | 8 | 10 | 49.1 |
| 31 | 36 | 9 | 34 | 40.3 |
| 32 | 36 | 8 | 33 | 47.9 |
| NO 33 | 37 | 9 | 4 | 31.7 |
| 34 | 37 | 9 | 11 | 46.7 |
| NO 35 | 37 | 8 | 3 | 39.5 |
| NO 36 | 37 | 5 | 1 | ~~39.~~ 46.75 |
| (12) 37 | 37 | 9 | 19 | 40.5 |
| (13) 38 | 37 | 9 | 22 | 48.3 |
| 39 | 37 | 9 | 30 | 42.5 |
| 40 | 37 | 9 | 26 | 49.2 |
| 41 | 37 | 9 | 30 | 40.7 |
| 42 | 38 | 9 | 5 | 44.4 |
| 43 | 38 | 9 | 7 | 23.7 |
| 44 | 38 | 9 | 23 | 54.1 |
| 45 | 38 | 7 | 26 | 28.3 |

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 46 | 38 | 9 | 29 | 45.3 |
| 47 | 38 | 7 | 36 | ~~28.5~~ 39.2 |
| 48 | 39 | 8 | 18 | 55.4 |
| 49 | 39 | 6 | 4 | 47.2 |
| 50 | 40 | 9 | 8 | 43.9 |
| 51 | 40 | 9 | 24 | 36.5 |
| 52 | 40 | 9 | 35 | BG 931* |
| 53 | 41 | 9 | 7 | 37.8 |
| 54 | 41 | 11 | 15 | 37.5 |
| 55 | 41 | 9 | 9 | 37.9 |
| 56 | 19N | 6E (Calif.) | 7 | BG 775 & 778* OFF MAP |
| 57 | 41 | 7 | 35 | BG 891* |
| 58 | 38 | 10 | 12 | 34.6 |
| 59 | 40 | 2 | 1 | 51.0 |
| 60 | 40 | 4 | 26 | 55.9 |
| 61 | 40 | 2 | 13 | 47.1 |
| 62 | 41 | 2 | 10 | 42.2 |
| 63 | 41 | 1 | 12 | 37.7 |
| 64 | 41 | 1 | 18 | 47.5 |
| 65 | 41 | 5 | 11 | 25.8 |
| 66 | 41 | 4 | 9 | 43.1 |
| 67 | 27 | 14 | 1 | 22.8 OFF MAP |
| 68 | 29 | 5 | 19 | 47.2 OFF MAP |

| Map No. | T(S) | R(W) | Sec. | $Cr_2O_3$ |
|---|---|---|---|---|
| 69 | 41 | 9 | 8 | 47.69<br>50.73 |
| 70 | 39 | 8 | 19 | 48.14<br>32.98 |
| 71 | 40 | 8 | 25 | 35.01<br>34.22 |
| ~~72~~ | ~~39~~ | ~~5~~ | ~~18~~ | ~~31.62~~<br>~~27.11~~ |
| 73 | 31 | 14 | 31? | 49.07 |
| 74 | 34 | 5 | 24 | 39.93 |
| 75 | 38 | 9 | 21 | 40.04 |
| 76 | 33 | 4 | 17 | 46.72<br>45.84 |
| 77 | 31 | 14 | 26 | 47.89 OF MA |
| 78 | 39 | 9 | 14 | 41.81 |
| 79 | 41 | 8 | 1 | 40.92 |
| 80 | 41 | 11 | 2 | 52.60 |
| 81 | 36 | 8 | 12 | 57.87 |

*Old Grants Pass assay, not available

PRODUCERS - REPORTED & OCCUR

(▼ SYMBOL)

| No | S | T | R | $Cr_2O_3$ | FeO | CR/FE RATIO | NAME |
|---|---|---|---|---|---|---|---|
| 1 | 35 | 31 | 14 | | | | TRAILS END |
| 2 | 20 | 32 | 12 | | | | SALMON MTN |
| 3 | 36 | 33 | 12 | | | | INDEPENDENC |
| 4 | 29 | 34 | 11 | 48. | | | ILLAHE |
| 5 | 13 | 35 | 12 | | | | AGNESS |
| 6 | 6 | 34 | 5 | 35 | | | GRAVES CR. |
| 7 | 3 | 34 | 4 | | | | CHROME KING |
| 8 | 31 | 34 | 5 | | | | HAMMERSLEY |
| 9 | 31 | 36 | 13 | 50. | | | SIGNAL BUTTE |
| 10 | 27 | 36 | 12 | | | | GAME LAKE |
| 11 | 14 | 36 | 9 | 40 | | | SORDY (BRIGGS |
| 12 | 24 | 36 | 9 | 47. | | | ELKHORN |
| 13 | 3 | 37 | 9 | 35. | | | HORSE MTN. |
| 14 | 10 | 37 | 9 | | | | BLACK ROCK |
| 15 | 2 ~~21~~ | 37 | 9 | 36.55-47.01 | 9.62-12.06 | 2.33-2.80 | OREGON CHROME ~~[illegible]~~ RIVER |
| 16 | 21 | 37 | 9 | — | | | SHADE |
| 17 | 36 | 37 | 10 | 43.27-44.73 | 11.14-11.32 | 2.64-2.75 | DAILEY CR. |
| 18 | 4 | 38 | 8 | | | | SQUAW CR. |
| 19 | 24 | 38 | 7 | | | | |
| 20 | 33 | 38 | 6 | | | | |
| 21 | 26 | 38 | 6 | | | | MUNGERS CR. |
| 22 | 31 | 38 | 5 | | | | |
| 23 | 22 | 38 | 6 | | | | |
| 24 | 4 | 39 | 6 | | | | |

(▼ SYMBOL)

| MAP No | S | T | R | $Cr_2O_3$ | FE | CR:FE RATIO | NAME |
|---|---|---|---|---|---|---|---|
| 25 | 18 | 40 | 7 | 49. | | | CHOLLARD |
| 26 | 22 | 40 | 8 | | | | ESTERLEY |
| 27 | 31 | 38 | 9 | | | | |
| 28 | 9 | 37 | 12 | — | | | WINDY VALLEY |
| 29 | 8 | 38 | 12 | | | | CHETCO |
| 30 | 36 | 40 | 11 | 43.03 | 10.54 | 2.79 | SOURDOUGH |
| 31 | 11 | 41 | 8 | | | | OWEN |
| 32 | CALIF | | | 48.84 - 54.98 | 9.53 - 11.56 | 2.94 - 3.74 | HIGH PLATEAU |
| 33 | 33 | 40 | 4 | | | | |
| 34 | 30 | 39 | 1 | | | | |
| 35 | 29 | 39 | 1 | | | | CASS RANCH |
| 36 | 6 | 40 | 1 | | | | HORSESHOE |
| 37 | 3 | 19N | CALIF [illegible] 2W | | | | SALLY ANN |
| 38 | 5 | 33 | 4 | 40. | | | STARVEOUT CR |
| 39 | 24 | 34 | 6 | — | — | — | SEXTON PK. |
| 40 | 21 | 37 | 9 | 42.91 - 45.59 | 10.70 - 10.99 | 2.74 - 2.84 | BLACK BEAUTY |
| 41 | 32 | 37 | 9 | 41.40 - 45.17 | 12.05 - 13.12 | 2.16 - 2.56 | DEEP GORGE |
| 42 | 30 | 37 | 9 | 35.84 | 10.89 | 2.25 | BURRO CLAIM |
| 43 | 20 | 37 | 9 | 44.32 | 12.26 | 2.47 | ORE. CHROMITE #1 |

CHROMITE ASSAY ABOVE 5% $Cr_2O_3$ -- AG- to LG 101

## T. 29 S

| R 5 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | 16,17,20 | BG 1011 | 47.21 | -- |

## T. 30 S

| | | | | |
|---|---|---|---|---|
| R 3 W. | 28 | GG 59 | 33.66 | 16.90 |
| | 28 | GG 60 | 38.12 | 17.78 |

## T. 31 S

| | | | | |
|---|---|---|---|---|
| R 2 W | 22 | BG 1310 | 46.82 | -- |
| R 12 W. | 15,21 | BG 1021 | 51.51 | -- |
| R 13 W. | 16 | BG 456 | 45.2 | -- |
| | 16 | BG 457 | 42.2 | -- |

## T. 32 S

| R. 4 W. | | Section | Sample Number | $Cr_2O_3$% | Fe % |
|---|---|---|---|---|---|
| | ~~26~~ 52 | 25 | DG 224 | 48.23 | -- |
| | | 30 | CG 374 | 31.4 | -- |
| | | 30 | Cg 375 | 27.1 | -- |
| | 61 | 32 | CG 769 | 33.9 | 19.0 |
| | ~~13~~ | 34 | CG 253 | 45.0 | 14.3 |
| R10W | ~~18~~ | 12 | — | 49.5 | — |
| R. 12 W. | ~~34~~ | 15 | CG 330 | 45.4 | 13.6 |
| | ~~17~~ | 16 | LG 2 | 45.19 | 11.27 |
| | ~~33~~ | 21 | CG 228 | 49.0 | 12.5 |
| | ~~18~~ | 19 | — | 50.1 | — |
| R. 15 W. | | | | | |
| | | 2 | CG 335 | 30.7 | -- |
| | | 2 | CG 336 | 36.3 | -- |

X



10

T. 33 S

| R. 4 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | 15 | CG 367 | 36.6 | -- |
| | 17 | Cg 138 | 12.7 | -- |
| | 17 | CG 139 | 15.4 | -- |
| | 17 | CG 151 | 6.5 | -- |
| | 17 | CG 152 | 12.1 | 26.6 |
| | 17 | EG 28 | 30.66 | 13.2 |
| 54 | 17 | KG 173 | 46.72 | 22.89 |
| | 17 | KG 174 | 45.84 | 22.98 |
| 55 | 19 | CG 285 | 45.1 | 9.5 |
| | 19 | Cg 352 | 42.9 | -- |
| | 19 | CG 468 | 31.9 | -- |
| 56 | 21 | IG 61 | 43.15 | -- |
| R. 5 W. | 17 | CG 310 | 37.9 | 15.0 |
| 57 | 11 | CG 311 | 54.2 | 12.8 |
| | 13 | BG 1058 | 44.6 | -- |
| 58 | 13 | BG 1059 | 48.7 | -- |
| | 13 | BG 1104 | 45.00 | 14.06 |
| | 16 | BG 453 | 39.9 | -- |
| | 16 | BG 454 | 30.2 | -- |
| | 22 | CG 251 | 37.6 | -- |
| | 22 | CG 252 | 34.5 | -- |
| | 22 | CG 409 | 32.5 | -- |

T, 33 S

| R. 5 W. | Sections | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | 22 | CG 410 | 34.7 | -- |
| | 22 | CG 595 | 38.5 | 12.6 |
| | 22 | CG 596 | 38.3 | 12.6 |
| | 22 | CG 626 | 30.0 | -- |
| 58 | 22 | 836 CG | 55.4 | -- |
| | 22 | DG 12 | 41.4 | 13.4 |
| | 22 | DG 13 | 42.2 | 12.2 |
| | 22 | DG 40 | 41.9 | 13.9 |
| | 22 | DG 108 | 40.6 | 11.5 |
| | 27 | BG 781 | 21.6 | -- |
| | 28 | BG 303 | 29.9 | 11.2 |
| | 28 | BG 304 | 28.6 | 11.9 |
| | 28 | CG 527 | 39.3 | 13.7 |
| | 28 | CG 663 | 31.1 | -- |
| | 28 | CG 705 | 28.0 | -- |
| | 28 | CG 708 | 17.3 | -- |
| | 28 | CG 709 | 15.4 | -- |
| | 28 | CG 780 | 29.8 | -- |
| R. 12 W. 59 | 23 | CG 458 | 45.5 | 11.7 |
| | 23 | CG 459 | 11.9 | 41.9 |
| | 24 | CG 163 | 39.2 | 27.0 |
| | 33 | BG 1184 | 22.65 | -- |
| 60 | 34 | CG 518 | 48.8 | 14.9 |
| | 34 | CG 519 | 40.8 | 14.6 |
| R. 15 W. 61 | ~~8~~ | ~~CG 19~~ | 41.08 | -- |

NOT PLOTTED

| | | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|---|
| R. 3 W | | 13 | BG 1166 | 49.94 | -- |
| | | ~~13~~ | CG 452 | 27.7 | -- |
| | 62 | 13 | CG 480 | 46.6 | 13.1 |
| | | ~~13~~ | 637 CG | 25.8 | -- |
| | 64 | 14 | CG 401 | 49.2 | 11.6 |
| | | ~~13~~ | CG 638 | 29.6 | -- |
| | | ~~15~~ | EG 39 | 16.01 | -- |
| | 65 | 23 | CG 223 | 49.1 | 14.3 |
| | | 23 | CG 224 | 44.4 | 13.0 |
| | 71 | 24 | — | 52.5 | |
| R. 4 W. | | ~~3~~ | CG 376 | 33.4 | -- |
| | 66 | 3 | CG 411 | 46.3 | -- |
| | | ~~3~~ | CG 423 | 38.7 | -- |
| | | ~~3~~ | CG 590 | 37.5 | 18.3 |
| | | ~~3~~ | CG 639 | 35.9 | 17.8 |
| | | ~~10~~ | BG 308 | 32.4 | -- |
| | 67 | 21 | CG 717 | 50.4 | 13.6 |
| R. 5 W. | | | | | |
| | | ~~2~~ | BG 777 | 36.3 | -- |
| | | ~~18~~ | CG 213 | 30.0 | -- |
| | 63 | 23 | CG 677 | 46.3 | 11.70 |
| | | ~~24~~ | LG 94 | 39.93 | 10.80 |
| | | ~~26~~ | EG 40 | 26.83- | 11.95 |

T. 34 S

| R. 6 W | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | 23 | CG 15 | 47.07 | 12.26 |
| | 69 - 24 | CG 28 | 47.06 | 11.3 |
| | 24 | CG 29 | 45.59 | 10.9 |
| | ~~24~~ | CG 337 | 30.7 | -- |
| | ~~24~~ | CG 338 | 31.4 | -- |
| | ~~24~~ | CG 339 | 30.2 | -- |
| | ~~24~~ | CG 340 | 28.8 | -- |
| R. 7 W. | | | | |
| | ~~22~~ | CG 160 | 27.2 | 12.3 |
| R. 9 W. | | | | |
| | ~~16~~ | BG 1189 | 38.53 | -- |
| | 93 16 | BG 1190 | 40.85 | 12.66 |
| R. 12 W | | | | |
| | 75 14 | CG 516 | 45.8 | 12.9 |
| | ~~26~~ | IG 108 | 33.05 | 13.30 |

T. 35 S

| R. 3 W | | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|---|
| | | ~~6~~ | LG 31 | 39.94 | 13.50 |
| | ~~86~~ | 10 | JG 166 | 55.04 | -- |
| R. 6 W. | ~~87~~ | 32 | CG 233 | 49.3 | 11.0 |
| R. 7 W. | | | | | |
| | ~~88~~ | 17 | CG 334 | 49.3 | 18.5 |
| | ~~89~~ | 32 | CG 236 | 45.0 | 27.6 |
| R. 9 W | ~~90~~ | 25 | CG 19 | 49.15 | -- |
| | ~~16~~ | 29 | LG 10 | 44.03 | -- |
| R. 12 | ~~91~~ | 10 | CG 417 | 49.1 | -- |

## T. 36 S

| R. 7 W | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| 46 | 6 | DG 144 | 52.4 | 11.2 |
| 47 | 7 | CG 723 | 46.8 | 11.7 |
| 48 | 7 | CG 724 | 49.1 | 11.0 |
| **R. 8 W.** | | | | |
| | 9 | BG 1029 | 49.46 | -- |
| ~~49~~ | 9 | BG 1030 | 44.13 | -- |
| | 9 | BG 1182 | 51.56 | 13.04 |
| 42 | 10 | — | 49.1 | |
| ~~92~~ | 30 | CG 579 | 40.8 | 12.3 |
| ~~44~~ | 33 | — | 47.9 | |
| ~~45~~ | 12 | — | 57.87 | |
| **R. 9 W.** | | | | |
| | ~~5~~ | CG 164 | 33.6 | -- |
| | ~~5~~ | EG 1 | 39.98 | -- |
| | ~~5~~ | LG 69 | 31.42 | 11.35 |
| ~~46~~ | 5 | LG 70 | 40.37 | 12.58 |
| | ~~14~~ | BG 936 | 35.1 | -- |
| ~~50~~ | 14 | CG 674 | 41.6 | 15.0 |
| | 34 | BG 1067 | 40.3 | -- |
| | 34 | BG 1304 | 45.47 | -- |
| | ~~34~~ | BG 1305 | 33.21 | -- |
| | 34 | CG 4 | 50.81 | 11.17 |
| | 34 | CG 240 | 47.7 | 16.3 |
| | ~~34~~ | CG 568 | 35.6 | -- |
| | 34 | DG 109 | 50.2 | 14.4 |
| ~~43~~ | 34 | DG 110 | 54.1 | 11.7 |

X

35

# T. 36 S

| R. 10 W. | Section | Sample Number | $Cr_2O_3$ % | FE % |
|---|---|---|---|---|
| | ? | CG 383 | 49.4 | 9.5 |
| R. 13 W. | | | | |
| | ~~41~~ 3 | BG 1110 | 47.12 | -- |
| R. 14. W. | | | | |
| | ~~51~~ 8 | CG 120 | 42.4 | -- |
| R. 15 W. | | | | |
| | 53 ~~1~~ | CG 71 | ~~41.21~~ | 12.50 |
| | ~~13~~ | CG 159 | 38.1 | -- |
| | 13<br>25<br>~~26~~ | CG 262 | 7.9 | -- |
| | ~~25~~ | CG 384 | 6.5 | -- |
| | ~~25~~ | CG 385 | 14.8 | -- |

NOT PLOTTED

3C

<u>T. 37 S</u>

| R. 5 W. | | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|---|
| | | ~~1~~ | BG 1100 | 39.37 | -- |
| | | | HG 244 | 46.73 | -- |
| R. 6 W. | | | | | |
| | | ~~9~~ | CG 555 | 16.2 | -- |
| R. 8 W. | | | | | |
| | | ~~3~~ | BG 1344 | 39.5 | -- |
| | ~~5~~ | 16 | LG 9 | 42.57 | -- |
| | ~~94~~ | 30 | CG 539 | 48.5 | 15.3 |
| | | 30 | CG 540 | 43.7 | 13.9 |
| | ~~95~~ | 33 | CG 197 | 53.5 | 15.3 |
| R. 9 W. | ~~96~~ | 1 | CG 244 | 46.2 | 13.9 |
| | ~~97~~ | 3 | CG 283 | 41.6 | 11.5 |
| | | ~~4~~ | BG 1211 | 31.74 | -- |
| | ~~98~~ | 10 | CG 201 | 46.6 | 11.9 |
| | | ~~10~~ | CG 314 | 26.3 | -- |
| | ~~11~~ | 11 | BG 1013 | 46.69 | -- |
| | 93 | 16&21 | BG 255 | 44.8 | 13.8 |
| | | 16 | BG 256 | 44.5 | 15.3 |
| | ~~99~~ | 16 | BG 1191 | 48.30 | 12.08 |

T. 37 S

| R. 9 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| ~~9~~ | 17 | BG 683 | 44.6 | -- |
| | 17 | LG 15 | 41.88 | 13.18 |
| | 17 | LG 16 | 42.82 | 13.40 |
| ~~12~~ | 19 | BG 1056 | 40.5 | 11.8 |
| | 21 | BG 254 | 41.6 | 15.9 |
| | 21 | CG 198 | 45.2 | -- |
| | 21 | CG 199 | 50.6 | 12.0 |
| | 21 | CG 455 | 48.3 | -- |
| ~~105~~ | 21 | CG 766 | 51.6 | 12.8 |
| | ~~21~~ 22 | DG 218 | 37.52 48.3 | -- |
| ~~13~~ | 22 | DG 52 | 42.6 | 18.4 |
| | ~~25~~ | DG 217 | 17.08 | -- |
| ~~15~~ | 26 | BG 682 | 47.5 | -- |
| ~~101~~ | 28 | BG 305 | 52.4 | 11.8 |
| | ~~28~~ | CG 448 | 37.0 | 11.7 |
| | 30 | BG 205 | 40.1 | 11.6 |
| ~~14~~ | 30 | BG 1108 | 54.52 | -- |
| | ~~30~~ | CG 418 | 35.2 | 11.8 |
| | ~~30~~ | CG 440 | 39.9 | 13.0 |
| | 30 | CG 447 | 49.1 | 18.5 |
| | ~~30~~ | CG 551 | 39.7 | 11.2 |

| R. 9 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| ~~101~~ | 31 | CG 402 | 47.0 | 14.3 |
| | 32 | BG 1247 | 41.47 | 14.57 |
| | 32 | CG 403 | 46.8 | 12.9 |
| | ~~32~~ | DG 119 | 27.0 | 11.7 |
| ~~102~~ | 32 | HG 99 | 46.67 | 15.73 |
| | 32 | LG 21 | 44.15 | 13.25 |
| ~~103~~ | 33 | CG 243 | 48.5 | 11.9 |
| | 33 | CG 838 | 44.6 | -- |
| | ~~33~~ | DG 22 | 39.9 | 16.3 |
| ~~104~~ | 34 | IG 57 | 44.43 | 14.87 |
| | 34 | JG 97 | 44.07 | 13.28 |
| **R. 10 W.** | | | | |
| | ~~7~~ | BG 1090 | 23.38 | -- |
| **R. 13 W.** | | | | |
| ~~105~~ | 4 | CG 92 | 42.4 | -- |
| ~~106~~ | 25 | AG 578 | 40.9 | -- |
| **R. 14 W.** | | | | |
| ~~107~~ | 9 | CG 242 | 47.8 | 14.5 |

| R. 5 W | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | ~~9~~ | CG 250 | 35.3 | -- |
| | ~~23~~ | EG 55 (#1) | 30.56 | -- |
| | ~~23~~ | EG 55 (#2) | 31.67 | -- |
| | ~~23~~ | EG 58 (#1) | 31.06 | -- |
| | ~~23~~ | EG 58 (#2) | 33.60 | -- |
| | ~~76~~ 29 | CG 508 | 40.9 | 0- |
| R. 6 W | | | | |
| | ~~71~~ 21 | CG 270 | 47.6 | 14.1 |
| | 21 | CG 271 | 43.8 | 14.6 |
| | ~~25~~ | CG 446 | 26.4 | -- |
| | ~~26~~ | CG 84 | 18.08 | -- |
| | ~~26~~ | DG 20 | 7.0 | -- |
| R. 7 W. | | | | |
| | ~~22~~ | DG 55 | 32.1 | -- |
| R. 8 W. | | | | |
| | ~~1~~ | BG 1802 | 12.40 | -- |
| | ~~78~~ 7 | CG 234 | 55.4 | 13.4 |
| | ~~7~~ | DG 50 | 12.7 | -- |
| | ~~18~~ | CG 727 | 26.4 | 14.9 |
| | ~~18~~ | CG 849 | 29.0 | -- |
| | ~~18~~ | Cg 850 | 10.2 | -- |

T. 38 S

| | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| R. 9 W. | 72 5 | Bg 1024 | 44.44 | -- |
| | 5 | DG 11 | 33.7 | -- |
| | 5 | DG 105 | 35.1 | -- |
| | 6 | CG 412 | 39.3 | 12.9 |
| | 79 6 | CG 110 | 41.6 | 11.0 |
| | 7 | BG 1212 | 23.71 | -- |
| | 80 7 | BG 1213 | 23.21 | -- |
| | 75 7 21 | CG 406 | 45.8 40.04 | 13.6 |
| | 18 73 23 | DG 116 | 32.4 54.1 | -- |
| | 27 | CG 157 | 45.8 | 9- |
| | 81 27 | CG 158 | 40.4 | -- |
| | 82 32 | BG 1098 | 45.28 | -- |
| | 34 84 29 | CG 249 | 48.8 45.3 | 16.6 |
| R. 10 W. | 83 2 | FG 26 | 46.01 | 11.31 |
| | 11 (?) | BG 1060 | 38.8 | -- |
| | 11 (?) | BG 1061 | 34.6 | -- |
| | 11 | BG 1062 | 21.5 | -- |
| | 11 | BG 1063 | 5.0 | -- |
| | 11 | BG 1327 | 39.3 | -- |
| | 11 | CG 720 | 24.7 | -- |
| | 11 | DG 51 | 26.8 | -- |
| | 13 | CG 109 | 35.0 | 13.9 |
| | 23 | CG 853 | 38.1 | -- |
| | 23 | CG 854 | 37.9 | -- |

T. 39 S

| | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| R. 1 W. | 32 | BG 1250 | 52.88 | -- |
| R. 6 W. | ~~3~~ 4 | BG 458 | 47.2 | -- |
| R. 5 W | ~~18~~ | LG 83 | 31.63 | 12.60 |
| | ~~18~~ | LG 84 | 27.11 | 10.01 |
| R. 7 W. | ~~1~~ 3 | CG 149 | 41.5 | 13.4 |
| | ~~3~~ | LG 1 | 37.66 | 12.40 |
| | ~~8~~ | CG 424 | 33.5 | -- |
| | 34 | CG 641 | 41.6 | 20.5 |
| | ~~2~~ 4 34 | LG 4 | 40.18 | 12.56 |
| R. 8 W. | ~~12~~ | DG 222 | 31.49 | 14.1 |
| | ~~4~~ 18 | BG 257 | 55.4 | 14.9 |
| | ~~6~~ 19 | LG 79 | 48.14 | 13.61 |
| | ~~3~~ 18 | LG 52 | 42.60 | 11.70 |
| | ~~19~~ | LG 80 | 32.08 | 10.69 |
| R. 9 W. | ~~108~~ 3 | CG 536 | 45.8 | 18.2 |
| | 109 8 | CG 421 | 45.3 | -- |
| | ~~7~~ 14 | LG 101 | 41.81 | 13.83 |
| | 16 | DG 117 | 44.7 | 13.9 |
| | ~~30~~ | BG 306 | 31.2 | 10.0 |
| R 10 W. | ~~?~~ | BG 833 | 42.6 | -- |
| | ~~?~~ | BG 834 | 45.3 | -- |
| R. 14 W. | ~~27~~ | BG 478 | 10.90 | -- |

39

33 10
32 13
R 2W 30 1

T. 40 S

42.2
47.1
51.0%

| R. 4 W | | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|---|
| | 10 | 21 | CG 51 | 43.08 | 12.8 |
| | 31 | 26 | — | 55.9 | |
| R. 6 W. | | | | | |
| | 34 | 31 | DG 170 | 42.9 | -- |
| | | ~~31~~ | EG 37 #1 | 33.98 | -- |
| | | ~~31~~ | EG 37 #2 | 39.36 | -- |
| R. 7 W. | 35 | 15 | CG 407 | 43.7 | -- |
| | | ~~16~~ | DG 84 | 26.5 | 10.9 |
| | | ~~17~~ | CG 12[illegible] | 27.0 | -- |
| | | ~~17~~ | CG 312 | 24.7 | -- |
| | 36 | 17 | CG 658 | 47.8 | 15.4 |
| | 37 | 18 | CG 697 | 41.0 | -- |
| R. 8 W. | | | | | |
| | | ~~15~~ | CG 294 | 17.0 | -- |
| | | ~~15~~ | CG 295 | 31.2 | -- |
| | | ~~15~~ | CG 300 | 35.2 | -- |
| | | ~~15~~ | CG 301 | 30.1 | -- |
| | 38 | 22 | CG 56 | 58.52 | 11.51 |
| | | 22 | CG 72 | 48.3 | 8.8 |
| | | ~~22~~ | CG 444 | 19.2 | -- |
| | | ~~22~~ | CG 491 | 32.0 | -- |
| | | 22 | CG 694 | 40.0 | 16.7 |
| | | ~~22~~ | CG 699 | 29.0 | 12.7 |

T. 40 S

| R. 8 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | ~~22~~ | CG 802 | 36.6 | 12.1 |
| | ~~22~~ | CG 803 | 36.4 | 12.8 |
| | ~~22~~ | CG 842 | 18.7 | 9.0 |
| | ~~22~~ | JG 78 | 31.10 | -- |
| | ~~25~~ | LG 81 | 35.01 | 11.79 |
| | ~~25~~ | LG 82 | 34.22 | 11.25 |
| | ~~28~~ | CG 256 | 33.4 | -- |
| | 39 28 | CG 286 | 42.2 | 9.3 |
| | 28 29 | LG 68 | 56.08 | 12.10 |
| | ~~33~~ | CG 441 | 32.1 | -- |
| | ~~35~~ | LG 36 | 38.43 | 11.34 |
| | ~~?~~ | CG 445 | 38.9 | 10.8 |
| | ~~?~~ | CG 497 | 33.4 | 11.7 |
| | ~~?~~ | CG 498 | 35.6 | 12.5 |
| R. 9 W. | | | | |
| | 29 8 | BG 1195 | 43.95 | 11,51 |
| | ~~8~~ | BG 1196 | 39.21 | -- |

## T. 41 S.

| | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| R. 1 W. | ~~8~~ | BG 1064 | 37.7 | 25.8 |
| 23 | 18 | — | 47.5 | |
| | ~~12~~ | CG 457 | 34.9 | -- |
| 2w 22 | 10 | — | 42.2 | |
| R. 5 W. | | | | |
| | 11 | BG 258 | 41.2 | 12.2 |
| 21 | 11 | LG 65 | 48.99 | 13.97 |
| 111 | 15 | CG 576 | 41.0 | 12.8 |
| 112 | 16 | CG 368 | 43.3 | 9.0 |
| R. 4 W 24 | 9 | — | 43.1 | |
| R. 7 W. | | | | |
| | ~~6~~ | CG 679 | 26.7 | -- |
| 113 | 6 | CG 680 | 46.3 | -- |
| 114 | 14 | BG 891 | 41.7 | -- |
| | ~~32~~ | BG 775 | 37.0 | -- |
| | ~~34~~ | CG 493 | 38.8 | -- |
| R. 8 W. 26 | 1 | — | 40.92 | |
| | ~~1~~ | DG 226 | 27.3 | 12.3 |
| | ~~2~~ | JG 238 | 38.94 | -- |
| | ~~8~~ | CG 414 | 26.7 | -- |
| | ~~8~~ | CG 425 | 21.9 | -- |
| 115 | 8 | CG 426 | 44.2 | 11.9 |
| | ~~11~~ | DG 25 | 37.1 | -- |
| 116 | 13 | BG 681 | 50.4 | -- |
| | ~~34~~ | BG 778 | 32.4 | -- |
| R. 9 W. | | | | |
| | ~~1~~ | CG 143 | 33.2 | 12.3 |
| 117 | 4 | CG 93 | 62.4 | 11.7 |
| 118 | 5 | CG 706 | 51.2 | 13.4 |
| | 5 | CG 707 | 47.8 | 11.6 |
| | ~~5~~ | Lg 38 | 35.63 | 10.22 |
| | ~~6 & 7~~ | CG 327 | 38.6 | 14.1 |
| | ~~6 & 7~~ | CG 328 | 34.0 | 15.0 |

# T. 41 S.

| R. 9 W. | Section | Sample Number | $Cr_2O_3$ % | Fe % |
|---|---|---|---|---|
| | 7 | BG 776 | 41.6 | -- |
| ~~119~~ | 7 | CG. 5 | 43.56 | 11.2 |
| | ~~7~~ | CG 297 | 32.5 | -- |
| | 7 | DG 107 | 45.7 | -- |
| | ~~8~~ | BG 317 | 29.5 | -- |
| | 8 | CG 30 | 41.39 | 10.5 |
| | ~~8~~ | CG 31 | 37.65 | 10.7 |
| ~~25~~ | 8- | CG 247 | 50.8 | 13.9 |
| | 8 | CG 840 | 41.4 | -- |
| | 8 | DG 203 | 46.72 | 13.22 |
| | 8 | LG 71 | 47.69 | 18.90 |
| | 8 | LG 72 | 50.73 | 10.24 |
| | ~~9~~ | BG 1088 | 37.88 | -- |
| | ~~9~~ | BG 1089 | 35.76 | -- |
| | 34 | BG 1251 | 41.37 | -- |
| | ~~35~~ | BG 931 | 21.8 | -- |
| R. 10 W. ~~120~~ | 12 | CG 400 | 41.6 | 10.8 |
| R. 11 W. ~~21~~ | 2 | — | 52.60 | |
| | ~~7~~ | CG 373 | 36.9 | -- |
| | ~~11~~ | LG 100 | 32.69 | 11.92 |
| ~~20~~ | 16 | LG 57 | 40.83 | 13.47 |
| R. 12 W ~~121~~ | 4 | FG 9 | 43.45 | 12.98 |

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

December 28, 1956

Mr. Hollis M. Dole
1069 State Office Building
Portlandl, Oregon

Dear Hollis:

The complete list of eastern Oregon chrome shippers as I know them to be is as shown in the accompanying tables.

I plan to visit John Day about the 20th of January to secure the shipment records of some of the new operators and the last portion of the 1956 Comstock data. All settlement sheets for 1956 shipments should be back from the depot by then.

When the foregoing is done, I will have in this office copies of the shipment returns for about 99 percent of all the chrome shipped from eastern Oregon since the beginning of World War II to the end of 1956.

The grand total for shipments to the Grants Pass depot under the present purchasing program, and for the records presently on file, are 3,953 dry long tons valued at $406,525.28.

Bill Gardner tells me he has receipts for me covering about 300 tons shipped from the Ward last fall. Since the Comstock should have about that much more to report, it is evident that the full tonnage shipped through 1956 will crowd 5000 tons and a half-million dollars, when these loose ends are assembled and included in the calculating.

As said before, I hope to have these presently missing gaps filled by the end of January --- and will, if all goes well.

Sincerely,

N. S. Wagner

NSW:gl
enc.

Table I -- Summary of shippers whose shipment records are currently on file for the periods indicated in the date-range column.

| Mine | Location | Owner | Operator | Ore | Number of Shipments | Date Range Shipments |
|---|---|---|---|---|---|---|
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | Burt Hayes<br>John Day | Chrome Conc. | 4 | Aug. 4, 1952<br>Sept. 19,1952 |
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | Tri-County Mining & Concentrating Co.<br>John Day | Chrome Conc. | 28 | Sept. 17,1952<br>Feb. ,1953 |
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | not currently sure | Chrome Conc. | 3 | June 15,1953<br>June 25,1953 |
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | Zanetti Brothers<br>Wallace, Idaho | Chrome Conc. | 32 | July 10, 1953<br>Oct. 16,1953 |
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | John Day Mining Co.<br>John Day | Chrome Conc. | 72 | Oct. 20,1953<br>Mar. 23,1955 |
| Dry Camp | 17 S.; 32 E.; 8 & 17 | H. R. Elliott<br>Bridge St., John Day | Allen & John Stinnett<br>John Day | Chrome Conc. | 2 | Aug. 15,1956<br>Sept. 24,1956 |
| Haggard & New | 14 S.; 32 E.; 17 | Ray Summers<br>Canyon City, Ore. | Burt Hayes<br>John Day | Chrome Conc. | 52 | July 23,1953<br>Dec. 6,1954 |
| Haggard & New | 14 S.; 32 E.; 17 | Ray Summers<br>Canyon City, Ore. | Breedlove & Sintay<br>John Day | Chrome Conc. | 24 | April 19,1955<br>June 17,1955 |
| Haggard & New | 14 S.; 32 E.; 17 | Ray Summers<br>Canyon City, Ore. | Comstock Uranium-Tungsten Co., Inc.<br>John Day | Chrome Conc. | 45 | Mar. 19,1956<br>Sept. 26,1956 |
| Gardner Ranch #1 | 14 S.; 32 E.; 8 | Wm. Gardner<br>Canyon City | Al Dunn<br>Canyon City | Chrome Conc. | 7 | Oct. 7,1955<br>Aug. 29,1956 |
| Gardner Ranch #2 | 14 S.; 32 E.; 8 | Wm. Gardner<br>Canyon City | Harlan Jones<br>John Day | Chrome Conc. | 1 | Nov. 1,1955 |
| Kingsley | 14 S.; 32 E.; 9 | Charles Brown<br>Canyon City | Lyman & Findley<br>John Day | Chrome Conc. | 1 | Oct. 28,1954 |
| Spider Group | 14 S.; 32 E.; 16 | Chester Elliott<br>John Day | Lyman & Findley<br>John Day | Chrome Conc. | 2 | Nov. 8,1954<br>April 18,1955 |
| Ward | 14 S.; 32 E.; 5 | Wm. Gardner<br>Canyon City | Art Neuman<br>John Day | Chrome Conc. | 1 | March 11,1955 |
| Wayne Stewart Ranch | 13 S.; 33 or 34 E. on south fk. John Day R. | Wayne Stewart<br>Dayville | Burt Hayes<br>John Day | Lump ore | 1 | Aug. 9,1956 |

Baker Office -- December 28, 1956.

Table II, Revised Edition -- Summary of known and reported shippers whose shipment records for 1956 have not yet been secured in full.

| Mine | Location | Owner & Shipper | 1956 Shipment data yet to be secured |
|---|---|---|---|
| Zero Claim | 14 S.; 32 E.; 8 | Wm. Gardner, owner & shipper | Small tonnage through Tri-County mill |
| Ward Mine | 14 S.; 32 E.; 5 | Wm. Gardner, owner & shipper | An appreciable tonnage through Tri County Mill |
| Gardner Ranch (Al Dunn lease) | 14 S.; 32 E.; 8 | Wm. Gardner, Owner<br>Al Dunn, shipper | Shipments from lot 6925 (Aug. 29, 1956) to year's end. Several made. |
| Haggard & New | 14 S.; 32 E.; 17 | See Table I | Shipments from Receipt 7200 (Sept. 26, 1956) to year's end. Shipments were continuous and steady, and record should be sizeable. |
| Unknown property near Potato Patch | 14 S.; 31 E.; 3 | J. E. Shaw, 309 N. W. 3rd St., John Day; and Kinsella, Prairie City -- shippers.<br>Owner unknown | Milled about 100 tons through Al Dunn mill during summer. Concentrate didn't make the grade at the depot, but was sweetened to meet acceptance. |
| Lost Buck | 14 S.; 33 E.; 28 (?) | Ben Bailey & Coy Short, Prairie City, shippers.<br>I. B. Hazeltine, owner. | About 28 tons of ore through Tri-County mill, about 12 tons concentrates recovered. |
| x Red Hill | 14 S; 32 E.; 2 & 11 | Art Moothart, John Day, -- shipper.<br>R. C. Begg & W. R. Wright, John Day -- owners | 3 shipments of lump ore shipped and 1 shipment of conc. milled through Tri-County.<br>Lump shipments about 7 tons each; conc., 5 tons |
| x Mule Shoe | ?<br>Probably Mormon Basin area | Joe Anderson & Paul Towell, Ironside -- shippers | Grants Pass shippers record to Portland Office lists these shippers. Are reported to be now looking for a mill. |

A Mr. Gallis Simpson is reported to have made some shipments from some eastern Oregon property, but he didn't mill through any of the known custom mills, and the report must be classed as unconfirmed as yet.

It is confirmed that Harlan Jones and Earl Lyman made no 1956 production. The Lyman mill was moved from Dog Creek to some property near Unity, but identity of the Unity property is not known as it may well not be a chrome property.

Original report, Baker Office -- December 28, 1956
Revised report, Baker Office -- January 8, 1957.

# CHROME MILLS ACTIVE IN 1956
## EASTERN OREGON

| MILL LOCATION | OPERATOR ADDRESS | MINES SUPPLYING ORE TO MILL |
|---|---|---|
| 1. COMSTOCK-URANIUM-TUNGSTEN CO INC. on Dog Creek - | * ~~EARL E. W. [illegible]~~ P.O. BOX 352 JOHN DAY | HAGGARD-NEW |
| 2. AL DUNN Canyon City . | AL DUNN Canyon City . | GARDNER RANCH, Al Dunn lease Potatoe Patch |
| ~~4. [illegible] & FINDLEY "on Dog Creek above Haggard + New~~ | ~~Vail [illegible] Box 432, John Day "~~ | ~~[illegible]~~ NO - this was 1954 ~~SPIDER [illegible]~~ NO - 1954 + 55 GARDNER RANCH # ~~[illegible]~~ Jones lease |
| 3. TRI-COUNTY MILLING & CONCENTRATING CORP John Day | Mr J. A. Curzon BOX 188 John Day | LOST BUCK Ward Zero |

Jan 7, 1957

* Kearney + his successor have both long since been [illegible] and as of a day or two before Xmas the Sheriff padlocked the layout again for non-payment of bills. This has happened before and they will probably pay up + resume operations again as they have done before — but in the meantime I would be extremely reluctant to give any name for any super as they will probably resume with a new one. Why not just use the company name? Lousy outfit.

# GENERAL SERVICES ADMINISTRATION

DEFENSE MATERIALS SERVICE
49 Fourth Street

*Region 9*
*San Francisco 3, California*

IN REPLY REFER TO: 9-DMS

April 9, 1958

Mr. Ralph S. Mason
1069 State Office Building
Portland 1, Oregon

Dear Mr. Mason:

In response to your telephone call, we give you below the total tonnage and dollar value of chrome ore and/or concentrates received at our Grants Pass Depot thru March 31, 1958:

| Long Dry Tons | Payments to Vendors |
|---|---|
| 144,397.5385 | $ 14,124,339.74 = $97.81/TON |

We do not have the administrative costs of the Grants Pass Depot. These figures might be available in Washington.

Very truly yours,

R E Reno Jr

R. E. Reno, Jr.
Regional Director

97.81
200000
19,562,000.00

# GENERAL SERVICES ADMINISTRATION

*Region 9*
*San Francisco 3, California*

January 9, 1959

IN REPLY REFER TO:

Mr. Ralph S. Mason, Mining Engineer
State of Oregon
Department of Geology and Mineral Industries
1069 State Office Building
Portland, Oregon

Dear Mr. Mason:

We do not have the breakdown of Chrome Ore from Oregon mines in our files. Mr. H. A. Kauffman, Bureau of Mines, at Albany, Oregon received copies of all Grants Pass settlement sheets and no doubt can supply the information from his files.

We did run some figures which should fairly represent the quality of the ore from Oregon sources.

Weighted Average of Deliveries January 1, 1958 through February 28, 1958 (1928 LDT)

| | |
|---|---|
| Average Cr/Fe ratio | 2.69 |
| Average $Cr_2O_3$ | 45.97 |
| Average Value per ton | $98.17 |

Purchases January 1, 1958 through May 19, 1958

4583 LDT valued at $480,933.63 or $104.94 per LDT

Additional purchases were made after May 19th. In going through the files it was noticed that the quality of the ore, particularly the Chromic Oxide content, improved after February deliveries.

Mr. Ralph S. Mason, Mining Engineer
Page Two
January 9, 1959

Since for a good part of the program a large part of the Grants Pass deliveries were from California, we feel that Bureau of Mines figures for Oregon mines would be better than anything we might develop.

If we can be of further assistance or you have any questions about this report, please advise.

Yours very truly,

Robert E Reno Jr

Robert E. Reno, Jr.
Regional Director

Chronology of events preceding closure of GSA

Chrome Depot at Grants Pass

| | |
|---|---|
| Feb 12 | GSA mails letter "To all shippers under the domestic chrome program" |
| Feb 14 | GSA letter received by dept, and copies sent to Baker, Grants Pass, Bill Robertson and Bill Gardner. |
| Feb 28 | Ore Bin article "Chrome Mining Nearing End" published. (article embodied GSA letter of 2-12-58, plus unpurchased tonnage as of 2-21-58.) Week-by-week death watch on unpurchased tonnages established by department. (information obtained by calling Dan Beyer each Tuesday) |
| March 31 | Ore Bin article giving unpurchased chrome tonnage published |
| April 29 | Ore Bin article giving unpurchased chrome tonnage published |
| May 14 | GSA sends letter to all shippers warning of impending termination of stockpile program |
| May 19 | Some Oregon shippersreceive GSA letter of 5-14-58 |
| May 20 | Department calls R.E. Reno's GSA office in San Francisco and learns that stockpile buying terminated on the 19th. Some Oregon shippers receive GSA letter of 5-14-58.<br><br>Department alerts Grants Pass and Baker offices and suggests that they determine whether or not shippers have been notified. Baker office immediately called every shipper at John Day, and Grants Pass canvassed several of the larger producers. |
| May 29 | Ore Bin article published re closing of stockpile. |

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

May 21, 1958

Mr. Ralph S. Mason
1069 State Office Building
Portland 1, Oregon

Dear Ralph:

I just got back from the chrome depot. Dan Beyers is "Busier than a 1-arm paper hanger" so didn't have time to discuss anything with me. As of Monday I understand that the local depot was allotted 400 tons on which they are taking committments. When this tonnage has been committed it is my understanding that no more committements will be taken.

In talking with the local producers and Dean Axtel I gather that no one will be left holding an appreciable amount of ore ready for shipment. They gave me no estimation as to when the allotment would be filled or how much the total committments are at present.

I did hear a rumor that a large shipment of ore from Alaska probably wouldn't arrive in time.

I hope that this information is of some help.

Sincerely,
Len

LR:amj

Len

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

RECEIVED
MAY 21 1958
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

May 20, 1958

Ralph S. Mason
1069 State Office Bldg.
Portland 1, Oregon

Dear Ralph:

Following are the results of my phone calls to Mrs. Wm. Gardner, Al Dunn and Mrs. Curzon--all of John Day and Canyon City and all active shippers to the chrome stockpile. The phone calls were all made approximately 11 to 11:30 A.M., May 20, 1958.

Mrs. Wm. Gardner, Canyon City.

She knew about the depot closure but did so as the result of a phone conversation with Mr. McCllelland, G.S.A., Seattle, the phone call being from him relative to a previously made request by Mr. Gardner for information concerning rail car shipment data. In other words, her information came to her in a round about manner and as a result of business contacts on other matters. Mr. Gardner has had no official notification of the closure from San Francisco. His only previous communication was a letter dated May 14th and received May 19 carrying a warning to the effect that he should phone for clearance before making any future shipments. This letter reportedly signed by Robert E. Reno. I repeat---no notification of depot closure received.

Al Dunn, Canyon City.

Mr. Dunn knew of the closure as a result of having phoned Beyer at Grants Pass at 8:00 A.M., May 20th, relative to making some shipments. He made this call as a consequence of the G.S.A. letter of the 14th but he had received no notification of depot closure prior to putting in his call. Incidentally, he has 25 tons of concentrate and 10 tons of lump ore ready to ship and has another 40 tons of ore at the mill ready to mill.

Mrs. Al Curzon, John Day.

Mrs. Curzon knew of the closure as the result of a conversation with a truck driver for the Cummins Freight Service and a subsequent check with Al Dunn. Like the others, she has the G.S.A. letter of the 14th directing shippers to phone the depot for advance clearance to ship, but she had received no official word from the G.S.A. that the program was over. They have a 15 ton shipment ready to go.

By way of summary, all of these people knew of the program termination, but all had learned from round about sources and none had received any direct, official notification. All seemed bewildered as to how 5,800 tons should have been purchased so quickly. Trust this answers your questions satisfactorily.

Sincerely,

N. S. Wagner
Geologist

NSW:mr

LONG DRY TONS TO BE PURCHASED BY G.S.A

FED REG No 6-54 p7245
(AS OF SEPT 30, 1954)

| | TERM DATE | | PROG | PURCH 1/4 | TOTAL |
|---|---|---|---|---|---|
| ASBES | 10-1-57 | S. TON CRUDE No 1 | ~~4~~500 | 166 | 617 |
| | | AND/OR No 2 | | 71 | 320 |
| BERYL | 6-30-57 | S.T. DRY No 3 | 1,500 | 188 | 457 |
| CHROME | " | G.T. DRY | 200,000 | 9561 | 70,040 |
| CO-TANT | 12-31-58 | POUNDS PENTOXIDE | 15,000,000 | 621,590 | 5,326,14 |
| MANG | 6-30-58 | G.T. DRY | 6,000,000 | 335,361 | 1,109,64 |
| BUTTE PHILLISBURG | | | | | |
| DEMING | | | 6,000,000 | 270,097 | 1,713,88 |
| WENDEN | | | 6,000 000 | 624,876 | 4,909,4 |
| SMALL PROD | | | 19,000,000 | 322,129 | 1,679,98 |
| MICA | 6-30-57 | S.T. HAND COBBED | 25,000 | 551 | 4,157 |
| TUNG | 7-1-58 | S.T. TRIOXIDE | 3,000,000 | 189,787 | 1,224,36 |

FED REG 2-18-54 p962
(AS OF 12-31-53)

| | | 1/4 PURCH | TOTAL TO 12-31-53 | |
|---|---|---|---|---|
| CHROME | G.T. DRY | 9,240 | 46,640 | |
| " | | 9,280 | 37,400 | (AS OF 9-30-53) FED REG 10-4 PG5 |
| " | " " | 6,448 | 53,088 | (AS OF 3-31-54) FED REG 5-7-54 p2644 |
| | | 7,391 | 60,479 | (AS OF 6-3-54) FED REG 8-28-54 p5526 |

PROGRAM SET UP UNDER TITLE 44 PUBLIC PROPERTY & WORKS CHAP 1 GSA PART 99 (IN FED. REG AUG 28, 1951 p8680) §§ 99.101 TO §§ 99.108 ISSUED UNDER SEC 205 63 STAT 389 AS AMMENDED 41 U.S.C SUP 235

TERM DATE CHANGED (FED REG AUG 31, 1951 p 8848) FROM 6-30-55 TO 12-31-54

# CHROME PURCHASE PROGRAM

MAY 11, 1951 G.S.A. ANNOUNCES SELECTION OF GRANTS PASS AS CHROME PURCHASE DEPOT. PAYMENT ON BASIS OF $115 PER LONG TON FOR ORE ASSAYING 48% $Cr_2O_3$ WITH 3:1 Cr:FE RATIO. MINIMUM 42% AND 2:1. SCALE FOR CONCENTRATES IS $5.00 LESS PER TON

JUNE 11, 1951 WM. M.B. FREEMAN OF G.S.A. ANNOUNCES THAT PROGRAM WILL NOT EXCEED 5 YEARS FROM JUNE 30, 1951. MINIMUM PURCHASE 10 TONS. MAXIMUM OF 2000 TONS FOR ANY ONE SHIPPER DURING FIRST YEAR.

AUG 3, 1951 G. PASS CHROME DEPOT OPENS.

MAY 19, 1958 STOCKPILE CLOSED BY GSA UPON RECEIPT OF 200,000 TONS.

M

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

Sept. 19, 1955

Mr. Ralph Mason
1069 State Office Building
Portland 1, Oregon

Dear Ralph:

In answer to your recent letter regarding statistics on chromite mines and mills in southwestern Oregon I have come up with some approximate figures.

There are 16 chrome concentrating mills in southwestern Oregon, 10 of which are active at least intermittently. The average daily capacities of the mills is about 50 tons. The small mills such as Bowers and Foster mills, have about 25 tons daily capacity; while the larger mills, such as the Waldo Milling Co., Six-Mile and Sourdough mills can handle in the neighborhood of 60 to 80 tons in a 24-hour period. The mills employ a total of about 35 men at the present time.

There are, I believe, approximately 22 active chrome mines in the area. Several others were active last year or earlier this year and have since shut down. More than twice as many ~~as~~ were active in 1953. This is probably due to the fact that some of these operations failed to show a profit. The chrome mines employ approximately 55 men at present.

My figures are based on actual knowledge of the number of men working at several of the mines and an estimation of the number working at others. The Oregon Chrome Mine employs from 10-15 men and operates 2 shifts. Most of the other mines employ only 2 or 3 men and operate on a single shift.

I hope this will be of some help. If you wish a breakdown giving the names of the mines and mills and the number of persons they employ, I could probably whomp one up.

Sincerely,

Len

LR:ams

Len

50 TPD × 250 DAYS × 10 MILLS = 125,000 T/YR
62 500
187 500

GRANT COUNTY CHROME MILLS

LYMAN AND FINDLAY

TRI-COUNTY MILLING & MINING

JOHN DAY MINING CO

COMSTOCK URANIUM & TUNGSTEN CO (OLD BERT HAYES)

REMALEY MILL

45 OREGON SHIPPERS

62 CALIFORNIA

# ACTIVE CHROME ORE PRODUCERS FOR THE YEAR 1955

| NAME OF PRODUCER | P.O. ADDRESS |
|---|---|
| x ALCORN, GEORGE AND/OR HARTT, FRANCIS | O'BRIEN, OREGON |
| c ~~ALLENDALE~~, WILLIAM | BOX 34, LOWER LAKE, CALIF. |
| x ASHLAND MINING COMPANY | 835 N. MAIN STREET, ASHLAND, OREGON |
| x ASHLAND MINING COMPANY AND WATKINS, J.H. | 835 N. MAIN STREET, ASHLAND, OREGON |
| ~~AXTELL~~, DEAN S. | 2000 N.W. G STREET, GRANTS PASS, OREGON |
| ~~AXTELL~~, DEAN S. AND/OR SCOTT, JAMES I. | 2000 N.W. G STREET, GRANTS PASS, OREGON |
| x BADLEY, AUDREY | JOHN DAY, OREGON |
| x BAKSHAS, JOHN | C/O HOME GAS CO., GRANTS PASS, OREGON |
| x BEASLEY, HOWARD | BOX 15, TAKILMA, OREGON |
| c ~~BEEGUM MINING COMPANY~~ | 4311 ROSEDALE HIGHWAY, BAKERSFIELD, CALIFORNIA |
| x BOWERS, D.W. | 48 ROSE AVE. MEDFORD, OREGON |
| c ~~BRADLEY AND EKSTROM~~, INCORPORATED | 320 MARKET STREET, SAN FRANCISCO, CALIFORNIA |
| x BREEDING, JIM W. | KERBY, OREGON |
| c ~~BROWN, RAY G.~~ | 402 E. ALAMAR AVENUE, SANTA BARBARA, CALIFORNIA |
| c ~~CACHUMA MINING COMPANY~~ | P.O. BOX 96, SANTA YNEZ, CALIFORNIA |
| c ~~CASTRO MINING COMPANY~~ | 625 MARKET STREET, SAN FRANCISCO, CALIFORNIA |
| c ~~CHALMERS, DAVID~~ | STAR ROUTE, LOWER LAKE, CALIFORNIA |
| x CHROME INDUSTRIES, INCORPORATED | 1100 N.W. F STREET, GRANTS PASS, OREGON |
| x CONLEY, L.J. | 1101 WINCHESTER, MEFORD, OREGON |
| x COX, EARVEL AND STRICKLAND, ARTHUR | SELMA, OREGON |
| c ~~CRO-TUNG COMPANY, INCORPORATED~~ | P.O. BOX 428, ELK CREEK, CALIFORNIA |
| c ~~CRO-TUNG COMPANY, INC., BYRON MILLER, AND CHESTER HILL~~ | ELK CREEK, CALIFORNIA |
| x DAVENPORT, LEONARD | CANYONVILLE, OREGON |
| c ~~DAVIS MINING COMPANY~~ | ROUTE 1, BOX 158, SANTA MARIA, CALIFORNIA |
| c ~~DELMUE, J.A. AND GARNER, J.J.~~ | BOX 77, FORESTHILL, CALIFORNIA |
| c ~~EASTLICK, J.T.~~ | P.O. BOX 583, FORT JONES, CALIFORNIA |
| c ~~EHORN, LISTON~~ | BOX 328, RED BLUFF, CALIFORNIA |
| c ~~ELLISON, R.H.~~ | WEITCHPEC, CALIFORNIA |

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|---|---|
| x EVITT, BILL, AND WILLIAMS,A.E. | O'BRIEN, OREGON |
| x FITZPATRICK, J.E. | MYRTLE CREEK,OREGON |
| x FOSTER, ERNEST A. | SELMA, OREGON |
| x FUNK, HAROLD T. | 1625 HIGHWAY 199, GRANTS PASS, OREGON |
| x GALLAHER, J.G. | 716 N.E. A STREET, GRANTS PASS, OREGON |
| c ~~GALLEMORE~~, NOVA M. | P.O. BOX 428, ELK CREEK, CALIFORNIA |
| c ~~GRAHAM~~, HOWARD B. | GASQUET, CALIFORNIA |
| x GRISSOM, J.N. | SELMA, OREGON |
| c ~~HANCOCK~~, THOMAS L. | BOX 37,DUTCH FLAT,CALIFORNIA |
| c ~~HAIGHT~~, DAN | SMITH RIVER, CALIFORNIA |
| x HANSEN, ROY | SELMA, OREGON |
| c ~~HARRISON~~, GEORGE W. | P.O. BOX 371, ETNA, CALIFORNIA |
| c ~~HAYDEN, ERNEST~~ A. | CALLAHAN, CALIFORNIA |
| c ~~HAYDEN~~, J.S. | BOX 46, ROUTE 1, FORT JONES, CALIFORNIA |
| c ~~HAYDEN~~, E.A. AND SMITH, E.L. | CALLAHAN, CALIFORNIA |
| x HAYES, BURT S. | BOX 422, JOHN DAY,OREGON |
| x HICKS, R.I. | KERBY, OREGON |
| x HICKS,J.W. AND SHIRLEY, R.L. | BOX 54,TAKILMA,OREGON |
| c ~~HOLMAN~~, ~~J.~~R. | 1465 E. ORANGE GROVE AVENUE, PASADENA 7, CALIFORNIA |
| c ~~INTERNATIONAL~~ METALLURGICAL CHROME CORPORATION | 1026 CHORRO STREET, SAN LUIS OBISPO, CALIFORNIA |
| c J~~. AND W.~~ MINING COMPANY | GASQUET, CALIFORNIA |
| c ~~JAMES MINI~~NG COMPANY | 1465 E. ORANGE GROVE AVENUE, PASADENA 7, CALIFORNIA |
| c R~~. JARRETT~~ AND/OR P. DULEVITZ | ROUTE 1, BOX 3758, REDDING, CALIFORNIA |
| x JOHN DAY MINING COMPANY,INCORPORATED | JOHN DAY, OREGON |
| c ~~JOHNSON~~, ALBERT P. | 7589 LINDEN AVENUE, CITRUS HEIGHTS, CALIFORNIA |
| x JOHNSON, D.R. | RIDDLE, OREGON |
| c ~~KALBAUGH~~, C.L. | BOX 2746M,BUCKEYE ROUTE, REDDING, CALIFORNIA |
| x LEWIS, S.B. OR HUTCHINSON, J.R. | RTE. 3, BOX 678, GRANTS PASS, OREGON (LEWIS); 1055 TOLMAN CREEK ROAD,ASHLAND,OREGON(H) |
| x LLOYD, D.H. AND LEE, LARRY | SELMA, OREGON |
| c ~~LOUGH~~, E.A. | P.O. BOX 636,HAYFORK,CALIFORNI |
| x LYMAN, EARL A. | JOHN DAY, OREGON |
| c ~~METRO METALS~~, INCORPORATED | UNIT 100, 2020 43RD, NORTH, SEATTLE, WASHINGTON |
| c ~~MUNSON~~, FLOYD L. | BOX 315,ETNA, CALIFORNIA |
| x MCCALEB,B.A AND KAISER, KATIE C. | SELMA, OREGON |
| c ~~MCCLEND~~ON, C.H. | CRESCENT CITY,CALIFORNIA |
| c ~~MCCOSK~~ER, STANLEY | STAR ROUTE,LOWER LAKE,CALIFORN |
| c ~~MCKINN~~EY, J.H. AND PIATT, FRANK | PLATINA, CALIFORNIA |

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|---|---|
| × MCSHANE, M.J. AND ADAMS, M.E. | 590 E. PARK STREET, GRANTS PASS, OREGON |
| × MCTIMMONDS, E.K. | 706 S.E. M STREET, GRANTS PASS, OREGON |
| × NEUMAN, ARTHUR F. | JOHN DAY, OREGON |
| c ~~NEALY~~ LOGGING COMPANY | GASQUET, CALIFORNIA |
| × NICHOLS, C.E. | BOX 242,SELMA,OREGON |
| c ~~NORGAAR~~, LOWELL | HAYFORK, CALIFORNIA |
| c ~~PALO ALTO~~ MINING COMPANY | 521 SOUTH SAN TOMAS ROAD, CAMPBELL, CALIFORNIA |
| × PERRY, JAMES L. | BOX 32,CAVE JUNCTION,OREGON |
| × PETRIE, T.M. AND POINTON,G.T. | 207 N.E. C STREET,GRANTS PASS, OREGON |
| c ~~PIERCE~~, FRANK AND FEREE | MORRO BAY,CALIFORNIA |
| c ~~PIERCE~~, KARL | MORRO BAY, CALIFORNIA |
| c ~~PILLIKEN~~ MINING COMPANY | 1253 JONES STREET, SAN FRANCISCO, CALIFORNIA |
| c ~~PIONEER~~ MINING COMPANY | P.O. BOX 846, CRESCENT CITY, CALIFORNIA |
| × PRESSLER, JEAN W. | SELMA, OREGON |
| c ~~REID~~, ~~ROY~~ RAY | GASQUET, CALIFORNIA |
| c ~~RICHTER~~, J.A. | BOX 295, CALLAHAN,CALIFORNIA |
| × ROBERTSON, RUTH | BOX 475, GRANTS PASS,OREGON |
| × ROBERTSON, WILLIAM S. | 1225 N.W. WASHINGTON BLVD., GRANTS PASS, OREGON |
| c ~~RUDA AND~~ NEGRANTI | CAYUCOS, CALIFORNIA |
| c ~~SAN LUIS~~ MINING COMPANY | 1185 MONTEREY STREET, SAN LUIS OBISPO, CALIFORNIA |
| c ~~SCOTT~~, JAMES I. | P.O. BOX 511, MIDDLETOWN, CALIFORNIA |
| c ~~SELDOVIA~~ CHROME COMPANY,INCORPORATED | P.O. BOX 210, SELDOVIA,ALASKA |
| c ~~SHARPLES~~, ROY M. | P.O. BOX 794,YREKA,CALIFORNIA |
| × SHIPPEN, HARRY L. | BOX 260,CANYONVILLE,OREGON |
| c ~~SIMONSON~~, LELAND | BOX 199,SMITH RIVER,CALIFORNIA |
| c ~~SKICKLIG~~,LAWRENCE | 1515 PENNSYLVANIA AVENUE, WEST SACRAMENTO, CALIFORNIA |
| c ~~SMITH~~, E.L. AND HAYDEN, ERNEST A. | BOX 443,ETNA,CALIFORNIA |
| × SMITH, G.E. AND STRICKLAND,ARTHUR | GRANTS PASS, OREGON |
| c ~~SOUTHWEST~~ OIL COMPANY | 802 W. 123RD STREET, LOS ANGELES 44, CALIFORNIA |
| × SMITH, SHERMAN S. AND GEORGE BRICKELL | 724 N.W. 4TH ST. GRANTS PASS, OREGON |
| c ~~STARR~~, C.F. | HAYFORK, CALIFORNIA |
| c ~~STEVENS~~, HARRY J. | CAYUCOS, CALIFORNIA |
| c ~~STEPHENSON~~, J.J. AND ELSIE B. | PLEASANT GROVE,CALIFORNIA |
| × STEVENS, CARL, AND HILLIS, ROY | 425 GRANDVIEW,GRANTS PASS, OREGON |
| × SYPHERS, WALTER | 416 N.W. A STREET, GRANTS PASS, OREGON |
| c ~~TEAGUE~~, BLAKE | FORESTHILL, CALIFORNIA |
| c ~~THOMPSON~~, D.G. | BOX 521,YREKA,CALIFORNIA |

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|---|---|
| C ~~TULARE~~, L.V. AND ELLIOTT, GENE | BOX 571, GOLD HILL, OREGON(T) |
| | O'BRIEN, OREGON (E) |
| C ~~VOY, JOHN~~ | BOX 82, GAZELLE, CALIFORNIA |
| X WALDO MILLING CO., INCORPORATED | CAVE JUNCTION, OREGON |
| X WATKINS, J.H. | BOX 721, MEDFORD, OREGON |
| C ~~WATSON~~, FRANK V. | P.O. B OX 121, RED BLUFF, CALIFORNIA |
| C ~~WILD~~, BASIL | BOX 342, GREENVIEW, CALIFORNIA |
| X WILLIAMS, A.E. | O'BRIEN, OREGON |

WB:8-9-55

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Am ORE Cr

I No OF PROSPECTS
w/GOOD ASSAYS 407

II No COUNTIES 9

III No OF GOOD ASSAYS
3:1 BAD : GOOD

$$\begin{array}{r} 800 \\ 2400 \\ \hline 3,200 \end{array}$$

IV No OF Cr. MILLS
TONS/CAP'Y DAILY

V

93,985 GT / 9/55
GSA

| | | |
|---|---|---|
| OTHER | I | 1 |
| MALHEUR | II | 2 |
| JACKSON | ~~IIII~~ ~~IIII~~ | 10 |
| | | 45 |
| JOSEPHINE | ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ III | 43 |
| COOS | II | |
| | | 21 |
| CURRY | ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ I | 19 |
| DOUGL | ~~IIII~~ ~~IIII~~ IIII | 11 |
| GRANT | ~~IIII~~ ~~IIII~~ I | 6 |
| BAKER | ~~IIII~~ I | |
| UNION | | |

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
BAKER FIELD OFFICE
2033 FIRST STREET
BAKER, OREGON

December 26, 1956

Mr. Hollis M. Dole
1069 State Office Building
Portland 1, Oregon

Dear Hollis:

Attached is the eastern Oregon list of chrome shippers which you sent to me. Attached also is the list of western Oregon-California shippers which you sent later.

I have made such notations as I can on each of these lists, but I am also preparing you a list of eastern Oregon shippers as I know them to be from the records I have amassed beginning with the first Dry Camp shipments (Hayes) to the depot. This I will try to get out for you tomorrow.

Sincerely,

N. S. Wagner

NSW:gl
enc.

Eastern Oregon

Joe Anderson
Ironside, Oregon

Mule Shoe Mine - 18 tons, 1956 according to a memo from Ralph, 12/19/56

Paul Towell
Ironside, Oregon

and Ronald Begg Red Hill claim. My understanding is they shipped a load or so in late 1956 -

William Wright
John Day, Oregon

Comstock Uranium & Tungsten Co.
John Day, Oregon

Haggard + New,

Burt Hayes
John Day, Oregon

Wayne Stewart (Ranch Property) on South Fk John Day about five miles from Dayville. Shipped 13.7 tons (dry wt) lump ore - inactive now

H. G. Heathman
John Day, Oregon

This man used to be contract trucker for Comstock, hauling Concentrates to Grants Pass. He is now General Supt. for the Comstock Company. Never operated any property on his own, or made any shipment of his own according to what I can ascertain

Harland Jones
John Day, Oregon

One shipment 10.1384 dry long tons crude, Nov 1955 from the Wm Gardner ranch. Very likely another shipment or two again in 1956

Also I. See Grants Pass list for additional marked there-on -

Also 2. Burt Hayes - from Dry Camp, 1952 - 6 shipments concentrates

Tri County Mining + Concentrating Co, from Dry Camp 1952 + 1953 } 28 shipments
Newman - from the Dry Camp 1953
John Day Mining Co, from Dry Camp 1953-1954, 72 shipments.
Zanneth Bros - from the Dry Camp, 1953 - 32 shipments

Burt Hayes from Haggard + New, 1953-1954 - 52 shipments
Breedlove-Sentry " " 1955 24 shipments
Comstock " " 1956 (to Sept 26) 45 shipments

Lyman + Finlay from Spider 1955 + also 1956
Bailey + Stout, from Lost Buck 1956
Kinsella + Shaw from property near Potato Patch (about 100 tons reported milled)
Gallen Simpson

COPY

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

OREGON CHROMITE

Ore and Concentrates Delivered to GSA Stockpile
at Grants Pass from Deposits in Oregon Only*

| Year | Short tons | Cumulative | Long tons | Cumulative |
|---|---|---|---|---|
| 1951 | 754 | 754 | 673 | 673 |
| 1952 | 6591 | 7,345 | 5885 | 6,558 |
| 1953 | 6216 | 13,561 | 5550 | 12,108 |
| 1954 | 6665 | 20,226 | 5951 | 18,059 |
| 1955 | 5000 | 25,226 | 4465 | 22,524 |

* Source: U.S.B.M. Mineral Industry Surveys (Area Reports for each year)

Number of producing mines in State in 1955 . . . . . . . . . . . 20

Number of producing mills in State in 1955 . . . . . . . . . . . 17

Estimated number of men employed directly in chromite
production in 1955 . . . . . . . . . . . . . . . . . . . . . . . . 100

Estimated number of men employed indirectly in chromite
production in 1955 . . . . . . . . . . . . . . . . . . . . . . . . 300**

** Based on U.S.B.M. "Oregon 1954" summary.

Approximate number of known mines in State (active
and inactive . . . . . . . . . . . . . . . . . . . . . . . . . . . 50

Approximate number of known prospects in State (active
and inactive . . . . . . . . . . . . . . . . . . . . . . . . . . . 400

Approximate number of assays for chromium run by
Department since 1951 . . . . . . . . . . . . . . . . . . . . . . . 3200

1-28-58

# Chrome Ore Receipts Told

Receipt of 5,200 long tons of chrome ore from Josephine county mines at the Government chrome depot on Redwood highway in 1957 was reported today by Dan Beyer Sr., depot manager.

Heavy shipments of chrome from Northern California mines as well as additional Oregon shipments from Curry, Douglas, and Grant counties are expected to result in the ending of the chrome support program at the depot sometime in mid-summer this year. The program is in effect until 200,000 long tons has been registered or by June 1959.

Beyer said that as of September 1957, 160,000 tons had been brought in and unless production slumps more than expected, the limit will be reached this summer.

9-17-57

# Second Quarter Local Chrome Report Made

Chrome receipts under the Federal Domestic Chrome support program for the second quarter of 1957 were published in the Federal Register for September 11. Receipts of 6,975 long tons were noted during the quarter, bringing to 150,715 long tons the amount received in the program which is scheduled to expire when 200,000 tons has been taken in or by June 30, 1959.

Shipments into the Grants Pass chrome depot are not separated from carload shipments received at other western points.

Chrome under the program, comes not only from mines in Oregon and California but from operations in Alaska.

C O N F I D E N T I A L

GARDNER MINING COMPANY
Canyon City, Oregon

Profit and Loss Statement for the Year Ending December 31, 1957

INCOME:

| | | |
|---|---|---|
| 577.312 tons concentrates @ $103.00 per ton . . . . | $ 59,366.76 | |
| 229.22 tons crude ore @ $105.20 per ton . . . . . . | 24,067.36 | |
| Other income . . . . . . . . . . . . . . . . . . . | 87.50 | |
| | $ 83,521.62 | |
| Less ore purchases . . . . . . . . . . . . . . . | 2,784.76 | $ 80,736.86 |

EXPENDITURES:

| | | | |
|---|---|---|---|
| Mine wages* . . . . . . . . . . . . . . . . . . . . . | | $ 25,769.41 | |
| Administrative expenses . . . . . . . . . . . . . . | | 7,698.25 | |
| Cost of explosives . . . . . . . . . . . . . . . . | | 1,206.61 | |
| Depreciation of machinery . . . . . . . . . . . . . | | 2,162.50 | |
| Miscellaneous expenses . . . . . . . . . . . . . . | | 6,084.35 | |
| Total mining expenses** . . . . . . . . . . . . . | | $ 42,921.12 | |
| Ore hauling costs . . . . . . . . . | $ 7,291.60 | | |
| Milling expenses, wages . . . . . | 3,617.00 | | |
| Rent on mill, power, parts . . | 8,049.44 | | |
| Concentrate hauling costs . . . . | 5,721.64 | | |
| Miscellaneous expenses . . . . . | 1,327.93 | | |
| Total expenses*** . . . . . . | $26,007.61 | 26,007.61 | |
| Less total operating expenses . . . . . . | | $ 68,928.73 | 68,928.73 |
| TOTAL NET INCOME . . . . . . . . . . . . . . | | | $ 11,808.13 |

Gross income turned into profit is 14.5%

- - - - - - - - - - - -

* 310 days worked, average income per day $260.20.

** 1,962 tons of ore produced, cost per ton $21.83, average cost per day worked, $138.45.

*** Cost per ton concentrates milled $22.51, ratio of concentration 3:1, cost per ton of ore milled $7.50, hauling cost per ton $7.10.

NOTE: All data furnished by Wm. W. Gardner
June 30, 1958.