STATE OF OREGON
DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES

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MINING COURSE RESTORED TO OREGON STATE COLLEGE

The State Board of Higher Education has restored the course in mining engineering and metallurgy to Oregon State College. The course will be a part of the College of Engineering and will be initiated next fall.

Action by the State Board in restoring the course has been urged for some time by the Oregon Mining Association, the Oregon Section of the American Institute of Mining and Metallurgical Engineers and the State Department of Geology and Mineral Industries. It was believed that the action was fully warranted because of the growing demand for mining engineers and metallurgists in the Northwest, and because of the increase in importance of metals in world economy.

Many future conditions of living are unpredictable because of the present world upheaval, but one factor stands out clearly. It is reasonably certain that the role of metals in domestic and world affairs will become increasingly powerful. Therefore, there will be a corresponding demand for technical men schooled in methods of production of mineral supplies, processing of minerals, smelting of ores, and the preparation of alloys. As a corrollary it is also safe to predict that the new age of metals will be characterized by ever increasing use of the light metals magnesium and aluminum, production of which will require large numbers of engineers and metallurgists.

The establishment of metallurgical and chemical industries in the Northwest has only just started; the movement will undoubtedly be greatly expanded. A consistent, large demand for mining engineers and metallurgists will be created and these industries should be able to rely upon our Northwest technical schools to meet this demand.

CHROMITE PRODUCTION SET-UP

The January Ore.-Bin was devoted to certain basic facts concerning chromite, such as its occurrence, characteristics, identification, markets, etc. The purpose of this issue of the Ore.-Bin is to outline in a general way the factors that have had a bearing on the production of domestic chromite up to date.

During the first World War, chromite ore for immediate consumption became a very critical problem. It was impossible, or at least extremely hazardous to import the ore from South Africa or across the Atlantic, but New Caledonia ore was brought in without difficulty. No price restrictions were imposed on the purchase of chromite, and no restrictions were made as to its use. The Federal Government let price seek its own level, gave it no especial attention other than to attempt to stimulate production in the western states by setting up an organization to inspect properties and to give advice on mining problems. Federal loans were made to a considerable number of chrome producers. The armistice came on, and contracts were cancelled. Some of the operators lost money on these contracts.

In the present war emergency, we find the country little if any better prepared in the matter of chromite stocks than in 1918, although the situation as a whole is worse because now we are unable to import chromite satisfactorily from any of the principal foreign sources, namely Turkey, New Caledonia, the Philippines, and South Africa. Moreover the demand now is greatly increased.

When war clouds first appeared on the horizon three or four years ago, the U. S. Bureau of Mines and U.S. Geological Survey started making inventories and tentative plans to aid in encouraging domestic production in a possible emergency. The Congress appropriated a small sum for the use of these two Federal agencies in exploring some of the better known domestic deposits. A policy of purchasing strategic or deficiency mineral ores for stockpiling was established, and an appropriation was made for the purpose. Activities were placed in the hands of the Procurement Division of the Treasury. Stockpiles of ores were to be established from both foreign and domestic sources. This program fell down. Then the actual purchase of such ores was placed in the hands of Metals Reserve Company, a Federal agency, and subsidiary of the R.F.C. Specifications and contract details were set up by Metals Reserve.

That program of stockpiling fell down completely too. Some of the reasons were that specifications were too difficult to meet; the prices were too low; and contract relations in general suited the Government and the consumers, but did not suit- or could not be met by the producers of the ores.

Following this failure of stockpiling program, Government agencies appear to have decided along in 1941 to place in the hands of the larger corporations, who presumably knew the score as regards supply of the various strategic minerals, the matter of production for stockpile reserves. It was not particularly important who used the ores or stockpiled them; the important point was that they should be produced and available in case of emergency. These corporations, such as Union Carbide, Rustless Steel Corp., Ohio Ferro Alloys, and others, sent their representatives into the field and made earnest efforts to buy domestic chromite and other strategic minerals from individual producers. At the same time they continued to import ores from foreign sources for their own stockpiles. The producers of chrome chemicals, chromates etc., did likewise.

There was no significant increase in the ore prices, particularly of chromite, and no one could expect these corporation buyers to increase the price substantially in the face of the stated expectation on the part of the Government in Washington to peg the price of ferro chromium and the other products of these same corporations who were asked to buy the raw materials.

By October, 1941, it was plain that no important amount of domestic chromite--disregarding reference to other strategic minerals--would be produced under the consumer-purchaser plan. The Government program had again fallen down.

The Metals Reserve then took matters back into its own hands, and on November 14 publicized increased prices for chromite and manganese, slightly more favorable specifications, and a slightly improved contractual set-up. It is probable that those who established the policy were not in possession of many of the facts concerning domestic chromite production; the purchase conditions reflected the viewpoint of the buyer and gave little consideration to conditions with which producers must contend. Nothing came of this price increase because the situation was not sufficiently improved to provide an incentive for domestic producers.

War was declared against Japan on December 8, 1941. The Government presumably found that it had but a very few months' supply of what had formerly been classed as "metallurgical grade" chromite--that is, 48 to 53 percent chromic oxide. Many months' supply of somewhat lower grade chromite, mainly imported by the chemical users were in domestic stockpiles. This product ran say 43-47 or 48 percent Cr_2O_3 with a chrome to iron ratio of less than three to one.

The Government then presumably took stock of the situation, and on December 19th publicized new prices, new specifications, and new contract arrangements for chromite and manganese. The price was raised, the specifications were lowered slightly, and conditions that the producer must meet were eased. As of February 1st these purchase conditions are still in effect. The conditions are unsatisfactory and will not bring out any important quantity of metallurgical grade, hardrock chromite from the northern California-southern Oregon area, which is the only place in continental United States where this much-desired, sweetening product may be produced.

On December 8th, the Oregon Department of Geology and Mineral Industries went over virtually 100% to the encouragement of strategic mineral production and has confined its activities since then almost entirely to chromite because that is the most critical of the lot. We have worked closely with chrome miners for several years, but since December 8 we have held meetings with miners and chrome operators in Port Orford, Bandon, and Grants Pass, and discussed problems of production, and Metals Reserve purchase policies. By early January we had come to the definite conclusion that no important increase in hardrock chromite production could be expected under the present set-up, and we took stock of the situation to discover whether or not the Department might be instrumental in improving the situation.

At our request, Mr. John E. Norton, head of the Mining Division of R.F.C. came out from Washington. On February 2nd at Grants Pass he met with members of the Department and miners, chrome operators and others from all over Oregon and northern California. Some one hundred fifty interested persons were present. At the meeting many statements were made by individuals that served to verify the proposition that hardrock chromite will not be produced in important quantity in the northern California-southern Oregon area unless the Government's purchase policy is changed. It is believed that sufficient facts were presented to Mr. Norton to show that the hardrock ore cannot be produced in the Siskiyou Mountains area without substantial changes in Government policy.

Representatives of five miners' associations in Oregon and California were present and voted to have Earl K. Nixon represent them in negotiations with Washington authorities in order to change and improve the Government's purchase policy on chromite, to the end that encouragement be given chrome miners so as to insure production of an important tonnage of hardrock chromite.

Mr. Norton invited Mr. Nixon to sit in at a conference in Washington on February 17th with officials of the Metals Reserve, R. F. C., and O. P. M. to try to work out a satisfactory solution of the chromite purchase arrangement.

It should be stated that each Oregon member in Congress has been kept advised of the chromite situation as described in these pages and each has expressed particular desire to lend aid wherever possible.

NEGOTIATIONS WITH GOVERNMENT OFFICIALS IN WASHINGTON ON CHROMITE

On January 15th we addressed a detailed letter to Dr. Andrew Leith, Chief Chrome-Manganese Division, Office of Production Management, Washington, to which was attached a detailed statement of conditions with suggestions for encouraging production of hardrock metallurgical grade chromite. Our position was based on the premise that if the Government really needs this product, it can be obtained in important quantities but not under existing purchase policies of Metals Reserve Co.

Pertinent parts of our letter to Dr. Leith are as follows:

"It is my considered opinion-- and the opinion I believe is shared by the best informed chrome operators in southern Oregon and northern California--that the output of hardrock chromite during 1942 from the above area will not exceed a few thousand tons--between 5000 and 10,000--under the present buying policy of Metals Reserve.

"It is our opinion also that the regions could produce ten to forty times that much--even at present prices--if the Government's attitude offered real incentive to the small miner and prospector. They are the ones who find small lenses of the ore, and the small lenses sometimes develop into big ones as we have recently seen. But there must be development."

".....To bring out an important amount of chromite, corrective measures by the Government must be made on the following points:

(1) Access roads must be built.
(2) The stockpiling situation must be clarified and improved.
(3) A purchase arrangement giving incentive to the individual miners and prospectors must be worked out."

The accompanying details were as follows:

On December 8, 1941, this Department started to devote one hundred percent of its activities to the encouragement of strategic mineral production and has confined its attention almost entirely to chromite. This action was founded on the following assumptions. Our comments on each are given in indented paragraphs.

1. That the U. S. Government was caught with but a few months supply of metallurgical grade chromite in stockpiles.

It is not for us to determine how badly the Government needs chromite. We are under the impression, however, that the metallurgical grade product is in especial demand for ferro-chromium and for sweetening other domestic grades of which there is an obvious over-balance of domestic supply. If the government is prepared to commandeer existing stockpiles of chemical and refractory grade ore and use them for metallurgical purposes, then its policy may not be to encourage domestic production of the high-grade. Anyway we must decide as to how badly the Government needs high-grade by the measures it takes to encourage chromite production in this area.

2. That it may be two years at least until additional supplies from outside the country, including Cuba, can be depended upon to supply adequately domestic requirements.

Small production can be started in Oregon promptly under favorable conditions and with encouragement of development.

3. That the southwest Oregon - northern California area has important, although mainly undeveloped, reserves of metallurgical grade, hardrock chromite.

It is our guess that the Oregon - California area - if proper development is brought about -- could produce as much as twenty-five to fifty thousand tons of high-grade chromite in the next twelve months. Over a longer period, and again depending on encouragement given to development, two or three or possibly more times that amount of tonnage can probably be produced in this area. In recent months it has been demonstrated in respect to several of the more important deposits, that anywhere from one and one-half to five times the tonnage estimated originally by U. S. Geological Survey geologists and other competent engineers has actually been produced or developed at the deposits in question. Therefore, it may be said with certainty that no engineer can actually estimate, with any degree of accuracy the ultimate production of high-grade chromite in the Oregon-California region. Development only will tell the story. Some of the larger deposits that have produced several thousand tons of high-grade ore appeared as only small lenses at surface.

4. That the Oregon coastal area, judging by our drilling and metallurgical work during the last year, can probably produce several hundred thousand tons of 40% plus chromite sand concentrate that is not considered metallurgical grade at present.

Evidence of this is that one mining group has done a substantial amount of drilling, made a contract to supply 90,000 tons of 40% plus concentrate to Metals Reserve, and is ready to build a plant. Further evidence is that this Department, through drilling sponsored by it in a different part of the area, indicated the presence of material to produce another 100,000 tons of 40% concentrate. The two drilled areas are only a very small portion of the total length of potential deposits. These deposits, now apparently very important, were maligned generally for many years and until investigated by this Department were considered worthless as a source of chromite.

5. That no important increase in hardrock chromite production can be expected under the present Metals Reserve purchase policy.

The reasons expressed below are based on results of several meetings with chrome miners and operators and mining associations in southwest Oregon within the last month, as well as our close connection with chrome miners and their activities over a period of years.

a. Chrome operators cannot calculate what freight charges they will have to prepay to government stockpiles because the government has not named the stockpile locations.

b. Although chrome operators were given to understand that stockpiles would be established within 100 miles of the mines, and it was presumed that the government would accept the ore at railhead, the Metals Reserve does not so state, and no one knows for sure whether rail freight will have to be advanced by the operator. We believe that under the present arrangement, an operator will be obliged to prepay freight to government stockpile however remotely located.

c. Chrome operators are not well-financed, and they cannot afford to prepay rail freight charges.

d. As chrome properties are in remote mountain locations and trucking facilities are meager, most operators would require considerable time to fill a single railroad car although their production might be constant throughout the season. Presumably the government would not stand demurrage under such circumstances, and the operator could not.

e. Ninety-five percent of the chrome operators cannot take a contract to deliver a minimum of 1,000 tons of ore.

f. Under the law, the banks cannot make contracts as a service to chrome operators. Brokers or middle men might in some cases take minimum contracts, accept ore in small lots, and stock it for delivery in car lots to the government. This would entail rehandling of the ore and other

complications that would require that brokers buy the ore from individuals at substantially less than the government price. Furthermore, some chromite brokers are not reliable; they have sometimes caused operators' losses as was demonstrated in the First World War.

g. Most chrome operators require some financing to get out their ore. Banks cannot loan money until ore is delivered to stockpile.

h. Chrome operators have no idea whether the present prices announced by Metals Reserve are good for one month, six months, or two years. No time guarantee is given, nor are the producers protected in case of price rise. Chrome owners have asked, "Suppose Government contracts are cancelled, what protection, if any, have we against total loss?"

i. Nothing is stated in Metals Reserve communications as to whether there is any penalty for failure to fulfill contract, or whether any bond is required.

6. That no substantial hardrock chromite production can be expected from this area without some financing by R.F.C. and that conventional R.F.C. mine development loans require too much time and red tape to help the present situation.

Past experience with R.F.C. development loans indicates that there are interminable delays because of red tape. Such loans have been based on the proposition that the Government must reduce its risk to the absolute minimum. It demands that a reasonable amount of ore be indicated usually by mine workings, assays, and maps. Engineers' reports are essential since preliminary information cannot usually be supplied adequately by the chromite claim owner.

Chrome miners are poorly financed. They cannot afford engineers' reports as a rule. If their properties were well-developed, the ore would already have been mined because individual deposits are usually small. It is very difficult to "block-out" chromite. Chrome miners, as a rule, do not require many thousands of dollars for their developments. More often they need only a few hundred dollars for powder, drill steel, and road work. They feel that it would be ridiculous to spend months in trying to get a loan for a few hundred dollars. In this, they are right. If chrome lenses extended for hundreds of feet across the country, trenches could be cut at regular intervals and sampled, and development loans could be made on probable ore from visible evidence. So frequently, however, chrome bodies are kidneys or "blobs", and development requires underground work. There is insufficient surface area of exposed ore to warrant an engineer estimating sufficient tonnage to justify a loan.

Nevertheless, if the Government expects chromite to be produced in substantial amounts, and expects the situation to be aided by R.F.C. development loans, some risks will have to be taken, loan conditions must be liberalized, and red tape must be cut.

7. That Metals Reserve must at least clarify and probably change the mechanics of its stockpiling arrangement, or contracts for delivery of chrome to Government stockpiles will not be forthcoming.

This statement is made after we have gone into the situation with chrome operators and miners throughout the Siskiyou Mountain region of Oregon and California. A few reasons as to why these contracts will not be made are given under paragraph five above.

We suggest that a Government stockpile should be established in each of the three chromite areas in Oregon: one in the Coos Bay District, one at Grants Pass, and one near John Day or Canyon City. Machinery for purchasing ore in small lots (all ore will be delivered in trucks) should be established at stockpile locations suggested above. Chrome miners do not have proper facilities for sampling and assaying ores at their properties, nor can they employ engineers to do it, nor can they load a car (over a period of at least two weeks) and run the risk of its being rejected because of grade.

This is not covered in Metals Reserve arrangement.

In general, there is no elasticity whatever about the Metals Reserve plan of of purchase.

8. That a program of building access roads into the mountains, of a quality sufficient only for the purpose of "rawhiding" out chromite, must be carried out by Government financing.

The building of access roads into the mountains should be a Government program because the purchase and consumption of chromite is in the hands of the Government. A program of access roads was laid out by the Forestry Department in cooperation with this Department and others many months ago. No money has been forthcoming to carry on this program. The roads planned are mainly justified for purpose of fire protection of the National Forest area in any event, but their need now in connection with the production of hardrock chromite is greatly enhanced. Most of these roads as planned will be done under Forestry Department specifications and would cost considerably more than necessary if they were built for the temporary purpose of getting out chromite. All the chrome miner needs is a trail wide enough to get a dual-tired truck over it, and he is not concerned about ten or twelve percent grades. He merely wants a chance to "rawhide" out his ore and furnish it to the Government in this emergency. Between one hundred and two hundred thousand dollars spent for chrome roads, some of which will never be used after the present emergency, would go far toward making accessible the most important chrome areas and deposits. That money should be spent by the Government and would be outstandingly justified as an emergency measure, and should be started immediately. Some of it should be done by the Forestry Department in its own way and some of it should be done by private contractors at less cost and with greater speed.

9. That whereas hardrock chrome deposits are found only by small miners and prospectors their case has been entirely overlooked by the Government in its chromite purchase policy.

Hardrock chrome deposits, because of the nature of their deposition (usually as magmatic segregations) occur as lenses or kidneys in no readily determinable pattern, usually as separate and detached deposits, and usually as relatively small bodies. The lenses almost always have very meager surface expressions. It is rare that more than a few hundred tons can be estimated by surface inspection. Therefore, mining corporations have been reluctant to develop western chromite ores because of small tonnages indicated. It is strictly a job for the small miner and prospector. The latter, with characteristic optimism, digs into deposits that would never by vigorously attacked by a large corporation. Some of the lenses that are small at surface may develop into hundreds or even a few thousands of tons at depth. Tonnage estimates of partially explored chrome lenses, honestly and conservatively made by U. S. Geological Survey men and other competent geologists, have in deposits recently developed rather regularly been shown to be wide of the mark. Original estimates have been shown to be only a small fraction of the true tonnage. In order to estimate chromite tonnage successfully, it is almost necessary to mine the ore. Predictions as to lens habits based on normal engineering practice are practically worthless.

For the above reasons, hardrock chromite is a small miner's and prospector's proposition. It must, therefore, be plain that failure to encourage the small miner and prospector means failure to develop hardrock chromite. Therefore, the small miner and prospector must be encouraged to go out in the hills and dig into the chromite lenses he finds. Definite encouragement must be incorporated in Federal purchase policies since chrome miners are individualists. They like to run their own show. They are determined to make all the profit possible from the fruits of their labors -- and their labors are real in this mountainous country; they do not want to deal with brokers, middle men, and representatives of corporations of which groups they are generally suspicious. This is a case where the Government representatives cannot take a high and mighty attitude as has sometimes happened in the past and say, "The miners and prospectors will have to do it our way" -- at least if the Government wants the chromite. The Government policy makers will be obliged to adapt their ideas to the prevailing conditions in this case rather than try to make the conditions suit the Government representative.

No Metals Reserve purchase policy has ever made it possible for the small miner to sell his product direct to the Government. This will have to be done if the chromite is to be developed -- unless the Government itself develops the chromite, which will cost many times more than if, with a little encouragement, the work is done by the individuals.

10. That the central Oregon or Grant County chrome areas drilled by the U. S. Bureau of Mines and rated second only to the Montana deposits by the U. S. Geological Survey, cannot, because of low grade (25 to 35 percent and not all readily amenable to beneficiation) which is below minimum set by Metals Reserve, supply an acceptable product.

It has been shown that much of the chromite ore in the central Oregon area is of medium or low-grade, being classed as chrome-picotite, and assaying 25 to 35 percent Cr_2O_3. Generally this type of chromite does not respond readily to gravity concentration to produce a 40 percent plus concentrate. That which does concentrate to plus 40 percent suffers high tailings losses. The quantity of this kind of ore is probably several hundred thousand tons. The U. S. Bureau of Mines drilling on three properties indicated from 80,000 to 130,000 tons in the areas drilled. We know of no reason why this tonnage might not be multiplied by more extensive exploration, yet the question of metallurgy remains. Under present Metals Reserve purchase specifications, the ore will not be accepted by the Government. We know of no intensive program of metallurgical work that is being carried on by the U. S. Bureau of Mines or others to make this chromite available for general consumption.

This matter requires immediate attention. Either Metals Reserve should establish a separate purchase classification for this type of low-grade ore and stockpile it against the time that it can be successfully utilized or state that the Government has no interest in this type of ore and we will forget it. Our feeling is that in the present emergency, and with timing so important a factor, the Government could well afford to establish immediately a research project to determine definitely and promptly the answer as to the utilization of the ore in these deposits.

11. That the Government authorities who determine the policies, however, honest and earnest they may be, are not in possession of basic facts pertaining to chromite production in this area.

The Government authorities in laying down purchase policies for chromite have evidently made a number of assumptions. These assumptions presumably were based on common mining conditions as in copper, iron, coal, gold, etc. The set-up of hardrock chromite mining is substantially different from that of other minerals. Some of the facts pertaining to local chromite production are brought out above. We think it absolutely necessary that the Government authorities send a competent observer into the chrome areas of northern California and southern Oregon to see actual conditions, to find out how the chrome miners think, and how they work. Until that is done, sound purchase policies that will bring out an important amount of hardrock chromite cannot be established.

Here, for example, is a point that Government officials in Washington would not be expected to know about. There is a large quantity of road machinery available in the months of January, February, and March which could be used on some of the access roads to known chrome properties. Later in the season very little of this equipment will be available as it will be tied up on the regular summer programs of the Forestry Department, County road maintenance, by logging companies and others. The time to get road work started at the lower elevations is now, not next summer when there will be no equipment available and no labor to man the equipment.

The Government evidently has taken the position that it just cannot be bothered with the minor details and work involved in buying chromite in small quantities. That attitude, in our unqualified opinion, will defeat the program.

These chrome producers are patriotic and will do all that they can to supply chrome if they feel that the governmental agencies involved realize conditions under which chromite must be produced, and if these agencies will be sympathetic in helping to solve the producers' problems. Under present conditions, it looks to the producer as if the government agencies are taking exactly the same position as a private customs smelter would take. In other words, that they are saying to the producer, "We need your chrome and want it produced, but you must take all the chances of financial loss". In other words, the evidence seems to be that either the government agencies do not understand the conditions under which chromite must be produced or they are indifferent to the problems involved.

CLEARING HOUSE

59-CH H. L. Combs, 1765 W 25th Street, Los Angeles, California, wishes to secure either output or properties of the following: mica, magnesite, bauxite, fluorspar, chrome, manganese, antimony, beryllium, tungsten, vermiculite, lead, zinc, and copper. Send full particulars in first letter.

RAW MATERIAL FOR MAGNESIUM-METAL PRODUCTION IN THE UNITED STATES

To meet the great need for raw materials for the production of the vast quantities of magnesium metal required for war effort the capacities of the various magnesium mineral operations are being increased enormously and new mineral sources are being sought and studied.

Estimates made in 1941 of the raw materials for the desired annual production of 200,000 tons of metallic magnesium alone are as follows:

Calcined magnesite.....	short tons	185,000
Calcined dolomite.....	do	192,000
Sea water.....	gallons	10,500,000,000
Natural magnesium chlorides1/.	short tons	77,000

Reported domestic production of caustic-calcined and dead-burned magnesite for 1940 (the latest year for which data have been compiled) was 156,929 short tons. Estimated annual requirements of calcined magnesite (including the quantities of brucite that may also be used) for metallic-magnesium production therefore will amount to 18 percent more than total domestic production in 1940. Most of this new supply will be produced from the huge deposits in western Nevada.

Although the expansion in the production of calcined dolomite, owing to requirements for metal production, will not be as great, relatively, as that for calcined magnesite, this new outlet becomes second in importance in uses of calcined dolomite, the first being as a basic refractory material. In 1940 consumption of calcined dolomite for the chief uses included 1,296,884 short tons for basic refractories, 40,105 tons for basic magnesium carbonate, and 50,000 tons for paper manufacture.

In addition to the foregoing minerals, which are definitely scheduled for use in the manufacture of metallic magnesium, other minerals and sources of raw material for the purpose are being studied actively. Production of the metal from olivine is being investigated on a laboratory and pilot-plant scale in Tennessee (the North Carolina olivine) and in Washington State. Consideration is also being given to the use of serpentine in Georgia and in the State of Washington as a source of magnesium for metal. The Utah Magnesium Co. is planning to set up a plant to recover 500 tons of anhydrous magnesium chloride from a natural saline deposit in eastern Utah. For some of the magnesium metal plants using the electrolytic process the use of magnesium chloride has an advantage over magnesium oxide in that it would yield chlorine (of which there is a shortage) at little more expense than the cost of refining and packing.

1/ Includes magnesium chlorides from the brines of Michigan and from the potash operations at Carlsbad, N. Mex.

(From U. S. Bureau of Mines Mineral Trade Notes, Jan. 20, 1942.)

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