

ORE.-BIN

Vol. 4, 1942

CHROMITE -AN IMMEDIATE NATIONAL NEED

This issue of the "Ore.-Bin" is devoted to chromite - the ore of chromium necessary for making chrome steel. Oregon is one of the few states of the country which contains commercial deposits of chromite; therefore, we wish to emphasize points bearing on occurrence, production, and marketing of this vital mineral.

Tough, rugged, hard-bitten chrome steel will have a large share in winning the war. But chromite remaining in the ground will not make chrome steel. The chromite must be mined and transported long distances to steel mills or electric furnace plants in order to put it in fighting form. We cannot now depend on Turkey, South Africa, New Caledonia, and the Philippines to furnish the ore to us; we must produce it ourselves, and do it NOW. There isn't time for measured, long distance planning as to whether or not this and that are economic. This is an emergency and the essential thing is to get the chromite out.

The crying need is that those in authority should realize conditions under which lode chromite must be produced. They should realize that chromite occurs back in the mountains, far from a railroad; that access roads must be built; that the deposits vary in size over a wide range; that development is required; that encouragement must be given the prospector, for he, not the engineer for large operating companies, finds the ore; that the small operator has no capital for developing and mining his ore; and that he usually cannot prepay freight to a government stockpile, the location of which he does not know. Probably the most important of all the unique conditions governing production from these lenticular deposits -- sometimes small discontinuous and remote -- is the necessity of setting up machinery for buying ore in small lots. Only by providing such a market will maximum production be obtained.

Action is necessary if chromite is needed -- and we believe it is. Delay will be translated into American lives lost. A rattlesnake doesn't wait for you to find a club of just the right size, or remain coiled without striking so that you may take some practice swings before deciding on the most effective method and posture for delivering the lethal blow. True, a rattlesnake usually gives some warning before it strikes; and in this regard it is one up on the enemies we are fighting now.

WHAT IS CHROMITE MADE OF AND HOW MAY IT BE RECOGNIZED?

Chromite, the only ore of chromium is made up theoretically of three elements - chromium (Cr), iron (Fe), and oxygen (O), in the proportions of two parts of chromium, one part of iron, and four parts of oxygen. It is usually considered as a chemical combination of chromium oxide (Cr_2O_3) and iron oxide (FeO) and may be considered when pure to have the formula of $Cr_2 Fe O_4$. In nature, however, it also contains impurities of magnesium and aluminum in varying amounts.

Chromite is a hard, black, heavy mineral which is most readily recognized by its dark brown streak; that is, when it is scratched or powdered, it shows a dark chocolate color. This is also characteristic of some manganese ores, but the latter are nearly always much softer and lighter in weight than chromite.

Oregon high grade chromite occurs as small bodies, only a few feet in diameter, of hard massive ore, and as scattered crystals making up a varying percentage of the country rock. Lower grade deposits may occur as larger lenticular masses. Chromite also occurs as little pea-shaped aggregates of crystals disseminated in the rock, and may also form bands of higher grade material alternating with bands of rock. In certain areas along the coast chromite makes up an appreciable percentage of the "black sands" both on the present and old high beaches.

The marketability of chromite depends upon its grade, which must be determined by assay of its chromium and iron content. The assay laboratories of the State Department of Geology and Mineral Industries, located in Baker and Grants Pass, make assays of samples originating in Oregon free of charge. The State law requires that in return for this assay-service, the location of the property and certain other information be supplied on sample information blanks supplied by the Department.

HOW AND WHERE CAN I LOOK FOR CHROMITE IN OREGON?

Chromite is one of the few ore minerals which only occurs in certain very definite and easily recognizable types of rock. This means that unless one is prospecting in a region where these rocks occur, there is absolutely no chance of finding chromite deposits; and it therefore means that prospecting for chromite in Oregon is considerably simplified because regions of chromite-bearing rock are fairly well-known and well-defined.

Chromite occurs only in serpentine, a dark green to brown, highly fractured, greasy-lustered rock, made up largely of iron and magnesium-bearing silicates, and in peridotite or "buckskin rock" (from which the serpentine is derived). Peridotite is a rock which is light tan or reddish-tan on its weathered surface and dark green upon a broken surface, and usually contains little crystals of a fine green platy mineral which stick out on the weathered surface to form rough knobs. When this "buckskin rock" lacks the crystals of this mineral and is uniform and fine-grained, it is known as "dunite", and in several parts of the State chromite deposits are found surrounded by dunite areas, which in turn lie within peridotite areas. Consequently, the prospector, in certain parts of the State, looks first for peridotite, then for dunite areas in the peridotite.

In areas where serpentine has formed, the chromite usually occurs associated with talc and a white or pale green and sometimes fibrous or platy "tremolite", which occurs in veins and fissures in the serpentine or peridotite. This is actually an alteration product of peridotite, and prospectors will follow along these veins of white or pale green mineral to pick up the chromite ore bodies occurring with it.

Chromite is sought for by its "float". These hard, loose pieces of ore weather out of the solid rock and work their way down the hillside perhaps into a stream bed. Therefore, the prospector searches, first, for float, and then attempts to follow the float up to its source. It is sometimes well worth while to use the gold pan in panning up streams and gulches to determine down which gulch the chromite came.

The chrome-bearing areas in Oregon are first, southwestern Oregon, particularly the western part of Josephine County, Curry County, and southern Coos County. It is also known to occur in parts of southern Douglas County and Jackson County. In this part of the State, the rocks in which chromite may be found occur in bands from a few hundred yards to ten miles in width and from a half mile to thirty miles in length. These bands nearly always run in a north-south direction, usually a little bit east of north. They are easily recognized by the fact that the only plant which flourishes on them is the scrub pine. Even buck brush, chaparral and salal will avoid areas of serpentine or peridotite so that when open prairies of grass or bare yellow rock studded with pine are found, it is fairly certain that serpentine or peridotite underlies them. In southwestern Oregon, the largest chromite deposits seem to occur in the bands running from Briggs Creek on the Lower Illinois River, northwest of Selma, south and west into California. Another band lies farther west of this one, and also contains some very large deposits.

The location of these serpentine-bearing bands may be seen on the following maps: (1) Riddle Folio No. 218, U. S. Geological Survey Atlas; (2) Port Orford Folio No. 89, U.S.G.S. Atlas; (3) Preliminary geologic maps of the Medford and (4) Grants Pass quadrangles. State Department of Geology and Mineral Industries. There is also available in the public libraries a ⁽⁵⁾geologic map of Curry County upon which the chromite-bearing rocks are outlined. This is contained in "A Preliminary Survey of the Geology and Mineral Resources of Curry County", Vol.2 No.2, Mineral Resources of Oregon, Oregon Bureau of Mines, 1914. A rough small-scale geologic map of western Josephine County is contained in (6) "The Mineral Resources of Southwestern Oregon", U. S. Geological Survey Bulletin No. 546, 1914.

A recent (1940) bulletin discussing the detailed geology of two chromite-bearing areas in southwestern Oregon is U. S. Geological Survey Bulletin No. 922-P. and Bulletin No. 9, State Department of Geology and Mineral Industries, discusses other deposits in both eastern and western Oregon.

In central Oregon, chromite-bearing rocks are found in the central part of Grant County, south of the John Day River, just east and west of Canyon City. This area is outlined on a map published in U. S. Geological Survey Bulletin 922-D. and also in Bulletin No. 9, "Chromite in Oregon" by the Department. In the eastern part of the State, chromite occurs in several small areas; one of them is on Conner Creek, six miles northwest of the Snake River; another is on Willow Creek, ten miles east of Malheur; another just west of

Sumpter, (see the geologic map of the Sumpter Quadrangle, published by this Department, for the serpentine areas in which chromite might occur in this region); and other is near Bull Run Creek, southwest of Unity, Oregon. It is possible that other small patches of chromite-bearing rocks may be located in other areas, but is is not probable.

Along the coast of southern Oregon, the present beaches, as well as old beaches formed thousands of years ago and uplifted so that they now may stand several miles back from the present coastline, frequently contain lenses of "black sand" which, in Curry and Coos Counties, contain appreciable amounts of chromite. These black chromite sands are derived from the wearing down of the rocks in the chromite-bearing regions drained by the Illinois, Rogue and other streams, and the concentration of these heavy minerals is effected by the selective "panning" action of the waves.

It is probable that these chromite sands will yield a larger tonnage of commercial chromite than the rock deposits. Since the sand is already crushed and sorted by nature, much lower-grade material can be handled commercially than under hard-rock conditions. Since the sands occur in fairly well-defined strips along the coast (see U. S. Geological Survey Circular No. 8, 1934 for map showing their distribution), and since they are usually of unconsolidated material, exploration is not too difficult. During the past summer, the State Department of Geology and Mineral Industries, in cooperation with the U. S. Geological Survey sponsored a W. P. A. project for the purpose of exploring three deposits of black sand north of Bandon by drilling and test pitting. Results of the exploration show that several hundred thousand tons of commercial chromite sand are present. Another commercial chromite sand area south of Bandon was explored during 1941. There are several other possible favorable areas between South Slough and Port Orford -- a distance of over 40 miles.

WHAT ARE SOME OF THE MINING AND MARKETING PROBLEMS?

Prospecting and Mining

Hard-rock chromite in Oregon may occur in discontinuous, irregularly-shaped, roughly lenticular bodies varying widely in size as well as shape. It may also occur disseminated as grains, and arranged in bands of varying grade. The occurrence as concentrations in marine sands has been described in previous pages.

After chromite float has been traced up to the place where it is found in place, development work is required in order to indicate the extent and attitude of the deposit. This work usually means, first, surface cuts and trenches and, second, underground work in the form of tunneling and shaft sinking. The amount of development required, will, of course, depend upon the size of the deposit. In the case of a small orebody, development work usually will extract all of the ore, and thus development and mining go hand in hand. Development to prove the extent of a large deposit, containing many thousands of tons, may most readily be done, at least in initial stages, by drilling.

Mining of small ore deposits is done by hand, since the quantity of ore available may not warrant purchase of power drilling equipment. For large proven deposits, power equipment applicable for mining any lode deposit would be suitable. Speaking generally, however, power equipment should be kept at a minimum in advance of fairly accurate knowledge of the extent of the orebody.

Small deposits usually require hand sorting as the ore is mined, in order that all waste be removed, and only the best ore obtainable retained for shipment. In mining larger deposits, hand sorting for removal of waste, in so far as practical, should be done.

Concentration by milling equipment may be commercial provided the proven extent of the deposit warrants the necessary capital expenditure and provided the ore is of such character that sufficiently high grade grains of chromite may be mechanically separated from the gangue. In the case of commercial chromite marine sands, a concentrating plant is essential and requires specialized operation. Such operations should not be undertaken except by technically qualified operators. In all cases where milling plants are contemplated, design should be by a qualified metallurgist and planned only after proper testing work is completed. Some low-grade chromites are not amenable to treatment mechanically so as to produce a satisfactory concentrate.

Unit cost of mining (cost per ton) is an elastic figure, but is usually meant to include all costs incident to getting the ore to a stockpile at the surface or to mill storage. Very little information on the cost of mining chromite in the United States is available, since up to 1941 practically all chromite consumed in this country was imported.

Costs will vary widely depending upon the size, type, and location of the deposit, and upon the experience of operators. This is true for any mineral deposit, but is especially applicable to discontinuous, lens-like orebodies in the mining of which the proportion of dead work to total quantity of ore removed is high.

In the cost of mining lode chromite, as in other lode deposits, the labor cost would be by far the largest single item and might be 70 or 80 percent of the total mining cost. Added to this would be the cost of explosives, sorting, power, timbering, supervision, assaying, and any dead work necessary in opening the deposit. Unit cost of mining small or medium-size deposits may be \$6.00 or \$7.00 and up per ton.

Mining of chromite sand in back-beach deposits would be under wholly different conditions from those of lode deposits. Only relatively large-scale operations will be practical, and it will be necessary to employ modern, earth-moving equipment, especially in clearing and stripping operations.

The critical factors in lode chromite production are grade and size of deposit, together with transportation facilities. The last is especially important and may be the determining factor as to whether or not a deposit can produce at a profit. The critical factors governing operation of a chromite sand deposit are thickness of overburden, grade and extent of chromite sand. The importance of determining proper method of concentration has been mentioned above.

Marketing

Prior to the present emergency, the market for chromite was principally in the East and all quotations were at a price delivered at Atlantic seaboard. Since domestic supplies became critical, Government buying became increasingly important in the market; at present Federal government prices and specifications, as well as allocations, determine the market.

Chromite is bought on a dry, long ton (2240 pounds) basis. "Dry" weight is determined by taking moisture samples of shipments at stockpile. The loss in weight by drying these samples at 212 degrees F. is the basis of deduction in weight of shipments. For example, a producer ships 50 long tons of ore as determined by railroad shipping weights. At the point of unloading on stockpile, moisture is found to be 5 percent. The "dry" weight paid for is $47\frac{1}{2}$ tons. Transportation charges are on the wet weight but, as noted later, according to Government specifications, a freight allowance is made by the buyer to cover all railroad freight. The seller would pay wet weight transportation charges on ore delivered from mine to railroad.

Present Government prices and specifications are given as a supplement to this issue of the Ore-Bin. Since certain specifications apply to both chromite and manganese ore, prices and specifications for both kinds of ore are given.

Briefly, the Metals Reserve Co. (Government buying agency) will purchase ores according to these specifications at a designated stockpile. Seller is to deliver ore on board cars at the Seller's nearest convenient rail station to Buyer's stockpile. Rail freight is prepaid by Seller but is refunded by the Buyer. Upon arrival of the shipment at the designated stockpile, the ore is sampled, as unloaded, moisture is determined, and settlement for shipment made as soon as analysis and weight of shipment are received by Buyer. Contracts between Buyer and Seller are to be made. Minimum quantity to be delivered under such a contract would be 1000 tons in eighteen months, but payment would be made for each carlot received. At least 20 percent of the total amount specified in the contract must be delivered in six months.

Three classes of ore are defined depending on chromium oxide (Cr_2O_3) content and chromium to iron (Cr to Fe) ratio. A base price is established. An increase in price is allowed both for each unit increase in chromium oxide content and for each tenth increase in chromium to iron ratio. A unit is one percent; chromium to iron ratio is explained in detail below. Also given are graphs by means of which Government prices may be found for various grades of ore, and the chromium to iron ratio estimated provided the chromium oxide and iron or iron oxide are known.

COMPUTING CHROMIUM TO IRON RATIO

As stated above the market price of chromite depends not only on the chromium oxide content but also on the chromium-iron ratio. For example, an ore that assays 48 per cent chromium oxide (Cr_2O_3) and has a chromium-iron ratio (Cr:Fe) of 3 to 1, is classed as metallurgical ore and commands a premium price. However, the chromium-iron ratio does not, as is sometimes assumed, mean a chromium oxide (Cr_2O_3) to iron oxide (FeO) ratio of 3 to 1. It means a ratio of metallic chromium to metallic iron of 3 to 1. Chromium assays usually are reported as chromium oxide and the iron content may be reported as iron oxide; so to obtain the Cr:Fe ratio certain computations are necessary.

If the assay report shows that both chromium and iron are reported as oxides and the Cr:Fe ratio is desired, the following methods are used:

- (1) The metallic chromium (Cr) content is 68.42 percent of the chromium oxide (Cr_2O_3) reported.

Example: If an ore is reported to contain 50 percent Cr_2O_3 , the metallic chromium (Cr) content would be 0.6842×50 or 34.21 percent.

- (2) The metallic iron (Fe) content is 77.73 percent of the iron oxide (FeO) reported.

Example: If an ore is reported to contain 20 percent FeO , the metallic iron content would be 0.7773×20 or 15.55.

- (3) The chrome-iron ratio of an ore such as given in (1) and (2) would be 34.21 divided by 15.55 ($\frac{34.21}{15.55}$) or 2.2 to 1 (2.2:1).

- (4) The steps under (1), (2), and (3) may be simplified and the chrome-iron ratio found in one computation as follows: multiply the percentage of chromium oxide (Cr_2O_3) by 0.88 and divide by the percentage of iron oxide (FeO).

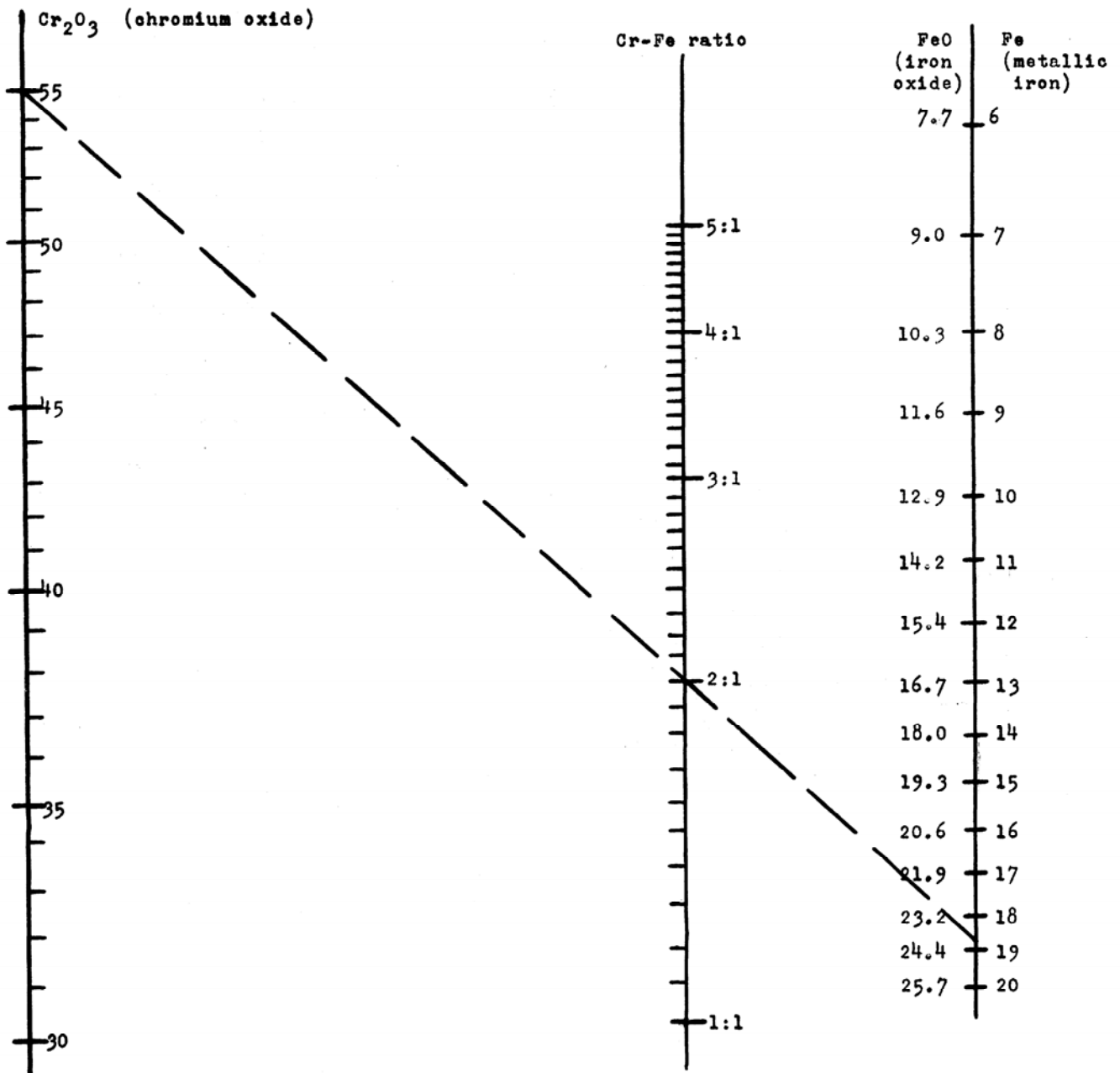
Example: If an ore is reported to contain 50 percent Cr_2O_3 and 20 percent FeO , the chrome-iron ratio would then be $\frac{50 \times 0.88}{20}$ or 2.2 to 1.

This ratio of chromium to iron may be obtained from the following chart. Knowing the percentages of chromium oxide and iron or iron oxide, it is necessary only to place a straight edge or ruler at the points of known percentages of chromium oxide and the corresponding iron oxide or iron on the outside vertical lines. The point of intersection of the straightedge with the inside line will be the chromium-iron ratio.

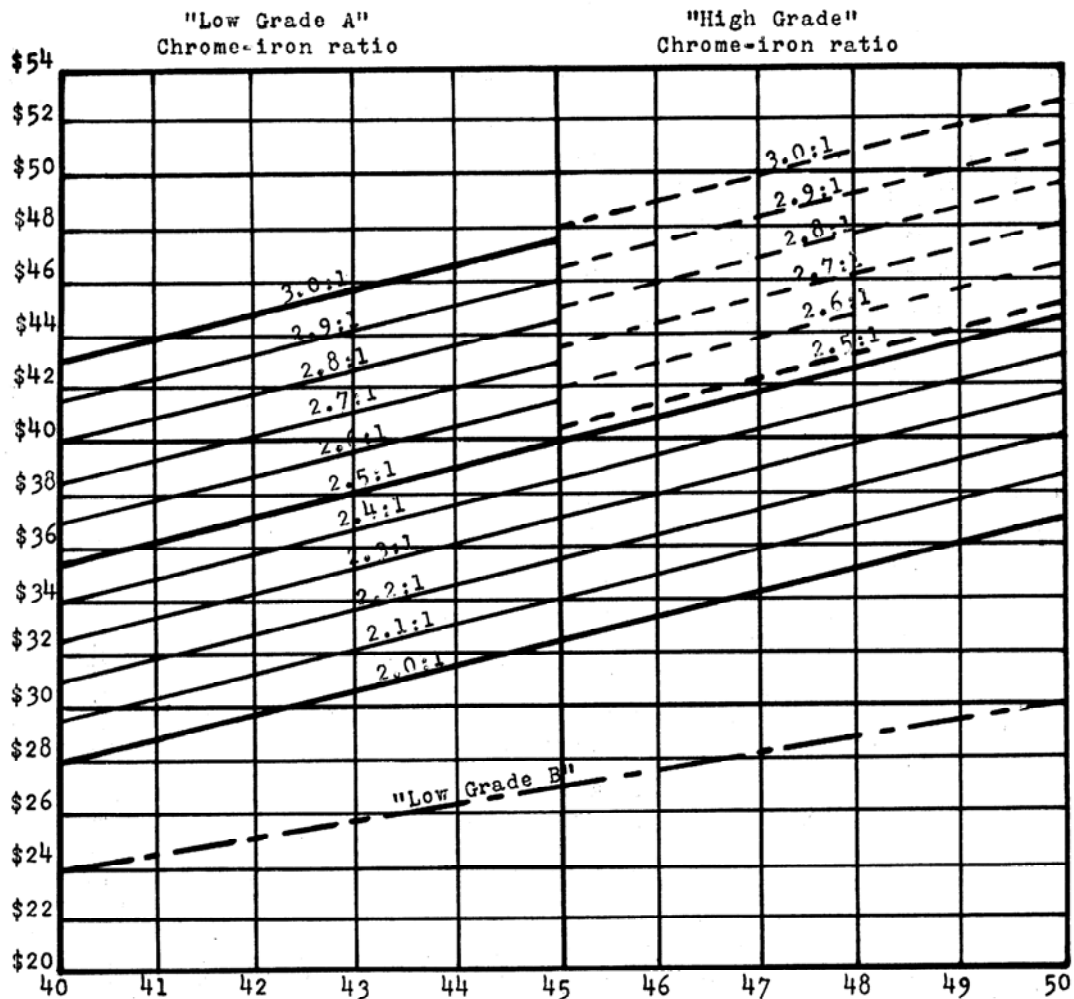
Thus, on the chart, the broken line drawn represents a straightedge connecting the points represented by the assays 55 percent chromium oxide (Cr_2O_3) and 18.8 percent iron oxide (FeO). The intersection on the middle line gives a chromium-iron ratio of 2 to 1.

While this method is accurate enough for usual purposes, in order to check such ratios in control samples of shipments, it may be necessary to use the computation method outlined on this page (5).

NOMOGRAPHIC CHART FOR THE DETERMINATION OF
CHROME-IRON RATIOS FROM ASSAY DATA



GRAPH SHOWING VALUES OF CHROMITE ORE
 ACCORDING TO METALS RESERVE COMPANY
 SPECIFICATIONS AS OF 12/19/41



(Specifications governing "High Grade A" "Low Grade A" and "Low Grade B" are given in the attached appendix)

In order to obtain the value of ore from the graph both the percent of chromium oxide and the chrome-iron ratio must be known. Select the point on the horizontal line along the bottom of the graph corresponding to the known percent of Cr_2O_3 . Next find the point vertically above this Cr_2O_3 percent and on the inclined line corresponding to the known chrome-iron ratio. From this point on the inclined line a horizontal line will intersect the "value" vertical line on the left side of the graph at the point corresponding to the value (to the nearest dollar) of the ore. If the chrome-iron ratio is less than 2 to 1 "Low Grade B" line should be used.

CHROMITE IN OREGON MARINE SANDS

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	%	Equivalent to 40% Cr ₂ O ₃ long tons	Long tons	%	Equivalent to 40% Cr ₂ O ₃ long tons	Long tons	%	Equivalent to 40% Cr ₂ O 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 forth-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.

Prices for Copper, Lead and Zinc Advanced

The following release has been received by the Department:

"FEDERAL LOAN AGENCY

WASHINGTON

January 12, 1942

"Federal Loan Administrator Jesse Jones today announced that at the request of OPM and CPA, Metals Reserve Company has agreed to stimulate the production of zinc, lead and copper through paying a higher price for these metals for production in excess of 1941 output.

"Details of the plan and quotas for individual producers will be announced by the Price Administrator.

"Mr Jones' letter to William S. Knudsen and Leon Henderson follows:

"January 12, 1942

"Gentlemen:

"You are advised that, in accordance with your suggestion, Metals Reserve Company will, at your request, for a period of two and one half years from February 1, 1942, pay 11 cents per pound East St. Louis for zinc, 9½ cents per pound New York for lead, and 17 cents per pound Connecticut Valley for copper, for increases above 1941 production governed by quotas to be fixed by you with our approval.

"This price will apply also to mines which were not operated at all in 1941, and to new mines, but will not apply to production already arranged for by specific agreement. Consideration will be given to a longer purchase agreement than two and one half years where the expansion of facilities is necessary.

"Any metals so acquired by Metals Reserve Company which are not used for or by the government will be subject to your allocation at the ceiling price fixed by the Price Administrator. By this procedure we should get maximum production of these critical and strategic metals for war purposes without increasing the price to the consumer.

"Sincerely yours,

(Signed) Jesse H. Jones

Administrator "

CLEARING HOUSE

56-CH Eugene Mee and John O'Brien, 107 Washington St., Medford, Oregon desire to sell new cinnabar prospect in sec. 19, T. 41 S., R. 2 W., Jackson County, Oregon. Development consists of one opencut, one shallow drift and two shallow shafts- average value reported as 1 percent. Accessible to road; water available; no equipment; altitude, 4500 ft.

57-CH Albert Weathermoon, Bridgeport, Oregon, desires to sell his placer ground located on Clarks Creek about 8 miles from Bridgeport. Ground consists of 55 acres of deeded land and one unpatented placer claim. Little testing work has been done, but gravel is reported to average 12 feet in depth and channel is believed to be 100 feet in width.

58-CH J. H. Curnow, O'Brien, Oregon wishes to sell undeveloped scheelite property, reported to assay 0.96 percent WO₂; with pan concentrates running 85 percent WO₂. Owner states float found for over a mile; one outcrop 6000 tons.

METALS RESERVE COMPANY

Washington, D.C.

December 19, 1941

Superseding Schedule dated November 14, 1941

INFORMATION CONCERNING PURCHASE
OF
DOMESTIC MANGANESE AND CHROME ORES

For the benefit and guidance of producers desiring to make offers of low grade manganese and chrome ores, Metals Reserve Company herein provides information describing in detail the specifications, price schedules, conditions of shipment and delivery, sampling and analysis which will be included in contracts for the purchase of manganese and chrome ores.

The present purchasing policy of the Metals Reserve Company is subject to change without notice, and the terms and provisions of each contract will be based on conditions and circumstances existing at the time of acceptance. The policies herein outlined do not apply to ores originating outside the limits of the continental United States.

MANGANESE ORES

1. QUANTITY - One thousand to ten thousand tons per contract. In cases involving large investment in plant and equipment for beneficiation of ore, contracts may be let for larger tonnages and on such terms as may be deemed appropriate in each case.
2. QUALITY - Purchases of domestic manganese ores will be of three grades, with the following specifications:

	<u>High Grade</u>	<u>"Low Grade A"</u>	<u>"Low Grade B"</u>
Manganese - Minimum	48.0%	44.0%	40.0%
Alumina - Maximum	6.0%	10.0%	No Maximum
Iron - Maximum	7.0%	10.0%	No Maximum
Phosphorus - Maximum	0.18%	0.30%	0.50%
Silica - Maximum	10.0%	15.0%	No Maximum
Zinc - Maximum	1.0%	1.0%	1.0%

Size of ore: None which will not pass a 6-inch screen, and not more than 12½% of fines which will pass a 20-mesh screen.

Buyer may reject any shipment which does not conform to the applicable requirements and specifications as set forth above.

3. PRICE - Effective December 19, 1941, contracts will be considered on the following schedule for domestic ores, within the continental United States (excluding Alaska); all prices per long ton (2240 pounds) of dry weight, f.o.b. discharged onto stockpile designated by the Buyer.

High Grade - Base price, \$36.00 per long dry ton for ore containing 48.0% manganese with increase of seventy-five cents (75¢) per ton for each unit (22.4 pounds) in excess of 48.0%; fractions prorated.

"Low Grade A" - Base price, \$28.60 per long dry ton for ore containing 44.0% manganese; plus an increase of sixty-five cents (65¢) per ton for each unit (22.4 pounds) in excess of 44.0%; fractions prorated.

"Low Grade B" - Base price, \$22.00 per long dry ton for ore containing 40.0% manganese; plus an increase of fifty-five cents (55¢) per ton for each unit (22.4 pounds) in excess of 40.0%; fractions prorated.

An allowance per long ton shipped equal to the freight tariff per long ton from the Seller's nearest convenient rail station to the buyer's stockpile will be made, in addition to the above prices.

The cost of sampling, analysis by the Buyer, weighing, and unloading onto the stockpile will be for the account of the Buyer.

Under the contract, each lot will be priced under the grade the specifications of which it meets. Thus a lot carrying 45% manganese but also 0.50% phosphorus would be priced as "Low Grade B".

4. SHIPMENT AND DELIVERY - The Seller will give such advice regarding shipment and arrival as Buyer may require at least ten days before the arrival of any shipment at stockpile; otherwise, any demurrage at the stockpile will be for Seller's account.

Shipment will be made in flat bottom gondolas, if available, in lots of not less than one carload, to the stockpile designated by Buyer. The Seller will prepay the freight to such stockpile, where the ore will be weighed in cars, light and loaded, on track scales, and sampled for moisture. The lot will be sampled as unloaded and upon receipt of analysis, the Buyer will advise the Seller as to whether the ore is acceptable and under what classification.

If the lot is ascertained to be unacceptable under the above specifications, the Seller will not be entitled to any allowance for prepaid freight and will be held responsible for the removal of this shipment from the stockpile location. Upon failure so to remove the shipment within fifteen days of due notice, the Buyer may, at his absolute discretion, remove such shipment and the cost of such removal shall be for Seller's account; or Buyer may, at his option, otherwise dispose of such shipment without any liability therefor. In the event that Seller fails to repay Buyer for the cost of removal, within fifteen days thereafter, Buyer may cancel the contract forthwith.

5. PAYMENT- As soon as moisture and analysis determinations are received, the Buyer will promptly pay the Seller in accordance with the weight certificate and the above schedule.

6. WEIGHTS - The weight paid for will be net railroad track scale weights (weight of loaded car less weight of empty car), less moisture as determined by standard practice.

7. SAMPLING AND ANALYSIS - Each lot will be sampled at the time of unloading onto the stockpile by a sampler designated by the Buyer, three samples being taken, one each for Seller, Buyer and Umpire, and analysis made for manganese and other guaranteed elements. Usual provisions will be made for splitting limits and settlement by average of Seller's and Buyer's analyses, or by trade practice if samples are sent to Umpire. Moisture samples will be taken in accordance with standard practice. Seller may have representative at sampling at his own expense.

8. TERM OF CONTRACT - Deliveries must be completed within eighteen months of date of signing of contract. If delivery of 20 percent of the tonnage contracted for has not been made within six months of date of signing the contract, the Buyer may cancel the contract forthwith.

CHROME ORES

The same general program and conditions will be followed on contracts for the purchase of chrome ores as outlined above for manganese ores, except as to quality and price.

1. QUALITY - Purchases of domestic chrome ores will be of three grades, with the following specifications:

	<u>High Grade</u>	<u>"Low Grade A"</u>	<u>"Low Grade B"</u>
Chrome (Cr ₂ O ₃) - Minimum	45.0%	40.0%	40.0%
Chrome (Cr) - Iron (Fe) Ratio - Minimum	2.5 to 1	2.0 to 1	No Minimum
Silica - Maximum	11.0%	13.0%	No Maximum
Phosphorus - Maximum	0.20%	0.50%	No Maximum
Sulphur - Maximum	0.50%	1.00%	No Maximum

2. PRICE - Effective December 19, 1941, contracts will be considered on the following schedule for domestic ores within the continental United States (excluding Alaska); all prices per long ton (2240 pounds) of dry weight, f.o.b. stockpile designated by the Buyer.

High Grade - Base price, \$40.50 per long dry ton for ore containing 45.0% Cr_2O_3 and with a ratio of chrome (Cr) to iron (Fe) of 2.5 to 1; with an increase of ninety cents (90¢) per ton for each unit Cr_2O_3 in excess of 45.0% Cr_2O_3 ; with an increase of one dollar fifty cents (\$1.50) per ton for each tenth increase in chrome-iron ratio to a maximum of 3.0 to 1. The chrome content of any ore is 68.4% of its chromic oxide (Cr_2O_3) content.

"Low Grade A" - Base price, \$28.00 per long dry ton for ore containing 40.0% Cr_2O_3 , and with a ratio of chrome (Cr) to iron (Fe) of 2.0 to 1; with an increase of ninety cents (90¢) per ton for each unit Cr_2O_3 in excess of 40.0% Cr_2O_3 ; with an increase of one dollar fifty cents (\$1.50) per ton for each tenth increase in chrome - iron ratio to a maximum of 3.0 to 1.

"Low Grade B" - Base price, \$24.00 per long dry ton for ore containing 40.0% Cr_2O_3 , with an increase of sixty cents (60¢) per ton for each unit in excess of 40.0% Cr_2O_3 . Requirements as to amount of fines are waived on this one class of material.

Fractions prorated in all cases.

An allowance per long ton shipped equal to the freight tariff per long ton from the Seller's nearest convenient rail station to the Buyer's stockpile will be made in addition to the above prices.

The cost of sampling, analysis by the Buyer, weighing, and unloading on to the stockpile will be for the account of the Buyer.

Under the contract, each lot will be priced under the grade which specifications it meets. Thus a lot carrying 45.0% Cr_2O_3 and 0.50% phosphorus would be priced as "Low Grade A".

APPLICATIONS FOR CONTRACTS

Requests for information about contracts and offers of sale of manganese and chrome ores should be addressed to Metals Reserve Company, Washington, D.C., and should contain the following information:

1. Name of applicant, with business references, and statement of experience of applicant in connection with mining the above types of ores, other ores or non-metallic products.
2. Description of the mining property from which it is expected to offer production, with data to show that ore is available, or can probably be made available in quantity to meet the contract requirements.
3. Statement of the tonnage offered for sale, rate of delivery, complete analysis of the ore to be delivered, and the location on railroad from which shipments will be made.

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 corollary 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 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 be 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 chlorides ^{1/}	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.)

PORTLAND GEOLOGY MAPPED

The past geologic story of the evolution of the landforms of the Portland area is depicted on a large colored map, and is described in an accompanying short paper by Ray C. Treasher, field geologist of the Oregon Department of Geology and Mineral Industries, released this week. This seventeen-page pamphlet tells how local landscapes came to be and what the country was like in past ages. The paper has been made as non-technical as possible. It is issued primarily for the layman, for the student, for the average citizen who looks at the hills, the streams, and the valleys and is greatly interested in learning why, how, and when.

The Portland area has a most interesting geologic history. The basaltic hills of West Portland, the Boring hills to the southeast, the little cinder cone on the flank of Mt. Tabor, the peculiar turn of the Willamette River near Oregon City, the classic gorge of the Columbia with its precipitous cliffs, -did not materialize over night, just before the advent of man. These and many other unusual landforms in the environs of Portland developed according to a logical pattern throughout millions of years. This pattern was complicated by such episodes as glacial floods, and volcanic explosions, by outflow of lava, and long continued erosion.

The colored geologic map of the area which shows in detail the rock outcrops from which the geology has been interpreted may be purchased separately or with the short paper. This map measures (16 x 23) inches and shows the topography and culture as well as geologic formations. The cost of the map is 25¢ and the pamphlet (GMI Short Paper No. 6) is 15¢; they are obtainable at the offices of the Department of Geology and Mineral Industries in Portland, Grants Pass, or Baker. Both are postpaid.

OREGON MANGANESE

Over eighty manganese deposits in Oregon are described in a bulletin just published by the State Department of Geology and Mineral Industries, Earl K. Nixon, Director. The bulletin is the result of field work undertaken for the purpose of cataloguing the State's resources of this important strategic mineral. In addition to descriptions of individual properties, a chapter is devoted to a brief discussion of mineralogy, origin, methods of prospecting, and economics of manganese ores. A list of western buyers of manganese ore is included. The volume contains eighty pages and has three plates which show localities of deposits.

Bulletin No. 17, Manganese in Oregon, by members of the Departmental staff, is for sale at the Portland office of the Department, 702 Woodlark Building, or at the field offices at Baker and Grants Pass. The price (postpaid) is 45 cents.

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TO ALL EXCHANGE LIBRARIES
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Copies of these publications were mailed from this
office March 17th, 1942. If not received within
ten days from the above date, advise this office
immediately; otherwise, replacement for copies
lost in the mail or otherwise cannot be made.
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KROME, INC.

The importance to Oregon and to the country of the new plant of Krome, Inc. for the recovery of chromite from marine sands can hardly be minimized. It is a new industry for the State; it will produce in very material quantity a strategic mineral of which there is a serious shortage; and it may, in addition, produce by-products needed in our war effort. But probably of equal, if not of more far-reaching, importance are other factors not fully appreciated by people outside of the mineral industry.

This new plant is a pioneer in a field practically untouched in this country. There has been some domestic production of zircon, ilmenite, rutile, gold and platinum metals from heavy sands, but no production of chromite, by far the most important of black sand minerals. Krome, Inc. is the first chromite sand project. It will use large scale procedure, modern metallurgical methods, and a carefully prepared flow sheet based on extensive testing work. Other projects will follow. Potentially this new industrial development is susceptible of large expansion.

The actual start of construction on this project is a source of considerable satisfaction to the Department. For four years we have been studying, insofar as our facilities permitted, the feasibility of producing chromite from the Oregon marine sands, and have continually advocated, both to Federal agencies and private capital, the desirability of exploration and research which would lead to commercial operations. The Krome Company project is a definite milestone in the growth of the State's mineral industry.

AIN'T IT ALL WONDERFUL?

You will probably agree with us that the event of Sunday morning December 7th at Pearl Harbor was the real turning point of World War II. You won't? Well, let's do a little mental meandering.

The war has been going on several years. Germany has cleaned up on 13 (or is it 19) countries. She controls most of continental Europe. She pulled Francois Frenchman's cap down over his eyes and he is licked; she flopped her apron at Mousie Mussolini and he fell into the Adriatic; she stole Denmark, and stiff-armed Norway; she murdered Poland, etcetera, ad nauseam. She could doubtless have captured Britain had the omens been right on that particular invasion day. Anyway, she taught British army chiefs how to be the most brilliant strategists the world has produced - at evacuating. She was smart enough to keep USA out of the war, from thinking war, from providing for war, from having a war policy; she sabotaged our efforts to accomplish unified public opinion.

We, the USA, the richest, the stupidest, the most resourceful, the most improvident, the most democratic, the most disunified, the most literate, the most witless, the most talented, the most lethargic, the most important, the most vulnerable, nation in the world, and the most unprepared.....sat on our soft cushions saying, "It can't happen here."

And then, Pearl Harbor!

If Japan had schemed since the first dynasty, she couldn't have figured out a device that would more certainly have sealed her own fate - her defeat - the ultimate outcome of the war issue. By her act, she changed, in a matter of hours, our war psychology, the reactive consciousness of more than one hundred million people, from a condition of relative complacency, and divided opinion, to one of fury.

The Yankee is a funny duck. It wasn't so much the loss of planes and boats and material - or even the loss of life at Pearl Harbor that incensed each of us! It was the fact that Japan had deliberately and carefully and cunningly planned her act, and had gotten away with it.

What did the average man in the street say on that Monday morning? He said, or felt, "Why, the dirty, sneaking, murdering, yellow _____s". (use your own judgement in filling the blank).

And then we knuckled down, coolly, collectedly, rapidly to try and correct the terrible blunders that had come out of the stupid complacency the country had been in for many, many months. For we all had arrived at the same idea - FINALLY. And when the American people finally, or suddenly come to think and act as one - something is just going to bust. It always has. As evidence, when the Congress votes a 20 or 30 BILLION dollar war measure for a single purpose, by unanimous vote, and without a squawk from a newspaper, a citizen, or a taxpayer, that is a bust, - in the nose for the Axis. (It may mean bust for us, too; but then, we're pretty well busted anyway, so 'what the Hell'.)

We are going to win this war. That is certain. When? Neither you nor I know. If our efforts, like those of a miner we once had for a short time, are characterized by "All guts and no brains," we will win for a time and then go "Boom"; if we go "all brains and no guts", we might ultimately muddle through and win by sheer force of numbers and resources. If our efforts are in balance, our timing right, we should win in a couple of years. But win we must, or else. And we shiver to contemplate the "or else".

In three months we have done the impossible. We have got the production machine oiled up and started to turn over; we have pretty well mobilized the army; we have taken inventories and found the weak spots in the raw materials production picture - and made plans to save ourselves (we hope); we have pretty well licked the strike problem; we have got some of the politics and much of the complacency out of the Washington set-up (there is still too much of both left); and, most important of all, the people are beginning to think in terms of offense rather than defense. We probably never could defend this country, big and awkward as it is, but, if we ever get going, we can lick the stuffing out of any bully before he gets to us.

Anyway, we have gone places in three months, at least relatively speaking. We are not satisfied with our efforts, which is not an unhealthy sign. We are reasonably well satisfied with our leaders, which is a good sign, - although we continually criticize them, which merely indicates that we are human. Best of all, we collectively and individually, are thoroughly awakened and mad; and when anything gets 130 million resourceful Yankees really mad, nothing is going to stop their making a sea-going job of setting matters right.

Pearl Harbor touched it off. Had it not been for that explosive event, had Japan continued her invasion of Malaya, she might have taken Singapore, and even Sumatra and Java before we awakened and asked the Isolationists if it weren't time to declare war and perhaps start making some machine guns a few months hence. Now, if Japan would follow up by coming over with planes and drop several bombs in the suburban eye-sores and garbage dumps of some West Coast cities, or a couple of hundred-pounders in Central Park at midnight, or sticks of incendiaries on the broad pavement of Constitution Avenue, it would really help to knock the rest of the complacency out of all of us.

So credit the Pearl Harbor double-cross as a favor in disguise. We were rudely but thoroughly awakened, and now there is a unified America with a paramount purpose -- to get going, to get hold of the ball and keep it; to block, to pass, to plunge. We can't lose if we'll forget for the time, our petty politics and selfish interests. If we don't, God help us -- if we're worth helping.

GOLD AND SILVER MINES AFFECTED BY
PREFERENCE RATING ORDER P-56 AMENDED (March 2, 1942)

Order P-56 under which mines have received serial numbers and thereby allotted certain priority ratings was drastically amended on the above date so that, in effect, mines producing mainly gold and silver are removed from those benefits formerly enjoyed in the matter of obtaining high priority ratings. The amendment of the order which directly effects gold and silver mines defines "mining enterprise" as follows: "Any plant actually engaged in the extraction by surface, open pit, or underground methods, or in the beneficiation, concentration, or preparation for shipment of the products of mining activity, but not including any plant more than 30% of the production of which in dollar value consists of gold and/or silver". The basis upon which the 30 percent and 70 percent are estimated is the gross value as produced without smelter or freight deductions.

Since practically all the quartz mines in Oregon producing concentrates for shipment to a smelter have the value of production mainly in gold and silver, the ratio as given in the amended order requiring that the value of gold and silver production be less than 30 percent of the dollar value of the total production, will eliminate Oregon gold lode mines from benefits of Order P-56. Various mine serial numbers have already been cancelled. This does not mean that such mines whose value of production is mainly in gold and silver are prevented from obtaining priority ratings, but that they would be obliged, in general, to operate under no better rating for repairs, operating and maintenance supplies, than A-10, whereas previously they had enjoyed ratings of A-1-c, A-3, and A-8. There is little doubt that the result will be that more or less gradually all quartz mines in Oregon will close down.

There should be a stimulation of dormant copper properties, as a result of the order, and in the case of some quartz mines attempts will be made to increase the proportion of base metal production as related to gold and silver.

Formerly, in order to apply the A-1-c rating, mine operators were obliged to obtain special permission and an authorization number. The amended order allows the operator (except as provided below) to apply the A-1-c rating, ^{for repair parts} as well as A-8 and A-10 ratings, without special permission by using the following endorsement on purchase orders or contracts: (See "Schedule A" last page.)

"Materials for a mining enterprise, Rating A-_____ under Preference
Rating Order P-56, Serial Number _____ and in compliance therewith.

(Name of operator or supplier)

By _____
(Authorized signature)

The exception noted above, in which the privilege of applying the A-1-c rating without obtaining special permission from the War Production Board, is for those mining enterprises more than 30 percent of the production of which in dollar value for the previous calendar quarter was derived from any one or more of the following:

Sand (except foundry sand), gravel, crushed stone, and slag,
including all commercially recognized forms of these products.
Clay of all types, except those used for refractories and ceramics
for electrical use.
Building and ornamental stone of all types.
Gypsum, talc, soapstone, slate (except for electrical use) and all
raw material for the manufacture of lime and calcareous cements.

In other words, a sand and gravel company could not apply the A-1-c rating without the special permission of the War Production Board.

In this amended P-56 order the A-3 rating previously allowed for repairs and equipment is discontinued, being replaced in general by the A-1-c rating. An A-8 rating is allowed for all repairs and maintenance not covered by the A-1-a and A-1-c ratings; and an A-10 is set up for repairs, operating, and maintenance supplies not directly connected with production.

As in previous orders the A-1-a rating is to be applied in cases of actual breakdown or suspension of operations and only after specific approval has been obtained from the War Production Board.

There is no change in the order making it necessary for holders of mine serial numbers to submit monthly reports of all rated purchases made on Form PD-119 to the State Emergency Coordinator of Mines. Such reports should be submitted by the 10th of the month following the month covered by the report. They should be made whether or not rated purchases were made. If no rated purchases were made, the fact should be so stated on the regular PD-119 form.

In applying the A-1-c rating, quotas are established. The order states that for any calendar quarter the quota for any operator shall consist of the dollar value of repair parts as may be expressly authorized by the Director of Industry Operations after application by such operator in form prescribed by the Director of Industry Operations. For the first calendar quarter of 1942 such quota shall be the dollar value of repair parts which bears the same ratio to the dollar value of repair parts delivered to the operator in the last calendar quarter of 1941, as the dollar value of the operator's production in the first calendar quarter of 1942 bears to the dollar value of the operator's production in the last calendar quarter of 1941. In other words, if in the first quarter of 1942 the dollar value of production was 25 percent greater than in the last quarter of 1941, then the dollar value of materials to which an A-1-c rating may be applied may be 25 percent greater than the same value for the last quarter of 1941.

Preference ratings for repair parts, machinery and equipment will be issued only where such repair parts, machinery and equipment are required to maintain or increase production and not primarily to reduce cost of operation.

In cases where a material production of base metals can be obtained even though the proportion of dollar value of gold and silver production is greater than 30 percent of the total, indications are that the War Production Board will not curtail priority assistance to such operations. Each individual case will be considered on its merits.

CHANGE IN MANGANESE SPECIFICATIONS

In a release dated February 20, 1942, Metals Reserve Company states that, referring to size of manganese ore, "none in excess of 12 inches and not more than 25 percent to pass a 20-mesh screen". Previous specifications had given the maximum size acceptable as 6 inches with not more than 12½ percent to pass a 20-mesh screen. In addition, the Metals Reserve Company specified that manganese concentrates to be acceptable, must be nodulized or sintered. Prices for the various grades, namely, "High-Grade", "Low-Grade A" and "Low-Grade B" remain the same as specified in previous circulars.

METHODS OUTLINED TO OBTAIN PREMIUM PRICES ON COPPER, LEAD, AND ZINC ORES

Mr. Harry T. Hamilton of the Metals Reserve Company has notified the State Department of Geology and Mineral Industries that the outline of method to be followed by shippers of base metal ores is as follows: The producer will ship to an appropriate smelter as has been his custom. Settlement will be made according to the so-called "ceiling price" established for the metal. The shipper must make out an affidavit and deliver it to the smelter. This

affidavit (forms can be obtained from the smelting company) covers information required by the Metals Reserve Company to show that the shipment of base metal ore comes within the requirements allowed for premium payments, or in other words, is in excess of quota. The affidavit is submitted to the Metals Reserve Company by the smelter and the Metals Reserve Company will then remit to the smelter. The smelter will make out checks in the amount due each individual shipper.

Previous smelter schedules have not been altered nor are any smelter contracts affected by premium prices.

The release of the Metals Reserve Company covering the program is dated March 7, 1942 and has the title "Program for Premium Payments by Metals Reserve Company on Production of Copper, Lead and Zinc in Excess of Monthly Production Quotas".

The release by the office of Price Administration dated February 9, 1942 covered rules and regulations governing quotas.

Three regular classes of quotas were set up in the latter release. These are "zero", "intermediate", and "100 percent". All are based on 1941 production. The "zero" quota applies to properties which had no production in 1941, or production of less than 200 tons in that year; "intermediate" quotas apply to production of from 200 to 600 tons in 1941; "100 percent" quotas apply to production of more than 600 tons.

Quotas are established on a monthly basis. Premium prices will be paid for all production over monthly quotas. If a property fails to produce its quota in any month or months, premiums will not be paid until the deficit is made up. Methods for relief are provided in cases of catastrophes, such as fires or floods, which make quota attainment impossible. Once quotas are set, they shall not be raised during operation of the plan.

The premiums apply to all over-quota production after February 1, 1942, and are to apply for a period of 2½ years. Should the emergency end before the termination period the Metals Reserve Company reserves the right to terminate the arrangement on equitable terms.

BUYING OF CHROMITE IN SMALL LOTS

On March 5th the Metals Reserve Company released new rules to include purchase of chrome ores in small lots. Such lots will be accepted in amounts of one or more than one truck load at Purchase Depots where Purchasing Agents will be available. These Purchase Depots will be at Coquille, Grants Pass, Seneca, Oregon and Yreka, California. Other Purchase Depots may be established by Metals Reserve. Contracts already made under schedules of November 14, 1941, December 19, 1941, or February 20, 1942 will not be altered to come under specifications as published in the circular of March 5th.

Specifications as to grades of ore remain the same as given in the release of February 20, 1942, and state that the size of ore shall be as follows: None in excess of 12 inches will be acceptable. In "High-Grade" and "Low-Grade A" not more than 40 percent is to pass a 1-mesh screen. As before, requirements as to amount of fines are waived on "Low-Grade B".

In the case of concentrates, if briquetted, they are acceptable under the schedule of prices and terms the same as hardrock ore. In the case of concentrates not briquetted the grades "High-Grade" and "Low-Grade A" will be acceptable under the schedule at a discount of \$3.00 per long ton. Prices remain the same as previously published.

The seller must, at his own expense, deliver all ore or concentrates to the Purchase Depot. Metals Reserve Company will pay the cost of weighing, sampling, and analyzing and will furnish a weight ticket on each lot weighed. The lot will be sampled and analyzed by a Metals Reserve Company analyst. As soon as analysis, including moisture determination, is obtained, settlement sheet together with check in payment will be mailed to seller from the buyer's Portland, Oregon office. Weighing, sampling, analysis and classification by Metals Reserve Company shall be final and conclusive. The buyer will reject any ore or

concentrates which do not conform to the requirements and specifications as set forth in the circular. Any and all ore rejected by the buyer must be removed by the seller within 15 days after mailing of notice of rejection. Any and all ore not removed by seller may, at the option of the buyer, be removed or otherwise disposed of by buyer without any liability therefore.

This new program is to date from April 1, 1942.

CLEARING HOUSE COLUMN

For Sale - High-grade pumice in carlots. Interested persons should write Mr. C. T. Reardon, Kirk, Oregon.

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ORE.-BIN, vol. 1, vol. 2, and vol. 3

Legend:

(p.b.5; 2-6) means Press Bulletin no. 5, pages 2 to 6.
 (I:3; 45-56) means Ore.-Bin, vol. 1, no. 3, pages 45 to 56.
 * means out of print.

- * Abbreviations, some mineral industry (II:10; 71).
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 - Strategic Minerals, (III:3;34-36;37)
 - Stockpiles (III:7;79)
 - Hearing (III:8;80-83)
 - Excess profits tax (III:8;88-89)
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 - *Legislation (I:6;42)
 - *Oregon's place with, (I:3;23)
 - Specifications and bids (I:12;79-80)
 - * Sumpter quadrangle map (I:3;24)
 - Talc (III:7;77-78)
 - Tale of a Rock Hound (III:5;56-57) (III:7;75-77)
 - * The Prospector, a poem (I:4;28)

- Timing and Bull (III:6;63-65)
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 Let's Stick to Facts (III:12;120-121)
 Truck transportation (II:6;45-46)
 * U. S. Bureau of Mines working in central Oregon (I:7;44-45)
 * Vanadium, by-product (I:3;25)
 Wallowa Mountains, geologic map of *(p.b.12;1-2)
 *Geology of south portion (p.b.4;1)
 *Marble, black (p.b.13;5) (p.b.14;3-4)
 Warm Spring dome in Snake River canyon (II:4;29)
 What We Are Doing (III:8;80)
 Willamette Valley survey (II:5;41)
 Wood-coke process, Ruzicka (II:4;28-29)
 X-ray machines, super (II:4;33)
 Zinc, electrolytic (II:5;61)
 Sources (III:8;84)
 Zircon & Zirconium (III:11;111-117)

"SCHEDULE A"

(Attached to Preference Rating Order P-56 as amended to March 2, 1942)

An A-1-c rating may be applied by qualified mine operators to deliveries of repair parts for machinery and equipment of the types listed in Schedule A (below) by making the proper endorsement on purchase orders or contracts.

Schedule "A"

As to all machines listed below, the rating provided herein likewise applies to equipment items, accessories, and tools customarily sold with such machines.

Aerial tramway equipment	Hoists - including room hoists and car pullers
Air Compressors for mine use	Hydraulic monitors, with feed pipe and fittings
Air distribution equipment	Jacks for lifting and roof support
Assaying and testing laboratory equipment at the mine	Lamps--mine, miners', safety, and ore-exploration types
Ball-casting machines	Locomotives for mine use
Boxcar loaders	Loaders, mobile, including mucking machines
Cages and skips	Equipment for Milling plants
Car dumpers - rotary or end	Mine cars, track or trackless
Equipment for Cleaning plants	Pit-car loaders and elevating conveyors
" concentrating plants	Equipment for Preparation plants
Conveyors - shaking, belt, chain, or gravity type, including duckbills and other self-loading heads	Pumps, pipe and fittings for mine drainage or material transport
Cutting machines - cable reel and self-propelling transportation trucks therefor	Rock dusting equipment
Diamond core drilling machines	Safety and defense equipment
Dragline dredges, excavators, and scraper units	Sand dryers
Dredges - continuous bucket, including pumps	Scraper loaders
Drills and drilling machines, power driven, and reconditioning Equipment therefor	Sheaves and sheave blocks
Dust control equipment	Shovels, power
Electrical equipment for mine transportation and power	Shuttle cars, track or trackless
	Slusher hoists and scrapers
	Steel sections for support of mine openings

Storage batteries for mine use

Tanks and bins for storage of mine products

Tipples and head frames

Track and track accessories for mine transportation

Equipment for Treating plants

Truck, tractors, and trailers for mine use

Ventilation equipment

Waste disposal equipment

Weighing equipment, including automatic devices

Wire rope for haulage and hoisting

An A-1-c is allowed to deliveries of repair parts for essential productive facilities to other mining enterprises and/or for other types of machinery and equipment up to the minimum required to make reasonable advance provision to avert an actual breakdown or suspension of operations. However, such deliveries may be obtained only after special permission from the War Production Board.

NEW EDITION OREGON MINING LAWS

Oregon mining regulations are printed in the revised edition Bulletin No. 1 of the State Department of Geology and Mineral Industries just published. New laws passed by the 1939 and 1941 legislatures have been included. Also added is a reprint of part of United States Bureau of Mines Technical Paper 591 which gives an outline of the Federal placer mining laws. Oregon mining regulations relating to location of mining claims are not specific as to placer claims and in all cases where State laws have not been passed to modify the Federal laws, the latter would apply.

This Bulletin, No. 1 revised, may be obtained at the Portland office of the Department, 702 Woodlark Building and at the field offices at Baker and Grants Pass. The price is 20¢ postpaid.

STRATEGIC MINERAL PAPER

"Strategic and Critical Minerals, A Guide for Oregon Prospectors" by Dr. Lloyd W. Staples, assistant professor of geology at the University of Oregon, has just been published as G.M.I. Short Paper No. 8, by the State Department of Geology and Mineral Industries. This paper is issued to meet a demand for information created by the great need for finding and developing deposits of much needed minerals to supply war needs. The unprecedented demand for metals other than gold and silver finds prospectors and small mine operators with incomplete knowledge of various minerals and metals which have recently assumed prime importance.

The report contains 27 pages, is prepared particularly for the use of Oregon prospectors, and describes mineralogical and geological characteristics of minerals by which they may be identified, as well as occurrences and markets.

G.M.I. Short Paper No. 8 may be purchased at the Portland office of the State Department, 702 Woodlark Building, Portland, or from Department assay laboratories at Baker and Grants Pass. The price is 15¢ postpaid.

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BOTTLENECK

This is a plea for simplification of Federal agencies written orders. From the standpoint of the mine operator, these orders are so numerous and complicated that a disproportionate part of the operators' efforts is consumed in obtaining interpretations of the orders and in filling out reports.

Getting interpretations of orders consumes time that might well be spent on the many problems of exploration, mining, milling, and marketing that are the well-known headaches of the mine operator. A great many of such interpretations have to be made in Washington, and it is not necessary to draw a diagram to show this time-consuming operation, to say nothing of the nervous exhaustion, such procedure entails.

Everybody agrees that maximum production of essential materials is absolutely necessary in order to win the war, and that obstacles preventing maximum production should be hurdled without delay. One of these obstacles is the time consumed in excessive governmental paper work required of mine operators.

Administrative orders should be issued only when absolutely necessary; they should be worded as simply as possible; reports and questionnaires should be required only when there is no other available method of obtaining information essential to actual war production.

Mine operators are earnestly patriotic. Because of the cosmopolitan nature of their calling, as a group they are probably better informed on world conditions than any other comparable group. They realize the jam we are in and are eager to do their utmost to increase mineral production. Despite their earnestness of purpose, they feel engulfed in a web of Government regulations which seem to frustrate their efforts to produce much-needed metals. Morale (a much-maligned word) is thereby reduced.

Mistakes in planning the organization for war production are to be expected, but it would seem to us far better to make the mistake of issuing too few orders than to issue so many that they form a decided obstacle to maximum production.

NOTES ON ANTIMONY ORE BUYERS

Harshaw Chemical Company, El Segundo, California:

This plant buys either oxide or sulphide antimony ore ranging in grade from around 30% to 67%. Sulphide ore carrying more than 60% is used for making antimony oxide direct and would command a higher price than lower grade ore or oxide ore.

Texas Mining and Smelting Company, Laredo, Texas:

Antimony ores of any grade are acceptable; lump ore, fines, or concentrates are purchased. Gold and silver are not recovered and ores containing lead are not purchased.

United States Smelting Company, Midvale, Utah:

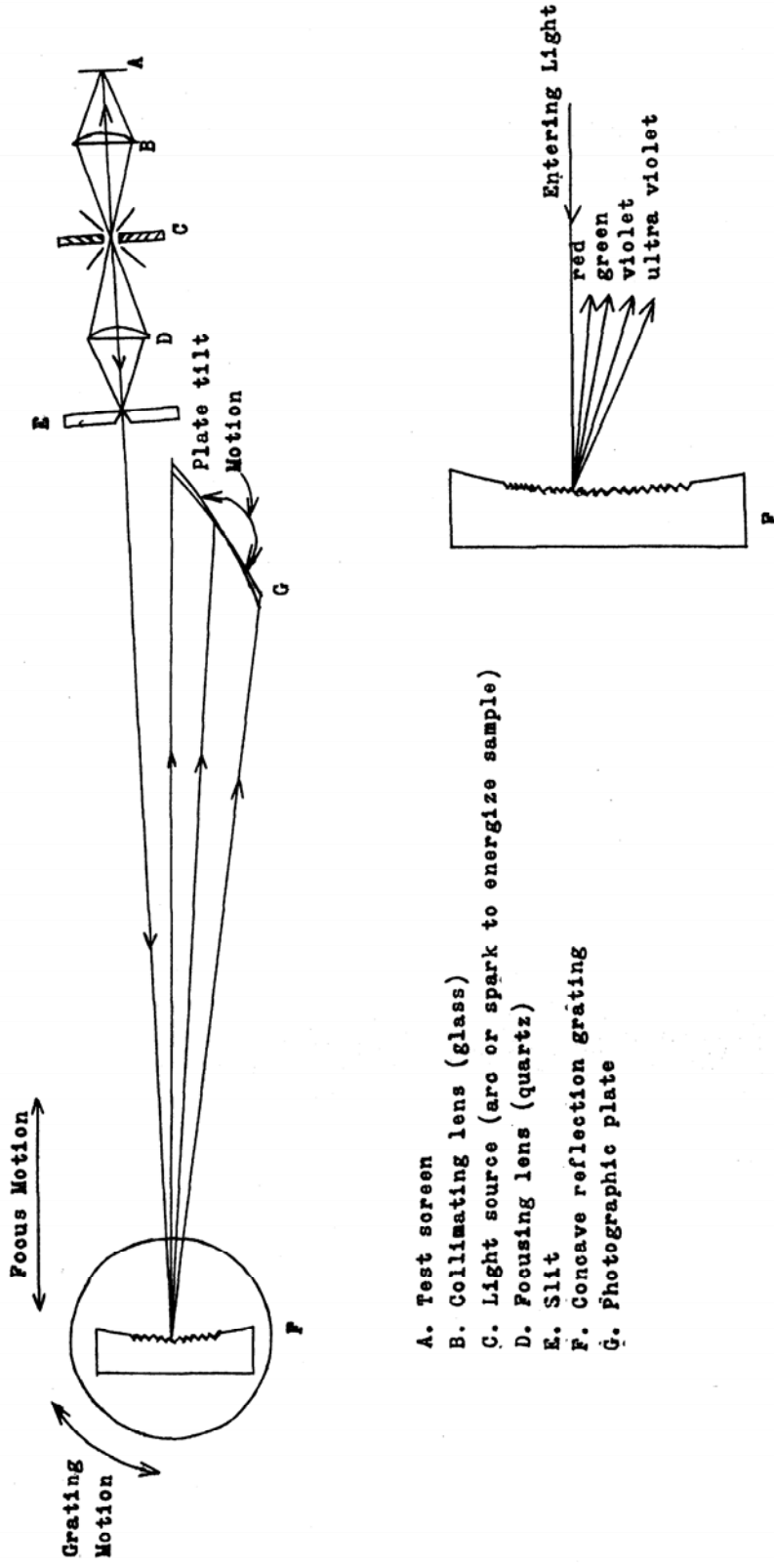
Antimony ore is required in this company's refining process and antimony contents result in antimonial lead production. Gold, silver, and lead are recovered if contained in the ore.

Bunker Hill Smelter, Kellogg, Idaho:

This company has in the past produced antimonial lead from the small antimony content of Coeur d'Alene ore. Recently an electrolytic antimony plant has been built which takes antimony, copper, and silver concentrates produced in the district.

Sunshine Mining Company, Kellogg, Idaho:

This company is building an electrolytic reduction plant for treating antimony, copper, and silver concentrates. It is possible that this plant will have extra capacity.



- A. Test screen
- B. Collimating lens (glass)
- C. Light source (arc or spark to energize sample)
- D. Focusing lens (quartz)
- E. Slit
- F. Concave reflection grating
- G. Photographic plate

DIAGRAM OF LITTRON MODEL SPECTROGRAPH

SPECTROGRAPHIC ANALYSIS

Although man has observed the rainbow since the beginning of time it was not until the seventeenth century that its origin was actually determined. In 1666 Sir Isaac Newton was carrying on experiments dealing with sunlight. During the course of his experiments he allowed sunlight to enter a darkened room through a pin hole in a window shade and passed this small beam of light through a glass prism. Much to his surprise he found that the beam of white light was broken up into a spectrum of seven colors similar to the rainbow. Further experimentation was carried out and Newton found that this spectrum when passed through another prism came out of the other side of the prism as white light. Thus, it was proven for the first time that white light was not basic but was composed of a mixture of colored light. If Newton had used a narrow slit instead of a circular hole in the window shade he would have made the first spectroscope. This was done many years later when the first crude spectroscope, as we know it today, was developed by Bunsen.

Except in refinements, the modern spectroscope differs very little from the one developed by Bunsen. All that is essential is a narrow slit, a means of separating a mixture of colored light into the individual colors present in the mixture, and a telescope for focusing the separated light so that it can be seen or photographed. The separation of the light into the individual colors depends upon the fact that light of different colors travel at different speeds and thus some colors are bent more than other colors when the mixture of colors is passed through a glass or quartz prism. The red rays are bent the least and the blue rays are bent the most, so these rays are separated when they emerge from the prism. This is shown in the accompanying figure. The grating (a mirror ruled with many fine lines close together) gives the same general result as the prism so that it can be used as a separating medium in a spectroscope.

The spectroscope is an instrument for separating light into its component colors and focusing these different colors so that they can be seen. Unfortunately the human eye is sensitive to only a very small portion of the spectrum and thus the spectroscope is limited in its use; however if we replace the eye with a photographic plate we are able to record those colors not detected by the eye, and thus the range of the spectroscope is greatly increased. Whenever a spectroscope is so constructed that a photographic plate can be used in place of the eye it becomes known as a spectrograph. When looking into a spectroscope the eye sees the individual colors in the mixture of light as bright colored lines ranging from violet at one end of the spectrum to red at the other end with different shades of the colors blue, green, and yellow between these two ends. When these colors are recorded on a photographic emulsion they appear merely as black lines on a clear background, but their position on the photographic plate is a measure of the color of the light forming these lines. Not only does the spectrographic plate extend the range of usefulness beyond the visible spectrum but this method of observing the spectrum has many additional advantages. When the colors are photographed as lines on a photographic emulsion they are permanently recorded and may then be studied by anyone. Often the colors appear only as flashes of light and it is very difficult for the eye to detect and classify these numerous flashes; the photographic emulsion automatically records these flashes of light and thus they are not lost. Frequently the visible spectrum contains a great number of colored lines and it is extremely difficult to determine definitely the actual position of these lines; however when the lines are photographed it is possible to measure accurately the position of these lines by means of a high powered microscope.

Experiments have shown that every different chemical element will emit light when excited by heat or electricity. The spectroscope and the spectrograph have proven that the light emitted from each element is as different from the light emitted by any other element as the finger prints of one person are distinctly different from the finger prints of any other person. The difference in appearance in mercury vapor lights and neon signs are common examples of the different colors of light emitted from different elements. Thus, we see that if we have a method of causing a sample of substance to emit light and a means of identifying the emitted light we will be able to identify positively the elements present in the sample.

Although there are a number of methods used to make a substance emit light, the electric arc is probably the most generally useful method now in use. This method of excitation can be used with samples which are not electrically conductive (ores, slags, minerals, etc.), as well as those samples which are electrically conductive (metals, alloys, etc). For all practical purposes the electric arc acts as a small furnace and a sample placed in the arc will vaporize under intense heat and emit light. Graphite rods are usually used as the electrodes in the arc and the sample to be analyzed is placed in the form of a powder in a hole in one of the electrodes. The arc is struck and the light from the arc is made to pass through the spectrograph where the light is broken up into its different colors and photographed on the photographic plate. After the plate is developed the recorded lines are classified and the elements present in the sample which emitted the light can be identified. In addition to the information regarding the elements present in the sample the lines on the photographic plate can be used to determine the amount of each element present in the sample. This is accomplished by measuring the blackness of the lines produced by the element and assuming that the blackness of the line is dependent upon the concentration of the element producing the line.

Spectrographic methods are finding varied and many uses, and during the present time when analytical results must be obtained rapidly and with reduced personnel. Practical uses of spectrographic analysis in chemistry, metallurgy, medicine, geology, mining, crime detection, sabotage detection, and prospecting are numerous.

Some of the advantages of spectrographic analysis over chemical analysis may be summarized as follows:

1. Small traces of most elements can be detected as readily as large amounts. This means that small samples may be used whenever it is difficult to obtain a sample, or when the material being analyzed is of great value, as is the case with alloys of the platinum group of metals.
2. Once the sample has been obtained, the analysis can usually be made in a small fraction of the time required for a chemical analysis.
3. Identification is positive. Methods of increasing the sensitivity of spectrum analysis have been so developed that this method is usually more sensitive for small amounts of elements than chemical analysis. It is possible to differentiate between elements of similar chemical behavior such as the rare earths, which would be almost impossible to identify by chemical methods. There is very little danger of mistaking one element from another.
4. Spectrographic analysis often shows the presence of elements not looked for by chemical analysis of the sample. Not only does it record the lines of the element

being sought but also the lines of the other metallic elements in the sample, and also the lines of some of the non-metallic elements. It is not uncommon to analyze an ore for a certain element and find commercial amounts of another unsuspected element present in the sample.

5. Any element that can be detected qualitatively can also be determined quantitatively. It reveals the presence of metals at concentrations so low that they would escape chemical detection and in many industries it has been found that these trace elements are an important factor which must be taken into account. Quantitative analysis with the spectrograph is most satisfactory when concentrations of the element being determined are not over 5-8 percent. Above these values chemical analysis is better. Below 1 percent spectrographic analyses are better than chemical analyses.

6. It is extremely useful in examining substances difficult to attack chemically such as glasses, slag, tin ore, refractories, certain organic materials. It is possible to determine the nature of inclusions in minerals and alloys, and to analyze without destroying or mechanically removing material from the sample.

The spectrograph installed in the laboratory of the State Department of Geology and Mineral Industries is a complex research instrument about twelve feet long, weighing nearly a ton. This machine allows a wide spread of colors with ample detail and complete coverage of the spectrum from the ultra-violet region to that of the infra-red. The optical system is quite simple and is kept down to the smallest number of optical parts. The 4-inch diffraction grating is a piece of aluminum-coated glass which has been ruled in a precision lathe so that it has 15,000 lines per lineal inch.

Further information regarding the work of the Spectrographic laboratory and the State law regulating its functions will be sent on request.

MINING NOTES

Crescent-Pacific Gold Mining Company: This dredging company has discontinued operations on the Applegate River and has moved the floating washing plant to the W. L. Greenleaf Ranch on Kane Creek southeast of Gold Hill. At present, the company's dragline is being used at Camp White on construction work. Following the construction of the camp, the dragline will be moved to Kane Creek where the company plans to dredge the Greenleaf ground and other holdings.

Jackson Mining Company with a dryland plant about a mile east of Jacksonville has discontinued operations. The dragline equipment is being used on the construction of Camp White. It is reported that the company does not intend to resume dredging operations.

Christine & Dobbins have a small dragline in operation within the northwest city limits of the town of Jacksonville. They are digging ground which has been dredged several times, but it is reported that they are making good recoveries. The operation started shortly before Christmas.

NOTES FROM INFORMATION SERVICE
OF AMERICAN MINING CONGRESS
Washington, D.C.

Change Scheduled in Applying Blanket Priorities Ratings

According to an announcement made by J. S. Knowlson, Director of Industry Operation of the War Production Board, a new plan called the Production Requirements Plan to replace use of blanket priorities ratings allowed under existing "P" orders may be put into effect in the near future.

Under the new P.R.P. plan a company would make application to cover its estimated needs of material requiring priorities rating for a three months period in advance.

Quoting from the American Mining Congress release of March 27, "Heavy increases in demands for war materials have made it impracticable to continue the use of preference ratings which have been assigned under existing 'P' orders to whole industries, without any exact check of the amount of materials which such ratings may be used to obtain. Under the PRP (Production Requirements Plan) ratings will continue to be assigned to deliveries of materials for essential uses, but the rating in each case may be used only to secure a pre-determined quantity of materials or products....."

"The existing preference rating order P-56-a, applying to the manufacture of mining machinery, is of a very different nature from the general 'P' orders referred to in Mr. Knowlson's announcement. Under P-56-a, as under the PRP, manufacturers submit their needs of critical materials for one or more quarters in advance, and the ratings assigned apply only to such quantities. The general condemnation of existing 'P' orders, therefore, does not apply in principle to the mining machinery order. Meanwhile, continued efforts are being made through the Mining Branch of the WPB to insure delivery of those raw materials which are now available only in limited quantities or under very high ratings, but which are essential to the production of mining machinery and repair parts."

Funds Requested for Mineral Exploration

Congress has been asked by the President to make a special appropriation of \$366,370 to be used for exploration and development of strategic and critical minerals.

Quotas Under Priorities Order P-56

Dr. Wilbur A. Nelson, head of the Mining Branch, W.P.B. has written mines operating under P-56 as follows:

"Any operator who has not yet submitted to the Mining Branch an estimate of his repair part requirements for the second quarter of 1942 and the related figures for 1941, as previously requested, should do so without further delay. This is necessary in order that the Mining Branch may approve and assign the second quarter quota of repair parts under Schedule A to which an A-1-c preference rating may be applied.

"Pending receipt from the Mining Branch of official assignment of his second quarter quota, an operator may proceed to endorse an A-1-c rating on purchase orders for repair parts or equipment on Schedule A, provided that the aggregate total dollar value so endorsed, for delivery during the month of April, shall not exceed the March quota figure which the operator computed on his own account in accordance with the provisions of the March 2 revision of the P-56 order."

Explosive Licenses

Director R. R. Sayers of the United States Bureau of Mines has issued a warning that licenses for distributing, storing, selling, issuing, transporting, or using explosives were necessary as of March 16 and that operating without a license makes companies liable to imprisonment and heavy fine.

Recently amended regulations of the Federal explosives act require that associations, corporations or others shall furnish the Bureau with pertinent information concerning control of their organizations. The purpose of the amended regulation is to prevent explosives falling into the hands of enemy controlled organizations or individuals.

Coal Allocations May Be Made

According to a statement by Acting Solid Fuels Coordinator, Howard A. Gray, allocation of coal supplies may be necessary in order to protect war industry fuel supply. The bituminous coal division statistics show failure of consumers to store coal in advance of immediate needs and are depending upon uninterrupted transportation schedules to continue to supply them.

Industrial Salvage

More than thirty field offices to handle industrial salvage throughout the nation will be each set up by W.P.B. which has named J. W. Bertch to supervise this work.

In describing the program, Mr. Bertch said "it is our function to expedite the movement of large accumulations of scrap materials where special obstacles exist such as uncertain ownership, clouded titles, high cost of demolition, remote location or some other familiar complication. In this category are many obsolete or abandoned railroad or street-car rails, mines, oil wells, bridges, etc."

Assessment Work

A bill, S.2395, has been introduced in the Senate and referred to the Committee on Mines and Mining. This bill would suspend assessment work on mining claims until such time as the President issues a proclamation declaring wars in which the United States is now engaged have been terminated. No reports have been received concerning action on this bill.

Gold Mines May Operate Under P-100

Those precious metal mines whose serial numbers were cancelled because dollar value of their gold and silver production ran over 30 percent of their total production value may operate under P-100. This order allows a blanket rating of A-10 for repairs, maintenance and operating supplies. No serial numbers nor specific authorization are required. Each purchase order for material which may be obtained with an A-10 rating should be endorsed as follows:

"Materials for maintenance, repair, or operating supplies - rating A-10 under Preference Rating Order P-100 with the terms of which I am familiar."

" _____ "

Name of Producer or Supplier"

" _____ "

Signature of Designated Official

In order to obtain new equipment, operators must fill out Form PD-1A and submit it to Dr. Wilbur A. Nelson, Administrator, Mining Branch, War Production Board.

Many of the gold mines whose serial numbers were cancelled produce, in addition to gold and silver, a material amount of lead, zinc, copper and other strategic minerals. This fact has been taken into consideration by the Mining Branch of the War Production Board and up to April 3, about one hundred serial numbers had been re-instated. In considering application for re-instatement of serial number, the W.P.B. will consider each individual application on its merits as to amount of metals being produced which are needed for war materials and the amount and quality of fluxing ores desired by lead and copper smelters.

OREGON NICKEL DEPOSIT

The nickel deposit near Riddle, Oregon, is described in a new bulletin issued by the United States Geological Survey. The bulletin is designated as 931-I and gives the results of an investigation made by Messrs. William T. Pecora and S. Warren Hobbs, geologists of the Survey in 1940.

Because an adequate supply of nickel for our war needs is essential and because the large deposits at Sudbury, Ontario, cannot supply an amount sufficient for all allied needs, the Riddle deposit, which may be the largest in the United States, assumes national importance. The abstract of the report is reproduced herewith:

Abstract

"The Riddle nickel deposit, on the slopes of Nickel Mountain about 5 miles northwest of Riddle, Douglas County, Oregon, was discovered in 1864. Since then much prospecting and preliminary development work has been done, but no ore has been shipped except small lots used for metallurgical tests.

"The deposit is a layered blanket, containing the nickel silicate garnierite, which rests upon unserpentinized peridotite. This blanket ranges in thickness from a few feet to a maximum of 60 or 70, but with an average of about 20 feet. It is best developed on terraces, flats, and gentle mountain slopes above an elevation of 2,000 feet. It consists of three layers, a top brick-red soil layer, an intermediate thick yellow limonitic layer with some quartz-garnierite boxwork, and a root layer composed of quartz-garnierite boxwork in nearly fresh bedrock that is a transitional phase between weathered material and fresh peridotite. The disposition of the boxwork veins was controlled by original blocky jointing in the peridotite. Nickel occurs in all three layers of the blanket but is most abundant in the boxwork veins carrying garnierite. The darker green varieties of the garnierite contain the highest percentage of nickel.

"The nickel is believed to have been derived from olivine in the peridotite by decomposition during lateritic weathering, which probably took place during late Tertiary time, before the present regional surface at an elevation of 2,000 feet was dissected. This process formed limonite and nickel-poor garnierite. Under present climatic conditions the original laterite has undergone a change resulting chiefly in a boxwork of quartz and nickel-rich garnierite.

"About 162 acres of ground are underlain by a blanket containing over 6,000,000 tons of material, 1 to 2 percent of which is probably nickel. Eighty thousand tons have been proved to contain 2 to 3 percent of nickel, and 75,000 tons have been proved to contain 1 to 2 percent of nickel. A new method of treating low-grade silicate material would have to be devised before this large deposit could be utilized."

Bulletin 931-I may be obtained from the Superintendent of Documents, Washington, D.C. The price is 20¢.

QUICKSILVER BULLETINS

Two bulletins describing quicksilver deposits in Oregon have recently been published by the United States Geological Survey. Both are by Clyde P. Ross and give results of his field work during the summer of 1940. The bulletins are numbered 931-B and 931-J respectively.

Bulletin 931-B, "Some Quicksilver Prospects in Adjacent Parts of Nevada, California, and Oregon", describes the Glass Buttes Quicksilver Mine in northeastern Lake County and also the Currier Mine near Paisley, Oregon. Maps of both these Oregon quicksilver properties are given. Other prospects described in this bulletin are in the northwestern corner of Nevada and northeastern corner of California.

Bulletin 931-J, "Quicksilver Deposits in the Steens and Pueblo Mountains, Southern Oregon", gives the results of a reconnaissance geologic survey and describes various quicksilver prospects of the region. The abstract of this bulletin is reproduced below:

"The Steens and Pueblo mountain ranges together form a shallow crescent of northerly trend in the eastern part of Harney County, Oreg. They contain more than 15 quicksilver prospects and a few that were opened for gold and copper. Most of the area is underlain by flexed and faulted Tertiary lava, but pre-Tertiary metamorphic and igneous rocks are exposed in the southern part. Part of the eastern flank of the mountains consists of somewhat deformed alluvial deposits, which are younger than the lava but older than the lacustrine and alluvial deposits on the valley floors.

"The lavas along the east side of the mountains have undergone rather extensive hydrothermal alteration. At intervals for a distance of about 30 miles they contain mineralized fracture zones, in most of which mercurial tetrahedrite and cinnabar are the principal valuable minerals. The pre-Tertiary rocks in the southern part of the mountains also contain lodes. These were first explored for gold and copper, but locally they contain quicksilver as well.

"Although the presence of quicksilver deposits in the Steens and Pueblo Mountains has been known for 40 years, they have been very little explored and probably less than 10 flasks of quicksilver has been produced from them. The lodes on the whole are of low grade, although they contain rich pockets, some of which may have formed in the zone of weathering. The low average tenor, coupled with the large size of some of the lodes and the metallurgical problems introduced by the unusual mineralogy, suggest that the area may be better adapted to exploration by large, well-equipped organizations than to working by individual operators. If keen demand for quicksilver continues, this region should be considered as a possible source of supply."

These bulletins may be obtained from the Superintendent of Documents, Washington, D. C. and are priced at 25¢ and 40¢ respectively.

CLEARING HOUSE COLUMN

61-CH W.W. Blackwell, Baker, Oregon, desires to sell or lease copper property on the Imnaha River about 7 miles north of Imnaha, Wallowa County, Oregon. The owner states that 9% copper ore shows in surface workings.

62-CH E. G. Kingwell, with Abrams & Ellis Incorp., 409 Masonic Bldg. Salem, Oregon, is a mine broker and is interested in all metals produced in Northwest. He desires to get in touch with anyone having a good mine prospect requiring development or a property for sale.

ROVER, MOVE OVER

by
Earl K. Nixon

They come to me frequently, daily; sometimes singly, at other times in pairs or trios. Occasionally a covey will wing in. They employ divers manners of approach, none comforting to me.

Most come personally to unburden across my office desk, or while I'm in the field; some telephone, a sprinkling telegraph, and numbers write letters the lengths of which, I suspect, is quite likely to be in inverse proportion to the suffering of the writers. This afternoon (honest) while spending an hour for general physical (and to a lesser extent, mental) investigation by my favorite physician- my pathologic symptoms having arisen perhaps from recent excesses in line of duty pertaining to the encouraging of strategic mineral production, - I received no less than three long distance calls- one from another State- all of the same tenor.

Some of the communicants merely curse while others lament; a few deride, but most of them in plain disgust merely state bluntly in accepted Western vernacular that, so far as the direction of mineral raw material production in this War Emergency goes, "SOMETHING IS ROTTEN IN WASHINGTON". (I'm giving their story, not mine.)

They say it in all variety of ways - most of them bordering on the profane, but the versions all add up to the same thing. There is little question about the conviction of the tellers. "They", by the way, are citizens- and, I suppose, voters- of California, Oregon and Washington who are addicted to the business of mining. "Business of mining!" We used to be proud of that term, but now look at the damn thing!

I'm neither father confessor nor wizard nor Merlin, - just a rough-neck mining-geologist, employed by the State to minister to mining and geological ills, and incidentally employed also by the government in a minor way. The latter consideration, it appears, is largely responsible for my being expected to preside at a sort of Court of Inhuman Relations. Anyway, I "give" whether on the doctor's table, in the bath tub or at way points; and derive certain satisfaction, and much fatigue, from affording non-paying customers the chance of venting their enlarged spleens or of asking a favor arising from a gripe.

If one were to believe the allegations or suspicions of my visitors and correspondents, he would conclude that the people in Washington who run the mineral affairs of the government in this emergency are unusual persons indeed. They are classified variously- sometimes whimsically, sometimes contemptuously- into a number of species. Almost any of these species, it seems, when serving with the government on mineral production matters, are anathema to Mr. Visitor-Miner. He would swear on a stack of Bibles as high as the cost of democracy that nobody in Washington could tell a jackhammer from a muck stick.

A WPB official in Washington, I gather, is supposed to know all, see all, believe all, and do all, - and do it right now, TODAY; "but never does:" - And, it is claimed, he tells nothing, whether he is supposed to or not, or whether or no it would help matters with the mineral producer.

My inquirer, it seems, has "written to Washington" and received a reply suggesting that he should obtain the desired information by writing Mr. Ixnay, Chief of the Promethium Section of the Heavy Liquid Branch of the Department of the Exterior. An air-letter to Mr. Ixnay brings the answer in a couple of weeks, that the inquiry should have been addressed to Mr. Buxtoop, Deputy Director of the Girdle Section, Pyro-Textile Branch, of the Federal

Chiffonier of Public Robes. My inquirer was a little uncertain about names, but never mind. A few more exchanges of letters over a period of weeks has caused my visitor to conclude that Washington is a booby-hatch or that it isn't interested in answering his question about how to make rubber out of coal and swamp water. So he comes to me and tells his story. Dear God, why couldn't I have been born a bull frog so I could dive under a lily pad?

But such cases are rare. More often, Jerry Doe, who has a babbit metal operation up near Tom Cat Lake, 'phones in that the crank shaft of his compressor has busted. He's wired to Denver for a new one to come air-express; the company has wired back asking for a priority; he wired, in effect, 'To Hell with the priority, send the crank shaft'. They say, 'No can do. Get priority from Washington.' He wires Washington, and Washington wires back that they are sending Priority blanks. (They come ordinary mail.) He hasn't received the blanks yet, and to say merely that he is 'fit to be tied', would be like averring that Hitler is 'a bit of a bounder'. Then, while Jerry is coming over the mountain to take in food for the crew, the gears go out of his truck- and no gears his side of Seattle. How Jerry would like to entertain the War Production Board, the Priorities Division, et al., up at his camp until the compressor is going again! He'd feed them cyanide biscuits, litharge pudding, and 100-W coffee until they learned what it takes to produce babbit metal out of the ground!

Or Dominic McSwithy 'phones from some hundred miles down the line that he's dumped 25 tons of chromite at the new government retail stockpile, and that it assayed .2 of a percent below grade. The engineer would like to have McSwithy take the rock out of the yard. McSwithy's bloodpressure hits a new high for the season. There is a misunderstanding, which the engineer straightens out in a day or two. But McSwithy wants to know of me if MacArthur has to write a letter to Washington whenever he wants to load his gun. (How the Hell should I know? Maybe he does.)

Or Jim Crow, who turns out bottles per day of quicklead, ran the gears out of his cat and can't keep the road to the mine clear of snow. Yes, he has a priority serial number, but there aren't any gears. Peoria may have them in a few weeks if the Army doesn't take them. In a few weeks! And it costs \$600 per day to keep the mine going. And Mr. Blickes talking about lowering the price of quicklead!

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So I demur, and temporize with my friends in some such vein as....."You know, we workers, citizens, taxpayers, and voters, have, through the last 160 years developed a most remarkable economic, industrial and political system in the United States. Right or wrong, our system has gotten results, - the country's progress, wealth, and resources demonstrate that. In this development, we have built up a tremendous and ponderous system of checks and double-checks to govern the actions of government employees and officials in Washington. Under the system, we the wide-eyed people of the wide open spaces have come to feel that a reasonable portion of our tax contributions have a chance of coming within a row of apple trees of being spent honestly and in the approximate manner we desire. It's our system; we put it in. It wasn't started over night by a dictator. So, it's our responsibility. We did it in normal, or peace times, and in such times it has worked well. Tie our system up in a package and try to characterize it, and 'red tape' would be the only word you could summon. We tolerate red tape in normal times, knowing it may serve some purpose.

"Now, suddenly we find ourselves in a war emergency; we are caught literally with our plants down; we aren't geared to producing, or acting, or even thinking rapidly. A change of pace doesn't come naturally or easy. When we do begin to get going, we find ourselves burdened down with that ponderous government machine, designed and rated for peace time operation, but with its gears plugged with red tape. Without eliminating red tape you can-

not obtain faster timing; without faster timing, the result may be disaster.

"There is no question but that the government agencies in Washington are trying desperately to reduce red tape, cut out duplication of effort, and by-pass some of the double-checks we would demand in normal times. But in many cases they are obliged by law to follow certain courses. The War Department, it appears, is still plugged with a lot of red tape to a large extent. And War Department approval is still tied in with WPB and other agency operations. The result is delays. Add the effect of the politicians, the pressure groups, and some isolationist feeling and the answer is more delays. Anyway, it's our own system and we will have to sleep with it until we can shake it off for purposes of this emergency. Jerry will have to wait for his crank shaft....."

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Western people in general and miners in particular are very human mortals. They're realists, a bit earthy at times, but genuine in feeling, literal in concept, and direct in both logic and action. They are on the whole, deeply patriotic, in a very impersonal way. They have too much pioneer blood to be otherwise. Their ancestors struggled across the plains or sailed 'round the Horn, and made this a Whitemans' country out of an Indians' wilderness. (There are still a few Indians and an occasional Republican out here, but you seldom hear much about either any more.)

Mining people seem really to appreciate the land, the soil in which things grow, and the rock underneath, more than other breeds of humans. They would. It's their domain, their source of livelihood. It and the peaceful possession of it, mean their existence. They are not so concerned with the complexion of the current administration or its personnel in Washington, so long as their land and livelihood are neither jeopardized nor interfered with too much. We, in Oregon and Washington have often thought that when they drew the map of the United States that we barely got under the wire, and we've wondered sometimes if it would have made much difference if we hadn't. We've pretty much pushed our own wheelbarrow through the years. The industrial East has been happy to keep us as customers and not otherwise. Then some hardy recent explorer reported to the Great White Father, the Columbia River with a lot of potential water power going to waste, and we have had a lot of attention ever since. We'd gamble our rubber tires against a donut that few adults east of the Alleghenies can tell you which is closer to Japan, Oregon or Pearl Harbor.

Now, we are in a war. We on the West Coast feel that we are slightly under the gun. When we used to go to the beach before tire rationing, we'd look out over the Pacific and say, "you can almost see the yellow so and so's out there." There's nothing between us and Japan but some flat water, - anybody's water. Are we afraid? Hell, no! Last week a town near the Oregon coast made a formal petition to its County Judge to get a road cut from the village down to a certain broad, land-locked beach, - so they can get at and lick the pants off the Japs if they land there.

But nevertheless, we want to be prepared. We want the implements with which to defend the country, and especially our part of it. We've had too many promises and too many delays on the part of Washington so far and we're tired of it. We've been at war five months now, since Pearl Harbour. Washington is discovering that it doesn't take merely new buildings, mechanics, and machines to turn out planes and ordnance, -- it takes iron and magnesium and copper and chromite and zinc and quicksilver that have to be dug out of the ground. More than was ever dug out before, and more rapidly! If the government needs chrome for armor plate and copper and zinc for shell casings, quicksilver for detonators, and iron ore for steel, we want to tie in and dig the ores out of the ground without waiting on red tape, political expediency, or completion of gentlemen's arrangements in far-away Washington.

We want facilities and machinery with which to dig our ores out; and access roads to make the deposits accessible. And we want smelters and furnaces to treat our ores - plants of the type and size, we hope, that may carry on in normal times; we want them in "our country" - not on the other side of the mountains; and we don't want to wait until it's too late for these things.

We are not asking for great profits on our operations; we know that nobody is going to make any considerable profit in the future. We'd like just enough incentive to allow us to feel that what we develop now, we can depend on for a living after the war (if we win the war). We want to develop and produce our minerals NOW as a contribution in this emergency.

One mad-hat remarked that, "If we win this war, - which we have been losing rapidly so far - it will be in spite of Washington rather than with the help of Washington."

That is the story of a lot of mining people in the three coastal States as it comes to me. It's their story, not mine. I've just tried to do a job of honest reporting on ideas of a cross-section of miners, engineers, and operators.

Now, as to my own story, well, I may write that as a sequel to this one of my visitors and communicants, if I feel the urge sometime.

Anyway, Washington, You're in the dog house with these people, the miners. Move over, Rover.

GREATEST EARTH MOVER

Man's efforts in large scale mining and in excavating large quantities of rock are dwarfed by nature in erosion by streams. The enormous quantity of material moved by streams is shown by a release May 2, 1942 by the U. S. Geological Survey, part of which is quoted as follows:

"SUSPENDED MATTER IN THE COLORADO RIVER, 1925-1941

"The Geological Survey has made measurements of the loads of suspended matter carried by the Colorado River at Grand Canyon, Ariz., during the 16-year period from October 1, 1925, to September 30, 1941, and for shorter periods at other places in the Colorado River drainage basin. The annual loads of suspended matter at Grand Canyon ranged from 50,300,000 tons in 1933-34 to 480,000,000 in 1928-29, and the mean annual load for the 16-year period was 200,200,000 tons."

The suspended matter referred to does not include dissolved salts, which would mean an additional large quantity of mineral taken from the crust of the earth.

SUSPENSION ASSESSMENT WORK

According to a telegram received by Senator Charles L. McNary, H.R. 6604 which provides for suspension of annual assessment work on mining claims has passed both houses of Congress and now awaits the President's signature.

H.R.6604 was introduced by Representative O'Connor of Montana and suspends assessment work for two years beginning July 1, 1941 and ending July 1, 1943.

UNUSUAL MANGANESE MINERAL FOUND IN OREGON

Neotocite, a hydrous manganese silicate, was recently discovered in Oregon by Randall E. Brown, Junior Geologist for the State Department of Geology and Mineral Industries. This mineral forms the principal part of a manganese deposit in southern Curry County, and is distinctive in that it is believed to be the first recorded occurrence of neotocite in Oregon. The mineral is not uncommon in the manganese areas of the Olympic Peninsula in Washington and in the Sierra Nevada of California.

Neotocite is a manganese mineral of indefinite composition, essentially $x\text{MnO} \cdot y\text{SiO}_2 \cdot z\text{H}_2\text{O}$. Iron is usually present, replacing the manganese. It is dark brown to liver brown in color, has a hardness between 3 and 4 and a specific gravity of 2.8. It is an amorphous mineral, colloidal in character with conchoidal fracture and a resinous luster. Weathering alters the mineral to black manganese oxides on seams and fractures.

The neotocite occurs in a chert lens, similar to other manganese deposits in the southwestern part of the State. Normally bright red jasper accompanies the manganese and has been replaced by the neotocite. Some of the siliceous material resembles the jasper even to the fine grained structure, yet weathers to a black manganese oxide, as does the dark brown material.

Lack of sufficient exposures prevented a detailed study of the deposit, but it appears that the neotocite was probably derived by the alteration of primary silicates of manganese, probably rhodonite.

PALEONTOLOGY
a
PRACTICAL SCIENCE

What? Paleontology a practical science?

Seems doubtful, but let's look at the record.

If people think about it at all, they loosely catalogue paleontology along with archeology as "long haired" stuff dealing with very ancient lore- of no present use - a study taken up by well-meaning but slightly queer college professors who dwell in the long, long ago.

Collecting dinosaur eggs from the Gobi Desert may appear to us as news, but we never think that there may actually be a "dollars and cents" value to that information. The finding of elephant or camel or rhinoceros bones in the eastern Oregon deserts may impress us enough so that we give a fleeting, wondering thought to the scene of past days; but we never think that this knowledge may be worth something to the citizens of the State. And the multisyllabic latin names they tack on to these animals are enough to scare anyone from further interest in the subject! Even the biologists, geologists and doctors, and engineers who actually make use of paleontology in their everyday work, frequently do not realize to what a tremendous extent the advancement of their own science depended and still depends upon the science of paleontology.

Just what is paleontology? Most people have an idea that it is the study of fossils... which is correct. It is more than that, however; it is the interpretation of all the processes and habits and environments of the life of the past, as evidenced by the fossils, which themselves have been defined as "any recognizable traces of past life". A footprint of a dinosaur is a fossil. A bore-hole made by an Archean worm is a fossil. Each of these is just as much a fossil as is, for example, the complete skeleton of a saber-tooth tiger

recovered from the Rancho La Brea tar pits.

Let us make a brief survey of time intervals of life in the past. We can go back 400 years in American written history, and about 2500 years in European history. Egyptian history, since deciphering of the Rosetta stone, enables us to go back (in that one small locality on the earth) as far as 7000 years ago. Beyond that our knowledge of the past enters the realm of the archeologist, who digs up remnants of human bones and huts and castles and mounds, restores artifacts and potsherds, and can tell us something about the human race which existed as far back as the "Eolithic" maybe half a million years ago.

From then on, for the next half billion years, we must depend on the paleontologist for our story of past life. Before that time we find no record at all of life on the earth.

It is a basic fact that certain types of fossils are found only in their characteristic geologic horizons. Thus, when one finds the coiled ammonites, such as are found in the Mitchell-Suplee area of Central Oregon, it is reasonable to assume that the age of the formation yielding these forms is in the Mesozoic. Further study of the ammonitic forms will reveal the age to be of Triassic, Jurassic or Cretaceous, since each of the three periods composing the Mesozoic era are characterized by distinct forms.

At the close of the Triassic, all forms living during that time died and were replaced by forms characteristic of the Jurassic. Toward the close of the Jurassic period, the genera and families decreased in numbers, and by the close of that period, had become extinct. During the Cretaceous, other and more complex genera became dominant. Incidentally the sudden extinction of the ammonites at the end of the Cretaceous is one of the most remarkable phenomena in the history of the organic world, and one as yet without explanation.

What, then, are the applications of paleontology? Foremost of all, it is necessary in arranging the sequence of past geologic events. Paleontology furnishes us with markers which say "I came before so-and-so" and "I came after so-and-so"; it helps us build up the chronology of the past into a more or less complete history of the events which have taken place, because we can tie these events in with the life which was growing and developing and changing while the events were going on. "Stratigraphy" is the name of the science (whose father is geology and mother is paleontology) of building up this history of the earth, and stratigraphy is the basis for structural geology. This sort of study is essential in design and location of dams and reservoirs; to a lesser degree is it used in highway construction and foundation plans.

Probably the most important commercial use of paleontology is in exploration and correlation of oil structure. In such work detailed studies are made of large (macroscopic) and small (microscopic) fossils found in the drill cores. The correlation of geologic horizons and knowledge gained by these studies directly controls the drilling programs. Foraminifera (micro-fossils) are used as a criteria for determining the age of the sediments associated with productive oil horizons. Each stratum has its own characteristic foraminifera, and whenever these fossils are encountered in drilling for oil, the formation and its age are immediately ascertained, and the possibilities of finding oil are thereby fairly well known.

The relation of the paleontologist to the engineer-geologist may be compared to that of the x-ray specialist to the surgeon. To perform a successful operation the surgeon must rely not only on the x-ray picture but on the interpretation of the picture by the specialist. So does the geologist call in the specialist to tell him how old the rocks may be and "which happened when".

Speaking of the surgeon and physician leads us to the fundamental concepts of development of life. A large portion of the evidence for such concepts is based on the work of the paleontologist. The gill-slits in the human embryo are only one evidence of the "life of the individual repeating the life of the race" in its development.

Biologists tell us that a clear understanding of the functions of many of the so-called non-essential organs found in the bodies of present-day humans and animals can be interpreted only by facts revealed by the paleontologist who has shown that these degenerate organs were essential to life in past geologic ages.

PRIORITIES

According to the American Mining Congress Information Service the War Production Board has asked that a form attached to the A.M.C. bulletin dated April 10, 1942 be brought to the attention of metal producers throughout the country. This form outlines information which the producer must supply the mining branch of W.P.B. in applying for a priority rating on new machinery or equipment, or in applying for an A-1-a rating in the event of actual breakdown or an A-1-c rating to avert impending breakdowns. This form supplied by the A.M.C. is reproduced below:

METAL MINES

REVISED OUTLINE OF INFORMATION

FOR RATINGS UNDER PREFERENCE RATING ORDER P-56 AS AMENDED TO MARCH 2, 1942.

Address all communications to: Mining Branch, War Production Board
First Floor, Wing One, Temporary Building E
Sixth Street and Adams Drive, Southwest
Washington, D. C.

All the information listed below is required to support requests for Preference Ratings.

1. Name and Mail address of Company.
2. Mine name, location, and serial number.
3. Total production for last year by metals (in terms of ounces, pounds, tons).
4. Present daily production, or anticipated production if new operation.
5. Machinery or equipment needed with specifications, including manufacturer, type, size, etc.
6. Actual or estimated cost.
7. Name and address of supplier, and name of dealer, if different from supplier.
8. Your purchase order number and date placed.
9. Reasons for purchase of equipment:
 - a. If actual breakdown, state the extent and date of the breakage and the effect of the breakdown upon production.
 - b. If impending breakdown, describe circumstances indicating that a breakdown is likely and the effect of such breakdown upon production.
 - c. If expansion of production or new plant, state increase in production which will result from the new equipment.
 - d. If replacing obsolete or worn-out equipment, state length of life, proposed disposal plan, and salvage value of replaced equipment.
10. If metal alloys or steel plates are included, state type of alloy, size of plates and weight.
11. Rating requested (A-3, A-1-j, A-1-c, or A-1-a) with delivery date promised, both on this rating and on the next lower rating.

SPECTROGRAPHIC ANALYSES

The Department recently received a letter containing questions concerning spectrographic analysis. It is believed that these questions may be typical; therefore they, together with the reply to the letter, are reproduced below:

"Also I would like to know the difference between the two spectrographic analyses-- one \$7.00 for 66 elements- and the other \$3.00 for 2 elements and \$1.00 for each of the remaining 64. I am wondering if the latter is an enlarged portion of the spectrograph of the area occupied by the desired mineral and so more accurate. If that is so would it not be advisable to first have the complete analysis and then if anything shows up of interest another of the localized section?"

"I would also like to know what percentage of an element is necessary to show accurately and if elements in chemical combination in the ore will show on the spectrograph.

"How much of a sample is required and where should it be sent for analysis? Is the regular form for analysis of ores required?"

Department's reply:

"In reply to your letter of April 21st I am glad to answer your questions regarding spectrographic analyses and their cost. The difference between the price of a spectrographic analysis for two elements and a spectrographic analysis for 66 elements is based upon the amount of time and photographic material involved in the analysis desired. The State Department of Geology and Mineral Industries has installed a large grating type spectrograph because it was felt that this type of spectrograph is the only type suitable for mineral analysis where very complex ores and minerals are frequently encountered. Our spectrograph is sufficiently large to spread out the spectrum to such an extent that there is a minimum chance for doubt in the identification of spectrum lines when the spectrum is extremely complicated. However, whenever the spectrum is spread out to a considerable extent it is not practical to design a spectrograph so that the entire spectrum may be photographed by one exposure. Smaller spectrographs photograph all of the usable spectrum in one exposure but in this case it is not possible to analyze samples containing high percentages of certain elements, among which are tungsten, iron, chromium, and many others. It is the general practice to list the elements in groups depending upon which portion of the spectrum is used for the analysis of these elements.

"In our listing, group one includes those elements whose sensitive spectrum lines appear in the ultra violet region; group two those elements whose sensitive lines appear in the middle of the usable spectrum range; and group three those elements whose sensitive lines appear in the red region of the spectrum. If the analysis calls for two elements in any one group it is only necessary to photograph and develop one spectrographic plate, while for the analysis of 66 elements it is necessary to take three separate exposures in three different regions of the spectrum and this procedure necessitates the use of two different photographic plates. In addition to the difference in the photographic procedure it is relatively easy to study the spectrographic plate for the presence or absence of a few elements, while the work involved in searching for the presence of 66 elements is much greater. Because our spectrograph is the largest commercial instrument of its type it is not necessary to enlarge any portion of the spectrogram; because it is a grating instrument we can work in a higher order of magnification and thus have a still greater spread of the spectrum if we feel that it is necessary to do so. Thus the localized section you mention would not be any more susceptible of intensive study than would be the entire spectrum.

"The percentage of an element necessary for the detection of that element varies with the different elements, and there is no general rule covering this subject. In most cases amounts in the order of 0.01 to 0.001% are easily detected. However, in general the metals are more sensitive than the non-metals although some of the metals such as uranium, throrium, cerium, and a few others, are more easily detected by chemical methods. If you wish more specific information regarding the sensitivity of certain elements I will be glad to give you that information on request. The chemical combination of the element does not appreciably affect the accuracy of the analysis although if there is much organic matter present it is generally wise to ash the sample before attempting an analysis.

"The amount of material used in the analysis is quite small, generally not more than a few hundred milligrams but we prefer to have a sample of at least a pound so that we can be surer of a representative sample. Such samples should be sent to the Portland office.

"One matter that may not be clear to you is the price of the analysis. Because we believe that we have one of the finest spectrographs obtainable we have placed the price of our analyses at a slightly higher level than that charged by the various commercial laboratories. That is, our analysis priced at \$7.00 is listed by the majority of commercial laboratories at \$6.00. However, the spectrographic laboratory is a State service and our Governing Board felt that citizens of Oregon should be allowed to use the laboratory at as reasonable a cost as possible; therefore any citizen of Oregon who submits a sample which originated in the State of Oregon is allowed a 20% discount, provided he accompanies the sample with an affidavit stating that he is a citizen of Oregon. Blank affidavit forms will be sent on request. It is not necessary to supply the information as to location required in the free assaying service. If the sender wishes to have an analysis without submitting an affidavit it is not necessary that any information regarding the source of the sample be submitted, but in such cases it is not possible to obtain the 20% discount.

"In case I have not fully answered your questions I will be glad to go into more detail. We welcome visitors at the spectrographic laboratory and I will be glad to discuss spectrographic analysis with you whenever you care to visit us."

H.R.6604

SUSPENSION ANNUAL ASSESSMENT WORK

After printing the notification received from Senator McNary as given on page 43 the Department received the text of the bill which is reproduced below:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provision of section 2324 of the Revised Statutes of the United States, which requires on each mining claim located, and until a patent has been issued therefor, not less than \$100 worth of labor to be performed or improvements aggregating such amount to be made each year, be, and the same is hereby, suspended as to all mining claims in the United States, including the Territory of Alaska, during the year beginning at 12 o'clock meridian July 1, 1941, and ending at 12 o'clock meridian July 1, 1943: Provided, That every claimant of any such mining claim, in order to obtain the benefits of this Act, shall file, or cause to be filed, in the office where the location notice or certificate is recorded, on or before 12 o'clock meridian July 1, 1943, a notice of his desire to hold said mining claim under this Act: Provided further, That such suspension of assessment work shall not apply to more than six lode-mining

claims held by the same person, nor to more than twelve lode-mining claims held by the same partnership, association, or corporation."

PAPER ON MINE SAMPLING

Modern Methods of Mine Sampling is the title of a paper just issued by the Engineering Experiment Station, Oregon State College, Corvallis. The author is Richard K. Meade, instructor in mining engineering, Oregon State College. The paper was originally published by The Compass of Sigma Gamma Epsilon, January 1942, and is now issued as Reprint No. 25 by the Engineering Experiment Station.

Several standard methods of mine sampling are clearly described in the 16 pages of the paper which also contains several illustrations. The paper contains much of value for the small mine operator, the engineer and the prospector.

CLEARING HOUSE COLUMN

62-CH E. G. Kingwell, with Abrams & Ellis Incorp., 409 Masonic Bldg. Salem, Oregon, is a mine broker and is interested in all metals produced in the Northwest. He desires to get in touch with anyone having a good mine prospect requiring development or a property for sale.

63-CH Mrs. Robert Lundborn, Route 2, Box 419, Gresham, Oregon, phone, Gresham 5604, wishes to sell or lease productive coal land in Castle Rock coal district, Washington. Location is 4 miles from Castle Rock; area, 160 acres. Coal is sub-bituminous grade; heating value 9000 to 10,000 B.t.u.'s. Coal beds are close to Cowlitz River and owner reports coal could be barged to Longview or hauled to railroad at Castle Rock.

OREGON ITEMS OF MINING NEWS

The hottest thing in the State just now in the way of mining--and that would be of course in line with strategic mineral production--is exploration of chromite, and the hottest chromite area is in the Coos Bay district. Between Marshfield and Gold Beach in Coos and Curry Counties, there are no less than seven groups, big and little, developing the chrome-bearing sand. None of them is advertising what he is doing because they don't want to be pestered by salesmen, book agents, and beach combers. Five or six drills have been operating in the district. One geologist of the U. S. Geological Survey has been mapping and giving particular attention to the beach deposits.

Geophysicists (Geophysical Division of the U. S. Geological Survey in cooperation with the Oregon Department of Geology and Mineral Industries) have been doing magnetometer work in the area a few miles back from the present beach--extending known chrome-bearing lenses. The U. S. Bureau of Mines has had two men in the district for a brief investigation to plan a drilling campaign which should start after July 1st. Out of all this, we anticipate that two or three chrome concentrators will be in operation well before the end of this year.

The U. S. Bureau of Mines has been exploring and drilling the Scappoose iron deposits in Columbia County, 25 miles northwest of Portland, for the last three or four months. Completion of the job will require another month or six weeks we understand. The results are expected to indicate the presence of a few million tons of minable grade limonite iron ore.

The U. S. Bureau of Mines is carrying out a diamond drilling exploration at the Black Butte quicksilver mine east of Cottage Grove. This started recently, and we have not been informed as to the length of the project.

The U. S. Geological Survey is understood to be ready to place a party of geologists in the State under Dr. A. C. Waters within the next month. The party will confine its attention to quicksilver and center activities in the beginning near the larger producing mercury mines.

The U. S. Bureau of Mines with cooperation of the U. S. Geological Survey has for the past month been investigating high-alumina clays in the Willamette Valley and along the Columbia where such clays were investigated and reported on by the Oregon Department of Geology and Mineral Industries five years ago, then engaged in its refractory clay studies. The purpose of this work, we are informed, is to have advance information on the location, tonnages, and alumina content of deposits that may be worked when, and if, a commercial process is developed for the manufacture of metallic aluminum from such materials. Exploration and drilling, we are informed, started on this project, at a deposit of high-alumina clay near Castle Rock, Wash. For the last month, however, the Survey has been working principally in the Molalla area southeast of Portland, where we understand drilling activities will follow.

The Oregon Department of Geology and Mineral Industries is making a reconnaissance study in the Snake River canyon area near the mouth of the Imnaha River.

A Department junior geologist is completing the mapping of the Ironside quadrangle near Unity, Oregon for his doctorate thesis. Geological mapping of a 15-minute quadrangle southeast of Baker will be undertaken about July 15th with particular attention being paid to the economic possibilities of a known tungsten occurrence in the Chicken Creek district.

Two geologists of the Department recently made a reconnaissance study and geological map of the newly discovered locality of nepheline syenite at Table Mountain in Lincoln County near the coast. The particular point of this work was to determine whether there might be deposits of true bauxite or aluminum ore that might have developed from weathering of the syenite. The answer seems to be "no".

Pat O'Brien and associates are developing the Kohler Mine, located three or four miles east of Baker. They expect to ship a car of ore late this month.

Mr. Grabner is actively developing the Cliff Mine about seven miles northeast of Baker. This is a gold-tungsten-antimony property. Preliminary sampling by Department engineers indicate a fair possibility that the old dumps may warrant retreatment, and that the deeper workings of the mine contain possibilities for sheelite production.

A group from San Francisco has recently undertaken the exploration and possible development of the Tyrrell manganese property on Lake Creek, about fifteen miles east of Medford. This is a property that produced metallurgical grade manganese concentrate during the first World War. The manganese mineral is mainly manganite occurring in brecciated tuff. The deposits are low-grade, but may be large. The ore appears to be amenable to mechanical concentration.

Messrs. S. J. and E. P. Merrick are continuing development and mining of antimony ore at the Blue Jay property twenty miles southwest of Medford.

A number of hardrock chromite operators are beginning to truck ore into the Metals Reserve-R.F.C. retail stockpile at Grants Pass. A series of late spring snowstorms and rains has delayed shipments materially.

The Government purchasing depot at Coquille was ready to receive ore on May 25th. A fair tonnage of hardrock chromite is expected to come to this depot mainly from the Powers district and to a lesser extent from down the Oregon coast, south of Bandon.

The Whiting Number One and Blue Ridge quicksilver properties in the Ochoco district are being operated by Col. J. A. Maller as Cinnabar Mines, Inc. After some delays caused by bad weather and transportation difficulties the operation is now getting into production.

The Oregon Department of Geology and Mineral Industries has been delayed by bad weather in starting a project to study the geology and possibilities of vanadium occurrences. The presence of this highly strategic element was recently discovered from samples tested in the Department's new spectrographic laboratory.

RETAIL CHROMITE STOCKPILES

Three purchasing depots in Oregon--one at Seneca, one at Grants Pass, and one at Coquille--and a fourth at Yreka, Calif. have been established by Metals Reserve Co. for the purchase of chromite ore. Although truckload lots will be sampled as delivered, minimum lots to be paid for is 10 tons. This arrangement was designed to assist the smaller operators who could not make large contracts with the Government. The program was approved in Washington the last week in February, largely because of the efforts of the Director of the Oregon Department of Geology and Mineral Industries. We wish to make it perfectly clear that after formal approval of this program was given by the Board of the R.F.C. and Metals Reserve Co. in Washington, all details and mechanics of buying, sampling, and assaying, as well as settling with the producers were left to the engineers of the R.F.C.; the Oregon Department of Geology had no part in the setting up of the program after it was once approved. It has taken three months for the R.F.C. engineers to put the program into effect, and there are still difficulties in the arrangement that should be straightened out. The Oregon Department has been severely criticized by producers because of delays and poor handling of purchasing, sampling, and assaying details with which the Department had no connection. We would like to make it perfectly clear that, after getting the program approved in late February, the Department for obvious reasons washed its hands of the program setup in order not to embarrass Metals Reserve and R.F.C. We must therefore deny any responsibility for the mishandling of the various details of the arrangement as alleged by chrome producers. We have, as a matter of fact, from time to time made suggestions and constructive criticisms direct to Washington intended to alleviate some of the difficulties, but we must deny responsibility for any failure on the part of R.F.C. and Metals Reserve to make good on their promise to carry out "promptly" the program of retail chromite purchasing.

In spite of determined efforts on the part of at least three parties working together--Senator Holman in Washington, the Bonneville Administration, and the Oregon Department of Geology and Mineral Industries--it appears that "forces" in Washington are determined to block the program for a Pacific Northwest electrolytic zinc smelter. A new tack is now being followed, but in the light of the present objection to approval by the Government of any plant development that cannot be finished and operating by mid-year, 1943, the possibility of obtaining Federal approval of this smelter issue seems somewhat unlikely.

MINING PRIORITIES

The War Production Board has established a so-called "Mining Section". This apparently will be devoted almost exclusively to matters relating to priorities on mining equipment and supplies. The Section is under Dr. Wilbur A. Nelson who is head of the Priorities

Division. It appears that mining priority service offices are being established in several of the western states with headquarters centralized at Denver. Mr. Lee Hinkley of the Denver office, which has just been set up, visited Portland recently, conferred at length with Earl K. Nixon, mainly in regard to mining priorities, and expressed his intention of assigning a mining engineer to an office to be set up in Portland within the next few weeks. Office space, it is understood, will be taken in the offices of the War Production Board's general priority office in Portland.

Under the new set-up matters concerning inventories of mining equipment purchased under priorities will be referred to the field engineer who also will make physical inventories at the mining properties where it is deemed necessary. He is expected to give direct service on acquisition and transfer of mining equipment under the current rules and restrictions to mining operators. Thus considerable detail will be taken from the various State Emergency Coordinators who nevertheless, we understand, will retain their status and be in a position to assist producers in obtaining serial numbers and special consideration in cases of urgency.

COAL FOR OREGON ARMY CANTONMENTS

United States Bureau of Mines has recently advised the Oregon Department of Geology and Mineral Industries that the War Department is disposed to use coal from Washington and Oregon for the Army cantonments at Medford and Corvallis, Oregon. Shipping facilities to Pacific Coast points are understood to be desired for other commodities if coal can be supplied locally. The question now is whether or not Oregon and Washington can supply the necessary quantity of coal, namely 140,000 tons annually - 70,000 for each cantonment. It is believed that Washington could supply probably 50,000 tons of such coal. Mines in Washington are in a better state of development than are those of Oregon. How much Oregon could supply is uncertain. The most likely point of production is the Coos Bay district where a few properties are in small production only. They are turning out only a matter of 7000 or 8000 tons annually.

The Oregon Department of Geology and Mineral Industries immediately took the matter up with local leaders in Marshfield and Coquille to try to devise ways and means of increasing the production of this relatively undeveloped field. We believe that no great difficulty would be met in obtaining R.F.C. loans for the development of some of these coal properties if competent operators are disposed to start the ball rolling. One difficulty is the time element which allows little delay, and another is that operators are somewhat loath to develop their mines without first having a satisfactory idea of the price they could obtain for their product. The War Department presumably will buy whatever coal they use on straight bids. Coos Bay operators, not having thoroughly developed properties so that advantage can be taken of low unit cost on the basis of substantial production, cannot accurately anticipate their costs, especially in the light of the present scarcity of labor and difficulty of obtaining promptly the necessary mining equipment and supplies.

Governor Sprague assigned his Executive Secretary, David Eccles, whose duties recently have been in connection with the War Industries Board, to work with the Oregon Department in trying to help the operators in the Coos Bay district with problems presented by the Army's need for coal. It is too early yet to see what the outcome of these efforts will be.

SUSPENSION OF ANNUAL ASSESSMENT WORK

H. R. 6604 passed by Congress and approved by the President May 7 reads as follows:

" (Public Law 542--77th Congress)
 (Chapter 294--2d Session)
 (H. R. 6604)

AN ACT

"Providing for the suspension of annual assessment work on mining claims held by location in the United States, including the Territory of Alaska.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provision of section 2324 of the Revised Statutes of the United States, which requires on each mining claim located, and until a patent has been issued therefor, not less than \$100 worth of labor to be performed or improvements aggregating such amount to be made each year, be, and the same is hereby, suspended as to all mining claims in the United States, including the Territory of Alaska, during the years beginning at 12 o'clock meridian July 1, 1941, and ending at 12 o'clock meridian July 1, 1943: Provided, That every claimant of any such mining claim, in order to obtain the benefits of this Act, shall file, or cause to be filed, in the office where the location notice or certificate is recorded, on or before 12 o'clock meridian July 1, 1942, and July 1, 1943, a notice of his desire to hold said mining claim under this Act: Provided further, That such suspension of assessment work shall not apply to more than six lode-mining claims held by the same person, nor to more than twelve lode-mining claims held by the same partnership, association, or corporation.

"Approved, May 7, 1942."

It is noticeable that the specified maximum number of claims which may be exempted appears to apply to lode-mining claims only. Authoritative opinions have been expressed (1) that there are no restrictions on the number of placer-claims which may be exempted, and (2) that placer-claim owners would have the same restrictions as lode-claim owners. Probably the safe procedure for placer-claim owners would be to file within the same limitations as those given for lode-mining claims.

NEW BULLETIN ON STEENS MOUNTAINS QUICKSILVER
 AREA IN SOUTHEASTERN OREGON

The U. S. Geological Survey has just issued as Bulletin No. 931-J a bulletin entitled "Quicksilver Deposits in the Steens & Pueblo Mountains, Southern Oregon" by C. P. Ross covering reconnaissance survey carried out last summer of the quicksilver possibilities of the Steens Mountains in southern Harney County, Oregon. As no topographic maps have ever been made of this area, the Geological Survey had the area "flown" and photographed by plane. The photos were reduced to a mosaic and this used for a ground control for the Geological Survey. A number of very interesting air photos of the area appear in the bulletin. Because of the arid nature of the country and general lack of heavy forests, the air photo "map" afforded sufficient control for the geologic mapping. This could not be done in most of Oregon west of the Cascades because of the heavy forests which obscure details of topography and physiographic features.

Ross gives an excellent description of the geology and in his coverage of economic possibilities expresses the opinion the area is worthy of further investigation.

MINE SURVEYS VOTED FOR OREGON

Expanded mineral exploration work is expected to result from earmarking \$32,000 by the senate committee on appropriations for geophysical work in Oregon.

F. W. Lee, chief of the geophysics section of the geological survey, said work could be carried on simultaneously in several parts of the State. Four exploration field parties and an office in Portland are expected to be added.

Grants Pass Courier, May 26, 1942.

STATE MAY LEASE CHROME SANDS

The state highway commission agreed today to confer with the state land department to decide who has jurisdiction over chrome-bearing sands on southern Oregon beaches and who can turn them over to mining interests on a royalty basis.

Prof. G. W. Gleeson of Oregon State college testified that from Marshfield south the beach sands carry between five and six per cent chrome; that with development of the centrifugal mining machine it can be extracted profitably.

He wanted the commission to arrange to make the sands available to mining interests between high and low water.

The commission promised to try to determine whether it has jurisdiction before its next meeting.

Grants Pass Courier, June 4, 1942.

HEARINGS ON SMALL MINE LOANS ARE SET

Hearings before the senate banking and currency sub-committee on S-1388, sponsored by Senator McFarland of Arizona and 16 other western senators, have been postponed to June 9 because of the absence of several of the sponsors in the west.

This bill would authorize the Reconstruction Finance corporation to lend, upon the security of a lien upon ore or mineral development and an agreement to apply 10 percent of returns to repayment of the loan, not to exceed \$5000 to any one borrower, for the purpose of financing the unwatering, retimbering, making accessible or preliminary development of mine workings, or the sampling or assaying of ore therefrom, when, in the opinion of the RFC, the expenditure may make accessible, or reveal, sufficient mineral showings to warrant.

Baker Democrat Herald, June 2, 1942.

How to know Minerals

"How to know Minerals" is a most interesting course in elementary mineralogy that amateurs and collectors should not overlook. It is a correspondence course by Dr. A. J. Walcott, 4029 N. E. 79th Ave., Portland, Oregon. Write to him.

From Mineral Notes and News, the California Federation of Mineralogical Societies.

CLEARING HOUSE

- 64-CH Alfred A. Wright, 135 S. Olive St., Los Angeles, states that he has several inactive mining properties in Oregon and desires to sell.
- 65-CH P. L. Yarbrough Company, Congress Hotel, Sacramento, Cal., presents the following:
For Sale: Large placer field, glacial formation, 88 claims, testing 70¢ to \$6.55 per ton, no clay or adobe, no boulders, abundance water and wood. Located between Medford and Crater Lake on Crater Lake Highway, southern Oregon.
- 66-CH Powell Creek Mining Co. - Leon C. Osteyee, secretary, 580 Market St., San Francisco, wishes to sell mine equipment consisting of 160-c.f.m. portable G-D compressor, drifter, stoper, 3/4 yd. mine car, blasting machine, blacksmith outfit, 8" galv. ventilator pipe, 2000 feet mine rails, 2000 feet of 3/4" and 1" iron pipe, ore sacks, and miscellaneous tools and mine appliances.

The following release contains the latest specifications and rules for Government purchase of chrome and manganese ores at Metals Reserve Company purchasing depot.

METALS RESERVE COMPANY
WASHINGTON, D. C.

June 1, 1942

INFORMATION CONCERNING PURCHASES OF SMALLLOTS OF CHROME AND MANGANESE ORESSuperseding Circular dated March 5, 1942

In order to stimulate production of chrome and manganese ores from small deposits located in the United States and to provide a ready market for such ores, Metals Reserve Company (herein sometimes called "Buyer") has arranged to purchase from the producer (herein called "Seller") chrome or manganese ores in lots containing a minimum of ten tons. The terms and provisions of this Circular will be effective until April 1, 1943.

PURCHASE DEPOTS: Such lots (not less than ten tons to each lot) of chrome or manganese ores may be delivered in one or more than one load and, subject to the provisions of this Circular, will be accepted at Purchase Depots established by Buyer. Payment will not be made until an entire minimum lot of ten tons (or more) has been delivered and accepted. Ore or concentrates delivered to Purchase Depots under the terms and provisions of this Circular will not be accepted as delivery under, nor will same be applied against, contracts entered into by Metals Reserve Company. Purchase Depots, where Purchasing Agents will be available, are listed on sheet attached to this Circular.

A. SPECIFICATIONS OF CHROME ORES: Purchases of such ores will be limited to three grades of the following specifications:

	<u>"High Grade"</u>	<u>"Low Grade A"</u>	<u>"Low Grade B"</u>
Chrome (Cr ₂ O ₃) - Minimum	45.0 %	40.0 % (*)	40.0 % (*)
Silica - Maximum	11.0 %	13.0 %	No Maximum
Phosphorus - Maximum	0.20%	0.50%	No Maximum
Sulphur - Maximum	0.50%	1.00%	No Maximum
Chrome (Cr) - Iron (Fe) Ratio - Minimum	2.5 to 1	2.0 to 1	No Minimum

* Under "Low Grade A" and "Low Grade B", chrome will be accepted to 35.0% minimum under penalties hereinafter prescribed.

1. CHROME CONCENTRATES: Are acceptable under the schedule of prices, terms and conditions herein.

2. SIZE OF ORE: None in excess of 12 inches.

3. PRICE: Effective June 15, 1942, purchases will be made in accordance with the following schedule (all prices quoted being per long ton - 2,240 pounds avoirdupois - dry weight delivered at Purchase Depot):

"High Grade" - Base price, \$40.50 per long dry ton for ore containing 45.0% Cr_2O_3 , and with a ratio of chrome (Cr) to iron (Fe) of 2.5 to 1; with an increase of ninety cents (90¢) per ton for each unit (22.4 pounds) of Cr_2O_3 in excess of 45.0% Cr_2O_3 ; with an increase of one dollar fifty cents (\$1.50) per ton for each tenth increase in chrome-iron ratio to a maximum of 3.0 to 1. (The chrome content of any ore is 68.4% of its chromic oxide (Cr_2O_3) content.)

"Low Grade A" - Base price, \$28.00 per long dry ton for ore containing 40.0% Cr_2O_3 , and with a ratio of chrome (Cr) to iron (Fe) of 2.0 to 1; with an increase of ninety cents (90¢) per ton for each unit (22.4 pounds) of Cr_2O_3 in excess of 40.0% Cr_2O_3 ; with an increase of one dollar fifty cents (\$1.50) per ton for each tenth increase in chrome-iron ratio to a maximum of 3.0 to 1. Chrome ore containing a minimum of 35.0% Cr_2O_3 but otherwise meeting the specifications set forth under "Low Grade A" will be accepted with a penalty of \$1.40 per long dry ton for each unit (22.4 pounds) of Cr_2O_3 under 40.0%.

"Low Grade B" - Base price, \$24.00 per long dry ton for ore containing 40.0% Cr_2O_3 , with an increase of sixty cents (60¢) per ton for each unit (22.4 pounds) of Cr_2O_3 in excess of 40.0% Cr_2O_3 . Chrome ore containing a minimum of 35.0% Cr_2O_3 will be accepted under this schedule with a penalty of \$1.20 per long dry ton for each unit (22.4 pounds) of Cr_2O_3 less than 40.0%.

B. SPECIFICATIONS OF MANGANESE ORES: Purchases of such ores will be limited to three grades of the following specifications:

		"High Grade"	"Low Grade A"	"Low Grade B"
Manganese	Minimum	48.0 %	44.0 %	40.0 % (*)
Alumina	Maximum	6.0 %	10.0 %	No Maximum
Iron	Maximum	7.0 %	10.0 %	No Maximum
Phosphorus	Maximum	0.18%	0.30%	0.50%
Silica	Maximum	10.0 %	15.0 %	No Maximum
Zinc	Maximum	1.0 %	1.0 %	1.0 %

* Under "Low Grade B", manganese ores will be accepted to 35.0% minimum under penalties hereinafter prescribed.

1. MANGANESE CONCENTRATES: To be acceptable under this schedule must be nodulized or sintered.

2. SIZE OF ORE: None in excess of 12 inches and not more than 25% to pass a 20-mesh screen.

3. CARBONATE ORES: Manganese carbonate ores will be accepted under this schedule only if calcined.

4. BLACK OXIDE ORES: The schedule of prices and the terms and conditions herein refer to black oxide ores of manganese.

5. PRICE: Effective June 15, 1942, purchases will be made in accordance with the following schedule (all prices quoted being per long ton - 2,240 pounds avoirdupois - dry weight delivered at Purchase Depot):

"High Grade" - Base price, \$48.00 per long dry ton for ore containing 48.0% manganese with an increase of one dollar (\$1.00) per ton for each unit (22.4 pounds) of manganese in excess of 48.0%. "High Grade" ore containing not less than 48.0% manganese but otherwise falling below specifications but within the limits hereinafter set forth will be accepted subject to the following penalties:

Iron - Up to 10.0% maximum with a penalty of 1¢ per unit of manganese for each per cent of iron in excess of 7.0%;

Silica - Up to 15.0% maximum with a penalty of 1¢ per unit of manganese for each per cent of silica in excess of 10.0%;

Alumina - Up to 10.0% maximum with a penalty of 1¢ per unit of manganese for each per cent of alumina in excess of 6.0%;

Phosphorus - Up to 0.30% maximum with a penalty of 1¢ per unit of manganese for each 0.03% of phosphorus in excess of 0.18%.

"Low Grade A" - Base price, \$35.20 per long dry ton for ore containing 44.0% manganese with an increase of eighty cents (80¢) per ton for each unit (22.4 pounds) of manganese in excess of 44.0%.

"Low Grade B" - Base price, \$26.00 per long dry ton for ore containing 40.0% manganese with an increase of sixty-five cents (65¢) per ton for each unit (22.4 pounds) of manganese in excess of 40.0%. Ore containing a minimum of 35.0% manganese but otherwise meeting the specifications set forth under "Low Grade B" will be accepted under this schedule with a penalty of \$1.30 per ton for each unit (22.4 pounds) of manganese less than 40.0%.

C. CONDITIONS APPLICABLE TO THE PURCHASE OF BOTH CHROME AND MANGANESE ORES:

1. Fractions prorated in all cases.
2. Each minimum lot (or more) delivered will be graded in accordance with the specifications heretofore set forth (all elements to be within the range specified for the applicable grade) and the price paid for such ore shall be governed accordingly.
3. Seller must, at his own expense, deliver all ore or concentrates to and unload same at Purchase Depot.
4. Buyer will pay the cost of weighing, sampling and analyzing.
5. WEIGHING: The weight of each load will be determined by a Metals Reserve Company weighmaster on scales which will be provided by Metals Reserve Company at or in the vicinity of the Purchase Depot. A weight ticket will be furnished Seller for each lot.
6. SAMPLING AND ANALYSIS: Each lot of chrome or manganese ore or concentrates will be sampled at the time of unloading by a Metals Reserve Company sampler. Analysis will be made by a Metals Reserve Company analyst.
7. PAYMENT: As soon as analysis, including moisture determination, is obtained, settlement sheet, together with check in payment, will be mailed to Seller. Weighing, sampling, analysis and classification by Metals Reserve Company shall be final and conclusive.
8. REJECTION: Buyer will reject any ore or concentrates which do not conform to the applicable requirements and specifications set forth above. Any and all ore or concentrates rejected by Buyer must be removed by Seller within 15 days after mailing of notice of rejection. Any and all ore or concentrates not removed by Seller as above provided may, at the option of Buyer, be removed or otherwise disposed of by Buyer without any liability therefor.

DEPOTS FOR THE PURCHASE OF SMALL LOTS
OF CHROME AND MANGANESE ORES

Arizona: Phoenix

California: Yreka
Anderson
Auburn
Tracy

Colorado: Salida

Montana: Butte

Nevada: Battle Mountain

New Mexico: Deming

Oregon: Seneca
Grants Pass
Coquille

H. R. 7055

A bill, H. R. 7055, has been introduced in the House of Representatives by Representative Serugham of Nevada, "To promote research on minerals in the United States, to establish mining and metallurgical stations in universities and colleges in the several States to aid prospectors and small operators, and to promote utilization of the natural resources of the Nation".

The bill authorizes the appropriation of \$50,000 annually to any State mining and metallurgical station established in connection with a land-grant college for the purpose of "acquiring and diffusing among the people of the United States useful and practical information on subjects connected with mining and metallurgy and to promote scientific investigations and experiments respecting the principles and application of mining and metallurgical science".

The act would be administered by the Secretary of the Interior. The grants of money authorized by the Act are made subject to legislative assent of the State to the purpose of the grants.

The State Department of Geology and Mineral Industries, the Oregon Section of the American Institute of Mining and Metallurgical Engineers, and the Oregon Mining Association have requested Oregon senators and representatives to support this measure.

ONE MAN'S OPINION

Two and a half months ago, the writer turned out a story entitled "Rover, Move Over", written in slightly facetious vein, but nevertheless accurate and serious in its coverage of the material on which it was based. It covered the miners' attitude and included some of their criticisms of Federal agencies. The story was reprinted in the Mining Journal. We stated then that the story was that of the miners, not ours, and we promised our own story as a sequel, when we felt the urge. This, then is our story, not that of the miners.

In the last month we have noted a distinct lessening of criticism by the miners of the efforts of the Federal agencies to increase mineral production, and to effect operating control regulations, in this emergency. This seems to be due to a combination of causes, among which are:

1. A better understanding of the mining priorities set-up by the operators.
2. Smoother working of the priorities arrangement itself.
3. Easing of specifications and somewhat higher prices by Metals Reserve in the cases of some of the more strategic ores.
4. Better weather conditions and less time for "fireside" or "curbstone" mining by operators.
5. More government engineers on the job to service mining and production problems.
6. A more sympathetic attitude of both mine operators and Washington officials due, doubtless, to realization that we are all in a real, sea-going war that won't stop tomorrow, and that requires our best efforts.

Let us first look into the basic causes of the miners' criticisms reported in "Rover, Move Over."

In truth, if you subdue or deny to the Yankee, his privilege of frank, free, and bold discussion of his affairs and ideas, you efface an influence that probably, more than anything else, has been responsible for the development of the country we have built up. In a dictator country, the antithesis of this condition of affairs exists. Such freedom of expression is likely to result in the offender being "liquidated."

However, through the years, it has become the habit of many Yankees - perhaps we should say 'most' Yankees - to take advantage of their rights to vent their spleens; it has, unfortunately, become the great Yankee pastime to criticize, - especially to criticize Washington. It is well known that criticism or approval voiced by the people at large, has tremendous effect on the actions of the Congress, and presumably, but to a lesser extent, on other Washington institutions or agencies. The mere voicing of criticism then, in a democratic country, may have a constructive effect. If so, it is justified. It is at least reasonable to expect that the institutions or leaders criticized should give some consideration to the criticism, in proportion to the spirit, sincerity, and accuracy employed by the critics.

In the case of the miners' criticism this spring, much of it was true, much of it was blindly directed; some of it was based on unsound reasoning, and some on lack of facts. To the miners' credit let it be said that they, possibly even earlier than some of the highest non-technical lay officials of the government, foresaw the necessity of prompt attention to the domestic production of certain strategic mineral materials in order to prevent bottlenecks in the turning out of finished products for war use. On the other hand, the miners have been guilty of much intolerance of the efforts of Washington officials.

This intolerance could have been lessened somewhat, and the entire psychology of raw material production improved, by more frankness and a slightly different attitude on the part of the Washington agencies. In the present instance, the entire situation was not improved by the critical and unsympathetic attitude of some non-technically informed feature writers and commentators. The criticism by technical and industrial journals is commonly of constructive nature and therefore likely to be justified.

There is another underlying cause for recent general criticism by U. S. citizens. It is basic; witness criticism of Churchill's conduct of government. A few months ago - January, February, March - we Yankees were in an unprecedented state of mind. We had suffered a military invasion - had been caught asleep at Pearl Harbor. Partly from deeply injured pride, and partly from anger at the fluke or bit of military inefficiency that let the enemy best us, we were in a defiant mood. The U. S. couldn't seem to get started. Things were going badly in the far east. The losses of Singapore, Burma and Manila came in succession. As individuals we seemed helpless, our efforts ineffective. We were in a why-the-hell-doesn't-somebody-do-something state. Washington, caught off balance, was not organizing quickly enough to suit the people. Information issuing from Washington was often contradictory or too meager. The net reaction on the part of the citizens was to cause them to bluff and bluster, to criticize, to lay the blame for lack of results at someone's door. Washington got it. As a matter of fact, Washington had some of it coming, but that is quite beside the point.

In any event, we have two points that deserve comment: a lack of tolerance on the part of the miners, and a certain lack of frankness, ready cooperation and warmth of attitude toward individuals on the part of some of the administrative agencies. There is no point in rehashing here some of the errors that developed in the judgment used in the early, more chaotic, period of the war effort. The production effort as a whole seems to have been as good as, or even better than, could have been expected within the elapsed time.

The larger mining corporations, judging by criticisms that came to us from some of the leaders, were intolerant because the government agencies could not get action along some lines as promptly as could a private group. That criticism, although quite true as to facts, was, in our opinion, largely unwarranted. Government regulations consist in large part, as mentioned in our first article, of a set of checks and balances for which all of us are responsible. They were set up to provide an orderly and businesslike manner of doing things, and it just isn't in the cards that, in a democracy - even in a war emergency - the system can be tossed out overnight and a new one installed so that we can get optimum results without delays. Although we think a pretty fair job has been done, we would never ask anyone to cease appealing for better results, nor shall we stop snapping at the laggards. Whoever saw achievement equal expectation, anyway, under conditions such as we have now? Let's give the devil his due.

The intolerance of small miners was less soundly based than that of the large corporations. Let us look into this a bit. Take the case of copper, for example. Between 80% and 90% of the copper produced in the United States is turned out by five or six corporations - from 15 mines. These groups had large mines, large reduction plants, large operation personnels, and presumably substantial ore reserves. When it became plain that there would be a shortage of copper the obvious and simplest and quickest and cheapest thing for the War Production Board to do was to start scrutinizing these few very large operations with an eye to upping the copper production. This was done. Quotas were worked out and arrangements presumably made that gave W.P.B. a pretty accurate line on the amount of additional copper that could be depended upon. Another way - a harder, longer, more costly and much less definite way as to possible results, would have been for the W.P.B. to hire dozens of engineers at the outset, to survey every copper prospect in the U. S., spend many millions of dollars exploring, re-opening and developing old mines and new

prospects. That is the way the owner or promoter of a small mine or prospect wanted it, and this kind of reasoning produced a lot of criticism of government agencies. Originally this criticism was largely unwarranted. It now appears, due in part to sinkings in the Gulf of ships bearing copper from the west coast of South America, that a much wider hunt for copper must be made and that a double-barreled program should have been initiated in the beginning; but this does not demonstrate the shrewdness of the little fellows' criticism in the beginning.

The largest percentage of miners' criticisms that came to us was on the part of the smaller operators. That is mainly because the smaller fellows are much more numerous. Some of the most caustic and pointed criticism came from a few of the larger operators. There was a time when, it seemed, everybody was criticizing Washington.

It should be borne in mind that the perspectives of the two mining groups, large and small, are in the main, vastly different. The large mining corporations are in business on a permanent basis; they are part of the going economy of the nation; their plans must be based on many years operations; they must make profits through the years for they have a number of critical stockholders to satisfy; they have problems of operation, taxation, and labor that are extremely complex; regulations and trends such as import duties, metallurgy, and regional power developments affect large operators critically. Small operators, although no less a part of the national economy, have a quite different set of problems. They are on a less permanent basis; they have few or no stockholders to satisfy; their planning is likely to be short range - they are often 'in and outers'; their problems of taxation and labor have been in the past less severe. Their problems are mainly those of financing, marketing, price and transportation. Usually they have not the wherewithal to help themselves. They can't keep representatives in Washington to look after their interests as the large operators can, so they 'take whatever is dished out' and they feel that the dish is pretty well licked clean before it gets to them. They feel that Washington agencies discriminate against them in favor of the larger operators. That is a principal cause for their criticism.

The truth is that members of the War Production Board, for example, are charged with the duty of bringing about the ultimate maximum production, and they, of necessity, must rate the importance of operations to the war effort in some manner or proportion to the amount each operator produces. That doesn't mean that the W.P.B. considers a 1000-ton mill ten times as important as a 100-ton mill, and defers on priorities and otherwise on a 10:1 ratio in favor of the larger operation. If such were the case the little fellows all over the country wouldn't get a look-in. As a matter of fact, the latter do indeed. However, the W.P.B. and other Washington agencies have the difficult duty of keeping the entire war effort as nearly in balance as possible. It would be difficult enough if W.P.B. merely had the abstract mathematical relations of production, supply and probable demand to deal with; but with the added complications of the politicians, pressure groups, labor trends, the effect of week-to-week changes in commodity imports due to war conditions, and to other variables, the job of the W.P.B. and other Washington agencies becomes tremendously more complex and difficult than most mine operators, large and small, ever stop to realize. And, after all, the people that run the show in Washington are human. By that same token it may be presumed that they are subject to influence. It is our opinion that in the earlier days of the war agencies, when conditions were somewhat chaotic, the war effort may have suffered at times from influence brought by selfish interests. We believe that these effects have now been reduced to a minimum.

Let us mention briefly the case of criticisms of the priorities set-up. While it is true that many mining operations have been hampered at times, some quite seriously, it is probably also true that the mining priorities division activities have been more efficiently

handled than those of any other agency having so involved a set of duties. We know of no other agency that, in order to expedite action, handled so much of its work by telegraph. That helped greatly. More criticisms on priorities came to us than of any other government activity, and most of these came from the smaller operators. That was natural because priorities affected every mining operator in the land, and the largest number by far are small operators. Priority difficulties, relatively, are less serious to the large corporations than to the small operator, but the latter's complaint is just as loud. Although his contribution of tonnage in the war effort may be minute in comparison, he has according to our experience, received practically the same attention as the larger operators. The small sand and gravel operator probably has not fared quite as well as the large, but this is a fault of general conditions rather than of the acts or omissions of the priorities division.

In the last few months we have noted a gradual change in attitude on the part of Washington agencies, such as W.P.B., R.F.C., Metals Reserve, etc. toward mineral raw material producers and it is all for the good. In February the attitude of a goodly number in Washington seemed to be akin to "Treat 'em rough, and tell 'em nothing". That, to the credit of the parties in question, has changed very measurably. Their manner of dealing with mine operators is now more sympathetic. We don't know that any more information is dispensed than before, and that is a point that could well be improved. Washington agencies probably could, without giving out military information, be more frank on matters of production with mine operators. So frequently we have heard such complaints as "If they'd just tell us what the hell they want, how much, and how badly it is needed, we'd tear our shirt to get it." There is a latent production angle that "the powers" have as yet not taken full advantage of. It is patriotism. There really is such a thing as a man or group going out and, from starkly honest, patriotic motives, spending hard-earned money to produce ore. It may not be any more real, but it is more apparent in the smaller operators and individuals. To get the most from this production angle requires frankness and rather direct methods.

In the case of hardrock chromite and manganese production, some months ago the powers in Washington were taking small cognizance of the multitude of small operators and prospectors who then composed the potential producers of these ores. As a result of lack of marketing facilities, low price, difficult transportation, difficult financing, reluctance to making mine development loans, and the fact that the little fellow in mining seemed to have been left out of the picture in the government strategic minerals scheme, there developed in spite of the miners' innate patriotism, not only a low morale but a certain antagonism toward Washington. It began to be a bit alarming in the light of the production job that needed to be done in the war emergency. The mood started with frustration and wound up with contempt. The feeling spread somewhat to western mine operators in general. Criticisms from every hamlet poured into offices of the state and government, and were also heaped on the legislators. The situation was not healthy. Washington was indeed in the dog house. Then Metals Reserve and RFC and WPB began taking various measures such as raising prices, giving attention to access roads, lowering ore specifications, improving marketing facilities, establishing retail ore stockpiles, and providing more engineers to service mining and priority problems. As stated at the first of this paper, the clamor and criticism have lessened markedly in the last month, doubtlessly due in part to the measures named above. There is still need of improvement on the part of the government agencies, but the latter need no longer be so much on the defensive; the miner is beginning in some cases, to find himself on the defensive. The government almost everywhere has improved conditions for the small miner. In some of the more important producing localities the conditions are almost all the miner can expect under the present state of national economy. It is now beginning to be a question of the miners making good on production and showing good faith.

One weakness remaining in the mineral production program is access roads to isolated mines and undeveloped districts. The mechanics of access road approval is still too slow but the miners are equally at fault. They are failing in a large number of cases to do enough development work to justify the access roads demanded.

Summing up our opinions of the relations between miners in general and the government agencies in Washington.....there has been a mutual distrust and lack of sympathetic understanding of each other's problems. This condition is clearing. Some months ago there was a disposition on the part of the government to use the dollar yard stick in reaching most of its decisions, and to disregard the feelings, morale, and psychology of the mine operators. That has changed to an important extent. Very recently RFC announced its willingness to negotiate promptly small mining loans up to \$5000 for reopening mines and exploring new prospects, and the miner need not sign his life and future away. Already several inquiries have come in from small operators, and they have actually said some kindly words about RFC. Life is beginning to be worth living again.....The small operators have accused the government of 'playing with the big fellows'. True, but from necessity, as we explained in an early paragraph. It's a good thing we have some large operators who are dependable mineral producers in this emergency. The smaller operators collectively can help tremendously, but the big fellows must carry the ball, and Washington must call the signals.....The small operators were yapping for attention, only they had considerable reason to yap. The government heard them and has been catering to their wants. Now it is up to the miners to make good.....Criticism, like ham and eggs, is indigenous among Yankees. When sincere and intended to help bring about a desired result, it may be classified as constructive and therefore generally justified; when its target is concealed, when it merely covers bluff and bluster, or when based on lack of facts, it is unwarranted and often harmful. If we credit, as we probably can, to the criticism and hell raised by the miners, the straightening out or improvement of a number of difficulties, then no one can deny the justification of much of the criticism voiced.

In any event the mineral production program is well under way. Its feet are on the ground, or in the ground, and stock can be taken of progress. There are bright spots and dark spots, but the pattern is reasonably clear. Miners are getting over the bluff, bluster, and criticism stage, and down to the plan, dig, and make good stage. The industries that turn out the planes, tanks, ships, etc. got away to a much faster start. They would. You can hire mechanics, build shops, and turn out machines rapidly, but you can't turn on production of chromite, copper or quicksilver like water from a faucet. Now, with the manufacturing industries going full tilt on a production basis, the problem is raw materials to keep those hungry plants going. To keep the total effort anything like in balance will require the shrewdest kind of planning by the War Production Board and other Federal agencies, and the hardest kind of work by those in the field who do the actual work of turning out the materials needed in vast quantities. The need for critical raw materials has not eased.

Washington took some months to get its feet untangled from its skirts. During that period of the war effort it caught merry hell from John Citizen in general and it had much of it coming, although some of the hell it caught was clearly unfortunate and unjustified. Washington has made a determined and rather effective effort to correct difficulties. Some weaknesses remain, and some criticism will continue, but mineral producers as a whole have largely cooled off, and are now too busy digging out ore to dwell on many of their troubles for which they were inclined to blame Washington. Anyway,..... that's one man's opinion.

Earl K. Nixon

SNAKE RIVER PASSAGE

"Neither snow, nor rain, nor heat, nor gloom of night stays these couriers from the swift completion of their appointed rounds." This oft-repeated quotation might be supplemented on the pennant of the "Idaho" by the words "and no Snake River rapids will prevent delivery of the U. S. mail by mailman and freighter, Capt. Kyle McGrady". Capt. Kyle in his river boat "Idaho" delivers mail to ranchers and miners on the banks of the Snake River through 50 miles of canyon and innumerable white-water rapids in that inaccessible, little-known region between the mouth of the Grande Ronde and Johnson's Bar, from 40 to 93 miles south of Lewiston, Idaho.

The "Idaho" is 58 feet long, flat-bottomed for shallow drought, and is driven by two independent powerful Diesel engines. There is a small pilot house and the rest of the boat is practically all combination hold and cabin designed to carry a maximum load of freight. And a surprising amount of freight - mainly sacks of wool - it can carry.

Regular mail trips are made each week, leaving Lewiston Friday and returning Saturday. Those are long hard days for Capt. Kyle and his one-man "crew", for navigating the Snake after dark just isn't done, and in order to complete the trip on schedule it is necessary to take advantage of every minute of daylight.

The boat pulls away from its modest dock and warehouse at Lewiston at 6 A.M. sharp and if you want to take the trip, don't get there at 6:01.

Out into the turbid current without any backing or filling throbs the "Idaho", Capt. Kyle at the wheel, and the Snake River trip up to Hells Canyon begins as any other boat trip begins. The river is in something of a hurry to get to the Columbia, but it is an orderly hurry and the "Idaho" pushes along at a regular gait.

The passengers - maybe fifteen or twenty - distribute themselves around as fancy dictates. Three or four maybe are in the pilot house with McGrady; the rest may either sit on a bench in the cabin or drape themselves on the cat walk around the cabin. A favorite place in good weather is on the deck over the cabin where one may recline on a bedroll or sit on the edge with feet hanging over the cat walk.

Your fellow passengers will be mainly ranchers or miners returning to their homes on the up-trip and visiting the city on the down-trip, but, more likely than not there will be a tourist or two, maybe a couple of mining engineers, even perhaps a representative of a national magazine of wide circulation with his photographer and a Forest Service Supervisor. In any event, there will be an interesting group, some of whom will experience your thrills in your first trip into the canyon of the Snake.

The first 40 miles or so will be interesting but relatively tame, for you feel still in civilization. After leaving Lewiston and its sister city, Clarkston, on the Washington side of the river (yes, Lewis and Clark crossed the river here), you'll see some cultivated land but mostly grazing land - no timber - up to and beyond the sleepy little town of Asotin, Washington, eight miles from Lewiston. A few miles beyond Asotin, on the Idaho side, some basalt cliffs show a varied assortment of columnar jointing. Some twisted patterns, roughly spiral-shaped are worth a picture or two.

On 30 miles or so up the river without much change in scenery. There are two or three places where the water is fairly swift, but easily navigated compared to the upper river.

Then you reach little Rogersburg at the mouth of the Grand Ronde River which comes in all the way from the Blue Mountains and Wallowas in Oregon. Here the "Idaho" makes a stop - no piers or floats are necessary; at this, as at all other stops on the upper river she just noses into the bank and holds on.

From Rogersburg you begin the real Snake River canyon trip. Here the mountains close in on the narrowing river. Here also are great beds of limestone on both sides of the river - destined some day probably to be quarried and put to industrial use.

Soon you come to some real rapids and McGrady grips the wheel, turning it quickly so that the bow hits the current at just the right angle. The boat keels over, a big splash of spray comes over the bow, you grab a hand-hold somewhere and brace yourself. The boat slows up, then digs in as the propellers churn, and slowly crawls up the swiftest part. You wonder if there will be swifter rapids above and you hope nothing happens to an engine or a propeller while she's battling up one of these rapids. There are too many rocks a bit too close for comfort.

One rapid follows another in fairly regular but far from monotonous succession. You begin to feel confidence in the "Idaho" and her captain; you don't grip the hand-hold quite as rigidly - "roll with the punch" as it were and grin as the spray hits a fellow passenger.

The sides of the canyon are fairly steep - all rock, no timber. The only exceptions are the occasional gravel bars accumulated along some bends in the present river, and those old flat stream terraces, sometimes several acres in extent, up to thirty or forty feet above present high water mark. These latter terraces represent ancient levels of the river and stand as mute evidence of the history of all such streams which are slowly but constantly wearing their channels downward.

A few of the gravel bars and terraces are being plucked by "snipers". The equipment required is simple and everything about their lives is simple. They are not concerned about priorities, governmental regulations, excess profit and income taxes, rent, fuel, gasoline, movies, blackouts, and the various other advantages we enjoy in our so-called civilized communities. These "snipers" have three main concerns, namely, food, clothing and McGrady's boat, and of these, perhaps McGrady's boat is paramount. It is their only connection with the outside world. Just to see it go by is proof that their communication line is intact and that they can go out into the land of Broadways and bright lights any time they choose. A white flag on the bank will bring the "Idaho" to the shore.

Snake River gold has a none too good reputation based on many disappointments and failures. One can pan it from all gravel bars but it is so finely divided that the quantity seen in a gold pan gives a magnified idea of the real weight. Report has it that the snipers on Snake River are doing well when they recover two or three dollars a day. The average is probably much less than that. But theirs is an independent breed, and they possess much that we in the city have exchanged for carbon monoxide, drunk drivers and epidemics. No regimentation for them. And boy, there's some swell fishing and hunting up in that country.

A landing on the Idaho side where a woman comes aboard to confer with McGrady about buying a money order; an old prospector is waiting to mail a mineral sample; he engages the "crew" in earnest conversation about this discovery, as prospectors will; you think of the Ancient Mariner; sample appears to be graphite - probably too much iron.

Time and the "Idaho" wait for no man; the prospector's discourse is cut off; the gang plank is hauled in and McGrady heads up stream.

More rapids; more landings to deliver mail; some passengers get off; nearing mid-day the mouth of Salmon River is passed. It's called "the river of no return". Don't know why, but the appellation is sufficiently descriptive to suggest an Indian legend. At any rate, the Salmon, a very husky member of the Snake family (if you'll overlook the biology of the admittedly poor figure of speech) boils down out of the high mountains of central Idaho in considerable volume.

Well, it's time for coffee and sandwiches. Hope you've brought along sandwiches, for something about the scenery or mental exertion of helping to push the "Idaho" up the rapids gives you a swell (or is it "swollen"?) appetite. Besides you had breakfast at 5 A.M. McGrady's "crew" lights the gasoline stove in the cabin and supplies the coffee in a big coffee pot. You stand around waiting for the darned thing to boil. Pretty soon you get a sniff of the coffee; you wish to appear disinterested; didn't Robert Louis Stevenson say

"It is better to anticipate than to arrive"? Let the rest anticipate all they want; you want the coffee. You have your own cup ready and waiting - better be safe and have your own sugar too- finally the coffee is ready- wait your turn-page Emily Post- maybe they'll trample the "crew".

Well, that primal urge to consume all the food and drink in sight seems to have given way to a feeling of well-being and you can again view the river without the distraction of hunger. Say, that coffee was good.

The "Idaho" keeps right on moving up the river - more rapids. The rock walls are getting higher- you guess that they slope up to 1500 or 2000 feet at the apparent summits. Some of the walls are sheer for a few hundred feet; others have a 30 to 40 degree slope. Once in a while a little creek comes rushing in.

Now McGrady eases into Eureka landing just below the mouth of the Imnaha River. A pack train meets the boat for supplies and mail. Three fishermen get on with their outfits, evidently bound for some fishing stream up the river.

Eureka is a ghost-town with only the ghost remaining. The foundations of an old mill can be seen; nothing more. Report has it that a mining company attempted production of copper ore and concentrates in the early part of the present century. A great deal of money was spent - not warranted by ore developed. A steam boat costing \$65,000 was built; wrecked on the first trip.

The Imnaha is at flood stage and muddy - very swift as far up as you can see. Quite a river although not in the same class as the Salmon.

Next stop is Fargo Landing a half mile above the mouth of the Imhaha where some men get off with camp equipment. They will set up camp for the engineers who are to make some mineral investigations.

Out into the current again and a short distance up to Divide Creek on the Idaho side. Fine looking fishing stream; ought to be some real trout in it. Now you approach Zig Zag rapids in an S-curve of the river. Here the "Idaho" labors. You watch a mass of rocks jutting out from the shore on your right. The boat is not moving and seems to be getting pretty close to the rocks. This would be an uncomfortable moment and place for something to happen to the engines or propellor shafts, but there's a little reserve of power left and you see that the boat is now edging forward. That's a relief.

A couple of stops at one of which the fishermen disembark and then Pittsburg Landing, on the Oregon side, where there are many sheep and much bleating. Shearing is in progress and McGrady investigates as to how much wool he will have to load on the return trip.

Well, must hurry along; there are dark clouds gathering and distant rumblings promising a storm. More mail is left at landings and you begin to think of supper and of tying up for the night. But first an important matter must be attended to. The Snake is famous for its sturgeon and McGrady likes to set out sturgeon lines in the evening on the way up. Night is the feeding time for sturgeon, and the lines may be collected on the way down the next morning. The favored place for setting a line is a fairly deep eddy. A small hemp rope is the line and three large hooks, each on a separate piece of line a foot or so long are attached to the main line at intervals of a couple of feet, starting at about that distance from the rock weight. Each hook is baited with a third of an eel. (McGrady carries live eels obtained at Lewiston in an eel box on the stern of the boat.) The boat heads in to shore at the selected eddy. The "crew" secures the free end of the rope to an alder or large rock. Then the boat backs away, and at the point where the line is stretched out at right angles to the shore, the rock weight is dropped overboard.

After four lines are set at four different eddys, a place to tie up for the night is chosen and the boat made secure by two wire lines.

By this time it is dark and raining. The all-important matter of supper is the next order of business. The party of nine including captain and "crew" gathers in the cabin and

there's considerable activity. Everyone attempts to help the "crew" in preparing the meal, but in most cases it is mostly moral support implemented by a can-opener. The cabin is rather crowded and there is no space at all for the fastidious. The rain increases and is really coming down now, beating on the metal roof which proves to be less than water tight. At long last things are ready and everyone becomes wholly occupied. It's self-service and plenty of food. What more could you ask if you're hungry - and you are.

Anti-climax - dish washing - some members very busy - like the guy with the group in the restaurant who is check blind; but others haven't equal courage and start in. Light is a bit dim in the cabin, and perhaps some phases of the cleansing operation are a bit "sketchy" according to "white kitchen" standards. Dishes are finally stowed away.

Now beds are laid out on the floor of the cabin and there's very little extra space. It's still pouring outside and you try to get your bed down to avoid the drips from the deck. Such attempts are never entirely successful, but maybe you'll get out of the way of the drop aimed at your eye.

Now everybody quiets down - a few facetious remarks, then intervals of silence - finally all silence - no, not exactly; the "crew" snores. Then crash - something explodes out there on the river. You and the rest sit bolt upright in bed, wide awake. Then somebody says "water spout". This isn't altogether enlightening to you, but seems to be an explanation satisfactory to the others so you lie down again. Then you find out that this means a rock slide in the walls of the canyon caused by excessive rains. Since the "Idaho" is tied up at a terrace you know that "water spouts" can't reach you and you quiet down again. Seems as if sleep has just taken over when, klang! Must be the telephone you think stupidly and then you get a glimmer of intelligence and realize it's an alarm clock - somebody says "three thirty - time to get up" - you mention something about the Inquisition; others groan also. But there's nothing you can do about it. Just about time to get up and eat breakfast so that McGrady can start at daylight.

Everybody gets busy - a little more organization this morning. Beds are rolled up. The "crew" has the coffee already well along; somebody gets some potatoes to frying while the "crew" is hovering over some bacon. A vitamin-minded member passes canned fruit juices around. You don't need it for an appetizer but you don't pass up anything in the food line even if it is only 4 A.M.

McGrady and the "crew" eat with facility, even hurriedly, and immediately cast off. It's daylight now and ten miles more of current to fight in order to reach Johnson's Bar and the end of the line so no time to lose.

Anti-climax again. You can't seem to walk away and leave those dishes, so you sigh and grab a "tattle-tale gray" dish cloth. Lucky you are not handling breakable dishes for the "Idaho" in motion gives an insecure footing. You go through various contortions in trying to maintain balance and dry dishes at the same time.

Out on deck again to see what the canyon has to offer in the way of scenery. It's about the same. There are the same steep rocky walls, a few terraces, the same current with occasional rapids all the way up to Johnson's Bar. The river is noticeably higher, but the "Idaho" has no particular difficulty.

Johnson's Bar is reached - end of the line - nothing there but a mail box on a terrace. Nobody to meet the boat. A few minutes for delivery of mail and then the start of the return trip.

It's something of a relief to be going down stream. There is a pleasurable thrill in running the rapids; also you feel that now, with little strain on the engines, there is small likelihood of any accident to machinery. Going down through the rapids, however, requires fully as much skill, if not as much power, as going up. McGrady's technique inspires confidence even though at times the "Idaho" keels over so that you will get your feet wet if you are standing on the cat walk.

Now for the sturgeon lines. McGrady noses in to the bank where the last line was set the previous night. The "crew" disengages the line and gets on board. The "Idaho" floats away from the shore and the "crew" pulls in the line. Because the sturgeon is a bit on the sluggish side and because of the heavy rock weight, you can't be sure whether or not the "crew" has a fish until either you see said fish in the water or the "crew" pulls the rock weight into view. In this case, a fish about 3 feet long comes into view and is hauled aboard without difficulty. The fish flops about some, but nothing compared to a real active fish like a salmon. The "crew" runs a rope through the sturgeon's gills and places him in the eel box which is much too small for him. One of the other three lines yields a sturgeon - smaller than the first - and that's all for sturgeon fishing.

McGrady makes a landing and takes on 3 sacks of wool. There is nobody around, and no sign of habitation. Ranches must be up in the hills somewhere. A sack of wool sounds as if it would be light and fleecy - fleecy surely, brother, but not light - 350 pounds in a sack made of heavy jute. You don't do much in the way of lifting - you just roll them aboard.

Down to Pittsburg Landing - to take on wool. Seems like a metropolis this morning. There are at least a dozen people including some youngsters; plenty of sheep, dogs, and horses.

Before loading the wool and taking on passengers, McGrady has another job to do which indicates something of the scope of his freighting service. Several men get aboard on the Oregon side and the "Idaho" goes across the river where a man with a rope on a steer is waiting. As soon as McGrady lands the boat, the men get off and promptly "bulldog" the steer, tying his head and feet so that he cannot move. Then, by means of a rope attached to his horns and by ungentle (definition: vigorous yanking east or west) steering with his tail, the unhappy steer is pulled up two planks and oriented cross-wise on the deck in front of the pilot house.

Back across the river goes the "Idaho" and several sacks of wool are taken aboard as well as some passengers. Among these are two young ranch girls, fourteen or fifteen years old, who are having a wonderful time.

Four or five miles below Pittsburg Landing, the "Idaho" noses in to the Oregon bank, and the Pittsburg Landing passengers get off. Some men and a pack train are waiting. This is the end of the excursion for the steer also. He is unloaded rather easily by placing him at the side of the deck with his four feet just over the side. While a man standing on shore holds the rope attached to his horns, and another man sits on the steer's head, McGrady carefully loosens the rope so that it can be removed from the steer's feet quickly. At the critical moment, McGrady takes away the ropes, the man at the head end gives a mighty shove, and the man on shore pulls on the rope. The steer convulses himself over the side of the boat and lands on all four feet in the shallow water. He scrambles on to dry land; then stands switching his tail and rolling his eyes as if to ask indignantly, "what's coming off around here?"

One of the young girls mentioned above starts saddling a horse. You remark the efficient way she cinches the saddle - no lost motion - old stuff to her - she's probably been it ever since she was able to boost a saddle on to a horse.

Incidentally you will be struck by the fine-looking saddle horses up in the canyon. Without exception, they all seem well-shaped, spirited and well kept - evidence that the horse is still of first importance for transportation in some sections of our country. The automobile has no place in the Snake River Canyon.

A description of the balance of the trip down the river would be not without incident but in the main repetitious - running Zig Zag Rapids is highly exhilarating. The "Idaho" groans a bit with the strain in her timbers as she changes course here; one side goes down into white water; you hold your breath for a moment as she rights herself and goes plunging along.

More wool - the cabin is full; all the luggage and stuff is now stored on the deck; some sheepherders get on; they are holiday bound for Lewiston. Conversation indicates certain anticipations and you are certain that Robert Louis Stevenson was one hundred percent right. One sheepherder has a bundle of "green" sheep skins - very redolent of - well - sheep. He places them on deck next to some luggage, and thoughtfully mentions to the owner of the luggage that maybe said owner would like to move it a greater distance away from the skins. "Some people don't like the smell", he says.

Rounding a turn in the river, you view perhaps the finest scenic stretch of the river below Hells Canyon. Here the river flows westward. You look down the swiftly moving water for a mile or so. On the Idaho side are steep rock headlands to the waters edge. On the Oregon side is a small terrace backed by mountains with steep, rocky slopes and pinnacled summits. The Imhaha rushes into the Snake beyond a high bluff and high-up along the skyline to the west are massive horizontal basalt flows.

Here on the terrace, Fargo Landing, the engineers get off. A tent with a fly has been set up. Smoke from a camp stove beckons. Perhaps you'll want to stay here until the "Idaho's" next down-trip. There isn't very much new to see on the way down. Besides the number of passengers aboard precludes free and unrestricted selection of desirable deck space. You are continually on the lee side of those "green" sheep skins. Yes, Fargo Landing it is - - Adios, McGrady.

Too bad to stop on a sort of sour note? Not so intended. You treasure the small inconveniences as a part of the whole pleasant picture of this unique voyage. In a day you have travelled into one of the most inaccessible regions of the country - a region with all the flavor of the old West - where the few inhabitants rely with assurance for mail and transportation entirely upon weekly trips of Kyle McGrady.

CLEARING HOUSE

No. 67-CH George E. Zweifel & Company, 1123 N. W. Glisan Street, Portland, Oregon, have for sale smelting equipment, including a practically new 250-ton capacity Allis Chalmers blast furnace, together with tools, slag pots, cars, bins, gates, blower, motors, pumps, Fordson locomotive, track, steel tank, et cetera. Largest piece will weigh about 11 tons, complete dismantled and transported by truck

No. 68-CH A. O. Weathermon, Bridgeport, Oregon, has for sale property of Giraffe M. and M. Company, Baker County near Bridgeport, consisting of 55 acres patented placer ground and 8 unpatented lode claims. Several hundred feet of development work done. Values reported to be the same as at the Rainbow Mine. Price, \$10,000.

WAR MINERALS AND METALS

The War Production Board has classified minerals and metals according to their present scarcity, as given below. The present classifications show that conditions in mineral supplies have changed since the original "strategic" and "critical" lists were made. Undoubtedly conditions will continue to change and revised classifications may be issued from time to time.

GROUP I

Vitally needed for war purposes; not generally available for civilian use.

Alloy Steel	Graphite (Madagascar)
Aluminum	Iridium
Asbestos (long fiber)	Lead
Cadmium	Magnesium
Calcium-silicon	Nickel
Chromium	Sodium nitrate
Cobalt	Tin
Copper	Tungsten
Corundum	Vanadium

GROUP II

Essential to the war industries, but supply not as critical as Group I.

Antimony	Manganese
Arsenic	Mercury
Barium carbonate	Mica splittings
Beryllium-copper alloys	Molybdenum
Borax	Platinum
Calcium	Quartz crystals
Cryolite	Rhodium
Diamond dies and industrial diamonds	Steel--Carbon and scrap
	Titanium pigment
	Zinc (all grades)

GROUP III

Available in some quantities for other than strictly war purposes. Use may be restricted, however, by accompanying manufacturing limitations.

A. Available for Substitutions:

Asbestos ,(common)	Feldspar
Cement	Gold
Clay	Iridium (plating)
Coal and Coke	Lignite
Slate	Limestone and marble
Sulphur	Silver

B. Available in varying amounts for substitutions:

Bismuth	Ruthenium
Palladium	Gypsum
	Uranium

C. Presently available for substitutions in critical civilian industry:

Basic low-carbon steel	Gray cast iron Malleable iron. Bessemer steel
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TAXATION OF MINES

There is the Law of Diminishing Returns and the fable concerning the demise of the goose that laid the golden eggs - both pertinent to the probable effects of taxing mines under the latest Federal tax bill.

These effects are however primarily concerned with the amount of money to be collected.

Based on an entirely different viewpoint, there is another effect which we wish to emphasize as strongly as we can - that of the effect of such tax regulations on production.

Nobody can successfully deny that we need to raise all the money by taxation that we can possibly raise to pay on the war costs. But maximum production of metals is par-amount in our war program - much more important than raising money to pay the costs.

Any plan then to increase tax revenue at the expense of production at this period of our trial by fire would be ill-advised, to put it mildly. More definitely the full program advocated by the Treasury would throttle down mine production, scare away venture capital and effectively stop exploration projects by experienced operators.

Mr. S. H. Williston, President of the Oregon Mining Association, gave testimony before hearings of the Senate Special Sub-Committee which met at Reno July 16 and 17, Salt Lake City July 20 and 21, and Denver, July 24, to investigate at first hand tax difficulties of mine operators.

Knowing of Mr. Williston's intimate knowledge of the subject, we asked him to prepare the following paper of the probable effects of the proposed tax program on Oregon's mining industry.

It should be emphasized that most strategic mineral projects are short-lived. They are "war babies". As Mr. Williston points out, profitable operation of most of them after the war would be unlikely. Experienced capital will not be risked on a project which stands little chance of recovering even capital costs.

It has been reported that the Treasury has labelled depletion allowance "special privilege" and advocated abolishing it. Experienced mine operators find it difficult to understand how such a position may be taken intelligently.

Mines are not the same as manufacturing enterprises whose capital investment is continually renewed by replacement. An ore deposit is the capital of a mine. Each ton of ore removed depletes the mine's capital and likewise proportionally shortens the mine's life. Without a depletion allowance a tax on receipts from sale of ore is a capital tax. If we must have a capital levy, let's have it applied fairly and universally--not on a single industry whose maximum effort is considered essential to winning the war. Surely even the Treasury must realize the importance of producing all we possibly can of copper, lead, zinc, chromium, manganese, quicksilver, tungsten, antimony, etc.

Statements have been reported from those in authority that profits from some large mines have more than repaid capital and interest and that these mines continue to operate at a profit, still taking advantage of depletion allowance. If all facts could be assembled and balanced by an unbiased accountant, we think there would probably be presented a different picture; but assuming that such statements are one hundred percent accurate, a whole industry should not be punished because in a few cases exceptionally fortunate enterprises have been quite profitable. Without some such cases to brighten a history containing so many financial failures, the industry would certainly present a dubious investment opportunity.

The general impression among people inexperienced in mining that it is highly profitable is definitely erroneous. Mining, like any other business, may be profitable if conducted by qualified operators. But it is a business with certain definite hazards to capital some of which are the result of Government regulations. Further difficulties imposed in the form of additional tax burdens may be just too much for the industry to take, particularly the small to medium-sized new operations. If we ever needed a healthy mining industry, we need it now. Any action taken which would have the effect of reducing mineral production other than that of gold would be dangerously close to obstructing the war program.

TREASURY DEPARTMENT VS. PRODUCTION OF CRITICAL MINERALS

By S. H. Williston, President Oregon Mining Association.

The provisions of the 1942 tax bill which has passed the House and is now being considered by the Senate Finance Committee make it advisable for mine operators attempting to maintain and increase production of strategic metals in the State of Oregon to examine their position under this new tax bill. Since the bill has not^{yet} been passed there is still a possibility for many changes by the Senate Committee but every individual mine operator must take into account what will happen to him and his property if remedial changes are not made in the Senate.

In the past the taxpayer usually computed the amount he had to pay the Government. At present it is simpler to figure instead on what the Government is going to let the taxpayer keep. After computing income before taxes, depreciation and depletion, the operator may take the following deductions:

If he has no Certificate of Necessity* he may deduct 10% of his investment in his plant as depreciation and retain that 10%. He may then deduct 15% of his gross sales (not to exceed 50% of his net profits) for depletion and he may be able to keep that. He may then retain 4.4% of his invested capital and \$5,500 of the first \$10,000 profit. From any additional income he may retain only 10%, paying the balance to the Government.

*Certificates of Necessity are issued by the War or Navy Department; application forms may be obtained from the War or Navy Departments of the W. P. B. They are only issued when the operation is highly essential to the war effort, and permit amortization on a five instead of the usual 10 year basis.

This tax procedure is applicable to new prospects, new properties and new mines which were not in operation prior to January 1, 1940, and since practically no strategic metals other than quicksilver were produced in the State of Oregon prior to that time it applies to every new development or operation in the State.

Figure 1. shows a few examples of the amount of invested capital which may be recovered under certain fixed conditions. There are so many variables that it is impossible to include them all, but if we assume that a corporation formed or to be formed, to develop deposits of this type, has a capital investment of \$100,000 the chart will show what percentage of that capital may be recovered under varying conditions. If we assume that the \$100,000 capital investment has gross sales of \$200,000 the first year and a net profit before taxes, depreciation and depletion, of \$75,000, the operator will at the end of two years have his investment back. If he should show a profit before taxes, depreciation and depletion of only \$50,000 it will be two and one-half years before he gets his investment back. Should he by any chance have a profit of \$100,000 he will get his investment back in two years and make 5% on his money.

The effect of this on the mining of strategic metals is easily apparent. These metals were strategic because domestic deposits could not compete before the war and it is almost certain that very few, if any will be able to compete after the war. Most of the deposits are not large and therefore they are short-lived. In the event that the deposit

is exhausted within two years or in the event the war is over in two years, the best that the operator can look forward to is to get his money back. Should the deposit not be up to expectations or should the cost of labor or materials be higher than anticipated, or if additional taxes be imposed within the next two years, then there is little possibility that the operator could get his money back.

Of the amounts recovered from these short-lived strategic metal deposits, a very large proportion of the investment is recovered from percentage depletion allowance. At the present time the Treasury regulations having to do with depletion permit the full 15% provided under the law only to those mines which concentrate their ore by flotation or gravity methods. Any other method is arbitrarily penalized and the cost and proportional profit on a basis of cost is deducted before depletion allowances are made. Mercury mines have already been arbitrarily penalized in this respect and it seems likely that tungsten, chrome, magnesium, manganese and nickel might be penalized in a similar manner. This penalty is severe and may easily alter the percentage depletion from 15% of the gross to 10% or even 5% of the gross, not to exceed 50% of the net. The Treasury Department is attempting at present before the Senate Tax Committee to have all percentage depletion stricken from the bill. If Treasury recommendations are adopted, recovery of investment within two and one-half years is no longer possible.

The recent hearings before the Senate Sub-committee at Salt Lake City, Reno and Denver to explore the effect of taxes upon metal mining brought out many examples of proposed mining operations which would have to cease as the result of the tax bill. Many more examples were given of operations started under the Senate's promise to exempt strategic metals from excess profits taxation which would fail to recover more than a fraction of invested capital since that exemption has been removed.

It has been stated that broad relief provisions have been included in the tax bill but an examination of these provisions shows that in not over one case in one hundred are they applicable to the mining of high cost or marginal strategic and essential metals.

Another injustice in the present tax bill is due to its effects on operating costs caused by shortage of men in the mining industry. Most of the mines in the country are now operating with a man power shortage varying from 20% to 50%. Practically no development work is being carried on due to man power shortage. Reserves and shipments to smelters are both falling off to a marked extent, and that money which would normally be spent on labor for development work in preparation of additional ore for mining now goes into profits. 90% of such development money would be paid to the Government for excess profits tax. Later when men are available to do development work the mining companies will no longer have the money and it is hard to see how such development work could then be done.

The War Production Board and the whole war effort depends primarily on the production of metals. The action of the Treasury department effectively prohibits the development and extraction of these metals by private capital. At present the only alternative is to have the Government go directly into the mining business. The Bureau of Mines, the U. S. Geological Survey and the Defense Plant Corporation would find, develop and equip deposits of strategic and critical metals. While we have the highest regard for the Geological Survey and the Bureau of Mines, if this whole load is put on their shoulders there is little possibility of getting these metals to the manufacturers in time to be of any help whatsoever in the war effort.

EXAMPLES

1. Small Hard Rock Chrome Mine:

Capital Investment	\$ 25,000
Gross Income	60,000
Net Income before taxes, depreciation and depletion	30,000
Oregon Income Tax	1,600
Net Income after Oregon Income Tax and before Federal taxes, depreciation and depletion	28,400

The amount which may be retained by the operator under these conditions is \$19,090 which means that he will get his money back in one and one-third years. 45% of his total recovery is obtained through depletion allowance.

2. Medium Size Beach Chrome Operation:

Capital Investment	250,000
Gross Income	700,000
Net Income before taxes, depreciation and depletion	200,000
Oregon Income Tax	8,000
Net Income after Oregon Income Tax and before Federal taxes, depreciation and depletion	192,000

Under these conditions the operator will be able to recover in the first year \$141,600. He will be able to recover his investment in one and two-third years. Of the total recovery 60% is recovered under the 15% depletion allowance.

3. Small Mercury Mine:

Capital Investment:	100,000
Gross Income	250,000
Net Income before taxes, depreciation and depletion	100,000
Oregon Income Tax	4,000
Net Income after Oregon Income Tax and before Federal taxes, depreciation and depletion	96,000

The amount of investment recovered in the first year would be \$41,270. This would return the investment to the operator in two and one-half years. Of the amount recovered 40% is obtained through the depletion allowance.

The above examples are good properties with ore blocked, and under normal conditions there would be no hesitancy whatsoever in private capital developing and producing these metals. If good properties on this basis show only a bare possibility of the recovery of investment during the war period and no profit, there is little possibility of private capital being persuaded to invest in such operations.

There is an infinitely lesser possibility that intelligent private capital would be willing to invest in a prospect which under favorable conditions might possibly be developed into a prospective mine similar to those given. The net result would seem to be a complete cessation of the development of prospects or the placing of developed prospects into production.

PROPOSED CORRECTIONS IN THE TAX BILL WHICH MIGHT
MAKE MINING POSSIBLE

1. That the wording of the depletion allowance be so altered as to make it clearly evident that mines are to receive their full 15% depletion allowance and that the Treasury be prevented from arbitrarily making regulations counteracting the expressed desires of Congress.

2. That short-lived deposits of strategic metals which could not compete before the war and which cannot compete after the war either be given the chance of making a profit by removal of the excess profits tax as promised by the Senate two years ago, or be given some guarantee of return of capital investment.

3. The granting of a unit of production credit so that those mines which have doubled their production and shortened their lives, and are now mining next year's ore this year should not have next year's normal profits taxed by this year's excess profits tax. Without such a provision those operators who have patriotically increased production are now subject to a 90% confiscation of their normal income of future years under this year's tax bill.

4. One other provision must also be made where man power is insufficient to carry on development work. The normal budgeted amount for development work must not be taxed as excess profits. The life of the mines depends on development work and if, due to temporary man power shortage, this money is taken by the Government there will be no money available for future development to maintain next year's quotas as well as those of succeeding years.

MOLYBDENUM CONTENT OF SCHEELITE

A new and quick method of determining molybdenum content of scheelite has been announced by the U. S. Geological Survey in a release dated July 16, 1942.

In the past the molybdenum content in the tungsten ore, scheelite, has been detected only by chemical analysis. The new method announced by the Survey uses a fluorescent light - the same light which has been used in the past few years for prospecting for scheelite. This mineral fluoresces under the ultra-violet light, giving a color which ranges from blue through white to yellow. It has been discovered by the Survey that the yellow color is due to material amounts of molybdenum. The bluish color indicates practically pure scheelite. When the fluorescence is white, the mineral contains roughly from 0.35 to 1.0% molybdenum and when the scheelite fluoresces distinctly yellow, the mineral contains more than 1%. Since scheelite concentrates containing more than 0.4% molybdenum are subject to a penalty, the value of the quick method of estimating molybdenum content of such concentrates is obvious.

In working out the method, finely powdered synthetic preparations containing various percentages of molybdenum and tungsten were made up and showed that fluorescence was bright blue for pure calcium tungstate, paler blue for combinations containing traces of molybdenum, and neutral white when molybdenum is around 0.5%. The color becomes increasingly yellow as the molybdenum content rises above 0.5%. The color is strongly yellow for a compound containing 4.8% molybdenum but does not increase in intensity of the yellow color as the molybdenum content rises above 4.8%.

The results obtained using synthetic compounds were checked on chemically analyzed natural minerals. Examples of results obtained are as follows: By the fluorescent test, one scheelite sample from the Nightingale Mine in Nevada was estimated to contain

less than 0.05% molybdenum. Chemical analysis showed 0.014%. Scheelite from the Tungstar Mine in California was estimated to contain 0.57% molybdenum by the fluorescent test. Chemical analysis showed 0.51%. A third sample from the Seven Devils District, Idaho, was estimated to contain 1.18% molybdenum by the fluorescent method; chemical analysis showed 1.20%.

For use in the field the Survey states that a series of finely powdered synthetic preparations or a comparable series of natural minerals of known composition may be mounted in circular areas on black card. The series would be so placed as to show increasing molybdenum content. The following is quoted from the Survey release:

"On cards that are being distributed to Survey geologists currently engaged in looking for tungsten ores, there are twelve standard synthetic preparations. Pure calcium tungstate is followed in sequence by compounds containing 0.05, 0.19, 0.33, 0.48, 0.72, 0.96, 1.4, 2.4, 3.4, and 4.8 percent molybdenum, and finally by one pure calcium molybdate, which is 48 percent molybdenum. Alternating with the circles covered with powder are circular holes of the same size. The card is used by placing a hole over a powdered sample of the scheelite to be tested and comparing the fluorescence color of the sample with those of the adjacent standards. By trying one hole after another, the sample will be found to have a fluorescence color, and hence a composition, between that of two adjacent standards. The composition can be further narrowed down by observing which of these standards the sample most nearly resembles. The accuracy of the determinations could be increased by mounting a larger number of standards on the comparison card."

An improved assay method depending on colorimetric chemical analysis has also been developed by the Survey. The following quotation from the release gives an outline of the method:

"The improved colorimetric method, which was developed by F. S. Grimaldi, of the Survey's Chemical Laboratory, permits rapid, precise determination of molybdenum, when it does not exceed two percent, in specimens of scheelite, or in any molybdenum-bearing ores or concentrates, wherever laboratory facilities and the services of a trained chemist are available. This method eliminates the uncertainties of the usual colorimetric determinations, made with ether extractions, and obviates the need for the standards used heretofore. A stable amber to red molybdenum-thiocyanate color is developed in water-acetone solutions, ammonium citrate being used to eliminate interference by tungsten, and this color is matched by adding standard molybdenum solution to a blank."

FELDSPAR TO EXTINGUISH MAGNESIUM INCENDIARY BOMBS

A cheap and effective means of extinguishing magnesium incendiary bombs has been developed by the U. S. Geological Survey according to a release by the Department of the Interior, dated June 14, 1942. Extracts from the release are given as follows:

"Because the problem of handling incendiaries may become of common concern, the Geological Survey sought a solution which would involve the least expenditure for equipment or material supplies, and yet be as nearly fool-proof as possible in handling. In the use of feldspar, ground to pass a 10-mesh screen and be retained by a 200-mesh screen, Geologist W. W. Rubey and Chemists Michael Fleischer and J. J. Fahey believe they have found an effective answer. The effectiveness of this material has been demonstrated on a

small scale in the Geological Survey laboratories, and on one-pound bombs at Edgewood Arsenal of the Chemical Warfare Service.

In order to protect the public interest and to prevent exploitation of the method, the Department of the Interior by arrangement with the inventors acting through the Department of Justice has taken proper steps to obtain Government controlled patent protection for the invention. Under the patent, the Department will make the process and use of the material available to any commercial concern. Commercial development of the material will be encouraged by the Department of the Interior, but Government control of the patent will protect the public against price exploitation and extravagant and misleading advertising. Certain products already have been exploited which have been found to be unsatisfactory in actual use.

The use of feldspar for combatting magnesium incendiaries is recommended by the Geological Survey for the following reasons:

1. Feldspar is inexpensive. It should not cost more than 50 to 75 cents a hundred pounds wholesale, when shipped in bulk to a central point in any of the large cities of the east coast. The retail price would be slightly higher. A hundred pounds will fill two buckets, enough for the average small house.
2. Feldspar is readily available. It is the most abundant constituent of a large variety of common rocks (granite, syenite, pegmatite, aplite, anorthosite and monzonite).
3. Feldspar is easily handled. Its use does not require expensive equipment or the services of trained crews. Once feldspar has been applied to burning magnesium (which can be done in a few seconds), the bomb requires no further attention. It is emphasized that in addition to having feldspar available to extinguish the magnesium bomb itself, the householder must have water available to combat fires started by flying sparks.
4. Feldspar is effective. With a lower melting point than sand, feldspar quickly forms a protective coating over molten magnesium which cuts off the supply of air from the magnesium and actually stops it from burning and its flame from spreading. It is superior to mixtures containing salt, pitch, ashes or fine powders as it does not burn, give off smoke, blow out, or scatter appreciably from the intense heat of the incendiary material. In laboratory experiments, it was shown that when magnesium or an incendiary bomb was ignited and placed on a pine floor or board and covered with ground feldspar, the fire was extinguished so quickly and the supply of oxygen was cut off so effectively that the wood was charred only to a depth of less than half an inch. Moreover, only about 50 percent of the magnesium was consumed in most tests with feldspar, the balance being put out before it burned.

The most common incendiary bombs consist of a core of thermite in a jacket of magnesium. When a bomb strikes any object, the thermite ignites and soon generates enough heat to kindle the magnesium which burns with a dazzling white flame and produces a very high temperature.

Sand has been recommended for controlling magnesium incendiary bombs. This is inexpensive and is generally available. It does not cause the bomb to cease burning, however, and the bomb should be carried out between thick sand layers as soon as possible. Several special mixtures and patented compounds have been proposed, but these are expensive and less effective than feldspar. "...

"It is essential, laboratory tests have proved, that extra-fine material of less than 200-mesh screen size be eliminated, as it tends to clog interstices and prevent the ready escape of gases which would erupt with sufficient force to form miniature craters in the feldspar cover and destroy its effectiveness. "...

"Syenite, 90 percent of which consists of potash and soda feldspars, is present in several scattered localities in the Atlantic Coast States. Where obtainable, ground syenite should be more effective than ground granite as a bomb extinguisher. Nepheline syenite rock should also be effective. Granite, by far the most abundant rock, furnishes screenings as a result of quarrying for crushed stone. Ground granite, consisting of about two-thirds potash and soda feldspars and one-third quartz and minor minerals, should be better than ordinary sand, although inferior to ground feldspar, as an extinguisher of magnesium bombs.

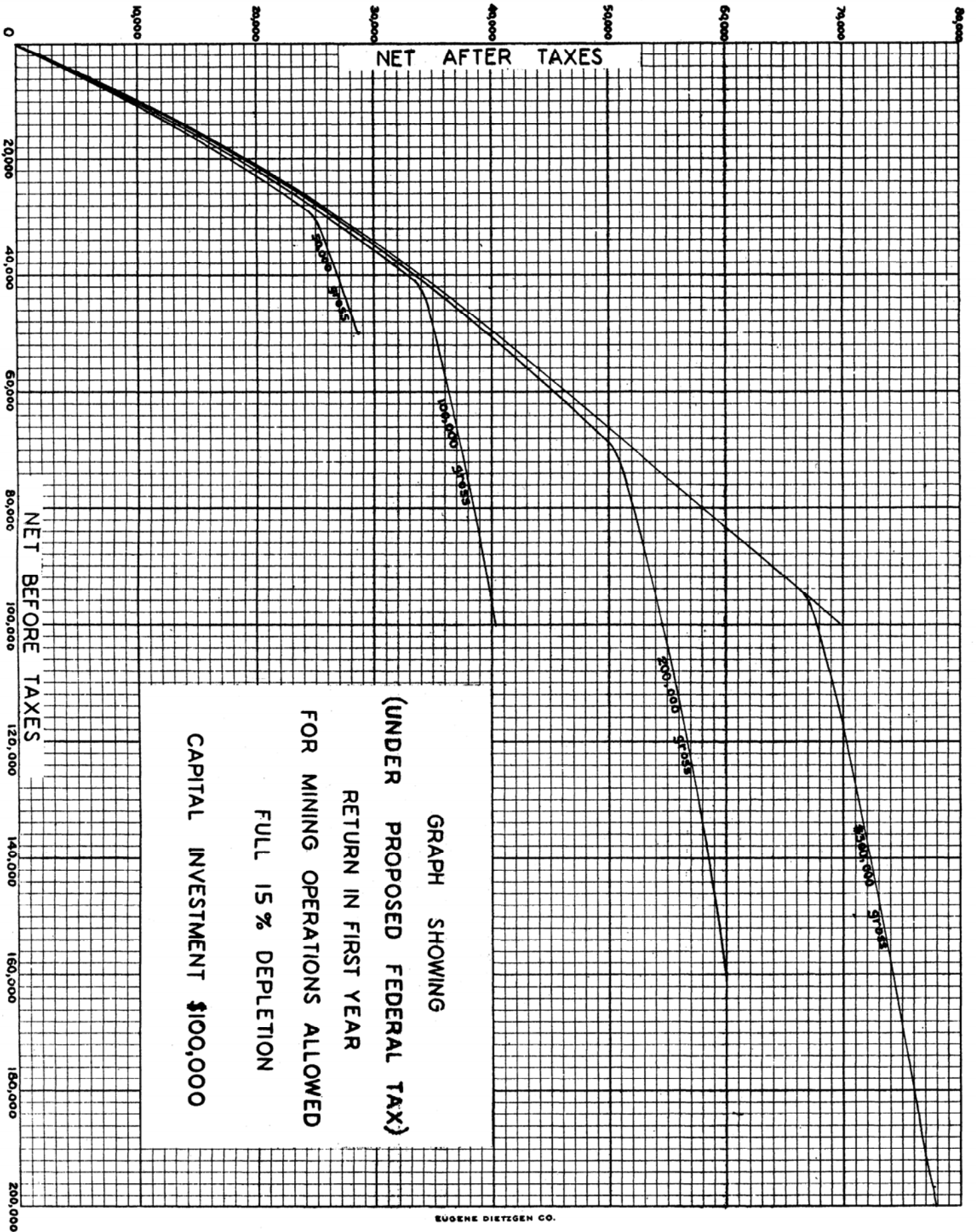
Granites also are abundant in the Pacific States, and pegmatite is associated with them in places. Besides granite, the rock monzonite, which is intermediate between granite and syenite in the quantity of feldspar content, is available at scattered localities throughout the West. Rhyolite and latite, volcanic rocks equivalent to granite and monzonite in chemical composition, also are abundant in the Pacific Coast region and are quarried for crushed stone. Screenings from these crushed rocks may not be as effective as feldspar, but they are worth trying, according to the Survey geologists." ...

CLEARING HOUSE

- No. 69-CH The American Lava Corporation, Chattanooga, Tenn., is reported to be the largest user of high grade steatitic talc for ceramic electrical insulation. This company desires to have samples and, where available, analyses of low-lime, low-iron talc from new sources.
- No. 70-CH Mr. L. S. Hackney, 132 N. Kenmore Ave., Los Angeles, Cal., wishes to secure a manganese or chrome property.
- No. 71-CH Mr. H. Stein, 754 Natoma St., San Francisco, Cal., has a 1-Ton per hour capacity Mace smelter and might be interested in equipping an Oregon mining property with it on an equitable basis.
- No. 72-CH Complete Mining and Milling Equipment for sale-- in one lot if possible. Included are new wire rope tramway, never installed, compressors, drills, cars, buckets, 7 x 6 ball mill, Oliver filter, tanks, shafting, belting, flotation cells etc. Location: Western Montana. Inquire E. B. Davis, 7307 North Ivanhoe Street, Portland, Oregon.

COAL INVESTIGATION

Mr. George Watkin Evans, consulting mining engineer of Seattle, has been retained by the U. S. Bureau of Mines to study production possibilities in the Coos Bay coal field. Mr. M. R. Geer, mining engineer at the Bureau's Seattle station is assisting in the work. Proximity of the Coos Bay field to new army cantonments in Oregon makes production in this field of major importance.



ATTENTION: Holders Mine Serial Numbers

A telegram received by Dr. Wilbur A. Nelson, Administrator Mining Branch, W. P. B. states that, effective August 8, 1942, Order P-56 amended provides that holders of mine serial numbers may use A-1-a rating for part of their quotas. The Mining Branch is authorizing the use of A-1-a ratings for not to exceed 30 percent of the dollar value of third quarter quotas which have been assigned.

According to the American Mining Congress weekly information service, requirement of the use of the system of "End Use of Symbols" and "Purchasers' Symbols" provided in Priorities Regulation No. 10 has been deferred until August 31. So many complications have arisen with this allocation classification system that its operation is being held up pending further conferences with industry representatives.

DEPARTMENTAL NOTES:

A car of chrome ore has been shipped to Baker by Anthony Brandenthaler from the Winterville Chrome Mine in the Greenhorn Mountains. Mr. Brandenthaler has a contract with Metals Reserve. Sampling and assaying on this contract will be done by the Baker staff of the State Department of Geology and Mineral Industries.

Small lots of chromite will be purchased at Baker by Mr. T. Ned Thomas, office manager of the Baker Mill & Grain Co. Mr. Thomas will act as Mr. Brandenthaler's agent, and the small lots will be incorporated in Brandenthaler's Metals Reserve contract.

Paul Fitzsimmons, geologist of the State Department of Geology and Mineral Industries, is mapping the Pine quadrangle, southern Baker County. His work at present is centered around the Chicken Creek area where scheelite is known.

Wallace Lowry, geologist with the State Department, and George Murphy, associate, are mapping manganese formations in the Lake Creek area east of Medford.

Drilling to develop nickel deposit on Nickel Mountain by the Freeport Sulphur Co. is well underway.

John Kennedy has taken over the Griffin chrome property at the mouth of Deer Creek at the mouth of the Illinois River.

Dr. W. H. Twenhofel, Professor of Geology at the University of Wisconsin and noted authority on sedimentation, has been employed by the State Department of Geology and Mineral Industries to make a study of marine sand deposition in the ancient beach terraces of the southwestern Oregon coastal area. Particular attention will be given to occurrence of chromite sands in the terraces at high elevations concerning which little geologic information is available.

A district office of the U.S. Bureau of Mines has been established at 806 Failing Bldg., Portland, Oregon. Henry Iverson is in charge. Under the new reorganization plan of the Bureau, the regional office for western states is at Salt Lake City with S. R. Zimmerly in charge.

NOTICE

In order to divert more of the Department's efforts directly to strategic mineral work as well as to conserve both labor and materials, the size of the Ore.-Bin will be reduced for the duration.

TAXATION BY DECREE

by

S. H. Williston, President, Oregon Mining Association

The Senate Finance Committee has approved the reinstatement of the 1940 exemption of strategic metals from excess profits in the 1942 tax law. Miners of strategic metals are naturally pleased, but it is important that they realize that this exemption no longer means what they had been led to expect.

From the time the percentage depletion provision was enacted in the 1932 Act up to the beginning of 1940 the Bureau of Internal Revenue did not attempt to reduce the amount of gross income from the property by deducting therefrom the costs of concentration by gravity or flotation or equivalent processes; and leaching, quicksilver furnacing, etc. were considered as equivalent to concentrating. Furthermore, if there were additional treatment processes performed by the mine operator before marketing the product, the cost only of such processes was deducted from the selling price of the product in determining the gross income from the property.

Although there has been no change in depletion allowances nor has there been any change in the wording of the strategic metal exemption, the Treasury Department and the Bureau of Internal Revenue have adopted regulations and unpublished rulings that very effectively alter the effect of the tax law.

By a new interpretation of the words "gross income from the property" the costs of beneficiation other than by flotation and gravity methods (and proportionate profits based on cost) are now deducted from what used to be "gross income from the property". Depletion allowances and exemptions from the excess profits are granted only on the remaining amount. Flotation and gravity concentration methods are still held as a part of mining, but all other methods are considered by the Treasury to be beyond the pale.

This is a very critical matter when production of strategic metals is considered. Low grade manganese, chromite, tungsten, quicksilver, and nickel ores are, in many cases, best handled metallurgically by methods other than flotation and gravily concentration. They will therefore be penalized and the penalty is a heavy one.

The effect of the Treasury and Bureau of Internal Revenue rulings is to give these minerals a 5 to 10 percent depletion base instead of the 15 percent base to which they are entitled, and to allow them only a partial exemption from the excess profits tax. In most cases the strategic metals held exempt from excess profits under the law will have to pay an excess profits tax on from 30 to 50 percent of their profits, as calculated by the Treasury, profits which in fact will probably be only a return of capital invested.

This activity of the Treasury Department and of the Bureau of Internal Revenue is an extremely short-sighted one. It is going to have a serious effect upon the development of strategic metals - not only in Oregon but throughout the West.

The change in the law by Bureau interpretation was made without thought or understanding of the strategic mineral industry, and since that effect has been discovered there is no tendency evident upon the part of the Treasury and Bureau to retract their ill-advised action.

It is interesting to note the relation of this action upon the research activities of the U. S. Bureau of Mines. Over a period of years the Bureau has been investigating and developing methods of treating low grade strategic mineral ores. The action of the Treasury, if uncorrected, makes almost worthless a large part of this research program.

What is the practical value to the industry of research outlining metallurgical economics and processes which may not be used economically by the mine operator because of tax rulings? This thought leads to the conclusion that the Bureau as well as the mine operator needs to consult a tax expert before approving or applying any beneficial process. It could very well be that a less efficient metallurgical process would be a less costly one after taxes.

Since the mine operator must recover a large portion of his capital from depletion allowance, it is self-evident that if that depletion allowance is cut in half as a result of using some metallurgical process not approved by the Treasury Department, he is not going to be able to recover his investment.

It would appear that the Treasury and Bureau rulings are going to have a very appreciable effect on slowing down production of strategic metals and probably some of the base metal production as well.

MINING LABOR

Miners in nonferrous metal mines in the west are to be "frozen" in their present jobs according to late reports from Washington, D. C. The Man Power Commission has issued a directive designed to prevent further depletion in numbers of employees in metal mining and timbering. During the past year, the shift of miners to the so-called defense industries because of the high wages paid by "cost-plus" government contracts became so serious that production of metals was adversely effected.

Better late than never, but we wonder how such action will bring about any increase in number of miners, particularly as there appears to be loop-holes in the directive. Incidentally welders can be trained in two or three weeks; not so with miners. Mining is more than running a machine. After his first year's work underground a miner would have picked up the rudiments of underground mining - if he had had proper instruction; but he would still be a beginner. Real miners, who can recognize and take care of bad ground, who can safely handle explosives, and who can break ground by placing drill holes properly are made only after years of work under a variety of conditions common in underground mines.

In a mining operation underground work is in two classifications--mining and development. The latter includes the work of finding new ore bodies and opening them up so that they may be mined. If production is to be maintained with a depleted mine force, it is inevitable that development work will be reduced or stopped. But it is obvious that production cannot be maintained for long without finding new ore. Therefore, stopping development work in order to maintain production is living off capital; it is pernicious anemia to the mine.

In Oregon, as well as in all other western states, the mining industry has been fighting this loss of workmen. One Oregon mine with a newly-built concentrating mill which was turning out copper, lead, and zinc concentrates on a 3-shift basis, has shut down because of labor shortage. Our quicksilver mines have had their underground forces reduced from 25 to 40 percent and in most cases have been obliged to suspend development work.

As surely as water runs down hill, labor will gravitate to the plants paying the highest wages--particularly when the labor demand at the "war plants" appears to be insatiable. This is not intended to detract from the essential role of such plants; but

if there is a shortage in mine production, what happens to the war production program? You may not think much about where the materials used in ships, planes, tanks, and explosives come from, but in nine cases out of ten the stuff comes from ore, dug out of the ground, without any publicity, without champagne and ribbons, without Navy "E's" or stars. Where would all this fanfare be if this smudgy old ore isn't dug in the required quantity? The answer is - you wouldn't have any ships, planes, tanks, etc.

It looks like a nearly impossible situation, with one industry paying very much higher wages than another for equivalent work. The one industry has a guaranteed profit; the other has a ceiling price on its output. In the one case everything is centered on speed--engineering organization is there necessarily, but dollar economy is in the back ground. In the other case a production schedule is based on ore reserves to be extracted at a profit dependent on the operator's ability. The amount to be produced safely is set to a large extent by sound engineering practice. The profit depends on economical management and efficient labor. Without these two factors which mean dollar economy, there will be no profit. "No profit" really means "loss", and no private company can operate long at a loss.

This problem is a tough one, but it can be solved and must be solved. It must be met squarely and honestly, for it will not solve itself. Past errors of judgment should be written off; political weather vanes should be blacked out, and precious time should not be lost. Otherwise the pernicious anemia alluded to above may reach the stage where no injections or transfusions by government will save the patient. You can let your imagination go on from there.

SALTING*

Sometime in the third century before Christ, Archimedes, a Greek mathematician, was confronted with the problem of proving that a metallic crown either was or was not gold. After many days of deep thought on the subject, he hit on the idea of specific gravity and was able to solve the problem. Thus we know that even in those early days, all gold bricks were not what they seemed and that even the cleverest men of the ancient kingdoms were called upon to prove the fact.

"Salting", may be defined as the act of enriching ore artificially, usually with fraudulent intent. "Salt" may be applied to the mine itself, to the samples after they are taken to mill runs, or even to the assay itself. High values result, and gullible buyers are tricked into purchasing worthless properties.

Theodore Jesse Hoover, in his book "The Economics of Mining" describes lucidly the prevention of fraud and salting. Following Mr. Hoover's outline, I will try in the next twelve minutes to cover some of the methods used by tricksters in salting mines, and precautions to take against these methods.

Salting may take place in the mine itself. The shotgun method is very simple and effective. Gold filings from coins or jewelry, loaded into a 12-gauge shotgun shell, are fired at random at the vein to make good ore out of the poor. Carefully placed shots make even better ore. A slight variation of this scheme is to load dynamite with the filings. Using this dynamite the examiner, who blasts down a fresh face in order to avoid any chance of salting, unwittingly enriches the ore himself. In dry mines the faces may be painted with gold chloride or silver nitrate solutions to up the values.

Cases are on record where "veins" were actually made in fissures in the rocks. In one such case cassiterite, the ore of tin, was very cleverly mixed with other minerals and tamped into cracks and joints of the barren country rock. A soluble silicate was then

* From a talk by Robt. G. Bassett given August 25, 1942, on Station KUIN, Grants Pass, Oregon.

added, and, when this had solidified, a truly artificial vein was formed. When later the hoax was exposed, an experienced Cornish miner who had originally recommended the property explained that "he was not accustomed to the particular vintage of champagne used on the expedition".

A less difficult and less expensive means of salting is to adulterate the samples. When the sample is being taken, the metal may be flicked into it from the ash of a contaminated cigar, or dropped in enclosed in a ball of prepared clay. Long fingernails may be very useful to the salters. Gold, amalgam, etc., can be nicely hidden under these until the critical moment when someone is not looking too closely. T. A. Rickard tells of Phillipine women using this scheme. These women wore a "Mother Hubbard" kind of dress with a pocket over the left breast. This pocket was provided with gold dust which was transferred inconspicuously by means of wet fingers to the gravel in the gold pan. The women worked, each sitting up to her waist in water, with her pan near the pocket so that detection was difficult. Furthermore, the gold was taken from the property being examined which made impossible detection of fraud by means of the microscope

"Salt" can be added to the samples even though they are in sealed sacks by giving them a "hypodermic" injection. Solutions of various metals are shot into the bags with a syringe. Some of these solutions are very difficult to remove after they have dried. Such salting cannot always be detected by panning. Filings blown into the sacks this way are effective, but are more easily detected.

Where samples are crushed and quartered on the property, there is always a chance that some villain will spill a little "salt" in the machines that are used or in the samples themselves, using the long fingernail act again. He might employ a different technique here though and use a dirty handkerchief instead.

A misguided man might think himself safe, when at last he has satisfied himself that he has taken and prepared for assay a number of good clean samples; but look out, Mr. Gyp is still on his tail. Even the early alchemists placed precious metals in their crucible bottoms and covered them with wax or other substance to hide them until the assay is made. Holes in charcoal filled with gold and waxed over served to fool the unwary then, even as today. A more modern version of this artifice, which came to me from a very reliable source is the case of the powdered tin in a furnace oil supply. When the furnace was fired, a stream of tin-bearing oil blew merrily into the firebox coating everything at hand with the remarkable element.

Fluxes and acids used for the assay can be "salted" too, as can the crucibles. In one instance new crucibles were soaked in gold chloride and silver nitrate and dried. The assayer, failing to run blanks for a check, was greatly fooled; and, needless to say his reputation was ruined.

There are assayers, too, who don't mind being fooled a little; in fact who will purposely make out false reports. One successful engineer once told me that, "Wherever ore is bought and sold there will be someone doubting the results of the assayer". I was this man's assayer, and he told me to be a hundred percent sure of every assay I made. In some cases, as many as two dozen assays were made to get one result, but results were worth all the effort; for, although there were many controversies between buyer and seller, there was never an argument over the validity of an assay after all dissatisfied parties had tried several umpires and lost.

Besides making deliberate, false reports, an analyst might be guilty of "innocent" salting. This is the result of carelessness in keeping crushing equipment, reagents, and the laboratory in general clean, or the result of improper preparation of the samples. Most carelessness will lead to high results, though some procedures, such as careless mixing or improper fluxing, might bring about low assays.

High grade can be added to the mill circuit in the same manner as it is slipped into sample sacks. The crushing plant, ball mill, feed, tables, flotation cells, or reagent feeders are possible points for adding the "salt". Reagent feeders that operate continuously without attention serve very nicely since they are inconspicuous.

Some methods of defrauding prospective buyers do not call for the addition of foreign material, but rather the removal of undesired portions of the vein. Dressing the mine, as such practice is called, requires that low-grade ore be mined out leaving nice large chunks of rich stuff to stare the sampler in the face. Fine looking specimens scattered over the dumps add to the attractiveness of the underground picture. Such lures are termed "sucker bait".

A difficult trick to expose is that of sealing off the bottom of the mine. An empty shell of a mine may exist far below the bottom level seen by the examiner, the shell being sealed off from the upper workings by planks covered with rock, track, and running water. Perhaps the level examined will extend a mile or more and will have this condition of rock, track, and water existing throughout. How, then, would one discover one small hole leading to lower levels? One party found such a hole once when it accidentally caved under them, nearly killing them all. Drifts, too, can be built up or closed off to fool people. Rich veins built into the false faces make tempting bait.

Deception by these and many other means can take place; but, assuming they don't, there is still a way of tripping the unwary. That is by the use of fraudulent weights. Let us say, for example, that the gold is obtained in exactly the right amount from representative samples, and that the true weight of the gold, represents, therefore, the true value of the ore. But on determining the moment of gold in the buttons, if the weights have had corners cut away or bottoms filed down, the results will be falsely high. Hollow weights or aluminum weights substituted for platinum could be used in this farce.

Thus it is seen that the ways of the "salter" are many and clever. In fact, one might ask, is there any protection against such a racket? The answer is yes, but only by eternal vigilance.

Samples must be taken carefully, notes and observations being recorded at the time of sampling. Several low-grade samples which are known not to have been tampered with, can be mixed thoroughly and divided into unequal parts and each part saved separately. It will be impossible for anyone to salt these so that the assays will be the same. If, then, the assays are unlike and high, the samples have been salted.

Duplicate samples taken after the originals often reveal fraud. These samples may vary in size from the originals to make accurate salting difficult. Erratic checks of originals and duplicates are to be regarded with suspicion. The second set of samples should not have numbers corresponding to the first set as this gives a clue to their location. They should be numbered after samples of another part of the mine, an example being to number check samples 1-a and 2-a not to correspond with original numbers 1 and 2, but with ^{say,} numbers 7 and 8.

Dummy samples serve a purpose similar to duplicates. They are best made of waste rock or low-grade ore carefully crushed, mixed, and assayed. Portions of the dummy are put in sacks, tied and labeled along with the mine samples. Failure of dummy samples to check their true assay value is a certain indication of "salting". Brick, concrete, and grind-stones are a little too obvious for dummy samples, but even these have fooled some "salters".

Cutting a fresh face of ore before sampling protects samplers against the possibility of either a salted face or a dressed face. Faces that change their appearance in many places when newly blasted should put one on his guard.

All samples should be quartered before being sent for assaying, one portion being saved for future reference and another for panning. Every sample should be panned for "salt" such as amalgam, metallic filings, or other foreign material. Fine particles of

lead added to the pan help in checking accuracy of the work; they should be recovered.

Another portion of the sample should be washed and both the pulp and the washings assayed. Gold chloride, gold cyanide, silver nitrate, or copper chloride used for salting can be detected in this manner.

CLEARING HOUSE

- No.73-CH For sale or lease black sand property fronts on coast near Geissel Monument a few miles north of Gold Beach, Oregon. Property extends back from sea cliff with bed rock about 30 feet above present beach and carrying considerable overburden. Property worked many years ago for gold and platinum. Communicate with Mrs. Mabel Miller, 1222 S. W. Montgomery Street, Portland, Oregon, or Gold Beach, Oregon.
- No.74-CH Wanted to purchase, small placer property with plenty of water, ranch house and land for market garden use. Write G. L. Gaskell, 404 Alhambra Avenue, Alhambra, California.
- No.75-CH For sale, 2000 feet 16-inch, 11-gauge steel welded pipe in 24 foot lengths; entirely unused, finished for welding, coated; located near Baker, Oregon. Robert S. Doubleday, 2306 Yakima Avenue, Tacoma, Washington.
- No.76-CH Alfred A. Wright, 135 S. Olive Street, Los Angeles, California, states that he will sell or lease numerous strategic and critical undeveloped mineral deposits in Oregon.
- No.77-CH For sale or lease, fluorspar deposit of commercial size and grade, located 20 miles west of Helena, Montana; rail facilities to mine; deposit tributary to metallurgical industries Oregon and Washington. Communicate with Paul E. Flynn, 823 Dearborn Avenue, Helena, Montana.
- No.78-CH For sale: Mining property known as Davis Tungsten mine, located about 26 miles northeast of Baker and 6 miles northeast of Anthony Lakes. Elevation 4700 feet. All year work possible. 11 miles from railroad. Some bulldozer cuts made and drilling done. Assays of 1.88% and 8.80% tungsten reported. Communicate with Sam Wright, 6019 S. W. Corbett Avenue, Portland, Oregon.

BRICK AND TILE

The following pertinent information is taken from The Hopper, published by the Oklahoma Geological Survey, issue of June, 1942:

There are four (4) basic processes used in the manufacture of brick and tile, namely:

Soft mud: made in moulds after the clay has been reduced by addition of water.

Stiff mud: adding a little or no water to the clay and extruding through a die by means of an auger.

Dry press: made from pulverized shale in a nearly dry condition, then formed into moulds and pressed.

Re-pressed: placing partially dried soft or stiff mud brick into a mould and compressing.

Products made are: common brick, face brick, hollow loadbearing tile, partition tile, face tile and drainage tile; at least these are the main divisions of the brick and tile industry.

In our present situation with defense industries booming and not being able to obtain the necessary materials and supplies, restrictions are definitely on their way here whether we like it or not.

October 1942

Portland, Oregon

STATE DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
Head Office: 702 Woodlark Bldg., Portland, Oregon

State Governing Board

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FLUORESCENT LIGHT MINERALOGY*

All of us are familiar with modern fluorescent lighting. We know that a tube of one of these modern lights which consumes 15 watts of electric energy is more efficient than an incandescent lamp which uses 100 watts; and we know that this tube is cold to the touch and not hot, as with the filament type bulb. But it is not generally realized that the new lights are a success, because of the fluorescence of certain minerals and chemicals under ultra-violet light.

The most common fluorescent lighting tube is essentially a glass cylinder, the inner walls of which are coated evenly with finely powdered minerals or chemicals. Tungsten filaments and mercury are put in the tube, and the tube unit exhausted of air, and then filled with inert gases such as neon or argon. A 300-volt potential or more across the tube's terminals is provided. All of these combined make the complete lamp.

When the current is turned on, the filaments or electrodes glow hot for awhile to ionize the mercury vapor. The vapor, when ionized, carries the current from electrode to electrode and emits ultra-violet light. Once ionization is complete the filaments cool. The ultra-violet light excites the chemical lining of the tube causing a fluorescence characteristic of the chemical used. By combining chemicals which give different fluorescent colors, a synthetic light which closely resembles daylight can be produced.

These new lamps produce a better light, more like daylight, at a cheaper cost than do incandescent lights.

Prospectors' lamps work on much the same principle as the household lighting units. The main differences are that the tube of the prospecting light is not coated, is made of quartz or special glass, and that, therefore, the ultra-violet radiations may be directed to a point some distance from their source. The rays are invisible, and hence are called "black light" by some people. The "black light" when turned upon a fluorescent mineral or compound excites the same kind of glow as that excited in the tube-coating of the lighting unit. Since prospectors' lights must be portable, they are operated by battery and have devices for converting the direct current to alternating current as well as stepping up the alternating current to higher voltages.

The three laboratories of the Department have recently obtained new "black light" lamps, mainly for detection of tungsten. The light is contained in a case about the size of a cigar box or smaller and is operated from a "hotshot" battery. The battery current is changed to alternating current by a vibrator and stepped up to a higher voltage by a transformer before entering the mercury vapor tube. The tube is of quartz, or special glass, since ordinary glass filters out the ultra-violet rays. All but the useful rays of light from the tube are held back by a colored filter. It is a simple device, but

*From a talk given September 1, 1942, over KUIN, Grants Pass, Oregon, by Ray C. Treasher.

it works wonders.

Scheelite, a tungsten mineral, fluoresces under ultra-violet light, and is now practically always prospected for with the aid of "black light". Scheelite ore is sometimes sorted under the lamp's rays in treatment plants. This tungsten mineral is ordinarily white to brown in color, but it fluoresces blue-white when pure, to golden yellow when impure. Molybdenum and copper are common impurities which lower the grade and sometimes make the rock worthless. Yellow fluorescing minerals should be checked by chemical analysis. If the mineral fluoresces green, red, or pink, it is not scheelite.

Hydrozincite, a hydrous zinc carbonate, fluoresces a soft blue. It is light in weight and soft, unlike scheelite in these characteristics. Black sand may contain grains of zircon which give an orange colored fluorescence.

Mercury vapor, even in extremely minute quantities, cuts out the "black light" so that when mercury is volatilized between the lamp and a fluorescent screen, the beam is cut off and cannot reach the screen. To perform this test, cautiously warm a small sample of mercury between the light window of the instrument and a screen painted with a fluorescent mineral such as willemite. A cloud appearing on the screen indicates mercury.

Tungsten miners use the ultra-violet lamp in distinguishing between ore and waste underground and thus avoid sending waste to the mill. Mill rock may be hand-sorted under the lamp, and tailings may be examined for unduly large losses. Efficiency of concentrating machinery may be checked and the flow sheet adjusted without waiting a day or more for assay returns. Old dumps from mines in which presence of tungsten has not been suspected might be profitably inspected with the aid of the lamp. These are only a few examples of the practical applications of the fluorescent light.

Agates, barite, calcite, fluorite, scheelite, uranium salts, and willemite are some of the many minerals which fluoresce. Calcite fluoresces red or orange, scheelite blue or white, willemite bright green, and so on; thus clues to a mineral's identity may be furnished by ultra-violet rays. Some easily acquired techniques may be necessary in order to make many of the tests, but there is nothing complicated about them.

Since different makes of lamps emit different wave lengths of light, it is important that the lamp chosen be one that gives suitable rays for the work to be done. Once the prospector has purchased his lamp he should experiment with it on various known specimens until he becomes thoroughly familiar with their characteristic fluorescence. Specimens should be examined wet and dry, in lumps and powdered, and from close and distant viewpoints. The angle of the ray incident to the specimen, the angle of observation, and the color of the visible light, some of which always gets through the filter, sometimes cause the variations of the fluorescent phenomenon.

Since glass will not transmit the "black light", glass containers are not suitable for holding solutions to be tested; quartz receptacles or cells with quartz windows are used. Two rocks appearing similar but of different composition can often be distinguished by the use of colored filters such as are used in photography. These filters allow only light of certain definite wave lengths to pass. Two ores that appear blue may differ in that one has red in its spectrum while the other has blue only. A red filter which passes only red light would make the wholly blue one appear black, whereas the other ore would show a bright red color due to the passing of those rays. All of this is getting a little involved and beyond the scope of ordinary fluorescent analysis, but it does suggest the infinite possibilities of the fluorescent technique to those who might want to delve deeper into the study. Those interested in a more detailed description of methods and apparatus are referred to "Fluorescent Light and its Applications" by Dake & DeMent.

Fluorescence phenomena are used in both qualitative and quantitative chemical analyses. Uranium, for instance, may be detected by mixing a very small amount of the powdered rock with sodium fluoride and fusing the mixture in a platinum loop over a Bunsen burner. The

resulting bead, when cooled, will fluoresce a brilliant yellow. In two minutes the test is completed, whereas, by other methods much time is consumed with less certain results. Vanadium, zinc, the rare earths, and other metals have been detected with ultra-violet light. Drugs, vitamins, and organic compounds have been assayed fluorophotometrically.

Now that we have discussed fluorescence and its wonderful properties, the question of the cost of the apparatus may be raised. The price ranges from a dollar or two up to hundreds for commercial machines. Devices vary in complexity from a soap box with a filter and a viewing window for use in the sunlight to complicated laboratory equipment that will determine certain compounds quantitatively. Prospectors will ordinarily be interested in the type of lamp owned by the Oregon Department of Geology and Mineral Industries and described earlier in this talk. Good tests may be made with a light-proof box with an ultra-violet filter over the specimen position and a peek-hole for the observer. Sunlight or photoflood bulbs serve as light sources. Cheap argon bulbs and "black light" bulbs are marketed commercially at a low price. Filtered iron-arc light is a very satisfactory source of ultra-violet. Any of these lights can be made or purchased for from two to ten dollars. The ionized gas type of instrument earlier described costs thirty-five dollars or more.

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MINING LABOR ESSENTIAL TO THE WAR PROGRAM

In Occupational Bulletins No. 12 and No. 16 issued July 28 and August 27, 1942, General Lewis B. Hershey, Director of the Selective Service System, states that the War Manpower Commission has certified metallic and non-metallic mining activity together with the smelting, refining and rolling of metals as essential to war production.

The subject of these Occupational Bulletins cover the following essential activities:

Metal Mining: The mining of iron, copper, lead, zinc, aluminum, mercury, manganese, chromium, molybdenum, tungsten, vanadium and similar ores. Includes also removing overburden, sinking shafts, and other activities preparatory to metal-mining operations.

Non-Metallic Mining and Processing and Quarrying: The mining and processing of rock salt, phosphate rock, sulphur, potash, asbestos, graphite pyrites, graphite, borates and other salines, fluorspar, mica, talc, abrasive sands, and similar products. Excludes all mined or quarried nonmetallic materials used exclusively in construction.

Smelting, Refining, and Rolling of Metals: Primary and secondary smelting and refining, alloying, rolling, and drawing of iron, steel, copper, lead, zinc, magnesium, aluminum, brass, bronze, nickel, tin, cadmium, and any other metals used in the production of war materials.

Accompanying the bulletins are lists of "critical occupations" in the mineral industry. The lists include practically every job that has to do with production of essential minerals and metals.

In its bulletin service, the American Mining Congress makes the following comments on the Occupational Bulletins:

"It was obviously impossible to include in this list all the varied occupational titles in common use throughout the mining districts. However, a careful review of the list will show that the great majority of key mine and mill employees are covered directly or by direct association of job classifications. In certain instances, it will be necessary to point out to local draft boards the parallel between the degree of training, qualification or skill required for occupations not specifically listed and some of those included in the critical list. Please keep in mind that the Occupational Bulletin is not a direct order to draft officials, but is merely an official

guide, and any omission from the occupational list should not be considered ground for refusing deferment.

"The issuance of this Occupational Bulletin provides a means whereby the mining industry may protect its essential manpower insofar as military service is concerned. It is suggested that mining companies make a comprehensive survey of their key men who may be subject to the draft, and endeavor to see that the complete facts of each case are properly presented to the local draft board. Men in critical occupations should be made to realize that they are engaged in vital war service, and that their cooperation with management in all matters respecting their draft status is highly important."

As a corollary to the above the American Mining Congress reports that:

"Draft Director Hershey telegraphed State selective service directors this week and ordered that any worker who leaves his job in copper or other non-ferrous metal industries or the lumber industry be reclassified from 2-A or 2-B, into a class immediately available for military service.

"This action marks the first time such a step has been taken and may be the forerunner of further such orders. Hershey's telegrams backed up WMC's order to workers in 12 western states making a 'certificate of separation' issued by the U.S. Employment Service a requisite to the further employment of any man who has quit his job in a non-ferrous metal mine."

CADMIUM

Characteristics and Occurrence:

Cadmium is a soft malleable, ductile, bluish, silvery-white metal recovered as a by-product in zinc reduction plants. It is precipitated in the purification of zinc sulphate solutions prior to the electrodeposition of the zinc and the precipitate is later treated to recover the pure metal. Cadmium is also obtained from the "blue powder" or zinc dust from zinc distillation plants; from the flue dust from zinc blende roasting, from lithopone manufacture; and from lead smelting and refining mainly because of the presence of zinc with accompanying cadmium in the original ores treated.

Cadmium was discovered by Stromeyer in 1817 when he found that a specimen of yellow zinc oxide contained a new metal. He named it cadmium from cadmia, the name given to zinc ore by the ancients.

The atomic weight of cadmium is 112.41 (atomic weight of zinc is 65.38); melting point is 320.9° C. (zinc, 419.4° C); specific gravity is 8.65 (zinc, 7.14). The chemical symbol is Cd.

Cadmium is similar to zinc metallurgically, but there is enough difference in some characteristics so that the separation from zinc is not very difficult. Because of the greater volatility of cadmium, it may be separated from zinc by fractional distillation and subsequently refined. In electrolytic zinc plants, the cadmium together with other metallic impurities is precipitated from the zinc electrolyte by the addition of zinc dust. It is essential to precipitate the cadmium in order to make high-grade electrolytic zinc. In the manufacture of lithopone (white pigment consisting of a mixture of zinc sulphide and barium sulphate used in paints, varnish, lacquers, linoleum, rubber goods, etc.) it is equally necessary to precipitate the cadmium. The cadmium is eventually recovered from the precipitate and refined electrolytically.

The metal occurs in nature mainly combined with sulphur (CdS) as the mineral greenockite in association with zinc ores, although lead ores sometimes contain small amounts of cadmium. Greenockite is relatively soft with a hardness of 3 - 3.5 (hardness of zinc blende is 3.5 - 4); specific gravity is 4.9 - 5 (zinc blende, 3.9 - 4.1); color is yellow

of various shades; streak is from orange yellow to brick red; mineral is nearly transparent; crystals are hexagonal, sometimes striated horizontally on pyramidal faces.

The amount of cadmium in zinc ores is generally very small - less than 0.5 percent. Exceptionally high percentages of 2 to 3 percent in zinc blende and calamine have been reported, but such percentages are rare. The ratio of occurrence of these two metals is said to be 1 of cadmium to 200 of zinc.

Production:

Prior to 1907, all cadmium consumed in the United States was imported from Silesia. In 1907 the Grasselli Chemical Company started the first commercial production in this country. The amount produced in 1907 is not reported but apparently it was approximately sufficient to supply the domestic demand, as shown by the following table from "Mineral Resources of the United States" (1908):

Cadmium imported for consumption into the United States, 1903-1908, in pounds:

Year :	Quantity (Computed)	:	Value
1903 :	8,679	:	\$ 4,565
1904 :	7,655	:	4,524
1905 :	8,138	:	5,298
1906 :	13,808	:	10,522
1907 :	1,953	:	1,633
1908 :	- - - -	:	2,390

Production and consumption of cadmium increased rapidly. In 1916 output was over 135,000 pounds; in 1917, 207,000 pounds. The over-all increase in production in the past 25 years is strikingly shown in the following table from U. S. Bureau of Mines Minerals Yearbook, Review of 1940.

Cadmium produced in the United States for the years 1936 to 1940 inclusive:

Year	Produced		
	Metallic Cadmium	Cadmium compounds (estimated)	Total Cadmium
1936	3,633,495	626,800	4,260,000
1937	4,265,973	828,000	5,094,000
1938	4,077,961	431,000	4,509,000
1939	4,411,530	679,000	5,091,000
1940	5,921,488	845,000	6,766,000

In 1929, world production of cadmium was a little under 3,000,000 pounds - less than 50 percent of United States production for 1940.

The following companies produced cadmium or cadmium compounds in 1940:
(Minerals Yearbook, Review of 1940)

- American Smelting & Refining Co. Denver, Colorado
- American Steel & Wire Co. Donora, Pa.
- American Zinc Co. of Illinois. Fairmont City, Ill.
- Anaconda Copper Mining Co. Great Falls, Montana
- Chemical & Pigment Co., Inc. Baltimore, Maryland
- E. I. du Pont de Nemours & Co. Cleveland, Ohio
- Eagle-Picher Mining & Smelting Henryetta, Oklahoma
- Harshaw Chemical Co. Elyria, Ohio
- New Jersey Zinc Co. Palmerton, Pa.
- St. Joseph Lead Co. Josephstown, Pa., and
Herculaneum, Mo.

Sherwin-Williams Co. Chicago, Ill., and
Coffeyville, Kansas
Sullivan Mining Co.. Kellogg, Idaho
U. S. Smelting, Refining & Mining Co.. . . . Midvale, Utah

Uses:

The greatest use of cadmium is in electroplating. Over half of the metal produced in 1940 was used for this purpose. Next in importance is its use in bearing metals and in many alloys. About 12 percent of the 1940 production was used in pigments and chemicals.

Its corrosion resisting qualities have occasioned a large increase in the use of cadmium for electroplating iron and steel. The cadmium surface is about the same color as tin, and takes a high polish. It does not readily tarnish. Cadmium, containing a small percentage of silver, is used instead of nickel for plating steel and is said to give better protection than nickel. Cadmium-silver alloys are used in silver plating where as much as 25 percent of cadmium is sometimes used without affecting the appearance of the plate.

Cadmium bearings are used largely in high speed internal-combustion engines; therefore, the automobile industry is a large consumer of the metal. According to the Minerals Yearbook, Ford used nearly 890,000 pounds in the 1937 model year. It is said that cadmium-silver-copper alloys under severe engine tests have shown approximately three times the life of babbitt bearings.

Low-melting point alloys are obtained by combinations of cadmium, lead, tin, and bismuth; cadmium, tin, and bismuth; and cadmium, lead and tin. Melting points of these alloys vary between 140 degrees and 203 degrees Fahrenheit. They are used as soft solders for work with tin, lead, etc.; also in electric fuses, and as fusible plugs for automatic fire sprinklers. A cadmium-nickel storage battery is used in Europe for miners' lamps. A dental amalgam consists of 26 percent cadmium and 74 percent mercury. A Cliché metal for stereotype plates consists of 22.5 percent cadmium, 27.5 tin, and 50 percent lead. Cadmium is used in the Weston cell for measuring electromotive force.

Chemical Salts:

Cadmium yellow is the name given cadmium sulphide prepared artificially. It is a bright lemon yellow from weakly acid solution and orange yellow from strongly acid solution. It is one of the most permanent pigments known.

Other commercial cadmium salts and their uses are cadmium acetate used in dentistry; cadmium chloride in dyeing and calico printing; cadmium nitrate in glass making and porcelain glazes; and cadmium halogen compounds in photography.

All cadmium salts ~~are~~ soluble in water and dilute acids are poisonous.

Cadmium as a Standard:

In spectroscopy the cadmium red line has been found to be the purest and most monochromatic of all spectrum lines. It has therefore been adopted as an international standard for all quantitative spectroscopic measurements. Many apparently single lines in a spectrum are in reality made up of a principal line together with lesser lines grouped closely on either side of it. Such complex lines would not be satisfactory as a standard. The cadmium red line has been determined as the most homogeneous line examined and in 1907 was adopted as the primary standard. Its wave length was designated as 6438.4696 Angströms.

For defining and comparing a standard of length the best standard is a definite wave length of homogeneous light. Thus the standard meter is defined as a piece of metal whose length at 0 degrees C. equals 1,553,164 times the wave length of the red line of the spectrum of cadmium observed in dry air at 15 degrees C. of the normal hydrogen scale at a pressure of 760 mm. of mercury at 0 degrees C.

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GOLD MINE CLOSING ORDER

Among the common failings of human beings--especially of a free people--is that propensity of unhesitating expression of opinion on almost any subject. Too often these extemporaneous opinions are given without thought either to their soundness or to their possible serious consequences.

For a good many months it has been the custom of people in various parts of this country to make such remarks as, "Why in h... don't they close the gold mines? Gold miners should be mining base metals to help the labor situation; moreover, gold mines are consuming critical materials."

This illustrates our propensity of forming and expressing opinions without realizing or weighing all the possibilities inherent in the action advocated.

Ever since people have come to realize the very critical role that base metals play in this war, gold mining has sunk lower and lower in the scale of human endeavor. Gold mines were denied satisfactory priorities; most of their workers^{either} migrated to better paying jobs under government contracts, or went into military service. Dredges were doing better than lode mines since a very few key men can keep things moving at capacity on a dredge. Not so with lode mines. Many of the latter had closed down while others were struggling along with about one-fifth of a normal crew when the W.P.B. delivered the coup de grace.

Ostensibly the proponents of gold mine closing had most of the logic on their side. However, the actual carrying out of the closing order shows up certain effects that may not have been intended. It is to be presumed that the government officials who made the decision on the closing order made a thorough and honest effort to predict the consequences, both good and bad. Plainly not all conditions could be anticipated. In any event, the matter of closing will stand some examination and we wonder if all factors were realized by those responsible for the sweeping order.

Let us list the benefits and the penalties of the gold mine closing order. On the benefit side are the following:

- (A) Making available experienced mine labor to base metal operations.
- (B) Stopping all consumption of critical materials by gold operations.

On the penalty side are the following:

- (A) Disaster to the economy of communities affected by closing of gold mining operations, including loss in taxes.
- (B) Disaster to classes of labor rooted to the community by property ownership, family relations or otherwise.
- (C) Discrimination by our Government against domestic producers by the continuation of gold purchases from foreign producers.

In commenting on these various issues, let us divide gold operations into three categories:

(1) the larger gold mines, such as Homestake and the Grass Valley mines in California; (2) the small "family operations" operated by one or two up to a half dozen men including both lode and placer and both seasonal and continuous operations; and (3) alluvial mining, particularly dredging.

In the case of the large lode gold mines (No. 1 above) their location is not uncommonly in mining districts that do not contain base metal mines and sometimes these districts are hundreds of miles from points where the labor released could find employment in base metals or strategic mineral operations. There are a number of reasons for this condition. Mine labor in the west has changed in complexion considerably in the last twelve months. The younger single men, especially, have practically vanished from the mines, choosing either fancy wages at war plants on the coast or the armed service. The mines then recruited farmers, sheepherders and miscellaneous types, largely of little mining experience, to supplement the meager force of older experienced men. When the gold mining closing order came, the elder employees with homes and families and the locally recruited miscellaneous labor went back to former occupations or into local industries having some bearing on the war effort. There was a conspicuous absence of migration of skilled mining labor from the larger gold mining operations to base metal operations.

The small family type of gold operations (No. 2 above) never did employ a significant number of miners that would be available for base metal operations. These little family operations, in the first place, consume almost no strategic materials. Their consumption of explosives even, of which there is no shortage apparently, is very low. A typical such operation continues in the winter months when there is water for hydraulicking or where underground work is not interfered with by weather, and the operators work on their farms or in the woods or for the Forestry Department regularly during the summer season. The gold mine closing order, if strictly administered, would be fatal to a lot of these small operations which are just as harmless as can be, but which nevertheless form an important part of the communities in which they are located.

Now as to the dredges (No. 3 above) their case is perhaps clearer than either of the other two. The supplies of critical materials they use are extremely small; the effect on the economics of the community where they operate is frequently very important. The number of employees they have released is relatively small and the percentage of those few employees that could be expected to go to a base metal or critical mineral operation is also negligible. Such employees consist of winchmen and other specialized jobs not common in underground mining, in fact most of the dredge employees are prejudiced against working underground. We know of one dredge recently closed that had been the main support for years of an entire valley. Not a single one of its twenty odd employees would consider migrating to a base metal district for underground work. Incidentally, closing down of this dredge and the selling of its equipment is a tremendous loss not only to the owners but to the community in which it operated and also to the State. In many former gold mining communities, it is very difficult to see how the tax income to the community can be replaced under war conditions.

There is the feeling that in closing down its own gold mines and at the same time continuing to buy gold from foreign countries our government is encouraging foreign producers at the expense of its own citizens.

It would appear that the penalties imposed on the country's economy by closing down gold mines outweigh the anticipated benefits to the war effort. We think that the matter of getting maximum base metal production was handled better during the last war. Then reduction in gold mining operations was automatic because of high operating costs.

ERRATUM

In the October issue of the Ore.-Bin the author of the radio script entitled "Fluorescent Light Mineralogy" was given as Mr. R. C. Treasher. This was in error. Mr. R. G. Bassett prepared the script and gave the talk.

GOLD MINES

Concerning the gold mine closing order, the American Mining Congress reported as follows under date of October 30:

"At a conference arranged this week by Representative Harry Engelbright of California, WPB Chairman Donald M. Nelson received first hand information concerning actual results realized under the gold mine shut down order, L-208. It now seems evident that even the small numbers of men which the mining industry had previously shown might become available for copper and other non-ferrous mines are not being realized, and that possible benefits to the war program are wholly incommensurate with the prospective damage to established communities and mining properties.

"Following the conference Congressman Engelbright reported that Chairman Nelson had stated that the whole matter would receive reconsideration. In connection with further studies, gold producers are being asked to submit to Rep. Engelbright full data as to the minimum number of men and minimum amounts of critical materials (such as carbon steel, alloy steel, stainless steel, copper, copper base alloys, zinc and aluminum) that would be needed to keep their properties operating on a sufficient basis to pay standby expenses, together with information as to age of employees and particularly whether such operations could be maintained with men above military age."

THE PLATINUM METALS*

Introduction

The platinum metals are a group of related elements usually occurring alloyed with one another; platinum is usually the dominant metal and is by far the most important commercially. Osmium, iridium, palladium, ruthenium and rhodium complete the group. They are characterized by their light metallic color, resistance to corrosion and high specific gravity.

Native platinum, generally found alloyed with small amounts of other metals of the group, rarely occurs in crystals (isometric) and is usually found in grains and scales. It has no cleavage; has a hackly fracture, a metallic luster, is malleable and ductile, and has a whitish steel gray and shining color and streak. It is fairly hard (4-4.5) and heavy - the native metal has a specific gravity between 14 and 19 and the pure, 21 and 22. It is sometimes magnetic and occasionally shows polarity. Most platinum yields from 8 to 15 or even 18% iron, 0.5 to 2% palladium, 1 to 3% each of rhodium and iridium, a trace of osmium, and finally 0.5 to 2% or more of copper. It is distinguished by its color, malleability, high specific gravity, infusibility and insolubility in ordinary acids.

Other platinum group minerals vary somewhat in their characteristics. For example, osmiridium (an alloy of iridium and osmium) is only slightly malleable and has a hardness between 6 and 7. It is distinguished from platinum by greater hardness and its tin-white to light steel-gray color.

Palladium, alloyed with platinum, has a whitish steel gray color and a specific gravity of 11.3 to 11.8.

Iridium, alloyed with platinum and allied metals usually occurs in angular grains of a silver white color. It is relatively rare.

Platinum also occurs as sperrylite ($PtAs_2$ - Sudbury, Ontario) and as cooperite ($Pt(AsS)_2$ - Transvaal, South Africa).

*Material for this article was taken mainly from Minerals Yearbook, Review of 1940, Lindgren's Ore Deposits, and Dana's Textbook of Mineralogy.

Occurrences

The members of the platinum group are siderophile (iron-like) elements and occur mainly as magmatic differentiates in basic rocks, especially in peridotites and dunites. They are not uncommonly associated with high temperature copper ores though in such association palladium is often more common than platinum.

In placer deposits platinum occurs as small rounded grains and as concretionary and knobby dark-gray particles. Osmiridium in the form of bright silvery scales often occurs with it. The largest pieces of platinum have come from the Ural placers; the largest piece weighed over 25 pounds. These deposits occur in the vicinity of the platinum-bearing rocks. Minerals associated in the rocks or found in these placers are olivine, serpentine, chromite, magnetite, zircon, corundum, and other platinum metals.

Platinum has long been known to occur in primary deposits but until the last decade or so, only a few of these have been of economic importance. As primary deposits its associations are as follows:

- (1) In dunites and peridotites (disseminated) associated with chromite. It is sometimes intergrown with olivine, pyroxene and serpentine.
- (2) As magmatic differentiates in basic rocks, in association with chalcopyrite and pyrrhotite.
- (3) In minor amounts in many kinds of copper deposits (with palladium).
- (4) Miscellaneous types.

Native platinum is a rare mineral and occurs in commercial quantities in but a few localities. It was first discovered in alluvial deposits of the river Pinto, Department of Cauca, Colombia, from where it was taken to Europe in 1735. Here in Colombia, it received its name from platina, meaning silver-like.

The placers of the Ural Mountains, U.S.S.R., discovered in 1822, have been important producers. The productive area is in the province of Perm, east of the crest of the Urals. Other important placer deposits are the platinum-bearing gravels in the Choco district, Colombia; in New South Wales, Australia; Goodnews Bay district, Alaska; the placer black-sands of California; and in Oregon at Cape Blanco, Curry County.

The most important commercial primary deposits are at Sudbury (Ontario) where platinum metals occur as sperrylite and palladium associated with nickel-copper ores. Other important deposits are those in Transvaal, South Africa (basic rocks) and those in Tasmania.

Production

World production in recent years has been slightly over 530,000 ounces annually. Canada became a significant producer in 1930. The long-time lead in production of platinum metals by U.S.S.R. was taken over by Canada about 1934 and since then Canada has increased its production till in 1938 she was producing over half the annual output, nearly 300,000 ounces. The U.S.S.R. was second in 1938 with some 100,000 ounces. South Africa was third with about 60,000 ounces, followed in turn by the United States and Colombia. Other countries contributed but a very minor amount.

According to U.S. Bureau of Mines Minerals Yearbook, in 1940, 35,000 ounces of crude platinum were recovered in Alaska, 1,400 ounces in California, 69 ounces in Oregon, and 31 ounces in Montana. Alaska production is largely from the Goodnews Bay district in southwestern Alaska. In California most of the output was a by-product of dredges working gold placers. The principal production in Oregon comes from the ocean beach sands near Cape Blanco in Curry County, but a small quantity was obtained as a by-product to gold recovery from hydraulicking and dredging.

In addition, reporting for 1940, the Minerals Yearbook states that many gold and copper ores in the United States contain small quantities of platinum metal. In 1940, 7,774 ounces

of platinum metals were recorded as a by-product of refining gold and copper ores. Since 1935, chiefly due to large-scale mining in Alaska, production of platinum metals in the United States advanced progressively from 11,552 ounces in 1935 to 48,269 ounces in 1938. This amount is made up of 40,932 ounces in placer platinum, 7,427 ounces recovered from gold-copper refining, and 90 ounces from platinum-bearing ore.

Despite the much larger output of domestic placer platinum, most of the new platinum metals recovered by refineries in the U. S. in 1939, as in previous years, were derived from crude platinum from foreign sources, notably Colombia, as most of Alaska platinum was refined abroad.

New platinum metals recovered by refineries in the U.S. 1936-40 in troy ounces (Mineral Yearbook):

Year	Platinum	Palladium	Iridium	Osmiridium	Others	Total
1936	39,728	4,682	1,678	541	317	46,946
1937	36,174	5,945	1,998	640	501	45,258
1938	30,444	3,653	1,247	384	485	36,213
1939	36,033	3,491	1,051	727	139	41,441
1940	38,951	4,564	1,517	644	1,663	47,339

Again the Minerals Yearbook states that the major part of the refined new platinum metal now consumed in the U.S. emanates from the United Kingdom. The metals are recovered there as by-products in refining nickel-copper matte from the Sudbury district of Ontario, and, to a smaller extent, ^{from matte} from the Rustenburg district, Transvaal, South Africa, and from placer platinum originating in the Goodnews Bay district, Alaska.

In 1940, 66,430 ounces of secondary platinum metals were recovered from the treatment of scrap metal, sweeps, and other waste products of manufacture that contain platinum.

Uses

Platinum and its allied metals (palladium, iridium, rhodium, ruthenium, and osmium) have high melting points, white colors and are resistant to oxidation at high temperatures and to attack by destructive chemical compounds.

The platinum metals either pure or alloyed are used in the jewelry trade and dentistry, in the chemical and electrical industries, and for numerous other purposes.

A marked increase in the world output of platinum metals, due chiefly to improvements in metallurgical processes for refining copper-nickel ores, has made available large quantities of platinum, palladium, iridium, rhodium, ruthenium and osmium. Despite this gain in output during the past decade, new uses are being found for these metals and they have taken the places of other materials in many markets.

In 1940 jewelers in the U.S. bought some 42% of the total domestic sales employing it, alloyed with iridium and ruthenium, for precious stone settings as well as in other forms of jewelry.

The chemical industry in 1940 took 25% of domestic consumption. It is used as a catalyst in making sulfuric and nitric acids, for lining processing and reaction vessels, for hydrogenation of organic compounds, for rayon, spinnerets, crucibles and the making of many other products.

The electrical industry advanced from fourth to third place as a consumer of platinum in 1940. Here it is used for thermocouples, temperature measuring and recording instruments, magneto contacts, automobile voltage regulators and many other electrical uses.

The dental industry, now fourth, took 8% and there it is used either pure or alloyed in tooth-pins, bridges, orthodontic appliances, etc.

Palladium is the next most extensively used metal of the platinum group and is about half as common as platinum though less costly. Pure or alloyed, palladium is suited for many of the uses of platinum and is being increasingly employed by the dental, electrical and jewelry industries.

The other platinum metals - iridium, rhodium, osmium, and ruthenium - comprised only 7.1% of the total consumption for the group in 1940. Iridium is used chiefly as a hardening addition to platinum and in magneto contacts for airplanes. Its compounds are employed as fixing agents, as a porcelain pigment, and as a catalyst. Rhodium, alloyed with platinum, is used for high-melting point thermocouple wire, furnace winding, and is used also as a catalyst. Rhodium plating is used as a finish to glassware and silverware and employed in surfacing reflectors for searchlights and projectors. Osmium, mixed with other metals, makes pen points that resist wear and corrosion by ink and these alloys are used as bearings in fine instruments to replace jewels. The oxide is used as a biological stain for fats and for finger-print work. Ruthenium also is used as a hardener for platinum metals and one of its salts serves as a biological stain. Ruthenium has been effectively employed as a hardener of platinum in jewelry to replace part of the iridium now being used by the aircraft industry.

Markets

The United States leads the world by a wide margin in consumption of platinum metals. This country is also an important refining center and occupies a prominent position in the international platinum trade.

Despite the increased consumption of these metals in 1940 there were no appreciable changes in the quoted prices of most platinum metals. Market prices were as follows per troy ounce: platinum, \$36; palladium, \$24; rhodium, \$125; and ruthenium, \$35-\$40. Iridium, however, opened the year at \$125 an ounce and advanced until in December it was \$275. The O.P.M. conducted an investigation and reported there was no real shortage (as attributed to increased use in aircraft industries and cutting off of supplies from U.S.S.R.) and in February, 1941, the quoted price was lowered to \$175 an ounce. Platinum is currently selling at \$36 per ounce troy (New York).

Buyers

Braun Corp., 2260 E. 15th Street, Los Angeles, California
 S.B. Gracier & Sons, 212 Stockton Street, San Francisco, California
 Wildberg Bros. Smelting & Refining Co., 742 Market Street, San Francisco, California
 Western Gold & Platinum Works, 589 Bryant Street, San Francisco, California

CLEARING HOUSE

No.74-CH Wanted to purchase, small placer property with plenty of water, ranch house and land for market garden use. Write G.L. Gaskell, 404 West Commonwealth Ave., Alhambra, California.

RAY OF LIGHT IN THE FOG

The American Mining Congress reports in its weekly information service that WLB chairman Nelson is endeavoring to eliminate unnecessary paper work on the part of war industry. Through his efforts, 120 WPB forms have been eliminated and 132 others have been improved and simplified. Also a centralized control has been established for the issuance of new forms, and no branch or division of WPB may issue a form requesting information from industry without approval by a special committee and the Bureau of the Budget.

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COCKEYEDEAS

Our premise may be simply stated:Well, never mind the premise. That can come later. Let's get on with the discussion.

Consider the following: We have been keeping records, in Washington and elsewhere, for the last 150 years, on almost every conceivable thing from the price of dried apples to the trend in halitosis among rats. From records, graphs are made, - or can be, if anyone is sufficiently curious.

Graphs are wonderful. One can prove almost anything by them. After one has proved something, the chances are good that someone else may come along and, using another set of official records, draw a graph that makes the first "grapher" look so silly it seems strange he hasn't been tucked away long ago.

By a graph, for example, you might discover some strange relation between the annual birth rate in a given country, and the date of that country's getting into a war. But after you had made the profound discovery, and were on the point of announcing it to a long-eared world, more than likely some simple-minded person with half your brains (but with a grain of common sense) would happen along and demonstrate that you could have figured it out without the bother of graphs, had you sat down a moment and reasoned from cause to effect.

"Graphitis" is the term we might use to describe this strange disorder; and its victims would then be known as "graphitics". How do they get that way? Oh, in several ways. For example.....

Every so often some adolescent, writing a bachelor's thesis or something, digs into the cobwebby scrolls, logs, and entrys pertaining to the decay of corpuscles or copper corporations, makes some graphs, and brings forth a new theory of medicine, economics, or what would you like? The boy is pardonably proud of himself. After further cogitation, he writes a book in which he enlarges on his theory, - usually making it apply to everything from the price of quicksilver to why girls leave home. He now has arrived; he is a 'name', an author. In the press, and to you and me - the common herd - he is a personage, - a scientist, an expert, a philosopher, a mineral economist, a genius, a thinker, a savant, or merely "the famous Mr. X".

The acclaim causes Mr. X. to expand a bit. He concludes that if THAT portion of the American people thinks he is pretty good, he MUST be pretty good. So, not to let his public down, he makes some more graphs, writes another book or two, and forthwith becomes THE man of the country in corpuscles, copper corporations, or what will it be this time? (The chances are that while making his graphs and writing his books, Mr. X has really done some thinking, probably some reasoning from cause to effect, too. In interpreting his

graphs in his writings, he makes a good, readable, and plausible story. He also becomes a sea-going bearcat on generalities.)

Now we have no aversion to graphitics or statisticians or thinkers of divers ilks. We love them. (Anyway they're interesting.) Some are great, burly fellows with shaggy heads,--remindful of bison at the zoo; others are little furtive chaps, bald-pated, with beady eyes behind thick-rimmed glasses, chipper as squirrels, and cute as a bug's ear. As a group they have a niche in the scheme: They help pay the taxes (some of them), and they give us something to smile, weep, or rant at. Each is a rara avis with a penchant for averages and a passion for ambiguity.

Let's remember, however, that statistics are abstract facts, usually without footnotes or explanations. In eighteen hundred thirty-seven, say, there were x-thousand boat loads of brass and solder shipped from the underground mines of Nebraska. In 1884, the number was something else. With all the figures from the records plotted up to 1942, Mr. X finds that it makes a pattern. The maestro waves his wand and the music begins. Bear in mind that the maestro may never have mucked ore or run a jackhammer underground a day in his life. But he's an expert at figures, statistics and graphs, and can reach a common denominator of prices through the years in half a shake; but a Swede shift boss with a stub pencil and the top of a powder box can come a damsite nearer telling the cost of turning out ore at his mine at any given time than could the famous Mr. X.

What we are trying to get at is just this:

In the case, for example, of next year's quicksilver production (selected without malice, merely because it's easy) all the curves, graphs, trend lines, and block diagrams that a thousand statisticians could draw on the basis of all the quicksilver records since Columbus, wouldn't in the War emergency of 1942 be worth an empty gas ration book as against the considered and impersonal judgment of a half dozen honest to goodness, old head, quicksilver operators. Why? Because graphs and averages must be based on past records during decades of years, mainly peace-time years, when we never imagined spending a billion dollars a year. Now we are spending a billion dollars a week; we have a cockeyed combination of commodity prices; we have an undreamed-of combination of labor conditions, wages, supply of materials; and we have a tax situation (lack of future profit incentive); and an industrial outlook different from anything we have seen in the history of the country.

Add to that, the fact that quicksilver comes in small packages in the ground. There are no Mesabi quicksilver ranges, no "Bingham Canyons" among the quicksilver mines. Quicksilver isn't "big business" - although it is one of the most necessary of the purely war minerals. Only two sizable corporations bother with quicksilver; most of the operators are little fellows. At the present writing probably no single mine in the country grosses \$100,000 a month; mines are "going down" and new prospects are being found every month. Future production under such circumstances is extremely uncertain.

So what?

Well, we wind up with our premise (In Cockeyedeads you should conclude with a premise); "Laws of averages can be depended upon" or "if you want to determine a trend, plot a graph and project a line"; or "what is true in general, over a period of years, is apt to be true in particular."

In 1942 the answer to the above is - "Like Hell" - -

Some of us have been wondering why the "smart boys" and "brass hats" in Washington couldn't estimate requirements within a "row of apple trees". According to our "cockeyedeas", old Solomon couldn't, either - in 1942 or 1943. So, in fairness, let's give the Washington boys a break, - let's not criticize, too much, standard methods that would be OK in normal times.

Epilog.....In connection with the setting down of the above 'Cockeyedeas', two thoughts come

to the writer: First, if, in this hectic life of 1942, we lose our sense of humor, we are indeed licked; and second, we have always adhered strictly to Rule 7 of the Ancient Order of Owls, which reads "Don't take yourself too seriously." We recommend it highly.

Earl K. Nixon

COBALT

Introduction

The beautiful blue color imparted to glass by cobalt and known as "cobalt blue" has served to characterize the metal, cobalt, since ancient times. With the advent and phenomenal growth of the present age of metals cobalt has joined the growing list of metals which give valuable properties to alloys, and its use as a coloring agent has become definitely secondary.

Recorded history of the use of cobalt dates back to Egyptian and Babylonian times when the people used it as a constituent of blue glazes and blue glass in an attempt to imitate lapis lazuli. In the middle ages, Hartz Mountain miners mistook it for a copper ore, but when it was tested it gave no copper and was termed "false ore" or cobalt. In 1735 it was isolated by Georg Brandt and in time uses other than in ceramics were discovered. Cobalt is an essential war metal because of its use in certain alloys. The supply is critical since supplies must be imported.

Cobalt is a hard white metal, malleable, ductile, and feebly magnetic. It is very similar to nickel but is slightly more bluish in color and is harder. It is sometimes substituted for nickel in various alloys in order to obtain slightly different qualities than those which are given to alloys by nickel.

Cobalt minerals

The economically important minerals of cobalt are smaltite, (CoAs₂), cobalt arsenide, and cobaltite, (CoAsS), cobalt sulpharsenide, both of which usually contain nickel as an impurity. The latter crystallizes in the isometric system, usually forming euhedral crystals which are identical with those of pyrite in form, although sometimes it may be either granular or massive. The cleavage is cubic and the hardness is 5.5. Cobaltite, also known as cobalt glance, has a specific gravity of 6 and is a reddish silver-white mineral with a metallic luster. It is a mixed salt of cobalt arsenide and sulphide. Smaltite also crystallizes in the isometric system and although it is sometimes found as small cubic crystals it occurs more often in a massive state without cleavage. Its hardness is 5.5 and it has a tin-white to steel-gray color with a metallic luster. The specific gravity is 6.2 and the composition varies from CoAs₂ to CoNiAs₂. Smaltite is the chief ore of cobalt. Smaltite and cobaltite commonly occur together and often with nickel arsenides and sulphides. Erythrite, "cobalt bloom" $\frac{2}{3}\text{Co}_3(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$ is an oxidized cobalt mineral which may be present at or near the surface of cobalt mineral deposits. Its red color is distinctive. When its water of combination is driven off by gentle heat, the resultant powder is blue.

Occurrence

Cobalt minerals are found in several different geological environments. Residual deposits of asbolite, an indefinite mixture of hydrous cobalt and manganous oxides, may be found where nickel and cobalt-bearing peridotitic and pyroxenic rocks, and the serpentines derived from them, have been deeply weathered. The silicates of cobalt and nickel are chemically altered to hydrated nickel silicates and asbolite. Deposits are superficial because concentration is by means of surface waters.

Smaltite, and ^{sometimes} cobaltite, are found in veins of nickel-cobalt-bismuth ores (sulphides) which may also contain silver, either native or in combined form. These deposits are mesothermal; that is, they were formed at intermediate temperatures by hot waters ascending from an intrusion.

Cobalt minerals are also found in high temperature, or hypothermal, environments. A deposit in San Juan, Chile, where cobalt minerals occur with tourmaline, and a deposit in British Columbia where magnetite is an associate mineral, are representative of this type of occurrence.

Probably the most famous cobalt occurrences of all time were those at Cobalt, Ontario. They were, however, famous for their very high silver content rather than for cobalt. The veins were mainly small - a few inches wide - consisting generally of smaltite, sometimes containing also cobaltite, niccolite and other cobalt-nickel minerals, but especially characterized by native silver. All the vein minerals were intimately intergrown. Veins assaying several thousand ounces of silver to the ton were common. The gangue mineral was calcite. The veins generally had sharp walls but a network of branching veins was not uncommon. In places, native silver was shot through the wall rock. In the early days of mining at Cobalt, only the rich ore was extracted and shipped. Later concentrating mills and cyanide plants were installed so that a large tonnage of low-grade silver ore was treated. Cobalt minerals and residues were a by-product of these plants and such materials were shipped to custom smelters at Deloro, and at Thorold, Ontario.

After the silver ore reserves were in great part depleted, most of the mills at Cobalt closed down, so that custom plants for treatment of cobalt material could not operate continuously. It is reported that the importance of cobalt in the war program has caused the custom plant at Deloro to resume continuous operations on material to be obtained from the Cobalt district.

The country rock at Cobalt consists of Huronian conglomerates and arkosic sandstones, called the Cobalt formation, which overlie Keewatin greenstones, basic volcanic rocks and schists. The veins are found at the base of the Cobalt, of which a 300 foot thickness is exposed in this area. Diabase sills have been intruded into the old sediments and are probably genetically related to the veins. After emplacement of the diabase in Keewenawan time, fracturing occurred and the fissures formed were filled with metalliferous sulphides and arsenides under mesothermal conditions.

The asbolite deposit in New Caledonia is representative of the residual type of deposit. Nickel in the form of a hydrous silicate is the chief product but small amounts of the cobalt ore are also recovered. The ores occur under a deep mantle of weathered rock ("variegated clay") and overlie serpentine and peridotite which they penetrate along fissures. The cobalt as well as the nickel is exported.

Ore deposits of the Belgian Congo contain cobalt associated with copper. The Katanga district produces "blister copper" which commonly contains a small percentage (less than 2%) of cobalt. The ore is mined from rich copper ore-bodies which impregnate folded sediments. They are tabular masses in schistose and highly metamorphosed Paleozoic sediments, and the ore masses are usually parallel to the bedding. The copper ores are generally oxidized and carry cobalt. The origin of the deposits is unknown but is probably related to granitic intrusions into the schist. In Northern Rhodesia, also, cobalt is produced as a by-product of copper smelting.

Production

World production: Approximately 4,500 to 5,000 metric tons of cobalt were produced per year for 1938 and 1939. These figures are not accurate because government restrictions do not allow the actual quantities to become known. However, the Belgian Congo, French Morocco, and Northern Rhodesia contributed 75% - 80% of the total. Cobalt is known to be produced in 14 countries.

World production of cobalt, 1937-39, in metric tons from U. S. Bureau of Mines Minerals Yearbook, Review of 1939:

Country*	Cobalt-bearing material	1937		1938		1939	
		Gross Weight	Cobalt Content	Gross Weight	Cobalt Content	Gross Weight	Cobalt Content
Belgian Congo	Cobaltiferous cu ore	a	1,500	a	a	a	a
Burma	Cobaltiferous ni speiss	4,389	298	3,399	238	3,322	229
Ontario, Canada	Ores, oxide, and metal	a	230	a	208	a	332
Morocco, French	Ore	5,280	581	6,541	720	a	a
Northern Rhodesia	Cobaltiferous cu ore	a	884	a	1,461	a	3,581

a - data not available.

*In addition to the countries listed, Chile, China, Finland, Germany, Italy, Japan, and Mexico produce cobalt, but production data are not available.

It is interesting to note that no cobalt deposit is sufficiently rich to enable it to be mined for cobalt alone. It is usually a by-product of the smelting of other ores.

The Belgian Congo is one of the largest producers of cobalt but exact figures of production are not available. The ore was sent to Belgium for refining previous to the invasion by Germany but since that time it has been sent to the United States. High-grade reserves of cobalt minerals have been found in Belgian Congo and in 1939 production was probably increased because of the installation of additional electric furnace capacity for treatment of the ore.

Burma produces considerable cobalt as a by-product of lead-zinc mining at the Bawdwin mines. Italian production is mainly from nickel-cobalt ores in the Piedmont district of northwest Italy. Cobalt occurs in the Atlas Mountains in French Morocco where erythrite, a hydrous cobalt arsenate (cobalt bloom), is found on the surface and smaltite is found at depth. This is an interesting occurrence in the light of recent world events.

U. S. Production

Due to the present emergency, domestic production of cobalt is on the upswing. Although the U. S. is a large consumer of cobalt, it has no important sources of the ore and depends almost entirely upon imports. However, small potential sources are being developed.

Cobalt has been recovered from iron pyrite concentrates produced at Lebanon, Pa., from iron ore mined at Cornwall, Pa. At Kellogg, Idaho, the residue from electrolysis of zinc contained cobalt but no cobalt was shipped in 1940. A concentrate of nickel and cobalt was recovered as a by-product of the froth flotation of talc at Burlington, Vermont, and cobalt minerals are found in various concentrations and with various ores at Tombstone, Arizona; Gold Hill, Colorado; Salmon, Idaho; and the Goodsprings district, Nevada.

U. S. Consumption

In 1940 imports of cobalt into the U. S. exceeded any previously known figure. In 1939 the imports consisted chiefly of the metal which had been refined in Belgium. In 1940, however, imports of ore and alloy totalled 10,497,719 pounds, a great increase over the total of former years. This was largely due to the invasion of Belgium, resulting in the Belgian Congo ore being sent to the U. S. for refining. In 1940 the price of 97% - 99% metal was \$1.50 per lb. in 100-lb. lots, and the price of 70% - 71% grade black oxide was \$1.84 per lb. in 350-lb. lots.

Treatment of ore

A generalized outline of one of the processes used for treatment of cobalt ores is as follows: The ore is first roasted to remove both arsenic and sulphur. Then it is fused in a blast furnace, the iron passing into the slag and the arsenide and antimonide of nickel and cobalt settling out. This is ground and roasted to drive off most of the arsenic and antimony, if present. Silver when present may be extracted with cyanide. The residue is treated with hot sulphuric acid. Iron, arsenic and antimony are precipitated with limestone. Copper is precipitated from the filtrate with soda ash. The cobalt and nickel are then precipitated by sodium hypochloride and sodium carbonate respectively. In this process both metals are sold as oxides.

Uses

One of the first uses of cobalt, when in oxide or silicate form, was as a blue pigment in glass, pottery glazes, etc. Combinations of cobalt oxide and different aluminum and zinc salts produce variations in shade of blue or green. Smalt, a glass made by fusing cobalt oxide and silica, may be used when ground to impart a beautiful and permanent blue color. The oxide is sometimes used in the ceramics industry to counteract the yellowish tinge produced by iron compounds. Cobalt salts, the oleate, acetate, and linoleate, etc., find their place in the paint industry. They are used in the preparation of dryers for use in paint, varnish and linoleum.

Cobalt metal, unlike iron, is not attacked by air and water at ordinary temperatures. It may be electroplated and produces a coating superior to that of nickel. An alloy of cobalt, iron, and chromium is used for cutlery. A cobalt amalgam is used in dentistry. Cochrome, an alloy similar to nichrome, is used in the place of the latter for electrical heating units because it melts at a high temperature and is more resistant to corrosion than nichrome. Surgical instruments are made of an alloy called "stellite" composed of chromium, tungsten and cobalt because of its hardness and durability, and cobalt is used as a bonding material for superhard cutting materials such as tungsten carbide. An alloy of cobalt, nickel, and aluminum produces the powerful Alnico magnets. Various tools and dies are manufactured of steel alloyed with cobalt, and the metal also has uses as a catalyst. Recent investigations show that cobalt compounds are needed to counteract pasture deficiencies which cause various sicknesses of animals.

Qualitative tests for cobalt

1. Specific: The powdered mineral is fused with sodium hypophosphite. If the elements cobalt, titanium, and tungsten, either singly or grouped, are present the melt is blue. If cobalt is present the blue-colored melt turns pink on cooling, and this color change is reversible on reheating the melt.

2. The powdered mineral is decomposed by treatment with nitric and hydrochloric acids. The resulting solution is adjusted to slight acidity. One or two drops of this solution are mixed with a few mgs. of ammonium fluoride on a spot plate, then five drops of ammonium thiocyanate in acetone (10% solution) are added. A blue color shows the presence of cobalt. This test shows presence of one part of cobalt in 50,000 parts of solution and enables the detection of cobalt in the presence of 1,000 times the amount of iron.

3. Ignited ore when fused with borax bead gives a distinctive blue colored bead.

References: "Mineral Deposits" by Lindgren; U. S. Bureau of Mines Minerals Yearbook, Reviews of 1939 and 1940; "Economic Aspects" by Leith; and "Mineral Deposits" by Lilley.

NOTICE TO HOLDERS OF MINE SERIAL NUMBERS

The Mining Division of the War Production Board has notified state emergency coordinators of mines and regional technical advisors that holders of mine serial numbers need not make monthly reports of rated purchases made on form PD-119 after October, 1942.

A. M. Dixon, mining engineer, with operating experience in various parts of the world has been appointed regional technical advisor to the War Production Board. Mr. Dixon's headquarters at present are at Room 815, Bedell Building, Portland, Oregon. His duties will be concerned principally with mine priority matters.

SALE OF LOW-GRADE CHROMITE

From time to time inquiries are received concerning marketing chromite of lower grade than that purchased by Metals Reserve Co. Since the War Production Board exercises complete control over use of chrome, it had been supposed that this control extended to the marketing of chromite ore. Such is not the case. Dr. Andrew Leith, Chief of the Ferroalloys Branch of the War Production Board, states that there are no W.P.B. restrictions on the sale or transfer of chromite ores, either high-grade or low-grade. The W.P.B. priority control is on the use of such ores by consumer.

It follows that a chrome producer may sell his ore to any purchaser without regard to permission from the War Production Board.

The question of use of the ore purchased is a matter between the purchaser and the War Production Board and does not concern the shipper.

Consumers of low grade chromite and possible purchasers of such ore, according to U.S. Bureau of Mines records as supplied to Senator Charles L. McNary, are as follows:

General Refractories Co., Broad & Chestnut St., Philadelphia, Pa.
 E. J. Lavino & Co., Philadelphia, Pa.
 Botfield Refractories, 777 S. Swanson St., Philadelphia, Pa.
 Harbison-Walker Refractories Co., Pittsburgh, Pa.
 American Locomotive Co., New York, N. Y.
 Bethlehem Steel Co., Bethlehem, Pa.
 Continental Steel Corp., Kokomo, Ind.
 Follansbee Steel Co., Third & Liberty Ave., Pittsburgh, Pa.
 Foote Mineral Company, Inc., 1607 Summer St., Philadelphia, Pa.
 Jones & Laughlin Steel Corp., 3rd Ave. & Ross St., Pittsburgh, Pa.
 Joslyn Mfg. & Supply Co., 3700 S. Morgan St., Chicago, Ill.
 Midvale Company, Nicetown, Pittsburgh, Pa.
 National Steel Company, 2800 Grant Building, Pittsburgh, Pa.
 Pittsburgh Steel Co., Pittsburgh, Pa.
 Youngstown Sheet & Tube Co., Youngstown, Ohio.

RHODOCHROSITE NEEDED

The following letter has been received from the Foote Mineral Company, 1609 Summer St., Philadelphia, Pa.:

"For the welding of ships, planes, and tanks we are desperately in need of very high-grade Rhodochrosite, similar to the following typical analysis:

Manganese Metal	30.52%
Calcium Oxide	6.00%
Silica	8.00%
Iron	4.70%
Magnesium Oxide	0.42%
Phosphorus	0.02%
Ignition Loss (CO ₂)	27.01%

You will see from this that the Silica content is roughly one-fourth of the Manganese Metal content. In other words, we cannot use a product in which the Silica is 75% or in some cases nearly equal to the Manganese Metal content.

We are interested in this ore in carload lots, and if you could put us in touch with any producers or prospective suppliers of this item, your help would be greatly appreciated."

Rhodo-chrosite is manganese carbonate. It resembles rhodonite, manganese silicate, but is somewhat softer than rhodonite, and has rhombohedral cleavage (like calcite). Rhodo-chrosite is soluble in warm hydrochloric (muriatic) acid giving off bubbles (effervescent) of carbon dioxide (carbonic acid gas).

GOLD MINING MACHINERY FROZEN

War Production Board order L-208 defined non-essential mines and closed those gold mines which could not qualify for a mine serial number. An amendment to order L-208 froze the machinery at these mines, that is, prohibited the sale or disposal of any equipment of the types listed in Schedule (A) of Preference Rating order P-56. Schedule (A) includes most types of mining machinery. The amendment required owners of the gold mines closed down by order L-208 to file with the War Production Board an itemized list of machinery and equipment within 60 days.

Under terms of a third amendment to L-208 owners of gold mine machinery are required to file their machinery lists with WPB on or before January 18, 1943.

Under date of December 11, 1942 the Weekly Information Service of the American Mining Congress states that, according to a WPB interpretation of order L-208, the "freezing" of machinery in "non-essential" gold mines applies only to mines which were operating on or subsequent to September 17, 1941.

Further the A.M.C. states that the Appeals Board of WPB had given permission to some few mines to continue to operate for a limited time in order to remove broken ore from stopes and to fill the stopes with waste.

The Appeals Board has announced that it would entertain appeals from closed gold mines "when substantial amounts of critical materials are not used, and when: (1) All work is performed by elderly or infirm miners not useful in critical metal mining; and (2) Ore is broken and needs only to be removed from the mine, and the stopes refilled with waste; and (3) In the case of placer mines where the equipment is not now in a place of safety, the appeal is for the purpose of permitting operation until equipment can be moved to the nearest place of safety."

Appeals may be addressed to War Production Board, Reference L-208, Washington, D.C.

The American Mining Congress also reports that mines of the Cripple Creek district of Colorado and the Golden Cycle mill at Colorado Springs have been granted permission to continue limited operation for a six-month period while changing the mill to recover zinc as well as gold. Several mines on the Comstock Lode in Nevada having a high ratio of silver to gold have been granted temporary serial numbers under order P-56 in order to permit continued production of silver for war use.

PACIFIC COMPANY TO RESUME SHIPPING CHROME

The Pacific Co. of Medford, John Day, President, which has been doing extensive construction work on Federal War Projects, principally airports, throughout the State, has started to mine chromite in Southern Oregon. Late in 1941, this company started prospecting the chromite sands in the Bandon-Marshfield area. More recently the Pacific Company leased the well-known chromite property owned by Harry Sordy in the Briggs Creek area, a few miles southwest of Galice. Machinery was installed, and mining and shipping of chromite was started in October. Shipments of chrome were made to the Metals Reserve Company, Grants Pass, but road conditions forced a suspension of shipping until weather conditions improve. Mr. Day is a well-known cattle rancher of Medford. It is the plan of the company to resume active operations in a few months, as soon as road conditions improve. Meantime an effort is being made to recruit a nucleus of an experienced mining crew for the job.

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