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At a recent conference with mining engineers in New York, Mr. R. V. Norris of the fuel administration said in regard to the coal shortage that the situation is serious and is going to continue to be serious. With a shortage of labor amounting to 30% production has been increased 20%; but greater increase is necessary. The railroads have done well and Mr. Norris stated that "the zone system of distribution has saved us 160,000,000 car miles a year."

The labor problem in every producing district is a serious one; but it is folly to attribute all our troubles to labor shortage. As has been shown by the coal operators in Western Canada, our coal mines could produce a much larger tonnage if the demand warranted continuous operation throughout the year. While men and machinery were idle at Western Canadian mines last summer, the Canadian railroads were busily hauling Pennsylvania coal westward to Winnipeg and beyond. This state of affairs has very properly been exposed and has resulted in action being taken by the U. S. fuel controller.

DANGER OF COAL SHORTAGE IS NOT YET REALIZED.

There has been a complete failure on the part of the public and (as the Government of any democratic country merely reflects the opinion of the general public) there has also been a failure on the part of the authorities to realize the fundamental importance of coal in the prosecution of the war. Great Britain, the United States and Canada all show a falling off in the production of bituminous coal this year as compared with 1917, and what the coming winter has in store for us it is not pleasant to contemplate. Governmental action so far has consisted in suggesting increased production through increased efficiency of the remaining workers, in the greater use of mechanical appliances, and in the adaptation of the transportation facilities to the seasonal demands for coal, with particular reference to the needs of domestic consumers. All these measures are but palliatives, and no one seems to have had the courage as yet to tackle the root of the trouble, which is the shortage of men digging coal at the face. There is the neck of the bottle; there is the true restriction and limitation of bituminous coal production which threatens worse troubles next winter than were experienced last winter.

Under the circumstances it would be amusing, if it were not so serious, to read of discussions in Winnipeg and other Western cities as to the hardships inflicted upon the householder by enforcing the substitution of soft coal for anthracite. The Winnipegger will be glad to get anything that will burn next winter. The Fuel Controller is doing all he can to alarm the people of the western cities as to the necessity to get in their winter coal during the summer, but apparently some wise people think the Fuel Controller is a bugaboo. It is not possible to exaggerate the dangers of disregarding the Fuel Controller's advice in this matter, nor is it possible to overstate the importance of the collieries of the Canadian West raising every pound of coal that can be mined before the frost comes.

In the recent registration questionaire it was evident that the Government realized the importance of farming, but what will be the advantage of raising wheat and other produce if there is no coal to transport it? Coal is the first need of modern warfare. It comes before man-power, food production, munitions or anything else, because without it all these other departments of war's varied needs are immobilized or non-existent. As Lloyd George has inimitably phrased it, "coal is the paramount lord of war." It is strange when the leader of our democracy expresses so clearly the place of coal to-day that so little attention has been paid to the increasing of its production, and that the authorities have been principally exercised over the suffering of the individual householder that arises from a coal shortage. That is sufficiently dreadful, of course,

but when coal production declines to a point where it threatens the production of war munitions and hampers the movement of troops and munitions, it throttles all national endeavor at its source.

Coal-mining to-day is not an industry within the general acceptance of that term. It is a department of national defence. Without it, the presence of our troops on the firing line cannot be. Why, then, should the production of coal, of all things, be distinguished by a decline that other and less essential occupations do not show. Steel, wheat, men, ships, guns, shells, money, all these things, and many others are but a transmutation of coal, merely the finished product of materials that have been mined, assembled, and manufactured with the help of coal. Coal is basic, fundamental. When will the fact be realized?—F. W. G.

THE GOSPEL OF UNITY.

One of the most notable figures in America to-day is Mr. Samuel Gompers, President of the American Federation of Labor. Mr. Gompers before the war was an extreme pacifist; but he quickly woke up when Germany set the world afire. Since then he has helped citizens of the United States to realize the dangers that confronted them, and he will always be honored for his part in preparing his country for the battle for freedom, which his vision enabled him to see in what, to many of his fellows, seemed to be merely a Europan quarrel. Mr. Gompers visited Canada recently and while here he made it clear that he has not been fooled by the sophistry and pretences of the Socialists. In view of what he has done and is doing his words have considerable weight and his appeal for unity was well received throughout the country. He closed his address to the Canadian Club with the following words:

"I ask and appeal for the unity of the people of Canada. I cannot find words to express to you my appreciation of the magnificent courage, of the wonderful contribution which the manhood and womanhood of Canada have given to this great cause voluntarily. I appeal for still stronger and greater sacrifices if needs be. I am making the same appeal to my fellow-countrymen in the United States. I wish that I could go abroad to my fellow-workers of Great Britain and of France. I wish that I could go to the front and give a word of cheer and heartening to the fighting boys there. But I am advised that the best service I can give is to remain at home and occasionally go to the men who are in accord with us and help to spread the gospel of unity of spirit and purpose, and solidarity, and sacrifice, in order that we shall not fail; and we dare not fail.

"The clock has struck. The time is tolled. Every man to his post of duty, where he can give the best possible service for the common cause. Men must fight. The men at home must sacrifice—must work, give service, buy bonds, spare all that can be spared—that our fighting men over there shall be supplied with everything that they may require to put up the fight that shall win. It is either to buy bonds and pay taxes for freedom, or to pay tribute and indemnity for the Kaiser and unfreedom—that is the choice. And for us, who not only understand what freedom means, but who have grown out of the loins of men whose forbears were the men who fought for freedom—for the men of to-day who have freedom, enjoy freedom and practise freedom, there is no choice. Men of Canada, fight on, carry on, and victory will be yours and ours, for the whole world and for the generations yet unborn."

B.C. LEGISLATURE MAY RE-ENACT LEGISLATION RE COAL LANDS.

Discussing the disallowance by the Dominion Government of the Provincial Statute giving the early settlers within the Esquimalt & Nanaimo Railway Belt the right to apply and, their claims on examination proving sound, to receive Provincial title to the coal rights in their lands, Hon. John Oliver, Premier of British Columbia, recently stated that he saw no reason why the Provincial Legislature, at its next session, should not be asked to re-enact the legislation. This is taken to mean that the Province will insist on its power to give the settlers the privilege indicated. It also means that the present British Columbia Government is likely to maintain the principle of Provincial authority in the case in question. The issue is one of vital import not only to the settlers, whose coal lands are at stake, but as well to the Granby Consolidated Mining & Smelting Co., which holds Provincial title to valuable coal areas, and to the Canadian Collieries (D) Ltd., which claims title to all the non-alienated coal lands in the Railway Belt by virtue of the terms of the subsidy granted to the E. & N. Railway Company in 1884.

B.C. MINERAL ACT NOW APPLIES TO TUNGSTEN, ETC.

The Mineral Act of British Columbia has been enlarged by Order-in-Council to apply to tungsten, fluorine, vanadium, radium, and uranium, or any combination of these elements "with themselves, or with any other elements." This action was taken by the Provincial Government on recommendation of Hon. Wm. Sloan, Minister of Mines. Without exception, these are minerals the importance of which has been accentuated by the war, some to a greater extent than others. It having been brought to the attention of the Department of Mines that there are occurrences of fluorspar and of scheelite in British Columbia it was decided to lose no time in bringing these and other minerals, heretofore outside the scope of the Act, but imperatively needed in the manufacture of munitions of war, within its provisions. It may be stated by way of explanation that the Provincial Mineral Act, and its definition of mineral, were drafted twenty years ago when the minerals in question were unconsidered so that they have been in the anomalous position of being unstakable under the Act in a legal sense, although common sense and the necessities of the times demanded their inclusion. Incidentally it is pointed out that the British War Board has asked the Canadian Government to produce as much vanadium as possible, while the need of tungsten also is great. Not an inconsiderable market for fluorspar exists at the smeltery of the Canadian Consolidated Mining & Smelting Co., at Trail, B.C.

Coal Production in Nova Scotia During the First Half of 1918

By F. W. Gray.

The production of coal during the first six months of 1918 in Nova Scotia shows a decline from the outputs of the corresponding period of 1917 of approximately 330,000 tons. The falling off is principally to be found in the production of the larger coal companies and it is slightly offset by one or two increases. The net result, however, is a decrease. In the writer's review of the Nova Scotia coal trade for 1917 it was forecasted that the yield of 1918 would in all probability show a decline from 1917 of 350,000 tons, and unfortunately this forecast has been almost realized in the first half of the year. During the next six months, barring accidents, it is not to be anticipated that the rate of decline will be quite so rapid as it was during the first six months, but no increase can be expected, and a further diminution of the rate of production is only too probable. It would look as if the 1918 figures would be about 400,000 tons below those of 1917.

Weather conditions in January, the explosion at the Allan Shaft Colliery, and some very minor labor troubles have partially caused this falling off from last year, but the real and important reason is the shortage of underground workers, and more particularly the insufficient number of men qualified to work at the coal face.

It has not been fully realized, how specialized is the occupation of the workman who "digs" coal, nor how largely the drain of voluntary and draft enlistments has fallen on this class of underground worker. In the organization of a colliery there are men who are classed as producers, and other men who are classed as "non-producers." The use of this last-named term does not imply any lesser importance of the work to which it is applied, but it is very essential that the respective proportions of producers and non-producers should be correct. Enlistments have taken away an undue proportion of the producing class, and while some readjustment is possible by transferring men from the non-productive classes to the productive class, this readjustment can only have a very limited range, as a large part of the underground non-productive class, and practically all the surface workers are unfitted for work at the coal face, either by being too young or too old, or by physical inability and in some instances by a distaste for the work of the actual miner. As the producers dig the coal, and the non-producers handle and prepare it for market, it is evident that the output of coal is limited and controlled entirely by the available number of producers. If all these men were taken away there would still be a very considerable number of workers left at the collieries, but there would be no coal for them to handle.

The disproportion between the respective classes has now become so great, that it can only be overcome by closing down some mines, and concentrating the workmen in the collieries selected for this purpose. If this readjustment is forced by the conditions existing, and it seems inevitable, then a certain number of older men, or physically ineffective men, will be thrown out of employment.

A statement issued by the Standard Silver-Lead Mining Co. in Spokane, Washington, indicates that that company operated at a loss of $7,010 during the month of April, as against a profit of $26,255 in the preceding month.

EXEMPTION OF COAL MINERS CONTINUOUSLY EMPLOYED.

Coal mining is classified in Canada as a work of national necessity and coal miners are dealt with as a special class in the enforcement of the Military Service Act of Canada. The course to be pursued in regard to application of conscription to the miners has been a matter of serious consideration to the tribunals charged with power to grant exemptions, temporary and permanent, in British Columbia, and other western mining Provinces of the Dominion. The attitude assumed by His Honor Judge Thompson of British Columbia recently, may be taken as indicative of the generally accepted policy in this respect. In the Crowsnest Pass Coal District he was confronted recently with a blanket appeal for exemption for 36 men having the backing of the United Mine Workers of America and based on the contention that the appellants were engaged in a work of national importance. After hearing all the evidence as to the actual time being worked by each man, the amount of coal produced and the individual earnings, he allowed 31 applications for a limited period, renewal being conditional on their maintaining their average production of coal.

In giving judgment Judge Thompson established the following rules:

1.—In cases where I grant exemption it shall be conditional upon the appellant being continuously employed in his occupation, either that in which he is now engaged or some other occupation in the mine. Any person ceasing to work for more than 24 hours will be deemed to be not continuously employed, unless he can show some just cause or reason for his non-employment. This prohibition does not apply to recognized holidays and the holding of funerals.

2.—A lay-off of 24 hours without just cause or reason being shown shall not occur more than once a month. In case of illness a certificate signed by some medical practitioner must be produced within 48 hours and if demanded by the military or civil authorities produced and filed in the office of the chief of provincial police at Fernie, B.C.

3.—In the event of a strike or cessation of work by workmen other than exempted men whereby the latter are prevented from working, exemption shall cease, subject, however, to the provisions in rules 9 and 10. (These are certain rules laid down in the agreement subsisting between employer and employe in this District.) Judge Thompson here observes: "This may seem a harsh ruling, but it must be remembered that this appeal has been made by the United Mine Workers of America and it will be the duty of the officials of the brotherhood to see that no such strikes or cessations of work occur."

4.—No exempted man shall occupy an official position or carry on work which will necessitate his absence from work at his usual occupation in the mines. In the event of any person to whom exemption is granted desiring to change his employment from one employer to another he may do so upon application being made in writing to me and a certificate allowed by me.

5.—In the event of any dispute arising between the military authorities and any person to whom exemption is granted, or in the event of the military authorities drafting, detaining or arresting an exempted man for alleged noncompliance with these rules, or from any cause, the matter shall be brought before me as speedily as possible for determination.

Mining in Kootenay, B.C.

By E. Jacobs.

With only half of the year gone, it is too early to venture an opinion as to what the value of the 1918 mineral production of British Columbia will be. There does not, however, seem to be any good reason to expect as large a total value for this year as there was for 1917; indeed, it will not be surprising to find that there will be a decrease that will show the optimism of some of those who have expected a larger value to have been without foundation.

It is quite likely the production of coal will be appreciably larger, but not of metalliferous minerals, neither placer nor lode. Nor is it to be expected that the total of dividend distributions of metalliferous mining companies will be as large as in 1917, for the amount declared for the first half of 1918 ($1,345,796) is $236,479 less than one-half of the total for 1917, which was $3,164,550.

The chief metalliferous mining districts of the province are those of East and West Kootenay, Boundary, and the Coast. The outlook appears to be that so far as the Kootenay and Boundary districts are concerned, there will be a considerable decrease in the production of metals, except, perhaps that the output of zinc may be larger. If nothing shall happen to interfere with the continuous production of coal from Crowsnest mines, it may be expected that there will be an increase in the value of the year's output of non-metallic minerals that will in part offset the decrease in that of metals, but it is unlikely that it will wholly compensate for the latter.

Data relative to the output of all mines in Boundary and Coast districts is not usually obtainable until after the close of the year, so that any attempt to review conditions in those districts would, in the absence of such information, of necessity, be largely guess-work. It is believed, though, that there has been a falling-off in production in Boundary district; that there may be a similar result disclosed when the output of the metal mines of the lower Coast district shall be known, and that the upper Coast district will probably show an increase, which will be largely the result of the operations of the Granby and Surf Inlet companies. Without authentic data, though, to exhibit the actual position, the reference to the upper Coast mines should be regarded more as a surmise than as a statement founded upon definite knowledge of what the mineral production has been to date, and what it may be expected to be for the remainder of the year.

So much of the ore produced in Kootenay districts goes to Trail for treatment, that a far better idea of the situation can be given, for statements of the quantities received are published regularly, and these supply a basis on which to form an opinion as to whether there has been an increase or a decrease. The following summary review of ore receipts at Trail during five and one-half months of this year may be taken to indicate what the general results for the first half of 1918 have been:

Ore Receipts at Trail.—Ore receipts at Trail were not as large during the second quarter of the year as in the first similar period. As the figures available at the time of writing are only up to June 14, inclusive, complete comparisons are not practicable just now, but the following figures will be near enough to give a generally correct idea of the position in regard to ore production so far as can be shown by a review of the quantities of ore received at the Consolidated Mining and Smelting Co.'s works at Trail. The monthly totals are as under:

Ore Received in 1918.	Tons.	Daily Average. Tons.
In January	27,404	884
In February	33,989	1,214
In March	41,725	1,346
In April	37,039	1,235
In May	21,162	683
In June (two weeks only)	8,222	587

The chief cause of the decrease was a considerably lessened production from the Consolidated Co.'s own mines. For instance, receipts of ore from mines at Rossland, by far the greater part of which comes from the Centre Star and Le Roi mines, owned by the company, averaged 770 tons a day for March and only 71 tons a day for two weeks of June; then East Kootenay mines, chief among which is the company's Sullivan zinc-lead mine, had an average of 225 tons a day for June against 347 tons for March, while Boundary mines shipping to Trail (the only important producer being the company's Emma mine) averaged but 38 tons a day in June as compared with 111 tons in March.

On the other hand, there was a distinct improvement so far as mines in Ainsworth and Slocan divisions are concerned. The total of Ainsworth mines for the months of February and March was 2,965 tons, while for April and May it was 5,004 tons. Slocan's total for February and March was 2,292 tons, and for April and May 2,884 tons, while for two weeks in June it was 1,368 tons. More ore come from United States mines, too, their February-March total having been 1,513 tons and that for April-May 1,731 tons.

It should be kept in mind that the foregoing figures do not include the whole production of the several districts included. While there may not have been any considerable quantity of ore shipped elsewhere from mines in East and West Kootenay districts, it is well known to those familiar with local conditions that the chief sources of ore-supply for the Boundary district copper smelting works, at Grand Forks and Greenwood respectively, are the mines of the Granby Consolidated Co. and the Canada Copper Corporation, the former having four blast furnaces in operation and the latter one or two.

EAST KOOTENAY.

Only one mine in East Kootenay district other than those owned by the Consolidated Mining and Smelting Co., during the period under notice, made an output of ore worth mentioning, namely, the Paradise, in Windermere division, which shipped to Trail 1,352 tons out of a total from the district of nearly 43,000 tons. Several small mines together shipped 79 tons, but with the exception of that from the Paradise, above mentioned, the whole of the remainder was from mines of the Consolidated Co., in the proportion of about 530 tons from the St. Eugene and 41,000 tons from the Sullivan, the latter quantity being of zinc ore except as to 229 tons which was lead ore. From time to time newspaper reports have been published, making it appear that one or other of several properties in the three mining divisions comprising the East Kootenay district—Fort Steele, Windermere, and Golden divisions—gave much promise of soon becoming ore-producers, but

the fact remains that the combined output of all of them, exclusive of the Paradise, which was reopened last year after many years of unproductiveness, has not this year reached to 100 tons of product shipped, and this notwithstanding that there is now a railway running through the district from north to south—from Golden, on the main transcontinental line of the Canadian Pacific Railway Co., to that company's Crowsnest branch in the southern part of the district.

WEST KOOTENAY.

It has already been shown that Ainsworth and Slocan divisions of West Kootenay have in recent months made a larger production of ore, while Rossland's output has dwindled until the figures for June show a most serious decrease. Not that Rossland mines have become exhausted, but that conditions are so unfavorable at this time for continuing the mining of ore in which the chief valuable content is gold that it has been decided to suspend for the time the production of such ore at the larger mines of that camp. Dealing with the several mining divisions separately the following comment is made:

Ainsworth.—Monthly totals of output in 1918 of mines in Ainsworth division, that is of ore or concentrate shipped to Trail, are as follows: For January, 584 tons; February, 1,319 tons; March, 1,646 tons; April, 2,255 tons; May, 2,749 tons; June (two weeks only), 963 tons; total to June 15, 9,516 tons. Of this total, about 5,200 tons was from the Consolidated Co.'s mines—from the No. 1 mine nearly 4,800 tons, and from the Highland 400 tons. The New Canadian Metal Co.'s Bluebell Mine, situated near the eastern shore of Kootenay lake, opposite Ainsworth, shipped about 2,700 tons of oxidized lead ore taken from a deposit opened between the surface and the deeper workings. The Florence Mining Co., operating on the west side of the lake, about two miles north of Ainsworth, shipped 680 tons, probably for the most part concentrate. The Bell, in the western part of the division, made an output of 255 tons of zinc ore, and there was shipped to Trail from the old dump of the Montezuma, on the south fork of Kaslo Creek, 106 tons. Seven other properties were shippers, with a combined output of nearly 300 tons; among them the Cork-Province group which is stated to now be better equipped for concentrating its lead-zinc ore and for maintaining an output.

Slocan.—Monthly totals of ore and concentrate, both lead and zinc, received at Trail are as follows: For January, 712 tons; February, 1,717 tons; March, 575 tons; April, 1,295 tons; May, 1,589 tons, and June (two weeks only), 1,368 tons; total, 7,256 tons. The larger shippers were the Standard, more than 3,000 tons; Surprise, nearly 1,200 tons, and Lucky Jim, between 1,500 and 1,600 tons. No information has been obtained as to what quantities the Standard and Surprise shipped to the United States, but since ore was received at Trail from the former during only three months of the half-year and from the latter only two months, it is thought that the figures just given represent only a part of the output of concentrates from the mills of those mines, respectively. The greater part of the ore and concentrate from the three mines mentioned had zinc as its chief marketable content. Quite recently it was announced that production had been suspended at the Lucky Jim mine, owing to expiry of contract previously in existence with the Consolidated Co.

In all there were nineteen shippers from Slocan district to Trail during the half-year, but only three, in addition to those already named, made an output in excess of one hundred tons; these were the Galena Farm and Lucky Thought, both in the neighborhood of Silverton, Slocan Lake, and the Rambler-Cariboo, in the eastern part of the district.

Late news concerning Slocan mines includes the information that another important shoot of silver-lead ore has been found in the Standard mine, which for several years was the largest producer of silver-lead in the district; that there has been a similar recent experience at the Rambler-Cariboo mine, and that the newly-organized company which has acquired the Slocan Star mine has commenced development work in the lower levels of that mine. The Galena Farm mine is expected to keep up a steady production until weather conditions in the winter shall again bring about a suspension of operations.

Nelson.—This division continues disappointing so far as ore-production is concerned, its total shipments in 1918 to date to Trail having been less than 1,400 tons. As more than 800 tons of this quality was from the Consolidated Co.'s Molly Gibson mine, and 170 tons from the Monarch, near Beasley siding, it will be seen that the large area of country in the division south of the Kootenay river, with a total of less than 350 tons shipped to Trail, of which 319 tons was lead ore from the Emerald mine, near Salmo, has done very little in recent months to add to the mineral production of the country. It may be that the Yankee Girl, near Ymir has been shipping to other smelting works, but with that possible exception there does not seem to have been much, if any, ore mined outside of the comparatively small quantity received at Trail. It is not surprising that the several gold mines about Nelson, and in Sheep Creek camp, have not been producers, but there are copper properties in the neighborhood of the city from which an output was looked for. Reports have been published making it appear that more zinc ore had been opened in the Hudson Bay mine, near Salmo, but no particulars of results have been received for inclusion in this review. Little is heard now of molybdenite, discovered several years ago in the southern part of the division and for a time stated to be important. Generally, productive mining in Nelson division seems to have been at a low ebb in the first half of the current year. Nor does there seem to have been any important progress made toward the utilization on a commercial scale of the electrolytic zinc process at Nelson of which much had been heard prior to 1918.

Rossland.—There is little to add to that already written concerning mines in Rossland camp, where the Consolidated Co. is now making only a small production. The Le Roi No. 2, Ltd., however, is keeping up its output, having sent to Trail about 8,150 tons of ore in five months of 1918, which compares with a little less than 11,000 tons during the whole of its fiscal year ended September 30, 1917.

It is of interest to note that Mr. J. J. Warren, managing director of the Consolidated Mining and Smelting Co., was lately reported by a Vancouver newspaper to have stated that only development work was being done in the company's Rossland mines, with about 150 men employed. The uewspaper report continued: "When asked if the provincial taxation legislation had had anything to do with the closing of the Rossland mines, Mr. Warren said there had been some talk about this, but the decision to suspend shipment of ore from the Rossland mines had not been influenced by taxa-

tion legislation, but was because operating costs had increased more than enough to wipe out the profit margin on gold-mining under present abnormal conditions and there had not been any appreciation in the value of gold. When normal conditions shall have returned, Rossland mines will be able to ship large quantities of ore with a fair margin of profit. The increased cost of coal and coke alone for each ton of ore treated was approximately 60 cents. Steel had doubled in price, powder nearly so, and labor costs had also gone up. The result was that a gold mine was now about the worst kind of mining asset for a company to possess."

Other Camps.—There is little productive mining going on in other West Kootenay camps, from the whole of which not much more than one hundred tons of ore has been received during this year. Several small properties in Arrow Lake division, others in Trout Lake, and still others in Lardeau, have sent small lots of ore to Trail, while in all three divisions some development work has been done. Now and again a report is published of something being done in Revelstoke division, but the only property in that part of the district that was among last year's shippers is not on this year's Trail list.

Upper Coast District of British Columbia

The British Columbia Department of Mines recently published a bulletin entitled "Preliminary Review and Estimate of Mineral Production, 1917," in which was printed preliminary reports on the six Mineral Survey Districts into which the Province has been divided. That on District No. 1, by Mr. Geo. A. Clothier, resident engineer, with headquarters at Prince Rupert, follows:

District No. 1 is the old Cassiar District and includes seven Mining Divisions of the Province, namely, Bella Coola, Queen Charlotte, Skeena, Portland Canal, Atlin, Stikine, and Liard. It has 300 miles of direct coast-line, from Seymour inlet to Portland Canal, which latter forms the south-eastern boundary between Alaska and British Columbia. In this distance there are hundreds of islands, and thousands of miles of canals and inlets cutting into the Coast range, affording the best possible conditions for prospecting. Shipping facilities and transportation are, of course, ideal, and it is because of these natural advantages that the large mining companies operating on the Coast have engineers in the field in search of suitable properties. The prospector on the Coast has therefore the double advantage of comparatively easy prospecting and a ready market for a prospect of merit.

The district, in 1917, produced about 830,000 tons of ore, of which amount, all, except about 1,700 tons, was treated at the Granby Company's smeltery at Anyox; this company producing and treating from its own mines alone about 812,000 tons, which includes the low-grade quartz mined and shipped to the smeltery for flux. The important new shipper added to the list in 1917 is the Belmont-Surf Inlet Mines, Limited.

Bella Coola Division.

The Bella Coola Division has had no mining outside of a little prospecting and the recording of about forty mineral claims. The only portion of the Division which I was able to visit was Seymour inlet, to look over some iron groups. I examined two properties and found some good surface showings of fine, clean magnetite, well located for economical production and handling.

Skeena Mining Division.

The Skeena Mining Division has made an exceptionally good record during the year 1917, due to the very successful operations of the Granby Consolidated Mining, Smelting, and Power Company.

It has added one more producing property to its list in the Belmont-Surf Inlet Mines. This company has expended upward of $1,000,000 in purchasing, developing, and equipping the quartz property on Princess Royal Island. The placing of this property on a shipping basis presented some difficult problems, and credit is due to the staff of the company for the installation of the up-to-date plant now in operation, and which will be dealt with more fully in a later report. The concentrator was put in operation in October, and to date the company has shipped to the Tacoma smeltery 700 tons of concentrates, which will give returns of between $90 and $100 a ton in gold, silver, and copper value. With the additional tube-mill now being installed, the mill will treat 300 tons every twenty-four hours, producing between 800 and 900 tons of concentrates a month. The flow-sheet is partly water-concentration and partly oil-flotation, the latter using the Belmont-Jones type of machine, The saving is from 92 to 94 per cent. and will be improved.

The company has also under option and development a very promising-looking property, with similar ore to and adjoining its present holdings. The management expects to ship a total of 1,700 tons this year.

There are several groups of claims in the immediate vicinity on which there are said to be fine surface showings, but which I was unable to examine on account of the heavy snowfall.

I have been reliably informed that up Khutze, Aaltanhash, and Klekane inlets, off Graham channel, on the mainland, are several promising surface showings.

About twenty-five miles from Hartley bay, on the north-west side of Douglas channel, the Drum Lummon Copper Mines, Limited, a Vancouver company, is developing a property which shows bunches of high-grade copper ores of chalcocite, covellite, and bornite in quartz, which itself lies in more or less regular bunches, replacing the granite on either side of a fracture-zone through it. They have installed a very serviceable small equipment of gasoline-engine and compressor which will run a couple of hammer-machines, also an engine and fan for ventilating. Development to date consists of 365 feet of crosscut tunnel to the vein and 59 feet beyond, with 104 feet of drifting on the vein. The drift shows continuous ore for the whole distance, pinching in places to a foot in width and widening to 10 feet. The face at present looks very promising indeed, being 10 feet in width of quartz containing disseminated high-grade copper sulphides which would concentrate probably 10 into 1, making a very high-grade product. I was unable to examine the surface on account of the snow. The Mines Department has assisted the company to build a wagon-road from the beach to the mine, a distance of about a mile. The property looks very promising and is just at the critical stage now, where the next few thousand dollars can be spent to the very best advantage. The company has just sent a trial shipment of about 8 tons to the smelter, of ore sorted from development work.

MILITARY GAS MASKS ARE NOT SUITABLE FOR MINERS.

Mining men who are familiar with the oxygen mine rescue apparatus used by rescue men at mine explosions have been making inquiries of the U. S. Bureau of Mines, Department of the Interior, as to whether or not the military masks worn by the soldiers as a guard against poison gas attacks would not be serviceable at mine disasters. The military mask is so much lighter in weight and therefore so much easier carried that the miners are wondering if they cannot be used instead of the heavier oxygen mine rescue apparatus.

In answering queries of this character Mr. George S. Rice, Chief Mining Engineer of the Bureau, has the following to say:

"Military gases which may be discharged from pipe, or in later usage through the agency of shells, are poisonous in character, and perhaps may be immediately irritating to the eyes and skin. On the other hand, these gases being discharged in the open air are rapidly diluted so that high concentrations are generally only momentary except in dugouts which must be cleared by fanning out. Moreover, there is never a material deficiency in oxygen.

"The mine atmosphere after explosions or during fires contains the highly poisonous carbon monoxide gas, one of the most difficult gases to absorb chemically, and may be in high degrees of concentration for a long period, and also, what is more important, there is usually so serious a deficiency in oxygen after explosions that even if there were no poisonous gas present a man could not live.

"It is self-evident, therefore, that the purpose of the military mask is to absorb the poisonous gases present and these gases are sometimes very complicated in composition and a great variety of them are used. The supplying of oxygen other than atmospheric oxygen is not necessary. On the other hand, the first requisite of the mine rescue apparatus which is used at the military front in tunneling operations compels the supply of sufficient oxygen, viz.: 20 per cent. of the atmosphere and the exclusion of high concentrations of gases. Hence the necessity of having the apparatus self-contained, shutting off all the external atmosphere.

"It may further aid in explaining the situation to state that very large numbers of the regular oxygen mine rescue apparatus are being used both by the enemy and the Allies in tunneling and contra-tunneling operations as well as other special purposes.

"A third service requiring special apparatus is the Aviation Service. There are no poisonous gases to contend with, but the need is for oxygen to supply the deficiency at high altitudes.

"It will, therefore, be seen that so far as mine rescue and mine recovery work is concerned it is idle to consider that the military masks could be used as a substitute: they are of no value for the purpose, although with certain changes a commercial form may be developed which may be adaptable for use in special gases or vapors in metallurgical plants. Mr. G. A. Burrell, of the Bureau is now working out the problem of such a commercial mask, but it must be understood that special absorbents will be required for special gases, which calls for a knowledge of the exact atmosphere in which the men who would use the masks would work."

MAY DEVELOP CHROMITE DEPOSITS IN B.C.

There are indications that some of the chrome deposits of British Columbia are to be developed, Walter J. Nicholls and associates of Spokane, Wash., being authoritatively reported to have secured control of claims situated at Cascade, B.C. The property is reported to have been purchased after an examination and report by George Crerar, a mining engineer of Spokane. The chrome of Cascade has been the subject of report by the Provincial Mineralogist, the deposit to which he refers, which no doubt is the same as that in question, being within 4,000 feet of the C.P.R. and in the Grand Forks Mining Division. Of this, Mr. P. B. Freeland, resident engineer, said last year: "Little development done. Ore in lenses carrying 30 to 50 per cent. chromium. Worth investigation. Had 250 tons on the dump, and were trying to get permit to ship. Associated serpentine rock carries 3 to 10 per cent. chromium." In view of the rush call for chromite by the Imperial Munitions Commission, and the consequent increased interest in the mineral in the Province, it is interesting to recall that Mr. W. M. Brewer, resident engineer at Nanaimo, B.C., reported in 1915 that chrome ore exists on Scotty Creek, near Clinton, B.C. The claims, he said, had been staked but abandoned and then re-opened. Little development, however, had been done. Selected samples ran 33 per cent. chromic oxide. Some low grade ore might be concentrated, but development was not such as to admit of an estimate of the quantity.

BRITISH COLUMBIA MINING DIVIDENDS.

The five leading mining companies of British Columbia, according to an authoritative compilation, have declared dividends for the first half of the year 1918 as follows:

Granby Consolidated Mining & Smelting Co.	$749,924
Canadian Consolidated Mining & Smelting Company, Trail, B.C.	523,872
Howe Sound Company (Britannia Mine)	198,415
Hedley Gold Mining Co.	96,000
Crow's Nest Pass Coal Co.	62,126

The Britannia mine, as represented by the Howe Sound Co., leads in the ratio of dividend to capitalization, its dividend rate being 5 per cent. per quarter, or 20 per centum per annum. Granby leads as the largest dividend paying mine in British Columbia, its dividends declared to date having aggregated $10,198,895. Both Granby and the Consolidated Mining & Smelting Co. pay dividends at the rate of 10 per cent per annum.

The Molly Gibson-Burnt Basin Mining Company is sending supplies and men out to their property at Paulson with a view to putting the mine on the shipping list in the near future. For the present ore will be hauled over the wagon road three and a half miles to the railway. The formation and character of ore is similar to that of the Rossland camp, gold being the principal value.

At a meeting of the Board of Directors of the American Institute of Mining Engineers, it was decided to drop all enemy aliens from membership. The meeting, which was under the chairmanship of Sidney J. Jennings, President of the Institute, was attended by twenty-three of the twenty-five directors, among them the Chairman and four members of the Naval Consulting Board. The action of the Board of Directors is said to affect the status of twenty-one German scientists and one Austrian professor, who held either honorary or active membership in the Association.

Lessons From The War*

By Eugene Schneider.

I should have scrupled to accept the Presidency of the Iron and Steel Institute, aware as I am that my personal merit does not suffice to make me worthy of that very high honor, and that a far-distant residence renders it difficult for me to discharge the responsible duties of the office, had I not understood that, prompted by a sentiment for which I am deeply grateful, you wished, in selecting my person, to emphasize the absolute, hearty, loyal no less than thoughtful and resolute union existing between Great Britain and France.

Your kindness has given voice to the thoughts that we share in common. United by mutual sacrifices, bereavements and hopes, we intend to remain undivided in victory. My hearty desire, as President of the Iron and Steel Institute, is, with the cordial assistance and support of both my predecessors and my colleagues on the Council, to draw still closer the economic bonds uniting our two countries; the unbroken development of such an alliance tending in the most efficient manner to disappoint our enemy in his insatiable lust of conquest.

Nor does it seem to me without profit, in order to prepare for the coming struggle, to seek even now in the tragic examples of the war for reasons and means of doing better than we have done hitherto.

Science and Industry.

Two years ago Sir William Beardmore told us, in his address, how the war had a long series of lessons to teach us, in the most varied provinces, ranging from ethics to politics and industry. In the last-named province, Sir William showed how scientific co-operation, that is to say co-operation between laboratory research and manufacturing development, is one of the questions most emphatically thrust upon us by the events that we have been witnessing, and one demanding as prompt as possible an answer, in view of our industrial destinies after the war.

I believe that the greater number of the industrialists interested in the manufacture of steel or any kind of manufacture in which the material used is steel or iron, on either side of the Channel, share Sir William's views. But the difficulty of the question certainly does not lie in the generalization of these views; it seems to me, on the contrary, to reside in defining clearly the connection to be established between two groups of men who, up to now, have had few direct relations; the scientists on the one hand, and the industrialists on the other.

In the definition we are seeking for, difficult problems of organization are involved; for a solution may be considered as satisfactory only insomuch as it realizes a complete harmonious balance between the different forces which we are using to obtain the sought-for results. Some are connected with the efforts of individual enterprise; others are the outcome of collective action, duly disciplined and, as it were, codified, and of the rational use of habits and traditions. We have no right to neglect that inheritance of the past. We should, on the contrary, in rearing our new fabric, avail ourselves, to the best of our ability, of any material at hand, provided it be serviceable.

We must first make sure that our future organization is so skilfully contrived as to provide individual enterprise with an open field broad enough or, as a mathematician would say, with a high enough degree of liberty. Industrial or scientific invention is, indeed, in almost every case, the product of a creative power in an individual endowed with active imagination. To quote an example, it is beyond doubt that we owe to the personal exertions of Henry Bessemer the manufacture of steel in a converter and also to those of Nasmyth (in England), and Bourdon (at Le Creusot), the invention of the steam-hammer.

However, science and industrial technique are both growing ever more complex. It is increasingly difficult, even for an exceptionally endowed mind, to store up, digest and finally use the mass of human knowledge contained to-day in one of the numerous branches that have sprung up on all sides out of the common stem formed by the discoveries of the scientists, engineers and industrialists of the later nineteenth century.

Our engineers, scientists and members of our industrial staff have less and less the possibility of getting at the knowledge of facts by direct observation and thus apprehending them in their reality; they must often needs accept ready-made doctrines and live in a world of theory. There lies the main danger, especially in a time such as the one we live in. The fate indeed of our industry depends on the right use of the "human material" we may have at our disposal, to the training of which we shall have to attend; and we must therefore solve, at the shortest notice, the most complex problems that have ever been set before man: I mean, we must discipline labor in both our countries, so that our different industries, at which war and the economic consequences of war have struck and will strike heavy blows, may recover their balance with the shortest possible delay; while we make sure in spite of that indispensable discipline and the extreme specialization it involves, that we are recruiting powerful individualities whose exertions are necessary to progress.

In that respect, the iron industries form the basis of the gigantic fabric we are to rear; they are, so to speak, the gauge of industrial prosperity in a country, since whenever industry expands there is a demand for plant, and recourse is always had to metallurgy to develop plant. I may add that metallurgy is also the protecting shield that allows our two nations to resist the onslaught of German imperialism, and that it plays such an important part in the tremendous struggle, that few people realize it exactly, outside those who are in familiar and everyday contact with the real facts.

Important Role of Metallurgy in the War.

Of course, almost everyone knows that the present war requires a far greater quantity of metal than any preceding one; but it seems to me that it may be interesting to enquire into certain of the more hidden causes of this new condition and into some of the consequences necessarily entailed, all the more so as this enquiry will provide us with concrete examples, calculated to expose the parts played on the one hand by scientific research and invention, and on the other by industrial organization.

It is certain that the expenditure of ammunition exceeded, at the very outset, all anticipations founded on comparisons with previous campaigns. This circumstance appears to be due to stable, unbroken fronts, rendered possible by the huge number of men in the field. Military operations, under those conditions, assume, with few exceptions, the character of a siege-war.

* Extracts from the Presidential Address, Iron and Steel Institute, London, May 2, 1918.

The two enemies invest each other, and can effect no very ample movement unless part of the continuous rampart they are besieging or defending be previously broken through. As that rampart is not a mere line of walled defences, but is constituted in fact by an extensive area where is to be found a sporadical system of great depth formed by tier upon tier of varied works and guns of all sizes, one may well understand that, to neutralize a sector in view of an infantry attack, necessitates the expenditure of a greater number of shells than when the object, as formerly, was simply to demolish or fire a few houses in two or three villages. Instead of the 20,000 gun-shots with which Napoleon won the battle of Wagram, or the 1,500,000 shells that the Siege of Sebastopol cost the Allies, we must fire to-day several million shells to drive the enemy a few miles back on a very narrow front.

This, after all, is due to the fact that the accuracy of our gun-fire, and the high power of our explosives, are held in check by an adequate organization of the shelters afforded to the infantry, the size of the targets being reduced to a minimum.

The principal cause, apart from the difficulty of finding the range, of the present huge expenditure of shells is that the increasing accuracy of our guns has not been sufficient to counterbalance the diminished vulnerability of the objects aimed at.

Our artillery engineers, left to their own inspiration, and confronted with this fact, have certainly been tempted to seek for the solution in an improvement in the accuracy of their guns.

The problem is of profonnd technical interest. But, before grasping the solution, how many varying factors must we take into account: the laws bearing on the combustion of gunpowder; the effect of priming; the transmitting of pressures in a gaseous mass in motion; the particular effects when the shell is near the muzzle; the effects of the flexibility of the gun and the gun-carriage; the varying resistances due to the varying directions given to the shell, etc.

The work may and must be done; but it will take up a considerable time, for how many erroneous theories will crop up in the minds of the enquirer before they hit upon the royal road leading to the desired result, that is to say, to the lessening of differences in muzzle velocity, angles of elevation, and disturbing motions in the projectile during its flight?

To a common-sense man it plainly appeared that to carry on such researches exclusively was out of season, and that we must provisionally admit, as a necessary fact, an expenditure of shells deemed until then impracticable, and find, in the use of improved methods of manufacture, the immediately indispensable resources.

New Metallurgical Plants at Creusot and Caen.

Accordingly, I resolved to build new metallurgical plants at Le Creusot and Caen, with the view of producing a considerable tonnage of steel projectiles in the form of rolled bars, and of transforming directly all or part of the bars into nosed and heat-treated projectile blanks ranging from the 75 mm. calibre upward (370, 400, 520 mm., or 15, 15.75, and 20.5 inch respectively).

No doubt such metallurgical plants, situated far from our mining districts of the North and of Lorraine, will suffer from certain industrial reactions when peace allows most of our ironworks in the East to begin to work again. But I thought it permissible to neglect those future difficulties, in order to contribute to the defence of our allied countries to the utmost of my capacity. Moreover, I do not think it impossible that the metallurgical future of France will afford the means of procuring a satisfactory prosperity, not only to the ironworks working with the ores of Lorraine, but to such as receive their supplies from other districts of our country, provided, of course, that the manufactured products are adapted to local conditions of extraction, fuel, and motive-power respectively.

Together with other French friends, we proceeded to build powerful blast-furnaces, and steel works equipped with 60-ton open-hearth furnaces, and this effort has enabled us to provide our armies with the necessary projectiles, in spite of the enemy holding more than 70 per cent. of our iron and steel works.

A similar question is raised with regard to deterioration in the inner tubes of guns. The intense firing to which they are subjected more or less quickly erodes the junction cone and the grooves of rifling, so that the accuracy and range decrease in a continuous manner, and a gun is useless after firing from 10,000 to 2,000 shots, according as it is a small or large calibre gun.

The engineers and ballisticians have naturally sought to reduce the effects of deterioration by a study of the very complex causes, the temperature of combustion of the powder, the maximum pressure, the calibre, etc. But it is evident that, knowing so little as we do about these things, the solution of the problem remains remote, and that, had we managed by laboratory experiments, to fix upon a quality of metal capable of withstanding the special erosion of guns, it was practically impossible to make the guns in course of manufacturing benefit by the discovery. We therefore took for granted deterioration, and consequently provided for the manufacture of spare tubes of guns.

Does this mean that we systematically avoided research? Quite the reverse, but we began by tackling problems admitting of an immediate solution, so to speak, and among the latter, above all such as tended to increase production. I am convinced that such a policy will have to be pursued still more strictly after the war.

So we have built in France extremely powerful plants for the manufacture of cast-iron or open-hearth steel. The Caen blast furnaces are to turn out, per unit, 450 tons per day, whereas, before the war, out of 123 such furnaces at work in France, but a few could turn out 250 tons. My new steel-works at Breuil, near Le Creusot, are equipped with 60-ton open-hearth furnaces, whereas the 30 to 35-ton type was already considered as very powerful.

Moreover, we are endeavoring to manufacture special high grade acid open-hearth steel for aeroplane motors and more generally for machinery intended to bear very high stresses and the results hitherto attained show that success is ahead. It is in that direction that our laboratories are working. It is not a question of merely finding some new metal, as the result of the skilful alloying of iron and rare metals, but on the contrary we are studying means for controlling the open-hearth process as securely as the mere melting in a crucible.

It would be tiring to review here all the questions we are now asked to solve. Perhaps, however, we may be allowed to select two more instances, in illustration of our idea of the part to be played by the engineers whose exceptional gifts help our technique to progress.

The greater part of the steel-ingots we are to produce will go to the rolling mill for conversion into bil-

lets or merchant bars. Hitherto, the different operations in the rolling mill department, and in particular the drafting of grooves on the rolls, had been left to the care of men of experience, no doubt, but who were guided by empirical notions based a little on tradition and much on sentiment. The manufacture of projectiles showed us the benefit to be obtained by a thorough and scientific study of the problem of hot-drawing of blanks or slabs. It is enough to say, for instance, that, with a properly selected speed of rolling, section of dies, piercing punches, drawing rings and punches, we are able to draw in one heating the largest projectile (520 mm. (20 15/32 inches) Schneider mortar) and to use in the process half as much power as was formerly deemed necessary.

To realize such a reduction of power in the rolling-mill department is, from an economic point of view, extremely interesting, but it is necessary to study methodically all the phenomena taking place during the various stages of rolling at the cogging mill and finishing mill. We must acknowledge that engineers in certain countries, had, if not anticipated us (for research had begun at Le Creusot as early as 1899) at any rate got ahead of us. The work of some of them is certainly calculated to give a sound basis to a really practical study. It is necessary, if we wish the rolling-mill department to profit by it, for younger engineers, having the requisite scientific equipment and eager to solve an interesting industrial problem, to attack it without delay.

They have a starting point: the empirical rules of those that preceded them. These must absolutely be taken into account. They have at their disposal the means of measurement furnished by the electric motors of our mills and all our laboratory apparatus, pyrometers, extensometers, etc.; they must needs reach the goal.

When we represent, on a diagram, as functions of the number of passes, the values of the sections of the rolled product and of its chief sizes, we are often surprised that the points thus obtained do not form continuous curves, when we know very well that, special steel being excepted, the tenacity of carbon steel varies in a continuous manner as a function of the temperature. The simple readjustment of the curves thus obtained often conduces to a decrease in the number of passes, and to a better distribution of the power. It is obvious that the profit to be reaped from the study will be immediately felt.

Defective Heating is Inexcusable.

I should like to say a word about another problem of an industrial type destined to be solved by our most skilled engineers. It is that of heating: heating industrial furnaces, heating boilers. It is an extraordinary fact that the art of making a fire and turning it to a good use is still in its infancy and that our heating apparatuses are often very crude.

We know the laws of combustion, gasification, radiation and convection; but many builders of furnaces go on copying old models instead of investigating the working of their apparatus. How many times have we not heard that a cast of open-hearth steel had gone wrong because "the furnace was not properly heated."

I lay down as a principle that an open-hearth furnace should always work well. If the defect in heating is due to the choking-up of the regenerators, we must manage to get the dust to settle and allow, if necessary, the addition of heat over the top of the bath, with the aid, for instance, of oil-burners or any other process, such as the use of a cleaner of some artificial draught; for how can we admit that we cannot provide against an inconvenience which has been removed elsewhere?

If the defect in heating is due to the exceptional poverty of the gas, we must dispose of the means to better it, and these are numerous. In short, a systematic study of steel-furnaces will certainly lead to the remedying of many weaknesses in design and construction so that we may control their working and be as sure of their temperature as a stoker is sure of the pressure of his boiler.

The metallurgical works of the future must no longer afford the picturesque but regrettable sight, still too frequent to-day, of a crowd of chimneys all emitting an abundance of black or white smoke. The latter is steam. Perhaps apart from locomotives, no engine should emit steam in the open; the recovery of the calories contained in waste steam expanded to atmospheric pressure and at a temperature of not more than 30° C., yields a power at least equal to that produced by the prime mover itself. This we have determined experimentally on the exhaust turbines driven by the steam winding machines in use in some of our collieries. Even the steam of our hammers can be utilized whenever there is a workshop with a large number of moderately-powerful engines.

The black smoke is the result of badly-constructed furnaces, or of insufficient discipline in the personnel of stokers. The latter may be remedied in a simple automatic way by the institution of a bounty system calculated according to the number of charges, as shown in the deprimometer. As to the building of furnaces, great improvements might be effected by the systematic application of a few well-known results of industrial physics. We may perceive, here, under one of its characteristic aspects, the question of "industrial output" as opposed to "mechanical output." In the greater number of cases, it is possible to represent by a figure the useful effect of some isolated engine or thermic apparatus; but the useful effect of a metallurgical plant is a function of a far greater number of variables, including at the same time measurable quantities of the physical order and "imponderables," such as the technical value of the personnel and their moral qualities.

The time is at hand when our works must yield their maximum useful effect, and, therefore, we should give all our attention to any loss, even those which formerly appeared negligible on account of their comparative smallness. Multiplied by the enormous tonnage of our future production, they will form a considerable total. For instance, the mere recovery of waste oil in a vast metallurgical works may give rise to a not inconsiderable profit.

Right Use of Sources of Heat and Energy of Each Country is a State Affair.

But those are the minor aspects, one might say, of the question. More exactly, the problem of the industrial output may be studied from different points of view, the first of which is certainly a right use of the sources of heat and energy at the disposal of each country. That is a veritable State affair, concerning the whole community. In particular, with regard to ourselves, France does not dispose of a stock of mineral fuel corresponding to her wealth of iron ore. In 1913, whereas 23 million tons of ore were extracted, her native coal mines provided only four million tons of metallurgical coke, which, together with three million tons imported coke, made up merely the seven million tons necessary to her production in cast iron (five million tons).

It behoves us, therefore, to cast up the account of our resources in hydraulic power, so as to reserve for metallurgical purposes the greatest possible part of our coal production. Those resources may even now be easily appropriated for the traction of trains and tram cars, lighting purposes, and the distribution of driving force over extensive zones, since a 60,000 voltage is in use, and one of 120,000 voltage will be so very soon. Whereas the water-falls now utilized yield only from 700,000 to 800,000 H.P., future plants should allow a yield, at low water, of a minimum of 4,500,000 H.P. And as 1,000 hydraulic H.P. economize per year 10,000 tons of coal, in round numbers, the profit to expect from those plants will rise to 30 million tons, that is to say, a figure approximating our total coal extraction before the war.

Metallurgical and mining industries are interested in this question not only indirectly in the way we have pointed out, but also directly, by the use of hydro-electric current to control engines and even to produce metal.

The engineer's task, as we conceive it, begins here in an endeavor to combine harmoniously the use of thermic power as produced by the blast-furnace and coke-ovens, and hydro-electric power; the latter having the defect of being transmitted by very long lines exposed to many risks. It will, therefore, be well to provide very powerful thermic generating sets, ready for running at a moment's notice, capable of carrying on the work in the chief departments, pending the time when the thermic emergency stations have brought up to a maximum figure their normal reduced power.

That part will devolve upon groups worked by Djesel motors of 2,000, 4,000 and even 6,000 H.P., the price of oil-fuel being, in that case, a negligible matter. We are studying in France such motors and their realization seems assured.

Direct Use of Hydraulic Power.

Hydraulic power will, in certain cases, be directly utilized in our metallurgical works, without previous electric transformation. Workshops turning out projectiles have already been equipped with hydraulic presses worked directly by water forced at high pressure through pipes. More powerful presses may be worked in a similar manner, and even rolling mills might be driven by high-pressure hydraulic turbines, transmitting their energy, in the case of reversible mill engines, through the medium of a Fottinger transformer. May I recall here that a similar installation was realized by us several years ago at the Terni steel works for the manufacture of armor-plate (the power-transformer being electric).

The Electric Furnace.

The electric blast-furnace is not yet widely used in industry, but the development of electric furnaces destined to the production and refining of steel is certainly assured, especially in works using hydro-electric current as motive power. It is likely that various combinations of the electric furnace with the Thomas converter or the basic open-hearth steel will in future be the characteristic feature of that special iron metallurgy which is the necessary consequence of a dual source of heat. It will be the topography of the region or more exactly the place of the works on the "electric map" of France that will determine the proportionate demand to be made from either of the two sources.

Those are entirely new vistas opening up before our engineers. Nor should they, on that account, forget the questions of internal organization, more immediate and more varied in their form.

Union of Empirical Knowledge and Scientific Research.

Some say pure science is disinterested, or, in other words, indifferent to results; that its goal is the truth, the pure, simple, naked truth, and that it is pursued for the pleasure of the pursuit; like a sportsman who enjoys the pleasure of a day's shooting but who is indifferent to the game he bags.

This is perhaps exaggerated. At any rate, the aims of the metallurgist are more practical; he too aims at scientific truth, but a truth which can be applied to some useful end; he is not like the pure scientist, all indifferent to the game he bags. I am convinced, also, that in no other branch of industry can the union of empirical knowledge and scientific research be attended with better results than in that of metallurgy.

The opinion is no doubt excessive. For my part, I am inclined to think—and I believe I have shown you on what facts my opinion is grounded—that our metallurgical industrialists can derive much profit from scientific research, on condition that the questions are stated and treated in the proper manner—that is to say, in taking into account the results already attained, regardless of their origin, however empirical it may be, and, above all, in limiting the field of research to the immediately realizable object in view.

It was certainly to suggestions such as those that I have just outlined that the foundation of the National Physical Laboratory was due, and we cannot help wishing that this magnificent institution may completely fulfil the purpose that seems to be at the basis of all general progress in contemporary industry, and, above all, in metallurgy—namely, to establish and maintain a harmonious balance between the efforts devoted to disinterested general scientific research on the one hand and those spent in the pursuit of immediately utilizable results in the vast and varied provinces of technology.

It is certain that this balance is a function of the particular genius of each nation, and that, even if an organization similar to the National Physical Laboratory was founded in my country, the part played by that institution in our industrial and technical development would be quite different from that which it plays in Great Britain.

Whereas, indeed, our French engineers and scientists are still imbued with the classical bias obtaining of old among us, and always seek to realize their scientific ideal by setting up doctrines of unexceptionable symmetry in accordance with the strictest rules of Cartesian logic, the British engineers and scientists, having outgrown that too rigid and geometrical discipline, more often obey the call of their independent imagination. The results thus attained constitute a vast province extremely varied in aspect, but it is plain that it is more than ever indispensable to sacrifice a little of the picturesque, and to set bounds to that splendid riot of individual enterprise, not with the view of marshalling individual minds in due order according to the German methods of work, and then stripping them of all spontaneity; but only to realize a unity of purpose necessary to their right use and quite consistent with the free play of each mind.

With regard to us French people, we must guard, not so much against the excesses of our scientific imagination, as against our exaggerated love of generalization and of what we call "pure science," to which we are always tempted to give up the seat of honor even at the cost of neglecting a little too much technological researches which are, after all, those alone whose results are of immediate benefit.

I am afraid that I shall appear most exacting to our younger engineers, fresh from college, and fired with enthusiasm for the "scientific sport" that they have practised for many terms, and even more so no doubt to older scientists inured to disinterested research. But I am convinced that I am in the right, and I should be most happy to bring some of you to share my opinion, for a close collaboration of scientists and metallurgists on both sides of the Channel is certainly one of the chief factors in the rapid restoration of the balance of the world so gravely disturbed during the last years by the folly of German Imperialism.

FURTHER AID FOR FRENCH REDUCTION CO.

Legislation was introduced to the British Columbia Legislature of 1918, recently prorogued, giving the Government power to guarantee the bonds of the French Complex Ore Reduction Co., Ltd., to the extent of another $25,000. The Province already has endorsed this company's issues up to $40,000. With this capital a plant has been erected at Fairview, B.C., near the city of Nelson, which has been equipped especially for the handling of the peculiarly fractious zinc-lead ores of the Slocan District by means of the French electrolytical process. The cost of plant, however, so exhausted the company's financial resources that it was unable to enter into the custom business on such a scale as to defray overhead expenses and keep ahead and it became necessary to close down. The position was aggravated by the fact that with the phenomenal rise in the quotations on both zinc and lead, following the outbreak of war, the Consolidated Mining and Smelting Co., of Canada, the largest smelting concern of Western Canada, was enabled to install an electrolytical process and to handle the silver, lead and zinc ores of the district. Under these circumstances the French Complex Ore Reduction Co. was compelled to cease operation, but its management is looking forward to the time, which in its opinion seems to have practically arrived now, when the Trail company will be unable to pay the prices it has been giving, and when its cheaper process will be able to demonstrate its value. It is claimed for the French process that it is capable of recovering from 90 per cent. up of the zinc contents of these ores, and that it can be run at a profit when the quotation on zinc falls to 5c. per lb. or thereabouts. The Government, having placed its credit behind the company in the first instance, has indicated, by the legislation referred to and which, no doubt, will be passed, that it is prepared to give the company and its process every chance to "make good."

The Western Fuel Company produced 29,967 tons more in the first three months of 1918 than in the opening quarter of the previous year; the Nanoose Collieries show an increase of 9,172 tons; while the output of the Canadian Collieries and the Pacific Coast Coal Company has fallen off slightly. This, however, is expected to be more than offset by the opening of two new mines, which now are being developed and equipped, one at South Wellington, by the Canadian Collieries (D) Ltd., and the other at Cassidy's Siding, Vancouver Island, by the Granby Consolidated Mining, Smelting and Power Co.

In the Crow's Nest District, the Crow's Nest Pass Coal Co. produced 24,708 tons more in the first quarter of this year than in the first months of 1917, while the Corbin Coal and Coke Co. also has increased its production to the extent of 8,716 tons.

Training of Metallurgists in Schools and in Metallurgical Works*

By H. C. H. Carpenter.

Non-ferrous metallurgy may be divided into two main parts which are quite distinct and well defined. One begins where the other ends. The first may be described as ore-treatment, and its field of operations is the extraction of metals from their ores. It may conveniently be regarded as having fulfilled its function when a marketable metal or alloy has been produced. The second includes the working up of the raw merchantable products of the first by mechanical processes into a variety of finished materials, the founding of alloys, their mechanical and heat treatment, etc. On the whole, while I do not think that there is any generally accepted designation for work of this somewhat composite character, the term metallurgical engineering seems to me to encompass it with sufficient accuracy.

Training in Schools.

The function of the technical school or university to which intending metallurgists come from secondary or higher grade school is (1) to provide the necessary training in the fundamental sciences, physics, mechanics, chemistry, physical chemistry, mathematics, geology and mineralogy, and this should be done before any attempt is made to give any instruction at all in any of the applied sciences. For these two years are necessary. (2) On the above foundations should be raised the structure of the knowledge of the principles of the applied sciences: fuel (including refractory materials), metallurgy, both ferrous and non-ferrous, the strength of materials, power production, and applied electricity. For these two more years will be needed. (3) Every attempt should be made—and made as soon as the students have reached the necessary standard—to get them into the way of acquiring knowledge for themselves, of testing its reliability—and, generally speaking, to instil in them habits of independence of mind, resourcefulness and initiative. I doubt whether the teacher at any educational institution of the kind referred to can render a greater or more absolutely fundamental service to the student who contemplates entering a works, than to awaken and strengthen in him the capacity to acquire knowledge for himself, and to be able to judge when he has acquired it, the precise degree of reliability attaching to it. Whatever the circumstances with which such a man may be faced, and however difficult it may be for him either to act or to give his opinion when called upon to do so in any given situation, if he has this twofold quality—the power to acquire knowledge and the capacity of estimating just how much weight should be attached to it—he will nearly always be about right, and he will certainly never be far wrong. Both these qualities are really indispensable—the one creative, the other destructive in its operations. Each has its function; neither is complete without the other. The necessity for the former is self-evident; but it may be thought that I am unduly stressing the importance of inculcating the habitual use of the critical faculty. May I therefore recall to you the words of one of the noblest and most successful workers in applied science—I refer to Pasteur. Speaking on the occasion of his seventieth birthday to colleagues and pupils at the Institute which bears his name and was founded in his honor, he used these memorable words, which have been

*Extracts from Presidential Address, Institute of Metals, London, March 13, 1918.

more helpful to me in my scientific and technical work than any others that I can call to mind: "Cultivate the spirit of criticism. By itself it is neither a generator of ideas nor a stimulus to great things. Without it nothing will avail. With it will always remain the last word."

To my mind, then, these three elements of training—a sound and broad scientific foundation, an adequate superstructure of knowledge of the principles of metallurgy and cognate branches of the arts and the applied sciences, and the awakening and development of the mental characteristics just touched upon—are what a technical college or university should concentrate upon. Less than this would involve the omission of some essential element of training, more than this it would be unwise to attempt, for it could only be successful with students of unusually high ability, and they can always be relied upon to make good whatever their training. How can these aims best be achieved? I can, of course, only discuss the matter in general terms, and in what follows may I ask you to remember that I am simply endeavoring to contribute something from my own experience that may be worth stating.

Educational influences—using the term in a very broad sense—as a rule operate on the student in the following ways: (1) By contact with his teachers; (2) by contact with his fellow-students, and (3) by the discipline of laboratory work and other ways in which the essential principle is that he has to make the efforts himself. Let me review these briefly.

No. (1) will no doubt at once suggest lectures, and these, though they do not exhaust this category, are at any rate an important feature of it. Are lectures really necessary? To some, no doubt, it may appear that as there are good text-books on the most important aspects of metallurgy, and a vast number of original papers, all that is required is to see that the student studies a proper selection of these. The mere imparting of knowledge, however, such as can be found in text-books, is not, in my opinion, the function of a lecturer. If the student—particularly at the beginning of his specific metallurgical training in the third year, such as I have presupposed—could really master original papers, and especially those dealing with intricate and disputed points of theory, and if he could weigh the evidence as he reads, I should agree that the case for lectures was very much weakened and that their necessity was open to question. But this is just what most students cannot do and what they require training in, and from this point of view lectures constitute a valuable instrument of education. In an hour's lecture it is possible to bring to a focus a wealth of considerations bearing on some given point of theory or practice, and thus to put before the student an aspect of the subject which so far as I know cannot be presented in any other way; and if the lecturer is successful, he will have created in the student's mind—I am, of course, assuming that the student is a willing accomplice, a condition that does not always hold good—a new point of view such as will cause him continually to use his mind on it—in a word, that will make him think, that rare and most precious of happenings. Once this habit is achieved—sometimes it is never achieved—lectures do not require to constitute so large a part of the student's education, and therefore in his fourth year it should be possible to diminish them. In this case they can advantageously be partly replaced by the less formal colloquium in which the students themselves largely take charge of the discussion of problems and important questions. The value of this training in arousing habits of independence of mind, criticism, and the exercise of judgment is so obvious as to require no elaboration.

(2) That students can and do educate one another is the experience of any teacher who takes the trouble to observe it. This is obvious in a variety of ways, and certainly shows most markedly in successive examination tests. The difference in standard between succeeding years of men is sometimes astonishing, and I have always found that the high standard years are attributable to the influence of one or more students of unusual ability who have raised the level of the remainder. I am not suggesting that this is consciously done on their part—I do not think it is. It occurs simply as the result of the normal intercourse of men who are working together and competing against one another for such a period as four years; and I must say I regard this as one of the most valuable results of the educational system that we have.

(3) Experimental work in the laboratory, if properly chosen and carried out, is a most important—indeed an absolutely essential—element in the training of metallurgical students. It constitutes, in fact, from the point of view of the time taken, much the largest part of the training. I have said it must be properly chosen, because if it is to exercise its maximum educational effect, either it must be related as closely as possible to the principles enunciated in the lectures or the matters discussed in the colloquia, or it should be designed with at any rate some particular end in view. There is, if I may say so, a tendency to make analytical work too prominent a feature of laboratory training. The educational value of a training in accurate quantitative analytical work I should be the first to insist on, but analysis is seldom an end in itself. It is a means to an end, and this is apt to be lost sight of. And the fact that the view is held in many works that the only thing a metallurgist who comes to them from a technical college or university can do is to analyze—and not always that—is a well-justified criticism that we teachers should take to heart and do our best to remedy. What is required, in my opinion, is a course of practical work so chosen as to exemplify and give rigorous training, on the one hand, in the principles of metallurgical processes, and, on the other hand, the testing of metallurgical theories. In such a course analytical methods have their due—but not more than their due—share, and the student gets into the way of viewing analysis in its proper place and proportion. There is to-day an urgent need to see that the training in physical and physico-chemical methods of testing and investigation is the very best that can be devised. Metallography, the testing of materials, and chemical analysis are the handmaids of our industry, and the role of the first named becomes more important every year.

Training in Metallurgical Works.

I have sketched, all too imperfectly and briefly, the broad principles of metallurgical training such as, in my opinion, should be given at educational institutions, and the underlying principles of methods by which such instruction can advantageously be given. I have said nothing as to the training that the student should get in the works itself, and I propose to touch on this aspect of the matter only very briefly, because here my responsibility ends and that of the works begins. The few remarks I am going to make are in the nature of an appeal to the management of the works into which the students enter.

I think the most suitable period at which to link up the training given at the educational institution with that of the works is at the end of the student's third year at the former. By this time he has had instruction in the fundamental sciences and a year at his professional subject, and he should have acquired something of the habits of judgment and independence of mind upon which I have laid such stress. He ought, therefore, to be ready to appreciate what he sees and get some value out of it. He has a three months' vacation, and this time can most advantageously be spent at a works. There is generally little or no difficulty about arranging this, and my own students do it regularly. They then return to their fourth and last year of study at the educational institution with, at any rate, some idea of the kind of work that awaits them at the works, and this should give a reality particularly to the character of the practical work in this year which would otherwise be less vivid. It must be emphasized, however, that the three months' period referred to cannot do more than familiarize in a very general way the student with the nature of works practice. The actual training in this cannot, however, begin until after the end of the fourth year, and this is the point at which I wish to make my appeal. The students who leave us, though they have all had the same training, are men each with his own special character and mental endowment. It is the function of the works they enter to find out what special aptitudes each man has, so that at the end of his period of training in their practice he can be entrusted with work which will make the very best of him. Give him, therefore, for a sufficient time an opportunity of acquainting himself with every side of that practice—not the laboratory methods only, but the practice of each of the operating departments. Give him time to find his feet and to acquire the works atmosphere, and let him have adequate opportunities of obtaining information on any details he wants as to the why and wherefore of any given operation he sees but does not completely understand. Do not stint this period, for it is difficult to over-estimate its importance and possible return to you in years to come. A discerning management will have little difficulty in judging how they can best utilize the services of such a man after this probationary period, during which he should be paid at any rate a living wage.

Some of these men may develop special aptitudes in connection with the requirements of the operating departments. They may—and this is the most vital element of training that no educational institution can ever give, but only the works itself—be found capable of working with and getting the best out of the operating staff and the labor in these departments, which can only be done by the exercise of human sympathy and insight in addition to technical knowledge. In a word, their interest will be the practical operations of the plant rather than the scientific processes which underlie them. Such men are not very common, and they are worth finding out, for they are quite capable of producing reforms in works practice.

Others—in spite of their prolonged training—may never develop sufficient independence of mind or confidence in their powers to enable them to take up a position to which much responsibility attaches, whether in the operating departments or the testing laboratory, but they will usually work well and faithfully under direction and produce results upon which reliance can be placed. Do not despise them. They fill a role which brilliant men would find irksome. They do work which has to be done, and are content to do it.

Others again—and these are usually the men of the greatest originality and imbued with the desire of improving upon existing processes used in the works by discovering new methods—find the most suitable exercise of their faculties in the laboratories where facilities for research work are to be found. These men are to be encouraged, even if results are slow in coming. Some of the leading works of so eminently practical a nation as our brothers in the United States of America have recognized, not only the importance, but the necessity of establishing laboratories where work of this kind can be carried out, and where the theoretical basis of each works operation is investigated more fundamentally than can be done even in a university or technical school, and where no practical results are looked for under a period of from five to ten years. Men who are capable of doing this work are rare indeed, but most of all are they worth discovering and employing in such labors. They are the men who, if I may apply a striking phrase recently uttered by the President of the Royal Society, will produce not merely a reform in your practice, but a revolution.

PERSONAL

Mr. Fraser Reid is now in charge of the Ankerite gold mine as well as of the Coniagas silver mine, operated by Coniagas Mines, Ltd. He will be assisted at the Ankerite by Mr. Douglas A. Mutch.

Mr. D. H. Angus has resigned his position as general manager of Tough-Oakes Gold Mines, Kirkland Lake.

Mr. F. J. Brule, assisant general manager of the British America Nickel Corporation has transferred his office from Sudbury to Deschenes, Quebec, where the company's refinery is to be erected.

Mr. G. L. Fraser has been appointed general manager of the Vancouver Island coal mines of the Granby Company.

Mr. C. H. Taylor has returned to Toronto from Panama.

Mr. M. M. Summerhayes has been appointed manager for the Blueston Copper Mining Co., Nevada.

Mr. A. A. Cole, Mining Engineer for the T. & N. O. Ry. Commission, has returned to Cobalt after a visit to Toronto.

Mr. A. R. Globe, assistant manager at the Hollinger mine, has resigned.

Mr. Charles Morris has been appointed mill superintendent at the Hill Gold mine. Mr. E. H. Williams is manager.

Mr. A. E. Flynn, mining engineer of Haileybury, Ont., is investigating ilmenite deposits in Eastern Quebec.

CHROMITE MINING IN QUEBEC.

Shipments of chromite from the Quebec chromite mines are increasing and the output this year will be considerably larger than that of 1917. The output last year was 35,726 tons valued at $495,981. The demand for chromite continues excellent, in fact it is impossible to satisfy the requirements.

MORE QUEBEC ASBESTOS MINES IN OPERATION

In addition to steady production at the mines which were in operation last year, several which have been idle for some years are being reopened. The Berlin mine at Rumpelville, the Regent mine at Robertson and the Eastern Townships mine at East Broughton are being reopened and their mining and milling equipment put in readiness for operation.

SPECIAL CORRESPONDENCE

BRITISH COLUMBIA

MORE LEAD, ZINC AND COPPER NEEDED FOR SHELLS.

As the Kootenay and Boundary Districts of British Columbia are centres for the production of lead, zinc and copper it is expected that mining activity in these sections will be considerably accelerated as a result of the orders received in Canada from the British Government for a large increase in shrapnel production. It is anticipated that the Trail Smeltery of the Canadian Consolidated Mining and Smelting Company will be worked to capacity, and that the operators of the silver-lead-zinc properties of lower British Columbia, will be kept busy in order to do their part in bringing the output up to 220,000 shells a week, which is what the British War Office has requested.

RAMBLER-CARIBOO MINES.

The annual report of the Rambler-Cariboo Mines, Ltd., Slocan, B.C., covering receipts and disbursements from May 1, 1917, to April 30, 1918, has been issued. It shows receipts from shipments of $78,767, derived from lead ore worth $63,732 and zinc ore worth $4,226. Surplus brought forward from last year was $21,849, making total receipts of $100,634, including $17.25 for transfer fees. Disbursements at the mine reached $62,343 and one dividend of a cent a share, or $17,500 was paid, making total disbursements, less special discount, of $42,798, and leaving cash balance of $20,833 in New Denver, Spokane, and Colfax banks. Ore in transit is worth $20,000, so that the total liquid resources at time report was issued were approximately $40,000. For damage done to tramway and buildings by snowslide during the winter $6,580 was written off as well as $5,991 for depreciation of buildings and plant. Two of the most pertinent paragraphs of the directors' report read as follows:

"In the past most of our net profits came from the shipment of clean ore, but during the past year we unfortunately encountered but small amounts of clean shipping ore and the operation of the mill on concentrating ore has but little more than paid expenses.

"We will be prospecting during the coming year on what we think is promising ground, and hope to pick up some good, clean bodies. In that event the earning power of the company would improve repidly."

DEVELOPING MOLLY GIBSON GOLD-SILVER MINE.

Considerable development work is being done on the Molly Gibson gold-silver property in the Nelson, B.C., Mining Division. A tunnel is being driven about 160 feet below the upper workings, to get in below the orebody and allow the rock to be stoped down and taken out by gravity, thus reducing considerably the cost of operation. Those interested believe that it is destined to prove one of the big gold producing mines of British Columbia. It is claimed that a shipment to the Trail smelter yielded $22.76 per ton in gold and silver. The Provincial Mineralogists' Report for 1917 refers to the Molly Gibson Mine, which is situated 32 miles from the Granby smeltery and 56 miles from Trail, as follows: "This mine was closed till the end of June. Work was started in July at the mine, and at the mill in August. All the development work was for enlargement of stopes. Some 367 tons of crude ore was shipped to Trail smelter. The mill put through 1,759 tons of feed and produced 134 tons concentrates, which was not shipped. A new flotation process was installed and a Hardinge ball-mill is now on its road to the mill. The average number of men employed was fifty."

There will be eight parties of the Geological Survey Branch of the Mines Department, Ottawa, in the field in British Columbia this summer. Several of these are at work already and the others will be equipped as soon as possible. As there are only about 25 such parties at work throughout Canada this year the comparatively large proportion assigned to this Province is taken as an indication that the Federal authorities are recognizing to a greater extent than ever the importance of the most westerly of the Canadian Provinces from a mining standpoint. This view is emphasized by the fact that a permanent Geological Station, under Mr. Charles Camsell, of the Geological Survey Branch, has been established in British Columbia.

Ore Testing Mill for B.C.

Reference has been made in these notes to the intention of the Dominion Government to establish an ore testing mill in British Columbia. It was thought that an appropriation of $40,000 would be made at the last session of the Federal Parliament, Ottawa, to carry out the project. This action, however, was not taken, so that the mill will not be started this year. Assurances have been received that the financial support necessary will be forthcoming in 1919. It is said that the officials of the Mines Department, Ottawa, realize the need of such a plant in this province; that they appreciate that the operators of the complex ore mines of the Slocan, Boundary and other districts would be materially aided in putting their properties on a paying basis were the means provided by which they could obtain accurate information as to the most economical method of treating their ores; and that it is believed that it is in the general interest of the mining industry throughout Canada that the step referred to be taken with the least possible loss of time.

Increased Wages at Trail.

The Canadian Consolidated Mining and Smelting Co. has granted to the employes at its Trail Smeltery a war bonus which gives them an additional 15 cents a day for every working day in the month of May and for six months, starting with June 1st, 1918, an extra 25 cents per day. It is explained that this action has been taken because of a realization that there has been a further increase in the cost of living within the past several months.

Searching for Platinum in B.C.

The quest for platinum in British Columbia is to be vigorously prosecuted this summer. Mention has been made heretofore of the fact that the Dominion Government has put competent engineers in the field for the purpose of investigating reported occurrences of the mineral as well as of the fact that the intention is to examine the placers of the Tulameen District, British Columbia, and some sections of the Cariboo. Since it has been learned that the Department of Mines, Ottawa, proposes to purchase two additional drills and that the intention is to place these drills on placer ground in British Columbia with a view to the establishment of platinum values. If occupied ground is selected a covenant will be obtained from the owners that, in the event of the mineral being located, energetic work in

its recovery will be inaugurated without delay. It is not expected that the Government will demand a monetary return for the development of privately held property believed to contain platinum because of the need of this mineral for munition purposes and the consequent necessity of giving the miners every possible encouragement to produce it.

Building Flotation Plant and Railway for Copper Mountain Property.

The Canada Copper Company continues to carry on its programme of development of its large law grade copper mineral claims situated on Copper Mountain. It now is engaged in the construction of a railway, about fourteen miles long, to the property from the town of Princeton, B.C. There connection will be had with the Kettle Valley Railway. An oil flotation plant, with a daily capacity of 3,000 ton of ore, is being built near Princeton on the line of the new railroad. Cut timber for the structures required for the housing of the mill plant is being supplied by the company's own saw-mill located in the vicinity. The contract for the railroad has been secured by W. P. Tiernay & Son who have 200 men employed and are reported to be making good headway. As soon as the road is advanced far enough machinery will be shipped in for the concentrator and will be installed under the supervision of Mr. Van H. Smith, who has had experience along similar lines in Montana, Utah and other of the Western States. As a result of this activity and the prospect of an early start in the production of copper, its concentration, and the shipment of the concentrates to the company's smelter at Greenwood, B.C., the town of Princeton and the whole surrounding district is experiencing something of a boom, all available houses being rented and a general atmosphere of prosperity being apparent.

A year ago it was announced that the presence of at least 5,000,000 tons of ore in this Copper Mountain property had been proved. Since then there has been considerable increase. Starting with the exploration of the ground by diamond drill work, the company followed with a comprehensive system of tunneling, lateral operations and raises. "This makes possible," General Manager Oscar Lachmund has pointed out, "the ready removal of the ore above tunnel level by glory hole methods and the rest by various stoping methods. The ore lies in parallel bodies adjoining the dikes that traverse the country in northerly and southerly directions. The average content of the ore is 1.75 per cent. copper, although bunches in some sections contain 4 to 5 per cent. The recoverable values in gold and silver are about 20 cents to the ton."

SPINNING ASBESTOS IN QUEBEC.

The Dominion Asbestos Spinning Co. has started at East Broughton, Quebec, a plant for the manufacture of asbestos yarn, carded asbestos and sheet packings. Asbestos cloth, brake linings and packings will be manufactured when the necessary machinery can be obtained.

NICKEL REFINERY IS IN OPERATION.

On July 1 the International Nickel Company of Canada began to treat matte at the new refinery at Port Colborne. A large quantity of matte from the Copper Cliff smelter has been shipped to the refinery and supplies of all kinds are now on hand, and one furnace is in operation.

"The Strathcona Park Amendment Act" is a measure passed by the 1918 Legislature of British Columbia which is of special interest to the prospectors of the North-West. This opens to mining development a highly mineralized section of Vancouver Island, comprising 530,066 acres. It was closed some years ago in order that it might be preserved in its natural state as a National Park. It is claimed by the present Government that the location and the exploitation of its mineral cannot interfere, at any rate to any material extent, with its value as a park, and consequently permission now is given to miners to record claims within its limits and to proceed with the work of their development and the taking out of ore.

USES OF GRAPHITE.

Graphite is in various ways essential to the success of military operations. Large amounts are required for the manufacture of crucibles, for foundry facings, for dry battery fillers, and for a protective polish for explosives. Its most familiar uses, in lead pencils and stove polish, consume comparatively little of the total output.

The crystalline graphite for making crucibles should contain as high as 85 per cent. of graphite carbon and should be free from mica, pyrite and iron oxide, which are particularly harmful impurities. It should also preferably contain a large proportion of flakes 1 millimeter or more in diameter, so that its fragments may interlock and thus be more easily bound together by the clay with which it is to be mixed.

The collieries of the Nicola-Princeton District show a similar improvement, the Middlesboro Collieries increasing their output 14,963 tons, although the Princeton Collieries have dropped about 3,000 tons.

TORONTO MARKETS.

Cobalt oxide, black, $1.50 per lb.
Cobalt oxide, grey, $1.65 per lb.
Cobalt metal, $2.50 per lb.
Nickel metal, 45 to 50 cents per lb.
White arsenic, 12 cents per lb.

July 9, 1918—(Quotations from Canada Metal Co., Toronto).
Spelter, 11 cents per lb.
Lead, 10¼ cents per lb.
Antimony, 18 cents per lb.
Copper, casting, 30 cents per lb.
Electrolytic, 29½ cents per lb.
Ingot brass, yellow, 21 cents; red, 26 cents per lb.

July 9, 1918—(Quotations from Elias Rogers Co., Toronto).
Coal, anthracite, $10.50 per ton.
Coal, bituminous, nominal, $9.50 per ton.

SILVER PRICES.

June—	New York cents.	London pence.
25	99½	48⅞
26	99½	48⅞
27	99½	48⅞
28	99½	48⅞
July—		
1	99¾	holiday
2	99¾	48 11/16
3	99¾	48 11/16
5	99¾	48 11/16

STANDARD MINING EXCHANGE.

Messrs. J. P. Bickell & Co. report the following closing quotations on the Standard Stock and Mining Exchange, July 10, 1918.

Gold.

	Ask	Bid
Apex	.04	.03
Boston Creek Mines	.20	..
Davidson Gold Mines	.32¾	...
Dome Extension	.10	.08¼
Dome Lake	.15	.14
Dome Mines	8.00	7.25
Gold Reef	.01½	..
Hollinger Cons.	4.75	4.70
Keora	.08	..
Kirkland Lake	.30	.27
Lake Shore M. Ltd.	.65	.63
McIntyre	1.30	1.29
Moneta	..	.06
Newray Mines, Ltd.	.18	.15
Porcupine Crown	.13½	.13
Porcupine Imperial	.01⅛	.01
Porcupine Tisdale	01½	.01
Vipond	.13¾	.13
Preston East Dome	.03	.02
Schumacher	.19½	.18
Teck-Hughes	.25	.20
Porcupine V. N. T. Gold M...	.13¾	.13
Thompson Krist	.06¾	.06⅜
West Dome	.08¼	.07¾
Wasapika Gold M. Ltd.	.40	..

Silver.

	Ask	Bid
Adanac	.08¾	.08
Bailey	..	.03
Beaver Consolidated	.25	.23½
Chambers-Ferland	.13	.11½
Cobalt Provincial	.48½	.46½
Coniagas	2.95	2.75
Crown Reserve	.22	.19
Foster	.03	.02⅞
Gifford	.02¼	.01⅞
Great Northern	.03¼	..
Hargraves	.04⅞	.04½
Hudson Bay	30.00	20.00
Kerr Lake	..	5.50
La Rose	.38	.35
Lorrain Con. M. Ltd.	.01½	..
McKinley Dar. Savage	.40	.38½
Mining Corp. of Canada	3.05	2.90
Nipissing	8.75	8.65
Ophir	.07¼	.06¾
Peterson Lake	.09½	.09⅜
Right of Way	.03½	.02½
Silver Leaf	..	.07⅞
Temiskaming	.30¾	.30½
Trethewey	.26	.25
Wettlaufer	..	.04⅛

NEW YORK MARKETS.

July 5, 1918.

Connellsville Coke—
Furnace, 6.00.
Foundry, 7.00.
Crushed, over 1-inch: Beehive, 7.30.
Beehive, 7.30.
Straits Tin, spot, f.o.b., none offering.
Copper—
Prime Lake, 26.00.
Electrolytic, 26.00.
Casting, 26.00.
Lead, Trust price, 8.05.
Lead, outside, nominal, 8.05.
Spelter, prompt western, shipment, 8.90 to 9.00.
Antimony—
Chinese and Japanese, 13.00 to 13.25.
Aluminum—Government price, carload lots, f.o.b. plant, effective June 1st:
98-99% Virgin, 33.10.
98-99% remelt, 33.10.
No. 12 Aluminum Co., 33.30.
No. 12 remelt, 33.30.
Scrap aluminum, 33.10.
Powdered aluminum, 65.00 to 70.00.
Metallic Magnesium—99% plus, 1.75 to 2.00.
Nickel—Ingot, 40.00.
Shot, 43.00.
Bismuth, nominal, 3.50.
Cadmium, nominal, 1.40 to 1.50.
Palladium, $135.
Quicksilver, nominal, 125.00.
Platinum (pure), $105.00.
Iridium, $175.
Cobalt (metallic), 2.50 to 3.50.
Tungsten—
Scheelite, best grade, 24.00.
Lower grades, down to 19.00.
Wolframite, best grade, 24.00.
Lower grades, down to 20.00.
Gravel, Fluorspar: f.o.b. mines—Prompt, $30.00.
Contract, year 1918, 25.00 to 28.00.
Silver (official), 99⅝.

Metal Products.—The following quotations represent mill prices and are strictly nominal except in the case of lead sheets and sheet zinc:

Sheet Copper—Base prices:
Hot rolled, 33.50 to 34.50.
Cold rolled, 34.50 to 35.50.
Copper bottoms, 42.50 to 44.00.
(Shipments from stock 2c per lb. extra).
Copper Rods—Base prices:
Round, 34.50.
Sq. and rectangular, 35.50.
Copper Wire—Base prices
Nominal, 28.25.
Brass Products—Base prices:
High Brass—
Sheets and wire, 28.25 to 29.00.
Rods, 25.25 to 27.25.
Low Brass—
Sheets and wire, 31.75 to 33.75.
Rods, 32.50 to 34.50.
Brazed tubing—
Brass, 36.37½ to 38.37½.
Bronze, 41.75 to 43.75.
Seamless tubing—Base prices:
Brass, 37.00 to 39.00.
Copper, 40.00 to 42.00.
Bronze, 44.50 to 45.00.
Full Lead sheets, 10.00.
Cut Lead sheets, 10.25.
Sheet zinc, f.o.b. smelter, 15.00.

THE LUCKY JIM SCANDAL.

Northwest Mining Truth, published in Spokane, Washington, has been active in exposing stated irregularities in connection with the Lucky Jim Zinc Mines, Ltd., which had for several years been operating the Lucky Jim mine, situated in the eastern part of Slocan mining division of British Columbia. The Lucky Jim is one of the oldest of the Slocan operating mines, having in the nineties shipped lead-zinc ore to the Pilot Bay smelting works for concentration there. The late Geo. W. Hughes acquired the mine in the early part of the present century and made considerable money out of the zinc ore he mined and shipped to Kaslo for preliminary concentration at the Kootenay Ore Company's sampling mill there. In later years Mr. G. Weaver Loper, of Spokane, obtained control, and he induced many Manitoba men, chiefly residents in Winnipeg, to buy shares in the company he organized. Eventually a first mortgagee took action to obtain possession of the property, but the persistent fight put up by Loper resulted in the Supreme Court of British Columbia appointing Mr. A. G. Larson, of Spokane, well known in West Kootenay district in which he had been superintending mining operations, chiefly at Rossland, for many years. Worked under Mr. Larson's direction, the Lucky Jim paid off two mortgages and a considerable proportion of the unsecured liabilities. Meanwhile Spokane and other shareholders in the company, after having resorted to the courts and taken other means to attain their object, finally succeeded in ousting Mr. Loper from control and possession of the company's books, etc. Searching investigations eventually proved that there had been a serious over-issue of shares.

A letter, dated March 30, 1918, sent by Mr. Walter J. Nicholls, of Spokane, to the Spokane Stock Exchange, as published by Mining Truth, reads thus:

"The audit made of the books of the Lucky Jim Zinc Mines, Ltd., shows on over-issue of 3,094,299 shares and this stock is all transferable, the capital stock having been increased to 6,000,000 shares. I suggest that should you list this issue, that you provide that only shares represented by the new form of certificate registered by A. W. Allen, assistant-secretary, be admitted. Some of the old certificates may be issued for a greater amount than shown on the stubs, consequently you should specify that only the new forms are listed."

In this connection, Mining Truth makes the following editorial comment: "Directors of the Spokane Stock Exchange have been asked to restore Lucky Jim Zinc Mines, Ltd., to the official list, and, quite properly, the request has been denied. It will be repeated, however, again and again, in the hope that those most vitally interested may be given an opportunity of working off a discredited issue upon the general public. There should be no temporizing and no palliation of the disgraceful episode. In all the mining history of the Northwest no other such astounding scandal has occurred—under the very noses of sworn officers of the law and with a brazen disregard for decency that puts the guilty outside the pale of consideration. Originally capitalized for $2,500,000, in $1 shares, that capital has been 'lifted' to $5,594,000 by a barefaced system of illegal transfers without counterpart anywhere. The fact that genuine stockholders, harassed and bewildered, have failed to protest expansion of capital stock to cover the defalcation does not alter the situation in any way. The whole matter is so disgustingly dishonest that the Spokane Stock Exchange cannot afford to burden itself with the stigma that must attach to even tacit acquiescence in such flagrant violation of law. Any disposition to restore the corporation's stock to good standing could only be characterized as connivance in a most disreputable affair. Compounding of felony is inimical to the best interests of an institution whose prime duty should be protection of the investing public. Until the blame has been placed and the sunlight of truth let in, there is no place for Lucky Jim upon the official list of any organization of self-respecting men."

The editor of Mining Truth has communicated with the Prosecuting Attorney for Spokane and also with the Presiding Judge of the Superior Court of Spokane County. The former, it is stated, declined to act unless some one would first "swear to an information charging anyone connected with Lucky Jim affairs with a crime," but the Judge of the Superior Court will probably bring the matter before a full bench of the Court, with a view to calling a Grand Jury or taking some other steps in the matter.

The editor of Mining Truth also communicated with the British Columbia Registrar of Joint Stock Companies, and has published the following reply from that official:

"The over-issue of this stock certainly is a bad case. My information is that the company, under the present management, is doing all in its power to rectify the situation and prevent the persons who bought the unauthorized shares from suffering loss.