

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

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GOVERNMENT CHANGES CHROME-BUYING PROGRAM

The General Services Administration, Office of Information, U.S. Courthouse, Seattle, Washington, on May 11, 1951, released information concerning the government chromite purchasing program including plan to establish a purchasing depot at Grants Pass. On June 11, 1951, a meeting of chrome miners and other interested persons was held at Grants Pass to hear the specifications for chrome buying from special representatives of the Emergency Procurement Service of the General Services Administration, Washington, D.C. At this meeting the program was outlined in detail by Mr. Wm. M. B. Freeman. It was stated that the program would be effective for a period not to exceed 5 years but might be terminated by the government at any time subsequent to 2 years upon the giving by the government of 1 year's notice of termination. The only specification in regard to quantity was that it was contemplated that at least during the first year deliveries from any one producer would not be accepted in excess of 2,000 tons. (It is of interest to note that "contemplated" was the word used in the release from Washington, D.C.) A good reason for this specification was not made clear at the Grants Pass meeting, and the impression was given that a prior arrangement with the government might allow a producer a larger annual production than 2,000 tons.

On the basis of the specifications as set forth by the government representatives, chrome miners in southern Oregon and northern California began to build roads, install equipment, and do exploration work in order to be ready to deliver ore to the purchasing depot when it opened for business. On August 3, the government depot started buying ore, and chromite prospecting and mining activities increased tremendously.

On August 31, the General Services Administration made an announcement from Washington which modified the original purchasing plan. The GSA administrator, Mr. Jess Larson, said that the new program calls for the purchase of chrome ore and concentrates up to 200,000 tons, and that it would end on June 30, 1955, or whenever the 200,000 tons of ore and concentrates have been received, whichever occurs earlier.

Mr. F. I. Bristol, president of the Oregon Mining Association, called a meeting of chrome miners on October 15 to consider the effect of the new program. About 150 persons were present. Many of the chrome people present had not previously heard of the new order and were stunned to learn of it. Five persons stated that they had started construction of concentrating mills; two of these were to have been of 100 tons daily capacity each, and it was stated by the backers of these two projects that they could not go ahead with construction on the basis of the new order. Forty-seven persons present had started exploration and five of these said that they had good ore bodies developed. Two large producers did not have representatives at the meeting.

By this new order the government has changed specifications of a program already set up and this change limiting the total amount to be purchased will discourage investment in

exploration and equipment. If the government bureaus having to do with mineral production wish to discourage exploration and production, the GSA is following the right procedure. What miner will risk money and labor in a development program when he may be "cut off at the pockets" at any time?

Is it any wonder that there has been a loss of confidence in the word of bureaus having to do with encouraging domestic mineral production, and that miners say with bitterness that a new pronouncement may come at any time which will take away completely the incentive for domestic mining of chrome?

F.W.L.

INTERRUPTION IN ASSAY SERVICE

THE OFFICE AND LABORATORIES OF THE DEPARTMENT MUST BE MOVED FROM THE WOODLARK BUILDING TO THE NEW STATE OFFICE BUILDING IN PORTLAND EARLY IN NOVEMBER. SINCE THE LABORATORIES WILL NEED TO BE DISMANTLED, MOVED AND SET UP IN THE NEW QUARTERS AND SINCE THERE IS A BACKLOG OF SAMPLES TO BE ANALYZED, THERE WILL BE AN INTERVAL DURING WHICH ANALYTICAL WORK CAN NOT BE DONE. FROM OCTOBER 15 TO NOVEMBER 19, DEPARTMENT LABORATORIES WILL BE CLOSED AND SAMPLES REQUIRING ANALYTICAL WORK WILL NOT BE HANDLED.

CHROMITE CONCENTRATION IN GRANTS PASS AREA

A small pilot mill for concentrating chromite has been built on Galice Creek about 3 miles southwest of Galice by Dana W. Bowers, 48 Rose Avenue, Medford, Oregon. The mill is on the Dickey placer claims which together with the Sordy lode claims in the Bridge Creek area have been leased to Bowers. These lode claims, owned by the Harry Sordy estate, contain considerable concentrating ore. The present mill includes a small jaw crusher, a 25-ton ball mill with classifier, and one shaking table. Several shipments of concentrates totaling about 50 tons have been delivered to the stockpile at Grants Pass. Initial returns have shown an average of about 53 percent Cr_2O_3 with a 2.6 to 1 chrome-iron ratio.

A second concentrating mill is under construction on the Dickey ground a few hundred feet south of the Bowers mill by the Strategic Minerals Corporation, Ltd., 307 Laurel Street, Medford, Oregon. Officers in this company are W. D. Plumley, President; James Daley, Vice-President; and Robert Brewer, Secretary-Treasurer. The mill site has been leased to the Strategic Minerals Corporation by Bowers. This mill is expected to be in operation by November 1. The equipment will include a hammermill, a ball mill rated at about 50 tons per day, a small classifier, and two concentrating tables. The ore for the second mill will be obtained from the Bowers lease on the Sordy property and the mining by open pit operation, using a power shovel and seven automotive trucks, will be by Strategic Minerals both for its own and Bowers' mill. It is planned to make a stockpile for the two mills of 3,000 and 5,000 tons respectively. Several hundred tons have already been trucked to the mill sites.

It is reported that a third mill of 50 tons capacity will be constructed at a location a few hundred feet north of the Bowers mill for Ernest Foster of Grants Pass, and that ore for this mill also will be obtained from the Sordy mine. Mr. Bowers reports that prospecting for additional ore on the Sordy property is continuing.

BIOGEOCHEMISTRY AND HYDROGEOCHEMISTRY¹

By

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and

Robert E. Delavault, B.Lett., D.V., (Paris)³Introduction

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It was with the object of finding new tools which would assist the prospector in his search for new mineral deposits that the Department of Geology and Geography of the University of British Columbia undertook much research during recent years. Some of our work is beginning to show promise and having devoted two seasons to testing under actual field conditions, the authors feel justified in outlining some of the results so far achieved.

Practical considerations

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As far as the senior author of this article is concerned, his interest in botany and chemistry as possible potential basic tools in the business of mine finding come quite literally from wielding pick and shovel, not with any particular skill, in many prospect trenches. All too often roots interfered with the business of digging and it seemed obvious that the roots of a single tree in many instances penetrated a far greater volume of earth and rock than was moved even in a large pit. Clearly if these roots served to collect any of the metals in which a prospector might be interested these roots might save him a lot of work. It might seem foolish to picture a prospector picking twigs in faithfully carrying out his assessment work, but it might prove infinitely less laborious and could conceivably produce comparable results.

We now know that elsewhere several other workers had had similar ideas and had carried and were carrying out many important investigations. The bibliography at the end of this article lists some of the more readily available of these publications and they in turn provide a reasonably full list of references for anybody wishing to delve more thoroughly into this field of research.

Coupled with this idea of using trees as guides to any metals which might lie buried below the surface, came the idea that any metal ions which were involved in weathering should in part at any rate find their way into circulating ground water. Obviously something had to be done about seeing if either biogeochemistry or hydrogeochemistry could be used by everyday prospectors. First of all, however, we had to find out whether abnormal amounts of metal some ten or twenty feet below the surface produced any readily measurable variations in the trees and lesser plants growing above, and in the surface waters derived, in part at least, from water which had had some connection with these abnormal amounts of buried metal.

For our first experiments we selected the elements copper and zinc. We chose these metals because they were ones which were known to occur in commercial quantities in B.C., and they were also known to be essential for healthy plant growth. Furthermore, there were in B.C., zinc and copper mines at which we were given permission to carry out experiments. We decided that at first we would forget theory and simply confine ourselves to sampling a number of trees growing over buried, but known, mineralization and a number of other trees growing over rock known to be barren, as far as zinc and copper were concerned.

¹Abstracted from paper published in B.C. Professional Engineer, Vancouver, B.C., April 1951.

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Early results in biogeochemistry

Our first investigations were altogether too striking and led to expectations which have not altogether been realized. However, in spite of many results which we could not explain we did obtain sufficient evidence at the Sullivan and Britannia mines to show that trees and lesser plants could betray the presence of abnormal amounts of copper or zinc lying from 10 to 30 feet below the surface.

While we were doing our own work we discovered, by looking through the literature made available by the close of World War II, that in the U.S.S.R., and Scandinavia, other men had had ideas similar to ours. Moreover they had made real progress. However, for reasons not yet fully apparent, our results appeared more conclusive than those of our coinvestigators abroad. Almost coincident with our first publication (1) there appeared in the U.S.A. an article (2) showing that others were also alive to this new, fascinating, and, it must be admitted, little-understood science of biogeochemistry.

Unfortunately our financial resources were meagre. Provincial universities are unable adequately to support research unless it has popular appeal. We had the good fortune to be able to obtain financial assistance from the Geological Society of America, who for three years, very critical years for biogeochemistry, supplied us with the bulk of the funds necessary to carry on our work.

To say even that we achieved steady progress would be an exaggeration. At times we seemed to be discovering problems faster than we solved them. Nevertheless, we were able to demonstrate beyond all reasonable doubt that biogeochemistry could be used as a tool in prospecting. We also discovered the reason for some earlier unsatisfactory results. We learned that to achieve useful conclusions one had to be careful to choose appropriate species for the particular problem which was being investigated. Similarly one had to select similar organs of the same age if comparable results were to be achieved. Only healthy trees could be expected to produce valid results. Samples had to be collected not too close to a main water table for usable variations in the metal content of trees to occur. These and many other similar problems had to be investigated before we were able to achieve anything like satisfactory field results. We also, as a by-product of our other investigations, determined the presence of gold and silver in some species of trees and lesser plants, thus confirming observations which had been recorded in Europe, but to the best of our knowledge never before in North America. We published several articles describing the more interesting results we had obtained (3,4,5,6).

Early in 1949, Dr. Charles C. Starr, P. Eng., published in Western Miner an article entitled "Leaf Sampling as an Aid to Prospecting for Zinc." Dr. Starr ended his article with: "The leaf samples seem to indicate that samples of vegetation may be of considerable value in prospecting but that water samples are of doubtful value." This modest and guarded comment represented the first visible evidence of any original biogeochemical investigation in British Columbia, other than our own.

Meanwhile in the United States Dr. H. E. Hawkes, of the United States Geological Survey, and his associates, were carrying on many valuable investigations, some of which appeared in print (7,8,9,10,11). We must publicly express our gratitude to Dr. Hawkes and his associates of the United States Geological Survey: they have throughout done a great deal to further our work. When we appealed for help to the Geological Society of America - all efforts to obtain adequate funds in Canada having failed - the officials of the U.S. Geological Survey supported our request because they believed that two independent lines of attack on biogeochemistry were more likely to provide useful results than one!

Later results in biogeochemistry

In 1950 Dr. W. H. White, a colleague of ours, presented to the Annual Meeting of the C.I.M.M., a paper (12) which showed clearly that under British Columbian conditions it was possible to use biogeochemical "contour" maps to indicate buried ore. Furthermore, in one area Dr. White presented a biogeochemical map and a geophysical map, each indicating anomalous areas above known ore. The results were of comparable value.

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Results in hydrogeochemistry

We had for many years pondered on the possibility of using natural water as a guide to buried orebodies. Our early attempts to obtain results at Britannia were failures. However, this attractive field of research obviously had to be investigated further. It seemed reasonable to assume that our failures might have been caused by extreme dilutions brought about by high rainfalls in the area in which we had worked. Dr. L. C. Huff of the United States Geological Survey produced a method (8) which worked well in parts of the United States but which gave negative results in our coastal area. Another approach to the problem was made and in 1949 Delavault and Irish (13) published an account of a new technique. This technique permitted the detection of as little as one part of zinc or of copper in a thousand million parts of natural water. This technique will be described in detail shortly in a bulletin of the Geological Society of America. In essence this new technique, which we have referred to as the emulsion or Delavault technique, consists of introducing in the sample of water to be tested an emulsion which is lighter than water and which becomes unstable in a weakly acid solution. Previously, the water has been brought to a proper pH with hydrochloric acid or acetic acid-acetate buffer, and a weak ammoniacal solution of dithizone added, which liberates dithizone at once, forming copper and zinc dithizonates. On adding the emulsion it decomposes and rises to the surface, carrying up the dithizonates and eventually excess dithizone. Copper or zinc dithizonate has a distinctive red or purple colour which is readily distinguished from the green colour of dithizone when it is uncombined with metal. Thus by merely adding in known amounts three simple ingredients, a suitable acid, emulsion, and ammoniacal dithizone, and then stirring and examining a surface layer at the top of a small beaker it is possible to say whether or not there is one part in a thousand million of zinc or copper in the sample. With a little practice it is possible to estimate with fair accuracy the number of parts of metal per thousand million there are in a sample.

Let nobody think that mine-finding is a foolproof business even with new aid. There are problems yet to be solved before this method can be used everywhere. For example, too much contamination by algae may spoil the test. However we have worked at the method during two field seasons and it has produced results. Unsuspected mineralization has been discovered and some creeks containing known mineralization have obligingly produced a definite purple!

Alas, some creeks which should have indicated mineralization have not. Whether this is because of some chemical condition which inhibits the release of ions in adequate amounts or whether it is merely our old problem of dilution appearing again remains to be determined.

As might have been expected our claims to be achieving such a high degree of sensitivity were questioned and it was not until our results were duplicated by a member of the United States Geological Survey that we felt free to make public this new technique.

Hydrogeochemistry will be applicable in relatively few areas but it does provide the prospector with a new tool which we expect will find an increasing number of applications in B.C. and elsewhere.

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STATE DEPARTMENT REPORTS ON LIGHTWEIGHT AGGREGATES

"The Lightweight Aggregate Industry in Oregon" is the title of a new report just issued by the State Department of Geology and Mineral Industries. The department has had a working interest in the development of lightweight aggregates in the State for several years especially in pumice, perlite, expanded shale, and volcanic tuff. Both field and laboratory work on these materials has been done by the staff of the department and the report summarizes the information accumulated in this work. A new method for improving the quality of pumice for use in construction is suggested as a result of laboratory work done by the department.

The report is classified as G.M.I. Short Paper No. 21 and consists of 23 pages including an index map of the State and a bibliography. The author is Ralph S. Mason, department mining engineer. This short paper as well as other department reports may be obtained at 702 Woodlark Building, Portland, and at department field offices in Baker and Grants Pass. Price is 25 cents, postpaid.

OREGON TUNGSTEN REPORT

A preliminary report on tungsten in Oregon has just been issued by the State Department of Geology and Mineral Industries. The report is classified as G.M.I. Short Paper No. 22 and includes 23 pages, a geologic map, and a bibliography. The authors are Harold D. Wolfe and David J. White, department geologists.

Occurrences of tungsten have been known in Oregon for many years but they have been considered too small to warrant expenditure for development. However, interest was quickened by discovery of tungsten at two places near Ashland in 1949, and the department's Governing Board decided that studies should be made of these and other known occurrences and results publicized because of the extreme need of developing domestic supplies of this highly strategic material. This need was multiplied by the Korean war which cut off some of our foreign supplies and at the same time increased the demand for tungsten in national defense industries. The report gives results of department studies to date.

The report is designed to help the prospector and gives a brief outline of economics and mineralogy of tungsten as well as geological associations. Descriptions of known occurrences both in the southwestern and northeastern parts of the State are given together with mention of favorable prospecting areas.

G.M.I. Short Paper No. 22 may be obtained at 702 Woodlark Building, Portland, or at department field offices in Baker and Grants Pass. The price is 35 cents, postpaid.

GOLD ECONOMICS

As quoted in the Mining World, September 1951, Dr. Donald Hamilton McLaughlin, president of Homestake Mining Company, in a recent speech in San Francisco spoke on the proper price for gold and also noted the flow of gold as follows:

"And now, with paper currencies including the dollar faced with the necessity of a second adjustment resulting from an even more wasteful and destructive war - and still more adjustments to the continuing excessive expenditures of the years of troubled peace - the relative value of our gold stock in terms of what it could command in the world's market is undoubtedly much higher. So far, it is still officially priced at \$35.00 per ounce for international settlements. Its availability on a bargain basis, now to our disadvantage, is reversing the flow in spite of the lack of true dollar balances abroad. (Balances created through ECA by ourselves seem hardly fair to include in my simple minded way of looking at the problem.) Our stocks of monetary gold are, as yet, hardly in danger from this outflow, great as it is, but it is surely indicative of a condition that needs consideration. Gold priced at around \$1,700,000,000 has left the country in the past year. If it continues much longer at this rate, there will be just cause for alarm. A proper correction would be adjustment of the dollars to gold as dictated by the realities of the postwar world."

United States Exports of Gold in Refined Bullion
In 1949 and 1950 by Countries of Destination*

Country	1949	1950
Canada	738 troy ounces	12,150,010 troy ounces
Venezuela	128,048	47,711
Peru	---	347,147
Germany	14,197	72,106
Kuwait	31,220	167,332
Portuguese Asia . .	150,318	76,979
Philippine Islands .	59,317	67,614
Egypt	---	1,265,675
Poland and Danzig .	521,479	85,974
Portugal	40,647	70,355
Tangier	4,126	38,413
Syria	50,000	61,201
French Indochina . .	188,672	4,021
Formosa	200,012	100,001
China	345,255	---
Mexico	242,993	106
All Others	291,786	83,542
<u>Total</u>	<u>2,168,808</u>	<u>14,633,177</u>

*U.S. Dept. Commerce statements.

LEAD AND ZINC

The Office of Price Stabilization raised the ceiling price of common lead to the basis of 19¢ per lb., New York, and Prime Western zinc to 19½¢, East St. Louis, effective October 2. At the same time it established ceiling prices on imported lead and zinc at corresponding levels. (From E&MJ Metal and Mineral Markets, New York, October 4, 1951.)

MINERAL FERTILIZERS FURNISHED OREGON FARMS

A report on Oregon by the Production and Marketing Administration of the U.S. Department of Agriculture giving a statistical summary for 1950 includes statistics on some mineral fertilizers. Liming materials were furnished to 17 counties and to 1,786 farms. Acres benefited totaled 28,271. These farms were furnished with 49,106 tons of liming materials having a total value of \$179,653, which amounted to 7.95 percent of total expenditures for conservation practices.

Sulphur was furnished in the amount of 22,200 pounds to 9 farms. Value of this sulphur was \$222. Boron, as 100 percent boron equivalent, was furnished to 21 farms and benefited 790 acres; 42,125 pounds were furnished at a cost of \$842.

DEPARTMENT GEOLOGIST GRANTED LEAVE OF ABSENCE

Hollis M. Dole, geologist with the Department for the past four years, has been granted a leave of absence to do graduate work at the University of Utah. He will continue his geological mapping for the Department in the Dutchman Butte quadrangle of southwestern Oregon during the 1952 field season.

A NEW CINNABAR PROSPECT

Cinnabar ore has been found on Deer Creek near Murderers Creek in Grant County, Oregon, by Mr. Lawrence N. Roba, Canyon City, Oregon. A retort has been installed and production will start about the middle of October.

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NEW CHROMITE DISCOVERY

A new chromite ore body has been found at the Black King mine in the Josephine Creek area, Josephine County. Donald A. Foster, operator, reports that the ore will be mined by surface operations and that mining will begin in the near future.

"FREE" GOLD PRICES

The following prices for "free" gold were compiled by Pick's World Currency Report:

	<u>Per Fine Ounce</u>	
	<u>Coins</u>	<u>Bars (12.5 kg.)</u>
	<u>Oct.6</u>	<u>Oct.6</u>
New York, transit . .	---	\$39.50
Manila	\$49.00	42.00
Hong Kong	48.50	42.50
Bombay	58.00	49.00
Tangier	54.00	39.50
Beyrouth	49.50	39.50
Paris	58.00	42.25
Buenos Aires	52.50	43.50

Canada, the world's second largest gold producer, will sell part of its gold for non-monetary purposes in the international market at premium prices, thereby following South Africa which has been doing so for some time. However mines in Canada which are receiving government subsidies for gold production will not be permitted to sell at premium prices. Sales of non-monetary gold may prove attractive to mines such as Wright-Hargreaves, Noranda, Lake Shore, and others which are receiving little or no subsidy. Right now, Canadian producers are not entirely sure whether a "free" market of any size really exists, or whether excessive premium sales would depress the market. (From E&MJ Metal and Mineral Markets, New York, October 11, 1951.)
