

WHAT PRICE GOLD?

PART III. The Relief Given to Foreign Gold Mines by Their Governments*

By Pierre R. Hines**

Canada, Australia, the Philippines, South Africa, and other countries have given subsidies or aid to their gold-mining industries. Why hasn't the United States done so, too? The reason is that the executive branch of the Government, particularly the U.S. Treasury, has opposed it, the grounds for its opposition being "...would in our considered and deliberate judgment, disrupt the monetary system upon which not only their [the gold miners'] own livelihood, but also that of all the rest of us depends" (U.S. Congress, 1962, p. 180).

It is not as well known as it should be that the International Monetary Fund has approved the gold subsidies given by the countries mentioned above. Nor has any proof been offered which shows that the livelihood of the gold miners has been harmed, but, on the contrary, certain mining communities have been saved from extinction. The Bretton Woods Agreement provides in Article IV, Sec. 2 (Internat. Monetary Fund, 1948, p. 79-80) "...that the Fund members are prohibited from buying gold at a price above parity plus the prescribed margin. In the view of the Fund, a subsidy in the form of a uniform payment per ounce for all or a part of the gold produced would constitute an increase in price which would not be permissible if the total price paid by the member for gold were thereby to become in excess of parity plus the prescribed margin. Subsidies involving payments in another form may also, depending upon their nature, constitute an increase in price."

Under Article IV, Sec. 4 (a), "each member of the Fund undertakes

* Part I, "Proposed plans for the improvement of the international monetary system," and Part II, "The official policy of the U.S. Treasury upon international monetary systems," were published in the September, 1965 ORE BIN.

** Mining Engineer, Portland, Oregon.

to collaborate with the Fund to promote exchange stability, to maintain orderly exchange arrangements with other members, and to avoid competitive exchange alternatives. Subsidies on gold production regardless of their form are inconsistent with Article IV, Sec. 4 (a) if they undermine or threaten to undermine exchange stability. This would be the case, for example, if subsidies were to cast wide-spread doubt on the uniformity of the monetary value of gold in all member countries."

"Subsidies which do not directly affect exchange stability may, nevertheless, contribute directly or indirectly to monetary instability in other countries and hence be of concern to the Fund." (Internat. Monetary Fund, 1948, p. 79-80). The IMF further states: "The International Monetary Fund has a responsibility to see that the gold policies of its members do not undermine or threaten to undermine exchange stability. Consequently, every member which proposes to subsidize the production of gold is under obligation to consult with the Fund on the specific measures to be introduced."

It is possible to give subsidies to gold producers which do not conflict with the sections quoted above from the Bretton Woods Agreement and to secure the approval of the International Monetary Fund. The measures which have been approved by the IMF are found in its annual reports from 1948 on to the present day. The gold subsidies of various countries now in effect follow.

Canada

Canada's assistance to its gold industry is the best example of a gold subsidy approved by the International Monetary Fund. It is based upon the cost to each gold mine of producing an ounce of gold in excess of Can\$26.50. Thus it is not a "uniform" or flat gold price.

Sixty-five Canadian gold mines received a subsidy in 1962 (Table 1) and these mines produced 56.7 percent of Canada's total gold (Table 2). Gold mines which were not eligible for a subsidy produced 28.3 percent. Gold which was a by-product of base-metal mines was 15.0 percent and was not eligible for assistance. The total cost to Canada for 1962 was Can-\$14,700,000 for a total production of about Can\$146,000,000. Canada has assisted its gold-mining industry since 1948. In doing so, it has saved many communities, some with as many as 25,000 inhabitants, from becoming ghost towns.

A mine to be eligible to receive a gold subsidy must fulfill the following basic conditions (Internat. Monetary Fund, 1948, p. 79-80; Dept. of Mines and Tech. Surveys, Ottawa, Canada, 1964):

1. The value of the gold produced must be 70 percent or more of

TABLE 1. Assistance to Canadian Gold Mines, Distribution by Costs, 1962*

Cost per Ounce	Number of Mines	Gold Production (oz.)	Percent of Total Production	Assistance Payable**	Percent of Total Assistance Payable	Assistance Payable per Ounce Produced**
<u>A. Lode Gold Mines</u>						
\$20.51 to 30.00	1	99,829	4.21	\$ 137,689.40	0.94	\$ 1.37
30.01 to 35.00	5	461,847	10.48	1,396,222.68	9.50	3.02
35.01 to 40.00	13	1,088,070	45.90	6,594,019.77	44.86	6.06
40.01 to 45.00	10	408,704	17.24	3,620,077.69	24.63	8.86
45.01 and more	13	259,997	10.97	2,671,471.56	18.18	10.27
	42	2,318,447	97.80	14,419,481.10	98.11	6.22
<u>B. Placer Gold Mines</u>						
	23	52,085	2.20	278,460.31	1.89	5.35
Total	65	2,370,532	100.00	\$14,697,941.41	100.00	(average) \$ 6.20

* Dept. of Mines & Tech. Surveys, 1964, p. 16.

** Canadian dollars varied between \$37.00 and \$38.00 per ounce.

- the total value of the output of the mine.
2. The mine or operation must produce at least 50 troy ounces in a designated year.
 3. Ore reserves of commercial significance must be developed and there must be a possibility of attaining production of gold on a commercial basis within a reasonable time.

Other requirements are:

The cost of production per ounce of gold, computed on all ounces of gold produced from the mine during the designated period, must exceed Can\$26.50. Assistance payments are made only for those ounces of gold produced from the mine during the designated period which are:

- a. Sold in the form of bullion to the Royal Canadian Mint by the operator; or
- b. Sold in the form of ore or concentrate to a domestic smelter, provided the smelter operator certifies that a number of ounces equivalent to those paid for by the smelter have been sold to the Royal Canadian Mint as soon as is practical after the shipment of the ore or concentrate and the separation of the gold therefrom; or
- c. Exported and sold in the form of ore or concentrate to a foreign smelter.

Quoting from Canada's report on the administration of the Emergency Gold Mining Assistance Act, "The amount of assistance payable to the operator of a gold mine is computed under the current formula by adding 25 percent to the product of the rate of assistance and the number of assistance ounces. The number of assistance ounces is two-thirds of the total number of ounces produced in the calendar year. The rate-of-assistance factor is two-thirds of the amount by which the average cost of production per ounce of gold for the calendar year exceeds Can\$26.50. The amount of assistance per ounce increases as the average cost of production per ounce increases from Can\$26.50 to Can\$45.00. A maximum rate of assistance of Can\$12.33 per ounce specified in the Act has the effect of precluding an increase in the amount of assistance as the average cost of production rises above Can\$45.00."

The average cost of gold eligible for assistance from gold mines in 1962 was Can\$37.70 and the average assistance was Can\$6.20 an ounce.

The Canadian Gold Assistance Act was extended to 1967. The new Canadian legislation contains provisions under which new lode gold mines

commencing production after June 30, 1965 will be eligible for assistance only if the mine provides direct support for an existing gold-mining community.

TABLE 2. Canadian gold production in 1962.

	<u>Ounces</u>	<u>Percent</u>
Gold eligible for assistance produced from gold mines	2,370,532	56.7
Gold not eligible for assistance produced from gold mines	1,182,049	28.3
Gold not eligible for assistance produced as a by-product from base-metal mines	625,815	15.0
Total gold produced	4,178,396	100.0
Approximate value:	Can\$146,000,000	

Australia

The Australian Government introduced a plan in October 1954 (Internat. Monetary Fund, 1955, p. 94), whereby certain gold producers whose annual output exceeded 500 ounces and who satisfied the conditions prescribed would be eligible during financial years 1954-55 and 1955-56 for a subsidy per fine ounce equal to three-quarters of the excess cost of production over A£13 10s (\$30.24) provided that the subsidy in not any case exceeded A£2 (\$4.48) per ounce; and producers whose annual output is less than 500 ounces would be eligible at a flat rate subsidy of A£1 10s (\$3.36) per ounce. The flat rate subsidy for small producers was adopted for reasons of administrative convenience in view of their large numbers and of the possibility of imperfections in their records.

Australia increased its gold subsidy in 1958 (Internat. Monetary Fund, 1958, p. 145). The maximum expenditure on mine development in ascertaining costs of production for subsidy purposes was also raised from A£3 10s (\$7.84) to A£5 5s (\$11.76). Australia again raised the subsidy in 1959; for producers whose output was more than 500 ounces the maximum rate became A£3 5s (\$7.28), and for small producers not exceeding 500 ounces per annum A£2 8s (\$5.38). This amendment did not change the basic structure for a subsidy. The program was extended for three years from June 30,

1959. The flat rate was extended to producers whose output did not exceed 1,075 ounces per annum. The Australian gold subsidy was again extended from June 30, 1962 to June 30, 1965.

The Philippines

The Philippine Government gave subsidies to gold producers first in 1954. They were made through the exchange system and were allowed to expire in 1957 (Internat. Monetary Fund, 1955, p. 94; 1958, p. 144). The Philippine Republic (Internat. Monetary Fund, 1962, p. 104) in 1961 introduced direct subsidies to gold producers. All producers were classified into categories – marginal and overmarginal – depending on whether or not their net profits fell short of "base profits" which are calculated separately for each mine. In order to be eligible for the subsidy, gold producers are requested to sell their entire output to the Central Bank at the official price, which is defined as the peso equivalent to U.S. \$35.00 an ounce or other price set by the Government. The maximum subsidy, in addition to the official price, is ₱65 per ounce for marginal producers and ₱50 an ounce for overmarginal producers. However, the total amount received is not to exceed ₱170 an ounce for marginal producers and ₱155 an ounce for overmarginal producers (on June 30, 1962 the approximate dollar figures were \$17 and \$13, and \$44 and \$40 respectively).

A change in the method of calculating the official price was made in January, 1962 (Internat. Monetary Fund, 1963, p. 180-181), as a result of the inauguration of floating exchange rates. While the rate of the gold subsidy remains the same, at ₱65 and ₱50 per ounce for marginal and overmarginal producers, the total amount of the official price plus the subsidy cannot exceed ₱200 or fall below ₱160 per ounce of gold for both marginal and overmarginal producers (at the free rate the approximate equivalents of these figures are \$17 – \$13, and \$51 – \$41 respectively). Assurances were given that if, at any time, the exchange rate moved to a point at which a uniform premium price for gold would seem likely to arise contrary to the terms of Article IV, Sec. 2 of the Fund Agreement and the Fund's statement on gold subsidies, the Government would be prepared to adopt appropriate corrective measures after consultation with the Fund.

South Africa

South Africa gave assistance to certain marginal gold mines to meet the cost of pumping water from interconnected workings for one year through June, 1964, and this was extended another year (Internat. Monetary Fund, 1964, p. 109). These marginal mines would have had to abandon substantial

tonnages of ore without further assistance in the form of unsecured loans guaranteed by the State to cover working losses up to a maximum of 10 percent of revenue, as well as for certain capital expenditures approved by the Government Mining Engineer, for example for shaft sinking, major development, and the purchase of items such as refrigeration or compressed air plants.

Others

Colombia (Internat. Monetary Fund, 1955, p. 94) in 1955 gave a subsidy of Col\$20 (20 pesos, \$10.25 at that time) to small gold producers and pan miners producing not more than 20 ounces a month.

"The United Kingdom (Internat. Monetary Fund, 1964, p. 109) consulted the Fund on behalf of Southern Rhodesia with regard to an Act approved by the Government of Southern Rhodesia on December 30, 1963, which provides for the granting of financial assistance to potentially economic gold mines in Southern Rhodesia during the period September 1, 1963 to August 31, 1968. These mines are those from which gold is being or will be mined at a loss, but from which gold may, at some future time, be mined at a profit. The Minister of the Treasury has discretion both to eligibility of mines and the amount of any proposed financial assistance."

The above subsidies and incentives are well known to the U.S. Treasury Department. Dr. Leland Howard, Director of the Office of Gold and Silver Operations of the Treasury, presented a memorandum at the U. S. Senate Hearings (U.S. Congress, 1962, p. 172-175) on S.J. Res. 44* on March 15 to June 8, 1962 which covers the subject thoroughly. It is clear that the International Monetary Fund will not approve a "uniform" subsidy per ounce of gold. It is equally clear that the International Monetary Fund will approve subsidies in certain forms. The opposition of the U.S. Treasury has never been based on the fact that the proposed subsidy would not be approved by the International Monetary Fund. Instead, the Treasury has relied upon dogmatic statements without supporting argument.

* The Hearings before the Subcommittee on Minerals, Materials, and Fuels of the Committee on Interior and Insular Affairs, United States Senate 87th Congress, Second Session, on S.J. Res. 44, March 15 and June 8, 1962. U.S. Government Printing Office, Washington 82666, 1962. It will be referred to as S. J. Res. 44, 1962.

Bills Introduced in Congress

Many bills designed to assist the gold-mining industry have been introduced in Congress since the end of World War II. They were all defeated by the U.S. Treasury, no matter in what form they were drawn. Nothing can be gained by repeating all of them here. One will be sufficient, the Hearings on S. J. Res. 44, 1962. It is a large document containing 248 pages. Fifteen Senators appeared or filed statements. The Departments of the Interior and State and the Bureau of the Budget all supported the Treasury Department in opposition to the Bill. The Bureau of the Budget's reason for disapproving it was, "The Bill is regarded as an undesirable approach to the basic problem of the balance of payments." Charles Merrill, Chief of the Division of Minerals, Bureau of Mines, deferred to the Treasury Department with respect to the monetary aspect and bowed out without committing himself.

The gold-mining industry presented an enormous amount of testimony, reports, articles, and statements to provide a thorough set of facts on the condition of the industry. One economist appeared for the gold-mining industry and qualified himself as having had experience in money, banking, and finance, both in governmental and private work. His most interesting statement follows (U.S. Congress, p. 146):

"These aspects of the gold question, however, lie in the field of monetary considerations and since monetary legislation is beyond the purview of this committee, I will confine my comments to one aspect of the operation of the Government monopoly which might be the subject or recommendation for legislation by your committee."

This quotation is worth discussing further. It brings up several questions.

1. Is the price of newly mined gold a monetary or a mining-industry production problem?
2. If it is a monetary problem, is it a domestic or an international one?
3. If it is not a mining-industry production problem, then to whom should the gold-mining industry appeal for assistance?

If the Treasury can oppose assistance to the gold-mining industry on the ground it is a monetary matter, why can't it be disputed on the same basis? Recognized monetary authorities do not agree upon the price for gold. Mr. Merrill in his short statement said as follows: "The Department of the Interior recognizes the dual nature of this problem, the monetary and the technical. The Department defers to Treasury with respect to its monetary aspect." (S.J. Res. 44, 1962, p. 216)

Gold does have dual qualities, one as a metal newly mined and refined for market. The other is as money, but it does not become money

until it is legally declared so and delivered to the proper governmental agency. The gold-mining industry does not mine money - it mines gold.

1. If one agrees that the price of gold is a monetary problem, then on which one of these many plans to reform the international payments system is the appeal to be based? Which one will be picked as the right one? As the first part of this review shows, help for gold from the U.S. monetary authorities is doubtful.

2. Whether the subsidy or incentive granted to the gold-mining industry is a domestic or an International Monetary Fund decision depends upon the word "uniform." Article IV, Sec. 2 of the Bretton Woods Agreement stresses "a uniform payment per ounce for all or a part of the gold produced would constitute an increase in price which would not be permissible." Uniform is used by the International Monetary Fund in the sense of "the same or alike." A graduated price based on the cost of producing an ounce in the case of a particular mine is permissible as in the case of Canada's assistance, while a uniform or flat price of, for instance, \$70.00 an ounce to all gold mines regardless of cost of producing an ounce is not permissible. In any case, the International Monetary Fund's approval is necessary, according to established agreement.

3. It is certain that an act to pay a subsidy or provide an incentive to the gold-mining industry could be drafted which would meet the approval of the International Monetary Fund - one which also would pass the Senate and House if it were cleared by the Administration or classified as not monetary legislation. Where monetary and fiscal policies - both domestic and international - are involved, it is not sufficient to take up a gold subsidy or an increase in the price of gold with a single Senate Subcommittee such as the one for Minerals, Materials, and Fuels.

The Report of the Commission upon Money and Credit (Commission on Money and Credit, 1961) gives some excellent advice upon how legislation is enacted in Washington. The section entitled "An Organizational Focus" (p. 264-268) is a practical guide on how to introduce a Bill in Congress. A single approach will not do. The gold-mining industry should present its case to several of the following committees and agencies: the President's Council of Economic Advisers; the National Advisory Council on International Monetary and Financial Policies; the Joint Economic Committee; the Subcommittee on Monetary and Fiscal Policies; and the Senate Banking and Currency Committee.

The President's Council of Economic Advisers: Gardner Ackley is chairman of this three-man board which reports directly to the President. It is now making a study of steel prices for him. The price of gold is in the same classification as the price of steel and in several respects of equal importance. It is logical to present the gold-mining industry's case if for

nothing else than a ruling as to where its case should be heard and decided.

The National Advisory Council on International Monetary and Financial Policies (Bell and Spahr, 1960, p. 149): This council is made up of the Secretaries of the Treasury, State, and Commerce, and the Chairman of the Board of Governors of the Federal Reserve System and of the Board of Trustees of the Export-Import Bank. Foreign transactions in finance, exchange, or monetary affairs come under its jurisdiction. Whatever the outcome, the economic facts of the gold-mining industry should be placed before this council.

The Joint Economic Committee: This committee is made up of seven Senators and seven Congressmen who are drawn from ranking members of related committees. It differs from other Congressional committees in that it studies problems in the field of economic policy and makes reports but does not introduce bills.

Joint Committee upon the Economic Report: The annual Economic Report of the President is criticized and analyzed by this committee in an economic report of its own. This committee has a Subcommittee on Monetary, Credit, and Fiscal Policies.

Senate Banking and Currency Committee: This committee deals with a broad range of subjects, including the affairs of the International Monetary Fund. If the committee decided the price of newly mined gold was not a monetary matter and referred it to the Committee of Interior and Insular Affairs, it would handicap the Treasury Department in its opposition to any assistance to the gold-mining industry.

How should legislation for obtaining relief for the gold-mining industry be handled: It should not be referred to a single committee or agency, because of the dual nature of gold. The legislation should be co-ordinated by a senior Senator from a gold-producing state - a Senator who is thoroughly familiar with the subject and is sympathetic towards the gold-mining industry, one who has served long enough to know the strategy of securing attention and action. It should be taken up also with the Executive branch and the shackled position of the gold-mining industry explained. Congress eventually will write the legislation, but not without prodding and urging from all forces.

References for Part III

- Bell, J. W., and Spahr, W. E., 1960, A proper monetary and banking system for the United States: New York, The Ronald Press, p. 149.
Commission on Money and Credit, 1961, Money and Credit: Report, Englewood Cliffs, N. J., Prentice-Hall, Inc.
Dept. of Mines & Tech. Surveys, 1964, Report on the administration of the

Emergency Gold Mining Assistance Act, year ended March 31, 1964:
Ottawa, Canada, p. 16.

Internat. Monetary Fund, 1948, Ann. Rept., Appendix II, p. 79-80.

Internat. Monetary Fund, 1955, Ann. Rept., p. 94.

Internat. Monetary Fund, 1958, Ann. Rept., p. 144-145.

Internat. Monetary Fund, 1962, Ann. Rept., p. 104.

Internat. Monetary Fund, 1963, Ann. Rept., p. 180-181.

Internat. Monetary Fund, 1964, Ann. Rept., p. 109.

U. S. Congress, Senate Subcommittee on Minerals, Materials, and Fuels
of the Committee on Interior and Insular Affairs, 1962, S. J. Res.
44, 1962, Hearings: U. S. 87th Cong., 2nd Sess., p. 146, 172-
175, 180, and 216.

* * * * *

AIME CONFERENCE SCHEDULED FOR 1966

Plans are being completed for the 1966 Pacific Northwest Minerals and Metals Conference to be held at the Olympic Hotel in Seattle on April 21 and 22. The conference is sponsored by the North Pacific Section of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., and the Puget Sound Chapter of the American Society for Metals. The two-day meeting will feature papers on exploration and geology, mining, minerals processing, nuclear explosives, extractive metallurgy, and physical metallurgy.

* * * * *

WATERS TO DELIVER FEBRUARY 1966 CONDON LECTURES

Dr. A. C. Waters, Chairman of the Department of Geology at the University of California at Santa Barbara, will come to Oregon in February, 1966 to deliver the Condon Lectures. Dr. Waters, a well-known authority on the geology and volcanology of Oregon, will give two lectures on the timely subject of "Moon Craters and Oregon Volcanoes." He will speak first at the University of Oregon in Eugene February 8 and 10; then at Oregon State University in Corvallis February 15 and 17; and, finally, at the Portland State College auditorium February 22 and 24 at 8:00 p.m. Condon Lectures are designed especially for the layman interested in results of scientific research. The public is invited to attend. There is no admission charge. At a later date, Dr. Waters' lectures will be adapted for publication, as previous Condon Lectures have been.

* * * * *

LIBRARY AUGMENTED BY REPORTS ON OREGON GEOLOGY

Listed below are the publications, open-file reports, and unpublished theses concerned with Oregon's geology and mineral resources that were added to the Department's library during 1965. The lists do not include papers published in trade magazines and technical journals. Although the listed reports are not available for loan, anyone wishing to consult them is welcome to do so at the Department's Portland office.

United States Geological Survey:

- Bailey, E. H., and Smith, R. M., 1965, Mercury - its occurrence and economic trends: U. S. Geol. Survey Circular 496.
- Blank, R. H., Jr., 1965, Southwest Oregon gravity data: U.S. Geol. Survey open-file rept.
- Bromery, R. W., 1965, Aeromagnetic map of the Albany-Newport area, Oregon, and its geologic interpretation: U.S. Geol. Survey Geophysical Investigations Map 481.
- Goddard, E. N., Chairman, North American Geol. Map Committee, 1965, Geologic Map of North America: U.S. Geol. Survey.
- Hart, D. H., and Newcomb, R. C., 1965, Geology and ground water of the Tualatin Valley, Oregon: U.S. Geol. Survey Water Supply Paper 1697.
- Hogenson, G. M., and Foxworthy, B. L., 1965, Ground water in the east Portland area, Oregon: U.S. Geol. Survey Water-Supply Paper 1793.
- Phillips, K. N., Newcomb, R. C., Swenson, H. A., and Laird, L. B., 1965: Water for Oregon: U.S. Geol. Survey Water-Supply Paper 1649.
- Price, Don, Hart, D. H., and Foxworthy, B. L., 1965, Artificial recharge of ground water in Oregon and Washington, 1962: U.S. Geol. Survey Water-Supply Paper 1594-C.
- Walker, G. W., and Repenning, C. A., 1965, Reconnaissance geologic map of the Adel quadrangle, Lake, Harney, and Malheur Counties, Oregon: U.S. Geol. Survey Misc. Geol. Invest. Map I-446.
- Waring, G. A. (revised by Blankenship, R. R. and Bentall, Ray), 1965, Thermal springs of U.S. and other countries of the world - a summary: U.S. Geol. Survey Prof. Paper 492.
- Wayland, R. G., 1965, The correlation of coal beds in Squaw Basin and part of Eden Ridge, T. 33S., R. 11W., southwestern Oregon: U.S. Geol. Survey open-file report.

United States Bureau of Mines:

- Fulkerson, F. B., and Gray, J. J., 1965, Economic trends in the Pacific Northwest aluminum mill-products industry: U.S. Bureau of Mines Inf. Circ. 8267.
- Kauffman, A. J., Jr., and Hold, D. C., 1965, Zircon: A review, with emphasis on West Coast resources and markets: U.S. Bureau of Mines Inf. Circ. 8268.
- Kingston, Gary A., 1964, Iron and steel scrap in the Pacific Northwest: U.S. Bureau of Mines Inf. Circ. 8243.
- U. S. Bureau of Mines, 1965, Mercury potential of the United States: U.S. Bureau of Mines Inf. Circ. 8252.

Oregon Division of Planning and Development:

- Olcott, G. W., 1965, Aggregate and rock sites, Mid-Columbia planning study: State of Oregon Dept. of Commerce, Division of Planning and Development.

Oregon Department of Geology and Mineral Industries:

See: List of Available Publications appearing on back cover of The ORE BIN.

Washington Department of Conservation:

- Mackin, J. H., and Cary, A. S., 1965, Origin of Cascade Landscapes: Washington Div. of Mines and Geology Inf. Circ. 41.
- Newcomb, R. C., 1965, Geology and ground-water resources of the Walla Walla River basin, Washington-Oregon: Washington Div. of Water Resources Water-Supply Bull. No. 1.
- Thorsen, G. W., 1964, Mineralogy of black sands at Grays Harbor, Wash.: Washington Div. of Mines and Geology Rept. Invest. 23 (similar deposits in Oregon).

Idaho Bureau of Mines and Geology:

- Savage, C. N., 1965, Economic geology of carbonate rocks adjacent to the Snake River south of Lewiston, Idaho: Idaho Bureau of Mines and Geology Mineral Res. Rept. 10.

Special Research Studies:

- Dott, R. H., Jr., 1965, Mesozoic-Cenozoic tectonic history of the southwest Oregon coast in relation to cordilleran orogenesis: (submitted for publication to Journal of Geophysical Research).
- Sceva, Jack E., 1965, A reconnaissance of the ground-water resources of the Hood River valley and the Cascade Locks area, Hood River County, Oregon: Oregon State Engineer, unnumbered report, May 1965.
- Watkins, N. D., 1964, Paleomagnetism of the Miocene lavas of southeastern Oregon: Stanford Rock Magnetism Research Group; prepared for Air Force Cambridge Research Laboratories, U. S. Air Force.

Unpublished theses:

- Chiburic, Edward F., 1966, Crustal structures in the Pacific Northwest states from phase-velocity dispersion of seismic surface waves: Oregon State Univ. (Oceanography) doctoral dissertation.
- Forth, Michael, 1965, Geology of the southwest quarter of the Dayville quadrangle (Crook County), Oregon: Oregon State Univ. master's thesis.
- Glenn, Jerry Lee, 1965, Late Quaternary sedimentation and geologic history of the north Willamette Valley, Oregon: Oregon State Univ. doctoral dissertation.
- Hixson, Harry, 1965, Geology of the southwest quarter of the Dixonville quadrangle, Douglas County, Oregon: Univ. Oregon master's thesis.
- Ikeagwauni, F. D., 1965, Photogeology of the Picture Rock Pass area, Lake County, Oregon: Univ. Oregon master's thesis.
- Johnson, Wallace, R., 1965, Structure and stratigraphy of the southeast quarter of the Roseburg 15' quadrangle, Douglas County, Oregon: Univ. Oregon master's thesis.
- Larson, Edwin Eric, 1965, The structure, stratigraphy, and paleomagnetism of the Plush area, southeastern Lake County, Oregon: Univ. Colorado doctoral dissertation.
- Maddox, Terrance, 1965, Geology of the southern third of the Marcola quadrangle, Oregon: Univ. Oregon master's thesis.
- Patterson, Robert L., 1965, Geology of part of the northeast quarter of the Mitchell quadrangle, Oregon: Oregon State Univ. master's thesis.
- Rinehart, Verrill Joanne, 1964, Investigation of 12 earthquakes off the Oregon and northern California coasts: Oregon State Univ. (Oceanography) master's thesis.
- White, Willis H., 1964, Geology of Picture Gorge quadrangle (Wheeler and Grant Counties): Oregon State Univ. master's thesis.

* * * * *

STEENS MOUNTAIN REGION MAPPED

"Reconnaissance geologic map of the Adel quadrangle, Lake, Harney, and Malheur Counties, Oregon," by George W. Walker and Charles A. Repenning, has been published as Misc. Geol. Invest. Map I-446 by the U. S. Geological Survey. This is the second in a series of Oregon geologic maps to be issued at this scale (1 inch equals approx. 4 miles) on AMS sheets, preparatory to publication of the eastern half of the State Geologic Map.

The report covers the geology of a large area of southeastern Oregon from Hart Mountain on the west to the Trout Creek-Sheepshead Mountains on the east (lat. 118° - 120° W., long. 42° - 43° N.). This part of Oregon lies within the Basin-Range province of the western United States, and there are several excellent examples of fault-block mountains to be seen within the quadrangle. Chief among these is Steens Mountain, which rises to a height of 9,670 feet at its highest point on the rim.

The oldest rocks in this area crop out along the base of the Pueblo Mountains and are Late Paleozoic and Mesozoic metamorphosed sedimentary and volcanic rocks intruded by granodiorite and quartz diorite. The rest of the rocks in the Adel region are continental sediments and volcanics of Oligocene(?) age or younger.

Copies may be obtained from the U.S. Geological Survey, Federal Center, Denver, Colo. 80225. The price is 75 cents.

* * * * *

U.S.G.S. PUBLISHES NEW MAP OF NORTH AMERICA

The U.S. Geological Survey has recently published a new geologic map of North America which replaces the 1946 map by the Geological Society of America. This map is the result of more than 10 years of effort, with many individuals and organizations contributing.

The map has a scale of 1:5,000,000 (approximately 1 inch to 80 miles), and covers almost 23,000,000 square miles of the earth's surface from the northern tip of Greenland to the northwest corner of South America. Sedimentary, igneous, and metamorphic rocks are grouped into systems, generally with one color for the continental sedimentary rocks, two or three colors for the marine sedimentary rocks, and one or two colors for the igneous rocks. More than 90 separate color patterns and symbols are shown. The offshore submarine margins are contoured, including the Arctic Ocean, the Gulf of Mexico, and the Caribbean Sea.

Copies of the map may be obtained from the U.S. Geological Survey, Federal Center, Denver, Colo. 80225. The price is \$5.00.

* * * * *

INDEX TO THE ORE BIN

Volume 27, 1965

- Age of Clear Lake, Oregon, by G. T. Benson (27:2:37-40)
- AIIME conference scheduled for 1966 (27:12:255)
- American Mining Congress passes resolutions (27:11:243)
- Asbestos potential, Oregon's, by J. H. Bright and Len Ramp (27:3:45-63)
- Buffalo mine, Union Pacific purchases (27:9:186)
- Cascade Range, Recent volcanism, by E. M. Taylor (27:7:121-147)
- Chemical Lime Co. plant and quarry (illus.) (27:6:118-119)
- Clear Lake, Age of, by G. T. Benson (27:2:37-40)
- Coastal landslides of northern Oregon, by W. B. North and J. V. Byrne (27:11:217-241)
- Coast Range, Variations of Tertiary volcanic rocks, by Snively, Wagner, and MacLeod (27:6:101-117)
- Condon lectures for 1966, Waters to deliver (27:12:255)
- Dallas-Valsetz bulletin revised (27:2:42)
- Department library augmented by reports on Oregon geology (27:12:256-257)
- Department publications in 1965 announced:
 - Dallas-Valsetz quadrangles (Bulletin 35, revised) (27:2:42)
 - Lunar Conference Guidebook (Bulletin 57) (27:9:188)
 - Recent volcanism reprints (Misc. Paper 10) (27:9:188)
- Earthquake of April 29 in Tacoma, by Chiburis, Dehlinger, and French (27:5:99-100)
- Engineering geologists form local chapter (27:11:244)
- Field work in Oregon in 1964, by R. E. Corcoran (27:1:19-24)
- Gold (Buffalo mine purchased) (27:9:186)
- Gold, What price?, by Pierre R. Hines, Parts 1 and 2 (27:9:169-186); Part 3 (27:12:245-255)
- Lake Owyhee State Park, Geology of, by R. E. Corcoran (27:5:81-98)
- Landslides of northern Oregon coast, by W. B. North and J. V. Byrne (27:11:217-241)
- Land withdrawals (27:1:24) (27:6:117) (27:11:244)
- Lunar geological field conference:
 - Announcements (27:2:36) (27:7:148)
 - Guidebook described (27:9:188)
 - Review and photographs (27:10:205-216)
- McColloch reappointed to Governing Board (27:3:63)
- Meteorites, Oregon's lost, by E. F. Lange (27:2:41-42)
 - Recognition of, by E. F. Lange (27:8:167-168)
 - Willamette and others, by E. F. Lange (27:9:187)
- Mining action pending in Congress (27:11:242-243)
- Museum exhibit
 - Tektites (27:4:80)

Natural gas and products pipelines in Northwest, by V. C. Newton (27:8:149-166)
 Offshore mining bill introduced (27:2:43-44)
 Oil and gas, Exploration in 1964, by V. C. Newton (27:1:11-18)
 Natural gas and products pipelines, by V. C. Newton (27:8:149-166)
 Records released (27:6:117)
 Old mine? Good luck! (27:5:98)
 Oregon Academy of Science and NW. Sci. Soc. announcement (27:2:34)
 Program and list of papers (27:3:63-64)
 Oregon Portland Cement Co. history, by F. E. McCaslin (27:2:25-34)
 Oregon's mineral industry in 1964, by R. S. Mason (27:1:1-10)
 Owyhee (Lake) State Park, geology, by R. E. Corcoran (27:5:81-98)
 Pipelines, Natural gas and petroleum products in Northwest, by V. C. Newton
 (27:8:149-166)
 Publications (non-Department) announced:
 Albany-Newport aeromagnetic map (27:2:35)
 Publications (non-Department) announced:
 Albany-Newport aeromagnetic map (27:2:35)
 Coal study in open file (27:2:35)
 Gravity data, Southwest Oregon (27:2:44)
 Ground water in east Portland (27:8:168)
 Mercury (U.S.) reports (27:4:74)
 North America, geologic map (27:12:258)
 Steens Mountain mapped (Adel quadrangle) (27:12:258)
 Thermal springs, world-wide survey (27:11:244)
 Tualatin Valley geology (27:5:98)
 Water in Oregon (27:8:168)
 Recent volcanism, Articles reprinted (27:9:188)
 Three-Fingered Jack - North Sister region, by E. M. Taylor, Part I
 (27:7:121-147)
 Clear Lake geology, by G. T. Benson (27:2:37-40)
 Tektites and Oregon's volcanic glass, by E. F. Lange (27:4:75-79)
 Museum exhibit (27:4:80)
 Tertiary volcanic rocks in central Oregon Coast Range, Compositional variations,
 by Snavely, Wagner, and MacLeod (27:6:101-117)
 Thunder egg, Oregon's State Rock (27:10:189-194)
 Origin and history of, by L. W. Staples (27:10:195-204)
 Volcanic rocks and volcanism (see: Recent volcanism; Tertiary volcanic rocks)
 Volcanology Center at University of Oregon (27:7:148)
 Walls of Portland, by R. S. Mason (27:4:65-74)
 Western Governors mining resolutions (27:6:120)
 Wild Rivers bill would affect Rogue River (27:4:80)
 World mineral production, New record set (27:11:242)

* * * * *