Book Reviews

Linari-Linholm, A. A. *Occurrence, mining and recovery of diamonds.* Diamond Promotion Services (P.O. Box 62349, Marshalltown, Transvaal). 1974. R1,00.

It may not be widely realized that the diamond-recovery industry has been going through a period of intense change over the last twenty years, both as a result of the expansion of known deposits and by the introduction of new methods of treatment. New major mining areas have been discovered in South Africa, Botswana, and Siberia, and major extensions to existing fields have come to light in Namaqualand and South West Africa. The recovery of diamonds through the use of heavy media in static cones was introduced at the Premier Mine in the early 1950s. In the 1960s, this method was superseded by the use of heavy-medium cyclones. At the end of the 1960s, the use of X-ray separators was introduced in the final stages of diamond recovery, and appears to have some probability of replacing gravity-separation methods in primary treatment.

To keep up with these changes, this new edition is most welcome. As the title suggests, this publication covers the occurrence, mining, and recovery of diamonds both historically and practically, with a wealth of information on present-day plant operations. This booklet was originally published in 1968, and has now been completely revised and brought up to date by its author, Dr Linholm, who was, until he retired in 1970, Technical Director of De Beers Industrial Diamond Division in Europe.

This new edition includes details of the discovery of the Orapa diamond deposit in Botswana and of the Siberia diamond deposits. Such is the pace of change that already the accuracy of the author's comment that the Lesotho diamond deposits are not rich enough to justify a sophisticated modern mining venture is to be put to the acid test by the De Beers' plans for a mine at Letseng La Terai in that country.

The latest views of the Chief Geologist of De Beers Consolidated Mines on the formation of alluvial diamonds in the Vaal and Orange River basins are given.

Although diamond-mining methods have not undergone any recent change, the section on mining details the increase in the size and capacity of the mining machinery used in the alluvial deposits at the Consolidated Diamond Mines of South West Africa, and highlights the trend towards centralized treatment plants equipped with facilities for conglomerate separation and crushing.

About the recovery of diamonds, the author says: 'Important and very useful methods have been developed during recent years to determine the diamond content of various products from a treatment plant. Old methods have been improved to increase their efficiency and completely new methods have been developed in addition, with the aim of getting more diamonds from the mined ground at the lowest possible operating cost'.

The operation of the venerable diamond pan, first introduced a hundred years ago and still working virtually unchanged, has been investigated by the De Beers Diamond Research Laboratory, and their findings are given.

Gravity-separation methods using pans, jigs, and various types of heavy-medium equipment are described. The use of mixed ferrosilicon-magnetite media in small-diameter heavy-medium cyclones is briefly discussed, the development of the vibrating grease belt is referred to, and details are given of the operation of the electrostatic separators that were originally introduced by Dr Linholm for diamond recovery.

The skin-flotation machines in use at the Akwatia recovery plant of Consolidated African Selection Trust, in Ghana, are shown and described, as is their method for the removal of gangue from the final concentrates of fine diamonds by fusion with caustic soda. Details are given of the use of solutions of lead sulphamate of density up to 3,6 in separating up to 30 000 carats of fine diamonds per day at the Bakwanga Mine in the Republic of Zaire.

In view of its importance in present and future developments, more space might have been devoted to X-ray separation. The established XR-112B machine, which has a capacity of up to 40 tons of plus 12 mm material per hour, is not mentioned. The most recent, but as yet untested, X-ray machine has been designed to treat 100 tons of plus 20 mm material per hour for the recovery of large diamonds prior to secondary crushing.

Reference is made to the heavy minerals accompanying diamonds, which also fluoresce. Other lighter minerals also fluoresce, and this may limit the spread of X-ray separation in certain locations. However, as the costs of conventional heavy-medium plant construction and operation increase, the cost of building and operating compact X-ray plants as primary concentrators of diamonds becomes more within the bounds of possibility.

Tables of world diamond production up to 1971 are given, and a useful bibliography is included.

I.R.M.C.

Metal Statistics 1962-1972. Metallgesellschaft Aktiengesellschaft. 60th Edition. Frankfurt am Main 1973. 328 pages. Published by Metallgesellschaft A.G., 6000 Frankfurt am Main, Reuterweg 14, Post Box 3724, Western Germany.

The 60th edition of the well-known publication 'Metal Statistics' covers the period 1962 to 1972. In this publication Metallgesellschaft Aktiengesellschaft present detailed statistics, by countries for aluminium, copper, lead, tin and zinc. Also included is a review of the World metal statistics of aluminium, copper, lead, zinc, tin, antimony, cadmium, magnesium, nickel, mercury and silver as well as tables of prices for most of the above plus various ores and metals. The latter include the platinum group, selenium, tantalum, titanium, vanadium, bismuth and tungsten.

It is instructive to compare the various figures given for mine production by publications in this field. In the case of South African copper

production, the figures given by 'Metal Statistics' for 1970 and 1971 (149 200 and 157 500 million tons respectively) compare most favourably with the values; 149 205 and 157 470 million tons reported in the South African Department of Mines publication, 'Minerals'. Metalli Non Ferrosi e Ferroleghe, World Metal Statistics and the Metal Bulletin Handbook all report these values as being 144 200 and 148 400 million tons respectively.

In the case of total world mine production of copper the average copper production for 1970 and 1971, derived from the four publications 'Metal Statistics', 'Metalli', 'World Metal Statistics' and 'Metal Bulletin' are 6 369 550 and 6 462 300 million tons respectively with standard deviations of 7937 and 13 841 million tons. The error is even greater in the case of the 'Eastern', or 'Other Countries' values with averages of 1 205 467 and 1 316 700 million tons of copper being obtained with standard deviations of 2631 and 1277 million tons.

The introductory section of non-ferrous metals, in 1972 and the first half of 1973, is rather brief in view of the large amount of data subsequently presented. More 'in-depth' comment on the reasons for price and supply fluctuations would enhance the value of the work and a mention of such trends as the supply of copper concentrates increasing at a faster rate than smelter capacity would be of assistance to those engaged in commodity studies and technological forecasting. The tables of statistics comprise a valuable addition to the literature of mineral and metal production.

H.A.S.

Symposium on underground mining equipment maintenance—1973. Institution of Mining Engineers, and Association of Mining Electrical and Mechanical Engineers.

The eleven papers presented at this symposium give a very clear indication of recent progress by the National Coal Board in making the preventive maintenance of coal face equipment more effective.

Careful recording of the causes of, and possible remedies for, breakdowns occurring underground over a number of years, have resulted in dramatic advances in the design of such units as motors, lubricating systems, gears, etc. In order to reduce down-time even further, a certain degree of 'over design' has been considered desirable.

At the same time, a variety of recording instruments have been developed for measuring wear, deterioration in performance, etc, showing exactly when preventive maintenance must be undertaken.

A determined campaign to improve the training of all levels of worker in preventive maintenance theory and practice has accompanied these improvements and some first class schemes are outlined in these papers.

A special feature of the symposium is the comprehensive description of the basic maintenance requirements of modern longwalling equipment, which will be invaluable for reference purposes in the South African mining industry.

K.S.

Colloquium and general meeting

A General Meeting and Colloquium on 'Motivation and productivity in the mining industry' was held on May 22nd, 1974, at Kelvin House, Johannesburg.

Mr P. W. J. van Rensburg (President) was in the chair.

The Colloquium was attended by 170 delegates and was opened by the President at 09h25.

Minutes

The minutes of the general meeting held on March 13th, 1974, and published in the May 1974 issue of the Journal, were confirmed.

Obituaries

Dr P. N. Lategan, Honorary Life Fellow and Past President of the Institute

H. H. McGregor, Fellow

J. E. Williamson, Fellow

T. L. Blunt, Life Fellow

R. Murchison, Fellow

In memory of the deceased and in sympathy with the bereaved, the delegates rose and observed a few moments' silence.

Membership

The President: I have much pleasure in announcing that the undermentioned candidates, whose names have been published in accordance with By-Law 5.2.2., have been elected to membership of the Institute in the following grades:

Fellows

F. Botha, C. Moll, N. Solden.

Members

S. J. Marais, P. H. Radcliffe, R. Stockton, M. D. Velzeboer.

Graduates

L. A. Melis, G. J. Petersen, L. C. Stilwell, V. M. dos Santos R. Lopes.

Associates

M. W. Bell, J. W. Briedenhann, A. C. Botha, J. R. Garbutt, L. S. Gibbs, J-J. J. V. Housmans, R. R. Perkin, A. P. Sinden, C. P. Smit, S. Venkatesan.

Students

A. C. Blignaut, W. H. J. Coetzee, H. P. F. Kern, T- S. O'Connor, E. D. Smith.

Transfer to Fellow

D. A. Blair Hook, R. D. Wolff.

Transfer to Member

G. A. P. Andersson, J. J. Geldenhuys, J. P. Hatfield, P. J. Pretorius.

I welcome the newly elected members to the Institute, and congratulate those who have been transferred to a higher grade.

General

Election of Scrutineers for Ballot

In accordance with Section 9.4 of the By-Laws, the following scrutineers were elected:

P. W. J. van Rensburg, R. P. Plewman, R. E. Robinson, J. K. E. Douglas, J. P. Hugo, M. D. G. Salamon, D. G. Maxwell, H. Britten.

The meeting ended at 09h30.