estimate will then be compared with figures obtained by conventional means. This will provide a measure of the capability of ERTS-type systems in monitoring this type of environmental hazard.

SUMMARY AND CONCLUSIONS

Thus far we have established that mine dumps can be identified on ERTS-1 imagery and that differences in their vegetative cover can be detected. The final phase of our project is to make a quantitative comparison between ERTS-derived estimates of vegetative cover and estimates derived by conventional means.

What we have found to date leads us to conclude that there is a good possibility that an ERTS-type system could perform the function of monitoring the environmental hazard posed by mine dumps, a function at present performed by aircraft overflight or *in situ* inspection. In this way, the tasks of keeping watch on potential pollution from mine dumps could be made part of an integrated environmental monitoring system.

REFERENCES

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2. GILBERTSON, B. P. Growth and decline of vegetation of mine dumps. NASA Earth Resources Survey Programme, *Weekly Abstracts* E73-10326.

NIM Reports

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag 7, Auckland Park, Johannesburg.

Report no. 1549

Thermodynamic and related physicochemical factors pertaining to the production of ferromanganese. A literature survey.

The literature dealing with the fundamentals involved in the production of ferromanganese is examined, the objective being to assemble the available information and thus to establish what aspects require further study. It was found that fundamental knowledge on the thermodynamic properties of alloy and slag phases is incomplete, and, although the mechanism of FeO, MnO, and SiO_2 reduction by carbon dissolved in liquid iron has been established, the reduction of these oxides with solid carbon could profitably be studied further. In addition, the activities of the components in the system Fe—Mn—Si—C require further study.

Report no. 1568

A computer programme for the estimation of parameters in flotation.

The report describes a computer programme for the estimation of parameters in the model that is used to predict the performance of any flotation plant. The confidence limits for the parameter estimates are also provided by the programme. Data from an incremental batch test or from the rougher and cleaner cells in a continuous plant can be used for the estimation. A method is given for the testing of various hypotheses concerning the parameters to give the characterization of a slurry that is both adequate and significant.

Report no. 1571

The commissioning of a direct-reading spectrometer for the analysis of silicate rocks by use of the graphite-pellet technique.

A number of relevant factors concerning pellet preparation, pellet surfacing, excitation parameters, preburn time, and spark geometry were investigated and assessed, and a set of calibration graphs was prepared for a group of twenty-five standard samples. The various element lines were assessed, and, where necessary, appropriate corrections were applied for spectral interferences. The method was shown not to be as accurate as classical chemical analysis, but it requires considerably less time and is therefore less costly. The accuracy of the method is 100 ± 2 per cent. The details of the procedure are listed in an appendix.

Report no. 1582

The construction and testing of a precision calorimeter.

The design, construction, and calibration of a titration calorimeter capable of measuring ΔH for complete ($K \geqslant 10^4$) and ΔG, ΔH, and ΔS for incomplete ($10^0 \leqslant K \leqslant 10^4$) reactions in the solution phase is described. The instrument was tested by the measurement of the enthalpy change for a well-documented complete reaction—the neutralization of sodium hydroxide with hydrochloric acid. The results had a precision of 0,5 per cent and agreed with published values. The instrument and the calculation techniques for incomplete reactions were tested by measurement of the formation constants and enthalpy changes for the reactions involved in the formation of silver(I)—pyridine complexes. The results are well within the range of values published in the literature. The calorimeter, with its automated temperature-sensing ability, is more convenient to operate than the LKB 8700 calorimetry system and gives better thermogram resolution. The instrument has been operated by a technician without any difficulty.

Report no. 1587

A preliminary investigation of the flotation of copper-activated sphalerite without the use of collectors.

Although non-activated sphalerite cannot be floated without the use of collectors, it is shown that this is possible once the sphalerite has been activated with either copper or silver ions. Elemental sulphur in any of its normal allotropic forms does not play a role in this flotation.

The major factor affecting the collectorless flotation of copper-activated sphalerite is the extent of oxidation of the sphalerite both before and after activation. Oxidizing agents such as $KMnO_4$ or $K_2Cr_2O_7$ were found to be the best depressants for collectorless flotation, which does not appear to be affected by the source or composition of the sphalerite used.