gives a factor of four increase in count rate in the uranium channel as compared with sodium iodide, whereas cesium iodide gave only a 25 % increase. However, the energy resolution of the BGO crystal is poor, due to its low level of light output. This weakness is currently being researched in Canada and no doubt improvements will soon be made.

Finally, improvements in the data acquisition systems of spectrometers will greatly enhance their use as lithological mapping tools. This aspect will be dealt with in more detail in the last paper of this session.

A review of recent developments in radiometric calibration facilities

Dr B Corner - (BPI)

Two new developments concerning radiometric calibration facilities are described in this presentation.

The first is the result of the international program for the monitoring and cross-referencing of existing calibration facilities, sponsored by the International Atomic Energy Agency. Such facilities are available in at least ten countries on three continents. All pads included in the program were monitored by Lovborg (Riso National Laboratory, Denmark) using a Geometrics GR-410 portable spectrometer. Previous calibration data recorded at facilities in Canada, Sweden, Finland and the USA were found to be very consistent and the average of these data was used as the monitoring standard for all subsequent facilities visited. The monitoring program was completed in November 1982 and included facilities in South Africa, Argentina, Brazil and Denmark. In situ monitored assays were compared (by ratio) to those prescribed for the pads from laboratory assays. The correlation for the Lanseria facility was excellent, and also the overall best in the group, viz. 0,99 for the thorium pad, 1,03 for the U pad and 1,06 for the potassium pad. The majority of the pads at Pelindaba were not monitored as they were considered to be too hot for the exercise. The potassium pad was read and yielded an excellent ratio of 0,99, whereas the fourth uranium source yielded a ratio of 1,12. This is considered to be slightly high and probably results from inhomo= geneities in the source.

The second recent development concerns the accuracy of the stripping ratios derived at Pelindaba and has important implications for in situ assaying. In the past it has been shown (Corner et al. 1979) that the Pelindaba-derived calibration constants will yield in situ assays both on surface and in boreholes to an accuracy of better than 10 %, assuming equilibrium ore. This conclusion was reached from data derived from 'clean' ores primarily enriched in one radioelement with relatively low concentrations (if any) of the other radioelements, and still holds good for such ores. A number of workers have, however, reported negative thorium and/or potassium in situ assays on ores or rocks containing equally significant amounts of two or more radioelements. Lovborg (personal communication) has suggested that this might result from a variation in the stripping ratios derived at Pelindaba, resulting from high source concentrations and consequent pulse pile-up in the gamma spectra.

A research project was commenced to evaluate the problem and stripping ratios were determined for the concentration ranges observed both at Pelindaba and Lanseria. It was found that the stripping ratios for potassium, uranium and thorium do vary considerably, with concentration, from those average values given to users of the facilities. These variations occur in such a way that for a rock or ore containing both uranium and thorium, inaccurate (and in extreme cases negative) concentrations may be obtained for the minor of the two radioelements.

The Lanseria pads yield stripping ratios and hence in situ concentrations which conform closely with those of the international monitoring program. Workers involved in mapping or low-grade ore evaluation are recommended to use the Lanseria pads for calibration purposes. Two sources, one uranium and one thorium, with concentration levels similar to those at Lanseria, have recently been constructed at Pelindaba and will be available to users as soon as laboratory assays become available.

The implication for spectrometric assaying in relatively high-grade mixed ores, is that stripping ratios specific to the concentration levels being investigated will have to be employed. Calibration procedures are currently being revised for both surface and borehole spectrometric work, to meet these needs.

REFERENCES

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Appraisal of a collimated radiometric face scanner for the in situ determination of gold and uranium in Witwatersrand mines

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The advantages offered by in situ radiometric assaying for uranium in Witwatersrand gold and uranium mines have never been questioned. However, the absence of a rapid technique for the in situ determination of gold has severely hampered the acceptance of radiometric instruments. It was suggested, therefore, that an estimate of the gold concentration within the reef could be obtained from the radiometric measurements, provided that the gold/uranium ratio of the reef in a particular mine is known. Preliminary investigations conducted in the Harmony Mine, near Virginia, with a collimated Chemtron radiometric face scanner have yielded encouraging results showing that reliable assays of both uranium and gold could be obtained through this rapid technique.

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Computerisation of the NUCOR borehole logging unit

N J B Andersen, C J B Smit and R Heard

The logging unit used by NUCOR is a Geometrics BLW-2000E differential gamma ray spectrometer equipped with a two cubic inch thallium-activated sodium iodide crystal. The instrument, along with an Osborne 1 micro-computer, is housed in the back of a truck and is thus fully mobile.

While logging in the field, all the spectrometric data are recorded onto magnetic tape. These data are then transferred onto a floppy disk in the Osborne, using an Assembler program called GETTAPE. The calibration