Oral 2.3

HUMAN EXPOSURE TO RADIOACTIVITY FROM MINING AND INDUSTRIAL RESIDUES

D.B.CHAMBERS[1]*, M. MONABBATI*[1]*, A. GARVA*[1]*, AND G. FEASBY*[1]

[1]*SENES Consultants Limited, 121 Granton Drive, Unit 12, Richmond Hill Ontario Canada L4B 3N4*

Radionuclides of natural origin are present in all soils and rocks. UNSCEAR 2000 reports Concentrations of natural radionuclides in a wide variety of materials and with a wide range of activity levels. Exploration and processing of these resources and production of consumer items can lead to further enhancement of the radioactivity in the products, by-products, residues or wastes, arising from the industrial processing.

A conceptual difficulty in the management of NORM has arisen largely because there has been different perceptions of the potential radiological hazard since all of these materials are naturally radioactive but in large part, are not associated with the nuclear industry. The IAEA recognizing the practical problems of regulating large quantities NORM materials with low levels of radioactivity proposed that exemption values for radionuclides of natural origin should be based on the upper end of the worldwide distribution of natural radionuclides (as
for example described by UNSCEAR 2000).

The IAEA Safety Guide RS-G-1.7 suggests that “doses to individuals as a consequence of these activity concentrations would be unlikely to exceed about 1 mSv in a year,excluding the contribution from the emanation of radon, which is dealt with separately in the BSS.” However, in order to evaluate this hypothesis, the IAEA decided to perform independent calculations of dose associated with a “generic” hypothetical NORM residue deposit. This paper describes the methods, data and results of that evaluation.

The study develops the characteristics of a “generic” NORM residue heap of 2 million m3 covering 10 ha that contains either (or both) natural uranium (U-238) decay series radionuclides and/or the natural thorium (Th-232) decay series radionuclides. The radionuclides are assumed to be in equilibrium, each at a concentration of 1 Bq/g. To the extent practicable, the doses to adults and children (1 year old child) living close to such heaps were assessed using the models and assumptions of the IAEA Safety Report Series (No. SR 44). The possibility that some NORM residues may be acid generating was also considered.

Based on the findings of this study, while doses slightly in excess of 1 mSv/a are possible, it is considered more likely than not, that the dose to an adult or child who lives in close proximity to a NORM residue heap would be well below 1 mSv/a for the vast majority of real situations.