Co-operation – the Way Out
(Introducing the Natural Materials Radiation Control Initiative)

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GENERAL CONSIDERATIONS

Everyone is exposed to radiation. About 80% of this exposure could be attributed to sources that exist naturally. It occurs naturally in our bodies and in surrounding environment and it is unclear if the exposure to natural sources of ionising radiation needs to be regulated.

Exposure to some sources is hardly amenable to control – potassium-40 in the human body is a good example. On the other hand, radiation exposure in industries dealing with large volumes of low activity materials is typically very easy to control. Good occupational health and hygiene practices limit the potential exposure automatically. Radiation, however, is perceived by many as being extremely dangerous. As a result, there is a possibility that radiation protection regulations initially designed for dealing with artificial radioisotopes in radiochemistry and nuclear medicine would be applied for such human activities as mining and minerals processing.
It is very likely that such an event will result in enormous difficulties both for the industry and for regulatory bodies [1,2].

DISCUSSION

It is obvious that there is no difference between radiation exposure due to *natural* or *artificial* sources, provided that radioisotopes and pathways of exposure are similar. Radiation protection standards were developed for *artificial* sources. Let us discuss their applicability to *natural* sources of radiation from different points of view:

RADIATION PROTECTION PROFESSIONALS

Since there is no difference in potential health effects of radiation, irrespective of its origin, it seems that it would be prudent to treat the exposure in the same way. The only argument against this is based on the practicality of proposed legislation. There is also a need to estimate social and economic impacts of the proposed legislation, which should be carried out via the appropriate government committees in accordance with approved procedures.

POTENTIALLY AFFECTED WORKERS

International bodies like International Atomic Energy Agency, World Health Organisation, International Labour Office stated that a certain limit of radiation exposure is applicable for *artificial* sources. A worker exposed to *natural* source of the same kind will demand and is, indeed, entitled to the same level of protection.

POTENTIALLY AFFECTED INDUSTRIES

The introducing of radiation regulations in mining and minerals processing, for example, presents certain inconveniences for potentially affected companies. These companies are, as a rule, already heavily regulated, and any additional restrictions are obviously undesirable. Further complications will arise in the international trade of commodities containing *natural* sources of radiation.
In the long term, however, the adherence to radiation protection standards could be beneficial for affected companies. The possibility of future lawsuits with regards to radiation exposure or contamination should not be dismissed and an affected company could be asked to prove that all government directions were followed exactly, or even bettered.
Due to the very nature of produced/processed materials and comparatively low radionuclide concentrations, controlling of radiation sources is usually quite easy. In the majority of cases the control measures will comprise employee education, designating some working areas as *supervised* and suppressing dust generation

(which is done already in accordance with occupational health legislation and environment, safety and health management programs in place in most mining and minerals processing facilities).

Furthermore, it is still unclear if the exposure to low level ionising radiation can result in any health effects for potentially affected employees and members of the general public. Therefore, in accordance with the *Duty of Care* principle industry has to take measures to protect both employees and general public from radiation, - irrespective of the existence of relevant regulations.

GENERAL PUBLIC

The reaction of the general public to any mentioning of radiation is typically that of fear and rejection. However, "although the public may be wrong in its fear of radiation, and even irrational, nevertheless the public has the right to be wrong, at least to some degree, in democracy." [3]. The one and only way to overcome this problem is the education of the public and the complete openness of both industry and government departments in regards to *natural* radiation.

As Radiation Protection Practitioners we should realize the following:

1. Both industry and regulators are facing significant problems with the introduction of regulations applicable for radiation exposure to *natural* sources of radiation,
2. Both demand that something should be done about it, but someone else had better do this 'something', because most of us are too busy doing something else.

Apart from the general public, there are two distinct groups of stakeholders in the process – Industry and Regulators. There are two cases that might generally describe the *extreme* point of view of both.

- A particular manager of a facility that produces/processes materials containing natural radionuclides may feel threatened by the new regulations and believe that regulators should have no right to make radiation regulations applicable to this facility, unless he/she has consented to these regulations;
- A particular regulator, on the other hand, may believe that he/she has the right to impose radiation standards on a particular industry without its consent whatsoever.

It should be emphasised that these two examples are given only to reflect the *extreme* case and are in no way describing the real situation. However, it should also be acknowledged that it is quite possible these opinions exist in the real world. Considering the extremity of these two positions it is hard to imagine how one could possibly reconcile them.

INTRODUCING THE NATURAL MATERIALS RADIATION CONTROL INITIATIVE

At the Second Symposium on Technologically Enhanced Natural Radiation in September 1999 in Rio de Janeiro, Brazil, it had been recognised that there is an urgent need for mutual assistance in quantifying exposures to ionising radiation and thereby more accurately identifying potential risks to workforce and general public arising from enhanced concentrations of naturally occurring radioactive materials in industrial operations. It was further recognised that the exposure modelling assumptions typically used in estimating risk were not necessarily correct and that more specific exposure information may be developed on the basis of existing data or new studies that will lead to a better understanding of the actual risks associated with these materials. However, this information, where it may already exist, is fragmented with different parties possessing incomplete data.

The recognition of the need for joint regulatory-industry co-operation resulted in a preparatory workshop, which was held at Phalaborwa, South Africa during the first week of April 2000.

GOALS OF THE INITIATIVE

- Development of a draft IAEA Safety Report identifying sources of exposures of workforce and general public to ionising radiation from enhanced concentrations of naturally occurring radioactive materials in industrial operations.
- Assessment of the impact of regulations on international trade in commodities containing such materials through co-operation between State Regulatory Authorities and Industries.

The Safety Report will provide information on suggested methods for national regulatory authorities, advisory bodies and industries to meet the requirements of the International Atomic Energy Agency Basic Safety Standards [4] for the safety of industrial operations with materials containing enhanced concentration of

naturally occurring radionuclides as well as quantitative assessments. As far as is practicable, the assessments will be carried out using data collected from industries, national regulatory agencies and advisory bodies (not on probabilistic assumptions).

The following aspects will be described:

- Occupational exposure,
- Exposure of members of the public,
- Waste disposal, and
- International trade in commodities.

The proposed Safety Report will consist of two parts – a technical support dossier and a guide for practical risk reduction. The latter part will include a look-up table for different processes resulting in the enhancement of naturally occurring radioactive material concentrations designed to assist the producer, customer and regulator in reducing radiological risk where it is identified within a particular industrial practice. The technical support dossier will be a comprehensive assembly of empirical data regarding worker and public dose compiled from existing sources within industry and regulatory authorities. A generic framework will be developed with one industry as a first example.

The Report will provide the methodology to quantitatively apply the principles of justification and optimisation to potential exposure, as well as risk limitation. It will continue to convert these principles to regulatory activities and will be complemented with examples of good practice on handling bulk amounts of materials containing enhanced concentrations of naturally occurring radionuclides in industrial operations.

It is expected that the goals of the initiative will be finalised at the workshop during this Conference and the first draft of the Safety Report is planned to be completed for the presentation to IAEA in early 2001.

TERMS OF REFERENCE

- Principles are to be consistent with ICRP and IAEA recommendations,
- Equal participation of regulatory authorities, industries and advisory bodies is to be a priority to ensure a robust data base is obtained;
- Actual measured results are to be used to the maximum practical extent, assumptions, where necessary, shall be justified;
- All industries (eg., phosphate, coal. niobium) will be studied individually, according to the different chemical, physical and radiological properties of materials as well as work practices encountered in that industry.

Further information is available from the NMRCI Internet site [5].

DECISION-MAKING

Four principles from the decision-making model suggested by the American philosopher K. Shrader-Frechette of Notre Dame University in Indiana, USA [3] could be taken as a basis for work of the NMRCI.

It is clear that *procedural criterion* for decision-making will be the most appropriate. There will be no need to keep track of all complexities of the process. Instead we specify *procedures* for arriving to a just and correct decision, as in a court of law. It was partly covered previously in description of NMRCI Terms of Reference.

1. The only way to ensure that a correct decision is made is to have persons representing various stakeholders (Regulators, Industry, Public) making that decision.

2. "Additional requirement of procedural justice would be that no member of the decision-making group has information that is not shared and made available to other members of the group."[4] If information in regards to radiation exposure in a particular Industry comes from the Regulators, it is necessary to have alternative information, prepared with alternative assumptions by the Industry, also available, and *vice versa*. Participation of representatives from Scientific Institutions and a peer-review of available information will assure that decisions will be based on the most reliable data.

3. The third principle deals with potential inequality and the ability of *all* stakeholders to attend gatherings of a decision-making group. With the rapid evolution of the Internet, this principle becomes obsolete. Of course, NMRCI Workshops will be held, but there will be no stakeholders left behind due to the inability to attend a meeting. Practically everyone interested will be able to participate.

4. If a decision-making body could not agree on which position to take on one or another subject, there should be a *procedural* way to overcome this obstacle. At the current stage of NMRCI this will be a consultation with IAEA.

REFERENCES

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