video, at the invitation of the National Atomic Energy Commission of Uruguay. For its part, the Inter-American Nuclear Energy Commission of the Organization of American States (IANEC/OAS), at its last regular meeting in Caracas, Venezuela, in January 1984, approved the organization of a Seminar on Legal System Governing Nuclear Activities in the Region, to be held in Caracas, Venezuela, in the first half of this year, and for which IANEC also asked for the Agency's support.

References

[1] IAEA Safety Series, No.9, 1982 edition.
[2] Ibid., No.26, 1983 edition.
[3] Ibid., No.6, 1973 edition (as amended).
[4] INFCIRC/225/Rev.1.
[5] All the Codes of Practice and Safety Guides of the NUSS programme have been issued in the IAEA Safety Series under the generic number 50.
[6] International Conventions on Civil Liability for Nuclear Damage, Revised 1976 Edition, IAEA Legal Series No.4.

Radiation protection in mining and milling of radioactive ores

by J.U. Ahmed*

Toward the end of last year the IAEA, the International Labour Organization (ILO), and the World Health Organization (WHO) organized jointly a Seminar on Radiation Protection in the Exploration, Mining and Milling of Radioactive Ores, for developing countries in Africa which have either potential or active programmes in these fields. The seminar was designed to generate awareness among the concerned countries in Africa of radiological problems and relevant control measures associated with the nuclear mining industry. The seminar was held from 14 to 20 November 1983 in Libreville, at the invitation of the Government of Gabon.

The uranium industry has been associated in the past with occupational illness, and in particular lung cancer. There is strong epidemiological evidence – from uranium mining in Colorado, USA, uranium and other metal mining in Newfoundland – that exposure to radon daughters in significant quantities can cause lung cancer. It has also been found that the incidence of excess lung cancer has been many-fold more among miners who smoke than among non-smoking miners. The characteristics of the uranium mining industry differ somewhat from those of other components of the nuclear fuel cycle, being influenced by radiation hazards such as radon and radon daughters, ore dust and yellowcake; and large volumes of wastes including mill tailings which have environmental implications. However, continual improvements in mining methods, engineering and ventilation controls, and radiation protection (including the enforcement of lower limits for exposure to radon daughters) have improved working conditions greatly. The improvements which have been achieved suggest that uranium or thorium can be mined and processed safely, without undue risk to workers or to the public. However, meticulous care should always be taken to ensure safe working conditions for the workers, and efforts should always be directed to betterment. It needs to be emphasized that any country undertaking active exploration, or mining and milling of radioactive ores, should be aware of the radiation hazards involved in such operations, and should also know of regulatory and radiation control measures, if they are not to repeat past mistakes in the development of the uranium industries in developed countries.

In Africa, a good number of developing countries have potential for mining and milling of uranium. Some, such a Niger and Gabon, are already mining and milling uranium with the help of foreign uranium mining companies; others have been carrying out active exploration or prospection for uranium or other radioactive ores. Many do not have their own means of ensuring adequate radiation protection in such activities, nor do they have regulatory controls designed exclusively for the mining

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and milling of radioactive ores. The IAEA, ILO and WHO, recognizing the need to enhance the appreciation of developing countries in Africa of the risks involved in the nuclear mining industry and associated radiological protection measures, planned the seminar accordingly.

The topics of the seminar were chosen to cover all aspects of radiation protection in the nuclear mining industry, namely the philosophy of the International Commission on Radiological Protection (ICRP) in radiation protection, types of radiation and their interactions with matter and with living cells, sources of radiation hazards in mines and mills and associated radiological protection standards, radiation protection in the nuclear mining industry, optimization of radiation protection in the mining and milling of uranium, regulatory and licensing aspects, organization of radiation protection programmes, occupational and environmental monitoring, radioactive waste management, engineering and ventilation controls, inspection and compliance and training of personnel, protective equipment and radiation hygiene, medical and socio-medical aspects, and handling of radiation accidents. The programme also included short reports on national activities in the areas of exploration, mining, and milling of radioactive ores. Practical demonstrations were organized through the courtesy of the French Atomic Energy Commission (the Commissariat à l'Energie Atomique); these demonstrations included a number of experimental set-ups for measurements of radiations encountered in the uranium mining industry.

The seminar was attended by 44 participants including the invited speakers and the three Scientific Secretaries. The countries represented from Africa were Egypt, Gabon, Ivory Coast, Morocco, Niger, Nigeria, Sudan, and Zaire. The programme included 20 lectures, five practical experiments, poster presentations, and documentary film shows. A visit to the Oklo uranium mine in Gabon was arranged through the courtesy of the Compagnie Minière d'Uranium de Franceville (COMUF). The seminar was acclaimed by all participants as a most useful exchange of information on the subject of the nuclear mining industry.

Transport of radioactive materials by post

by R.B. Pope*

Uniform standards are essential for the safe and expeditious transportation of radioactive materials. This is especially true of transport by post where, because of the small quantities of material involved and their low associated hazard potential, minimal effort is made to identify package contents, and individual item inspection is not feasible. However, only a few countries currently permit such shipments.

To explore the reasons for this, the Agency undertook in 1980 to arrange a Seminar on Transport of Radioactive Materials by Post. At the Agency's invitation, the Universal Postal Union (UPU) and the International Civil Aviation Organization (ICAO) agreed to be co-sponsors. The objective of the seminar, which was held in Vienna from 24 to 27 October last year, was to encourage the safe and efficient carriage of radioactive material by post. It was designed to bring together postal administrations, competent authorities for other modes of transport, carriers, shippers, and radiation safety people, to discuss the nature and magnitude of the hazards associated with radioactive items that can be transported by post, safety and administrative requirements, the need for and advantages of allowing such shipments, and any concerns they may cause. The seminar was attended by 73 people from 31 countries and six international organizations, and 19 papers were presented.

It has been estimated that nearly a third of all shipments of radioactive materials could be made by

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