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NATIONAL SYSTEM OF NOTIFICATION, AUTHORIZATION AND INSPECTION FOR THE CONTROL OF RADIATION SOURCES IN GHANA

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Abstract. The Radiation Protection Board (RPB) was established in 1993 in Ghana as the regulatory authority for radiation protection and safety of radiation sources; its functions are prescribed in the 1993 national radiation protection regulation. The report describes how the country's radiation protection and safety infrastructure have been established, including the RPB's organizational structure, with reference in particular to the main activities carried out by both the Regulatory Control Department and the Radiation and Waste Safety Department. It also briefly mentions the existing RPB human resources; the national system of notification, authorization and inspection of radiation sources; the inventory of radiation sources; and the management of disused radiation sources. Finally, the report identifies the two main problem areas regarding the regulatory control of radiation sources in the country.

INTRODUCTION

The Radiation Protection Board (RPB) was established in 1993 by amending the Atomic Energy Act 204 of 1963 by the Provisional National Defence Council law 308 in 1993 as the sole regulatory authority for the purposes of radiation protection and safety of radiation sources. The Authority and functions of the Board are prescribed in the radiation protection regulations LI 1559 of 1993 [1–3]. Under part ii — control of radiation sources of the regulations a national system of notification, authorization by registration or licensing, safety inspections and enforcement for the control of radiation sources has been established.

A national radiological emergency response plan to deal with all foreseeable accidents which may occur for radiation sources which give rise to potential exposures is under development.

The International Atomic Energy Agency (IAEA) has been instrumental in the establishment of a basic infrastructure for radiation protection and safety of radiation sources through technical co-operation projects (GHA/1/007, GHA/9/004, RAF/9/005, INT/9/143 and Regional Model Project RAF/9/024) spanning a period of twenty years.

RADIATION PROTECTION AND SAFETY INFRASTRUCTURE

The RPB has established a national inventory of radiation sources and has introduced administrative and technical procedures through a system of notification, authorization by registration or licensing, safety inspections and enforcement. Radiation protection and safety guides [4–9] have been developed to make the regulations consistent with the BSS [10] and assist registrants and licensees to notify and apply for appropriate authorization before engaging in any activity (practice) involving radiation exposure.

A National Radioactive Waste Management Centre (NRWMC) was established in June 1995 and designated as a national centralized facility for the collection and transportation of all waste requiring more than one year decay period to below clearance level. Requisite facilities for the treatment, conditioning and interim storage of all waste generated in the country is under development. Waste generators are required by the waste management regulations for on-site segregation, collection, characterization and temporary storage of all waste arising

from their activities [11]. Those Practices which cannot manage their own waste can engage the assistance of the NRWMC.

ORGANIZATIONAL STRUCTURE OF REGULATORY AUTHORITY

The RPB is currently structured as shown in Figure 1. The regulatory activities are distinct from the radiation and waste safety services provided by the Board.

REGULATORY CONTROL DEPARTMENT

This department initiates notification, authorization, safety inspections and enforcement procedures for the control of irradiating devices (X-rays) and radiation sources used in practices that involve radiation exposure. Operating staff in this department review applications for authorization, perform pre-authorization inspections and regular inspections and advise the Board on the issuance of authorization by registration or licensing.

RADIATION AND WASTE SAFETY DEPARTMENT

This department provides radiation and waste safety services comprising personal monitoring, safety assessment of ionizing radiation facilities and sources, food and environmental monitoring, calibration services for protection level dosimeters and quality audit at radiotherapy centres in Ghana.

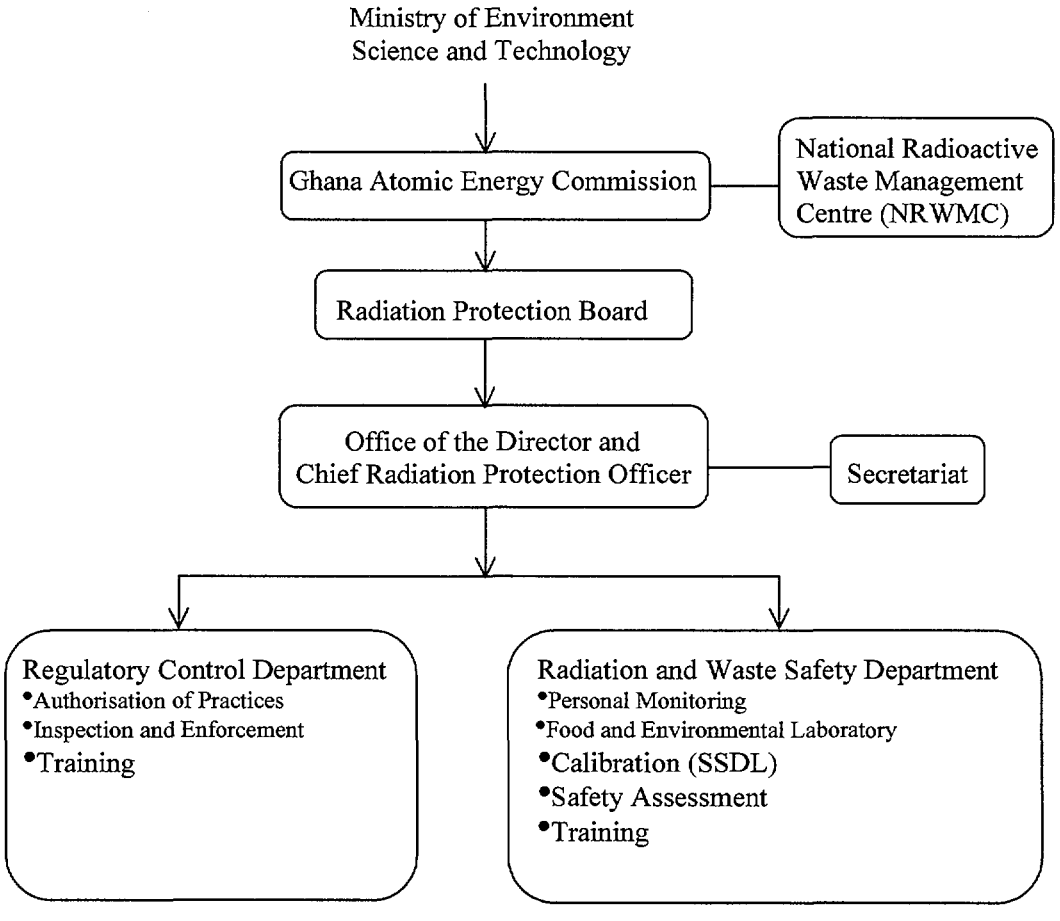

Fig.1. Organisational structure of Radiation Protection Board.

HUMAN RESOURCES

The Board has staff strength of 23. The chief radiation protection officer, five radiation protection officers and three technicians staff, operate the regulatory control department. Four radiation protection scientists and three technical staff carry out radiation and waste safety services. there are seven other staff members that provide administrative support services for the directorate and the two departments.

NATIONAL SYSTEM OF NOTIFICATION, AUTHORIZATION AND SAFETY INSPECTIONS FOR THE CONTROL OF RADIATION SOURCES

Based upon sections 7, 8 and 9 of the regulations, a system of notification for activities involving radiation exposure and authorization by registration or licensing is in place. Pre-authorization and regular inspection procedures are established and are being implemented.

INVENTORY OF RADIATION SOURCES

A national level inventory of sources is established. Information from the Regulatory Authority Information System (RAIS) indicates the types of radiation sources and practices in Ghana as shown Figures 2 and 3.

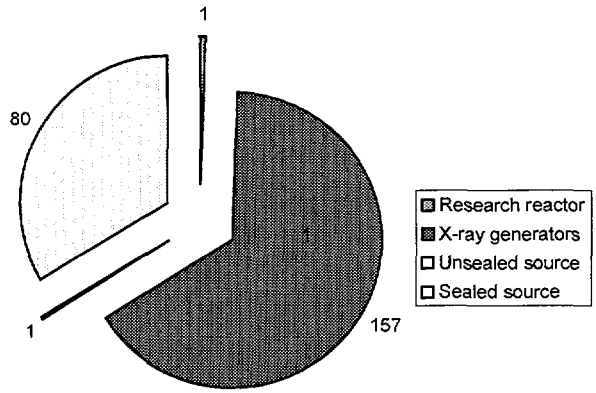

Fig.2. Types of radiation sources used in Ghana.

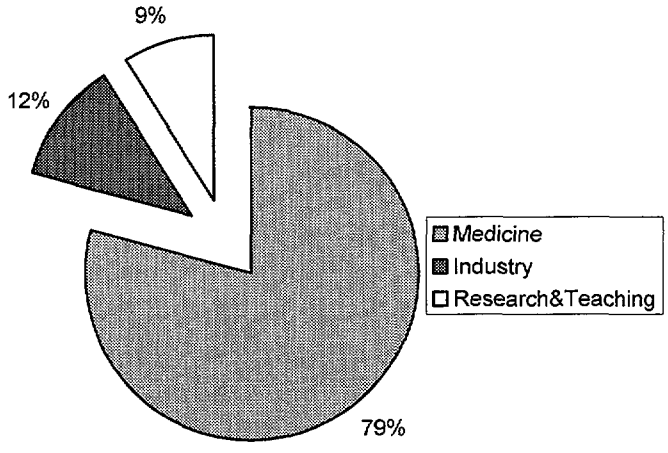

Fig. 3. Facilities in Ghana that make use of ionising radiation.

MANAGEMENT OF DISUSED RADIATION SOURCES

Authorization procedures require registrants and licensees to provide information about the radioactive waste management options for their spent sources and waste. Since many sources have no previous agreement with suppliers for return, the NRWMC was set up to assist registrants and licensees to manage their spent sources.

Disused radiation sources so far managed by the NRWMC include 90mg radium-226 needles which have been encapsulated and conditioned in concrete matrix in a 200L drum in 1999. The activities of waste generated by applications in hospitals, industries, research and teaching range from a few Bq to GBq The radionuclide composition in interim storage include ^{14}C, ^{137}Cs, ^{60}Co, ^{241}Am, ^{3}H, $^{90}Sr^{90}$, ^{99m}Tc generators and ^{109}Cd.

For new sources imported into the country from 1995, registrants and licensees are required to enter into an agreement to return spent sources to the suppliers for sources with activities greater than 100 MBq 10 years after their purchase.

PROBLEMS AREAS OF REGULATORY CONTROL

Two main problem areas have been identified: logistics and human resources. These are being addressed by a medium term expenditure framework for the period 2000–2002 to recruit more staff to be trained as inspectors and investment in the acquisition of three field vehicles. Another problem area is the security of radiation sources in existence before the introduction of the regulatory control programme in 1993. All sources in recognized institutions are currently under control.

Backtracking of orphan sources is ongoing, effected through a strategy of periodic press releases and information from our collaborators from other regulatory authorities, such as the Environmental Protection Agency; the Customs, Excise and Preventive Service; the Ghana Standards Board; and the Factory Inspectorate Division of the Ministry of Employment and Social Welfare. The effectiveness of the backtracking mechanism depends upon the collaboration and co-operation of all stakeholders and the general public in notifying the Board about orphan sources.

TRAINING AND EDUCATION IN RADIATION PROTECTION

In order to improve upon the level of compliance and safety culture of licensees and registrants seven national level training programmes have been organized since 1993 in radiation and waste safety. Ghana has also hosted ten IAEA fellows and four regional level IAEA training courses in radiation protection and safety involving about eighty-five participants.

EMERGENCY PLANNING AND PREPAREDNESS

The development of a national radiological emergency response plan (NREP) became necessary due to the existence of practices in Ghana such as the 30kW research reactor, GHARR-1, 1850 TBq gamma irradiator, 185TBq teletherapy facility and two 216 TBq Ir-192 industrial radiography facilities, which could lead to accidents with radiological consequences. In collaboration with the IAEA, Ghana initiated the NREP in March 2000.

The Radiation Protection Board is the lead technical agency for the co-ordination of appropriate national level radiological emergency response. The plan covers the following types of radiological emergencies:

(a) Accidents with radiation sources or radioactive materials, which include accidents that could occur at a facility or practices licensed by the RPB, found radioactive materials or contaminated areas, lost or missing sources and unshielded sources;
(b) Transportation accidents involving radioactive materials;
(c) Environmental impact from a foreign source: an emergency involving radiation from a foreign source that could pose an actual, potential or perceived threat to Ghana; and
(d) Re-entry of a satellite with nuclear materials: an emergency in which a spacecraft with nuclear material could land on the territory of Ghana.

CONCLUSION

Ghana, through the consistent commitment of regular IAEA technical assistance, has established a national radiation protection and safety infrastructure for the past two decades and within the last six years has upgraded the infrastructure to be consistent with the BSS.

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