

## ESTABLISHING A CENTRAL WASTE PROCESSING AND STORAGE FACILITY IN GHANA

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Radioactive waste and spent sealed sources in Ghana are generated from various nuclear applications – diagnostic and therapeutic procedures in medicine, measurement and processing techniques in industry, irradiation techniques for food preservation and sterilization of medical products and a research reactor for research and teaching. Statistics available indicate that over 15 institutions in Ghana are authorized to handle radiation sources (table 1). At present radioactive waste and spent sealed sources are collected and stored in the interim facility without conditioning.

With the increasing use of radioactive sources in the industry, medicine for diagnostic and therapeutic purpose and research and teaching, the volume of waste is expected to increase. The radioactive waste expected include spent ion exchange resins from the nuclear reactor water purification system, incompactible solid waste from mechanical filter, liquid and organic waste and spent sealed sources. It is estimated that four 200L drums will be needed annually to condition the waste to be generated.

The National Radioactive Waste Management Centre (NRWMC) was therefore established to carry radioactive waste safety operations in Ghana and research to ensure that each waste type is managed in the most appropriate manner. Its main task includes development and establishment of the radioactive waste management infrastructure with a capacity considering the future nuclear technology development in Ghana. The first phase covers the establishment of administrative structure, development of basic regulations and construction of the radioactive waste processing and storage facility [1].

The Ghana Radioactive Waste Management regulation has been presented to the Parliament of Ghana for consideration. The initial draft was reviewed by the RPB. A 3-day national seminar on the Understanding and Implementation of the Regulation on Radioactive Waste Management in Ghana was held to discuss and educate the general public on the regulations. About 50 delegates from various ministries and establishment participated in the seminar. The final outcome of the draft regulation was sent to the Attorney General's office for the necessary legal review before been presented to Parliament through the Ministry of Environment, Science and Technology.

A radiation sources and radioactive waste inventory have been established using the Regulatory Authority Information System (RAIS) and the Sealed Radiation Sources Registry System (SRS).

A central waste processing and storage facility was constructed in the mid sixties to handle waste from a 2MW reactor that was never installed. The facility consists of a decontamination unit, two concrete vaults (about 5 x 15 m and 4m deep) intended for low and intermediate level waste storage and 60 wells (about 0.5m diameter x 4.6m) for storage of spent fuel. This Facility will require significant rehabilitation. Safety and performance assessment studies have been carried out with the help of three IAEA experts [2]. The recommendations from the assessment indicate that the vaults are very old and deteriorated to be considered for any future waste storage. However the decontamination unit and the wells are still in good condition and were earmarked for refurbishment and use as waste processing and storage facilities respectively. The decontamination unit has a surface area of 60m<sup>2</sup> and a laboratory of surface area 10m<sup>2</sup>. The decontamination unit will have four technological areas. An area for cementation of non-compactible solid waste and spent sealed sources. An area for compaction of compactible solid waste and a controlled area for conditioned wastes in 200L drums. Provision has been made to condition liquid waste. There will be a section for receipt and segregation of the waste. The laboratory will be provided with the necessary equipment for quality control. Research to support technological processes will be carried out in the laboratory. A quality assurance and control systems shall be developed and established as it is an important requirement in establishing a national system for radioactive waste management.

A new interim storage facility with a maximum capacity of 100 200L drums has been built.

The cost of refurbishment was estimated at US \$ 100,000(one hundred thousand U.S. dollars). The rehabilitation works, which was expected to be completed and made operational by 2000, will be completed by 2002.

Table 1: Inventory of Radiation Sources

INSTITUTION	SOURCE	ACTIVITY PER SOURCE	APPLICATION	# OF SOURCES
Korle-bu Teaching Hospital	Co-60	185TBq	Radiation Therapy	1
	Tc-99	4.995 GBq	Nuclear Medicine	1/2 wks
Komfo Anokye Teaching Hospital	Cs-137	12.6 GBq	Brachytherapy	5
KASAP Limited	Cs-137	0.3GBq	Density Gauging	2
	Am-241	1.5 GBq		2
Pioneer Tobacco Company Limited	Sr-90	37-740 MBq	Thickness Gauging	28
National Nuclear Research Institute	Cd-109	111 MBq	X-ray Flour. Analy	4
	Am-Be	74 TBq	Neutron Act. Analy	3
	Co-60	277.5 TBq	Food Irradiation & Medical Sterilization	1
		1850 TBq		1
	Cs-137	78.8 GBq	Research&Teaching	4
	Am-241	740 GBq	Moisture Gauging	3
	Cs-137	0.3-0.74 GBq	Density Gauging	7
Am-241	1.48 GBq	Density Gauging	1	
Guinness Ghana Ltd	Am-241	0.37 GBq	Level Gauging	1
WRI	Am-241	1.11 GBq	Moisture Gauging	1
Cocoa Res. Inst.	P-32	0.37 GBq	Fertilizer Utilization Studies	10 ml/y
Motherwell Bridge Ghana Limited	Ir-192	2.34 TBq	Industrial Radiography	1
	Ir-192	11 TBq		1
	Co-60	11 TBq		1
Radiation Protection Board	Co-60	3.7 GBq	Calibration of Radiation Instruments	1
	Cs-137	3.7 GBq		1
	Sr-90	18.5 MBq		1
Base Workshop	Ra-226	Unknown (powder)	Dials in field Compasses	
D & C Industry	Am-241	370 MBq	Level Gauging	1
Ashanti Goldfields	Cs-137	7407.4 GBq	Density Gauging	2
Ghana National Petroleum Corp.	Am/Be+Cs	21.2 GBq	Oil well site verifier	1
	Cs-137	74 GBq	Density Gauging	2
	Am/Be	740 GBq	Oil welling	2

REFERENCES

- [1] Nachmilner, L., Report on Establishment of a Central Waste Processing and Storage facility in Ghana, (Vienna:IAEA)
- [2] Kucerka, M., Report on central Waste Processing and Storage Facility Design in Ghana, (Vienna:IAEA)