



Practices and regulations for the safe transport of radioactive materials in Sudan

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INTRODUCTION

1. To fulfill its mandate of the basic Safety standard The International Atomic Energy Agency (IAEA) has produced publications to enhance the safe transport of radioactive material.
2. In Sudan, many types of radioactive materials are employed in a variety of useful and steadily increasing applications. In the period from 2005 to 2008, 750 sealed radioactive materials were transported within the country.
3. In this article we investigated the development of regulation and legalizations for safe transport of radioactive material in Sudan in order to investigate whether transport of radioactive materials carried out according to relevant international standard and to set proposal for enhancing transport safety to minimize adverse effect of ionizing radiation.
4. Case studies were taken during transport of five radioactive sources from their port of first entry to the end user. Information concerning source type, physical characteristics and packaging type were reported on specially designed forms. Also included in the form are dosimetric parameters as required by relevant international standards.

History of nuclear regulation in Sudan

1. The "Sudan Atomic Energy Commission (SAEC) Act, 1996" created three levels of Responsibility for meeting radiation protection requirements (2):
2. THE BOARD: The Council of Ministers appoints the Board from among high-level officials and scientists; The Board is empowered to issue regulations, to promote the use of radiation and nuclear techniques and to ensure radiation safety.
3. THE REGULATORY AUTHORITY - THE RPTC: The RPTC is a national committee whose members are drawn from major institutes and departments connected with the use of ionizing radiation and from bodies responsible for the safety and security of humans and the environment in Sudan.
4. THE IMPLEMENTING TECHNICAL BODY: The RPTC has designated the Department of Radiation Protection and Environmental Monitoring (DRPEM) of the SAEC as its technical body.
5. Among others, the national regulations set the standards for packaging, transporting, and handling radioactive materials, including labelling, shipping papers, placarding, loading, and unloading requirements.

Results

1. Ambient dose equivalent rates measured at different locations (Table 3) are high especially at the vehicle surface. This conforms to national and international regulation for the need of enhancing radiations during transport of radioactive materials.
2. Security during transport is crucial since transportation can extend from 3 to 6 hours by land.
3. Emergency preparedness is another issue which need to be address.

Table 2. Source information and data

Radiation Source	I	II	III	IV	V
Transport License No.	10-TS-TS154 10-TS-TS155	10-IS-TS163	TS-179	10-MU-IM071	10-MU-IM070
Type of Source (s)	Cs ¹³⁷ & Am ²⁴¹ Be	Cf ²⁵²	Ir-192	I-131	Mo-99
Activity	7. Ci (Cs ¹³⁷) & 10 Ci (Am ²⁴¹ Be)	37.4 mCi	107.84Ci	20 GBq	20 GBq
Physical form	Solid	Solid	Solid	Solid	Liquid
Means of transportation	Car	TRACK	Car	car	car
Package Type	OVERPACK TYPE A	A-drum	GAMMA MAT	TYPE A	TYPE A
Category type	4	5	2	4	4
Time to destination	6 h	5 h	10 h	½ h	3 h

Standard shipping form

Container number:	.....	Maximum activity :	.....
Shipping name	.....	Physical/chemical form:	.....
Class 7:	.....	Radiation label (I-White, II- Yellow, III-Yellow)	.....
UN number:	.....	Transport index:	.....
Radionuclide	.....	Exclusive use:	.....
Total activity of shipment(as multiple of A2 value):			

Table 3. Dosimetric data

	Source data		Ambient dose equivalent rates (µSv h ⁻¹)					sources
	Source	Activity	Source surface	1 m from the source	driver seat	vehicle surface	1m from the vehicle	
I	Cs ¹³⁷ & Am ²⁴¹ Be	1.7Ci & 10 Ci	< 10	< 10	< 10	< 10	< 10	
II	Cf ²⁵²	34 mCi	79	1.02	0.78			n, γ
			38	3.2	0.63			n
III	Ir-192	107.84Ci	92.5	4.80	2.58	10	1.5	γ
IV	I-131	20 GBq	1 000	150	4.80	20	5.4	γ
V		20 GBq	150	150	1.5	9.2	3.1	γ

CONCLUSIONS

1. Updates in the regulations in needed to enhance quality assurance and emergency in the transport of radioactive material.

References

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