MADAGASCAR EXPERIENCE IN MANAGEMENT OF CONSEQUENCES OF INCIDENT WITH CONTAMINATED SCRAP METAL

M.J. Ramanandraibe, Raoelina Andriambololona,

H.F. Randriantseheno, J.L.R. Zafimanjato

Madagascar-Institut National des Sciences et Techniques Nucléaires (Madagascar-I.N.S.T.N)

Experience in Management of Consequences of incident with contaminated scrap metal

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INTRODUCTION

- Use of radiation techniques in Madagascar is subject to specific national regulatory systems.
- Any use, importation and exportation of radioactive sources must be authorized by the Regulatory Authority.

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INTRODUCTION

- Law n° 97-041 on protection against harmful effects of ionizing radiation and radioactive waste management in Madagascar was promulgated on 2 January 1998.

- Four decrees to implement the law approved by the Government in 2002.

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INTRODUCTION

- Institut National des Sciences et Techniques Nucléaires (Madagascar-INSTN) is ensuring the functions of the Technical Body of the Regulatory Authority.

- Customs services are working in collaboration with Madagascar-I.N.S.T.N to ensure that the import and export of radiation sources are properly regulated.

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INTRODUCTION

- Cross border workers and Custom officers were trained by Madagascar-I.N.S.T.N on radiological risks, protection techniques and for identifying radioactive packages.

- Information exchange between Customs and the Regulatory Body.

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INTRODUCTION

- Customs Administration requires authorization issued by the Regulatory Authority for any import, export of and transportation of radioactive sources.

- Regulatory Body notifies the Customs Administration of any changes to regulations, or of any other decision taken by the Regulatory Body, that has a bearing on the import, export and storage or transport of radiation sources.

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INTRODUCTION

- In case of goods suspected or found to be contained with radioactive material, the role of Customs Officers are:

  - to isolate the goods in a secure area
  - to inform the Regulatory Body

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INTRODUCTION

- In May 2007, two containers containing scrap metal to be exported to India were identified as contaminated with radionuclides at the international seaport of Madagascar.
- Level of radiation around and at the surface of the containers was relatively high.

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INTRODUCTION

- Management of consequences of this incident in order to guarantee the workers protection and the environment safety.

- Control on presence of radioactive materials followed by identification of their nature, recuperation of radioactive materials from the containers and interim disposal of radioactive waste could be performed.

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NATIONAL REGULATION IN RADIATION PROTECTION

- Following the publication of the ICRP 60 and the International Basic Safety Standards for radiation protection against ionising Radiation and for the Safety of Radiation Sources (BSS, IAEA Safety Series n° 115), Madagascar has prepared a set of new regulation based on these standards.
- Law n° 97-041 on protection against harmful effects of ionizing radiation and radioactive waste management in Madagascar was promulgated on 2 January 1998.

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NATIONAL REGULATION IN RADIATION PROTECTION

- Decree n° 2002-569 on 4th July 2002 related to designation, roles and functions of the Regulatory Body.
- Decree n° 2002-1199 on 7th October 2002 related to the basic principles of protection against ionising radiation.

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NATIONAL REGULATION IN RADIATION PROTECTION

- Decree n° 2002-1274 on 16th October 2002 related to the basic principles of radioactive waste management.

- Decree n° 2002-1161 on 9th October 2002 related to the possession and use of ionising radiation sources in medical field.

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NATIONAL REGULATION IN RADIATION PROTECTION

- Regulation on Safe transport of radioactive materials is based on current IAEA Regulation.
- Any use, possession and transportation of radioactive sources is subject to an authorization issued by the Regulatory Authority.

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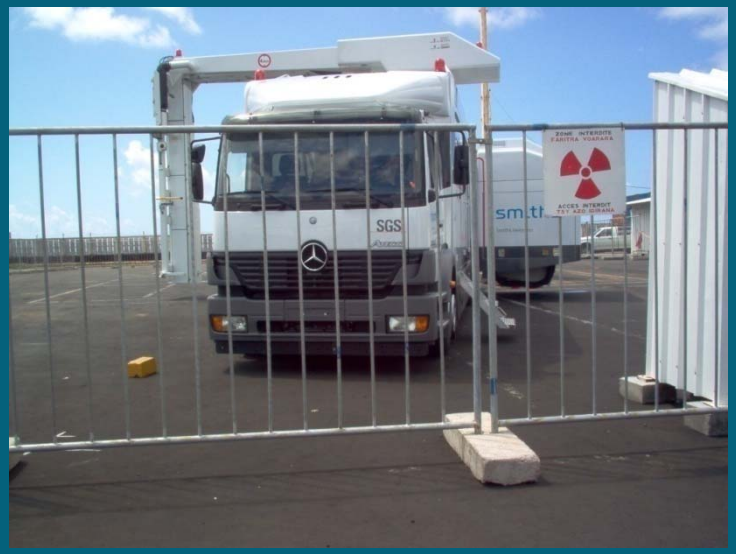
RADIATION DETECTION EQUIPMENT



CONTAINER SCANNER (installed in 2006)

Madagascar

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RADIATION DETECTION EQUIPMENT

RADIATION METER THERMO ESM FH 40G-L10 Ω

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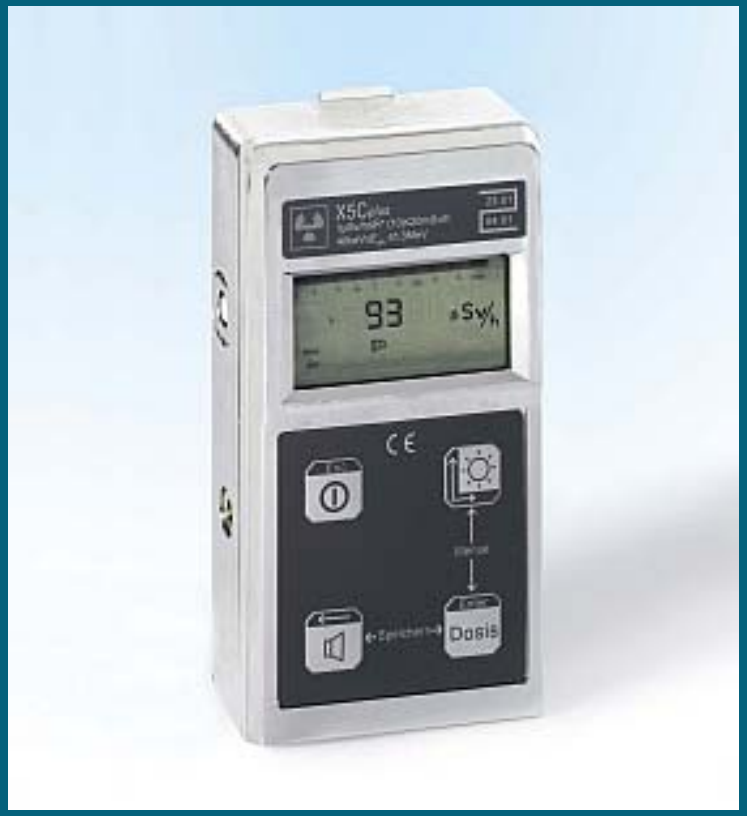
RADIATION DETECTION EQUIPMENT



GRAETZ DOSE RATE METER X5 DE

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RADIATION DETECTION EQUIPMENT

PORTABLE SPECTROMETER EXPLORANIUM
GR-135 IDENTIFIER

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DESCRIPTION OF THE INCIDENT

- May 2007: customs officers at the international seaport detected an abnormal radiation level while two containers containing scrap metal waste to be exported to India were passed through the container scanner: alarm indicating a "HIGH RADIATION".

- Radiation level around the containers checked by the cross border workers: radiation level is significant.

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DESCRIPTION OF THE INCIDENT

- As the Technical Body of the Regulatory Authority, Madagascar-I.N.ST.N (Technical Body of the Regulatory Authority) immediately informed on this incident.

- Exporter informed on the event.

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DESCRIPTION OF THE INCIDENT

- Dose rate measurement around and at the surface container were carried by radiation protection and waste management team of Madagascar-I.NS.T.N.
- Maximum dose rate found near the bottom of the container.
- Confirmation that radiation level is widely higher than acceptable limit for transportation of excepted package.

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DESCRIPTION OF THE INCIDENT

- Radionuclides identified with the portable spectrometer: Ra-226 source.
- Two containers containing radioactive materials could not be shipped and isolated in a secure area at the seaport.

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

- June 2007: radioactive materials (lightning conductor with

  Ra-226) isolated from the containers.
- The root causes of this incident were the lack of recognition of materials that may be radioactive by those involved in collecting, handling and exporting scrap metal.
- The origin of the scrap metal containing radioactive material is unknown.

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

Table 1: Radiation level at the container surface

Container identification	PCIU: 387 265/0	PCIU 379 046/5
Radioactive nuclide detected	Ra-226	Ra-226
Maximum dose rate at container surface (µSv/h)	23	40
Acceptable limit for transportation of excepted package (µSv/h)	5	5

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Dose measurement at the container surface

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

- There were no radiological consequences to either people or the environment.
- However, there is a possibility for financial damage as the containers could not be shipped with radioactive materials.
- Those dealing with collecting and charging goods into the containers might have been exposed to radiation but level of received dose is unknown.

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

Recommendations given by MADAGASCAR-I.N.S.T.N

- The contaminated scrap metal located at the container bottom should be removed before exporting the scrap metal.
- After removing the radioactive material, contamination checking should be performed before shipment.

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

Table 2: Radiation level before and after removing the radioactive material

Container Identification	Dose rate at the container surface before* (µSv/h)	Radionuclide detected	Dose rate at the container surface after** (µSv/h)	Acceptable limit (µSv/h)
PCIU 379 046/5	40	Ra-226	0.09	5
PCIU 387 265/0	23	Ra-226	0.08	5

* Before removing the radioactive material
** After removing the radioactive material

Madagascar

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

Table 3: Radiation level around the isolated radioactive material

Dose rate	Surface (µSv/h)	At 1 meter (µSv/h)
Source 1	1036	10
Source 2	590	4

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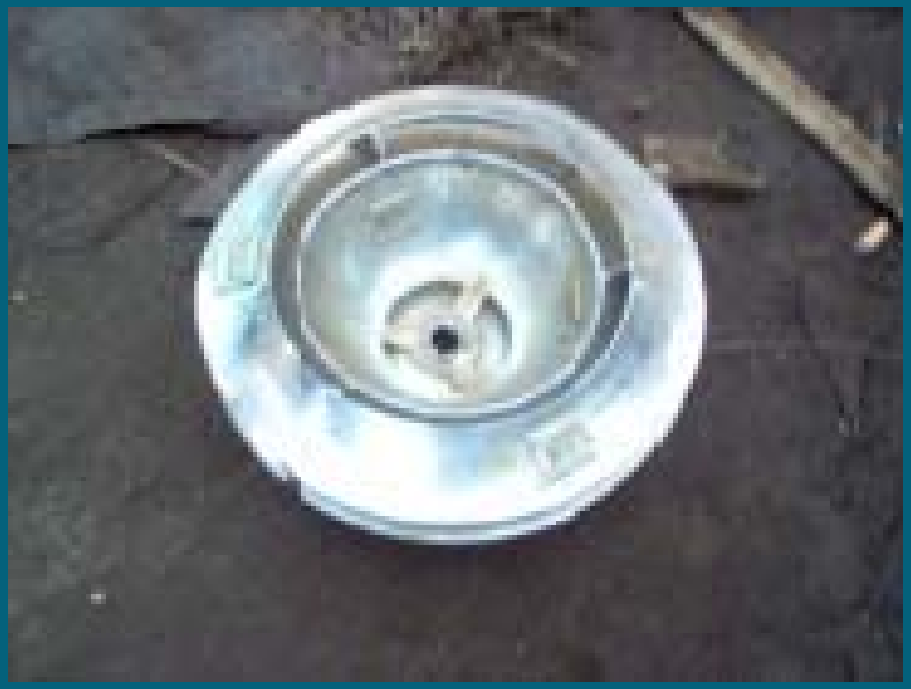

Figure 3: Isolated radioactive material (Lighting conductor with Ra-226 source)

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CONSEQUENCES AND MANAGEMENT OF THE INCIDENT

Recommendations given by MADAGASCAR-I.N.S.T.N for safe storage of radioactive waste

- Radioactive waste should be stored in a safe place.
- According to the regulation in force in Madagascar, radioactive waste should not be removed unless authorization is given by the Regulatory Authority.

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CONCLUSION AND LESSONS LEARNED

Efficiency of the national system for prevention of radiological risks in the recycling metal

- Availability of radiation detection equipment at the cross border in order to identify suspected contaminated goods to be exported or imported.

- Training of customs officers and cross border workers in radiological risks and protection techniques and instrumentation for the measurement and analysis of radiation.

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CONCLUSION AND LESSONS LEARNED

Efficiency of the national system for prevention of radiological risks in the recycling metal

- Collaboration between Customs and the Regulatory Body responsible for radiation safety to ensure that the import and export of radiation source is properly regulated.

- Existence of a national regulation on radiation protection, waste management and transportation of radioactive materials.

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CONCLUSION AND LESSONS LEARNED

Actions to be addressed in the future

- Radiation control at both national and international levels of scrap metal.
- Radiological training and information programme for those dealing with export and import of scrap metal.
- Installation of radiation monitoring systems at steel yards and scrap recycling facilities.

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THANK YOU