# National Report

# Introduction

Radioactive waste management constitutes the final step in the using of radioactive material as fuel for reactor research or as radioisotopes in research, medicine or industry. In compliance with the principal of protecting the public, the environment and to not impose undue burdens on future generation Morocco signed the joint convention in September 1997 and ratified it in May 1999

Morocco has a research nuclear centre (CENM) where we have our facilities to treat radioactive waste generated at national level.

Radioactive waste is generated also from the use of radioisotope and sealed sources in the field of medicine, agriculture and scientific research.

This report doesn't include NORM or TENORM.

The spent fuel will be stored in pool at the reactor building waiting his return to USA according to the agreement between Morocco and USA (or long term storage)

There is no nuclear facility that is in the process of decommissioning

**Categorization of radioactive waste**

According to the regulation of radioactive waste management (not promulgated yet) we categorise our waste as follow:

Depending on the period:

1. Waste contaminated by radioisotope, which has a half-life below 61 days

2. Waste contaminated by radioisotope, which has a half-life between 61 days and 30 years

3. Waste contaminated by radioisotopes, which has a half-life above 30 years

By categories:

A: solid waste

B: aqueous liquid waste

C: organic waste

D: mixture waste

E: spent sealed sources

F: biologic waste

G: medical waste

H: gaseous waste

According to level of activities:

1. Low level waste (<10MBq) contaminated by short lived (<61 days) management by decay at his origin of production and discharge after 10 period of decay

2. Low level waste contaminated by radioisotopes which have half-life below or equal to30 years (alpha emitters are limited to 4000 Bq/g for each package)

3. Low and intermediate level waste which is contaminated by radioisotopes having a half-life above 30 years

4. High level waste (spent fuel for example)

## Policies and practices

### Policy

The policy is mainly based on the following provisions:

The producer of radioactive waste should keep control on waste generation to the minimum possible, segregate, collect and characterise waste according to the technical specification given by the central operating organization which is CNESTEN

The return of disused sealed sources to supplier if it's possible mainly for those used in teletherapy

Producers are required to pay for the collect and the treatment of their waste

### Radioactive waste management practices

The spent fuel will be stored in pool (capacity 300 elements) waiting to be returned to the supplier if it's possible

Management by decay for the waste having half-life below 61 days and discharge when they reach the exemption limits with the authorization from the regulatory body

Treatment by evaporation for the aqueous liquid waste

Compaction for compactable solid waste

The spent sealed sources are conditioned in 100l drum in concrete for those collected by CNESTEN or returned to supplier for the others for example height radioactive sources used in medicine like cobalt 60

After treatment and conditioning we store the drum in a long term storage facility, which covers an area of 188 square, meters divided into 4 compartments of 612 drums capacity each

**Scope of application**

The present report applies to the safety of:

The management of radioactive waste resulting from civilian programmes for nuclear applications

The spent fuel that will be generated from the use of our reactor in civilian applications

Morocco has no radioactive waste of military origin; this report doesn't apply to this type of waste

**Inventories and lists**

We don't have an inventory of spent fuel

We have only one installation dedicated to radioactive waste treatment located in CENM

The regulatory body has an inventory of all radioactive sources imported because he is the only one who delivers the authorization to import such kind of material. It's updated on a yearly basis

The CNESTEN has an inventory of spent sealed sources stored in his facility (annex I)

**Legislative and regulatory system**

**Regulation**

We a main law (law 71) and this law will be implemented by four decrees:

One related to radiation protection promulgated

One related to nuclear installation promulgated

One dealing with radioactive waste management is not promulgated yet but it was signed by two ministers and submitted to the secretary general of the government

One decree on the transport still a draft

**Regulatory body**

There are two regulatory bodies:

1. The national centre of radiation protection (CNRP) which is under the ministry of health and covers all activities taken place in no nuclear installations

2. The ministry of Energy and Mine which covers activities occurred in nuclear installations

The main tasks of these regulatory bodies are:

- Licensing
- Safety assessment and inspections
- Personnel dosimetry services
- Authorizing transport and importation of radioactive materials
- Public awareness and information about safety problems of radioactive waste management

## Operating organisation

CNESTEN is the operating organism and was created in 1986 by law. Among its mission the management of radioactive waste at national level, the transport of radioactive materials and setting waste acceptance criteria land packaging

## Other general safety provision

**Responsibilities of the producer**

The producer remains responsible for his waste until collect by the CNESTEN or discharge with authorisation. He is also responsible of the characterisation, segregation and storage according to the safety and radiation protection conditions defined by regulatory body and wastes acceptance criteria defined by CNESTEN

## Human and financial resources

## Human resources

CNESTEN has 5 people working in radioactive waste management:

- One radio chemist
- One engineer
- Three technicians

## Financial resources

The government provide funds the CNESTEN to support safety of radioactive waste management facility during the operating lifetime

The producer pays for the collect and the treatment of his generated waste

## Quality assurance

Quality assurance programmes are requested on a regulatory basis. Each producer of radioactive waste including CNESTEN should establish this programme to comply with safety requirements. The regulatory body should approve this programme

The QA programme contains profile and skill of the staff, procedures of work, periodic check of the efficiency of devices, periodic calibration of measuring equipment, traceability and record keeping of data

## Operational radiation protection

These are in particular:

- The classification and delineation of working areas

- The classification of the employees in categories

- The individual monitoring and/or the monitoring of working area
- The respect of dose limitations

- The national registry of individual monitoring the assessment of doses in case of emergency or accidental exposure

**Emergency preparedness**

The CNESTEN is required by law to submit an emergency plan where he mentions the action taken for prevention of incidents and accidents and for mitigating their consequences, to the competent authority. Emergency plan is divided as follow:

- On site emergency plan for nuclear installation, which contains planned and approved countermeasures to be taken on the site of the nuclear installation to protect public and environment

- Off site emergency plan, which contains measures to protect public and the environment in case of the release of the radioactive substances around the nuclear installation

The emergency plan should approved before commissioning

## Decommissioning

We don't have any decommissioning plan

## Safety of spent sealed sources

The various steps are taken to guarantee the safety and the security of spent sealed sources is:

- The licensing of the sources

- The traceability of all movements of the source during its lifetime

- The storage of sources should be in approved local

# Annex

## Inventory of radioactive Sources

| Isotope | Activity | Related Date of storage at CNESTEN | Related date | Device Name | Manufacturer | Model Number | Remarks |
|---|---|---|---|---|---|---|---|
| Co-60 | 4.5 MBq | 03/05/91 | | | | | |
| Co-60 | 4.5 MBq | 04/05/91 | | | | | |
| Co-60 | 4.5 MBq | 05/05/91 | | | | | |
| Co-60 | 4.5 MBq | 06/05/91 | | | | | |
| Co-60 | 17.4 MBq | 07/05/91 | | | | | |
| Ir-192 | 1.85 KBq | 1991 | | | | | |
| Cs-137/ Am-Be | 281MBq/ 1.8GBq | 20/02/97 | | | | | |
| Cs-137/ Am-Be | 296MBq/ 1.8GBq | 20/02/97 | | | | | |
| Cs-137 | 203.5 MBq | 10/04/97 | | | | | |
| Am-Be | 362.6 MBq | 10/04/97 | | | | | |
| Am-Be | 107.3 GBq | 20/07/97 | | | | | |
| Ra-Be | 166.5 MBq | 12/09/97 | | | | | |
| Sr-90 | Unknown | 07/99 | | | | | |
| 3xAm-241 | 48.8mCi | 25/07/01 | | | | | |

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|---|---|---|---|---|---|---|---|
| Ra-226( in drum02) | 9.808 GBq | 20/04/02 | | | | | |
| Ra-226( in drum03) | 7.688 GBq | 20/04/02 | | | | | |
| Co-60(in drum01) | 10000.00 GBq | 20/04/02 | | | | | |
| Cs137/Am-Be | 8mCi/40mCi | 19/07/02 | | | | | |
| Am-241 (20) | | | | Smoke detectors | | | |
| H-3 (30) | | | | Indicators in airoplane | | | |
| Cs137/Am-Be | 7.8mCi/40mCi | 08/08/03 | | troxler | | | |
| Cs137/Am-Be | 7.9mCi/40mCi | 08/08/03 | | Troxler | | | |
| Cs137/Am-Be | 8.2mCi/40mCi | 08/08/03 | | troxler | | | |
| Cs137/Am-Be | 8.3mCi/40mCi | 08/08/03 | | Troxler | | | |
| Cs137/Am-Be | 8.3mCi/40mCi | 08/08/03 | | Troxler | | | |
| Cs137/Am-Be | 8.3mCi/40mCi | 09/05/03 | | Troxler | | | |
| Cs137/Am-Be | 8.8mCi/50mCi | 09/05/03 | | Troxler | | | |
| Cs137/Am-Be | 8.4mCi/50mCi | 09/05/03 | | Troxler | | | |
| Cs137 | 6.4mCi | 09/05/03 | | | | | |
| Cs137 | 6.4mCi | 09/05/03 | | | | | |
| Cs137 | 6.4mCi | 09/05/03 | | | | | |
| Ra-Be | 5 mCi | 08/05/03 | | | | | |
| Ra-Be | 4.5mCi | 08/05/03 | | | | | |

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|---|---|---|---|---|---|---|---|
| Ra-226 | 4.6mCi | 08/05/03 | | | | | |
| Am-Be | unknown | 13/05/03 | | | | | |
| Kr-85 | unknown | 13/05/03 | | | | | |
| Am-Be | 100mCi | 09/05/03 | | | | | |
| Sr-90 | 1.63 GBq | 01/04/04 | | | | | |
| Am-241 | $35E^{-3}$ mCi | 01/04/04 | | | | | |
| Co-60(7) | 30mCi | | 1975 | Level gauge | Ferrer Aurant (E.H) | | |
| Co-60(7) | 740 MBq | | 1992 | Level gauge | Polysius (E.H) | | |
| Co-60 | 370 MBq | | 1992 | Level gauge | Claudius Peters (Berthold) | | |
| Co-60 | 6 mCi | | 1975 | | Claudius Peters (E.H) | | |
| Cs137 | 5550 mBq | 03/05 | | | | 1407-05-90 | |
| Cs137 | 3700 MBq | 03/05 | | | | 1408-05-90 | |
| Cs137 | 3700 MBq | 03/05 | | | | 1409-05-90 | |
| Pm-147 | 100mCi | | | | Honeywell Measurex | MY 367 | |
| Cs-137 (4) | 100mCi | | 1953 | | hydrocarbone | | SCP (Société Cherifienne des Petroles) |
| Cs-137 | 500 mCi | | 1965 | | Balteau SA | | SCP |
| Cs-137 (3) | 500 mCi | | | | Balteau SA | | SCP |
| Cs-137 (3) | 80 mCi | | 1977 | | Instrument Service | | SCP |

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|---|---|---|---|---|---|---|---|
| **Am-Be** | 40mCi | | **1990** | | | | **IAV** |
| **Cs-137** | | | **1978** | | | | IAV |
| **Cs-137** | 10mCi | | 1976 | | | | IAV |
| **Am-Be** | 50mCi | | 1976 | | | | IAV |
| **Am-Be** | 10mCi | | **1990** | | | | IAV |
| **Ra-Be** | 100mCi | | | | | | **INRA** |
| **Am-Be** | 10mCi | | | | | | **INRA** |
| **Am-Be** | 0.5Ci | | | | | | Faculty of Sciences Rabat |
| **Am-Be** | 5Ci | | | | | | Faculty of Sciences Rabat |
| **Cf-251** | 20µg | | 1976 | | | | Faculty of Sciences Rabat |
| **Am-241(33 sources)** | 30mCi | | **1995** | | | | SAMIR |
| **Cs-137** | 50mCi | | 1981 | | | | **Khmis Zemamera** |
| **Cs-137** | 10mCi | | 1981 | | | | **Khmis Zemamera** |
| **Co-60** | 10mCi | | 1981 | | | | **Khmis Zemamera** |
| **Co-60** | 10mCi | | 1984 | | | | **Khmis Zemamera** |
| **Kr-85** | 0.3 Ci | | 1978 | | | | **CMCP Kenitra** |
| **Kr-85** | 0.4Ci | | 1988 | | | | **CMCP Kenitra** |
| **Kr-85** | 0.3Ci | | 1989 | | | | **CMCP Kenitra** |
| **Sr-90** | .05Ci | | 1988 | | | | CMCP Kenitra |