National Centre of Energy, Nuclear Sciences and Techniques

Radioactive Waste Management in Morocco

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Mohammed Hassouni
Radiation protection officer
CNESTEN-MOROCCO

Content

- Overview of CNESTEN
- The National Radioactive waste management facility.
- Case Study – Experience with repatriation of DSRS Category I to France

Overview of CNESTEN

CNESTEN (Operating organization):

National Center of Nuclear Energy, Sciences and Technologies (CNESTEN)

- Public institute created on 1986.
- Supervised by Ministry of Energy, Mines, Water & Environment.

Missions:

- Promoting nuclear scientific research, training and applications in socio-economic sectors.
- Contributing to the introduction of nuclear power program.
- Technical support to the state in safety and security
- Supporting the authorities for radioactive waste management and radiation protection.

Overview of CNESTEN
(Activities)

Nuclear Medicine and life sciences.

Industrial Applications : NDT, instrumentation,…

Natural Resources & Environment applications Hydrology, pollution,

Safety & Security,

Management of radioactive waste.

Applications of RS in Morroco

Teletherapy

Used for treating tumors

Typically contains ^{60}Co (37–560 TBq)

or ^{137}Cs (19–56 TBq)

Blood Irradiators

Used to sterilize blood

Typically contains ^{60}Co(56–111 TBq) or

^{137}Cs Ci (37–440 TBq)

Industrial Irradiators

Typically Co-60

Industrial Gauges

^{137}Cs 1-5 Ci (37-185 GBq)

Radioactive Waste Management facilities

CNESTEN is the waste management organization responsible for the collection, transport, processing and storage of all radioactive waste, spent nuclear fuel and DSRS generated in the country.

Radioactive Waste Management facilities

RW and DSRS are collected, transported and safely and securely stored at the waste management center operated by CNESTEN and located at Maâmora Nuclear Research Center. To the extent practicable, the storage of RW and DSRS in Morocco is centralized. However, a few DSRS are duly authorized by the CNRP to be temporarily stored at users' premises. After decay storage, some DSRS will be released from regulatory control. Remaining DSRS will be collected and transported to CNESTEN waste management center

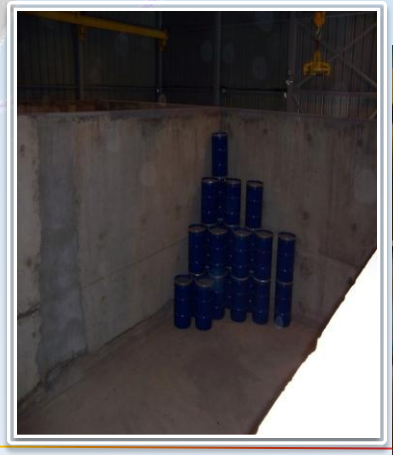
Radioactive Waste Management facilities

- The waste management center operated by CNESTEN at Maâmora Nuclear Research Centre consists of two buildings:
  - ✓ The treatment building called which houses:
  - ✓ storage tanks at the underground level,
  - ✓ the evaporation system, the compaction unit and the radiochemical laboratory
  - ✓ offices for the technical staff and laboratories
- The long term storage building called which consists of four concrete vaults used for RW and DSRS storage.

Radioactive Waste Management facilities

Building of Treatment

Building of Storage



MANAGEMENT OF DSRS IN MOROCCO

- No manufacturing of sealed sources take place in Morocco
- The New Law in takes in consideration all the code of conduct provisions and headings When the source becomes disused there are two options
  - ✓ Returning the disused source to the supplier
  - ✓ Or transferring the disused source to the central waste management facility(CNESTEN)

MANAGEMEN OF DSRS IN MOROCCO

Policy and strategy of RWM:

- The high disused radioactive sources like those used in therapy for cancer are usually returned to their suppliers. The other sealed sources are returned to their suppliers, if the license of importation provides for it, if not, they are collected by CNESTEN.

MANAGEMENT OF DSRS IN MOROCCO

Répartition of DSRS

- Priority shall be given by owners to returning their disused sealed radioactive sources to the respective supplier countries or to another country for recycling or reuse

CASE STUDY

Repatrition to France of 5 radiotherapy heads together whith their radioactives sources of Co60 located on the CNESTEN, site of kenitra in Morocco.

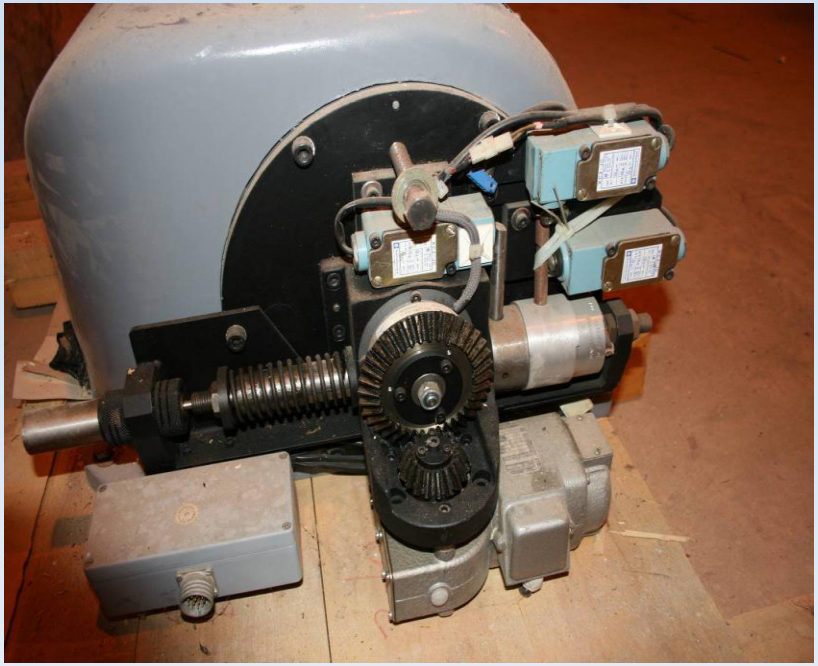
Under contract N°201401057betwen IAEA and CIS bio international, dated 09/of October 2013, IAEA asked CISbio international for the removal from Morocco 5 disused high activities sources and their containers (Alcyon heads) to France on june 2014.

The heads and sources specifications

Head n°	Special Form Source n°	Activity (in TBq)	Activity Date
2004	4222	115	01/01/2009
4016	4145	83	01/01/2009
90127	4127	68	01/01/2009
9095	3831	33	01/01/2009
90142	4163	85	01/01/2009

Photos of the Alcyon heads in their storage

The series 20 heads



The series 90 heads

Organization of the repatriation procedures

1-Customs procedures:

- ✓ During a meeting organized in the offices of the customs forwarding agent,a list of the documents required for the export of loaded transport containers was established.
- ✓ This meeting was followed by a visit to the airport storage facilities
- ✓ The facilities were fully secured and continuously monitored. Participants of the meeting met the persons in charge of customs administrative operations in order to raise awareness and to facilitate the export operations

Organization of the repatriation procedures

2-Road transport procedures:

At a meeting at the Ministry of Health, chaired by Director of National Centre for Radiation Protection, following decisions were taken:

1-Two trucks which meet the transport standards and 2 drivers who have received proper training ("Class 7" certification does not yet exist in Morocco).

2-Two radiation safety officers (one per truck).

3-Cnesten will organize the escort by the Royal Police of Morocco from the departure at the CNESTEN facility (Kenitra) until arrival at the secured area of Casablanca airport.

Description of the opération

1-The five transport casks, CC33, had arrived on the CNESTEN site approximately one week

Photos CASKS CC33

Description of the opération

2-Before the repatriation. The heads were secured by installing systems preventing the rotation of the barrels during the transport

Description of the opération

Control of sources

MESURE DE DEBIT DE DOSE DE SC DE CO-60

Evacuation of the heads out of their pit

Remove of source from the device

Securing sources

3-Then, the heads were evacuated from their pit with a hoisting equipment and installed in the five CC33 transport casks

Handling of heads before loading into the transport cask

Insertion of cobalt head into the container

Closing the conteneur, measurement of dose rate and labeling

4-The casks were conveyed from Kenitra to Casablanca international airport, under the supervision of the Royal Moroccan Gendarmerie


MANITOU

Conveying of the transport casks from Kenitra to Casablanca International Airport, realized under the constant supervision of the Royal Moroccan Gendarmerie

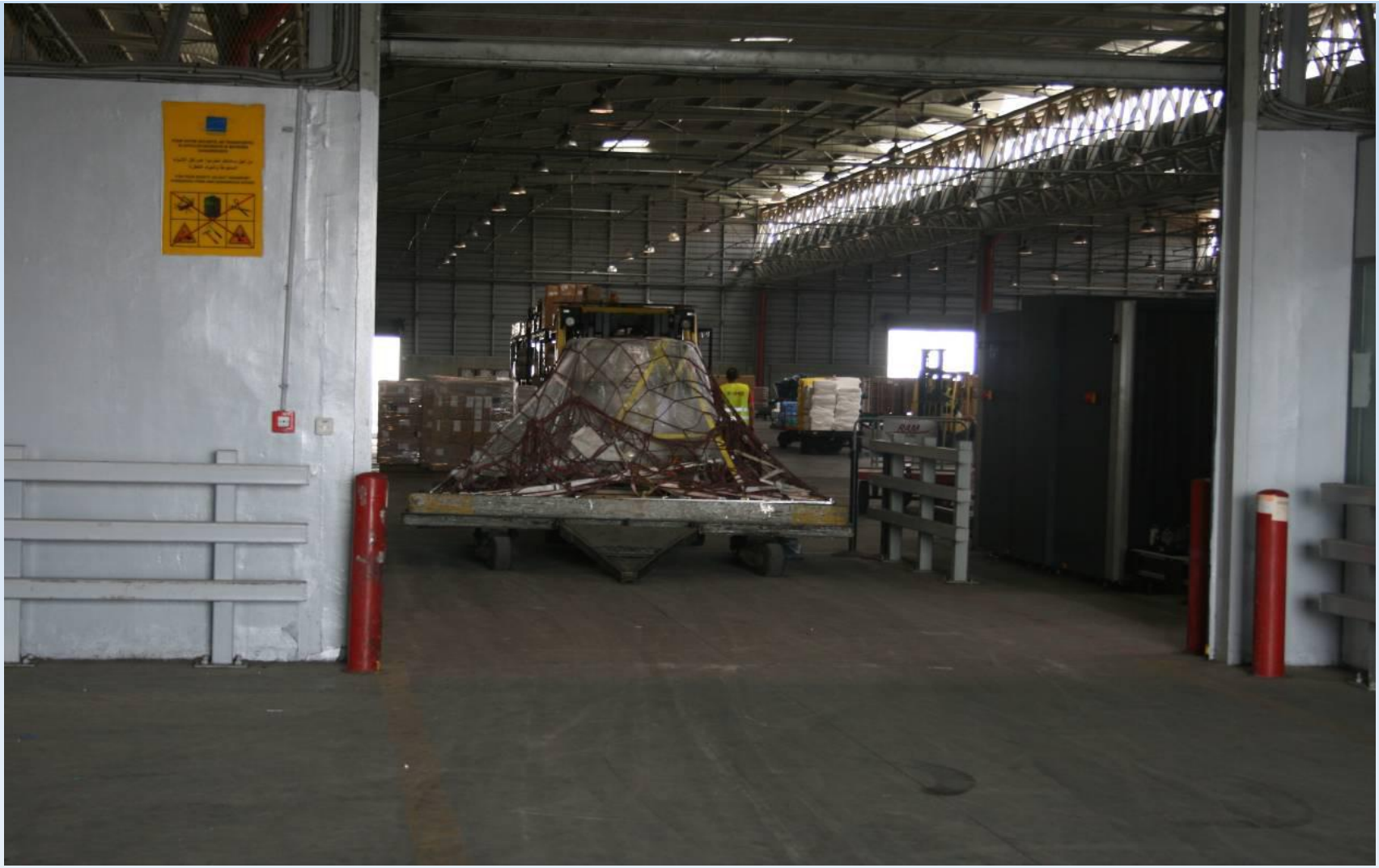
5-At the airport, the flight shipping procedure/documentation was fulfilled, the casks were weighed, placed on pallets, and a dosimetric control was performed on each cask.

Placing of the casks on aircraft pallets

Transfer of the casks in the cargo area, always under the supervision of the Royal Moroccan Gendarmerie.

6-The casks were then transferred to the secured cargo zone of the airport, before boarding.

Transfer in the secured cargo area before boarding of the casks to the aircraft




THANK YOU
FOR YOUR ATTENTION