Transport of Disused Sources

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Transport Safety Unit
Brazilian Nuclear Energy Commission
CNEN’s storage facilities

Disused source are transported by “Qualified Carriers” to storage at 4 CNEN’s facilities.

$^{60}$Cobalt teletherapy sources.

Activities ranging from 0,10 to 1916,2 TBq.

Transport expenses are covered by the entity, unless in the case of a non-profit organization.
Participating organizations

- Negotiations/promoters: CNEN/BRA, NNSA/USDOE/USA, DFATD/CAN
- Funding: US and CAN Gov´t
- Licensing: CNEN/DRS
- Implementation: NECSA (SA)
- Sources shipment: Gamma Service (GER), NPI (USA)
- Recycling/storage: Gamma Service (GER), SWRI (USA)
- Audit/follow-up: LANL (USA), DFATD (CAN)
- Observer: IAEA
Pre-operational phase

• Memorandum of Understanding / Implementation Agreement: CNEN, NNSA, DFATD

• Services contracts/sub-contracts: LANS/NECSA, DFATD/NECSA, NECSA/Gamma, NECSA/NPI

• License/Permit Applications:
  • Operation
  • Domestic transportation of teletherapy units
  • NECSA equipment importation
  • Use of transport containers in Brazil
Milestones

MHC concept presented by IAEA to Brazil (2007)
Brazil accepts hosting MHC operation (2008)
1st / 2nd Fact-finding missions (2009 and 2011)
Memorandum of Understanding signed (2014)
Implementation Agreement signed (2015)
Operation implementation (Oct 2016 - May 2017)
Operation implementation

• Teletherapy heads staged at IPEN
• MHC assembly and commissioning
• SHARS units pre-dismantling
• Source removal/transfer to capsules/containers
• Transport containers loading and preparation
• MHC dismantling / site checking and cleaning
• Equipment return to SA
• Operation report

Distances km/miles
2704/1680
584/363
434/270
Good Practice in Transport Safety

“The emphasis on thoroughly prepared and thoroughly evaluated transport plans is a practice that is commendable, as it provides an important practical structure for ensuring compliance with many of the transport requirements.”

1) Over 400 plans evaluated
2) Guidance on Transport Webpage
3) Endorsement by the Environmental Protection Agency
Transport Plan - Structure and contents

1. Introduction
2. Specification and classification
3. Transport Vehicle
4. Emergency Scenarios
5. Environmental and Radiological Protection
6. Emergency Planning and Contatcs
7. Miscellaneous
Main steps - Transport specific

Certificates of Design Approval validation.
Transportation plan acceptance.
Export License issued.
Transport Approval granted.
Environmental Approval released.
September 19, 2016

Mr. Natanael Bruno
Head, Transport Safety Unit
Radiation Protection and Nuclear Safety
Brazilian Nuclear Energy Commission
Rua General Severiano 90
22290-900 Botafogo
Rio de Janeiro – Brazil


Dear Mr. Bruno,

On behalf of Nordion (Canada) Inc., I would like to request the revalidation of the Certificate for Transport Package Design of the F168 issued by the Canadian Nuclear Safety Commission. To that effect, I have enclosed a copy of the new certificate, a copy of the last Brazilian validation issued for revision 3 and the following additional information:

1. CDN/2081/B(U)-96 (4) for the F168

Type of use: To transport cobalt-60 sealed sources.
Activity per shipment: As per section “Authorized Radioactive Contents” of the attached certificate.
Approximate frequency of shipment: Approximately two shipments per year.

Thank you for your timely consideration of this request. I believe the information herein will prove satisfactory. However, if you have any questions or require further information please feel free to contact me by telephone at (613) 592-3400, extension 2108 or by fax at (613) 592-2006 or by email at Luc.Desgagne@nordion.com

Sincerely,

[Signature]

Luc Desgagne
Senior Licensing Coordinator
Transport & Nuclear Compliance
Nordion

Enclosures: CDN/2081/B(U)-96 (4), Brazilian validation of CDN/2081/B(U)-96 (4)
Endorsement by CNEN

VALIDATION OF CERTIFICATE OF DESIGN APPROVAL

CDN/2081/B(U)-96 (Revision 4)

Under request of Nordion – Science Advancing Health is hereby certified that the Brazilian Nuclear Energy Commission (CNEN), the Competent Authority for Transport Safety, has validated the Revision 4 of the above mentioned Certificate of Design Approval.

Package Identification:

Designer: Nordion (Canada) Inc.
Make/Model: F-168 (1996) and F-168-X (1996), Serial Nos. 53 and up
Mode of Transport: Air, Sea, Road, Rail
The package shall bear the original identification mark “CDN/2081/B(U) – 96”

Notes:

1. Remains valid all other general and specific conditions as described in the original certificate;
2. This validation is issued on September 30-2016 and expires on November 30-2021.

Carlos de Almeida Gomes
Head, Division of Waste Management
Radiation Protection and Nuclear Safety Directorate
Security

Measures should be taken to ensure that radioactive material is kept secure in transport so as to prevent theft or damage and to ensure that control of the material is not relinquished inappropriately.

The total time that radioactive material is in transport, the number of intermodal transfers and the waiting times associated with the intermodal transfer are kept to the minimum necessary.”
The over-exposure incident

- Occurred on Nov 11, 2016
- Accidental handling of incorrect source drawer of the LTSS
- Direct exposure of worker 1 to 15 TBq (415 Ci) of Co-60
- Doses received (TLD)
  - Whole body
    - Worker 01: 71 mSv (acc. NECSA), 136 mSv (acc. IPEN)
    - Worker 02: 4.5 mSv (acc. IPEN)
    - Other workers/visits @ room: < 15 μSv
  - Hand (acc. IPEN)
    - Worker 01: 942 mSv
    - Worker 02: 3 mSv
- Medically examined (Worker 1): No effects
- Necsa investigated incident. Corrective actions implemented and further improvements identified
Categorization, dynamics and operational consequences

- Level 2 event in INES - Exposure of a worker in excess of the statutory annual limits (but below 10x);

- Suspension of work by regulator
  - Until 25 Nov: complete
  - Until 29 Nov: MHC operation

- Evidence was to be shown that measures were taken to avoid repetition
  - In-situ improvements
  - Training of one worker
  - Prompt communication to regulator of components malfunctioning
  - No visitors
  - Daily communication to IPEN RSO
  - Operational procedures
The gang