OPTIMIZATION OF THE TRANSPORT OF RADIOACTIVE MATERIAL

PROGRAM

Location: NRG, Petten, The Netherlands

Date: April 23rd-25th, 2025

Register in advance at: https://www.ean-workshop.net/

SCHEDULE – WEDNESDAY, 23RD APRIL 2025

11:30	Registration
12:00	Lunch
13:00	**Welcome** Folkert DRAAISMA (NRG|PALLAS)
13:15	**Presentation of the EAN** Fernand VERMEERSCH (SCK CEN)
THEME 1 – INTERNATIONAL STANDARDS, REGULATORY AND METHODOLOGICAL GUIDANCE	
13:30	**International Framework for the safe transport of radioactive material** Alenka BUJNOVA (IAEA)
14:00	**Radiation protection of transports in France: regulatory framework and guide** Thierry CHRUPEK (ASNR) and MATTHIEU GUITTON (ASNR)
14:30	**The organization of radioactive waste transport in Belgium and safety culture** Arno GRADE (ONDRAF)
15:00	**Radiation protection and dose evaluation of workers in the transport sector in Belgium** Luc VERPOORTEN and Martine LIEBENS (FANC)

15:30	Coffee break
THEME 2 – CASES STUDIES	
16:00	**Radiation protection during handling of radioactive material at the airport** Stefan COOLS (Vincotte Controlatom)
16:30	**Intern transport policy** Folkert DRAAISMA (NRG|PALLAS)
17:00	**Operational aspect of on-site transport, deviations, incidents** Rohen SCHURING (NRG|PALLAS) and René STOOP (NRG|PALLAS)
17:30	End of the day
20:00	Workshop dinner

SCHEDULE – THURSDAY, 24TH APRIL 2025

8:00	Coffee
THEME 3 – INCIDENTS, ACCIDENTS AND EMERGENCY RESPONSE	
08:30	**Progress in off-site environmental remediation in Japan** Ko TOGASAKI (Japanese Ministry of the Environment)
09:00	**Optimisation in air transport of radioactive materials: a case study from Switzerland** Patrick VONLANTHEN (SFOPH)
09:30	**ALARA learnings from the lost radioactive source in the Western Australian outback** Frank HARRIS (RioTinto)
10:00	Coffee
10:30	**Radiation protection culture: the importance of training and the benefit of the use of innovative tools** Gwenaëlle LORIOT (CEA/INSTN) and Bruno PERENNOU (Ob'dO)
11:00	**RELIR/OTHEA – Transport of radioactive material used in the medical filed, occupational exposure of carriers** Pascal CROUAIL (CEPN) and Laure-Anne BOFFA-BELTRAMI (CEPN)

THEME 4 – TRANSPORT OF MEDICAL AND RADIOPHARMACEUTICAL SOURCES	
11:30	**Transport of radiopharmaceuticals – radiation protection from start to end** Juul RIJPKEMA (CuriumPharma)
12:00	**Survey of supply and transport patterns of radiopharmaceuticals in the UK** Alison JONES (UKHSA) and Emma DAVIDSON (UKHSA)
12:30	Lunch
13:30	**Radioprotection in transport** Claude POLIART (RadioPharma) and Xavier DELCORPS (Be Sure)
14:00	**Dose assessment to members of the public arising from the transport of radiopharmaceuticals to Rome's hospitals** Alessandro ORSINI (ISIN)
14:30	Coffee
WORKING GROUPS	
15:00	**Themes and collaborative work**
17:30	End of the day

SCHEDULE – FRIDAY, 25TH APRIL 2025

8:30	Coffee
Feedback from the Working Groups	
09:00	**Working Group, no 1**
09:20	**Working Group, no 2**
09:40	**Working Group, no 3**
10:00	**Working Group, no 4**
10:20	Coffee
Closing	
11:00	**Conclusions and recommendations of the workshop** Laura WOODWARD (UKHSA)
11:45	**Closing remarks** Folkert DRAAISMA (NRG|PALLAS)
12:00	Lunch
13:00	Site visit (2 hours tour)

ADDITIONAL INFORMATION – PRESENTATION SUMMARIES

Patrick VONLANTHEN.
Over the past few years, air transport of radioactive materials transiting through Switzerland has resulted in several incidents during which radiological dose limits for passengers and ground staff were exceeded. In response, the Swiss radioprotection authorities have asked the companies handling radioactive freight in Switzerland to establish and implement optimization measures to protect ground workers, flight attendants and aircraft passengers. Our presentation will review these measures, explore the practical challenges in their implementation, and summarize the supervision activities conducted by the authorities.

Thierry CHRUPEK and Matthieu GUITTON.
Since Council Directive 2013/59/EURATOM (« Basic Safety Standards »), French regulatory framework had several modifications, impacting radiation protection of transport activities. French Competent Authority, ASNR, controls these activities, with respect to public, environment and workers. In France, employers are first responsible of the exposure of their workers. ASNR develops a guide for professionals to explain new regulation and give recommendations.

Alenka BUIJNOVA.
The presentation outlines the robust international framework and comprehensive safety standards established by the International Atomic Energy Agency (IAEA) to ensure the safe transport of radioactive material. Central to these standards is SSR-6 (Transport Regulations), which covers all modes of transport, and all operations and conditions associated with movement of radioactive material, including design, manufacture, maintenance and repair of packaging, preparation, consigning, loading, carriage including in-transit storage, shipment after storage, unloading and receipt at final destination of packages. The focus will be given to provisions and guidance related with radiation protection, management system and compliance assurance. Additionally, a brief summary will be provided on issues related with denials of and delays in shipment of radioactive materials.

Gwenaëlle LORIOT and Bruno PERENNOU.
Radiation protection is an essential issue within the transport of radioactive material. In France the training of drivers of such vehicles includes a mandatory practical work component. At CEA/INSTN it includes a scenario illustrating the control of a package before its transportation, and using an irradiation simulating tool (Dosicase®) without informing the trainees. This allows to observe their behavior facing situations with moderate/high radiation protection issues without actually exposing them to radiation.

Alessandro ORSINI.
Pursuant to para. 308 of the IAEA Regulation for the Safe Transport of Radioactive Material, the relevant competent authority shall arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with GSR Part 3.
For the scope of this assessment ISIN - National Inspectorate for Nuclear Safety and Radiation Protection, which is the Italian regulatory authority for nuclear safety and radiation protection, decided to focus on the transport of radiopharmaceuticals in the province of Rome. This is due to the fact that the large number of packages

transported in Italy contain radiopharmaceuticals (90%) and these are linked to the highest values of the transport index. The dose assessment was performed using the computer code NRC-RADTRAN 1.0, considering only normal conditions of transport. The dataset was taken by STRIMS, the ISIN Traceability System for Radioactive Waste, Nuclear Materials and Ionizing Radiation Sources. ISIN requested the cooperation of transport operators (carriers) to collect additional information such as routes and departure times.

This paper provides a description of the methodology that has been used, the scenarios analysed and a summary of the relevant outcomes. From the analysis of the results, it was shown that the dose to members of the public due to transport of radioactive material is clearly lower than the limits established by Italian regulations.

Martine LIEBENS.
Radiation protection and dose evaluation of workers in the transport sector in Belgium
The Belgian transport regulations require every carrier and organisation involved in the transport of class 7 dangerous goods (radioactive materials) to establish a radiation protection program as foreseen in the modal regulations for the transport of dangerous goods.
In the past 15 years the doses received by transport workers had been analysed for the main Belgian carriers and airport handlers. The results of these analyses are presented, and some fluctuations in the doses are explained.

Claude POLIART and XAVIER DELCORPS.
What are the dangers involved in transporting radioactive materials? How can drivers and handling personnel be effectively protected? The importance of dosimetry. Overview of the new A1/A2 classification and its consequences for producers and carriers.

Frank HARRIS.
In January 2023, national and international media became alive with reports of a radioactive source lost in the Western Australian outback. A subsequent multiagency search managed to locate and recover the radioactive capsule utilising large volume radiation detectors. The loss of a source capsule from its primary containment in the industrial gauge and the overpack highlighted critical deficiencies in both the gauge and transport methodology. Investigations into the root cause of the incident have been undertaken. The learnings from the incident have significant implications for the optimisation of potential doses following transport accidents involving radioactive sources.

Pascal CROUAIL and Laure-Anne BOFFA-BELTRAMI.
RELIR/OTHEA is provided by a network of radiation protection stakeholders who have a joint interest in sharing feedback and experience from radiological incidents, in order to improve the protection of persons working with similar radiation sources. The aim is to encourage good practice within different sectors - medical and veterinary, industrial, research and education sectors, etc. The incidents reports have been selected on the basis of those which provide interesting and useful lessons, to help others prevent such incidents and/or mitigate the consequences.
This presentation will focus on a specific incident report published on RELIR website (only in French) on transport of radioactive material used in the medical field, occupational exposure of carriers.
In this incident 3 carriers where exposed to a dose above the annual French regulatory dose limit of 20 mSv on 12 months. The RELIR report describes the incident, causes

leading to this incident, actions taken following the incident, radiological consequences and lessons learned from the incident.

Alison JONES and Emma DAVIDSON.
Over the last 30 years, Public Health England (PHE) and its predecessor organisations have conducted studies to assess the radiological impact of transporting radioactive material in the UK. Previously, these studies focused on a single mode of transport within three sectors (civil nuclear industry, medical, and general industry). However, it is now considered more beneficial to conduct sector-specific studies on the transport of radioactive material, regardless of the transport mode. The UK Health Security Agency (UKHSA) prioritises the medical sector due to the rising use of radioisotopes in diagnostic and therapeutic medicine and identified gaps in the information on the transport of radioisotopes in this sector from previous reports.
This presentation will discuss these past studies as well as the progress of a new study specifically focusing on the supply, manufacture, and transport of radiopharmaceuticals and other radioactive materials used in the medical and veterinary sectors.

Folkert DRAAISMA.
Transport regulations as laid down in the SSR-6 assure safe transport on public roads. Transport on restricted areas, like the premises of nuclear installations, is out of the scope in these regulations. So, what is needed to transport the sometimes-huge amounts of radioactivity safely within the site? The intern transport policy aims for optimization between internationally accepted transport regulations and implementing cost and time efficient requirements for a safe transport on-site.

Juul RIJPKEMA.
Producing radiopharmaceuticals is very time dependent. Producing nuclides with typical half-lifes of a few days has the challenge of getting the right amount of product at the customer, the patient. With a focus on the transport of radiopharmaceuticals in this presentation examples are given of the challenge of time versus radiation dose with ALARA being present as requirement and outcome.

Pending summaries will be available shortly.

ADDITIONAL INFORMATION – TOPICS TO BE DISCUSSED IN THE WORKING GROUPS

Regulation – compliance with the international safety standards.

- What are the national regulations? What the provision applicable to transport of material and optimization?
- Communication between operators and regulators?
- What are the approaches for the adoption of international standards into operators' procedures?
- What ideas would you have regarding optimization?

Radiation protection program. Typical contents, roles, responsibilities and services.

- What are the elements to conduct a safety analysis and assessment?
- What is the arrangement for emergency preparedness and response?
- Education and training. What is the education/certification required to be a radioactive material transport driver?
- What are the typical radiation protection measures for personal (e.g., container handlers)?
- What ideas would you have regarding optimization?