Transport of Radioactive Materials
Class 7 in Sweden
Content

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• Transport system for spent nuclear fuel from NPS to the interim storage (Clab).
• Inspections
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• Role of SSM
• Accident investigations
• Future transport challenges – spent fuel, decommissioning waste, etc
Sweden on the Globe
National framework

- Radiation Protection Act
- Ordinance on Radiation Protection
- Act on Nuclear Activities
- Ordinance on Nuclear Activities
- Act on the Transportation of Dangerous Goods
- Ordinance on Transportation of dangerous Goods
- ADR-S, RID-S
- IMDG and ICAO-TI are appendices to legislation
The Swedish Radiation Safety Authority

- Nuclear Safety
- Radiation Protection
- Physical protection (security)
- Nuclear non-proliferation
- Transport of Class 7 Radioactive Materials
• Regulates, supervises and gives authorisation
• Issues advice and recommendations to other authorities and the general public
• Maintains emergency preparedness 24/7
• Contributes to research
• Contributes to safety and security internationally
• Measures radiation levels and calibrates instruments.
• 300 employees with extensive and in-depth expertise in the Authority’s areas of responsibility
• 700 licence applications in total per year
• 300 individual supervisory actions per year (announced inspections, surveillance inspections and reviews)
• 450 million SEK annual budget, of which 80m SEK for research.
The nuclear programme

- Ten reactors in operation
- Two closed down reactors
- 4 reactors decided to close down (O1, O2, R1, R2)
- Central interim storage facility for spent fuel (Clab)
- Final repository for short-lived LIL waste (SFR)
- Fuel factory (WSE)
- Research reactors under decommissioning (Studsvik)
- Waste treatment facilities (Studsvik)
- Closed down uranium extraction facility (Ranstad)
Swedens nuclear programme

Nuclear Facilities in Sweden

- **Boiling Water Reactor**
  - ASEA Atom

- **Pressurized Water Reactor**
  - Westinghouse

- **Other facilities**

- **Ranstad**
  - Ranstad Mineral AB
  - Uranium Recovery facility

- **Ringhals NPP**
  - Vattenfall AB
  - Ringhals 1: 860 MW 1976
  - Ringhals 2: 917 MW 1975
  - Ringhals 3: 960 MW 1981
  - Ringhals 4: 960 MW 1983

- **Clab**
  - Central interim storage facility for spent nuclear fuel Swedish Nuclear Fuel Waste Management Co – SKB

- **Barsebäck NPP**
  - Sydkraft AB
  - Barsebäck 1: 615 MW 1975 - 1999
  - Barsebäck 2: 615 MW 1977 - 2005

- **Studsvik AB**
  - Scrap treatment, storage

- **Oskarshamn NPP**
  - OKG AB
  - Oskarshamn 1: 487 MW 1972
  - Oskarshamn 2: 630 MW 1975
  - Oskarshamn 3: 1200 MW 1985

- **Forsmark NPP**
  - Forsmarks Kraftgrupp AB
  - Capacity Operation
  - Forsmark 1: 1006 MW 1980
  - Forsmark 2: 1006 MW 1981
  - Forsmark 3: 1200 MW 1985

- **SFR**
  - Final repository for radioactive waste Swedish Nuclear Fuel Waste Management Co – SKB
RAM that is Transported and Modes of Transport

**Sea**
SNF from NPP to the Central interim storage (Clab); fresh reactor fuel; UF6; HASS; operational LLW/ILW from NPS to final repository SFR SCO I-III

**Road**
Fresh reactor fuel; sources (HASS); SCO I-II

**Air**
Medical sources; HASS
Nuclear Power Sites

Forsmark

Ringhals

Oskarshamn

Clab
SSM harbour inspection of enriched uranium hexafluoride (UF6)
Joint border inspection by SSM, Customs, Police and Coast Guard
Swedish Customs mobile X-ray scanner
National preparedness and respons system for nuclear and radiological emergencies
First responders

- First responders in case of an accident during a RAM transport is the local rescue service (firemen).
- They are supposed to take the initial actions including sealing off a hot zone if there is an indication of release or contamination.
- They have basic measurement instruments.
- Contact will asap be established with the duty officer of SSM (on duty 24/7) who will give advice and can call in necessary expertise.
Role of SSM

SSM role is mainly to give advice:
• To emergency services
• Authorities
• The Public
• SSM may also provide *in situ* help in certain cases

SSM is also the National Competent Authority (NCA) vs. the IAEA regarding Emergency Preparedness (EPR).
SSM measurement car
SSM measurement car with neutron detector HPGe, NaI etc.
Accident investigations

- Accident investigations are as a rule performed by the local rescue service. SSM will be part if RAM is involved.
- In the case of severe accidents the Swedish Accident Investigation Authority will take the lead. SSM will provide expert opinion in the case of RAM.
Future RAM transport challenges

Premature closure of reactors in Sweden due to economic reasons will significantly increase the need of RAM transports to:
- Away from reactor fuel storages
- Final repositorys for decommissioning waste.
- This might be a logistical challenge for the nuclear operators and SSM.
Thank you for your attention!