Australian Experience in Implementing Transport Safety Regulations and Transport Security Recommendations

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Abstract

Australian transport safety and security regulatory framework is governed by Commonwealth, State and Territory legislations. There are eleven competent authorities in Australia that includes three Commonwealth authorities, six states and two territory authorities. IAEA Regulations for Safe Transport of Radioactive Material (TS-R-1, 2005 edition) is applied through Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Code of Practice for Transport of Radioactive Material 2008 by road, rail and waterways not covered by marine legislations. All states and territories apply this Transport Code through their regulatory system. For air transport, the Civil Aviation Act 1988 adopts the requirements of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air DOC 9284, which also adopts TS-R-1. The security of radioactive material in air transport is achieved via the Aviation Transport Security Act 2004. For sea transport Australian Marine Order 41 applies the requirements of IMDG (International Maritime Dangerous Goods) Code which also adopts TS-R-1. The security of radioactive material (nuclear material) is governed by two Commonwealth Agencies namely, ARPANSA and ASNO (Australian Safeguards and Non-proliferation Office). ARPANSA regulates the security of radioactive sources through ARPANSA Code of Practice for the Security of Radioactive Sources 2007 which is based on the IAEA Draft Security Series. ASNO regulates security of nuclear material including U, Th and Pu through the Nuclear Non-Proliferation (Safeguards) Act, and the object of which is to give effect to certain obligations that Australia has as a party to the NPT, Australia’s safeguards agreement with the IAEA, and other bilateral safeguards agreements and certain obligations that Australia has as a party to the Convention for the Physical Protection of Nuclear Materials (CPPNM). This paper presents the effectiveness of regulatory approaches for safe and secure transport of radioactive material in Australia.

1. Introduction

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is responsible for the regulation of nuclear installations in Australia under the Australian Radiation Protection and Nuclear Safety Agency Act 1998 (the Act) [1] and the Australian Radiation Protection and Nuclear Safety Regulations 1999 (the Regulations) [2]. Nuclear Installations covered by the Act include research reactors, radioisotope production facilities, waste management facilities and fuel management facilities. All of Australia’s existing nuclear installations are under the control of the Australian Nuclear Science and Technology Organisation (ANSTO).

The State and Territory Authorities administer radiation protection legislation to regulate conducts and dealings involving radiation and radioactive material. No nuclear installation is regulated by them. The State and Territory Authorities regulate the transport of radioactive material by road and rail undertaken by non-Commonwealth entities. All states and territories apply the Transport Code through state and territory legislation.


The implementation of the IAEA Transport Safety Regulations is achieved as Australia's aviation legislation, Civil Aviation Act 1988, adopts the requirements of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air DOC 9284. In relation to the air transport of radioactive material, the ICAO document requires that we use the current edition of the TS-R-1.

Australian Maritime Safety Authority (AMSA) is the Competent Authority for transport of radioactive material by sea. Marine Order 41 applies the requirements of IMDG Code which adopts TS-R-1.

The security of radioactive material (nuclear material) is regulated by two Commonwealth Agencies namely, ARPANSA and ASNO. ARPANSA regulates the security of radioactive sources, and ASNO regulates security of nuclear material including U, Th and Pu. ARPANSA legislation [2] requires complying with the ARPANSA Code of Practice for Security of Radioactive Sources 2007 (Security Code) [4], which is based on IAEA Draft Security Series. Under Regulation 4R of the Customs (Prohibited Import) Regulations 1956 and Regulation 9AD of the Customs (Prohibited Export) Regulations 1958 ARPANSA issues permits for import and export of radioactive material. ASNO administers the Nuclear Non-Proliferation (Safeguards) Act [5], including permits for possession and transport of nuclear material-safeguards and physical protection. The principle object of the safeguards Act is to give effect to certain obligations that Australia has as a party to the NPT, Australia’s safeguards agreement with the IAEA, and other bilateral safeguards agreements. A further object of the Act is to give effect to certain obligations that Australia has as a party to the Convention for the Physical Protection of Nuclear Materials (CPPNM).

Dangerous goods security in air transport, including Class 7 Radioactive materials, is achieved via the Aviation Transport Security Act 2004 which prevents unauthorised persons from accessing aircraft and airports without being security cleared for those areas.
2. **Front-end material**

Australia is one of the largest producers of uranium ore concentrate (UOC) producers and three operating mines producing and exporting about 10,000 t of UOC per year. The UOC is exported to overseas for conversion.

Australia does not have any enrichment or conversion or fuel fabrication facility.

Each producer/shipper of UOC prepares an individual transport plan that specifically focuses on the numerous activities and responsibilities that need to be addressed and covered by all parties and individuals involved in the transportation of UOC containers from their mine site to the applicable export shipping port or terminal.

The fresh fuel for research reactor is imported from overseas and its transport is subject to the regulation by road and rail, and by air.

3. **Back-end material**

There are two shut down research reactors that have been principally responsible for Australia’s volume of spent fuel. ANSTO operated 10 MW HIFAR for about fifty years. ANSTO also operated an Argonaut type 100 kW reactor (MOATA) for about 34 years with HEU fuel which has been recently decommissioned. All the HEU fuel plates of MOATA were reconfigured to fit the basket for shipment to the USA. In the case of the HIFAR reactor the spent fuel arising from operation included both HEU and LEU fuel assemblies. The volume of LEU was much smaller since LEU fuel was only used in HIFAR reactor from 2004 till the time of its final shutdown in early 2007. ANSTO’s new 20 MW OPAL research reactor utilises LEU, hence, future volumes of LEU will be greater.

The UK-origin spent fuel arising from the operation of the HIFAR reactor, ANSTO initially elected to ship the irradiated fuel assemblies to the UKAEA in Dounreay, Scotland. With the closure of Dounreay, alternatives were evaluated and reprocessing of the spent fuel at the La Hague reprocessing plant was selected as the option for the disposition of the UK origin spent fuel. There have been nine spent fuel shipment overseas totalling 2281 spent fuel elements since 1963 [6].

4. **Safety and Security Assurance in Regulations**

The ARPANSA regulatory system is non-prescriptive but provides guidance and therefore, the licence holder has flexibility in developing plans and arrangements to give appropriate safety. ARPANSA guidance is derived from IAEA documents including TS-R-1.

As the competent authority ARPANSA approves fuel shipments and certifies cask designs applying the requirements of the Transport Code [3].

In assessing approvals under the Code, ARPANSA principally considers the submissions in relation to cask design safety, operational safety and transport safety. The level of risk is assessed taking into account key areas in relation to the transport of spent fuel including engineering system, radiation and nuclear safety, quality assurance, emergency arrangements, human factors, physical security and
protection system. In addition, compliance monitoring is undertaken as part of regulatory oversight of transport of spent fuel.

ARPANSA’s key methods of regulatory oversight of the shipment of spent fuels is by prior assessment of the safety case, compliance monitoring through regular reporting (quarterly and annually), and planned and reactive inspections of the fuel management facilities. ARPANSA conducts pre- and post-monitoring of transport routes for shipment of spent fuel. For transport of compromised spent fuel appropriate engineering and administrative controls are considered (e.g. use of special canister, inspection procedures).

AMSA utilises ARPANSA assessment for approval of shipment of spent fuel by sea. In addition, AMSA inspects the INF2 qualified vessel prior to loading the vessel.

For transport of spent fuel the security plan is assessed and approved by ASNO with inputs from relevant agencies. ASNO approves the overall security plan for the operation and observe the NSW police-led transport from Lucas Heights to the port of loading.

ASNO issues permits for possession and transport of nuclear material. ASNO monitors the physical protection oversights for shipment of uranium from Australia by checking of the physical condition of the containers and verifying the integrity of the containers and seals at each port of unloading or transhipment to detect any breaches of physical protection. ASNO also monitors the international maritime security environment. mitigating measures, consistent with international codes, to protect Australian UOC exports and to mitigate risk in piracy. ASNO consults with relevant national agencies and overseas counterparts to determine best-practice procedures that should be applied to shipments that may be subject to piracy. ASNO approves security arrangements for vessels and shipping routes carrying UOC to international destinations [7].

The UOC area transported in 205 litre drums in standard shipping containers in accordance with the requirements of the TS-R-1. In Australia it is transported by trucks or rail and internationally by standard cargo container ships.

The Safeguards Act [5] establishes a system for control over nuclear material and associated items in Australia through requirements for permits for their possession and transport.

The Security Code [4] applies a risk based approach to the protective security of radioactive sources through performance based outcomes for timely detection scaled on source category, and prescriptive based procedural and administrative requirements (mandatory not optional) scaled on the category of the source and the assessed level of threat.

Though the number of Competent Authorities for transport of radioactive material is eleven we have not experienced any difficulty in maintaining national uniformity in safe transport of radioactive material due to the following reasons:

a) The Transport Code is applied for road, rail and waterways not covered by marine legislation

b) ARPANSA is responsible for issuing the ID number for design approval for new packages, validation of foreign packages and shipment under special arrangements and ARPANSA maintains the register of transport packages
c) ARPANSA is the first point of contact for assessment of validation of packages for transport of spent and fresh fuel, and the transport plan. ARPANSA assessment is used by other Competent Authorities such as AMSA and CASA depending on the mode of transport.

d) No nuclear installation is regulated by any State and Territory authority.

e) The security plan for transport of nuclear fuel (spent and fresh) is assessed by ASNO and ARPANSA takes into account ASNO assessment in ARPANSA approval.

f) ARPANSA Security Code is applied by all States and Territories.

g) Strong all-agency coordination and collaboration in relation to transport of radioactive material.

5. Conclusion

The safety and security record of transport in Australia is impeccable as there has never been an incident that resulted in significant radiological consequence to people and to the environment. This can be attributed to the strict regulatory regime, effective coordination and collaboration between relevant regulatory agencies.

Australian risk-informed approach in regulating transportation of radioactive material including spent fuel is consistent with international best practice and has been found effective in achieving the object of the ARPANS Act [1], that is, to protect the environment from the harmful effect of radiation.

The regulation of security in transport of radioactive sources in Australia is still in the implementation phase as the Commonwealth, States and Territories amend Acts and Regulations to authorise safety regulators to regulate source security. ARPANSA are conducting security training for all stakeholders and assessing Transport Security Plans.

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REFERENCES


