Australian Government

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Australia
Used/Spent Nuclear Fuel Issues

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Background

Australia

- does not utilise nuclear power
- but has 40% of the world's easily recoverable uranium
- has been running various research reactors since 1958
- supports the peaceful uses of nuclear technology (e.g. for production of electricity and medical isotopes)
- has long been a strong and influential proponent of non-proliferation and disarmament

Background

Australia's research reactors

- HIFAR: 1958 – 2007 (initially HEU-fuelled, converted to LEU stepwise from 2004, conversion completed in 2006, decommissioned in 2007)
- Moata: 1961 – 1995 (HEU fuel)
- OPAL: 2006 – present (LEU fuel)

Management of SNF from Decommissioned Reactors

HIFAR and Moata Spent Fuel management

- Local wet and/or dry storage prior to shipment campaign
- Shipments to UK: 1963 (no return of waste residues); 1996 (cemented reprocessing residues to be returned to Australia)
- Shipments to France: 1999, 2001, 2003, 2004 (vitrified reprocessing residues to be returned to Australia)
- Shipments to US: 1998, 2006, 2009 (no waste residues to be returned to Australia)

OPAL Spent Fuel Management

- OPAL spent fuel to be stored no longer than 9 years – service pool capacity ~ 10 years
- Spent fuel shipments to US until lapse of the FRRSNF program in May 2016 (shipments accepted till 2019)
- Spent fuel generated post-2016 to be sent to France for reprocessing; reprocessing residues to be returned to Australia
- Plan to transition from U-Si fuel to U-Mo fuel once qualified and available.

Status National ILW Store

- Legislation is in place for establishment of store at remote site
- However, no practical actions have yet been taken
- Cemented and Vitrified intermediate level waste residues planned to be stored at the Intermediate Level Waste Store (above ground)
- Legislation for establishing an Intermediate Level Waste Store excludes storage of spent nuclear fuel

Back-end Risk

- Development of U-Mo fuel has been slower than estimated
  → **US leadership remains important**
- Addition of Si to U-Mo matrix raises questions about compatibility with current reprocessing technology
- Risks for Australia are that U-Mo fuel
  - may not be qualified and available before end of FRRSNF program
  - may not be compatible with current commercial reprocessing facilities

ANSTO Treatment of ILW

- ANSTO's Synroc and Hot Isostatic Pressing technologies will be applied to wastes arising from ANSTO's wholly LEU production processes, covering both:
  - legacy acidic Mo-99 production wastes, and
  - current alkali Mo-99 production wastes
- Plant design commenced in Apr/May 2010
- Full commissioning is expected in early 2014

Back-end Technical Option

ANSTO's tailored waste form technologies are attractive for a variety of intermediate and high level wastes because they:

- maximize waste loadings to minimise disposal volumes and deliver disposal cost savings
- optimize chemical durability
- reduce off-gas emissions, and
- increase processing flexibility (successfully demonstrated on chemically complex wastes, actinide-rich wastes, Tc, Cs, Sr and I wastes)

US and UK have both funded successful demonstrations of these technologies

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