

Regulatory Challenges of Spent Fuel Management in the UK

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UK Government Policy & Strategy



'spent fuel management is a matter for the commercial judgement of its owners, subject to meeting the necessary regulatory requirements'

'new nuclear power stations built in the UK should proceed on the basis that spent fuel will not be reprocessed'



Responsible 'to ensure the safe, secure & cost-effective lifecycle management of spent fuels'

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Industry Approach

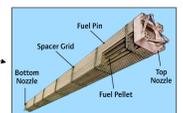
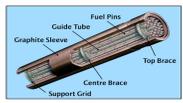
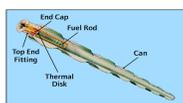
- Immediate storage local to NPP - Pond
- Transport to Sellafield – Flask
- Bulk storage in Sellafield Ponds
- Reprocessing – U, Pu and Fission products
- High Level Waste – Highly Active Liquor (HAL)
- Vitrification – Product store - passively safe
- Geological Disposal

Currently no justification for long-term storage of spent fuel– only justified option is reprocessing

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Main UK Spent Fuels

- Magnox - Metal fuel
- AGR – Oxide fuel
- LWR – Oxide Fuel
- Exotics



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Spent Magnox Fuel



- **Continued reprocessing** at Sellafield in 'Magnox Reprocessing' facility
- 10% of all spent fuel still to be reprocessed
- Reprocessing of Magnox is a priority over other fuels
- Significant degradation once wetted
- Reprocessing needs to continue (2017-2020) – Limited by conventions
- Ageing plant constrains throughput
- NDA developing contingency should reprocessing cease prematurely

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Spent Magnox Fuel – Regulatory challenges



- Magnox Operating Plan – oversees management, storage, transport and reprocessing of spent Magnox
- Chronic and ageing plant
- Increased emphasis on 'Multi-Legged' Safety arguments [shift towards administrative control in some cases]
- Some shortfalls against modern Engineering Standards – challenging regulatory judgements needed
- More proactive regulatory engagement a benchmark of ONR's approach in recent years
- Robust regulation influencing the development of Magnox Contingency Options e.g. drying

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Spent Oxide Fuel

- Spent Oxide fuel from AGR's and overseas LWR's is stored and reprocessed at Sellafield's THORP plant
- Spent UK PWR fuel wet-stored at Sizewell B
- New 'Holtec' Design Dry Fuel Store under construction at Sizewell B – first in the UK



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Spent AGR Fuel – NDA Strategy



- NDA contractually obliged to reprocess one-third of all spent AGR fuel + honour overseas LWR contracts
- **THORP due to close in 2018** – NDA has judged reprocessing to be economically viable up to then
- Remaining AGR fuel to be interim stored pending conditioning and eventual geological disposal [no later than 2075]
- Nature of interim storage to be determined – safety case required

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Spent Oxide Fuel – Regulatory challenges

AGR Spent Fuel

- Storage Capacity – MEB, Storage Racks
- Dosing
- Leaking elements
- Building integrity

LWR spent fuel

- Interim dry fuel storage of Sizewell B PWR post 2015
- Hinkley Point C [post 2023] PWR fuel will be stored underwater until geological disposal
- ONR will not prescribe spent fuel storage strategy – a matter for utilities

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Reprocessing – Regulatory challenges

- Highly Active Liquor, volatile by-product from aqueous separation, stored in ageing storage tanks then vitrified
- Significant concentration of nuclear hazard during evaporation storage and vitrification
- Enforcement required to drive stocks down, continued sensitivity in Ireland and Norway
- ONR has regular stakeholder dialogue with Irish and Norwegian Governments and their regulatory bodies



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Spent 'Exotic' Fuel – NDA Strategy



- 500 tonnes of 'non-standard' fuel
- Spent Fast Reactor Fuel and breeder material at Dounreay
- Carbide Fuels containing HEU
- Unique challenges requiring tailored management solutions
- Strategy of consolidation

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Geological Disposal

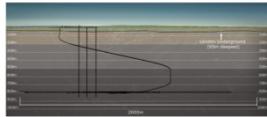


February 2013 – Cumbria County Council voted not to proceed with Stage 4 of Site Selection

September 2013 - UK Government launched a new consultation process for site selection

Now proposed that both ONR and Environment Agency (EA) should play a more prominent role:

- engaging with communities throughout the siting process
- but in a way that does not undermine their independence



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Regulators Must Prevent Hazardous Legacy



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Prevent Hazardous Legacy



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Summary

- Range of fuels within UK - metal, oxide and exotic
- Varying condition
- Reprocessing has been the foundation of SFM in UK
- End of both reprocessing streams is imminent
- Influenced by the regulator, contingency options are being pursued e.g. drying and long-term interim storage
- Many challenges need to be overcome to ensure well underpinned strategy of safe storage delivered.
- Regulators and operators need to work together to develop suitable solutions that ensure continued safety and protect society from the hazards of the industry.
- Don't forget the importance of stakeholder engagement

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Thank you for listening

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