



PCTG Launch Symposium

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Key Challenges at Sellafield

Royal Society of Chemistry

Process Chemistry and Technology Group

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Sellafield

The world's most complex and compact nuclear facility

In excess of 2600 buildings and 290 active facilities dating from 1940s to present day

1 million m³ concrete above ground,

1 million m³ concrete below ground

37km road, 15km railway, 120km sewers and 65km water pipes

Employs around 11,000 at Sellafield and its Warrington office

Further 5,000 employed through the supply chain

Costs £2bn per year to operate



Sellafield Operations



Calder Hall Nuclear Reactor



Challenges

- Completion of Reprocessing of Oxide Fuel 2019
- Completion of Reprocessing of Magnox Fuel 2021
- Post Operational Clean Out
- Waste Management Challenges
- Retrieval and Treatment of Legacy Wastes
- Decommissioning & Remediation
- Over-arching requirements
 - Safety in ongoing operations
 - Reducing hazards from redundant facilities
 - Progressive reduction in liabilities
 - Efficiency Improvements

Post Operational Clean Out

POCO (Post Operational Clean Out) is the process that takes place when a nuclear plant has reached the end of its operating life and is the final phase in a plant's operating life before decommissioning begins.

The aim of POCO at Sellafield is to reduce the risk and hazard in a facility by safely removing the nuclear and chemotoxic inventory and, ultimately, reducing the lifetime costs of the redundant plants.



Waste Management Challenges

What wastes do we have at Sellafield?

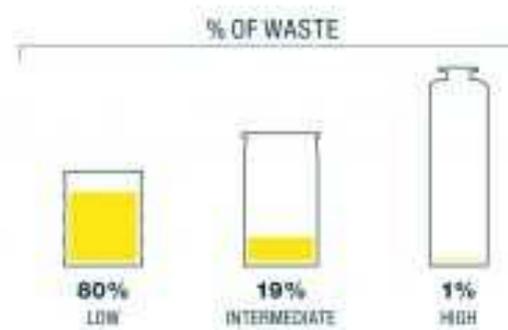
High Level, Intermediate Level and Low Level Wastes

When will they arise?

Historic, current and future

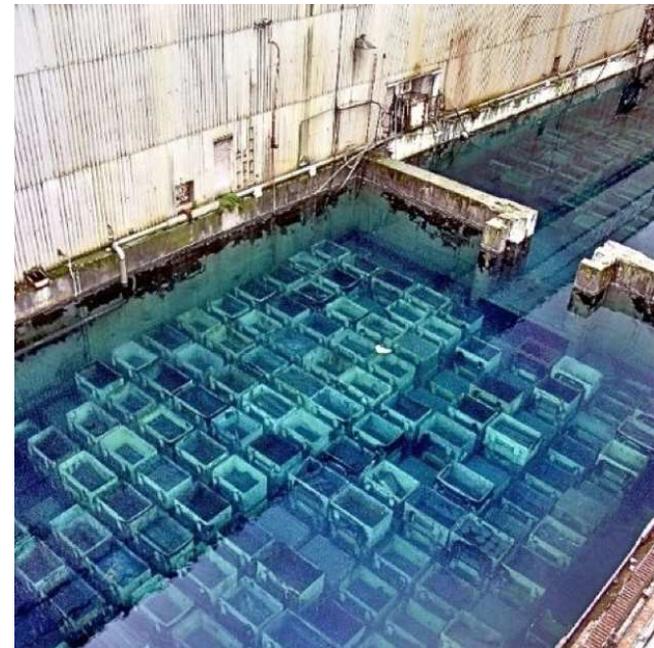
Characterisation, forecasting, records, modelling

What new capabilities do we need?



Retrievals & Treatment of Legacy Waste

- Retrieval of legacy wastes and conversion to forms for safe storage
 - Largely cladding, residues and nuclear waste
 - In ponds and silos
- Challenges
 - Characterising the waste
 - Hydrogen generation
 - Potential for adverse reactions during retrieval
 - Liquid and aerial



Decommissioning

- Decommissioning
 - Where a nuclear facility, at the end of its life, is taken permanently out of service and its site made available for other purposes
- Liabilities
 - The costs involved in decommissioning; the long term management, storage and final disposal of waste materials and spent fuel ; and the environmental remediation of nuclear sites

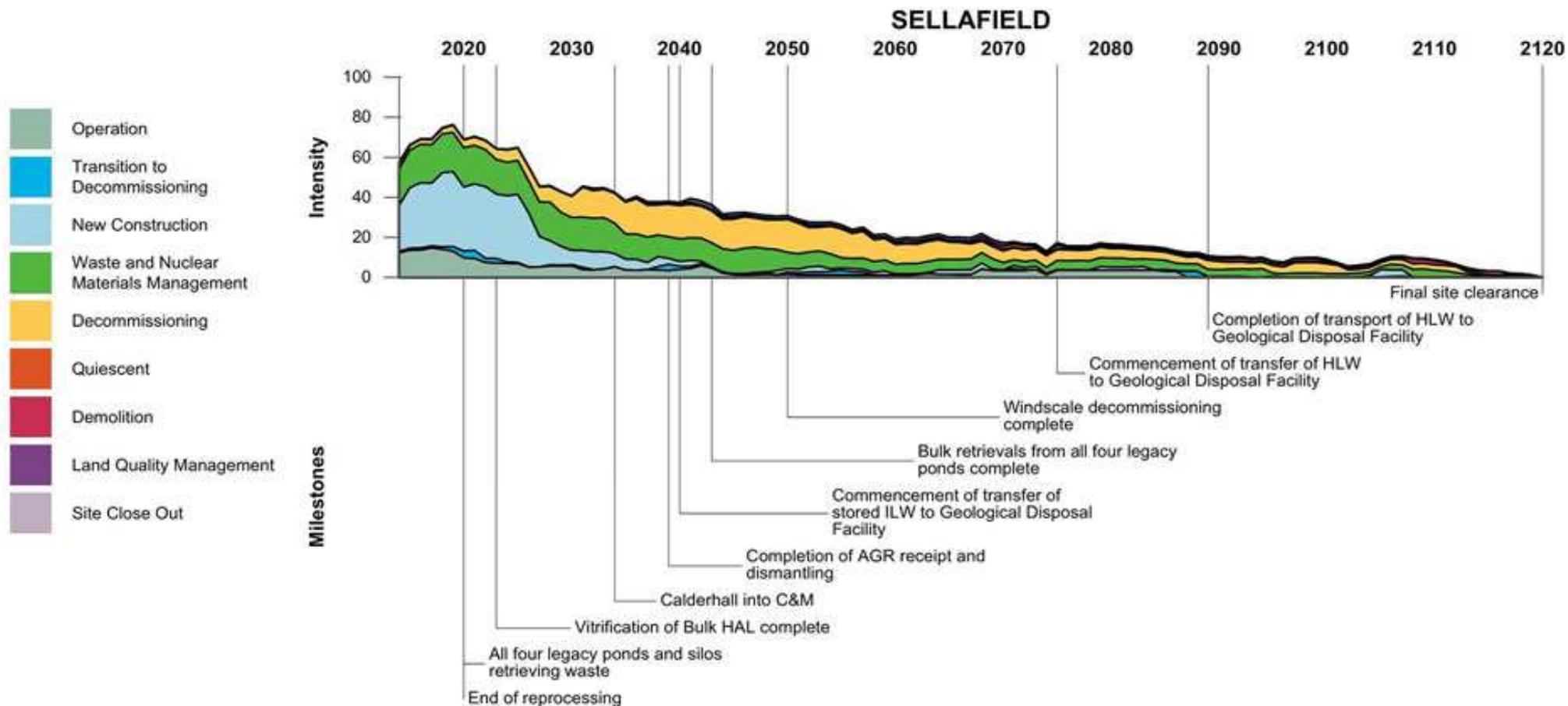


Remediation

Definition of Remediation

- Environmental Protection Act 1990 (central component of the definition)
 - The doing of any works, the carrying out of any operations or the taking of any steps in relation to any such land or waters for purpose:
 - of preventing or minimising, or remedying or mitigating the effects of, any significant harm, or any pollution of controlled waters, by reason of which the contaminated land is such land; or
 - of restoring the land or waters to their former

Timescales



Acknowledgements

Thank you for your attention

- Sellafield Limited
- National Nuclear Laboratories
- Nuclear Decommissioning Authority

Sources of Information

Sellafield : Major Challenges. • Reprocessing of Magnox. Fuel. •
Reprocessing of Oxide. Fuel. • Retrieval and Treatment of Legacy Wastes.
• Over-arching.

[PDF] Sellafield Site, Uk <https://www.twi-global.com/EasySiteWeb/GatewayLink.aspx?allId=2733890>

20 Jun 2018 - Sellafield is the largest and most hazardous nuclear site on the NDA ... the NDA's role, its governance, and the complex challenges it faces in ...

[PDF] The Nuclear Decommissioning Authority progress with reducing risk at ...<https://www.nao.org.uk/.../The-Nuclear-Decommissioning-Authority-progress-with-re...>

Sellafield GameChanger

<https://www.gamechangers.technology/challenges/post-operational-clean-out-poco/>

