Office for Nuclear Regulation

Pile Fuel Cladding Silo – A success story for outcome-focused regulation

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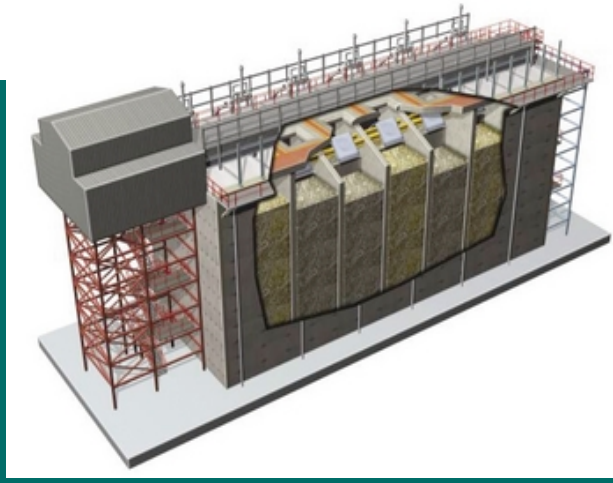
Fundamental principles of ONR strategy

- **Agree Common priorities**
- **Balance of risk**
- **Application of "Fit-for-purpose" solutions**
- **Effective use of resources across all stakeholder organisations**
- **Removal of barriers and unnecessary bureaucracy**
- **Removal of distractions and diversions**
- **Appropriate incentives and removal of disincentives**
- **Communications**

- ONR's strategy requires alignment and support from key stakeholders: NDA, BEIS, EA, UKGI, Sellafield, ONR – **the G6**

NOTE: The historic approach was compliance-based regulation but given the unique circumstances at Sellafield this was not successful in achieving progress with hazard and risk reduction – **this called for a change and innovation**

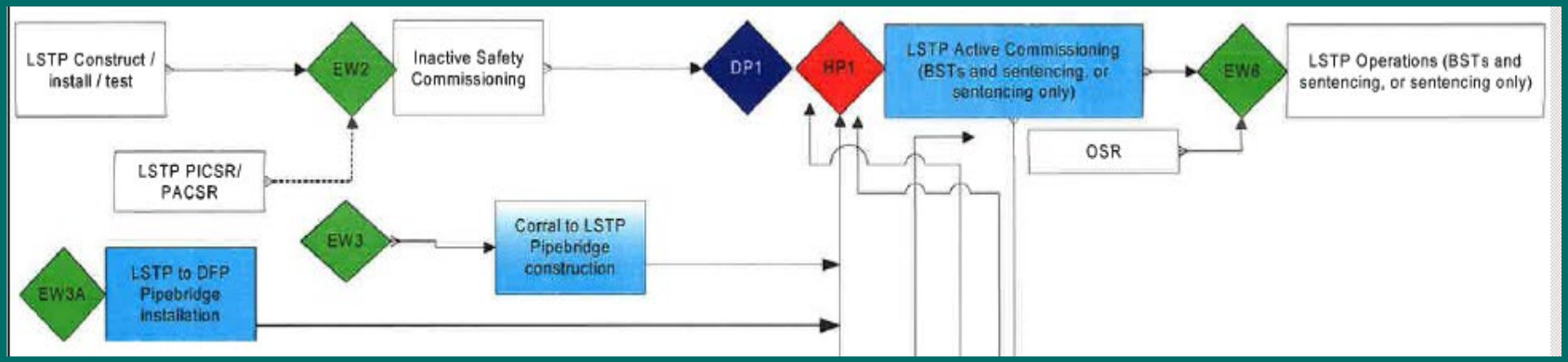
Sellafield's Pile Fuel Cladding Silo: challenge for the decommissioner and the regulator



CHALLENGE:

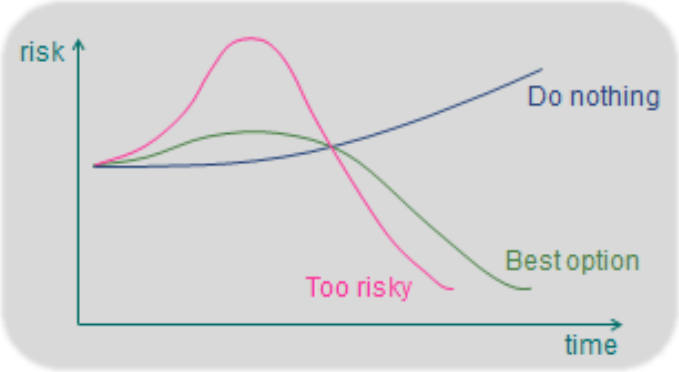
To enable accelerated retrievals through a framework of regulatory permissions

- Accepting a short-term increase in risk in the interest of longer-term risk reduction and storage of large inventory of waste
- Encourage development of a different type of safety case (move away from traditional bespoke high-reliability engineering in favour of **fit-for-purpose** solutions)



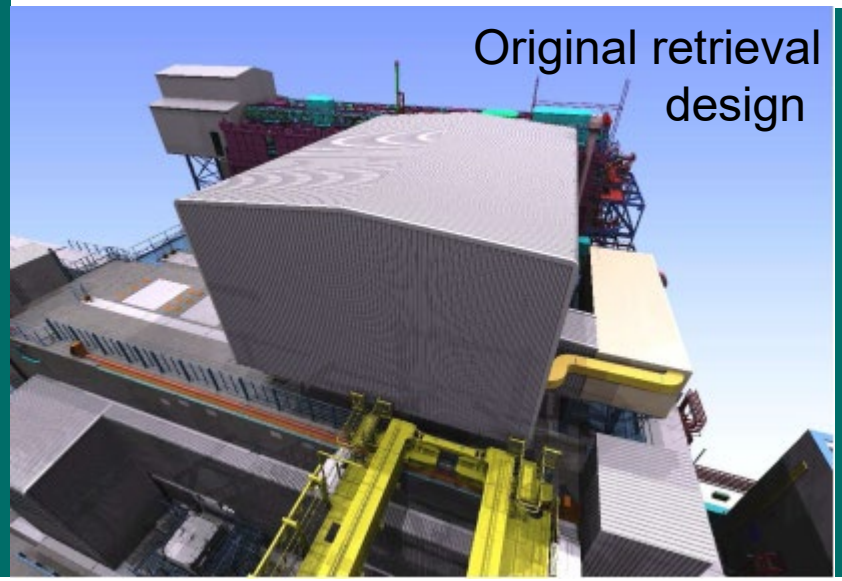
Delays in Preparation to Start of Retrievals: A Regulatory Concern

PFCS: hazard and risk reduction



- Retrieving waste can no longer be delayed – we accept some short-term risk increase in order to achieve a longer-term benefit, but this must be controlled ALARA

UK law requires that licensees **reduce risks so far as reasonably practicable -** the only reasonably practical solution was to start the retrieval hence: Delays to retrievals presented a regulatory concern



Pile Fuel Cladding Silo Acceleration

June 2016: UK Govt approval of 'lead and learn' early retrievals approach

Total programme cost:

£905m

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£662m

Start of retrievals

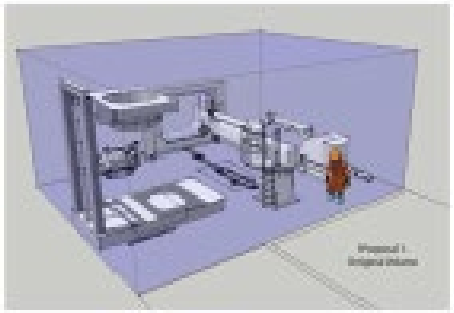
2019
Further acceleration opportunity for retrievals

2020
Previous forecast start of retrievals

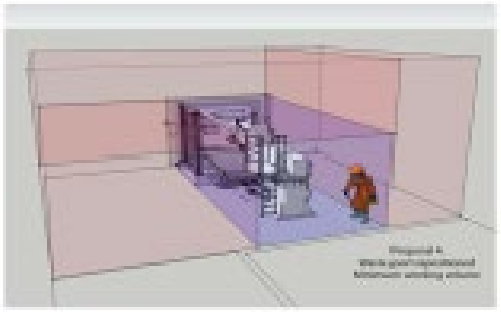
2022
Original forecasted start of retrievals in PP14

Innovative Approach; Road to Success

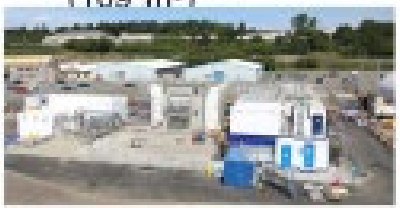
Innovation and Fit For Purpose



(535m³)



(109 m³)



CHALLENGES: 1 - Metal Fire-fighting Capability (2015)

The Issue:

- A large flammable radioactive inventory and numerous ignition sources
- A “whole-silo” fire has the potential to become a major nuclear safety accident
- the reliance on prevention (argon inerting) was not considered sufficient defence-in-depth during retrievals – additional mitigation against a large fire was needed

The Solution Accepted:

- Significantly enhanced emergency arrangements through
  - Off-the-shelf technology for fire detection: thermal imaging camera, cabon monoxide detection
  - Manual Fire fighting capability

Regulatory Issue Progress Follow-up

- Through inspections to secure appropriate implementation of the safety case, in particular emergency arrangements measures identified.

CHALLENGES: 2 - Deflector Plate Removal (2016)

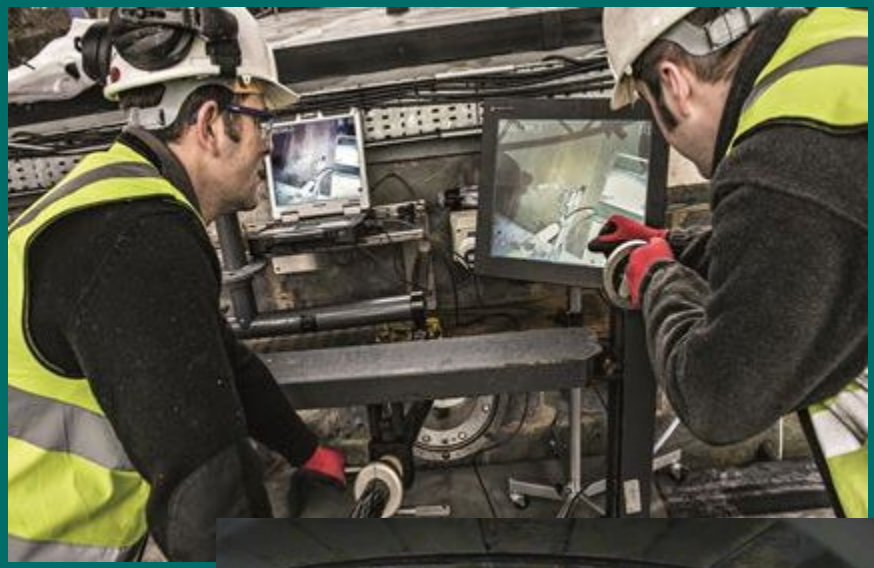
The deflector plates had to be removed from the silo interior to facilitate retrievals access

The Issue:

- Method of cutting: need to minimise heat and H_2 generation
- No “zero-risk” options available

Challenge for ONR:

- Water jet cutting is quite novel technology
- An increase in risk of fire during the cutting operation
  - Further refining the selected option to reduce the risks would cause significant delays



Route to Regulatory Permission

- Early engagement to understand administrative measures replacing enhanced engineering
- Enhanced engagement to accept the proposed H_2 monitoring system (*manual regular sampling using a spectrometer – continuous sampling was not feasible*)
- Development of a stakeholder communication plan

OVERALL: ONR’s willingness to look at the limited time at risk

CHALLENGE: 3- Hole-Cutting (2017)

The Issue:

- Breaking containment
- Making significant structural changes to an old building
- Heavy crane lifts in a congested area

Solution:

- Accepting controlled short-term risk
- Placing more reliance on mitigating measures (rather than prevention) and emergency arrangements

Sellafield
Pile Fuel Cladding Silo - retrieval preparation

CHALLENGE: 4- Early Retrievals Plant Installation and Commissioning

Regulatory approach:

- Focused permissioning on adequacy of the design and intended operation
- Did not permission inactive commissioning as the risk was considered low hence disproportionate to introduce a “hold point”

CHALLENGE: 5- Oxygen Limits and Conditions Change

The current safety case for the silo is based on a deterministic bounding approach (O_2 < 4% to prevent ignition)

Issue:

- Given the uncertainties , this is too onerous to deliver sustainable waste retrieval

Way forward

- We are engaging with SL to construct an extension to the safety case that works on the basis of preventing fire propagation (O_2 < 12%) rather than precluding all ignition (a less conservative but a more complex case)

Communication with Stakeholder

- Sellafield has two site stakeholder group events per year
- ONR inspectors always attend in person and a comprehensive report of our activities and findings during the period are presented

In the case of PFCS:

- An additional stakeholder engagement was held to highlight specific matters and to inform the group of ONR's position.
- ONR's basis for permissions are published
- Future engagement with the stakeholder before the start of retrieval is intended

Conclusions

The change in regulatory strategy and the alignment of key stakeholders to focus on delivering outcomes has proved successful.

ONR's focus is:

- Ensuring sustained progress with hazard and risk reduction at Sellafield
- Lessons learnt are shared widely within ONR and beyond
- We continue to learn from others and welcome feedback and challenge

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Thank you

We welcome your questions