Sellafield Ltd

Innovation in decommissioning and waste management
Safespur Forum 18th November 2009

Sellafield Today

Innovation - “introducing a change that brings benefit to the organisation”

- Business improvement focuses on processes and procedures such as

- Project delivery and process
- Engineering processes
- Safety Case process
- Plant Modification Process

- Technological innovation focuses on topics such as

- Project implementation
- Site, Facility and Plant operations
- Characterisation and assessment
- Address gaps
- Mitigate technical risk
- Assess opportunities

Technical Overview

Deliver quality technology and maintain technical capability to underpin delivery of the Sellafield LTP.

Skills

Capabilities

National Laboratory

Universities

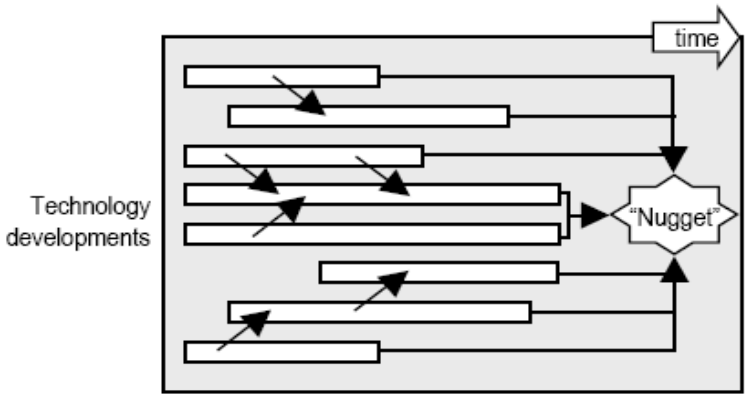
Supply Chain

Technology

Identification of requirements - current

- Lifetime plan identifies delivery of site plans
- Technology requirements identified in LTP
- Provides details of the current and future requirements

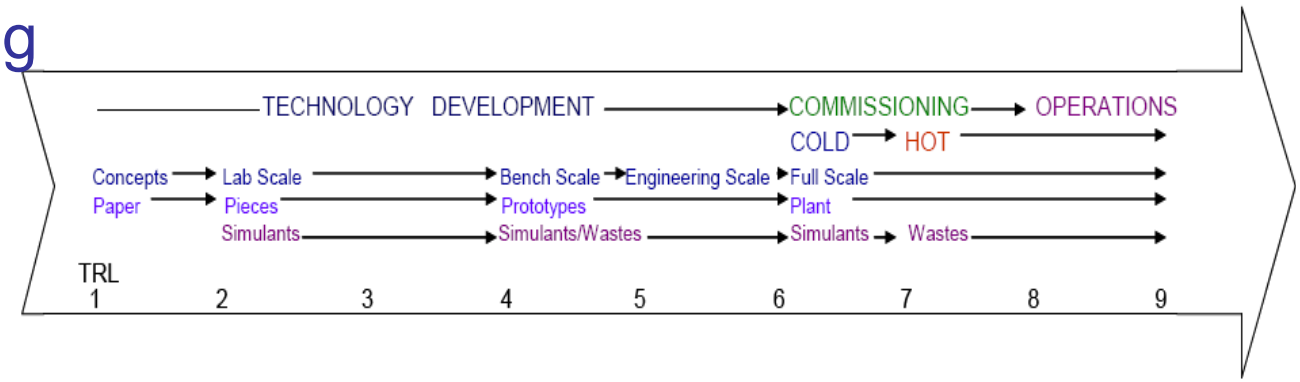
Identification of requirements - future



Long Term Planning

Systematic approach to developing technology elements through

- Technology Road Maps
- Technology Readiness Assessments



Deployment of Research and Technology at Sellafield

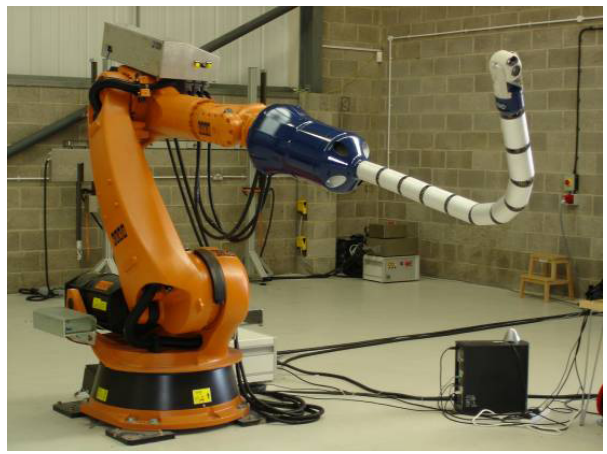
Science at Sellafield

- Changing the acid concentration in our reprocessing plant reduced the waste arisings by 40% for one particular waste stream
- Assessment of the tolerance of higher impurities for alternative chemical supplies
- Understanding biological behaviour of algal blooms in storage ponds and corrosion effects of plant equipment
- Corrosion chemistry of plant and equipment such as evaporators for highly active radioactive liquors
- Sludge properties – chemical, physical (rheology) studies

Seed corn investment

Investment in new and novel technologies.

Commission trials, demonstrations and assessments



Performance - Pilot stage

Innovation through collaboration – NNL, Sheffield University and ANSTO

Current and future challenges

Challenges – legacy facilities

Facility maintenance

Characterisation and monitoring

Waste retrieval

Decommissioning

Demolition

Land remediation

Challenges - waste processing

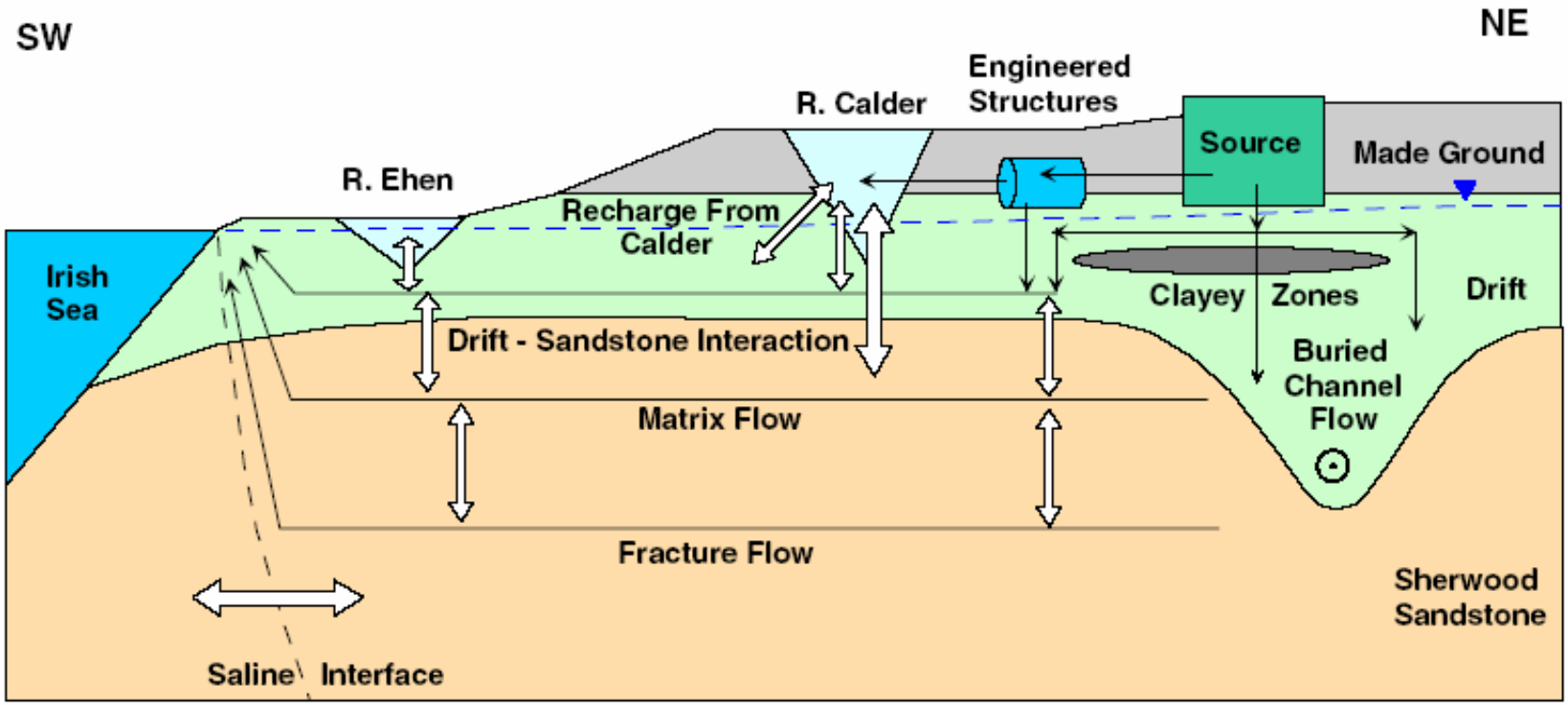
Silo wastes from historic reprocessing activities

Plutonium contaminated wastes from current operations

Challenges - waste processing

Sludges from legacy storage facilities

Challenges - Environmental

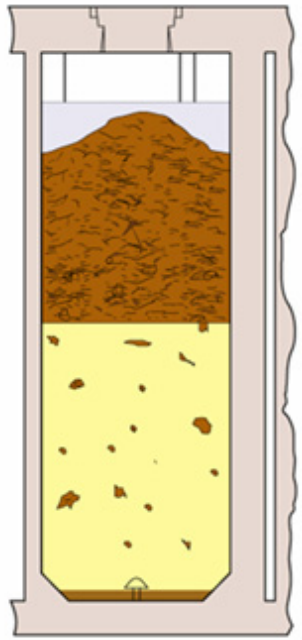


Challenges - Environmental

- Characterisation of contamination under buildings
- Development of Leak Detection technology
- Understanding of how hydraulic isolation or physical containment would work on Sellafield
- Treatment of contaminated groundwater e.g. technetium-99
- Reduction in disposal volumes of excavated contaminated soil

Challenges - Characterisation

- How can we determine the presence of voids in waste stored in silos?
- Can you identify the presence of hydrogen in these voids
- Access is restricted due to radiation and the facilities are shielded by virtue of thick concrete walls

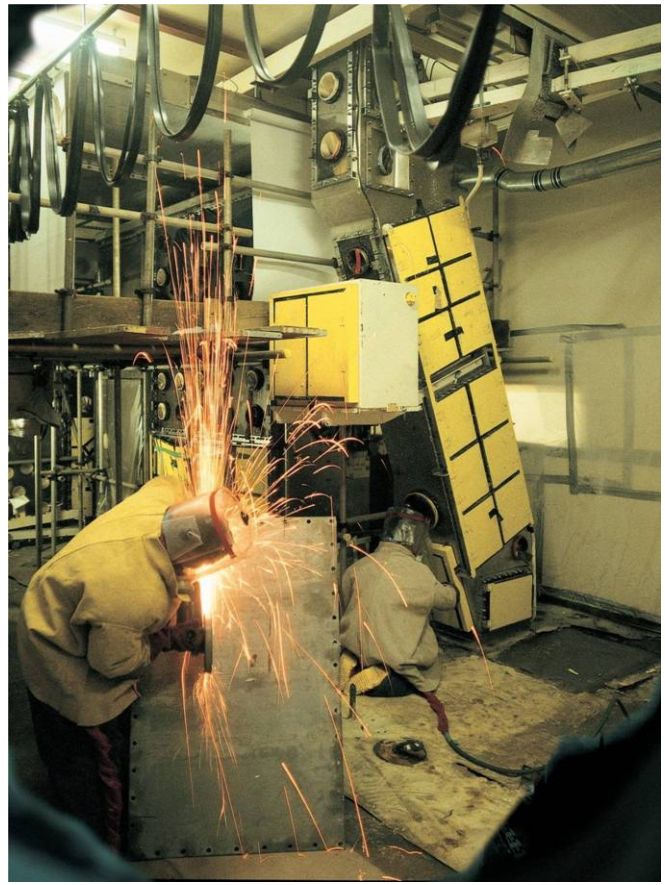


Challenges – Characterisation & Demolition

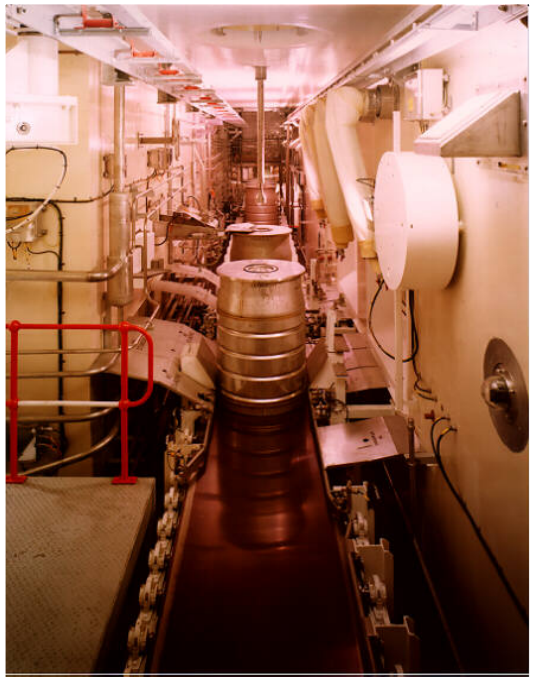
- Characterising the waste in the silo
- Retrieving the waste
- Processing the waste for final disposal
- Characterising the distribution of radioactive contamination in the concrete structure
- Selectively separate the contaminated material from the bulk non contaminated concrete

Challenges - Decommissioning

- Challenge – Decommissioning facilities handling plutonium
- The current approach is based on manual operations such as dismantling, size reduction and demolition
- This presents a hazard because of the risk of breaching the ventilated containment or the air-fed suit and contaminating the operator
- What alternatives are there?



Challenges – Beta -Gamma Decommissioning



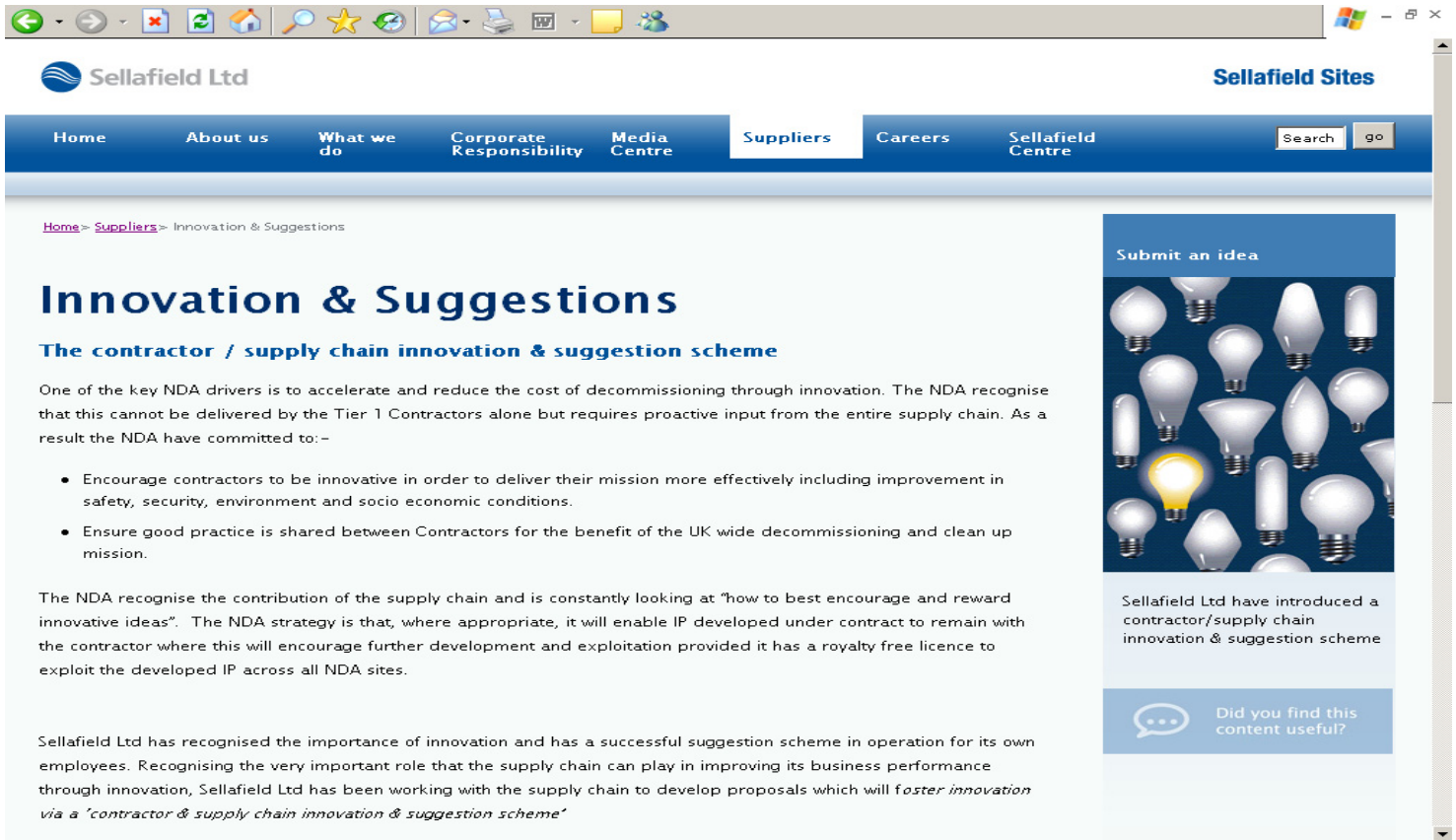
- Decommissioning of high beta/gamma facilities make significant use of Remotely Operated Vehicles (ROVs) deployed through engineered openings that are time consuming and hence expensive

Processes to simplify decommissioning of highly active plant, equipment and cells.

Areas for new, novel and available technologies

- Characterisation
- Remote size reduction and dismantling
- Modelling
- Chemistry/Process Knowledge
- Waste Treatment Processes
- Process improvements
- Novel Techniques
- Waste categorisation, processing and packaging
- Condition Monitoring
- Decontamination

Innovation Portal



http://www.sellafieldsites.com/suppliers/innovation--suggestions

Challenges to Innovation

- Commercial processes
- IPR
- Change
- Not invented here

Concluding remarks

- Technology development has been essential to the establishment of the Sellafield bespoke plants and processes
- TBURD, Technology Road Mapping and Technology Readiness Assessments will play an increasing part in focussing our future requirements
- Further development will be essential to address the challenges on the site.
- Implementing new technologies and processes are vital for the future