NNL's Systematic Approach to the Characterisation, Treatment and Disposal of Radioactive Wastes and its Application to NORM

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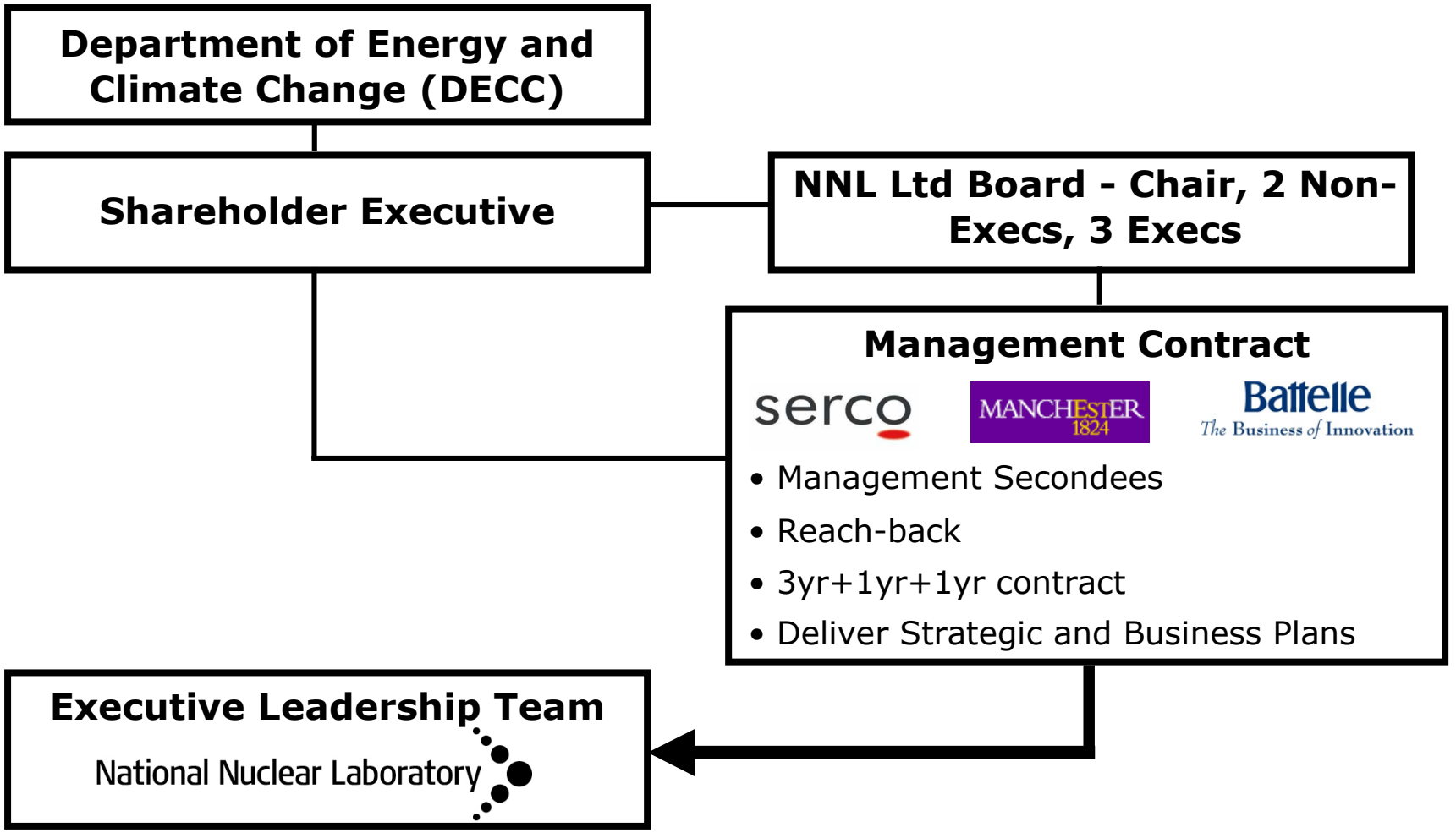
National Nuclear Laboratory

Environmental Services Team

Introducing the NNL – A UK Government Owned Contractor Operated (GOCO) Organisation

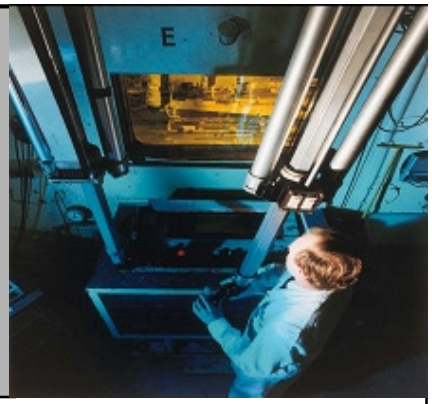


Our heritage

- 1954 – UKAEA formed to oversee the nation's nuclear research programme
- 1971 – BNFL formed
- 1996 – R&T division
- 1998 – Magnox integration
- 2003 – NSTS established
- 2003 – Acquired AEAT nuclear science business
- 2005 – Nexia Solutions Limited launched
- 2006 – UK Government announces intention to establish National Nuclear Laboratory, based around Nexia Solutions
- 2008 – NNL formed

NNL's Active Facilities

Windscale Laboratory



Large flexible shielded facility capable of accepting a wide range of active materials, and equipped for all types of non-destructive and destructive examination.

NNL' Windscale facility is primarily utilised to support the clean-up of Sellafield site and to undertake PIE for commercial customers.

Central Laboratory Sellafield

Facilities include high active alpha, beta & gamma cells, plutonium and MOX facilities, active/non active labs, full scale test facilities and a supporting infrastructure.

NNL will utilise the centre for fundamental research and process development including decontamination of real plant materials & immobilisation of plant wastes. Other planned research includes:

- HLW vitrification
- ILW treatment
- LLW disposal
- Effluent Treatment
- Decontamination & decommissioning
- Reprocessing & MOX fuel production

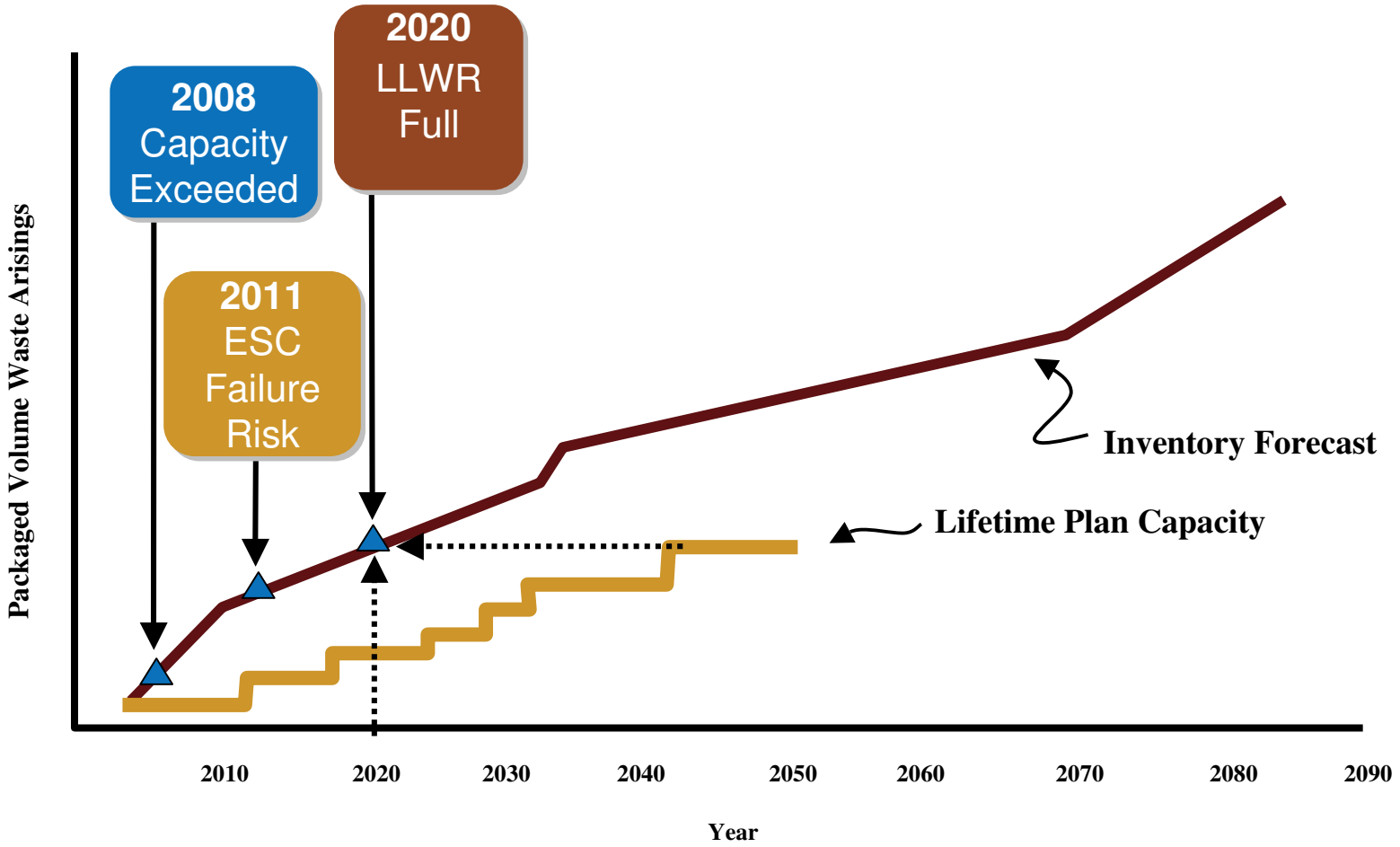
Preston Laboratory

NNL' Springfields facility houses active laboratories capable of handling uranic materials from a laboratory to a production scale. The facility also contains engineering facilities for large scale testing and analysis development projects.

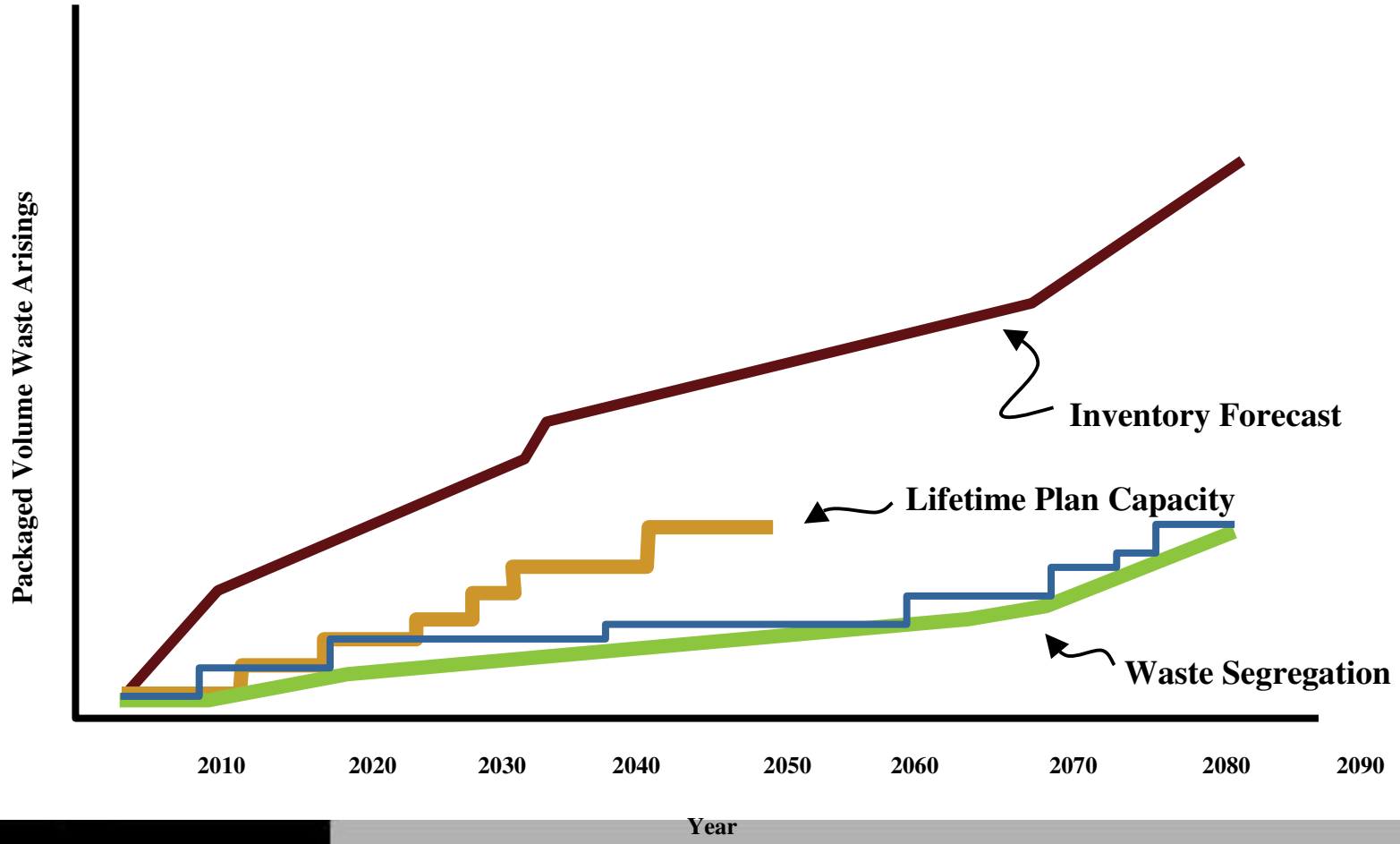
Waste management

- Waste management is a key challenge in the UK
  - Decommissioning and legacy waste
  - Contaminated land
  - Potential new build
- Drives development of waste management, residue recovery, treatment technologies

Disposal Challenge

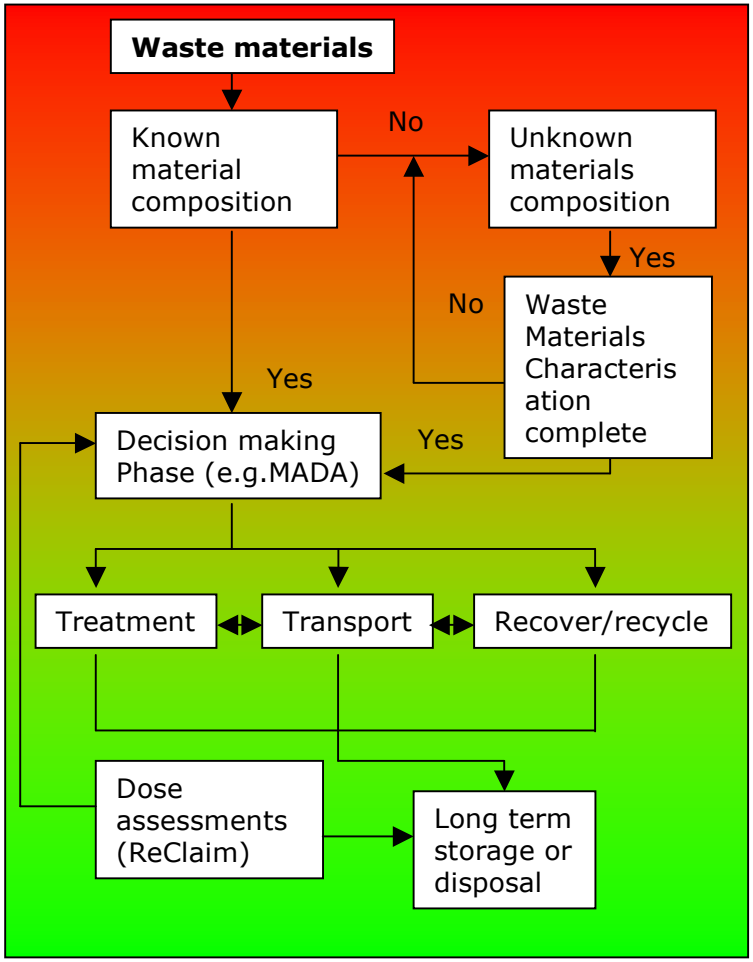


Meeting the Capacity Challenge



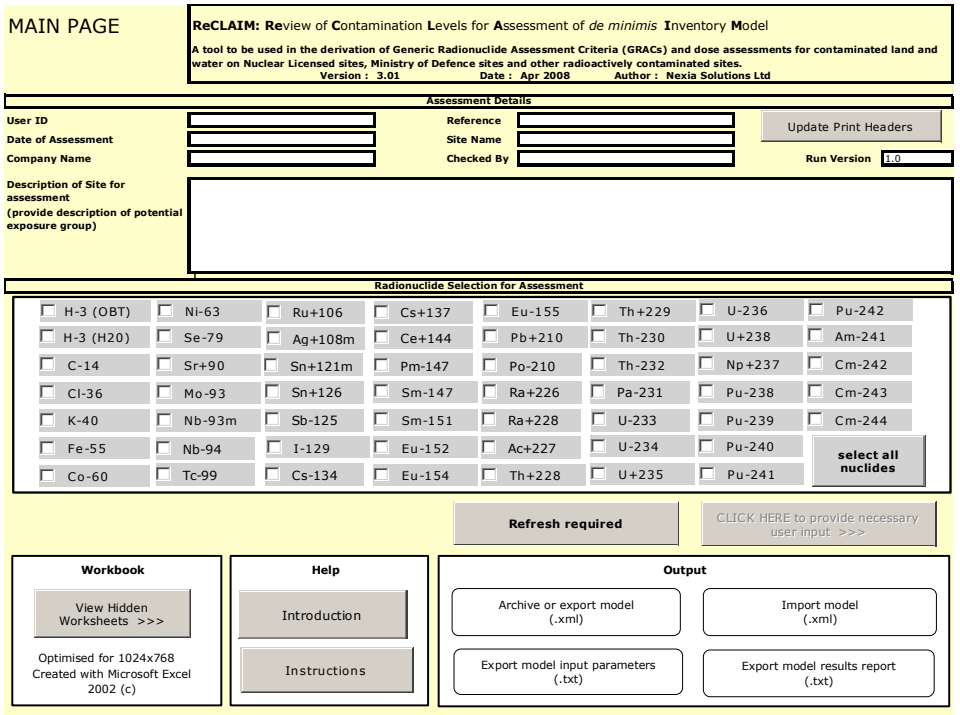
Our Systematic Approach to Waste Management (1)

- Approach at the highest level
- Transferring NNL's technical expertise developed within the nuclear sector, NNL are applying this knowledge to dealing with forms of NORM and radiologically contaminated wastes.
- Approach is based around collaboration with the waste owners/producers (Providence) and incorporates analysis, assessment, treatment and disposal.



ReCLAIM Dose Assessment Tool

- Calculates current and future exposure from radioactive contamination/content in soil building materials, waste and water.
- Rapid **determination of dose** based on measured values.
- Able to calculate **soil/material radionuclide levels** that meet a user defined dose criteria to help quickly assess the significant of data during work operations.
- Includes default models, compliant with UK regulatory requirements: but powerful options enabling a user to **develop their own scenarios and pathways** – especially for operational sites.



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Our Systematic Approach to Waste Management (2)

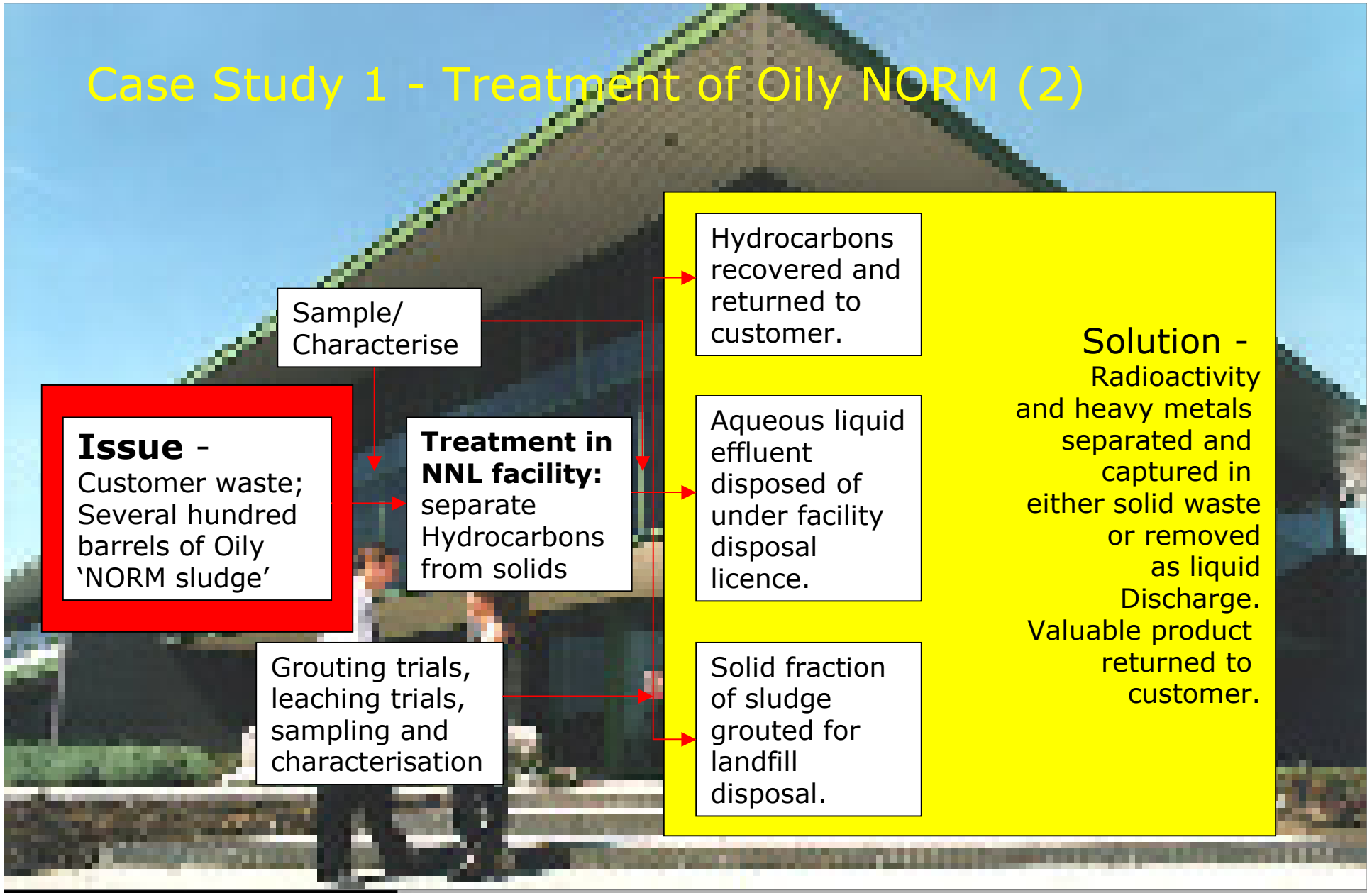
- Follows the principles of the waste hierarchy but also considers the financial implications (Aligned with ALARP Principles).
- Built on the decades of dealing with wastes (Exempt wastes to HLW) in the nuclear industry.
- Uses experience in waste minimisation, treatment etc but also extensive understand in terms of developing Waste Acceptance Criteria and conditioning waste to meet Conditions for Acceptance.

Case Study 1 - Treatment of Oily NORM (1)

Large Scale extensive project;

NNL's extensive experience of dealing with radioactive drummed waste has been applied to oily NORM waste.

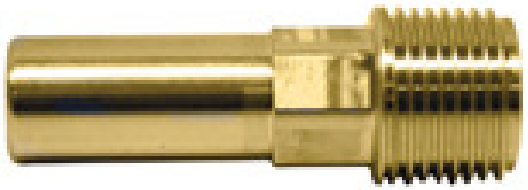
Case Study 1 - Treatment of Oily NORM (2)



Case study 2 – Contaminated Components (1)

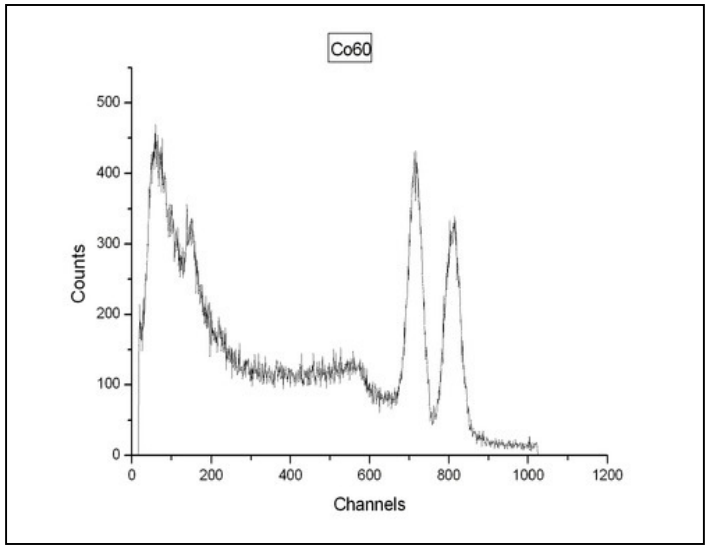
Accidental/inadvertent contamination of plumbing components.

The Customer organisation had inadvertently sourced metal components from China that were contaminated with radioactivity.



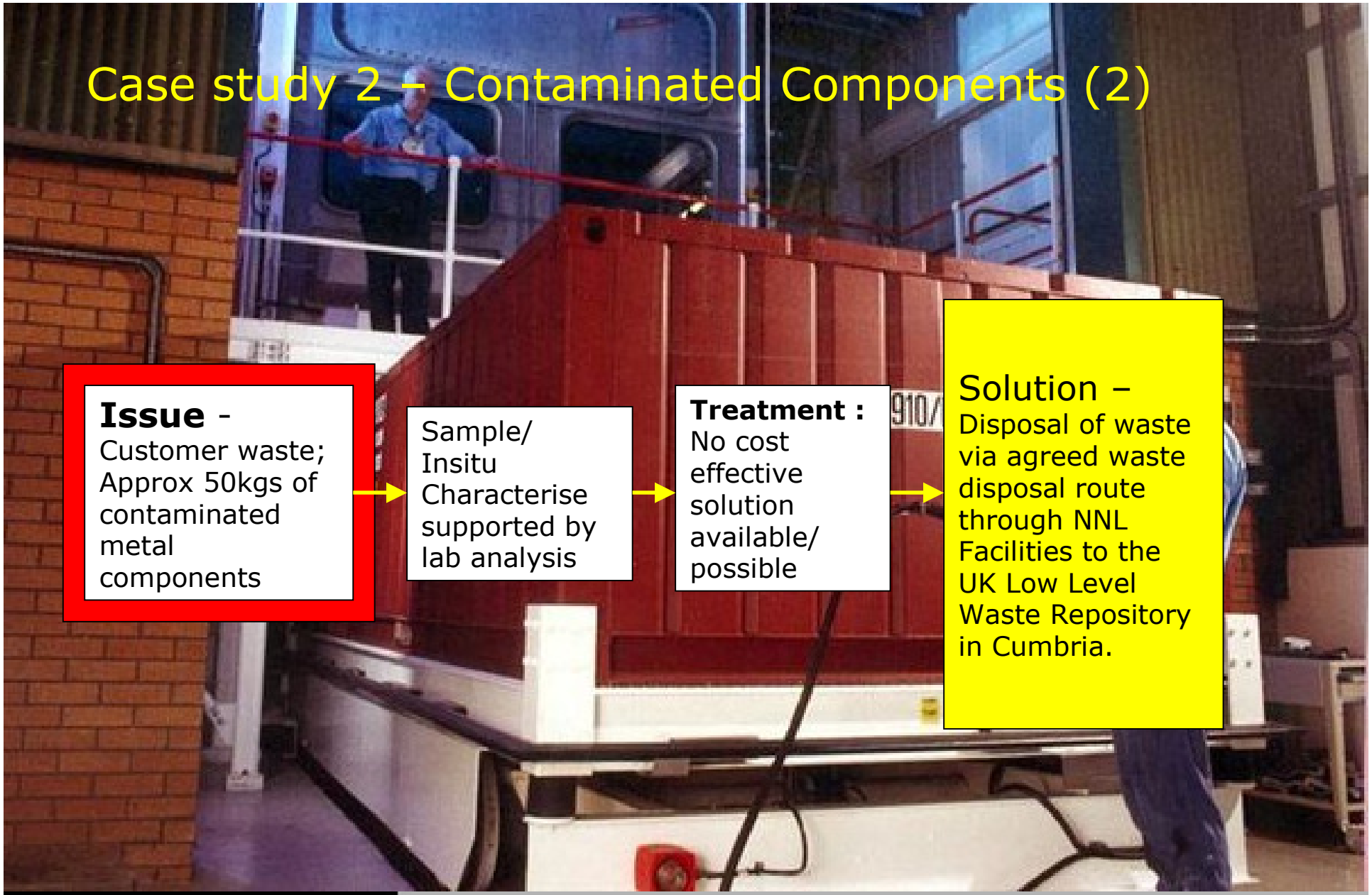
Case study 2 – Contaminated Components (1)

The Customer organisation had inadvertently sourced metal components that were contaminated with varying levels of radioactivity.



Insitu measurement and characterisation was undertaken to confirm the type and levels of radioactive contamination present (Cobalt-60)

Case study 2 – Contaminated Components (2)



Issue -
Customer waste; Approx 50kgs of contaminated metal components

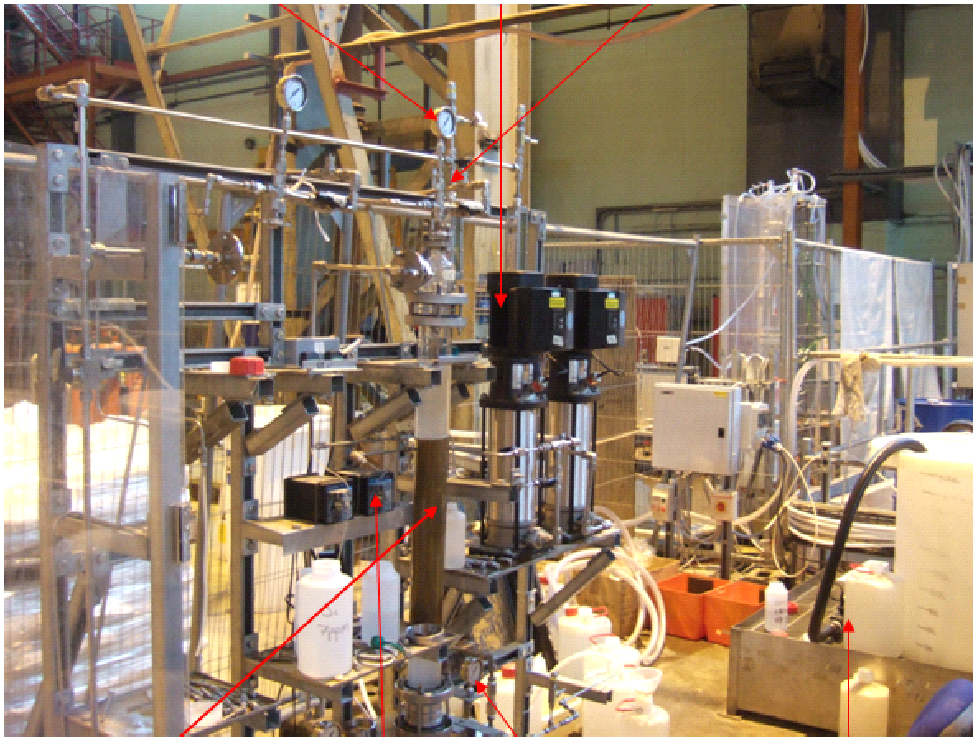
Sample/ Insitu Characterise supported by lab analysis

Treatment :
No cost effective solution available/ possible

Solution –
Disposal of waste via agreed waste disposal route through NNL Facilities to the UK Low Level Waste Repository in Cumbria.

Summary and Conclusion

- There are a wide range of transferable skills existing within the civil nuclear industry that can be applied across NORM industries, particularly in meeting the challenges of “difficult” wastes.



- **Thank you**
- **Any Questions?**