Project Background

- Innovate UK funded collaborative R&D project
  - Pairs SME with large business to bring a technology into the market

- Project Partners – Costain, Tetronics International and others

- Demonstration of nuclear-ready operations
  - Concept Design
  - Safety Case
  - Demonstration Plant
Simulants

- Magnox pond sludge
- SIXEP sand/clino
  - High radiation - shielding and remote operation
  - Current priority
  - Natural organics
  - Continuity of development

- Future decommissioning wastes
  - High contamination
  - Very large volume arisings in the future
  - Heterogeneity - large metal items
  - Synthetic organics
Plasma Furnace Detail

Twin electrodes (2-axes actuation)
Furnace roof and exhaust duct
Furnace shell
Crucible clamps
Water cooled ‘clam shell’
Scissor lift trolley
Demonstration Plant

- Feeding of sludges and fluxes
- Twin electrodes
- Plant cell (cage)
- Plasma furnace
- Water-cooled ‘clam shell’ and base
- Remote loading and unloading of crucible
- Simulated final waste container
The Developed Furnace

• From Engineering Schedule
  • Crucible Clamps and Seal
  • Electrode Clamps and Seal
  • Replaceable roof refractory
  • Remote drives
Wasteform

Crucible seal
Crucible liner
Refractory
Vitrified waste
Results of Trials

~60% bulk waste volume reduction

>95% of caesium retained in wasteform (single pass)

Uniform, unreactive monolith
Product

Single-skinned waste container

Grout

Crucible liner

Refractory

Vitrified waste
Product

500 litre drum

3m³ drum
Suitable Waste Types

• Wastes with immobilisation issues
  - Sludges
  - Containers
  - Particles
  - Oils and greases

• Wastes which are reactive during processing

• Wastes which otherwise remain reactive during storage
Future work

• This project value ~£1.8M - a lot of this funded by project partners
• Next stage will be much more expensive.

• Involvement in Integrated Project Team
• Commercial Development on lower activity wastes

• Graphite Gasification with UoM, MDecon and Tetronics
Thankyou