# TECHNICAL SPECIFICATION SHEET

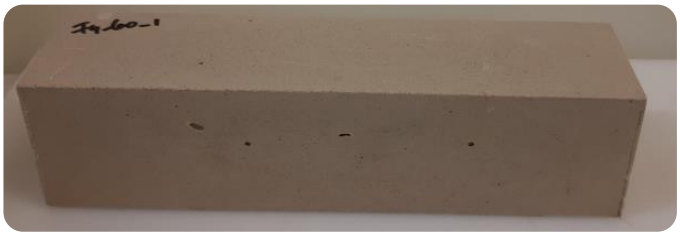
## MALLET™ - MIDAR®-Augmented Lower-cost Lower-carbon Encapsulation Technique for Oils

### Background

- NUVIA and Lucideon have worked on the development of MALLET™ a novel geopolymer formulation for the encapsulation of radiologically contaminated problematic wastes
- One waste stream that has been a focus of the study is contaminated and activated oils that are unable to be incinerated
- Over 600m$^3$ of problematic oil-based wastes require treatment and disposal (UK Radioactive Waste Inventory, 2019), with 44% of this arising at Dounreay
- Alternative encapsulation techniques can encapsulate up to 20% of oil, meaning that 80% of the waste form is the encapsulant

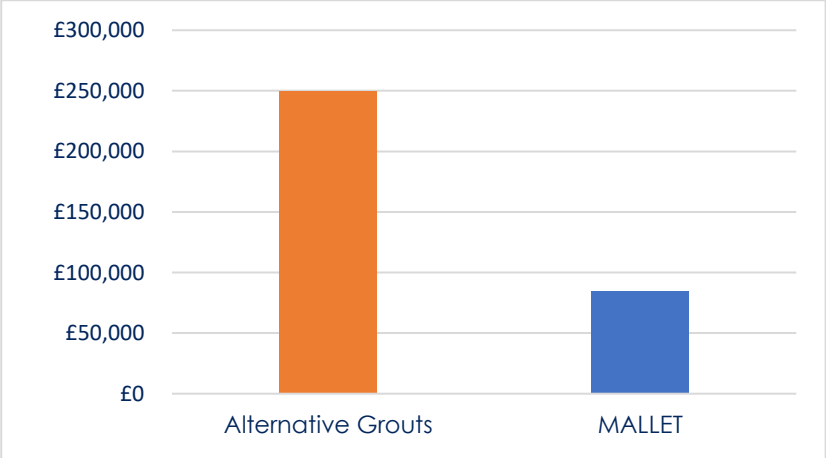
### Problem

- Oil incorporation is only up to 20% of the overall waste form volume – meaning that 80% is grout
- Disposal package costs are 5 times the raw oil volume. ILW disposal costs are £50,000 per m$^3$, so each m$^3$ of oil costs £250,000 to dispose



*MALLET™ encapsulated Oil (60:40 Oil:MALLET™*

MALLET™ ENCAPSULATION OF OIL COULD SAVE £165,000 PER M$^3$ IN DISPOSAL COSTS, SAVING UK TAXPAYERS £99M COMPARED TO ALTERNATIVE ENCAPSULATION METHODS



## Solution

- Oil incorporation using MALLET™ is 60% of the overall waste form volume, meaning that only 40% is geopolymer
- Disposal package costs are 1.7 times the raw oil volume. ILW disposal costs are £50,000 per $m^3$, so each $m^3$ of oil costs £85,000 to dispose

## Benefits

- Lower disposal costs
- Lower interim storage costs
- Lower carbon emissions than OPC
- Simple batch process
- Potential to be used in retrofits of existing encapsulation plants
- Potential to be used as a 'pour on' solution for 3$m^3$ boxes with sludge


*MALLET™ encapsulated Oil simulant cross section (60:40 Oil:MALLET™)*