Outcomes from the application of the 'Hazmelt' thermal treatment technology to a range of simulant LLW and ILW waste-streams.

Owen Mcgann*†[1], Martyn Marshall[1], Robert Werner[1], Shengheng Tan[2], Russell J. Hand‡[2], and Jonathan Macdonald-Taylor[3]

[1]Glass Technology Services Ltd. (GTS) – Glass Technology Services Ltd 9 Churchill Way, Chapeltown, Sheffield, S35 2PY, United Kingdom

[2]Department of Materials Science and Engineering [Sheffield] – Sir Robert Hadfield Building, Mappin Street, SHEFFIELD, S1 3JD UK, United Kingdom

[3]National Nuclear Laboratory (NNL) – National Nuclear Laboratory, Chadwick House, Warrington Road, Birchwood Park, Warrington, WA3 6AE, United Kingdom

Abstract

'Hazmelt' is a thermal treatment technology intended for the vitrification of intermediate and low level nuclear waste, which is derived from novel technology, developed by the main stream glass industry, and specially developed glass compositions. The Hazmelt melter utilises glass melting technology involving the use of submerged thermal elements to allow the treatment of wastes and glasses that would be incompatible with other technologies. This combined with the small volume (_˜0.15 m3) of the melter makes this technology ideal for the thermal treatment of a range of 'problematic' intermediate and low level wastes.
The Hazmelt technology has been subject to a series of small scale pilot trials where the technology has been tested through the treatment of three waste simulants; contaminated soil, 'Magnox' sludge and IEX resin. Through these trials it was demonstrated that the melting technology has the capability of successfully processing a variety of waste chemistries, including wastes with a high moisture content. However, the trials also established that the novel element technology gave rise to the selective accumulation of some simulant radionuclides within the furnace. This effect along with the other outcomes of these trials are discussed.

The glasses developed for these pilot trials are discussed, including the steps taken in the development of their compositions and the outcomes of durability studies that have been carried out.
Details are also provided on how the Hazmelt technology could be incorporated into a waste-treatment plant, taking advantage of the small scale of the melter to produce a small scale waste vitrification plant with the potential for deployment in locations local to waste generation or storage.

*Speaker
†Corresponding author: o.mcgann@glass-ts.com
‡Corresponding author: r.hand@sheffield.ac.uk

Keywords: glass, thermal treatment, thermal, vitrification, nuclear, nuclear waste, waste, Hazmelt, melter, melting technology, radioactive, immobilization