

Packaging of Medium Active Concentrate Heels in EARP WPEP, Sellafield

(Final stage)

Summary of Assessment Report

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British Nuclear Group Sellafield Limited (BNGSL) has submitted proposals to process the contents of Medium Active Liquor (MAL) tank 6/3 through the Enhanced Actinide Removal Plant (EARP) and Waste Packaging and Encapsulation Plant (WPEP), Sellafield. It is proposed that the contents of MAL 6/3 would be processed in the same fashion as Medium Active Concentrate (MAC) with the addition of tetraphenyl phosphonium bromide (TPPBr), which is used to enhance the retention of technetium-99 in the encapsulated waste product. NDA Radioactive Waste Management Directorate (RWMD) has considered whether the contents of tank MAL 6/3 fall within the previously endorsed envelope for MAC treated with TPPBr. In addition, the assessment has also considered whether processing the contents of MAL 6/3 would undermine previous estimates relating to the amount of Tc-99 retained within encapsulated waste products at Sellafield.

MAC was previously stored in three tanks, MAL 6/2, MAL 6/3 and MAL 6/4. A 2005 assessment by RWMD of MAC treated with TPPBr considered the bulk contents of these three tanks but specifically excluded the heel that would be left within the tanks following retrieval of the bulk MAC. Now that the bulk MAC has been retrieved and processed through EARP and WPEP, BNGSL has transferred the heels from tanks MAL 6/2 and MAL 6/4 to MAL 6/3. In addition, the contents of tank MAL 4/3, known as the historic arisings of P3/1 aqueous liquors, have also been transferred to MAL 6/3 for consolidation with the MAC heels. This consolidated liquor has a combined volume of 916 m³.

BNGSL has characterised the consolidated liquor currently held in MAL 6/3 and has confirmed that this liquor is most like MAC. Furthermore, BNGSL has demonstrated that the physical, chemical and radiological characteristics of the consolidated liquor fall within the characteristics for MAC that were assumed by the previous RWMD assessment of MAC treated with TPPBr.

Like MAC liquor, the combined liquor in MAL 6/3 has a significant burden of Tc-99. It is proposed that the liquor will be dosed with TPPBr during processing through EARP to enhance the retention of Tc-99 in the encapsulated wasteform and minimise sea discharges of this radionuclide. Both Tc-99 and the degradation product of TPPBr, TPP+, are significant species in respect of post-closure safety. BNGSL has demonstrated that the previously used best-estimate and bounding case inventories used to assess MAC wastes have been revised downwards following the elimination of a number of previous uncertainties. The addition of Tc-99 and TPP+ resulting from processing of the MAL 6/3 liquor as MAC would therefore not undermine the acceptability of encapsulated Tc-99 bearing wastes. The safety evaluations previously performed for MAC wastes therefore remain valid for the combined liquor in MAL 6/3.

The proposal from BNGSL to process this combined liquor through EARP and WPEP using the process parameters for MAC has been judged not to jeopardise the disposability assessment for the wastes packages and an extension to the extant Final stage Letter of Compliance for processing MAC flocs using TPPBr will be issued. However, such endorsement will be provided on the basis of the submitted information and any deviation from this would fall outside the scope of the endorsement.

A number of Action Points raised during the 2004 RWMD assessment of MAC wastes have been formally closed out as part of this evaluation. BNGSL should note that one Action Point is still outstanding from the 2004 advice report (B04/040) and this should be addressed at the earliest opportunity.