INTRODUCTION

This document describes our experiences with withdrawal and solidification of ion-exchange resins into the SIAL® matrix running under trial period at Dukovany NPP, Czech Republic. Liquid radioactive waste arising from the operation of the NPP with VVER 440-type reactors is stored at the Auxiliary building.

GENERAL INFO

The storage tank OTW30B02 with a total volume of 550 m³ is used to store the spent ion-exchange resins. AMEC Nuclear Slovakia was awarded a four-year contract for conditioning of spent ion-exchange resins with total volume of 250 m³ out of this tank using the SIAL® matrix. AMEC Nuclear Slovakia uses a new aluminosilicate SIAL® matrix for conditioning of the liquid RAW. By the year 2001, company acquired certificate approving immobilization to this type of matrix in the Slovak Republic, and the certificate for the Czech Republic was also acquired in 2007. The SIAL® matrix was approved as an official packaging form for RAW, suitable for final disposal in the appropriate repositories in the Czech Republic and Slovakia. The spent ion-exchange resins can be transported over a short distance via water. The transportation over longer distance was usually problematic. Therefore, an on-site method was selected for conditioning of an ion exchange resins in the immediate vicinity of the storage tank, performed directly at the premises of nuclear facility without any significant interference to the existing technology. The new technology was designed and equipment was manufactured to transport the ion exchange resins, and to subsequently separate resins from the transport medium and fill them into 200 dm³ drums. The ion exchange resins are according to customer requirements immobilized into SIAL® matrix in 200 dm³ drums using immobilization equipment FIZA S 200. During the trial operation within 2010, it was treated a total of 22.3 tons of dewatered resins in 240 drums. Each drum filled with dewatered resin was weighed, and the sample was taken for laboratory analysis. After immobilization into matrix, the gamma spectrometric measurement was performed for each drum with final product. The final product was observed for compressive strength, leachability, radionuclide composition, dose rate, solids and total weight. After consolidation the final product and meeting the requirements for final disposal, drums were transported to the Repository at Dukovany site. The immobilization of spent ion exchange resins into SIAL® matrix shows better results in comparison with other treatment technologies (cementation, bituminization) in terms of parameters and quality of the final product. According to available information from the conditioning centers, the immobilization of ion exchange resins in to other type of matrices is not implemented on a large scale in the Czech Republic and Slovakia, on the ground of inappropriate use of such matrices.

CONCLUSION

This document describes technology, parameters, results and experiences in withdrawal and immobilization of spent ion exchange resins into SIAL® matrix. AMEC Nuclear Slovakia plans treatment of approximately 70 - 80 tons of dewatered ion exchange resins at Dukovany NPP in 2011.