

Overview

Sampling / Monitoring / characterization / decommissioning / waste transport & disposal

Our Waste Led Philosophy and Approach

The challenge associated with this task was to gather all of the information required to define the waste treatment life cycle associated with the Intermediate Level waste (ILW) stream at Chapelcross. Information was gathered to underpin each of the life cycle stages that include the characterisation, retrievals and transport of the raw waste, through its conditioning and packaging, to an interim storage step and onwards transport to disposal.



Characterisation of the waste streams involved monitoring and sampling work to gather the required information to support the development of each of the process stages and to make the ultimate case and justification for the safe disposal of the material.

Nuclear Technologies would apply a similar structured waste led philosophy to any radioactive waste challenge, including those associated with decontamination events. Irrespective of the nature of the waste or the urgency associated with the waste retrieval challenge a full consideration of each stage of the waste treatment life cycle needs to be made to ensure a safe and effective waste recovery solution can be achieved.

DQO process

The key philosophy of our approach was to ensure that sufficient and pertinent information was gathered to understand the wastes and the challenge that they present, such that the development of the treatment steps including disposal can be underpinned. This was facilitated by the application of the DQO process.

The DQO process was initiated by undertaking a workshop with the key project stakeholders with the subsequent document covering the following;

- Clarifying the objective of each task;
- Defining the most appropriate type, quantity and quality of data to collect;
- Determining the most appropriate methods for collecting the data;
- Defining the criteria that a data collection design should satisfy.

The DQO document facilitated and systemised the production of Data Quality Plans (used to set out what data will be collected and where) and Task Quality Plans (aimed at supporting the project quality plan) for each of the characterisation tasks

The DQO process allowed the requirements of the radiometric monitoring of the Chapelcross cartridge cooling ponds to be defined. This included the information to be gathered, which included dose rate using a submersible dose rate probe and information on the likely isotopes present using a Low resolution Gamma spectrometer. The primary purpose of the monitoring was to support the safety substantiation of the intended sample recovery activities and to help categorise the waste. With this in mind DQO was used to help

define where and how monitoring would be done, including counting times, positioning of probes etc.

When it came to sampling activities, for each of the ILW streams DQO assisted in defining; the number and location of samples to be taken, how those samples could be best treated and preserved, the analysis requirements of those samples, including chemical, physical, radioanalytical together with the quality assurance arrangements that were required.

We worked with our contractor Inutec, to ensure that the analysis specification was robust and supplied all of the information needed to meet the process development requirements. This including understanding what could be done, what could not be done and the costs/benefits associated with the more onerous tasks.

In the case of the CXPP wastes (ceramic pellets) we used DQO to gain sufficient information that the intrusive sampling of a proportion of the several thousand waste containers would not be necessary. This is very much in alignment with ALARP principles as it means that minimal dose uptake was endured to characterise the waste.

Sampling Activities

A series of four waste types were characterised during the exercise.

The most technically challenging task was the recovery of samples from the Zeolite Skips in the fuel cooling ponds. The sampling task involved the development, design and manufacture of a drilling and sampling rig to remotely recover samples from the skips that are stored in 6 metres of water. In 2010 we successfully recovered a number of active samples from the zeolite skips.



In addition a series of samples of contaminated desiccant were recovered from humidrier vessels. In this case the waste was recovered using a tailor made blister bag containment system with the aid of bespoke long reach tools used in order to minimise dose uptake. A series of targeted samples were collected and successfully transported to Intec's laboratories for analysis.

Each of the sampling methodologies was tested in an inactive facility prior to deployment on plant.

Preparation for sampling required Nuclear Technologies to develop a comprehensive package of supporting safety documentation including HAZOP's, preparation of Plant Modification Proposals, Method Statements and Risk Assessments and included preparation of the specification for the sampling including the retrieval, waste processing and conditioning steps, transportation to the analytical laboratory and subcontractor management. Work within the Chapelcross facilities where actions associated with the project activities impacted upon operations and associated safety cases were managed through application of the Chapelcross Plant Modification Proposal (PMP) system. Details of controlling documents were defined in a Design Quality Plan. For each of the 4 main characterisation tasks separate quality plans were developed to show the specific interface management arrangements and key stakeholders

Fundamentally the characterisation project was the first phase in the project lifecycle for Chapelcross ILW, with an overall objective of recovering, conditioning, packaging and placing all waste into interim storage pending provision of a national disposal facility. The overall objective for this project was to inform a robust, integrated, comprehensive and holistic (RICH) strategy which is fully underpinned by the application of detailed waste characterisation. This project was focussed on developing approaches that remove project uncertainty and mitigate risk at the earliest possible opportunity. A key thread of this was the implementation of the waste characterisation work to accurately and comprehensively quantify the nature of the problem that the overall waste project seeks to address, prior to carrying out any significant engineering design work. We placed a strong emphasis on the earliest possible identification and mitigation of project risk, thereby increasing the probability of a successful outcome for the project and providing greater clarity and confidence of scope, schedule and cost estimates for future phases of the management of the wastes.

Development of the Waste Treatment Methods

The characterisation information gathered as a result of this project has subsequently been used to develop the processes for the retrieval, conditioning and packaging of the wastes.

NT has carried out a range of related ILW projects for Chapelcross over the last three years including:

- Preparation of the Technical Baseline and Underpinning Research and Development (TBURD) documents.
- Support to reopening the waste route to MBGWs at Sellafield for ILW generated during defueling, including Best Practicable Environmental Option (BPEO) and waste characterisation.
- ILW characterisation activities, including both physical sampling and characterisation and desktop activities
- LOC preparation for the Chapelcross ILW streams.