

BPEO/BPM/BAT Option Studies

Extensive expertise is available within Nuclear Technologies on the development of radioactive waste management and decommissioning strategies. This is underpinned by a wide range of experience in completing optioneering studies including Best Practicable Environmental Option (BPEO), Best Practicable Means (BPM) and Best Available Technologies (BAT) in support of the strategic decision making processes for a number of our major clients including EDF, Magnox Ltd, Dounreay Site Restoration Limited (DSRL), Research Sites Restoration Limited (RSRL), Rolls Royce Marine Power Operations and Atomic Weapons Establishment, Aldermaston (AWE).

Maintaining an up to date knowledge of recent developments in regulatory guidance on BPEO, BPM and BAT, coupled with our consultants' extensive experience within the nuclear industry puts Nuclear Technologies in an excellent position to undertake such studies.

As a consultancy focussed on providing high-value knowledge, the company puts considerable emphasis on maintaining the professional development of our staff. As such consultants have participated in major international conferences such as DECOM and NEDCON as well as playing an active role in many nuclear industry workshops.

Methodology

A staged, structured approach involving a range of stakeholders is typically employed when undertaking optioneering studies. These usually involve the following discrete phases:

- Identification of study aims and constraints
- Identification of options.
- Initial information gathering and coarse screening of options.
- Gathering detailed information on remaining options.
- In-depth assessment to identify and justify the preferred option(s).

Development of preferred option through more detailed assessments.

The design and application of optioneering studies will vary depending on the nature of the topic being addressed and the specific aims and objectives. It is important to target and set up the study correctly to ensure that the customers and the regulators requirements are met.

It is imperative with all optioneering studies to ensure that the outcome is not prejudged and that the assessment process is open and transparent. It is in helping to maintain impartiality throughout a study that Nuclear Technologies can be of particular assistance. We are fully familiar with all the requirements for undertaking optioneering studies, from objective definition through to preparation of the final report including weighting definitions and sensitivity analysis.

Our wide experience and expertise can be demonstrated through the following optioneering related projects;

- **Sellafield Ltd PCM BPEO:** Nuclear Technologies personnel were contracted to carry out a review of the available technologies to identify the BPEO for treatment of Plutonium Contaminated Materials (PCM).
- **DSRL Prototype Fast Reactor (PFR) Size Reduction Facility:** Following on from a peer review of the Report, Nuclear Technologies were contracted to facilitate an Optioneering Workshop to identify the most practicable methods for processing the identified PFR waste items at Dounreay. PFR was commencing a project to provide a means of size

reducing and packaging of wastes currently stored within various locations around PFR namely the decontamination and reactor halls and mortuaries. Additionally, consideration had to be given to future waste items arising from PFR dismantling operations.

- **Sellafield Ltd B30 Technology screening:** Nuclear Technologies recently supported the B30 technology screening project including provision of independent facilitation and an assurance role in ensuring stakeholder engagement was appropriately conducted. The aim of the screening methodology was to take the 11 technology options for the treatment of B30 solid wastes, and screen the technology options such that a smaller number could be taken forward for development.
- **EDF Energy Hinkley Point C RSR Application and Support to NNB GenCo. in the GDA Process:** Nuclear Technologies was asked to provide support a submission of an RSR application to the Environment Agency for the proposed construction and operation of two European Pressurised Reactors at Hinkley Point C. One of the tasks completed involved co-authoring a sub-chapter of the RSR application in order to demonstrate that the design and operation of the reactor would be in accordance with the BAT principle.
- **Magnox Trawsfynydd Waste Packaging:** Our staff were responsible for optioneering a waste packaging design and its packaging equipment to suit new encapsulation process for Magnox Fuel Element Debris. A novel process was required due to the low volume of FED waste drums inventory at the site. This included preparing Waste Packaging Integrity Calculations for RWMD approval.
- **Magnox Chapelcross:** Health Physics Options Study - The object of this study was to investigate the options to be considered in the development of a strategy for the monitoring of items prior to leaving site as free release.
- **RSRL Harwell Site Waste BPEO Study:** Nuclear Technologies were contracted to undertake a BPEO study for wastes arising from operations at the Harwell Site. The scope of work involved: Specialist advice on BPEO concept, Preparation of all technical information for the decision conference Decision conference facilitation and production of a final BPEO report which was consistent with UK BPEO methodology and in compliance with the clients procedures. The work also involved Development of Stakeholder Engagement Strategy.
- **Magnox Trawsfynydd:** ILW Transport Optioneering – this project reviewed the options for replacement of the existing straddle carrier as the transporter of ILW waste packages across the site from cementation facility to the store at Site. A new reach stacker was purchased as a result.
- **Magnox Bradwell:** To implement the waste retrieval project in line with the sites decommissioning timescale, a decision on the preferred option for the management of the Solid, FED and Wet ILW was required. Nuclear Technologies was contracted to undertake a BPEO Study for the management of FED arising at the Bradwell Site.
- **DSRL Decommissioning Detailed Design of Removal of Low Active Drain (LAD):** The detailed designs developed the results from optioneering workshops into a detailed technical solution for removing the drain duct and its internal features. This included waste minimisation, proposed developments and their limitations. The designs included a full process for the drain removal from the method of removing the complete ductwork and internal pipes to managing the trench and contaminated soils that would remain. Nuclear Technologies specified the methods for

cutting the drain, lifting the sections and placing them into the relevant packaging for weather conditions and access and included details of supporting infrastructure and a full detail on how the entire works was to operate from start to finish.

- **RSRL Winfrith BPEO Study of Waste Streams:** Nuclear Technologies was contracted to assist in the production of a study to identify the BPEO for all waste routes on site and other ancillary studies to the satisfaction of the client. The work included: facilitating of site wide BPEO, providing an independent review function and assisting in the sensitivity analysis and production of final report
- **Magnox Berkeley Caesium Removal Plant Project (CRP):** Processing of the mobile and solid waste within the CRP is a key aspect in the progress of the Berkeley Nuclear Licensed Site (BNLS) towards a period of Care and Maintenance. Nuclear Technologies undertook a BPM study to assess the options for processing various waste streams within the CRP, in line with regulatory expectations as well as modern standards. Thirteen separate BPM studies have been undertaken for various aspects of waste retrieval, transfer and solidification.
- **British Energy Radioactive Substances Act 1993 (RSA 93) Review Strategic BPEO /BPM Radioactive Waste Assessments:** The Environment Agency and the Scottish Environmental Protection Agency were undertaking a comprehensive review of the RSA 93 radioactive waste disposal authorisations at each of British Energy's operational sites. They also requested the development of a British Energy Integrated Waste Management Strategy (IWMS). The review required British Energy to complete detailed studies and assessments of their radioactive waste management arrangements. The revised RSA 93 authorisations required British Energy to implement waste management strategies that represented the BPEO and demonstrated BPM in minimising radioactive discharges and disposals. A public stakeholder consultation exercise was also needed to support this work.
- **British Energy Review of Desiccant Management and Disposal Strategy and Associated BPEO:** BEG recognised that there was a need to revisit the corporate strategy for managing its spent desiccant from drying reactor coolant gas and the associated BPEO. This addresses a commitment that was made to the regulators to carry out a comprehensive review following completion of initial desiccant treatment campaigns and to consider alternative approaches that have been developed since the current corporate strategy was identified. Nuclear Technologies were contracted to carry out a Technical Review to identify all potential options, identify key attributes and collate the data packages and to identify the preferred option for management and disposal of the spent desiccant including running the BPEO Decision Analysis Conference and producing the subsequent report including a sensitivity analysis.
- **CERN, Geneva - Decay Tube Dismantling Decommissioning Option Studies:** The CERN Neutrinos to Gran Sasso (CNGS) study's neutrino oscillations in a long base-line experiment. High energy protons are extracted, transported through a 727m long transfer line, particles created are then decayed in a 1km long tube (decay tube) to produce a beam of neutrinos which then travel 730 km through the earth towards a detector at the Gran Sasso laboratory in Italy. Nuclear Technologies were contracted to provide a feasibility study to ascertain the best method of dismantling the underground steel decay tube which will become radioactive and has to be removed from the underground tunnels at the end of the CNGS operation.