NUCLEAR TECHNOLOGY EDUCATION CONSORTIUM

N10 PROCESSING, STORAGE AND DISPOSAL OF NUCLEAR WASTES

Summary

This module reviews basic approaches of nuclear waste management and gives an introduction of scientific fundamentals of nuclear waste processing and disposal. A range of topics will be considered including classification schemes, description of basic techniques of nuclear waste processing, methods of storage and disposal of different types of nuclear wastes.

On completion, students should have obtained:

- A sound understanding of radioactivity, radionuclides and of types of radioactive waste.
- An appreciation of approaches to nuclear waste management.
- Knowledge of the encapsulation and immobilisation of waste in a range of wasteforms.
- A grounding in the techniques of nuclear waste processing to give wasteforms suitable for storage and ultimate disposal.
- Understanding of general performance and safety assessment methods.

Syllabus

- Radioactive waste, recycling, waste minimisation and immobilisation.
- Nuclear decay law.
- Contaminants and hazard.
- Heavy metal contaminations.
- Naturally Occurring Radioactive Materials.
- Background radiation.
- Nuclear waste regulations.
- Principles of nuclear waste management.
- Sources of nuclear waste
- Short-lived waste radionuclides.
- Long-lived waste radionuclides.
- Basic management approaches and characterisation of radioactive waste.
- Pre-treatment of radioactive wastes.
- Treatment of liquid radioactive wastes.
- Treatment of solid wastes.
- Hydraulic cements in waste immobilisation.
- Cementation technology.
- Immobilisation of radioactive wastes in bitumen.
- Glasses for radioactive waste immobilisation.
- Vitrification technology.
- Long term durability of silicate glasses.
- Ceramic and metallic matrices.
- Nuclear waste transportation and storage.
- Nuclear waste disposal.
- Performance assessment.