

Low-Risk Nuclear Waste Forms: Process Technology

Executive Summary

CLASS: Nuclear waste immobilization process technologies.

STATUS: Demonstrated.

MARKETS: Problematic radioactive waste.

INTELLECTUAL PROPERTY: Know-how, R&D, pilot facilities, and multiple patents.

COMMERCIALIZATION: Strategic alliances with end users and engineering contractors.

Technology Background

ANSTO, has over 25 years experience in designing low-risk, reduced-cost, tailored ceramic and glass-ceramic waste forms for the immobilization of radioactive waste.

Immobilization of radioactive waste involves 3 basic steps: waste pre-treatment and mixing; calcination; and consolidation.

ANSTO evaluates a wide range of process options for these steps and demonstrates their feasibility at full scale for various wastes. This is achieved with full integration with waste form chemistry.

synrocANSTO has developed a range of tailored waste forms directed towards wastes difficult to incorporate in glass.

synrocANSTO Technologies

Waste pre-treatment and mixing:

- Wet and dry mixing with waste incorporation;
- Size reduction (coarse, medium & fine);
- Granulation of fines.

Calcination technologies:

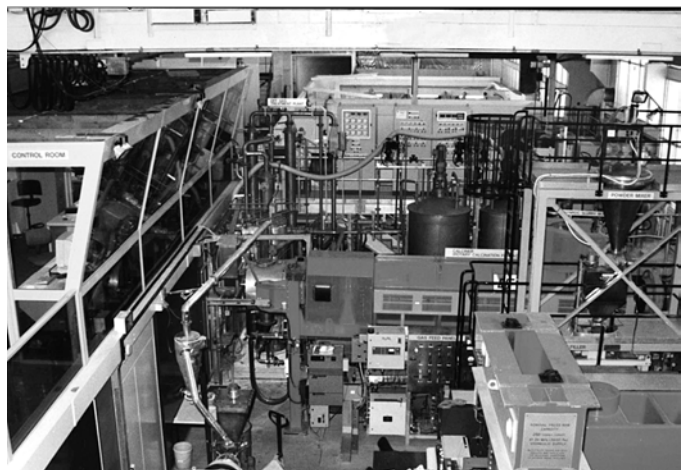
- Rotary, Fluidized bed, vibratory, pot and in-can calcinations;
- Potential auto-catalytic NO_x reduction with waste form chemistry.

Consolidation:

- Hot Isostatic Pressing (HIPing), with zero emissions and high throughput;
- Hot Uniaxial Pressing (HUPing) and Continuous HUP;
- Cold pressing and sintering;
- Cold Crucible Melting (CCM).

synrocANSTO Advantages

- Extensive international experience integrating waste form design, process development and characterization;
- Ability to tailor waste forms and processes to suit particular wastes and client needs;
- Use of industrially mature technologies with nuclear applications;
- Track record in developing quality solutions incorporating customer specific process technologies;
- Objective consultation on waste form and process selection;
- Zero emission consolidation processes.



Market Applications

DEMONSTRATED: Engineering scale plant to process 10kg/hr of waste form;

DEMONSTRATED: ANSTO-ANLW HIP technology in hot cell and scale up to over 100kg

DEMONSTRATED: ANSTO HIP and sintering technology for plutonium legacy wastes;

DEMONSTRATED: Controlled atmosphere calcination of mixed uranium and thorium waste; 5 tons of material successfully processed:

DEVELOPING: waste form and process technology for wastes from radiopharmaceutical production.

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