

## Low-Risk Nuclear Waste Forms for Technetium, Cesium, Strontium & Iodine

### Executive Summary

**CLASS:** Nuclear waste immobilization technologies.

**STATUS:** Product Development - Demonstrated

**MARKETS:** Wastes that contain Technetium (Tc), Cesium (Cs), Strontium (Sr) & Iodine (I).

**INTELLECTUAL PROPERTY:** Know-how, pilot facilities, chemistry & process technology.

**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.

Waste streams containing Tc, Cs, Sr & I pose unique challenges in radioactive waste management:

- Tc, Cs and I are all volatile and highly mobile in the environment and therefore figure heavily in repository performance assessments;



- Cs and Sr account for the majority of the radioactivity in fission product waste streams and generate a significant quantity of radiogenic heat;
- $^{135}\text{Cs}$ ,  $^{99}\text{Tc}$  and  $^{129}\text{I}$  have half-lives in excess of 100,000 years;
- They are often combined with other fission products and process chemicals to form complex mixed wastes.

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

### synrocANSTO Advantages

- Tailored waste forms that eliminate volatile losses during hot-consolidation by using hot-isostatic pressing technology;
- Waste forms exhibit high chemical durability and are based on natural mineral phases that have demonstrated their survival over geological timeframes;
- Waste forms that are chemically flexible, can be tailored to suit the requirements of the waste and readily accommodate process impurities;
- The radiogenic heat of decay does not affect the properties of the ceramic waste forms.
- Waste forms can be produced by a range of mature technologies proven in the nuclear industry

### Market applications

**DEMONSTRATED:** Tc, Cs, Sr & I successfully incorporated into chemically durable waste forms;

**DEMONSTRATED:** Waste forms made with zero to minimal volatile losses;

**DEMONSTRATED:** Waste forms produced by a range of consolidation technologies including melting, sintering and hot-isostatic pressing.

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