TRITIATED WASTE MANAGEMENT - 15607

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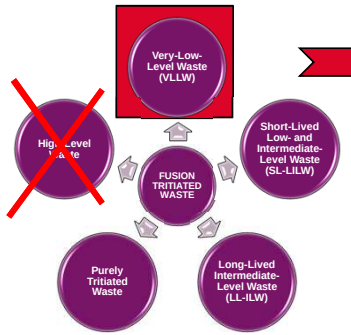
Tritium inventories and outgassing reduction: Issues



No high level radwaste but:
- **Specific materials for disposal , e.g. breeding blankets**
- **Significant amounts of tritium in several types of radwaste**

Case of the tritiated VLLW:
- Specific tritium activity: 2.10^4 Bq/g,
- Close to 100% are combustible

Reducing the tritium inventory and outgassing in primary waste

Advantages:
- Potential downgrading of classification
- Decreased interim storage periods
- Reduced radiation protection constraints.

Disadvantages:
- Secondary waste
- Industrial maturity.

Comparison of Three Techniques

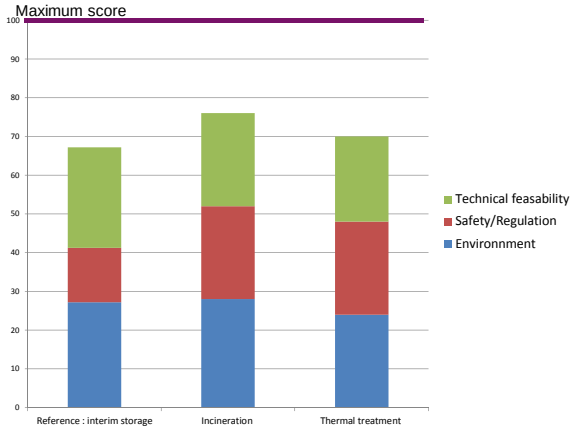
Description

	Process description	Detritiation factor	Illustration
Thermal treatment	- Low temperature , e.g. 60 °C, 12 hours - Primary vacuum	8	
Incineration	- Combustion, e.g. 1100°C for 3 hours - HTO volume depending on the gaseous treatment strategy	> 1000	
Interim storage	- Storage up to 50 years allowing for tritium decay	Natural decay	

Criteria

Criterion	Parameter	Scoring criteria
Environmental (40%)	Global release per year (water/gas)	Tritium amounts released
	Public acceptance	Possible nuisance felt by the public
	Waste volumes for disposal	Waste volume reduction factor
	Secondary waste management	Existence of a suitable waste route
Safety (30%)	Public exposure	Added annual exposure
	Occupational exposure	Level of exposure
	Tritium incident management	Detritiation equipment available
Technical feasibility (30%)	Treatment availability	Time before availability
	Process complexity	Techniques maturity
	Process efficiency	Volume and activity reduction

Main Results



1- Interim storage obtains the best score in technical feasibility (simple and well-tried)

2- Incineration offers a higher tritium and volume reduction than the thermal treatment

Conclusion and Next Steps

A combination of different techniques is the best solution for reducing tritium inventories and outgassing levels, taking into account:
- Radiological, physical and chemical properties of the waste
- Location of the treatment and interim storage facilities
- Acceptance criteria of the disposal facilities.

1. **Interim storage:** the only solution that offers an answer for all types of radwaste (combustible and non-combustible; for low and high levels of tritium).

2. **Incineration: an attractive solution for soft housekeeping waste:**
- Significant radwaste volume reduction
- More cost-effective than interim storage
- Extended release permits will be required for existing incinerators to meet the higher tritium acceptance criteria.

3. **Thermal treatment:** less interesting for soft housekeeping waste because more secondary waste is produced and the costs are higher than those for incineration.

Research is continuing based on a global optimization approach that takes into account release requirements to ensure the correct operation of the processes and of tritiated waste conditioning, while investigating any improvements for disposal facility operation.

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