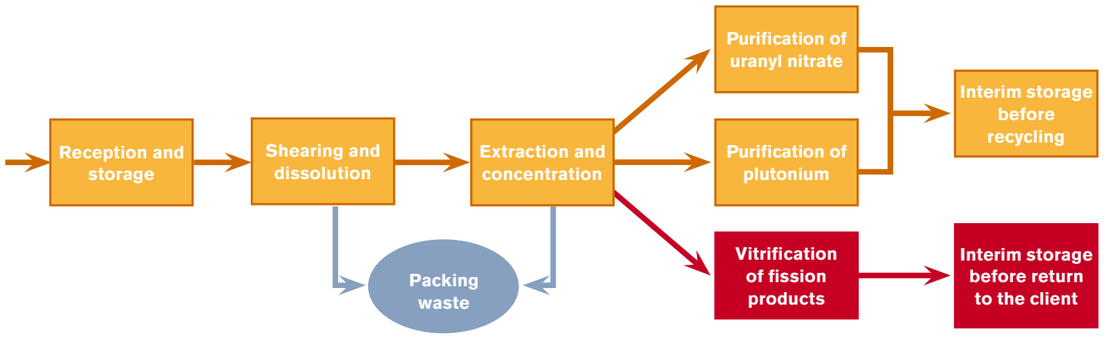
Reprocessing : the whole story



Cutaway diagram of a glass container

End waste from French spent fuel is temporarily stored in a specific hall where it is monitored.

This end waste represents 10 grams per year, per French person which is the same weight as a two-euro piece.

A preference for glass

Homogenous, resistant to the time effects, resistant to thermal shocks and irradiation, the glass manufactured in R7 and T7 facilities is of a composition similar to that of natural volcanic rock (obsidian). Once integrated into glass, fission products are safely trapped for a very long time.

The main advantages of vitrification

Environment-protection

Containment of radioelements in stable, homogeneous glass is used as a means of solidifying end waste, in readiness for disposal under the best possible conditions as regards safety and environment protection.

Client satisfaction

Vitrified residues are prepared according to technical quality specifications that have been approved internationally by safety authorities in client countries (France, Japan, Germany, Belgium, Switzerland, the Netherlands). Vitrified residues are very strictly monitored; quality is thus entirely under control.

In accordance with French law, AREVA NC's customer countries remain the owners of their waste which is returned to them.

AREVA NC
Établissement de La Hague
50444 Beaumont-Hague cedex
Tél. : +33 (0)2 33 02 64 00
Fax : +33 (0)2 33 02 66 11

REPROCESSING NUCLEAR FUEL

R7 AND T7 FACILITIES

Vitrification

AREVA NC

AREVA

Bertaud & Associés - Nantes B 316 844 323 00022 - Photos : AREVA NC - M. Ascani, P. Lesage, S. Jezequel

For a safe and stable solidification of fission products

Non-recyclable fission products, separated from re-usable fuel material (uranium and plutonium) after processing in T2 and R2 facilities, are highly radioactive. The role of R7 and T7 facilities is to incorporate these non-recyclable fission products into glass to contain them and then to pack this glass in canisters.
Vitrification is the final step in the reprocessing cycle for spent fuel; it packs highly active solutions in a form compatible with secure ultimate disposal.

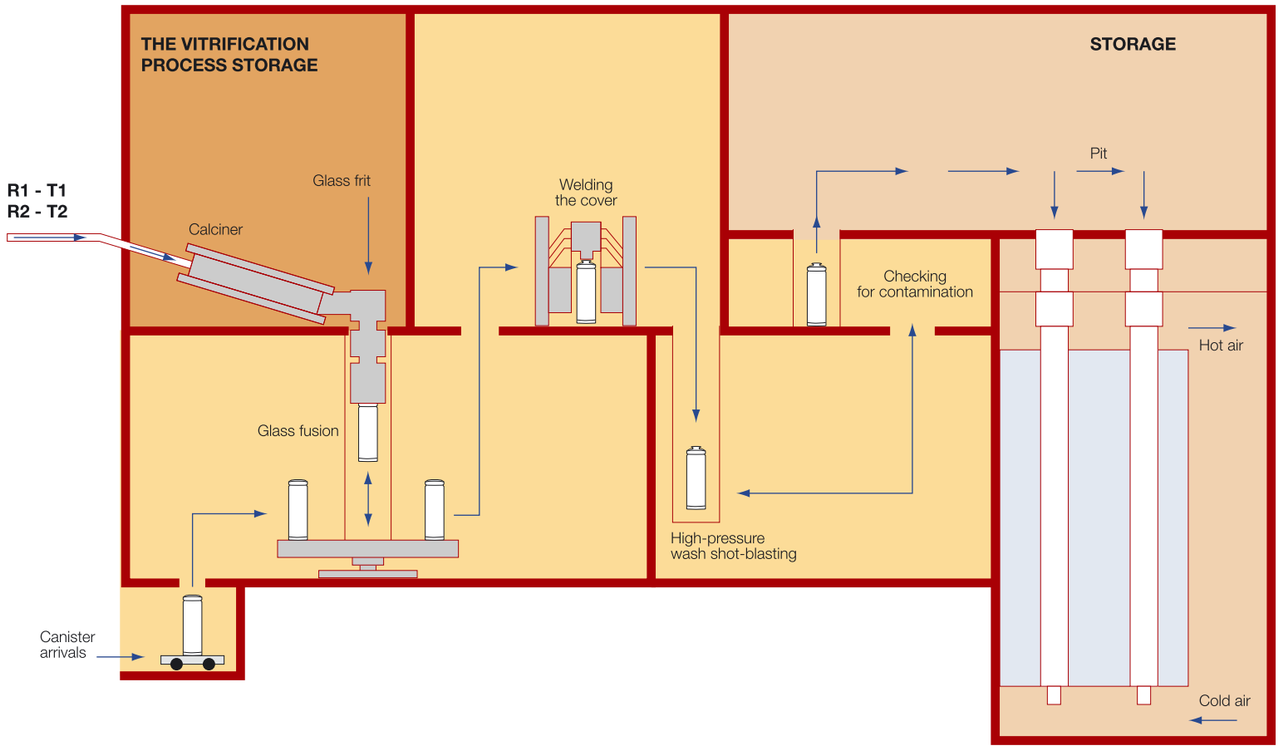
Storage hall.

1/ Preparing liquid solutions

Liquid solutions are composed of acidic solutions of fission products oxides and suspensions of fines (insoluble material) generated during shearing and dissolution. They are “adjusted’ by adding reagents to obtain a final glass that meets internationally approved specifications.

2/ Calcination - Vitrification

The liquid solutions are sent to a calcinator. A calcinator is a revolving tube, heated to approximately 800°C, through which the liquid solutions flow thanks to gravity, then dry to form a calcine. As the calcine leaves the calciner, inactive glass frit is added. The calcine and glass frit (82% glass and 18% fission products) fall together into a fusion furnace heated by induction to over 1,100°C, where they form a homogenous glass.



FINAL DISPOSAL

3/ Filling and packing the containers

The glass thus obtained is powred into a refractory stainless steel container fixed below the fusion furnace. After a 24-hour cooling period, a cover is welded onto the canister. The canister is then decontaminated by high-pressure water spray and shot-blasting. After a smear test for contamination, the canister are placed in interim storage.

4/ Interim storage

A shielded transfer crane that provides protection from radiation emitted by the glass, transfers the containers to ventilated pits where they will be stored vertically before being returned to the client.

Remote handling in dismantling cell.

Glass pouring cell.

Control room.

Welding the cover.