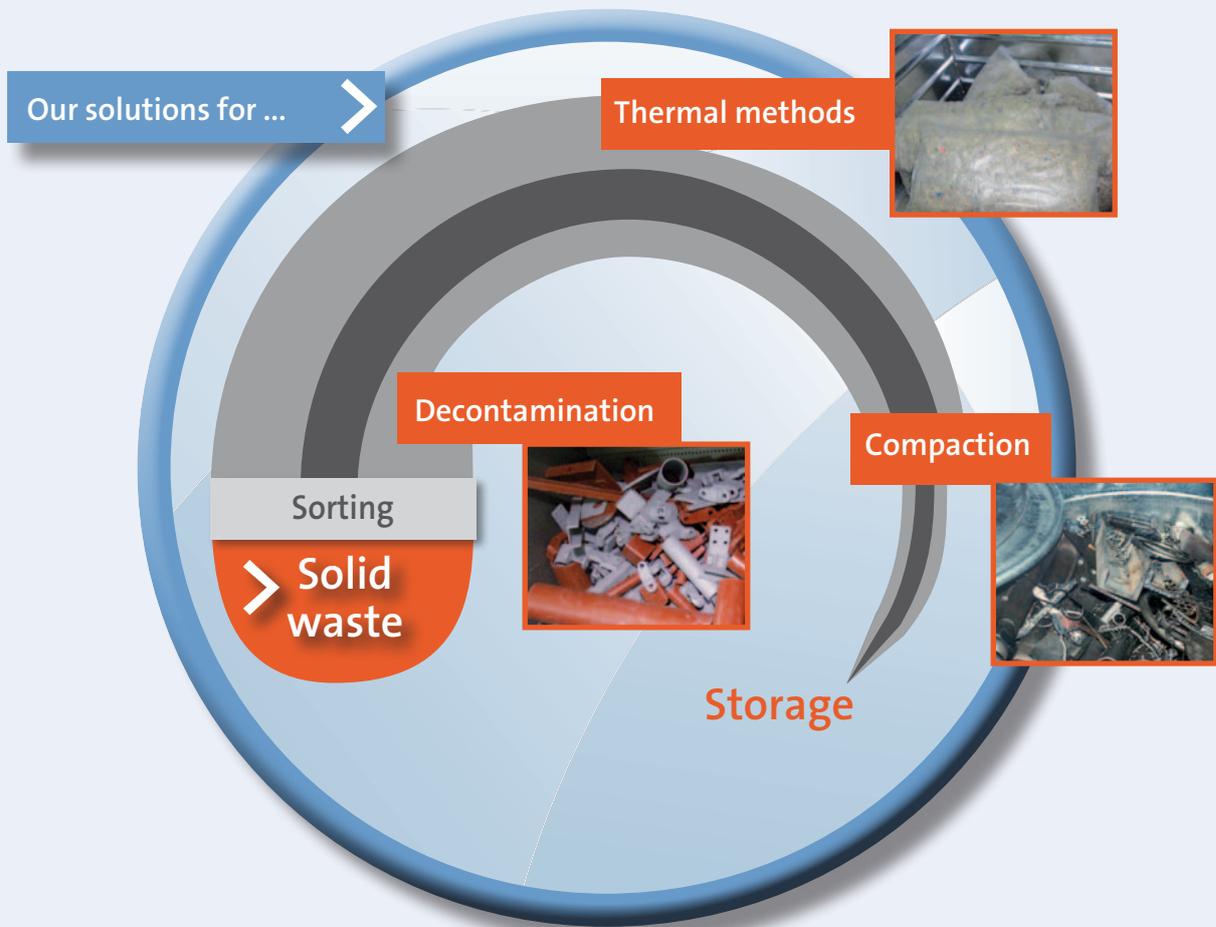


Management of solid radioactive waste

Solid waste

Nuclear facilities generate large volumes of solid radioactive waste during operation and also decommissioning. Reducing these volumes and binding the radioactivity they contain are essential for safe and cost-effective storage of the waste.

First the residual material is sorted, manually or by remote operation, for the appropriate process for optimising volume reduction. NUKEM Technologies offers proven and tested innovative solutions for all areas from sorting to the processing of solid waste.



Our solutions ...

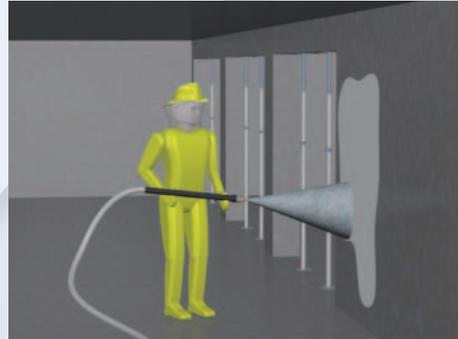
... Decontamination



Ultra high pressure water jetting

Ultra high pressure water jetting is used to remove coatings or as a preliminary cleaning operation before further decontamination procedures.

- Minimises secondary waste as additional abrasives are unnecessary
- Flexible process head design depending on application
- Manual operation or remote control possible



Ultra high pressure water jetting

Abrasive blasting techniques

Abrasive dry blasting removes coatings and the outer surface by blasting with hardened, sharp-edged steel scrap thus allowing effective decontamination.

- Minimises secondary waste by recycling abrasive
- Short batch times
- Plant variants:
 - Tumble blast machine for treating complex geometry parts
 - Roller Conveyor machine for treating long parts
 - Manual short blast cabin for specific retreatment



Metal waste before shot blasting



Metal waste after shot blasting

(Electro-) chemical decontamination

The surface of the waste, and hence the contamination adhering to it, is dissolved by the effect of acids, with the support of an electrolysis process where necessary.

Features:

- Effective primary circuit decontamination to minimise the dose for decommissioning using the DFD process
 - Radioactivity is precipitated concentrated in an ion exchanger
- Effective decontamination of complex geometry metal components by an immersion method
 - Immersion bath size can be adapted to waste size
 - Treatment of electrolyte waste for subsequent storage is possible
 - Electrolyte is converted into a powdery, solid product



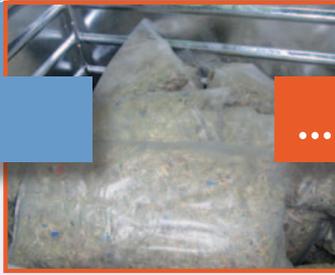
Heat exchanger plate before chemical cleaning



Heat exchanger plate after chemical cleaning

Our solutions ...

... Thermal processes



Pyrolysis

Spent ion exchange resins from the various water circuits in nuclear power plants are treated by pyrolysis so that not only are they reduced in volume but also organic constituents are destroyed.

- Volume reduction by a factor of up to 10 depending on resin type and storage drum
- Organic compound content of the product <1 %
- Non-contaminated secondary waste

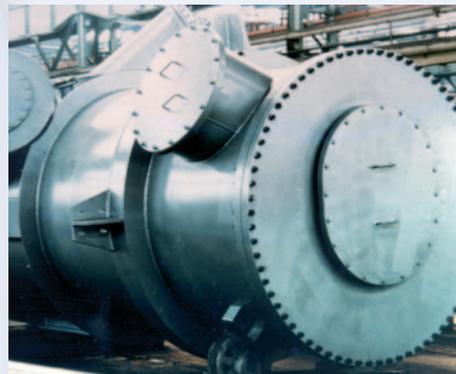


*TBP pyrolysis,
Guangyuan
(China)*

Incineration

Consumables such as cloths or clothing, and also other combustible waste such as waste oil-, for instance, can be treated in the incineration plant.

- Available plant throughput: 25 - 100 kg/h
- Volume reduction up to a factor of 120
- Waste mix of a wide variety of materials possible
- Chemically inert product



*Incineration
plant, Bohunice
nuclear power
plant (Slovakia)*

Exhaust gas treatment

NUKEM Technologies uses a multistage exhaust gas treatment system after incineration or pyrolysis, guaranteeing optimum cleaning by a combination of wet and dry processes which satisfy all current regulations on emissions capture.

- All current regulations are satisfied
- Decontamination factor: 15,000 (total including incineration plant: 30,000)



*Scrubber,
Leningrad
nuclear power
plant (Russia)*

Our solutions ...

... Compaction



Filter press

The geometry of ventilation filters generally used presents a challenge to conditioning in standard drums. Therefore filters are compacted directly into the desired package.

- Compaction load adjusted to reduce the volume of the filters while simultaneously retaining the geometrical integrity of the package
- Steel, aluminium or wooden filter housing can be compacted
- Further compaction in the high force compactor is possible

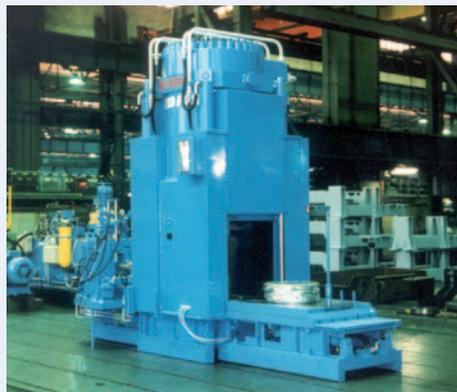


Effective compaction of filter elements, Ignalina nuclear power plant (Lithuania)

High force compactor

The high force compactor allows ultimate volume reduction for residual material remaining as a radioactive waste package from the preceding processes.

- Volume reduction up to a factor of 8
- Press force up to 20,000 kN
- Manual and automated loading and unloading possible
- No dust emissions due to the integrated extraction system
- Variable drum sizes and geometries possible



High force compactor, Leningrad nuclear power plant (Russia)

Storage ...

NUKEM Technologies designs and constructs interim storage facilities to customer's needs taking into consideration the current legal requirements and local conditions.

Features:

- Handling all packages
- Use of remote-controlled cranes and floor conveyors as necessary
- Consideration of inspection options
- Solutions for special workstations for temporarily opening inspection of packages
- Conditioning of the package appropriately for interim storage, e.g. cementation

NUKEM Technologies GmbH

Industriestr. 13, 63755 Alzenau, Germany, T +49 (0)6023 9104, F +49 (0)6023 911188

E info@nukemtechnologies.de, I www.nukemtechnologies.de