Problematic Waste Treatment - inDRUM Technology solution

Studsvik has developed and patented a waste treatment technology applicable to the treatment of:

- Mixed ILW and LLW wastes stored in drums or other containers typically from historic activities
- Waste which can have both radioactive and/or hazardous properties
- Waste that cannot currently be economically, environmentally, or technically disposed of in its current form or through other treatments such as grouting or incineration

Our process is a batch thermo-chemical system designed for the treatment of radioactive wastes to remove characteristics that make the waste unacceptable for shipping, long-term storage, and/or disposal. The resulting inert product can be safe for disposal at European disposal facilities.

LLW or ILW wastes examples suitable for inDRUM

Significant Volume Reduction of:

- Sludge
- Resins
- Organics
- Plastics
- Acids
- Nitrates
- Reactive Metals
- Oils
- Paint

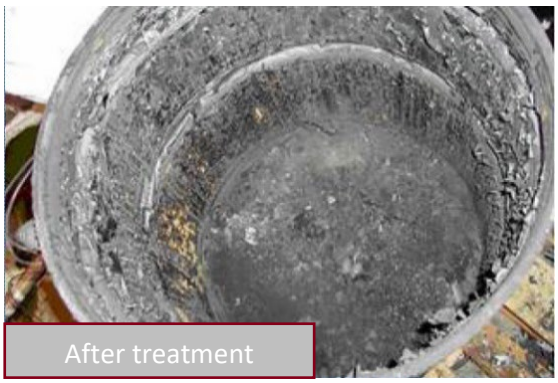
Waste capture possibilities:

- Mercury
- Iodine
- Tritium and C^{14} (Using a partner technology)

Overview of the Process

The inDRUM process utilizes heat and controlled environment to treat containerized radioactive wastes by means of in-container thermal treatment to remove the free liquids, destroy organics, and deactivate corrosives and reactive materials from the containers. The resultant product is a char (ash) which is dry, inert, inorganic waste material.

Treatment is achieved without removing or handling/sorting wastes from the container. In most applications, wastes are treated in the container in which the wastes were originally packaged.



After treatment

Before treatment

inDRUM Container Treatment Unit

The inDRUM process consists of two main treatment systems. An in-container autoclave treatment system which vaporizes liquids, thermally decomposes carbon based compounds, and stabilizes reactive materials, The second system if the off-gas treatment system: consisting of thermal oxidizer, quench scrubber, filtrations systems, and other equipment to achieve the necessary emissions standards.

In the autoclave, containers of contaminated waste are blanketed with nitrogen and electrically heated. The autoclave is normally heated to temperatures between 550˚C and 650˚C. A proven ventilation system captures any solids, reactive, corrosive or volatile gases are treated and volatilized radionuclides captured before the final filtration which will release permissible gases such as CO2.

Depending on waste types, significant volume reduction can be achieved (>90 %), supporting efficient disposal. The resulting waste product is typically a char (ash) which remains in the drum for any necessary final treatment (such as compaction or grouting depending on the disposal requirements).

The Future of inDRUM in Germany

In order to further develop and qualify inDRUM technology for the German waste requirements and associated tasks. Studsvik and GNS have formed a strategic cooperation to successfully tackle this challenge together.

GNS is a specialist in the disposal of high-level radioactive waste and spent fuel from nuclear reactors, as well as in the safe processing, packaging and storage of low- and intermediate-level radioactive waste and residues resulting from the operation of nuclear power plants.

In particular, GNS has valuable expertise and experience in the characterization of nuclear waste materials, associated waste management and treatment activities, decontamination, release and clearance, and the management of waste streams from building structures and machinery components of nuclear facilities.

Studsvik has long experience from treating waste with different thermochemical systems as well as offering such solutions to customers.

Summary

- inDRUM is a patented technology for the treatment of Problematic Wastes which:
- After treatment, the chosen final waste form can be acceptable for European disposal.
- Achieves significant volume reduction for organic and liquid wastes.
- Enables drums to be managed with minimal to no handling of containerized waste.
- Completely destroys nitrates and organics resulting in a stable waste form.
- Removes of any free liquids in the waste through evaporation.
- Nitrates are thermally decomposed into gaseous NOx.
- Corrosives and reactives are converted to inert non-hazardous oxides or carbonate compounds.

Studsvik

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