

Studsvik

Session II: A Solution for B&C Waste “Intentional Mixing”

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Studsvik

Who We Are?

Studsvik Pedigree

60 years of Service to the Nuclear Market

- Studsvik founded in 1949
 - Began as a branch of the Swedish government to develop, build and operate nuclear power plants in Sweden.
 - Early years, specialized in nuclear research, specifically
 - uranium production and
 - fuels and materials technology
- Since those formative years
 - Has diversified its international holdings to become a full service nuclear company with over 1,200 employees and a presence in the US, UK, Germany, and Japan as well as Sweden.

Studsvik's US Market Presence

- Memphis, TN: Acquired RACE, LLC in 2006
- **Erwin, TN: Began Operation in 1999**

Studsvik – Erwin, TN

In the Door Volume: ~300,000 ft³

Volume Reduced Volume: ~ 60,000 ft³

Volume Saved: ~240,000 ft³

Volume Reduction Ratio: 5:1

Waste Streams Processed:

- *IE Resins Consisting of -*
 - *Bead and Powdered Resins; Charcoal; Sludge*
- *Aqueous Liquids*
- *Filter Cartridges (Inorganic and Organic)*
- *Organic Waste Streams*



Studsvik's US Market Presence

- Erwin, TN: Began Operation in 1999
- **Memphis, TN: Acquired RACE, LLC in 2006**

Studsvik – Memphis, TN

In the Door Volume: ~500M lbs

Waste Streams Processed:

- General Waste / DAW / Metals
- Large Components (Pressurizers, Turbines, etc)
- Aqueous / Organic Waste Streams
- Decommissioning / Demolition Rubble

Methodologies:

- BSFR (*Bulk Survey for Conditional Release*)
- Survey for Free-Release
- Waste Sorting / Volume Reduction



Other Venture:

Joint venture with URS/WGI on the Erwin Thermal Process System to the US Government.

Studsvik US Market Experience

- Markets Serving

- Nuclear Utilities (Operating and Decommissioning)

- Institutions, Industrial, and Commercial

- Westinghouse

- Areva

- Honeywell

- Parr

- US Government - DOE

- Columbus Closure Project

- Portsmouth

- West Valley

- Ashtabula

- Brookhaven

- Paducah

- Los Alamos

Terms of Endearment

An Event that was inevitable

- **June 30, 2008 – Barnwell Closed**
- **Class B and C Material is now “Stranded”**
- **A righteous cause to save the “stranded” waste**
- **Evaluating the Alternatives –**
 - Industry evaluations:
 - On-site storage – managing a “stranded waste”
 - Reduction of B and C through system management, short loading
 - Downblending/dispersion – A shift in direction

Concentration Averaging (Downblending)

A Directional Change

- **How did we get here?**
 - Industries failure to resolve the issue of LLRW Disposal
 - When a hole appears, the market place fills it
 - Would this even be considered had a B/C Facility remained viable?
- **Terms of Endearment**
 - Concentration Averaging
 - Downblending
 - Dispersion
 - Intentional Mixing
- **A Paradigm Shift**
 - Volume Reduction versus Volume Dispersion
 - 20 Years of “conservatism”
 - Radical change in direction
 - Conserving valuable disposal space

Environmental Responsibility

- **When considering this new direction -**
 - Is the science sound?
 - What the right this to do?
- **Public awareness and how it will impact the program**
 - The “Nuclear Renaissance”
 - The Political Landscape
 - The Emotional Impact (the power or visualizations)
 - The longevity of the Program when science and emotion collide
 - Like it or not instead of the SCIENCE being the key driver; public and political perceptions and pressures will determine the viability and longevity of the Program

Maintaining an established Industry Direction

RadMaterial Disposition Program

- **Studsvik's Proposed Direction**

- NO CHANGE in present waste management operations
- Place the generator into the same position, legally and financially, as under the present climate
- Maintain a direction that follows a consistent industry interpretation of the BTP that has survived almost 20 years of public, political, and regulatory scrutiny

RadMaterial Disposition Program

Studsvik's THOR™ Thermal Process

- Waste is processed thermally through THOR™ Technology
 - Placed into a common tank (same process as today)
 - Fed through the THOR Pyractor creating “Reformed Residue”
 - It volume and mass reduces/eliminates organic wastes transforming it into a non-reactive form that is nearly as perfect a waste form as one can get
 - Chemical form is changed (organics removed)
 - Radiological identity of aggregate no longer attributed to a single source
- Conservation Volume Reduction ~5:1
- Title of waste processed through THOR is transferred to Studsvik

RadMaterial Disposition Program

Programmatic Outline

- Class B and C Waste
 - Thermally processed through THOR™ –
 - Makes Studsvik the attributable generator of the waste
 - As the “Attributable Waste Generator” Studsvik -
 - Takes title to the waste material
 - Accepts financial responsibility (liability) for the waste material
 - Class B and C Waste: The waste material is containerized and safely stored until a disposal option is available ---
- Class A Waste: Waste is processed, VR'd
 - Thermally processed through THOR
 - Disposal and manifested as “Studsvik Waste”

Studsvik Takes Title

Meeting Regulatory Requirements

Program Conditions

Satisfying Regulatory Issues

- **Taking Title**

- Studsvik operates in TN under a License issued by the State of TN
- License Amendment Submitted to State of TN License Authority
- Upon approval:
 - All waste processed thermally (THOR™) Studsvik becomes the “generator of the waste” and therefore is attributable for and title holder the waste
 - Therefore, the State of Tennessee would consider Studsvik the attributable generator of waste material processed through it Pyractor

- **Storing Studsvik B & C Material**

- Where: WCS, Andrews TX
- WCS operates in TX under a license issued by the State of TX
- License Amendment Submitted to State of TX License Authority
- Upon approval Studsvik’s Waste:
 - Would be allowed to be stored at WCS in below ground storage vaults specifically constructed for this material
 - The material is authorized for an “unrestricted term of storage.”
 - A “financial assurance” initiative is established

Managing Financial Liability

Program Conditions

Satisfying Financial Assurance Management

- **Liability Management for Class B and C Waste**
 - A Waste Management Fund (WMF) is created by Studsvik
 - A portion of the fee is placed into the WMF equal to \$3,146/ft³
 - Operates in a similar manner as a Decommissioning Fund
 - Prior to receipt of first container at WCS, Studsvik provides “Financial Assurance” and issues to TCEQ an -
 - Irrevocable Standby Letter of Credit (~\$2.4M) for every 6 containers are placed in storage
 - An enhanced storage facility design for safe storage of Studsvik Waste

Texas Commission on Environmental Quality (TCEQ)

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