Studsvik

SNF

# 3D Spent Nuclear Fuel Characterization and Analysis

Studsvik's SNF calculates isotopic concentrations, radiation source terms, and decay heat of spent light water reactor (LWR) fuel. By using the detailed, 3D power history from SIMULATE and isotopic inventories from CASMO, SNF provides the most accurate spent fuel analysis available.

Extensive Validation

- SNF has been validated against both international measurements and existing reference codes, such as ORIGEN.

- Source term validation has been performed against measured neutron emission rates of isotopes such as ^{242}Cm, ^{244}Cm, and ^{246}Cm.

- SNF also excelled in comparisons with fuel assembly decay heat measurements of a large number of BWR and PWR spent fuel assemblies at the Clab storage facility in Sweden.

Remove Complication. Remove Cost.

- SNF runs within minutes versus weeks, when used in the CMS eco-system, compared to other codes.

- SNF provides best-estimate results with best estimated uncertainties.

- SNF utilitizes the most recent Nuclear Data (ENDF/ B-VIII.0) available and removes the need for hand calculated corrections from older libraries.

- SNF has been shown to increase cask utilization by reducing conservatism in decay heat predictions versus conventional cask loading tools.
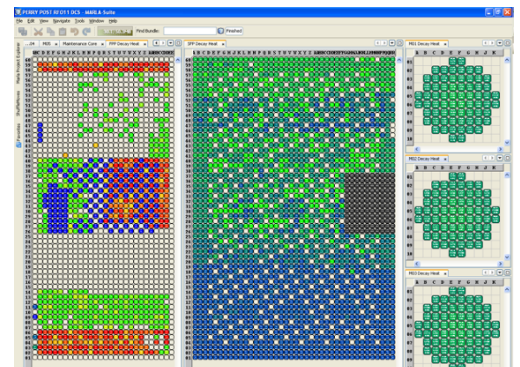
*Spent Fuel Pool and Casks*

Created at the Request of Customers

Studsvik's SNF software explicitly calculates decay heat, decay chains for safeguards isotopic inventory reporting, and rapidly determines source term in pools, casks, and final repository.

SNF is the most reliable spent fuel analysis tool available, leveraging CASMO and SIMULATE state-of-the-art methods.

Consistent Methods, In–Core and Out

- SNF leverages the multi-dimensional methods of CASMO and SIMULATE to provide a robust evaluation of isotopic concentrations, radiation source terms, neutron and photon spectra, and decay heat of spent nuclear fuel.

- Utilizing the detailed power histories, and the explicit nodal representation of the fuel assemblies, SNF ensures unparalleled fidelity.

- Any configuration of light water reactor fuel that can be modeled in CASMO may be analyzed with SNF.

- Multiple international standards are integrated into SNF for complementary information in comparison to explicit SNF calculations.
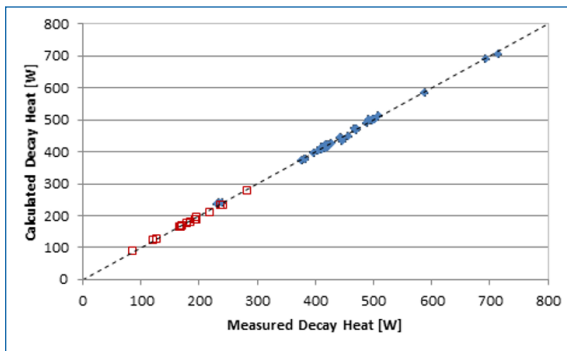
Reduce uncertainties with Studsvik accuracy

Applications

- SNF provides easy-to-use reports of radioactivity, photon and neutron spectra, and decay heat for use in cask loading design and optimization.

- Additionally, SNF can be used by reactor engineers to assess the decay heat of fuel in the reactor during shutdown or in the spent fuel pool.

- SNF has been coupled to GARDEL, Studsvik's on-line core monitoring software, for real-time decay heat calculations for the operating core.
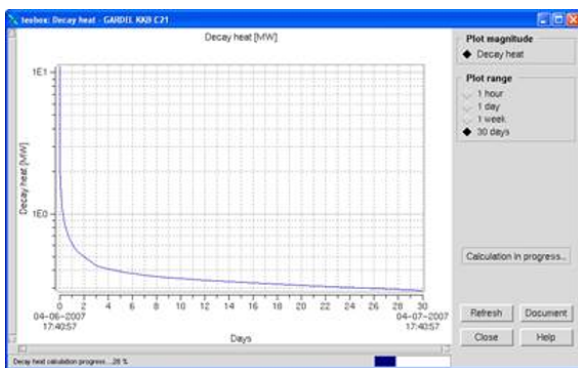
SNF Decay Heat curve in GARDEL

Fuel Cask Utilization

- SNF has been shown to increase cask utilization (i.e., fewer unloaded locations) by reducing conservatism in decay heat predictions versus conventional cask loading tools.

- The robust models and detailed fuel history data used by SNF can help prevent partially loaded storage casks, saving money in engineering time and costly cask loads.

Enhanced Modeling

- SNF includes enhanced mixed-oxide (MOX) modeling, additional actinide data for decay times up to 1 million years, and the most current neutron yield data.

- These improvements, coupled with Studsvik's industry-leading fuel management methods, make SNF the most reliable spent fuel analysis tool available.

- SNF is fully capable of analyzing non-LWR fuels.

Ease of Use

- SNF requires little effort from the user to produce detailed spent fuel assessments. All that is required is an isotopic library from CASMO and, optionally, power history results from SIMULATE.

- SNF complements Studsvik's in-core fuel management suite, providing the ability to support the entire nuclear fuel lifecycle.

Requirements for SNF

- SNF requires a valid CASMO5 license. To use additional features, a SIMULATE5 license is also needed.

- SNF is available for all standard computing platforms running most modern 64–bit operating systems. Linux, Windows, and UNIX architectures are all acceptable environments for SNF.

Unparalleled Customer Support

Studsvik's technical support is built on putting the needs of its customers first.

- 24–hour response time

- Easy ticketing system

- On-line support portals

- Access to technical documentation

- Active and growing user communities of practice

For further information please contact:

Your Studsvik representative or

e-mail: **cms–info@studsvik.com**

www.studsvik.com