

Status of US Spent Nuclear Fuel Data Management: System Development, Collection, and Preservation

IAEA Virtual Technical Meeting

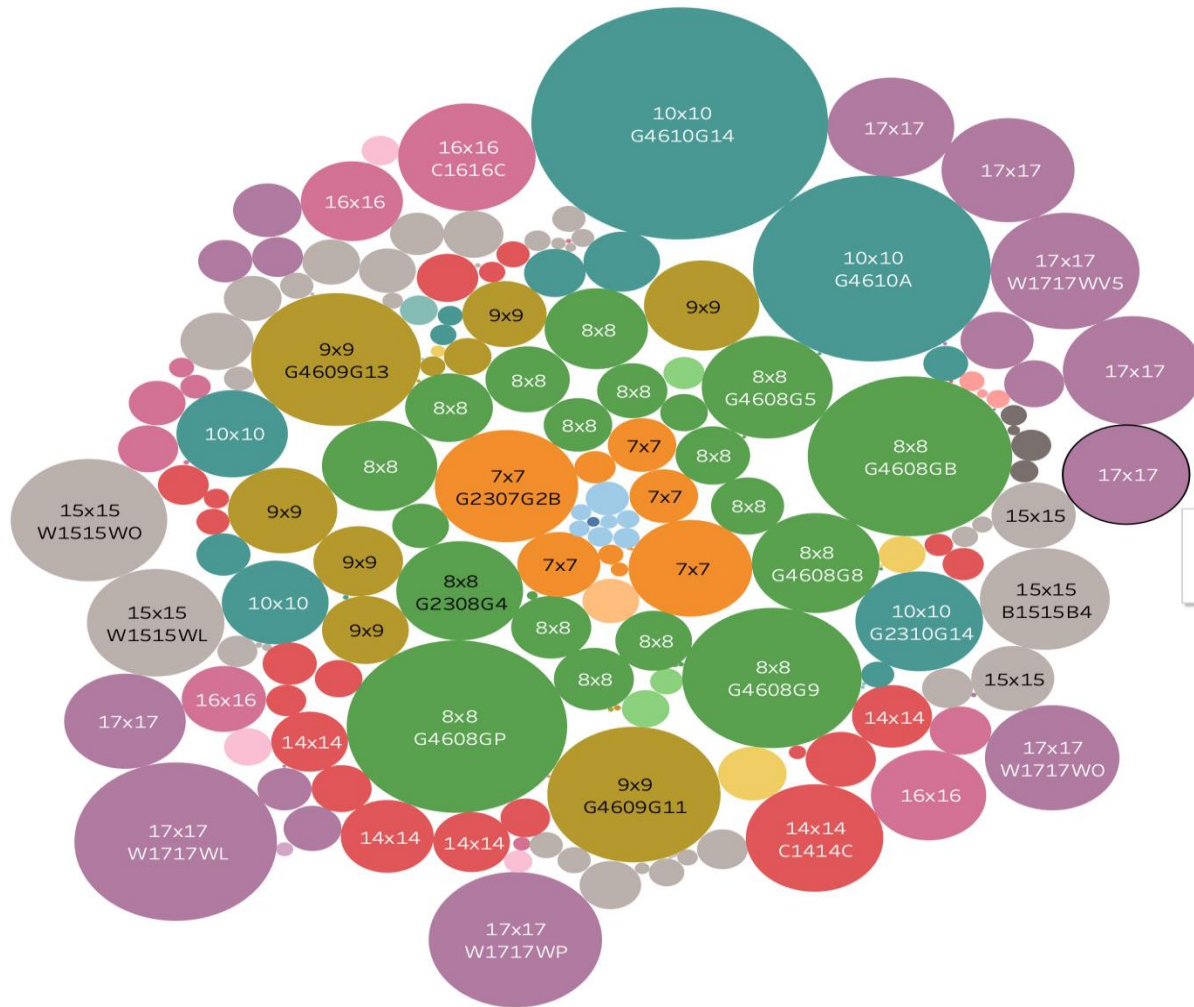
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The large spent nuclear fuel (SNF) volumes and diverse systems in the United States make system-wide planning a complex undertaking



Each bubble presents an assembly type

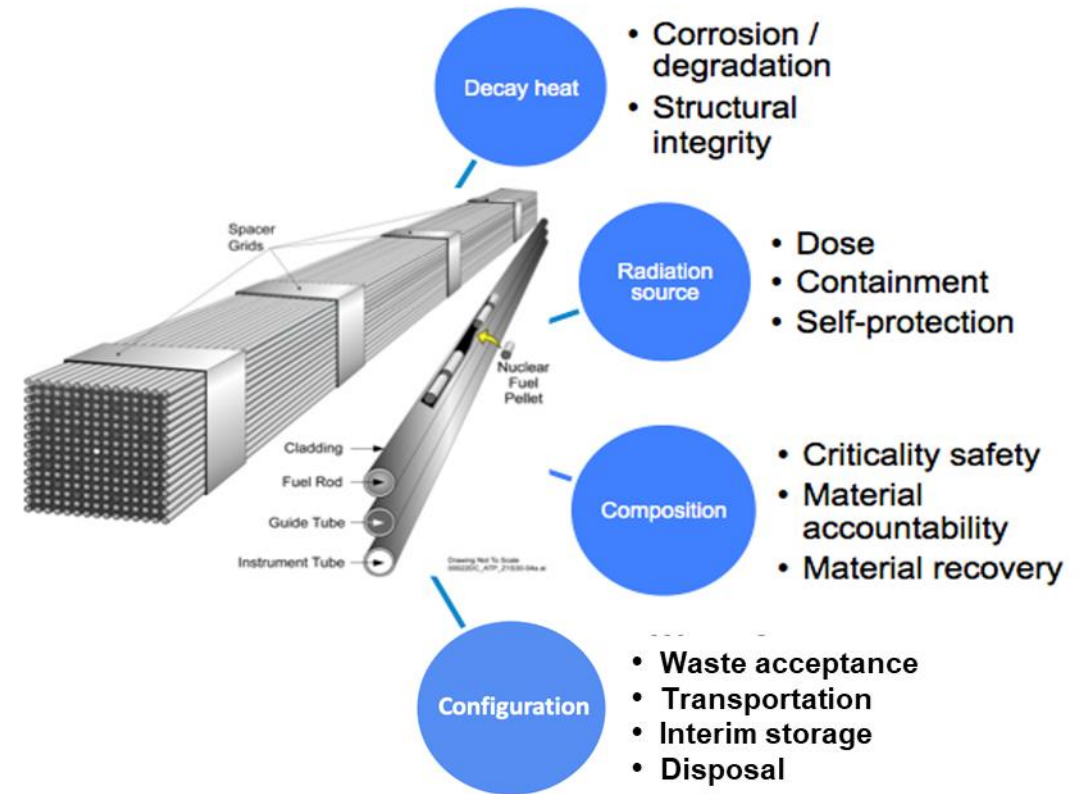
Fuel Assembly Type (group): W1717WVH
Lattice Type: 17x17
Count of c1.csv: 3,947

Automated best-estimate used nuclear fuel analyses from reactor power production through disposition



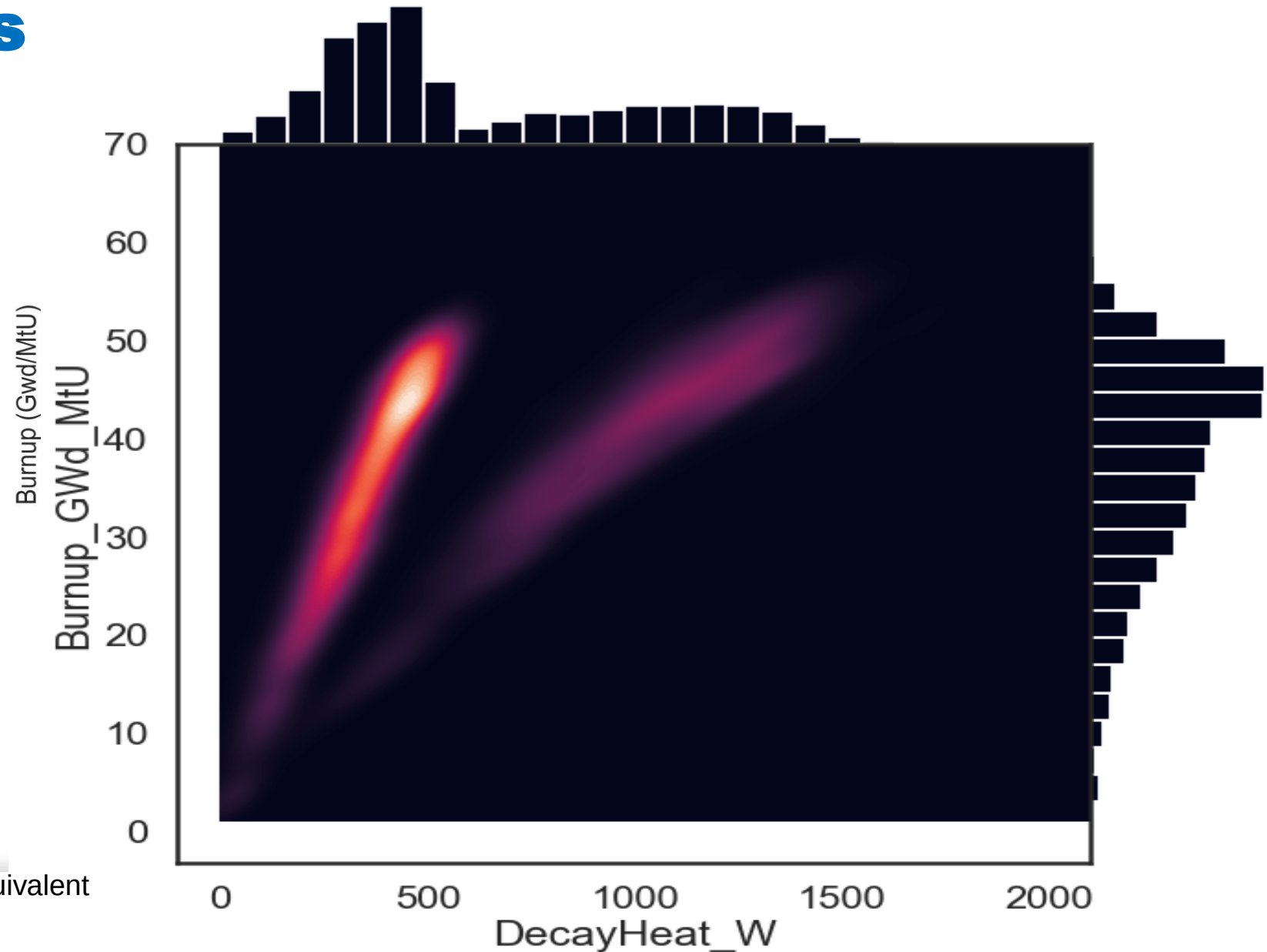
Any SNF related activity starts with understanding the SNF characteristics

- SNF and related systems characteristics can be categorized into:
 - **Base Characteristics:** fuel geometry, materials, reactor irradiation histories (e.g., cycle length, specific power etc.), cask system, cask loading patterns used to store SNF
 - **Derived Characteristics:** decay heat, isotopic composition, radiation sources, cask criticality, transportation cask dose rates



UNF-ST&DARDS is being developed to integrate data and analysis capabilities

- Used Nuclear Fuel-Storage, Transportation & Disposal Analysis Resource and Data System (UNF-ST&DARDS) provides an SNF database structure designed to work with integrated analysis tools
- The Unified Database (UDB) structure can be used to consolidate key information from multiple sources and preserve data
- Data relations facilitate analysis automation



Note: In this context, used nuclear fuel (UNF) is equivalent to spent nuclear fuel (SNF).

Nuclear Fuel Data Survey Form - GC-859

- **US Department of Energy (DOE) collects data from US nuclear utilities via a Nuclear Fuel Data Survey using Form GC-859 including**

- SNF initial enrichment, discharge burnup, initial U content, storage location, assembly type, assembly condition, non-fuel component etc.

- **Prior data collections: 1983-1995, 2002, 2013, 2018**

- Currently using a 5-year data collection cycle

- **GC-859 has 6 schedules/sections**

- Schedule A: Site information
- Schedule B: Reactor data
- Schedule C: Fuel data
- Schedule D: Storage facility data
- Schedule E: Non-fuel data
- Schedule F: Greater-than-Class C (GTCC) data



OMB NO. 1901-0287
Expiration Date: 03/31/2021
Burden: 90 Hours

FORM GC-859 NUCLEAR FUEL DATA SURVEY

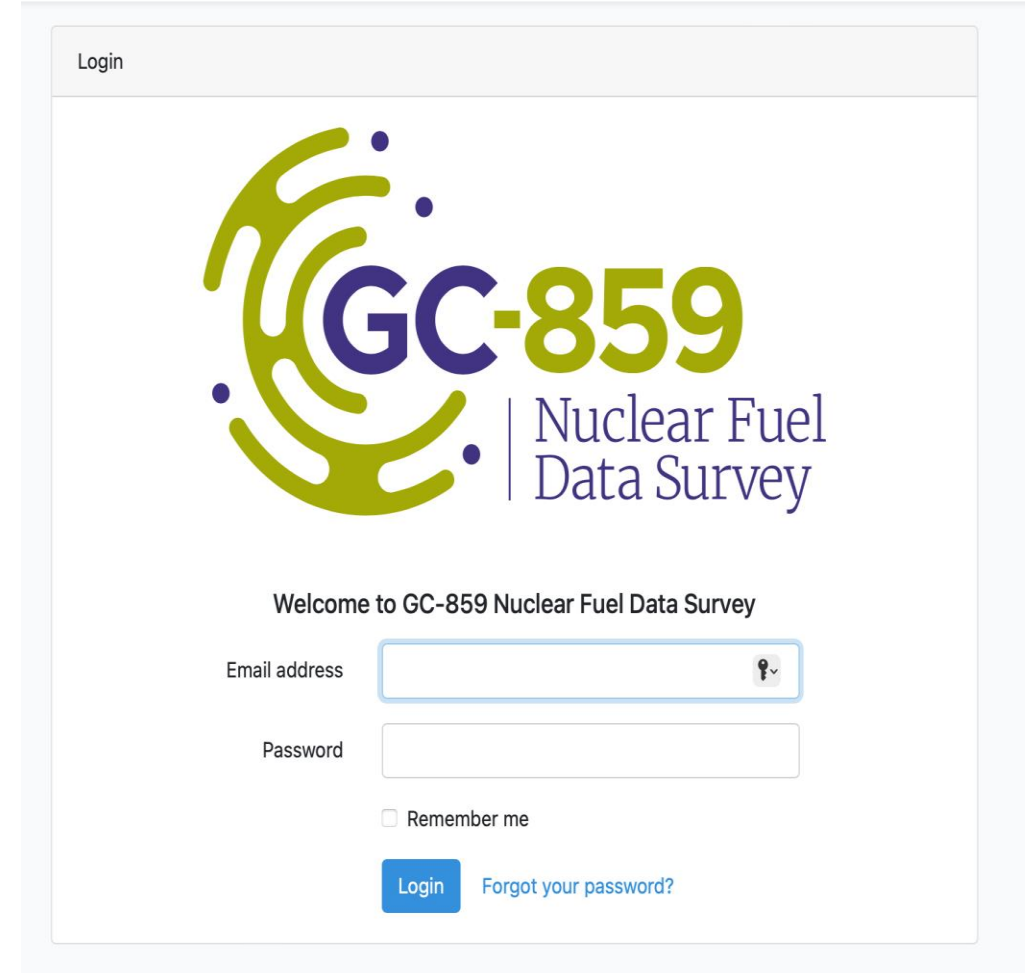
Legislative Authority: Data on this mandatory form are collected under authority of the Federal Energy Administration Act of 1974 (15 USC Schedule 761 et seq.), and the Nuclear Waste Policy Act of 1982, as amended (42 USC 10101 et seq.). Failure to file after receiving Energy Information Administration (EIA) notification may result in criminal fines, civil penalties and other sanctions as provided by the law. Data being collected on this form are not considered to be confidential.

Title 18 U.S.C. 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.

Public Reporting Burden: The public reporting burden for this collection of information is estimated to average 90 hours per response. The estimate by respondent category is 100 hours per response for operating nuclear reactors, 60 hours per response for permanently shutdown nuclear reactors, and 40 hours per response for storage facilities and research/test reactors. The estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Energy Information Administration, Office of Survey Development and Statistical Integration, EI-21, 1000 Independence Avenue, S.W., Washington, DC 20585, and to the Office of Information and

Nuclear Fuel Data Survey Form - GC-859

- Previously, GC-859 Data was collected using a Microsoft Access* database
- Currently we are developing a web-application for GC-859 data collection
 - Online data validation, completeness check
 - Easy entry
 - Accept native format
 - Preserve data in a Structured Query Language (SQL) database



The screenshot shows a web application interface for the GC-859 Nuclear Fuel Data Survey. At the top, there is a 'Login' header. Below it is the GC-859 logo, which consists of a stylized green and purple circular design with the text 'GC-859' in large purple and green letters, and 'Nuclear Fuel Data Survey' in smaller purple text to the right. Below the logo, the text 'Welcome to GC-859 Nuclear Fuel Data Survey' is displayed. There are two input fields: 'Email address' and 'Password'. The 'Email address' field has a dropdown arrow on the right. Below the 'Password' field is a checkbox labeled 'Remember me'. At the bottom, there is a blue 'Login' button and a link that says 'Forgot your password?'.

*Note: Access is a trademark name of the Microsoft Corporation

Unified Database - UDB

- **For DOE, the Unified Database (UDB) structure in UNF-ST&DARDS is populated with GC-859 and additional data to support analysis, planning, and preservation**
 - Fuel base characteristics data (rod dimensions, geometry etc.) from prior SNF characteristics database information
 - Various cask/canister data (mainly from publicly available sources)
 - Other data needed for nuclear analyses
- **UDB also stores SNF decay heat, isotopic compositions, dry canister criticality, dose, and temperature information as a function of time**
 - Calculated using UNF-ST&DARDS, SCALE, and COBRA-SFS analytical tools

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Thank you!