



WIR SCHAFFEN WISSEN – HEUTE FÜR MORGEN

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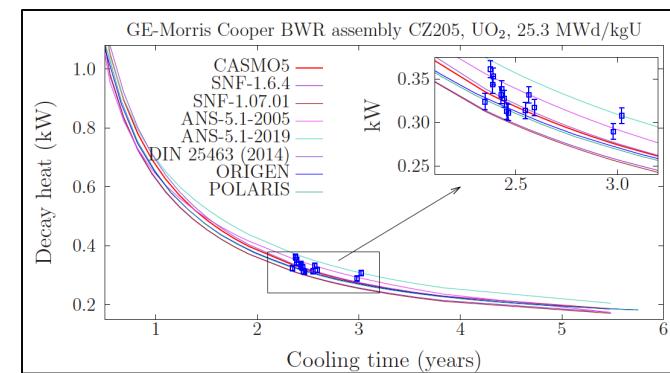
NEA SG12: Decay heat for existing SNF Short overview

IAEA SFC RCM-2, September 20-23, Calmar, Stadthotel,
Sweden



Subgroup general goal

- Goal: Provide users with reliable estimations of SNF-DH
 - Spent fuel from existing power plants
 - Decay heat for specific cooling periods (to be determined (*e.g.* < 3days, >months, years, decades, more))
- Intermediary steps:
 - Knowledge exchange, discussion, presentations
 - Report SOTA (state of the art)
- Preparation:
 - New benchmark
 - Measurement needs and possibilities
- Links:
 - NEA (WPEC, RW)
 - IAEA (NE, NA)
 - EU, national, international activities



Activities in 2022

- Online WPNCS meeting (short update), January 28, 2022
 - Official start of the SG12
- 1st meeting (online), March 15, 2022
 - Define the structure of the report, assign persons/sections
 - Discuss, collect ideas for a new DH computational benchmark
- Online meeting, April 1st, 2022
 - Update/debrief on the previous meeting (for participants unable to previously join)
- Online meeting, May 18, 2022
 - Defining a proposal for a DH benchmark, to be presented at the next meeting
- 2nd meeting (hybrid), June 27, 2022 (see next slides).

Main outcome of the 2nd meeting

- 62 participants, 21 in person
 - 7 technical presentations, 2 overview presentations (1 RWMC, 1 WPNCS)
 - Discussion on the SG12 report
-
- Decision on future computational benchmark
 - Letter of support for a calorimeter, interest in a joint project
 - Need of new measurements

Presentations 2nd meeting

- 2 CRIEPI presentations:
 - Measurements of g-rays from short lived fission products (< 4sec)
 - Need to simulate bremsstrahlung ray for Sr90 to Y90
- KKG presentation: project of a calorimeter
- CEA presentation: validation tool with PIE and CLAB data
- Studsvik presentation: new code available to the SG for standards
- VTI presentation: Validation of cask calculations
- EPRI presentation:
 - PIRT report,
 - EPRI-SKB collaboration,
 - new available DH measurements and re-evaluation

Reporting

- Main goal of the SG12: SOTA report (available on Overleaf)

A short introduction to Spent Nuclear Fuel decay heat

D. Rochman¹, J.-F. Martin², L. Giot³, R.W. Mills⁴, S. Sato⁵, A. Algora⁶, F. Àlvarez-Velarde⁷, K. Govers⁸, Y. Nauchi⁹, V. Hannstein⁹, R. Dagan¹⁰, E. Vlassopoulos¹¹, A. Shama¹¹, Pl. Petkov¹², R. Ichou¹³ et al. F. Minato¹⁴, S. Häkkinen¹⁵ [add your name here]

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Open questions

- Same questions as in the EURAD WP8 and the CRP projects
 - How well can we characterize SNF (nuclides, decay heat)?
 - What are the (industrial) needs ?
 - Source of uncertainties (modelling, 2D, core simulator...)
 - How much do we trust calculated burnup, core power...
 - How blind are we ?
 - New measurements, which ones ?

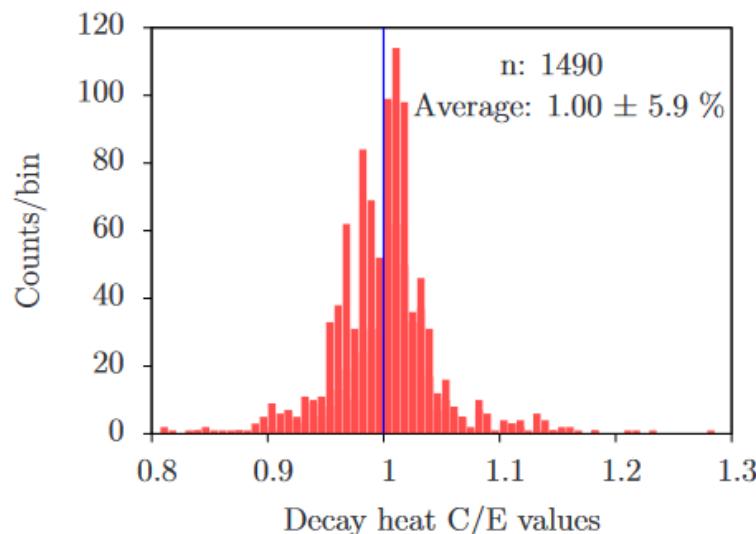


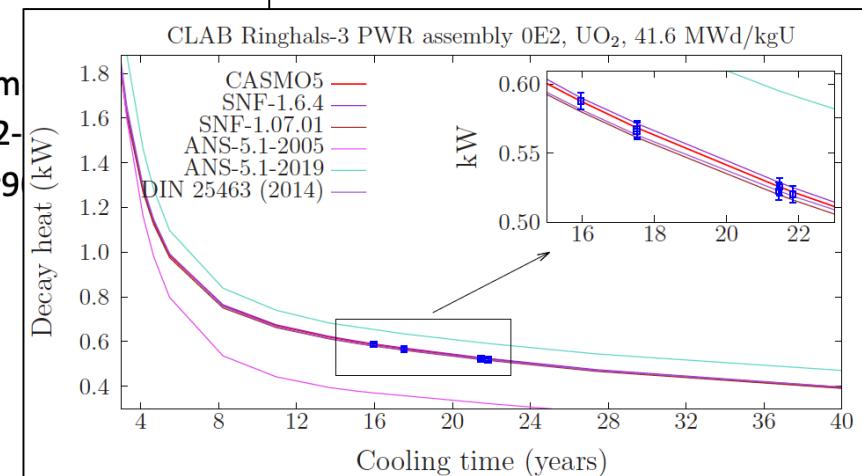
Fig. 2. Histogram of the ratios of calculated (C) over experimental (E) decay heat values from literature studies for calorimetric measurements. Both PWR and BWR assemblies are included.

Future DH computational benchmark

- 2D simulations: assembly and pincell
- CLAB-2006 measurement: PWR 17x17 assembly 0E2, 3.1 %, 41.6 MWd/kgU
- Multiple measurements

Required input/output

- Input details provided by the SG12
- Irradiation steps and cooling steps for the pincell and assembly
- Code, important methods, libraries
- Calculated DH + standard DH values
- Calculated neutron/gamma emission, activity
- k_{inf} during irradiation
- Nuclide concentrations during irradiation + cooling time
 - U-234,235,236,238, Pu238-242, Am241-243, Cm242-
 - Nd146-148, Rh103,106, Cs133,134,137, Ba137m, Sr90
- fission rates (separate between 4 main actinides)
- Delayed fission
- Sensitivity ?
- Gaps ?



Wir schaffen Wissen – heute für morgen

