

# NRG contribution to the SG45 repository

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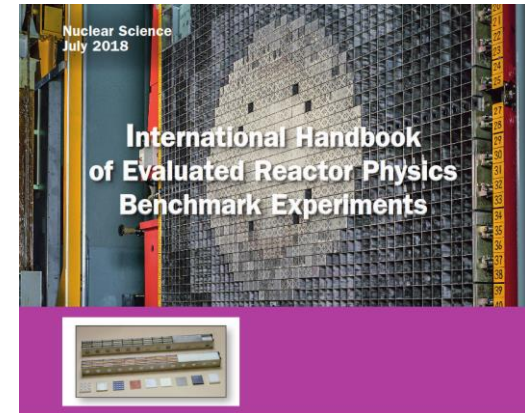
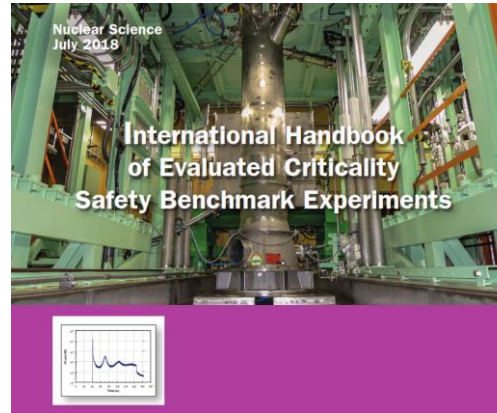
11 May 2020



Nuclear. For life.

# Contents

- ✓ Benchmark cases
  - ✓ ICSBEP
  - ✓ IRPhE
  - ✓  $\beta_{\text{eff}}$ , Rossi- $\alpha$
- ✓ Form in which they are provided
- ✓ Comments



# Number of ICSBEP benchmark cases (1)

## Compound

	therm	inter	fast	mixed	total
leu	462				462
ieu	36	4	2		42
heu	156	6	6	8	176
mix	100		9		109
pu		1		34	35
u233	8				8
total	762	11	17	42	832

## Metal

	therm	inter	fast	mixed	total
leu	31				31
ieu		5	28		33
heu	51		294	6	351
mix		5	33		38
pu	1		100	6	107
u233			10		10
total	83	10	465	12	570

## Number of ICSBEP benchmark cases (2)

### Solution

	therm	inter	fast	mixed	total
leu	67				67
ieu	60				60
heu	402				402
mix	53				53
pu	385				385
u233	60	33			93
total	1027	33			1060

### Miscellaneous

	therm	inter	fast	mixed	total
leu					
ieu					
heu					
mix	60		22		82
pu					
u233					
total	60		22		82

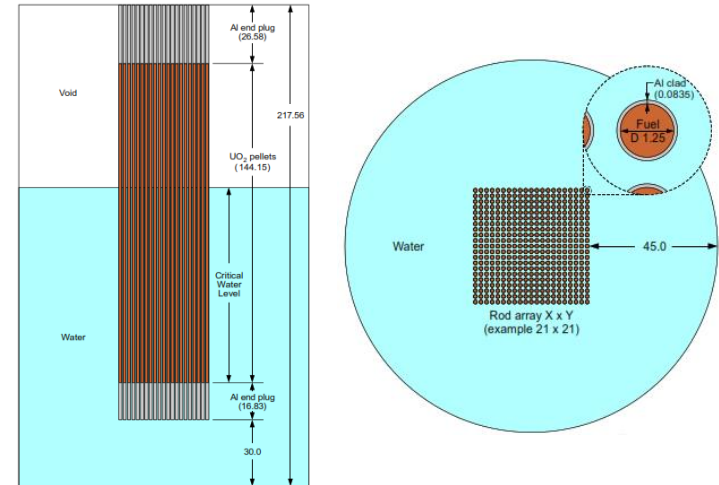
# IRPhE benchmarks

## ❖ JOYO-LMFR-RESR-001

- ✓ HEX-Z model
- ✓ 7 core configurations
- ✓ Not reported

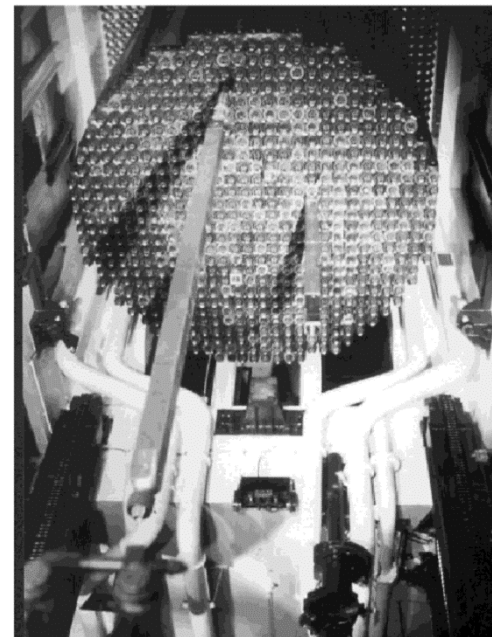
## ❖ TCA-LWR-EXP-001

- ✓ Temperature feedback (20–60 °C)
- ✓ 3 cores clean water
- 3 cores with  $\text{H}_3\text{BO}_3$
- 3 cores with  $\text{Gd}(\text{NO}_3)_3$



# $\beta_{\text{eff}}$ , Rossi- $\alpha$ inputs

- ✓ FCA                    cores XIX-1 through 3
- ✓ Masurca            cores R2 and ZONA2
- ✓ SHE                  core 8
- ✓ Sheba                core 2
- ✓ SNEAK              cores 7A, 7B, 9C1, 9C2
  
- ✓ IPEN/MB-01        (leu-comp-therm-077)
- ✓ TCA                   (leu-comp-therm-006)
- ✓ Winco slab tanks   (heu-sol-therm-038)
- ✓ LANL cases        (hmf1&28, pmf1&8, umf1&6, imf7)
- ✓ ZP(P)R cores      (hmi1, imf10, mmf11, pmi2)



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# Files provided

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- ✓ File “**job**”      shell script to generate MCNP input

Parametrized:

- Nuclide names      \$u235      for 92235.00c
- Abundances      \$A\_fe54
- Nuclide masses      \$M\_fe54

Files that set these variables are also provided.

- ✓ File “**inp**”      MCNP input generated by “job”

# Some comments

- ✓ Only 314 ICSBEP cases have been model at NRG. Most of these models have been made ~15 years ago. Consistency with the currently ICSBEP edition has not been checked.
- ✓ The remaining inputs are based on the ICSBEP DVD (in some cases bug fixes were needed). It has been checked that the results are consistent those reported on the ICSBEP DVD.
- ✓ In old inputs some elements have been omitted or replaced (e.g. Zn). This is not consistent with the benchmark definitions.
- ✓ The names of cases is rather arbitrary (1st19 cases are “run149–run153, run183”).

