
SHERWOOD BENCHMARK

ANALYSIS

USING JEF 2.2

CROSS-SECTION DATA

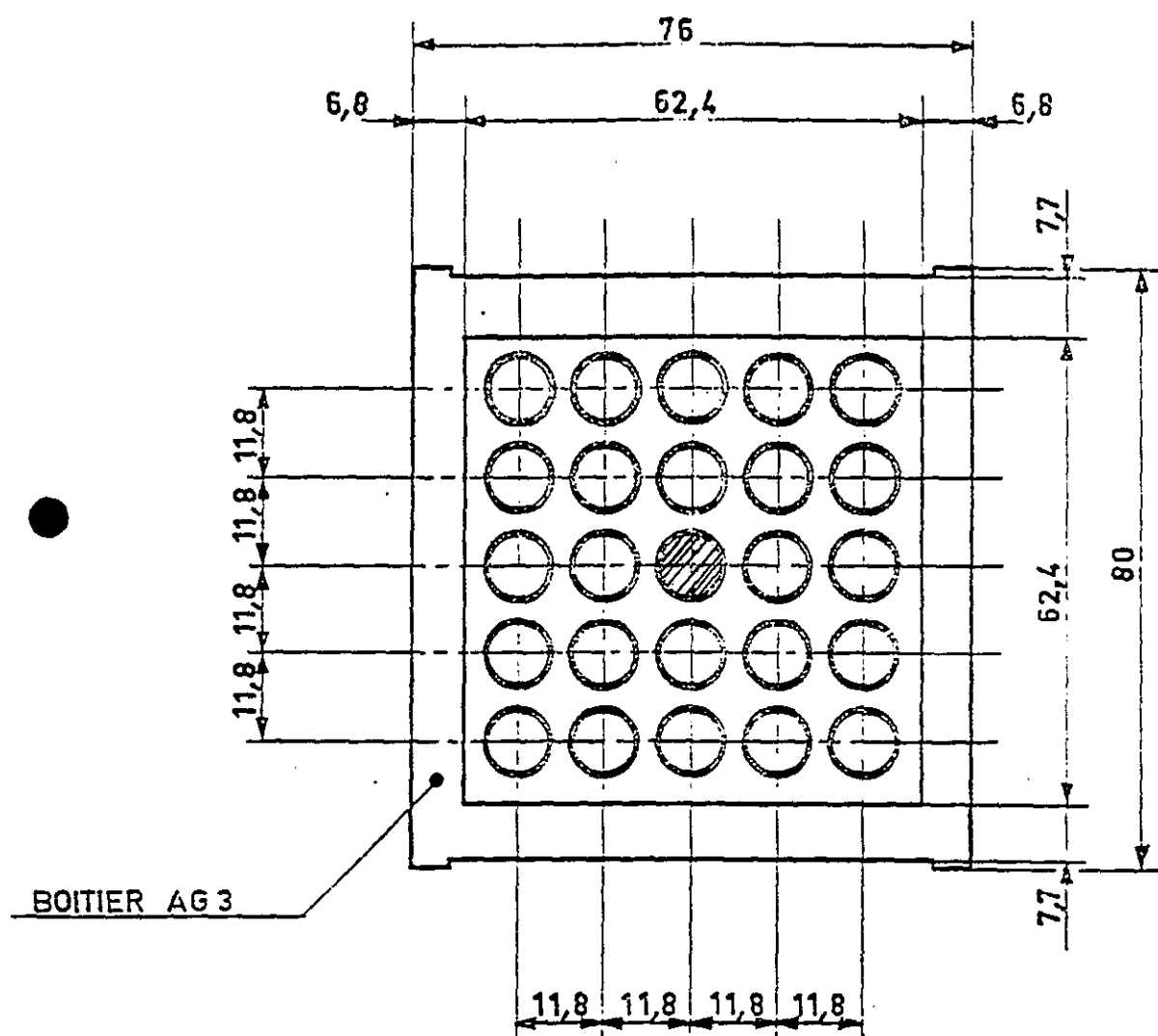
A. BENSLIMANE

S. CATHALAU

CEA/DRN/DER/SPRC

C.E CADARACHE

DISPOSITIF D IRRADIATION SHERWOOD ASSEMBLAGE



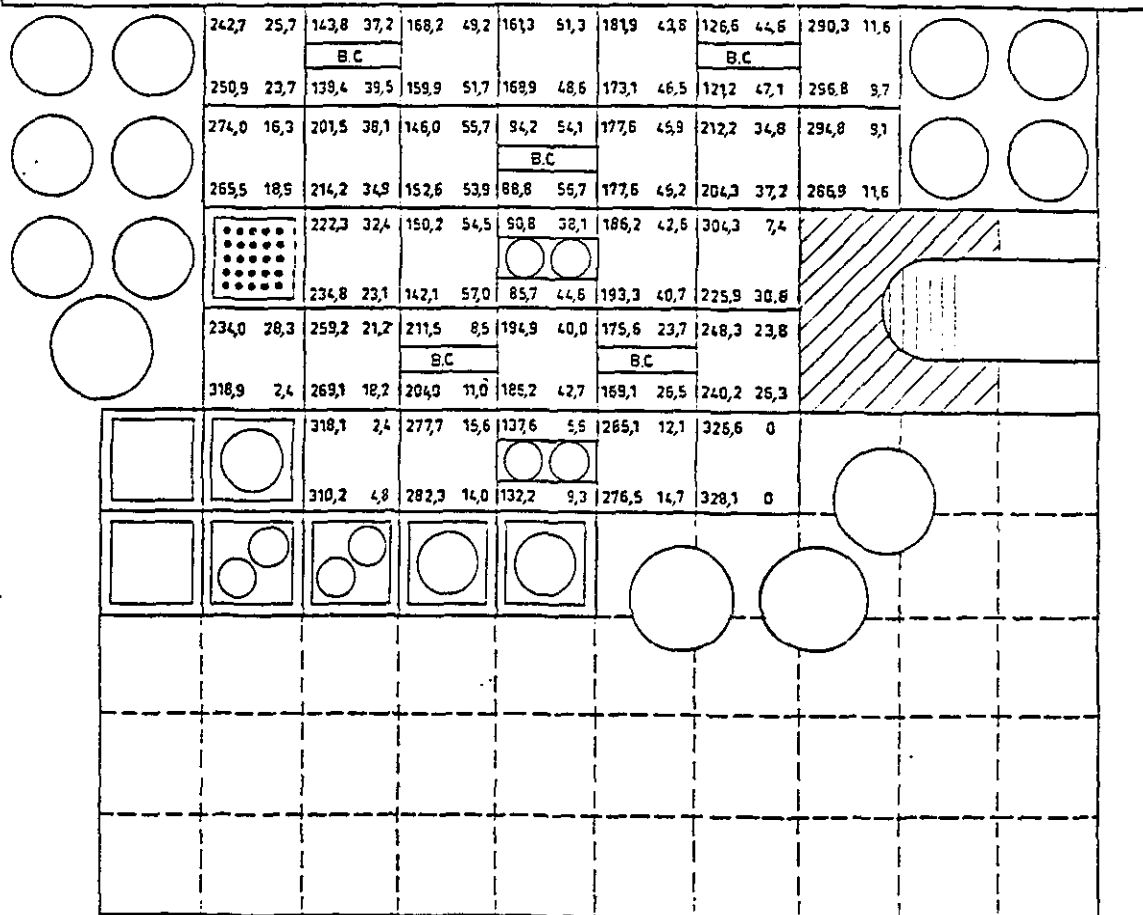
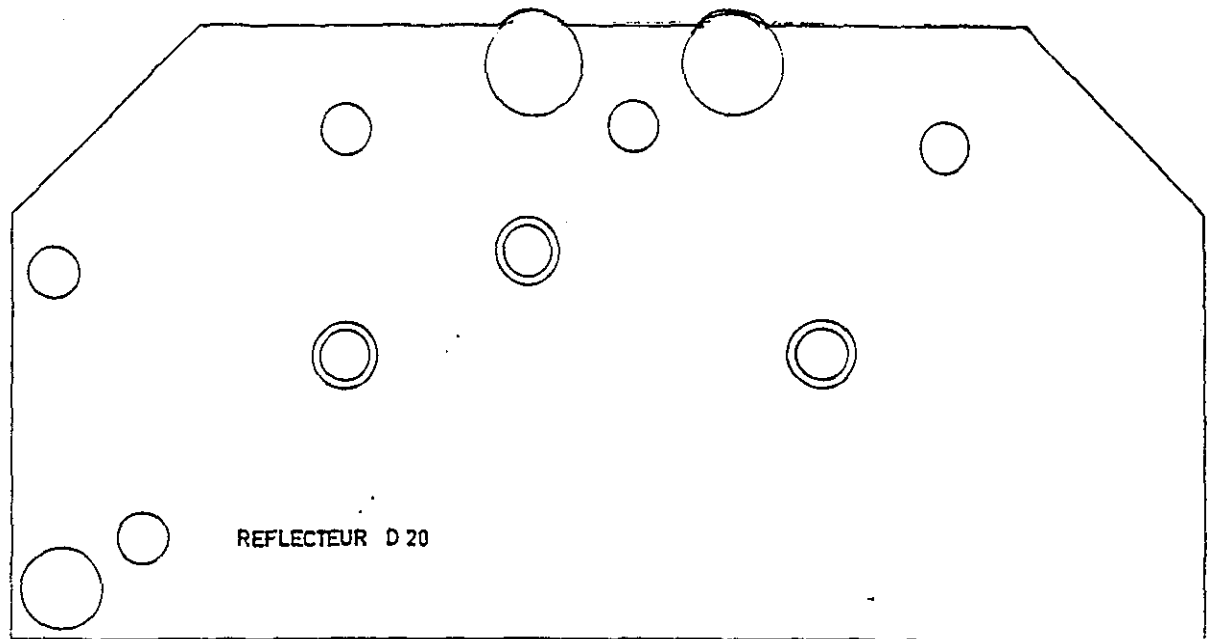
CRAYON EXPERIMENTAL

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UO 2	52	
UO 2	51	
	50	SOL 2
	49	SOL 3
	48	SOL 1
UO 2	47	
	46	U 233
UO 2	45	
	44	Np 237
	43	Np 237
	42	Th 232
	41	U 234
	40	Pu 239
UO 2	39	
UO 2	38	
	37	Am241
UO 2	36	
	35	Cm244
	34	Cm244
UO 2	33	
	32	Am243
	31	Am243
UO 2	30	
	29	Pu 242
	28	Pu 242
UO 2	27	
UO 2	26	
	25	Am241
	24	Am241
UO 2	23	
	22	Cm244
	21	Cm244
UO 2	20	
	19	Am243
	18	Am243
UO 2	17	
	16	Pu 242
	15	Pu 242
UO 2	14	
UO 2	13	
	12	U 233
	11	U 233
	10	Np 237
	9	Np 237
	8	U 234
	7	Pu 239
	6	Th 232
UO 2	5	
	4	SOL 2
	3	SOL 3
UO 2	2	
UO 2	1	

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DISPOSITIF D IRRADIATION SHERWOOD



Dispositifs d'irradiation

m1 i1
iC
m2 i2

Assemble pour
barre de contrôle



Assemblone SHERWOOD

m1 i1
m2 i2

Assemblage
 [m masse d'u5 (g)
 [i taux de combustion (%)
 cu debut de chaque cycle

FIGURE 1.1.

. REACTEUR MELUSINE .

- CONFIGURATION POUR L'IRRADIATION SHERWOOD -

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SHERWOOD LATTICE CHARACTERISTICS

Fuel : UO2

235U Enrichment 2.8 %

Density 10.3 g/cm3

Diameter 8.05 mm

Average temperature ?

Clad : Zircaloy 4

Diameters 8.2 , 9.4 mm

Moderator : H2O

Temperature 32°C

Square lattice pitch : 11.8 mm

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PWR REFERENCE LATTICE CHARACTERISTICS

Fuel : UO_2

^{235}U enrichment : 2,8 % ($^{235}\text{U}/\text{Total U}$ in mass)

Density : 10,3

Average temperature : 350° C

Diameter : 8,20 mm

Clad : Circaloy 4

Diameters : 8,25 x 9,55 mm

Moderator : H_2O

temperature : 306° C

Density : 0.713

Soluble Boron quantity : 650 ppm

Square lattice pitch : 12,6 mm

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EXPERIMENTAL VALUES

Reaction Rate	Experimental value normalized to the ^{235}U fission reaction rate
^{235}U Absorption	1.233 ± 0.017
^{235}U Capture	0.233 ± 0.003
^{238}U Capture	0.01917 ± 0.00014
^{239}Pu Capture	1.508 ± 0.010
^{240}Pu Capture	5.100 ± 0.075
^{241}Pu Capture	1.022 ± 0.029
^{242}Pu Capture	0.604 ± 0.016
^{241}Am Capture	3.185 ± 0.065
^{243}Am Capture	1.248 ± 0.025
^{244}Cm Capture	0.316 ± 0.015

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BENCHMARK CALCULATIONS
USING THE CEA93 LIBRARY AND THE APOLLO2 CODE

	Experiment	Calculation	E-C/C %
d25 / f25	1.233E+00	1.218E+00	1.217E+00
c25 / f25	2.330E-01	2.182E-01	6.797E+00
c28 / f25	1.917E-02	2.022E-02	-5.215E+00
c49 / f25	1.508E+00	1.473E+00	2.403E+00
c40 / f25	5.100E+00	5.212E+00	-2.153E+00
c41 / f25	1.022E+00	9.160E-01	1.169E+01
c42 / f25	6.040E-01	6.662E-01	-9.330E+00
c51 / f25	3.185E+00	2.739E+00	1.630E+01
c53 / f25	1.248E+00	1.155E+00	8.027E+00
c64 / f25	3.160E-01	3.655E-01	-1.354E+01

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