NEACRP-L-325

OECD/NEA COMMITTEE ON REACTOR PHYSICS

ANALYSIS OF THE INTERNATIONAL CRITICALITY BENCHMARK N°19 OF A REALISTIC FUEL DISSOLVER

H.J. SMITH - A. SANTAMARINA
CEA - DRN/DER/SPRC - Cadarache

Criticality Calculations Working Group

January 1991

A - A THEORETICAL STUDY OF THE VARIOUS PHYSICAL PHENOMENA INVOLVED IN THE DISSOLVER MEDIUM REACTIVITY CALCULATIONS.

B - ANALYSIS OF THE OECD/NEA CRITICALITY WORKING GROUP CALCULATIONS THROUGH NEUTRON BALANCE EVALUATION.

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ABSTRACT

The dispersion of the order of 12000 pcm in the results of the international criticality fuel dissolver benchmark calculation, exercise OECD/19, corresponding to a realistic case defined by BNFL, showed the necessity of analysing the calculational methods used in this case. The APOLLO/PIC method developed to treat this type of problem permits us to propose international reference values.

The problem studied here, at the request of the OECD group of experts on criticality calculations, led us to investigate two supplementary parameters in addition to the double heterogeneity of the fuel : the reactivity variation as a function of moderation and the effects of the size of the fuel pellets during dissolution. The following conclusions were obtained :

. The fast cross-section sets used by the international SCALE package introduces a bias of - 3000 pcm in undermoderated lattices. More generally, the fast and resonance nuclear data in criticality codes are not sufficiently reliable (^{238}U unresolved resonances in ROLAIDS, ^{235}U and ^{238}U radiative capture above 5 KeV in MONK6, ^{238}U fission in ANISN).

. geometries with micro-pellets led to an underestimation of reactivity at the end of dissolution of 3000 pcm in certain 1988 Sn calculations ; this bias was avoided in the up-dated 1990 computation because of a correct use of calculation tools.

. the reactivity introduced by the dissolved fuel is underestimated by 3000 pcm in contributions based on the standard NITAWL module in the SCALE code. More generally, the neutron balance analysis pointed out that standard ND self shielding formalism (SCALE, ANISN, Standard APOLLO calculation) cannot account for ^{238}U resonance mutual self-shielding in the pellet-fissile liquor interaction.

The combination of these three types of bias explain the underestimation of all of the international contributions (except the British contributions) of the reactivity of dissolver lattices by -2000 to -6000 pcm.

The improved 1990 calculations confirm the need to use rigorous methods in the calculation of systems which involve the fuel double heterogeneity. This study points ou the importance of periodic benchmarking exercises for probing the efficacity of criticality codes, data libraries and the users.

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The authors would like to thank the members of the OCDE/NEA Criticality Working Group, presented in the next page, for their fruitful collaboration.

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OECD/NEACRP CRITICALITY WORKING GROUP

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SPECIFICATIONS FOR THE HYPOTHETICAL PROBLEMS IN A DISSOLVER ENVIRONMENT: OECD NO. 19 AS SUPPLIED BY BNFL

The problem represented in a system of fuel particles sheared into liquor.

Fuel UO_2 spherical particles 4.0 wt % U_{235} ρ = 10.4 g/cc

There are two sizes of particles considered to cover the range of sheared fuel: (1) particle radius, 0.05 cm; and (2) particle radius, 1.0 cm.

Bulk Liquor

A variety of liquors can be considered.

(1) HNO_3 7.5 M + Gd nitrate (start of cycle)

(2) 300 g/ℓ uranyl nitrate + Gd nitrate + 3.0 M free HNO_3 (end of cycle)

Gd concentration 1.0 g/ℓ Gd metal.

Assembly Size

(1) Infinite (no leakage)

(2) Cuboid, infinite in z dimension; fully reflected by water (high leakage)

Fuel Packing Fraction

Defining Packing Fraction PF = (volume of UO_2/total volume), measured over the core region (i.e., without reflector). Need survey to find optimum PF.

Take 5 values of PF: 0.3, 0.4, 0.5, 0.6, 0.7.

Total number of calculations of k_{inf} or k_{eff}

Fuel	Liquor	Assembly	PF	
2	2	2	5	= 40 calculations

Number Densities

Fuel (UO_2)		N_5 = 9.3984E-4	N_8 = 2.2272E-2	N_O = 4.6399E-2
Liquor	HNO_3 + Gd	N_H = 5.5554E-2	N_O = 3.9072E-2	N_N = 4.5173E-3
		N_{155} = 5.707E-7	N_{157} = 6.0134E-7	

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Uranyl nitrate + Gd N_H = 5.5162E-2 N_O = 3.8174E-2 N_N = 3.3258E-3

N_5 = 3.075E-5 N_8 = 7.2868E-4

N_{155} = 5.707E-7 N_{157} = 6.0134E-7

Gd represented as isotopes 155, 157 (i.e., other isotopes ignored). The isotopes are present as 155 @ 14.9 at.%; 157 @ 15.7 at.%.

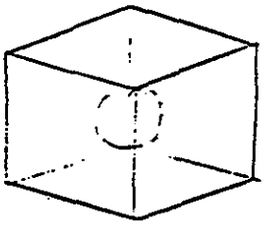
Note: The dissolution of Gd nitrate in the acid solution was assumed to produce no significant change in liquor density, thus the Gd number densities were derived from the gadolinium metal concentration only.

Note on Packing Fractions

Example of particle with packing fraction of 0.2, radius 1.0 cm.

Fuel Particle Radius = 1.0 cm.

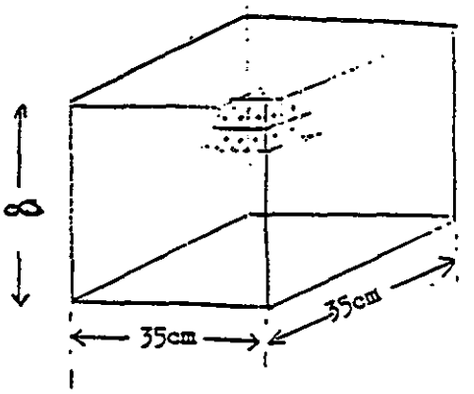
Elementary cell in model



$$\text{Packing Fraction} = 0.2 = \frac{\frac{4}{3}\pi (1.0)^3}{L^3}$$

Diagram of Assembly with High Leakage

Assembly of elementary cells



Note: Assembly fully reflected in x-y plane by H_2O.

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A - A THEORETICAL STUDY OF THE VARIOUS PHYSICAL PHENOMENA INVOLVED IN THE DISSOLVER MEDIUM REACTIVITY CALCULATIONS

1 - INTRODUCTION

2 - A DESCRIPTION OF THE HETEROGENEOUS MEDIUM AND THE DISSOLVER GEOMETRY

3 - THEORETICAL STUDY OF THE EFFECT OF THE DOUBLE HETEROGENEITY

- 3.1 - Models Implemented in this Study
- 3.2 - Errors in the Calculation of Self-shielding Introduced by the Models ; a Study of the Equivalent Cross Section
- 3.3 - Resulting Errors on the Effective Integral, Ieff(^{238}U), and on the Resonance Escape Factor
- 3.4 - The Value of k∞ in Different Types of APOLLO Calculations

4 - ANALYSIS OF THE RESULTS OF INTERNATIONAL CALCULATIONS

- 4.1 - Effect of Moderation Level
- 4.2 - Effect of Geometry (size of pellets)
- 4.3 - Effect of the Double Heterogeneity

5 - CONCLUSION

REFERENCES

APPENDIX A

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1 - INTRODUCTION

Criticality studies of fuel dissolvers raise delicate problems, from diverse sources, in neutronics calculations (1) . We have shown (2,3) that the double heterogeneity of fuel is one of the most important causes of problems, however, it is not the only source of dispersion in the results of international criticality benchmark calculations.

In effect, in the case of fuel double heterogeneity the resonance cross sections of certain isotopes of uranium and plutonium intervene simultaneously both in the UO2 (or MOX) pellet undergoing dissolution and in the nitric acid solution, which, from a neutronics point of view, is a moderator. This difficulty was clearly apparent following the comparison of results (4) of international dissolver criticality benchmark calculations on OECD exercise no 20 and we showed definitively (5) that the double heterogeneity explained the observed dispersion in this case. In the calculations for exercise OECD/no 20, which represented spherical fuel particles in hydrogenated fissile solutions,the dispersion of results exceeded 20 000 pcm. In essence, the conception of problem 20 maximised the effect of the double heterogeneity. However, in a realistic case modelling the dissolution of PWR fuel at 10 GWj/t burnup with an initial enrichment of 3.5% in ^{235}U, we showed that the errors of methods based on standard calculations of self-shielding of resonance cross sections (notably with the standard version of APOLLO) are between 1 500 and 4 600 pcm (6).

Exercise 19 in the series of international fuel dissolver benchmark calculations is another realistic case, suggested by BNFL, which also shows a high level of dispersion (12 000 pcm) among the contributors. The OECD Criticality Working Group asked us to analyse the disagreements. To understand the problem we carried out reference calculations using APOLLO with the "PIC" self-shielding formalism. The analysis of the reference results and a comparison with the results of international calculations brought to light several new sources of dispersion ; the variation of dissolver reactivity with the level of moderation and difficulties in modeling geometric effects (reduction of the size of fuel pellets) , as well as the determination of effective self-shielded cross sections in a situation with a fuel double heterogeneity.

This note presents the results of the reference calculations on problem 19 and a comparison with the international results.

The second chapter describes the internal geometry of the dissolver treated in this study which corresponds to PWR fuel pellets (enriched to 4.0% in ^{235}U) in a solution of nitric acid poisoned with 1.0 g/l gadolinium nitrate and bearing 0 - 300 g/l dissolved fuel.

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The third chapter presents a theoretical study of the effects of various self-shielding formalisms, the reference calculations and approximate models, are described. Errors on the resonance escape probability created by the the different models are quantified.

In the fourth chapter, a comparison of reference results and the results of international calculations shows the disagreements linked to geometry and moderation effects as well as the fuel double heterogeneity problem.

The last chapter summarizes the results of this study and provides a quantitative evaluation of the precision of fuel dissolver criticality calculations with codes in current use.

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2 - A DESCRIPTION OF THE HETEROGENEOUS MEDIUM AND THE DISSOLVER GEOMETRY

The heterogeneous medium treated in this exercise is a realistic case, representative of fuel dissolver contents, which was suggested by BNFL.

A spherical pellet geometry is used and corresponds to two sizes of UO2 PWR fuel (r=0.05 and 1.0 cm), enriched to 4.0 % in ^{235}U. These pellets bathe either in a solution of nitric acid (7.5M) containing 1.0 g/l of gadolinium nitrate or in a nitric acid solution (3.0M) containing 1.0 g/l gadolinium nitrate and 300 g/l uranyl nitrate. The pellets are arranged on a square lattice for which the packing fraction (PF = V(UO2) / V(cell)) takes the values PF = 0.3, 0.4, 0.5, 0.6, 0.7. The physical characteristics of this system are given in the table below (the concentrations are in E+24 at/cm^3).

Solution	Fuel Zone	Solution Zone
Liquor 1		
7.5M nitric acid	^{235}U = 9.3984 E-4	-
+ 1.0 g/l GdNO3	^{238}U = 2.2272 E-2	-
	^{16}O = 4.6399 E-2	3.9072 E-2
	^{14}N = -	4.5173 E-3
	H = -	5.5554 E-2
	^{155}Gd = -	5.7070 E-7
	^{156}Gd = -	6.0134 E-7
Liquor 2		
3.0M nitric acid	^{235}U = 9.3984 E-4	3.0750 E-5
+ 1.0 g/l GdNO3 +	^{238}U = 2.2272 E-2	7.2868 E-4
300 g/l uranyl	^{16}O = 4.6399 E-2	3.8174 E-2
nitrate	^{14}N = -	3.3258 E-3
	H = -	5.5162 E-2
	^{155}Gd = -	5.7070 E-7
	^{155}Gd = -	6.0134 E-7

PF	Cell Radii (cm)	
	r=0.05	r=1.0
0.3	0.07469	1.49380
0.4	0.06786	1.35721
0.5	0.06300	1.25992
0.6	0.05928	1.18563
0.7	0.05631	1.12625

TABLE 1
DISSOLVER CHARACTERISTICS FOR THIS STUDY

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The specificity of this benchmark is linked to the study of the effects of pellet size during dissolution. This effect is maximised by using two extreme cases r=1.0 cm and r=0.05 cm. As we will show in this paper, it is not the strongly heterogeneous cases which present the major problem, but the quasi-homogeneous case which produces significant differences among the results of criticality codes (Sn and Monte Carlo methods).

From a neutronics point of view ,the packing fraction = 0.3, corresponds to a "cold" PWR. The PF = 0.4 case corresponds to a PWR at nominal conditions . The level of ^{238}U resonance captures will therefore be quite weak. The PF=0.5, 0.6, 0.7 cases correspond to highly undermoderated light water lattices. The extreme value of PF=0.7 corresponds to a moderation level, VH2O/VUO2 = 0.43, which represents the most undermoderated reactor concept studied in France. The level of ^{238}U resonance captures is particularly high in this case. In this manner exercise 19 permits us to study the calculational uncertainties as a function of the moderation level. On the other hand the differentiation of situations with a 'pure' moderator (Liquor 1) and situations with fuel dissolved in the solution (Liquor 2) allow us to demonstrate errors linked to the fuel double heterogeneity. The realistic load of 300 g/l of uranyl nitrate in the second solution corresponds to a weak concentration of fuel representing merely 3.3% of the fuel in the pellet.

Hence the results of calculations for the first solution elucidate disagreements which are independent of the double heterogeneity (pellet size, undermoderation). Those for the second solution present the disagreements linked to the double heterogeneity as well as to the other problems . The different cases allow us to study the effect of the double heterogeneity as a function of the moderation level ; this effect increases as the packing fraction increases from PF=0.3 to PF=0.7.

Hereafter the calculations are classified in four categories : Small and Large pellets in Liquor 1, Small and Large pellets in Liquor 2.

3 - THEORETICAL STUDY OF THE EFFECT OF THE DOUBLE HETEROGENEITY

The calculations were carried out using the French code APOLLO (7) which solves the integral transport equation in the multigroup approximation by the method of first collision probabilities .

We have used the library "CEA 86" (8) currently recommended coupled to the latest version of APOLLO "procedure 86" : a more precise formalism of the interaction of resonances is implemented, as well as automatically taking into account the self-shielding of resonances in the thermal region (9).

Using procedure "CEA 86", we have shown experimentally (10) that the multiplication factor of a strongly moderated UO2

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lattice is calculated to better than 800 pcm (2σ) in the classic case where the fuel is entirely concentrated in the pellet. In a similar manner, this improved 1986 APOLLO has been well validated (11,12) for strongly undermoderated UO2 lattices which produce spectra enhanced in epithermal and rapid neutrons. The multiplication factor in these cases is calculated to better than 1 000 pcm (2σ).

Scattering anisotropy is treated by transport correction. Eventually outer iterations on the Laplacian permit us to work with critical leakages. The diffusion coefficient can then be calculated in the B1 approximation .

3.1 - Models Implemented in this Study

In the neutronics calculations of a fuel dissolver, we can no longer apply the basic self-shielding formalism of M.LIVOLANT and F.JEANPIERRE (13) because of the presence of a resonant isotope in several geometrical regions (pellet and solution). Therefore it becomes necessary to generalise the formalism, and to adopt a method such as "PIC" for the reference calculations. The implementation of this technique in APOLLO has already been discussed in reference 3.

We also examined the results of standard APOLLO calculations. The two models available use the classic formalism for self-shielding corresponding to the treatment of resonant isotopes in only one region. It is these models which are generally implemented in criticality codes (SCALE...) to obtain effective homogenized and energy-collapsed cross sections.

The simplest model, Average Self-Shielding (AS), uses the same set of self-shielded cross sections in the different fuel regions. In APOLLO, a single identification number is used (ex : 92238) with different concentrations in each fissile region ; for these dissolver calculations this approximation can be very bad in certain specific geometries because it approaches the level of a calculation with homogeneous self-shielding, hydrogen thus being mixed with the heavy elements of the pellet.

The other model, No Dancoff (ND), uses different self-shielded cross section sets for each region (ex : 92238 in the pellet and 100092238 in the solution). The equivalent cross sections and hence the effective cross sections are different in each fuel region, but the Dancoff effect of the ^{238}U in the pellet on the resonances of the ^{238}U in the solution (and vice versa) is ignored.

3.2 - Errors in the Calculation of Self-shielding Introduced by the Models; a Study of the Equivalent Cross Section

The level of self-shielding in a lattice is characterised by only one parameter, the equivalent cross section (at a fixed fuel temperature) . To illustrate the situation we present here the results of the equivalence calculation for ^{238}U. The equiva-

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lent cross section for ^{235}U does not intervene strongly in this problem. On the one hand the resonances are only lightly self-shielded , and on the other hand the self-shielding errors are compensated between the effective absorption integral and the effective neutron production integral.

The variation of the ^{238}U equivalent cross section in the pellet as a function of the effective total cross section, is presented in Figures 1a to 3a for the small pellets (r=0.05cm) in the range of moderation (PF = 0.3, 0.5, 0.7) for the reference PIC calculation and the two models. For the large pellets (r=1.0cm), the variation is presented in Figures 4a to 6a. It can be seen that the two approximate models give values of the equivalent cross section which are too high and thus lead to a strong underestimation of the self-shielding of the fuel pellet. The "PIC effect" (shadowing effect of the fuel dissolved in the solution on the pellet) intervenes principally when the value of the total cross section is greater than 1000 barns for the small pellets and greater than 100 barns for the large pellets , hence, at the peaks of the large resonances . This is due to the weak concentration of uranium in the nitric acid solution. For very large values of the total cross section , the equivalent crosssection of each model tends towards an asymptote consistent with the value of the expected theoretical limit (6). The level of underestimation of each model depends on the packing fraction and is increasing with the moderation ratio as expected.

The Figures 1b to 3b (small pellets) and 4b to 6b (large pellets) show that the PIC effect affects the self-shielding in the solution effectively at all levels of the total cross section.

These Figures 1 to 6, comparing the equivalent cross sections among the different models, show clearly that the design-oriented calculations, such as ND and AS, are completely unacceptable because they don't permit the representation of the strong variation of $\sigma_e(u)$ in the resonances.

In Table 2 below we present the values obtained for the global equivalence parameter, the 'true' equivalent cross section , for the different self-shielding models implemented, for the two sizes of pellet, over the range of packing fraction. Note that the 'true' equivalent cross section is the constant equivalent cross section that permits the conservation of the real effective integral of the heterogeneous medium being considered: $I^{hom}(\sigma_{ev}) = I^{het}_{eff}$. This cross section is also called the "interpolation equivalent cross section" because it allows interpolation in the effective cross sections $\sigma^g_{eff}(\sigma^i_e, T_j)$ tabulated for discrete σ^i_e values in the APOLLO data library.

3.3 - Resulting Errors on the Effective Integral, Ieff(^{238}U), and on the Resonance Escape Factor

The overestimation of the true equivalent cross section by

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		Reference method, PIC	"No Dancoff" Model	"Average Self-Shielding" Model
SMALL PELLETS				
PF=0.3	pellet	114.90	131.02	134.41
	solution	406.03	2030.58	
0.4	pellet	84.57	90.53	91.49
	solution	270.06	2166.53	
0.5	pellet	62.50	64.46	64.66
	solution	180.94	2356.80	
0.6	pellet	45.77	46.32	46.29
	solution	120.56	2642.05	
0.7	pellet	32.53	33.00	32.93
	solution	78.04	3117.09	
LARGE PELLETS				
PF=0.3	pellet	35.08	42.87	134.40
	solution	1464.50	1975.80	
0.4	pellet	33.01	39.48	91.50
	solution	1320.80	2084.82	
0.5	pellet	30.31	35.33	64.66
	solution	1156.54	2239.80	
0.6	pellet	27.08	30.56	46.29
	solution	969.46	2474.43	
0.7	pellet	23.18	25.34	32.93
	solution	757.70	2865.67	

TABLE 2
TRUE EQUIVALENT CROSS SECTION (σ_{ev} in barns)

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the different models penalizes the calculation of the multiplication factor essentially by the bias on the level of self-shielding of ^{238}U resonances.

To understand the error engendered in the value of k_∞, we present in the following Tables 3 and 4 (respectively for the small and large pellets) the values of the Effective Integral and of the resonance escape factor p8 in the pellet, for the different types of APOLLO calculations.

The ^{238}U resonance escape factor was calculated as :

$$p = \exp\left(- \frac{Vf \cdot N8 \cdot Ieff}{Vm \cdot (\bar{\xi} \cdot \Sigma p)m} \right)$$

using the data given below :

PF	Vf/Vm
0.3	.4286
0.4	.6667
0.5	1.0000
0.6	1.5000
0.7	2.3333
$\bar{\xi}.\Sigma p$	1.244

This formula is most appropriate to moderated and well-moderated cases (PF=0.3, 0.4), but in undermoderated cases leads to an overestimation of the errors linked to the models because it ignores the contribution to slowing down due to the pellet (essentially ($\xi.\Sigma p)ox$).

In the case of small pellets, r=0.5 cm, the p8 values given in Table 3 show an error of 1 000 to 2 000 pcm on k_∞ due to the self-shielding calculational models. Taking into account that in the AS model the error in resonance capture in the solution is going to compensate the error in Table 3 arising from the ^{238}U in the pellet, the AS model appears acceptable in the case of the small pellets . This is due to the fact that the AS model, corresponding to a self-shielding averaged over the ^{238}U atoms of the pellet and of the solution, represents a physically justified approximation in the case of weakly heterogeneous lattices. Table 3 also indicates that the ND model , used in standard criticality calculational models (APOLLO, SCALE...), leads to an underestimation of the order of 2 000 pcm of the reactivity effect of the 300 g/l of fuel dissolved in the solution .

As for the large pellets, the errors in the ^{238}U captures in the pellet become particularly unacceptable in the framework of the AS model. For these types of very heterogeneous lattices, Table 4 indicates that it becomes "preferable" to use the standard ND model, even though this approximation leads to an underestimation of the k_∞ of the internal region of the dissolver of the order of -2 000 pcm.

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		Reference method, PIC	"No Dancoff" Model	"Average Self-Shielding" Model
σ_{ev}^{8} (barns)	0.3	114.90	131.02	134.41
	0.4	84.57	90.53	91.49
	0.5	62.50	64.46	64.66
	0.6	45.77	46.32	46.29
	0.7	32.53	33.00	32.93
$\sqrt{\sigma_{ev}}/\sqrt{\sigma_{ev}^{P_{IC}}}$	0.3	1.	1.068	1.082
	0.4	1.	1.035	1.040
	0.5	1.	1.016	1.017
	0.6	1.	1.006	1.006
	0.7	1.	1.007	1.006
I_{eff}^{8} (barns)	0.3	27.36	29.87	30.04
	0.4	24.16	25.22	25.21
	0.5	21.13	21.65	21.59
	0.6	18.45	18.73	18.65
	0.7	15.97	16.20	16.13
$\Delta I_{eff}/I_{eff_{P_{IC}}}$	0.3	0.	+9.2	+9.8
	0.4	0.	+4.4	+4.3
	0.5	0.	+2.5	+2.2
	0.6	0.	+1.5	+1.1
	0.7	0.	+1.4	+1.0
p^{8}	0.3	.8106	.7952	.7941
	0.4	.7495	.7401	.7400
	0.5	.6850	.6787	.6794
	0.6	.6093	.6047	.6060
	0.7	.5132	.5083	.5098
$\Delta P/P_{ref}$	0.3	0.	-1900 pcm	-2036 pcm
	0.4	0.	-1254 "	-1268 "
	0.5	0.	- 920 "	- 818 "
	0.6	0.	- 755 "	- 542 "
	0.7	0.	- 955 "	- 663 "

TABLE 3
EFFECT OF THE DIFFERENT MODELS ON THE VALUE OF p8
IN THE SMALL PELLETS

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		Reference method, PIC	"No Dancoff" Model	"Average Self-Shielding" Model
σ_{ev}^{8} (barns)	0.3	35.08	42.87	134.40
	0.4	33.01	39.48	91.50
	0.5	30.31	35.33	64.66
	0.6	27.08	30.56	46.29
	0.7	23.18	25.34	32.93
$\sqrt{\sigma_{ev}}/\sqrt{\sigma_{ev}^{P_{IC}}}$	0.3	1.	1.105	1.957
	0.4	1.	1.094	1.665
	0.5	1.	1.080	1.461
	0.6	1.	1.062	1.307
	0.7	1.	1.046	1.192
I_{eff}^{8} (barns)	0.3	16.48	18.07	30.04
	0.4	16.07	17.45	25.21
	0.5	15.50	16.65	21.59
	0.6	14.79	15.67	18.65
	0.7	13.86	14.49	16.13
$\Delta I_{eff}/I_{eff_{P_{IC}}}$	0.3	0.	+9.6	+82.3
	0.4	0.	+8.6	+56.9
	0.5	0.	+7.4	+39.3
	0.6	0.	+5.9	+26.1
	0.7	0.	+4.5	+16.4
p^{8}	0.3	.8812	.8705	.7941
	0.4	.8255	.8120	.7400
	0.5	.7577	.7422	.6794
	0.6	.6722	.6565	.6060
	0.7	.5605	.5459	.5098
$\Delta P/P_{ref}$	0.3	0.	-1214 pcm	- 9884 pcm
	0.4	0.	-1635 "	-10357 "
	0.5	0.	-2046 "	-10334 "
	0.6	0.	-2336 "	- 9848 "
	0.7	0.	-2605 "	- 9046 "

TABLE 4
EFFECT OF THE DIFFERENT MODELS ON THE VALUE OF p8
IN THE LARGE PELLETS

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3.4 - The Value of k∞ in Different Types of APOLLO Calculations

The values of k∞ obtained using the different models for calculating self-shielding are compared in Table 5 to the reference k∞ obtained by the PIC method . The real differences $\Delta k\infty/k\infty PIC$ given in the table are consistent with the differences engendered by the ^{238}U resonance capture only (cf Tables 3 and 4). It can also be verified that the "Average Self-Shielding" model is acceptable only in the case of pellets which are almost completely dissolved. Table 5 shows, besides, that the ND model, used frequently in criticality studies , gives errors which are essentially constant as a function of PF, varying from -1500 pcm for large pellets to.-3 000 pcm for the fuel granules, r=0.05cm.

4 - ANALYSIS OF THE RESULTS OF INTERNATIONAL CALCULATIONS

To simplify references to the results of the various international contributors, the abbreviations described in Appendix A are used in the following text.

The values of k∞ calculated by the international participants (4) are presented in Table 6. Figures 7 present the differences of these k∞ from the corresponding reference APOLLO/PIC values. These disagreements are presented in terms of reactivity differences : ($\Delta\rho = \rho i - \rho ref = \ln(k\infty i/k\infty ref)$). Although they are very high (between 5 000 and 10 000 pcm), the dispersion of the international calculations is centered on our reference calculation. We will analyse these results by decoupling the three neutronics parameters which affect the calculation of the k∞ of this dissolver problem :

- Figure 7b shows an increase of the dispersion with increasing PF (effect of undermoderation).

- the comparison of Figures 7a and 7b show that the differences calculated for the small pellets (8 000 pcm) are larger than those of the large pellets (5 000 pcm) . The difference indicates problems of geometry in the criticality calculations when the pellet becomes small compared to a mean free path.

- when there is some uranium dissolved in the solution , Figures 7c and 7d , the differences become even larger (11 000 pcm in the case of small pellets , 8 000 pcm in the case of large pellets) as a result of the double heterogeneity.

4.1 - Effect of Moderation Level

To eliminate differences created by various evaluations of nuclear data in the thermal range ($\eta 235, \ldots$) used in the inter-

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Liquor 1		k_∞	
		R=0.05	R=1.0
Reference			
	0.3	1.02705	1.00458
	0.4	1.10909	1.12329
	0.5	1.13554	1.17167
	0.6	1.12061	1.16373
	0.7	1.07192	1.11032

Liquor 2		k_∞	
		R=0.05	R=1.0
Reference			
	0.3	1.05097	1.01889
	0.4	1.11877	1.12205
	0.5	1.13729	1.16564
	0.6	1.11958	1.15807
	0.7	1.07445	1.10694

		k_∞		$(k_\infty ND - k_\infty REF)/k_\infty REF$	
		R=0.05	R=1.0	R=0.05	R=1.0
No DANCOFF					
	0.3	1.02132	1.00634	-2821	-1264
	0.4	1.09054	1.10392	-2523	-1616
	0.5	1.11261	1.14391	-2170	-1864
	0.6	1.09831	1.13571	-1900	-1931
	0.7	1.05345	1.08725	-1954	-1779

		k_∞		$(k_\infty AS - k_\infty REF)/k_\infty REF$	
		R=0.05	R=1.0	R=0.05	R=1.0
Average Self-shielding	0.3	1.04353	0.98511	- 708	-3315
	0.4	1.11447	1.06272	- 384	-5288
	0.5	1.13596	1.10727	- 117	-5008
	0.6	1.11925	1.10886	- 29	-4249
	0.7	1.07046	1.07138	- 371	-3212

TABLE 5
A SUMMARY OF APOLLO K_∞ VALUES AND $\Delta K_\infty/K_\infty REF$ (PCM)
FOR EXERCISE 19 REFERENCE CALCULATIONS SEPTEMBER 1989

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		k∞ Liquor 1		k∞ Liquor 2	
		R=0.05	R=1.0	R=0.05	R=1.0
USA/ORNL					
R-XSDRNPM	0.3	1.01860	0.99070	1.04020	1.00020
	0.4	1.09120	1.10790	1.10070	1.09950
	0.5	1.10890	1.14950	1.11230	1.13600
	0.6	1.08670	1.13290	1.08740	1.12090
	0.7	1.03370	1.07220	1.03350	1.06450
FRANCE/CEA					
APOLLO	0.3	1.03940	1.00240	1.02450	1.00500
	0.4	1.11940	1.12760	1.09000	1.10700
	0.5	1.14240	1.17760	1.10970	1.14780
	0.6	1.12440	1.16830	1.09370	1.13770
	0.7	1.07420	1.11300	1.04940	1.08750
UK/SRD					
MONK 6.3	0.3	1.06500	1.01580	1.09560	1.04200
	0.4	1.15830	1.14100	1.16990	1.14940
	0.5	1.18050	1.19620	1.18960	1.19570
	0.6	1.16620	1.20730	1.15660	1.18780
	0.7	1.11420	1.15380	1.11400	1.14350
UK/BNFL					
WIMSE	0.3	1.04550	1.02200	1.06830	1.03170
	0.4	1.12680	1.14210	1.13710	1.13480
	0.5	1.15190	1.19010	1.15580	1.17750
	0.6	1.13640	1.18110	1.13720	1.16980
	0.7	1.08910	1.12720	1.08900	1.11970
ITALY/ENEA-CB4					
XSDRNPM	0.3	1.05770	1.02830	1.07980	1.02710
	0.4	1.12020	1.13330	1.13020	1.11000
	0.5	1.13500	1.17190	1.13760	1.13920
	0.6	1.11010	1.15920	1.10930	1.12560
	0.7	1.05650	1.09690	1.05310	1.07340
ITALY/ENEA-CJF					
XSDRNPM	0.3	1.02980	0.99980	1.05210	1.00650
	0.4	1.10920	1.11070	1.11980	1.10560
	0.5	1.13140	1.18170	1.13200	1.14010
	0.6	1.11160	1.16170	1.11690	1.16890
	0.7	1.05180	1.12420	1.06080	1.11480
JAPAN/PNC					
XSDRNPM	0.3	1.02430	0.99370	1.04740	0.97760
	0.4	1.10160	1.11450	1.11150	1.07050
	0.5	1.12370	1.16050	1.12690	1.10460
	0.6	1.10550	1.14860	1.10550	1.09250
	0.7	1.05530	1.09370	1.05430	1.04640
JAPAN/JAERI					
ANISN	0.3	0.99500	1.02060	0.97410	1.02270
	0.4	1.07940	1.13970	1.08290	1.12150
	0.5	1.11660	1.19020	1.09320	1.16470
	0.6	1.11280	1.18470	1.08510	1.15800
	0.7	1.05800	1.12900	1.04030	1.10600
ITALY/ENEA-T					
XSDRNPM	0.3	1.00590	0.99560	0.99950	0.97540
	0.4	1.06900	1.11160	1.06060	1.07820
	0.5	1.09340	1.15800	1.07460	1.11200
	0.6	1.09500	1.15310	1.08230	1.11710
	0.7	1.09000	1.10190	1.07900	1.07030

TABLE 6
A SUMMARY OF THE INTERNATIONAL K∞ VALUES
FOR EXERCISE 19 CALCULATIONS JUNE 1988

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		Δρ Liquor 1		Δρ Liquor 2	
		R=0.05	R=1.0	R=0.05	R=1.0
USA/ORNL					
R-XSDRNPM	0.3	0	0	0	0
	0.4	6885	11181	5653	9466
	0.5	8494	14867	6702	12731
	0.6	6472	13412	4438	11393
	0.7	1472	7906	- 646	6231
FRANCE/CEA					
APOLLO	0.3	0	0	0	0
	0.4	7415	11770	6197	9667
	0.5	9449	16108	7989	13286
	0.6	7861	15315	6536	12402
	0.7	3293	10466	2401	7889
UK/SRD					
MONK 6.3	0.3	0	0	0	0
	0.4	8398	11623	6562	9810
	0.5	10296	16347	8232	13759
	0.6	9078	17271	5418	13096
	0.7	4516	12738	1666	9295
UK/BNFL					
WIMSE	0.3	0	0	0	0
	0.4	7489	11111	6241	9525
	0.5	9692	15228	7872	13219
	0.6	8337	14469	6250	12563
	0.7	4086	9798	1919	8185
ITALY/ENEA-CB4					
XSDRNPM	0.3	0	0	0	0
	0.4	5741	9723	4562	7762
	0.5	7054	13072	5214	10359
	0.6	4835	11982	2695	9158
	0.7	- 114	6458	- 594	4409
ITALY/ENEA-CJF					
XSDRNPM	0.3	0	0	0	0
	0.4	7427	10519	6236	9391
	0.5	9409	16715	7320	12464
	0.6	7644	15008	5977	14958
	0.7	2114	11727	824	10220
JAPAN/PNC					
XSDRNPM	0.3	0	0	0	0
	0.4	7275	11473	5940	9078
	0.5	9262	15517	7316	12214
	0.6	7629	14486	5399	11112
	0.7	2982	9589	657	6801
JAPAN/JAERI					
ANISN	0.3	0	0	0	0
	0.4	8142	11037	10588	9222
	0.5	11530	15373	11535	13002
	0.6	11189	14910	10791	12425
	0.7	6139	10094	6575	7830
ITALY/ENEA-T					
XSDRNPM	0.3	0	0	0	0
	0.4	6084	11021	5933	10020
	0.5	8341	15110	7245	13107
	0.6	8487	14686	7959	13564
	0.7	8030	10145	7653	9285

TABLE 7

A SUMMARY OF THE Δρ(PCM) AS FUNCTIONS OF MODERATION FOR EXERCISE 19 INTERNATIONAL CALCULATIONS JUNE 1988

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national calculations, we have normalised all values from the well-moderated case (PF=0.3) to the same reactivity. This permits us to study the variation of reactivity with the effect of undermoderation ($\Delta\rho = \rho(PF=x) - \rho(PF=0.3)$). In this manner the total uncertainty in the calculated multiplication factor consists of, on the one hand a basic uncertainty of about +/-2 000 pcm associated with the calculation of an overmoderated lattice (cf Figure 7b), and on the other hand a supplementary uncertainty tied to the capacity of a criticality calculational tool to take account of the effects linked to a shift of the neutron spectrum to epithermal energies (resonance reaction rates).

These variations, $\Delta\rho$, of the reactivity of the dissolver with undermoderation are presented in Table 7 for all the contributors. The profiles of the variation of the reactivity are represented graphically in Figures 8, where they are grouped in four classes : a)small pellets, b)large pellets in Liquor 1, c)small pellets, d)large pellets in Liquor 2. We note that for this level of poisoning (a loading of 1 g/l of Gd), the maximum values of k_∞ correspond to a packing fraction, PF=(0.5 - 0.6) and that dissolver size is thus governed by the characteristics of the undermoderated case.

These figures also show the increase in the dispersion of results with decrease in moderation. If we eliminate the cases for r=0.05 cm (Figures 8a,c) which introduce the supplementary problem of "microheterogeneity", we notice, in Figures 8b,d, an acceleration of the divergence of results for values of the packing fraction of the order of 0.5 to 0.6 ; this range of PF corresponds to the turning point from a situation where reaction rates are predominantly thermal neutron events to a situation where they are predominantly resonance neutron events. Hence the proposed decoupling of the uncertainties linked to the calculation of thermal lattices and the uncertainties engendered by the effects of under moderation is justified, a posteriori.

For the range of undermoderated lattices (PF between 0.5 and 0.7) , the dispersion of results varies from 4 000 pcm to 6 000 pcm. In the specific case of small pellets,r=0.05 cm, the dispersion of results attains a level of 8 000 pcm because of the supplementary uncertainty linked to the geometric problem. In the most undermoderated lattices (PF=0.7) we observe, in all cases, a dispersion greater than 6 000 pcm.

The results of international calculations exhibit very different behaviours as functions of the level of moderation when one changes either the data library or the number of groups (cf Italian XSDRNPM calculations carried out with ENDF/BIV and with JEF presented in Figures 8) .

4.2 - Effect of Geometry (size of pellets)

Problem 19 allows us to analyse the effects of taking into account different pellet sizes in criticality codes. In effect, at the end of dissolution of the fuel pellets, a supplementary

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calculational problem is introduced by the residual size of the pellets as they become smaller than a mean free path of the neutrons.

We have analyzed the effect of pellet size by comparing the reactivities $\rho S/\rho L$ of lattices with Small pellets, r=0.05 cm, and Large pellets, r=1.0 cm (at the same Packing Fraction). This size effect , characterised by $\Delta\rho = \rho S - \rho L = \ln (k\infty S/k\infty L)$, is presented below (APOLLO/PIC calculations) :

	$\Delta\rho$ (pcm)	
PF	Liquor 1 S/L	Liquor 2 S/L
0.3	2212	3100
0.4	-1272	- 293
0.5	-3132	-2462
0.6	-3776	-3380
0.7	-3520	-2979

These values calculated by APOLLO can be considered as reference values of the effect of pellet size ; in effect , the method of collision probabilities (utilised by APOLLO) is particularly well suited for the treatment of the spatial variable in the Boltzmann equation when $R.\Sigma t << 1$.

The table above shows that the small pellets lead to an increase in the reactivity of the dissolver of about +3 000 pcm in well-moderated lattices (PF<0.3). In undermoderated lattices (PF>0.5), the dissolution of pellets engenders a loss of reactivity of 3 000 to 4 000 pcm. These results are due to the fact that the increase in the value of the resonance escape factor, created by the heterogeneity of the fuel is compensated by a decrease in the value of 'f', the thermal utilisation factor of the neutrons (effect due to the disadvantage factor $\phi m/\phi f$) when the level of moderation is high as shown in the table below :

PF	Small			Large			Contrib. to ($\rho S-\rho L$)	
	p	f	D.F.*	p	f	D.F.	Δp**(pcm)	Δf(pcm)
0.3	.6531	.6485	1.021	.7241	.5658	1.509	-10327	+13630
0.5	.4662	.8267	1.019	.5204	.7745	1.479	-10997	+ 6521

* D.F. = disadvantage factor ($\phi m/\phi f$) for thermal neutrons at E = 0.025 eV.

** $\Delta p = \ln(pS/pL)$, $\Delta f = \ln(fS/fL)$

For the very undermoderated lattices (PF>0.6), the saturation at a level of -3 000 pcm of the difference Small/Large pellets is linked to the new preponderance of the resonance

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region, and consequently to ^{235}U epithermal fissions as shown in the table below :

PF	Small			Large			Contrib. to (ρS-ρL)		
	p	f	ε5	p	f	ε5	Δp	Δf	Δε5
0.5	.4662	.8267	1.4244	.5204	.7745	1.4050	-10997	+6521	+1371
0.7	.2572	.9294	2.0538	.2848	.9054	1.9798	-10202	+2620	+3670

These trends are illustrated in Figure 9 which plots the absolute values of the reactivity contributions, Δp, Δf, and Δε5 as functions of the packing fraction.

In Table 8 we present the reactivity differences which correspond to the international calculations ; these reactivity effects, Small/Large pellets, are illustrated in Figures 10. In Figure 10a the values show a disagreement between contributors of 7 000 pcm at PF=0.3 (Liquor 1) ; the dispersion among international calculations decreases with undermoderation, where it assumes a value of 5 000 pcm in the range PF - (0.5, 0.7). The presence of fuel dissolved in the nitric acid solution (Liquor 2, Figure 10b) increases the disagreement among participants on the effect of pellet size : the maximum disagreement is represented by the results obtained by the two Japanese laboratories where the difference varies from 11 700 pcm at PF=0.3 to 7 000 pcm at PF=0.7 .

These results show clearly that the utilisation of criticality calculational tools is not always mastered in studies with "micro"-pellets. Discrete ordinates calculations (SCALE/XSDRNPM) give satisfactory results in the contributions from ORNL and ENEA/Casaccia ; on the other hand SCALE/XSDRNPM and ANISN give unacceptable results in the contributions from ENEA/Trisaia and JAPAN/JAERI.

As for calculations carried out with continuous energy Monte-Carlo codes, Figure 10c shows that a more consistent variation with PF can be achieved ; the dispersion of results is, however, greater than the statistical uncertainties of the calculations, which seems to indicate a difficulty in the treatment of "micro"-cells by the Monte-Carlo methods. In spite of this dispersion, Figure 10c shows clearly that the MONK and MCNP calculations confirm the law of variation with pellet size (ρS - ρL) = +2 300 pcm (PF=0.3) to -3 500 pcm (PF=0.7) derived from transport calculations based on collision probabilities (APOLLO and WIMSE/BNFL results).

4.3 - Effect of the Double Heterogeneity

The APOLLO treatment of the neutronics problem represented by the dissolver, i.e. the double heterogeneity of the fuel with its resonance isotopes in the fuel and in the nitric acid solu-

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	PF	Liquor 1 S/L	Liquor 2 S/L	Small L2/L1	Large L2/L1
USA/ORNL					
R-XSDRNPM	0.3	2777.	3921.	2098.	954.
	0.4	-1519.	109.	867.	- 761.
	0.5	-3596.	-2108.	306.	-1181.
	0.6	-4163.	-3034.	64.	-1065.
	0.7	-3657.	-2955.	- 19.	- 721.
FRANCE/CEA					
APOLLO	0.3	3625.	1922.	-1444.	259.
	0.4	- 730.	-1548.	-2662.	-1844.
	0.5	-3035.	-3376.	-2904.	-2563.
	0.6	-3830.	-3944.	-2768.	-2654.
	0.7	-3548.	-3566.	-2336.	-2318.
UK/SRD					
MONK 6.3	0.3	4730.	5016.	2833.	2546.
	0.4	1505.	1768.	996.	733.
	0.5	-1321.	- 511.	768.	- 42.
	0.6	-3464.	-2662.	- 827.	-1628.
	0.7	-3492.	-2614.	- 18.	- 897.
UK/BNFL					
WIMSE	0.3	2273.	3486.	2157.	945.
	0.4	-1349.	202.	910.	- 641.
	0.5	-3262.	-1860.	338.	-1064.
	0.6	-3858.	-2826.	70.	- 961.
	0.7	-3439.	-2780.	- 9.	- 668.
ITALY/ENEA-CB4					
XSDRNPM	0.3	2819.	5004.	2068.	- 117.
	0.4	-1163.	1803.	889.	-2077.
	0.5	-3199.	- 141.	229.	-2830.
	0.6	-4328.	-1459.	- 72.	-2941.
	0.7	-3753.	-1909.	- 322.	-2166.
ITALY/ENEA-CJF					
XSDRNPM	0.3	2956.	4431.	2142.	668.
	0.4	- 135.	1276.	951.	- 460.
	0.5	-4350.	- 713.	53.	-3584.
	0.6	-4408.	-4551.	476.	618.
	0.7	-6657.	-4965.	852.	- 840.
JAPAN/PNC					
XSDRNPM	0.3	3033.	6897.	2230.	-1633.
	0.4	-1164.	3758.	895.	-4028.
	0.5	-3222.	1999.	284.	-4937.
	0.6	-3825.	1183.	0.	-5008.
	0.7	-3574.	752.	- 95.	-4421.
JAPAN/JAERI					
ANISN	0.3	-2540.	-4869.	-2123.	205.
	0.4	-5436.	-3502.	324.	-1610.
	0.5	-6383.	-6335.	-2118.	-2166.
	0.6	-6261.	-6502.	-2521.	-2280.
	0.7	-6495.	-6124.	-1687.	-2058.
ITALY/ENEA-T					
XSDRNPM	0.3	1029.	2441.	- 638.	-2050.
	0.4	-3908.	-1646.	- 789.	-3051.
	0.5	-5740.	-3421.	-1734.	-4053.
	0.6	-5170.	-3165.	-1167.	-3172.
	0.7	-1086.	810.	-1014.	-2910.

TABLE 8

REACTIVITY EFFECTS ($\rho i - \rho j$) = LN $K\infty i / K\infty j$

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tion at the same time , is summarized in Table 9 . This table compares the results of the "PIC" calculations, the "ND" model and the "AS" model, for the reactivity effect, $\Delta\rho = \rho(L2) - \rho(L1) = \ln(k_\infty 2/k_\infty 1)$ of the introduction of 300 g/l of fuel in the solution. These reference values obtained with the PIC method indicate that the dissolved uranium increases the reactivity of the dissolver if the medium is well-moderated, but that the reactivity effect L2/L1 becomes negligible for undermoderated cases.

Table 9 also shows that the simple models of self-shielding are not conservative , i.e. they give negative L2/L1 reactivity effects, and lead to an underestimation of the reactivity of the realistic dissolver medium, loaded with 300 g/l uranium, greater than or of the order of 2 000 pcm . In this comparison the ND model gives an underestimation in the range 2 000 - 3 000 pcm for small pellets. The error introduced by this model amounts to -2 000 pcm in the dissolver medium with large pellets ; the bias is weakest in the well-moderated case (PF=0.3) , and represents -1 500 pcm in agreement with the value already obtained in an internal CEA study (6) of dissolved PWR fuel. As for the model "Average Self-Shielding", Table 9 demonstrates that this approximation is satisfactory for the quasi-homogeneous case of the small pellets, r=0.05 cm, but leads to an underestimation of about 4 000 pcm of the reactivity of the vessels containing non-dissolved fuel.

International calculations of the effect of "fissile liquor", L2/L1, are summarized in Table 8. These results are compared to our APOLLO calculations in Figure 11. We note that :

a) In the case of small pellets (Figure 11a) , the dispersion of the calculations varies from 5 000 pcm to 3 000 pcm, respectively for a packing fraction varying from 0.3 to 0.7. The rigourous methods :
   - continuous-energy Monte Carlo MONK (UK/SRD)
   - the subgroup method WIMSE (UK/BNFL)
   - the ROLAIDS fine slowing-down calculation (USA/ORNL)

   give results that are coherent with our PIC(ref.) values.

   The Sn calculations (JAERI and ITALY/T contributions), underestimate the fissile liquor effect by about 3 000 pcm ; this is linked to the failure to take account of the Dancoff effect between pellet and solution as affirmed by the APOLLO results in the ND model (cf Figure 11a).

b) In the case of large pellets (Figure 11b) , the dispersion of the international calculations due to the effect of the double heterogeneity is 4 500 pcm. Here also , the errors in the self-shielding calculation due to the shadow effect between pellet and solution lead to an underestimation of the dissolver reactivity of :

   - 2 000 pcm in the calculations ITALY/C, JAPAN/JAERI, APOLLO(std-ND)

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	PF	Small L2/L1	Large L2/L1
Reference PIC			
	0.3	2302.	1414.
	0.4	869.	- 110.
	0.5	154.	- 516.
	0.6	- 92.	- 488.
	0.7	236.	- 305.
No DANCOFF			
	0.3	- 559.	175.
	0.4	-1687.	-1739.
	0.5	-2040.	-2398.
	0.6	-2010.	-2437.
	0.7	-1738.	-2100.
Average Self-Shielding	0.3	1592.	-1957.
	0.4	484.	-5543.
	0.5	37.	-5653.
	0.6	- 121.	-4830.
	0.7	- 136.	-3570.

TABLE 9
REACTIVITY EFFECT (IN PCM) OF DISSOLVED FUEL
IN THE APOLLO CALCULATIONS

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- 3 000 pcm to 4 000 pcm in the contributions ITALY/T and JAPAN/PNC (SCALE calculations).

The differences presented above are certainly not as large as the 20 000 pcm observed in OECD Benchmark no 20 (2,3) where the effects of the double heterogeneity were maximised by the strong concentrations of fuel in the moderating solution. However, the bias engendered by the self-shielding formalisms represents 2 000 to 4 000 pcm of underestimation of the reactivity of the dissolver-type lattice.

5 - CONCLUSION

The analysis of OECD benchmark no 19, corresponding to a fuel dissolver model proposed by BNFL, has permitted the study of certain problems linked to the calculation of the criticality of an UO2 fuel undergoing dissolution.

In addition to the problem of the double heterogeneity created by the presence of heavy resonance isotopes in the pellet and in the solution (cf analysis (2,3) of benchmark TMI/dissolver - proposed by ORNL), the influence of the level of moderation and the size of the fuel pellets has also been studied. The theoretical analysis of the effect of these parameters on the reactivity of the dissolver has been carried out using the results of APOLLO calculations. The effects of the method for calculating self-shielded cross sections, linked to the double heterogeneity of the fuel, have been quantified by comparison of the results of various design-oriented methods ("No Dancoff" model used in criticality codes, "Average Self-Shielding" model) to the results of the reference method PIC that we are proposing . The analysis of the dispersion of the results of international calculations relies on the results of reference APOLLO calculations, to permit the development of the following conclusions :

1) The effect of "fissile liquor", in the realistic case of 300 g/l of dissolved uranium treated here , is positive and increases by +2 000 pcm the reactivity of the dissolver in the case of a well-moderated medium PF<0.3 (size limiting case in the absence of soluble poison) ; the reactivity effect is negligible in undermoderated lattices , corresponding to the size limiting case for the nitric acid solution poisoned with 1 g/l of Gd treated herein.

   The international calculations have shown that the contributions based on Sn calculations (ANISN, XSDRNPM) underestimate by 2 000 to 4 000 pcm the effect of the fissile liquor , as a result of failing to account for the Dancoff effect between pellet and solution . For the same reason , the standard APOLLO method appears to be non conservative : it underestimates the dissolver reactivity by -2 000 pcm at the start of dissolution to -3 000 pcm for the fuel granules.

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2) The size of fuel pellets is an important parameter since the reactivity of a well-moderated , poisoned , dissolver (PF < 0.3) rises by 3 000 pcm during dissolution . On the other hand the dissolution of fuel pellets in an undermoderated lattice results in a reactivity loss of -3 000 pcm

The dispersion of 8 000 pcm in the international calculations in the geometry r(fuel) =0.05 cm (Liquor 1) has shown that the utilisation of criticality codes presents some problems for studies with micro-pellets :

-the Sn calculations of the effect of pellet size show a disagreement of 5 000 pcm on the reactivity effect ($\rho S-\rho L$)
-recent continuous-energy Monte Carlo calculations have confirmed the variation of reactivity with pellet size as a function of PF given by APOLLO and WIMSE calculations based on collision probability methods ; however , the dispersion of several thousand pcm of the MONK and MCNP calculations seems to indicate a difficulty in the treatment of micro-cells with Monte Carlo codes.

3) The international calculations present a dispersion of +/-2 000 pcm about the APOLLO values in the standard PWR case (PF=0.3; r(UO2)=1.0 cm; Liq. 1) : the British codes overestimate the reactivity by 2 000 pcm as a result of a strong $\eta 235$ (+1 700 pcm in WIMSE, +2 500 pcm in MONK) , while the American code ROLAIDS is underreactive by -1 500 pcm.

The analysis of the benchmark has shown that the dispersion of the results from international calculations increases as the system becomes undermoderated . This parameter introduces a supplementary uncertainty of 4 000 pcm in the limiting range of moderation,PF=0.5, 0.6 . Similarly this international comparison seems to indicate an underestimation of reactivity in tight lattices of -2 000 pcm in the USA/ROLAIDS calculations, which explains the underestimated value of -3 500 pcm (compared to APOLLO/PIC) in the dissolver reactivity at limiting levels of moderation.

This study confirms the interest of the APOLLO/PIC method made operational during the preceding study (prob. no 20), which enables us to produce accurate evaluations of specific problems such as the fuel double heterogeneity and the effect of micro-pellets in a dissolver. It is evident that the standard design-oriented codes contain several weak points which may be improved by adopting such techniques as the APOLLO/PIC,the WIMSE subgroup method , the systematic use of the ROLAIDS routine in SCALE or else one must resort to continuous-energy Monte Carlo codes. We emphasize that the problems illustrated in this paper cannot be overcome by a simple correction factor since several parameters, functions of the level of moderation, intervene simultaneously.

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Several methods examined in this paper produce essentially equivalent results in terms of reactivity variations but differ markedly in the absolute levels of reactivity. A future experimental program seems, to us, to be desireable to validate the results obtained in the course of these studies.

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APPENDIX A

IDENTIFICATION SYMBOLS FOR THE INTERNATIONAL PARTICIPANTS

France,	Commissariat à l'Energie Atomique, Institut de Protection et Sécurité Nucléaire.			
		APOLLO CEA 79	ND Model Data Library	FRANCE/CEA
USA,	Oak Ridge National Laboratory			
		SCALE/ROLAIDS/XSDRN		
		ENDF/BIV	Data Library	USA/ORNL
UK,	Safety and Reliability Directorate			
		MONK 6.3		
		Point	Data Library	UK/SRD
UK,	British Nuclear Fuels Limited			
		WIMSE		
		WDN26	Data Library	UK/BNFL
Italy,	Energia Nucleare e Energia Alternive, Trisaia			
		XSRDNPM		
		ENDF/BIV	Data Library	ENEA/T
Italy,	Energia Nucleare e Energia Alternive, Casaccia			
		SCALE 0/NITAWL/XSDRNPM		
		JEF	Data Library	ENEA/CJF
		ENDF/BIV	Data Library	ENEA/CB4
Japan,	Power Reactor and Nuclear Fuel Development Corporation			
		SCALE 2/XSDRNPM		
		ENDF/BIV	Data Library	JAPAN/PNC
Japan,	Japan Atomic Energy Research Institute			
		ANISN		
		ENDF/BIV	Data Library	JAPAN/JAERI

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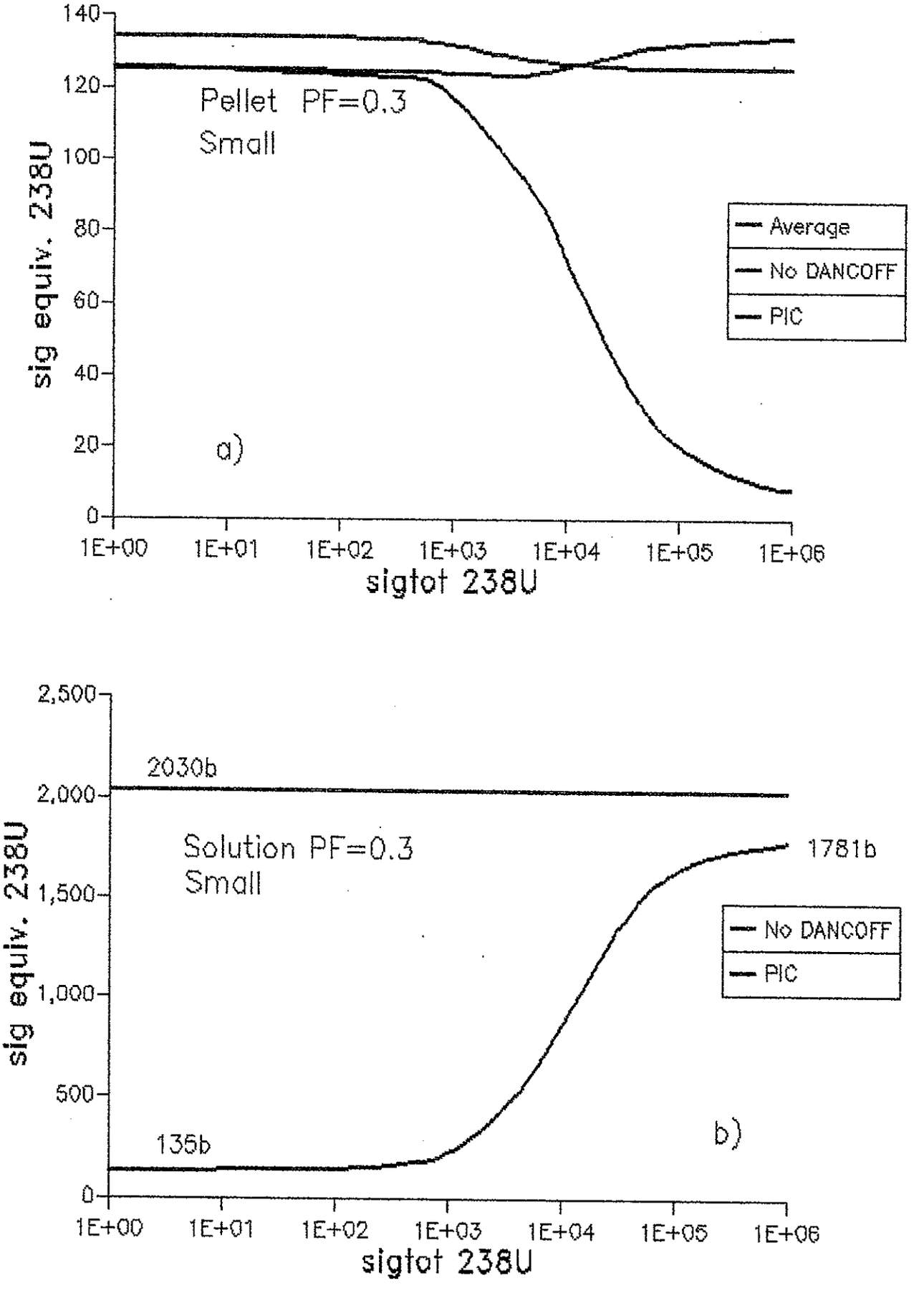

Figure 1 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.3, small pellets.

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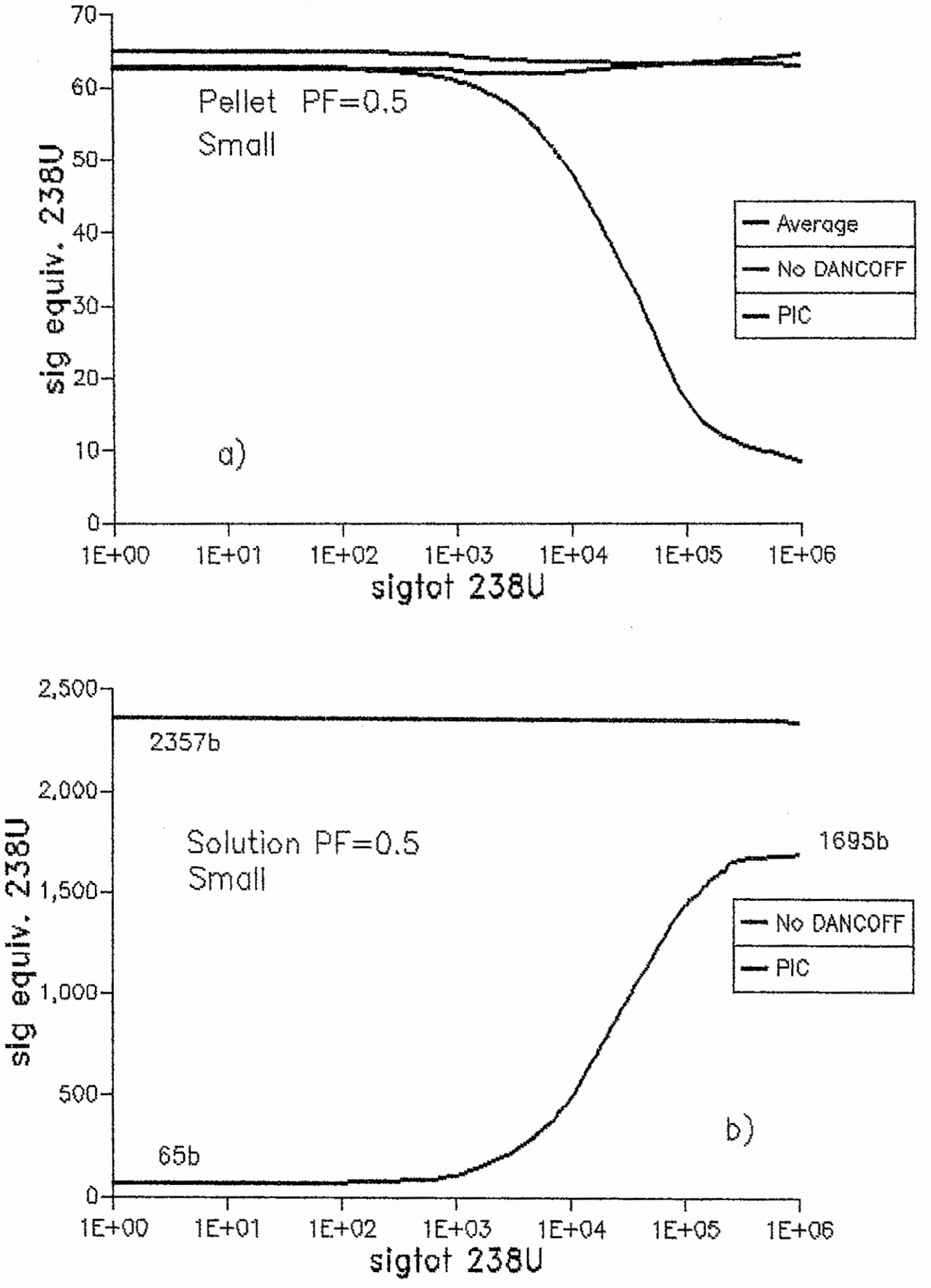

Figure 2 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.5, small pellets.

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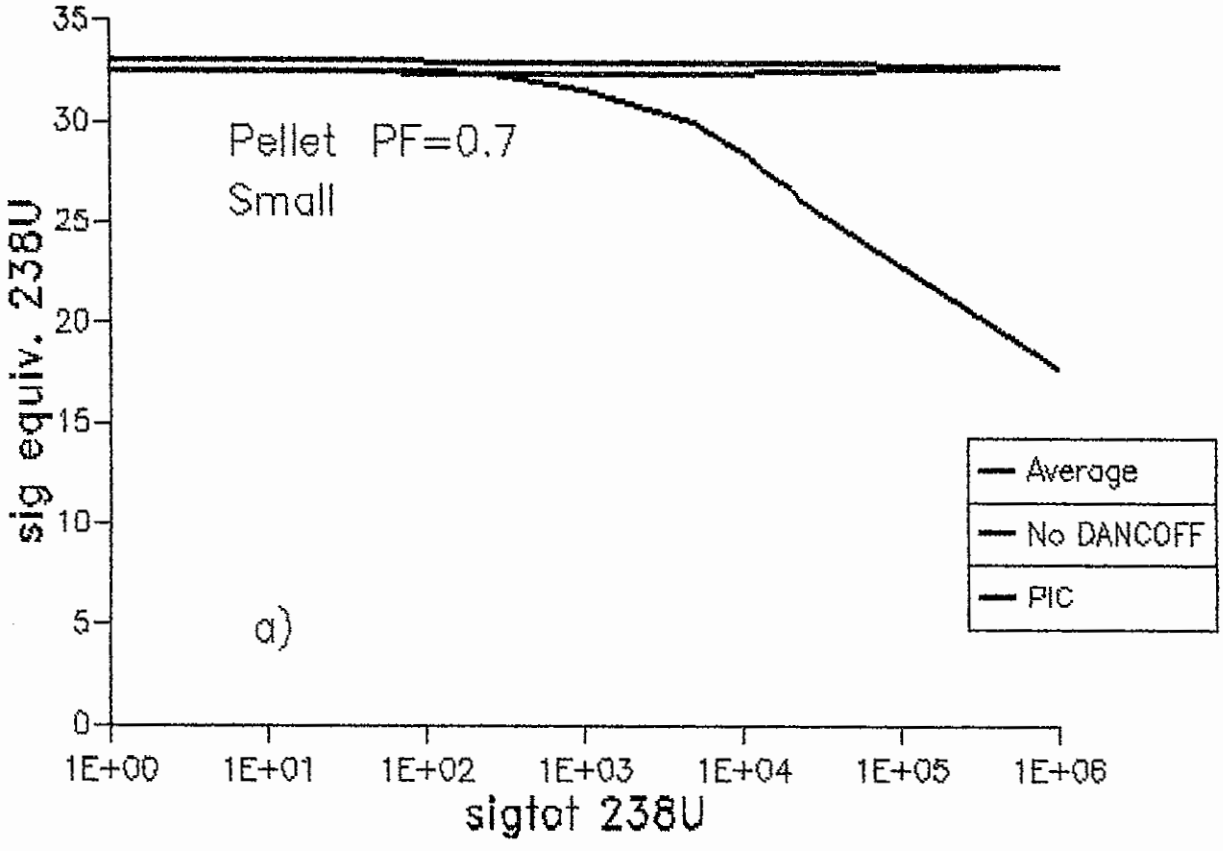

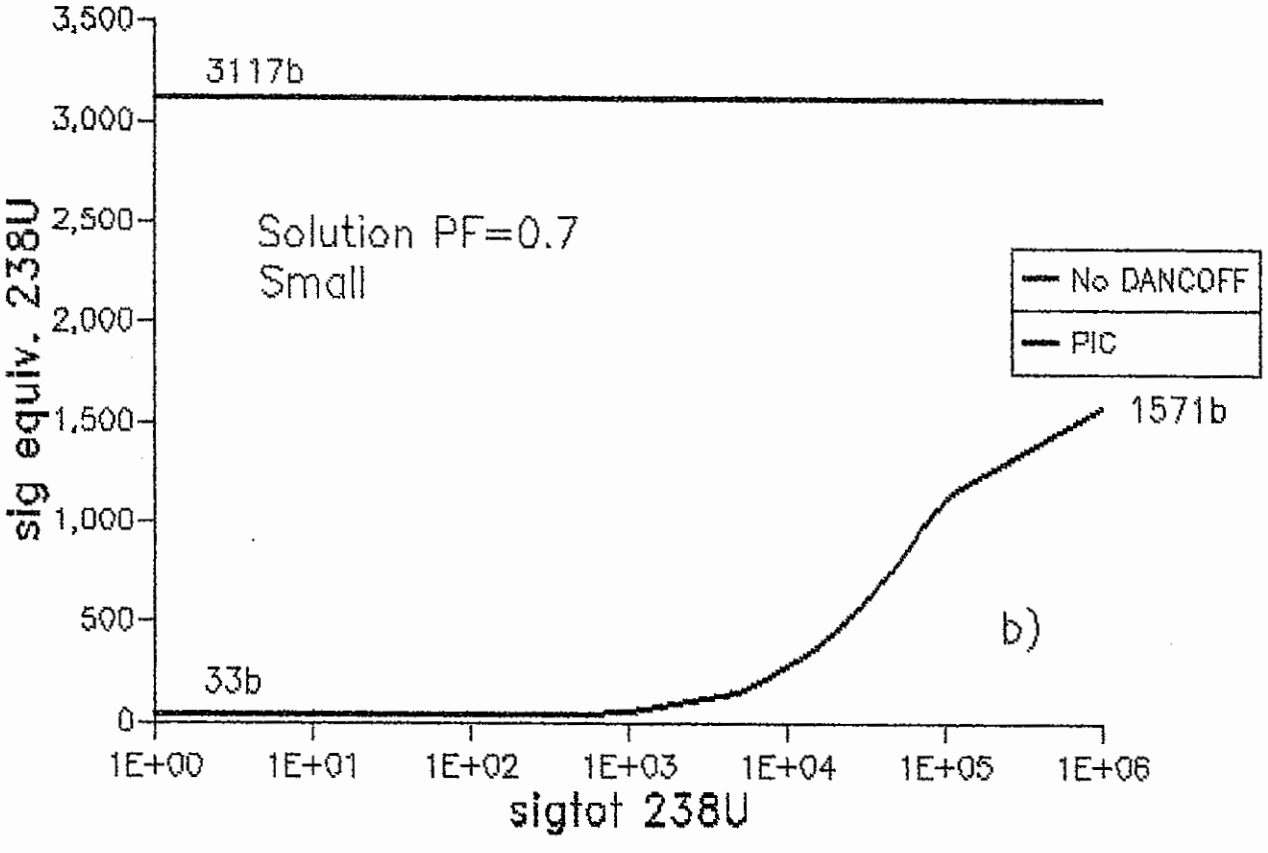

Figure 3 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.7, small pellets.

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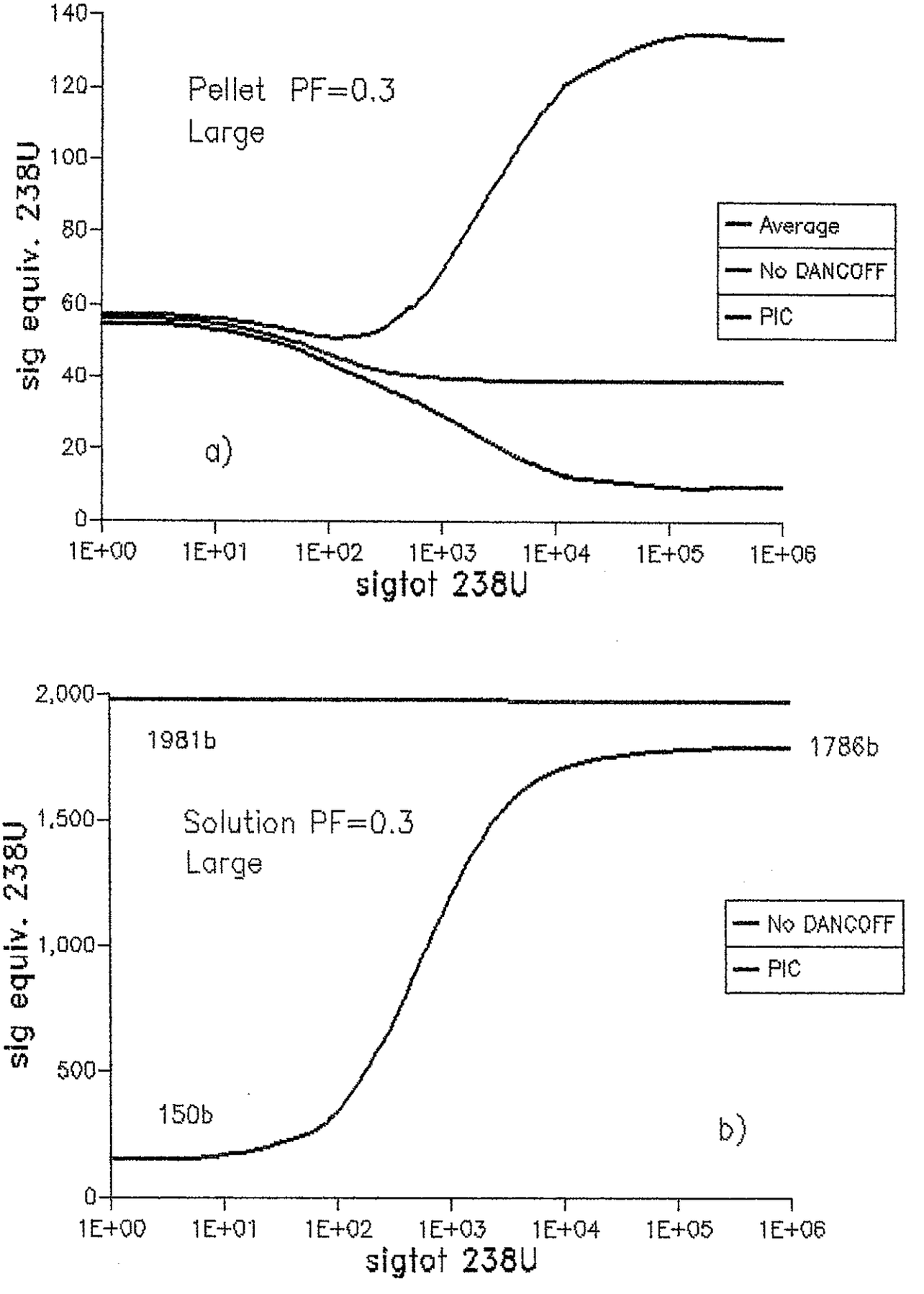
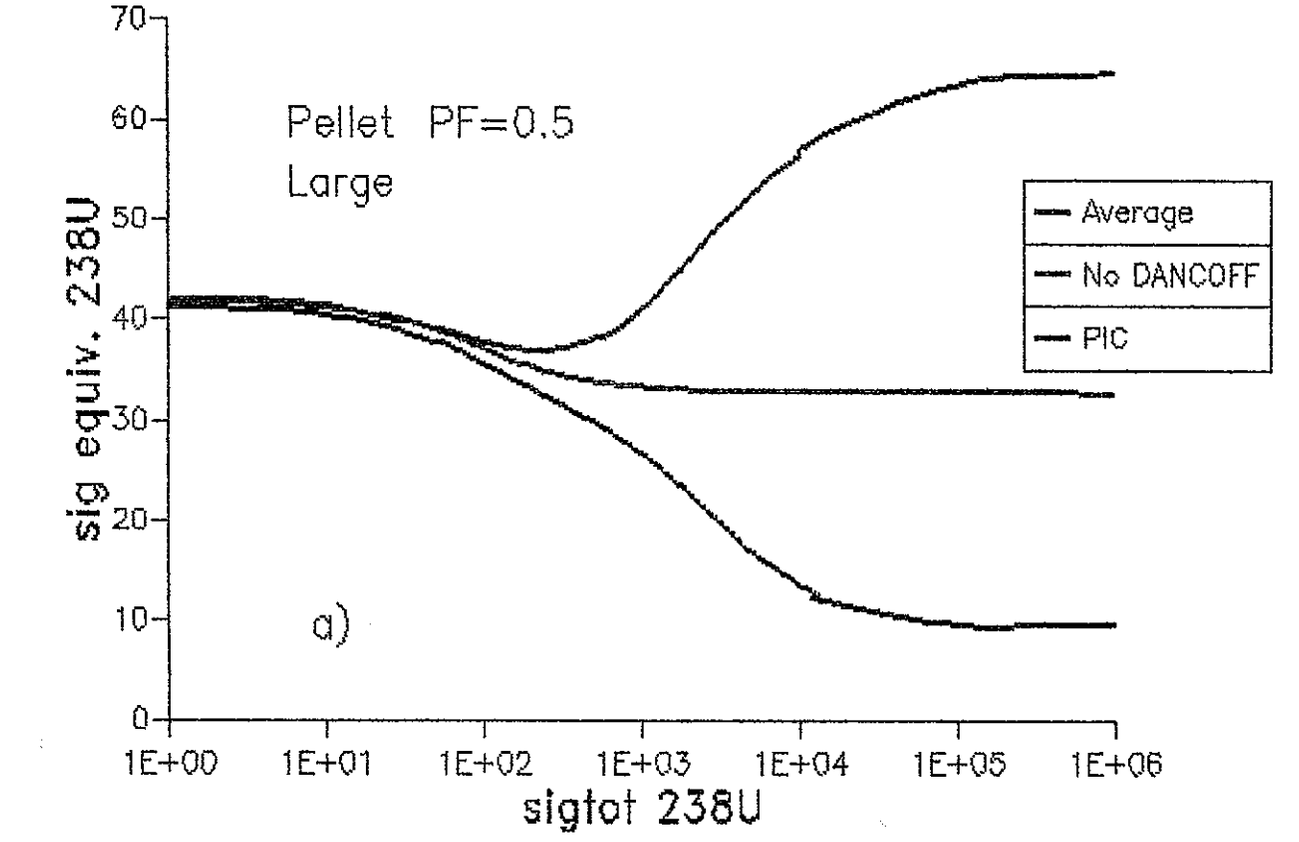


Figure 4 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.3, large pellets.



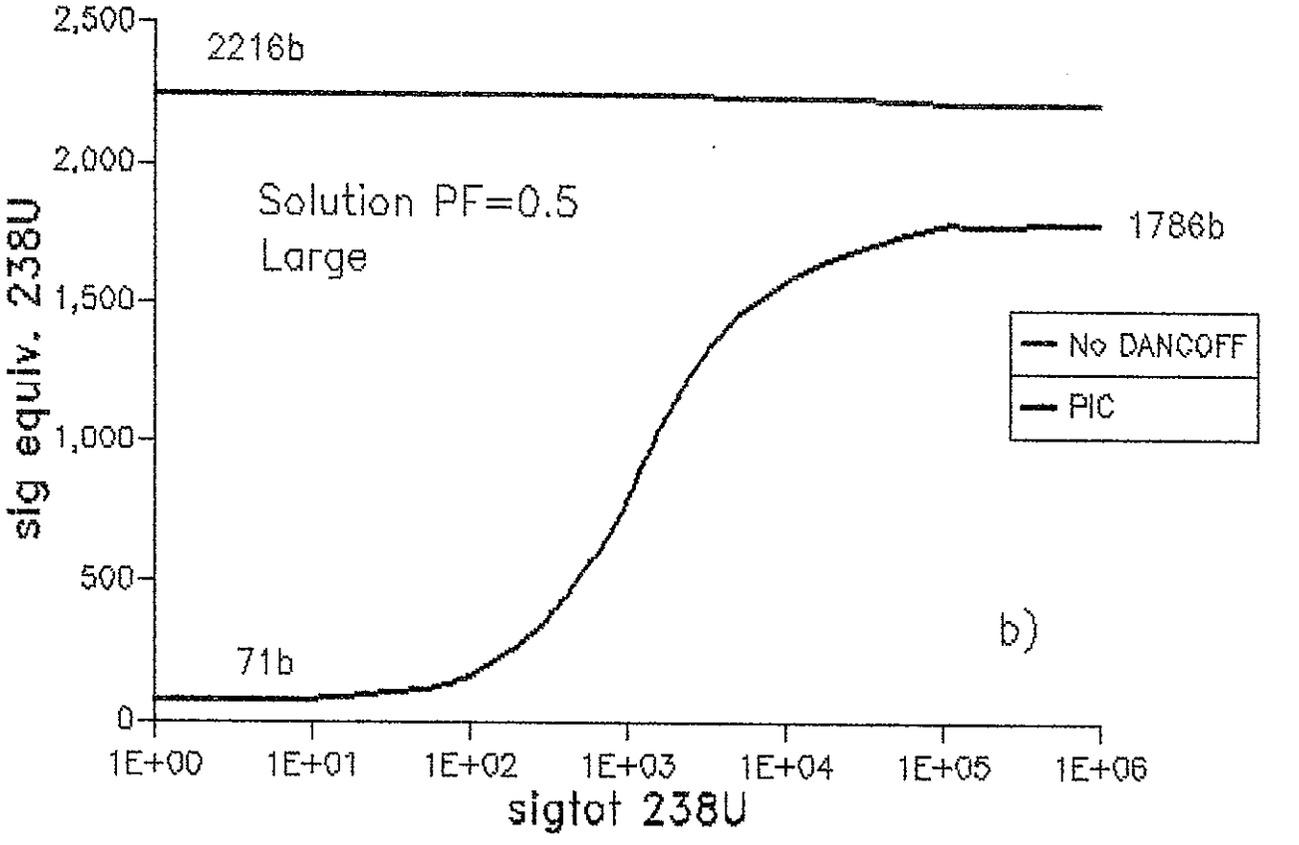


Figure 5 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.5, large pellets.

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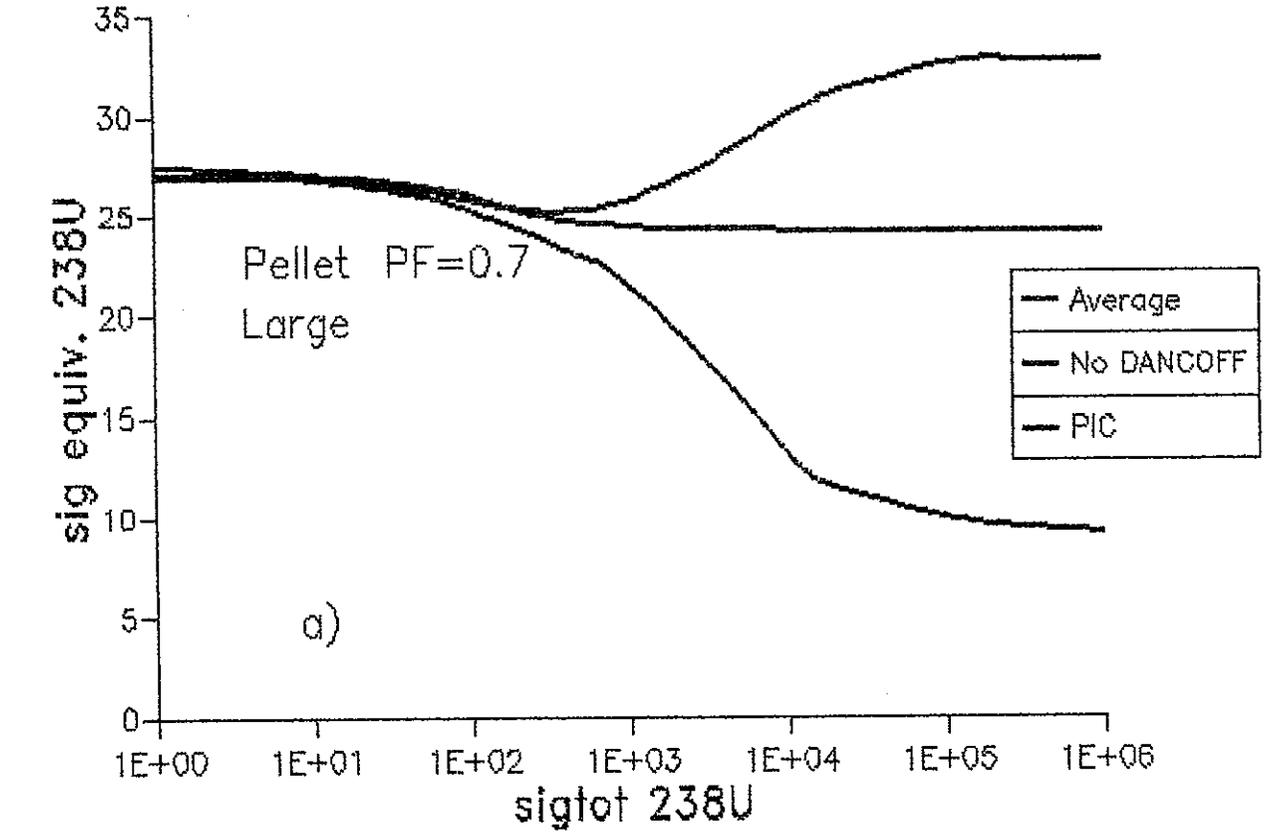

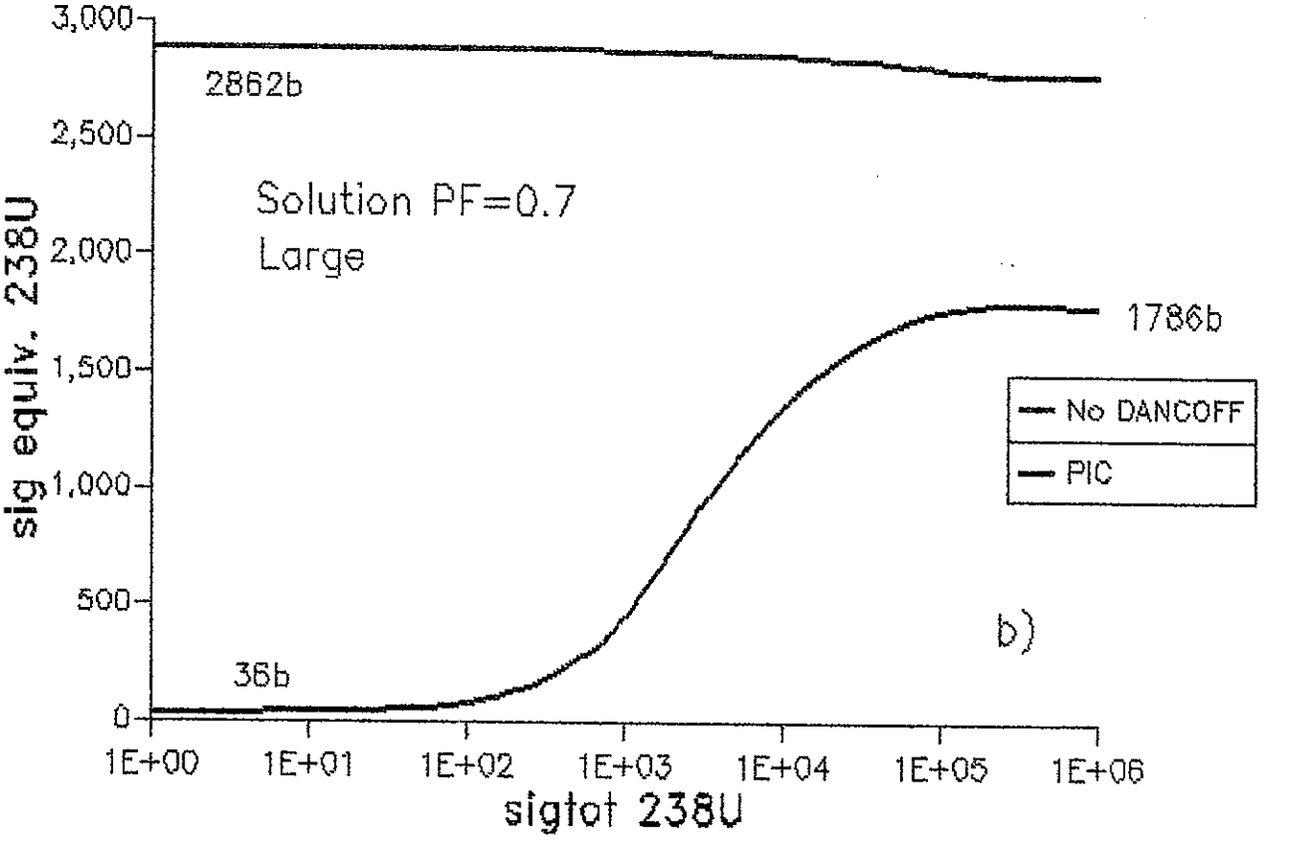

Figure 6 : Variation of the ^{238}U equivalent cross section as a function of the ^{238}U total effective cross section. a) in the pellet, b) in the solution, for the different models. PF=0.7, large pellets.

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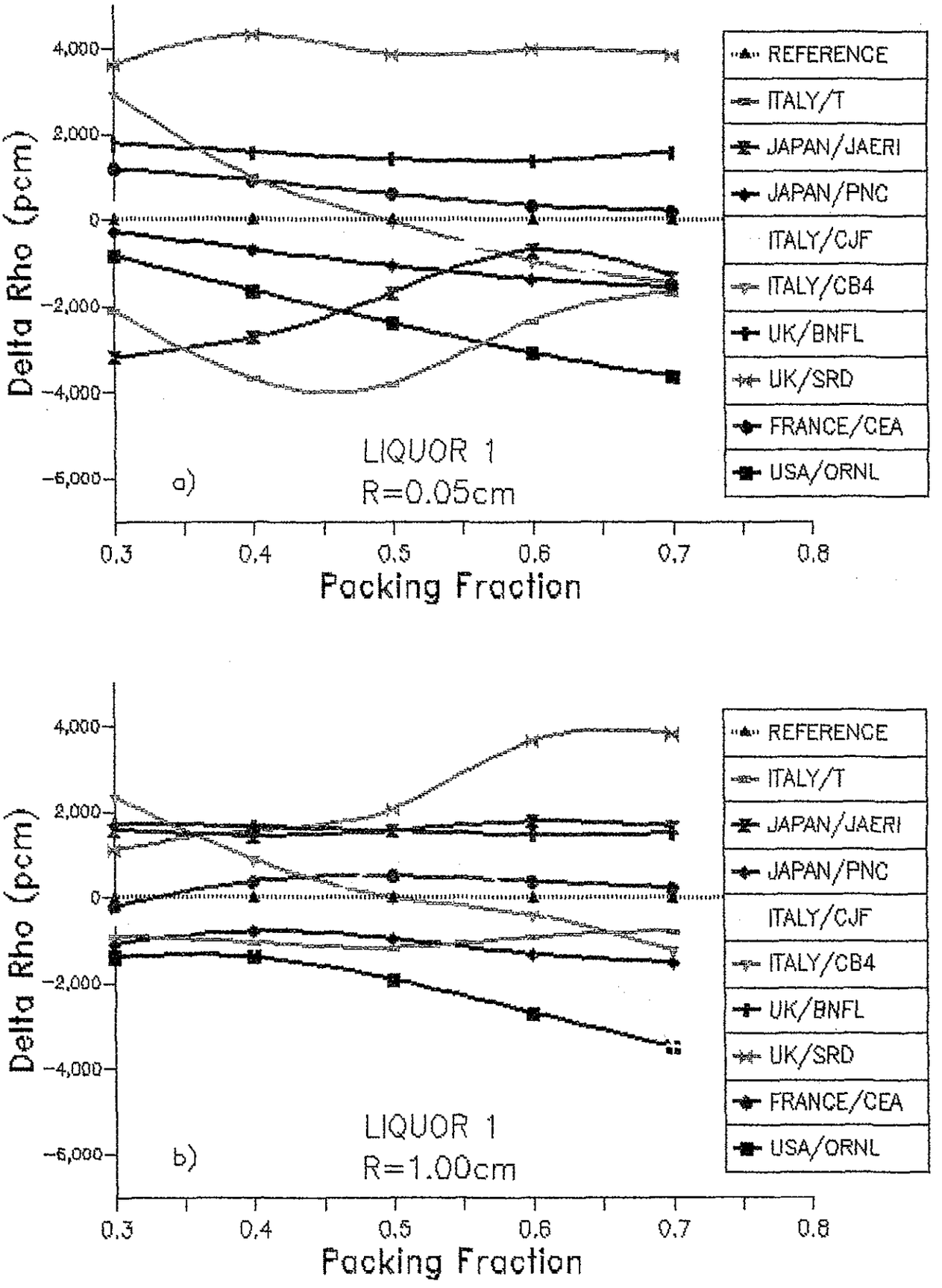

Figure 7 : A comparison of reactivity deviations from APOLLO/PIC reference calculations, of international k_∞ results submitted to the June 1988 OECD/NEA Criticality Working Group. a) small pellets, b)large pellets in Liquor 1.

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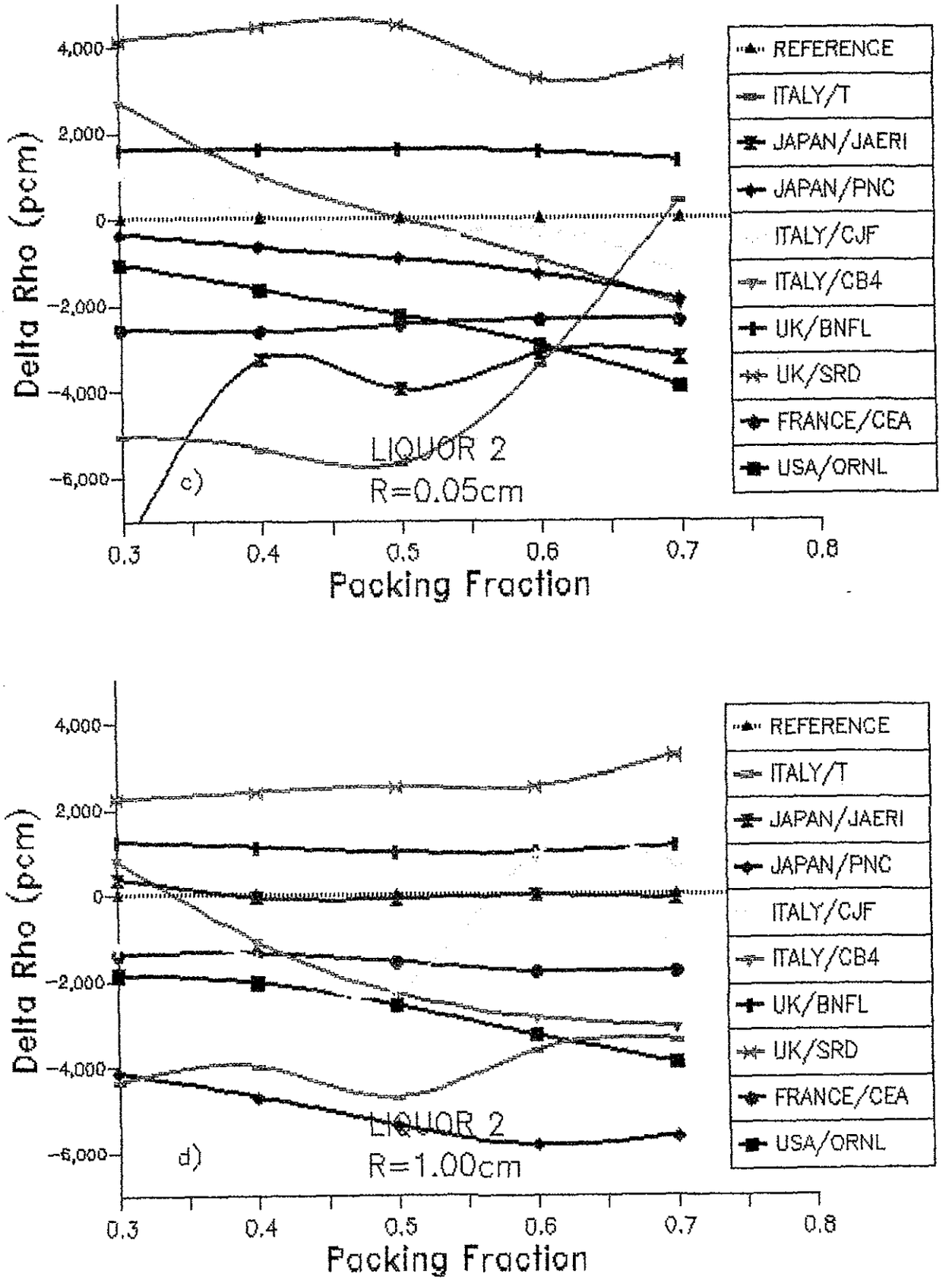

Figure 7 : A comparison of reactivity deviations from APOLLO/PIC reference calculations, of international k_∞ results submitted to the June 1988 OECD/NEA Criticality Working Group. c) small pellets, d) large pellets, in Liquor 2.

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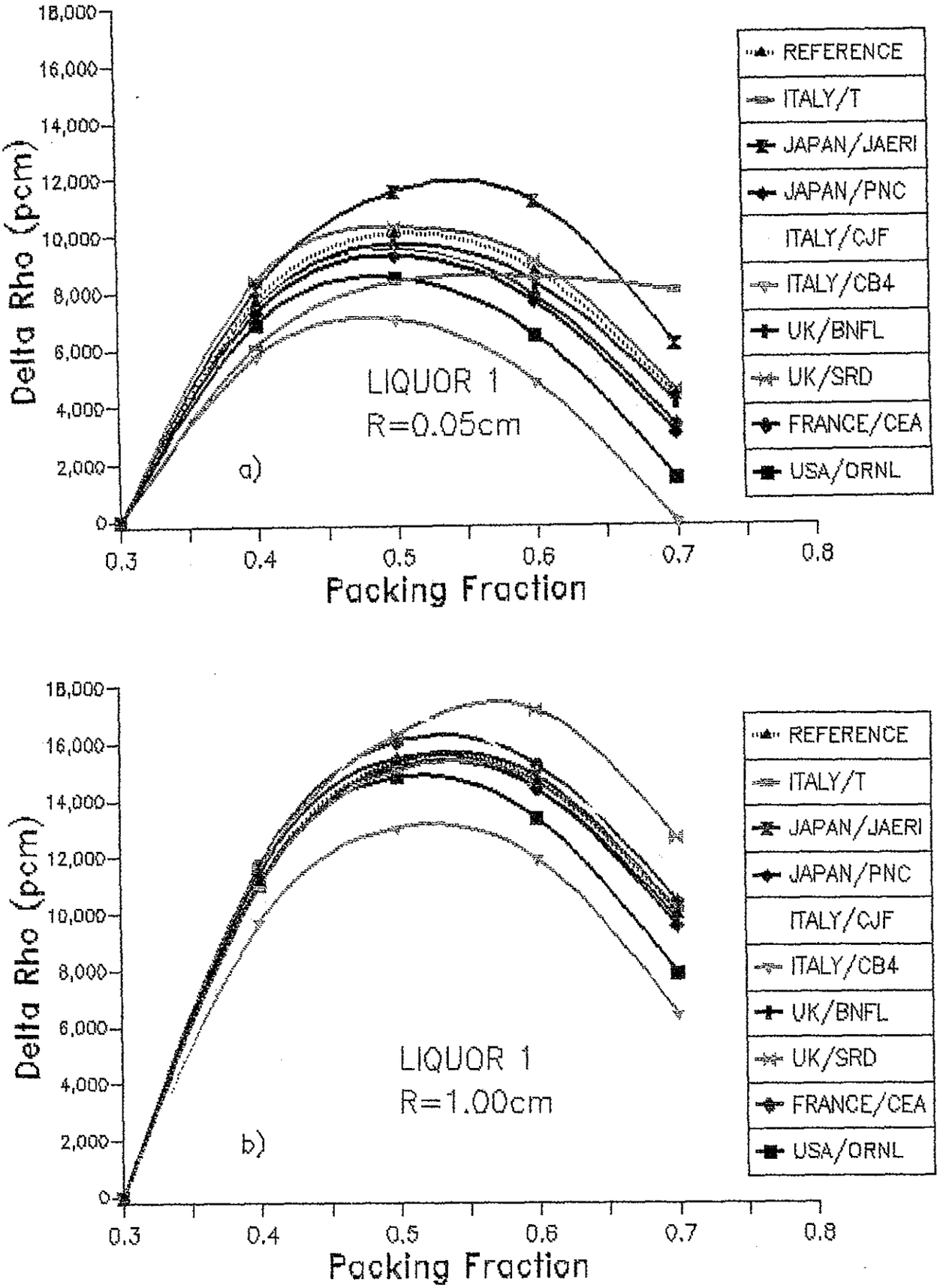

Figure 8 : VARIATION WITH MODERATION LEVEL. A comparison of the calculated reactivity changes from the value at PF=0.3, as a function of Packing Fraction for the international calculations. a) small pellets, b) large pellets, in Liquor 1.

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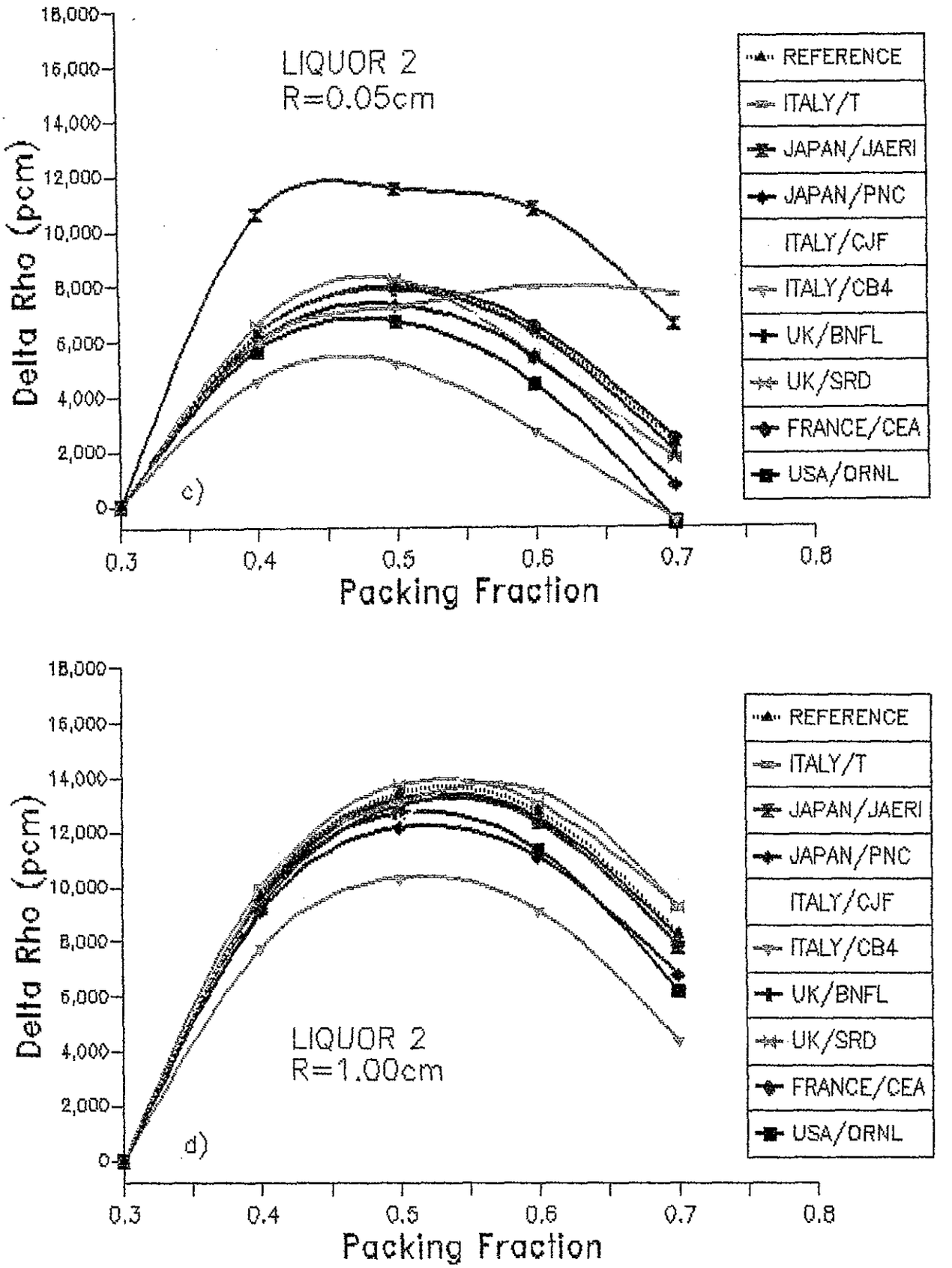

Figure 8 : VARIATION WITH MODERATION LEVEL. A comparison of the calculated reactivity changes from the value at PF=0.3, as a function of Packing Fraction for the international calculations. c) small pellets, d) large pellets, in Liquor 2.

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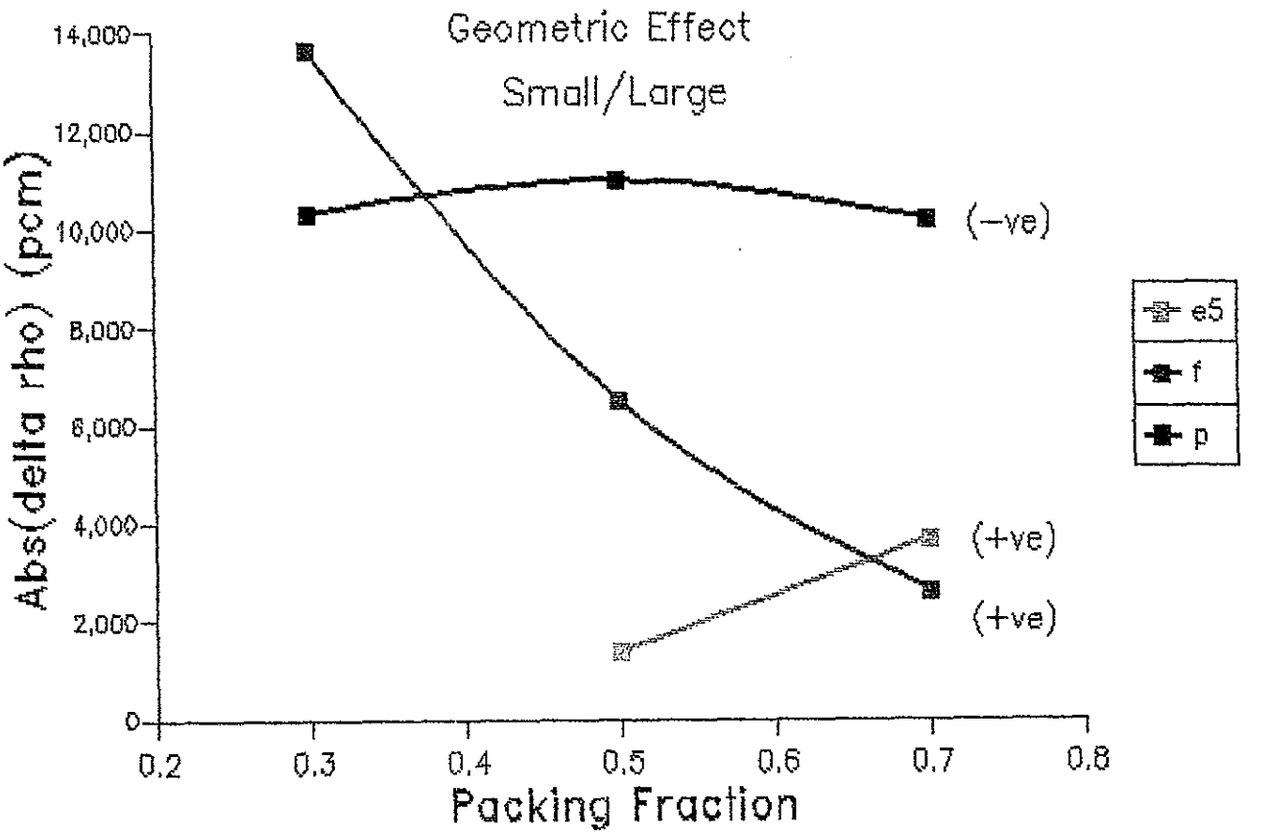

Figure 9 : The variation of the reactivity contributions of the Phenomenological Factors Δp, Δf and Δε5 as functions of Packing Fraction.

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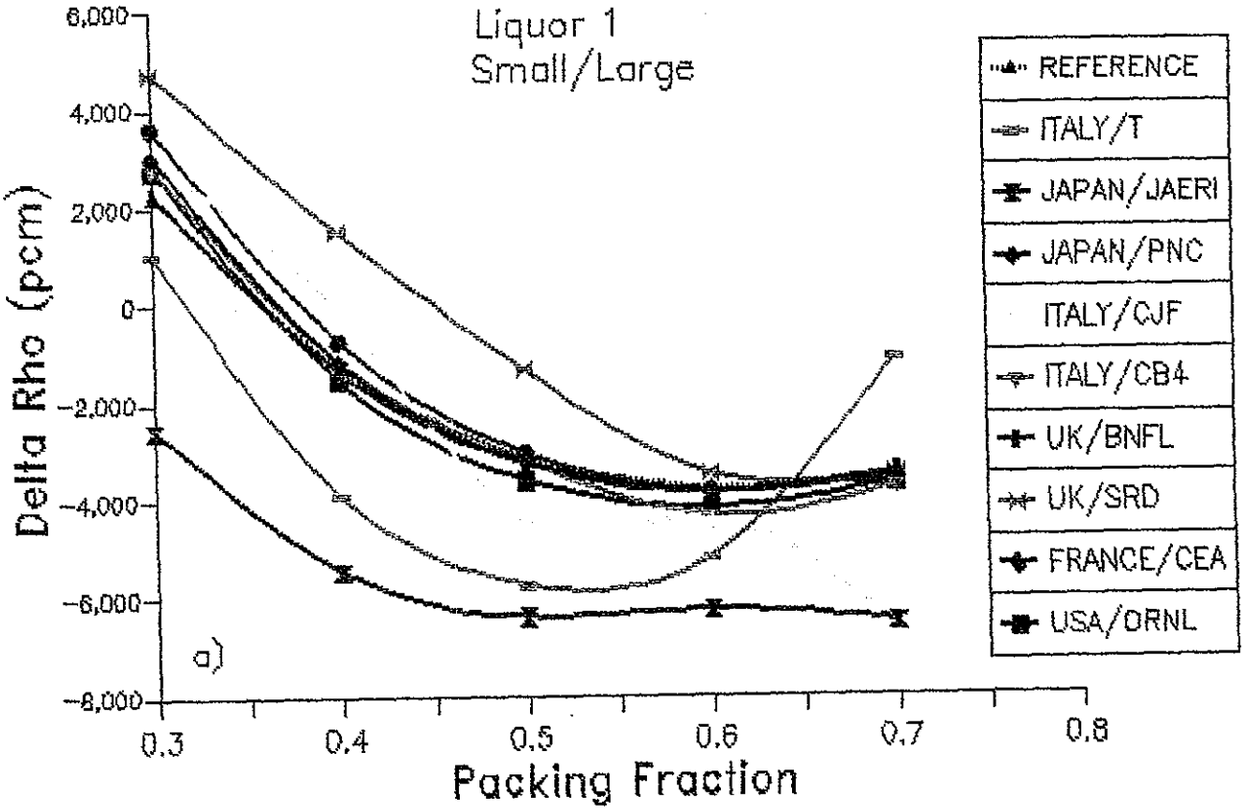

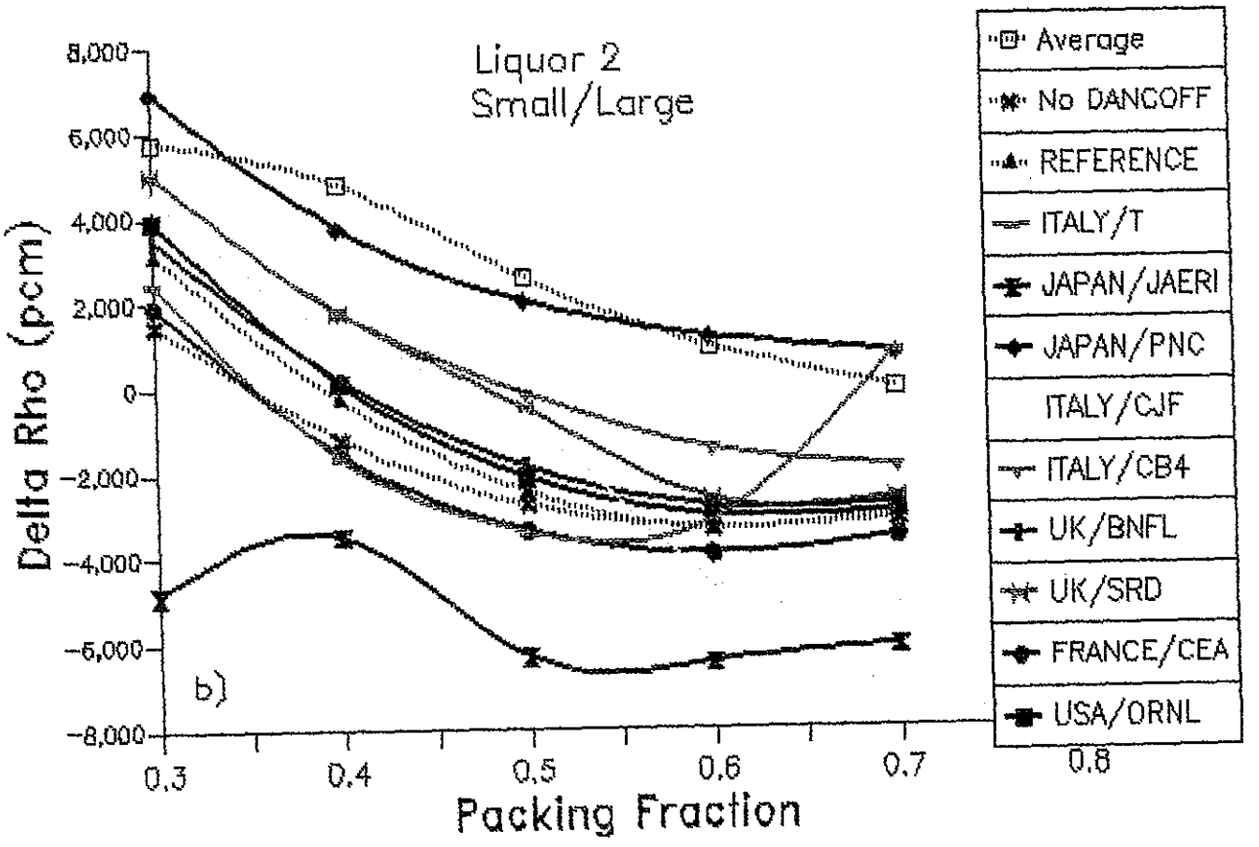

Figure 10 : THE EFFECT OF GEOMETRY. Reactivity changes in international criticality calculations which result from changing small pellets to large pellets a)in Liquor 1 , b) in Liquor 2.

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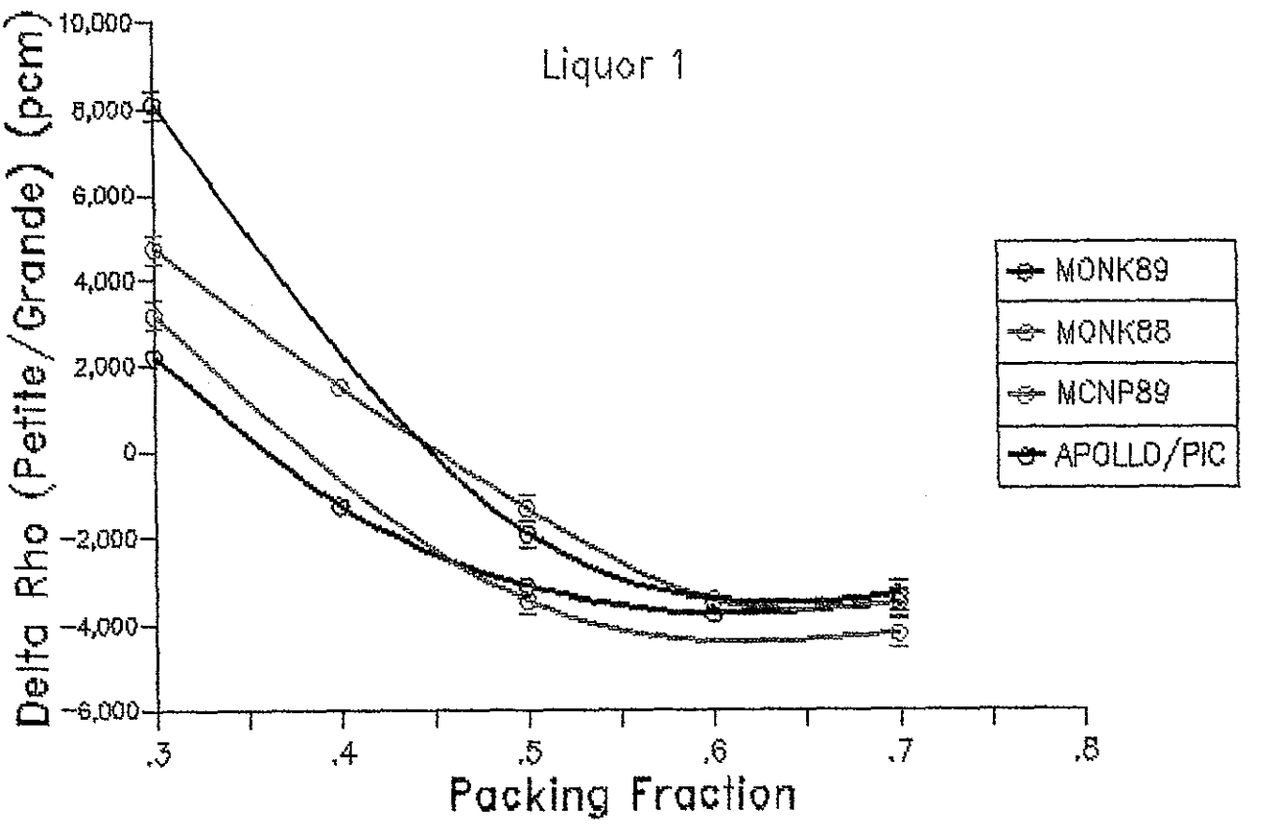

Figure 10c: A comparison of the reactivity effects of pellet size calculated with APOLLO and with continuous-energy Monte Carlo codes.

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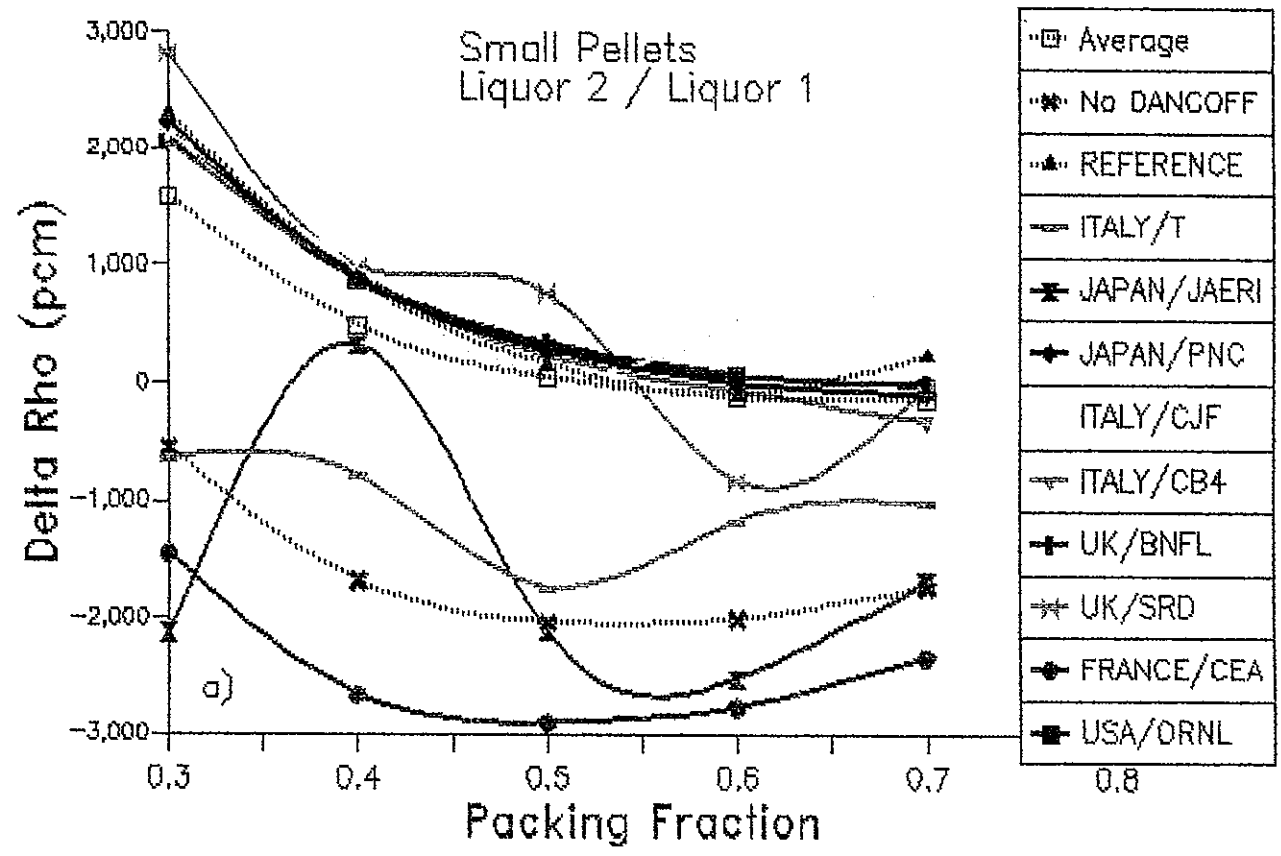

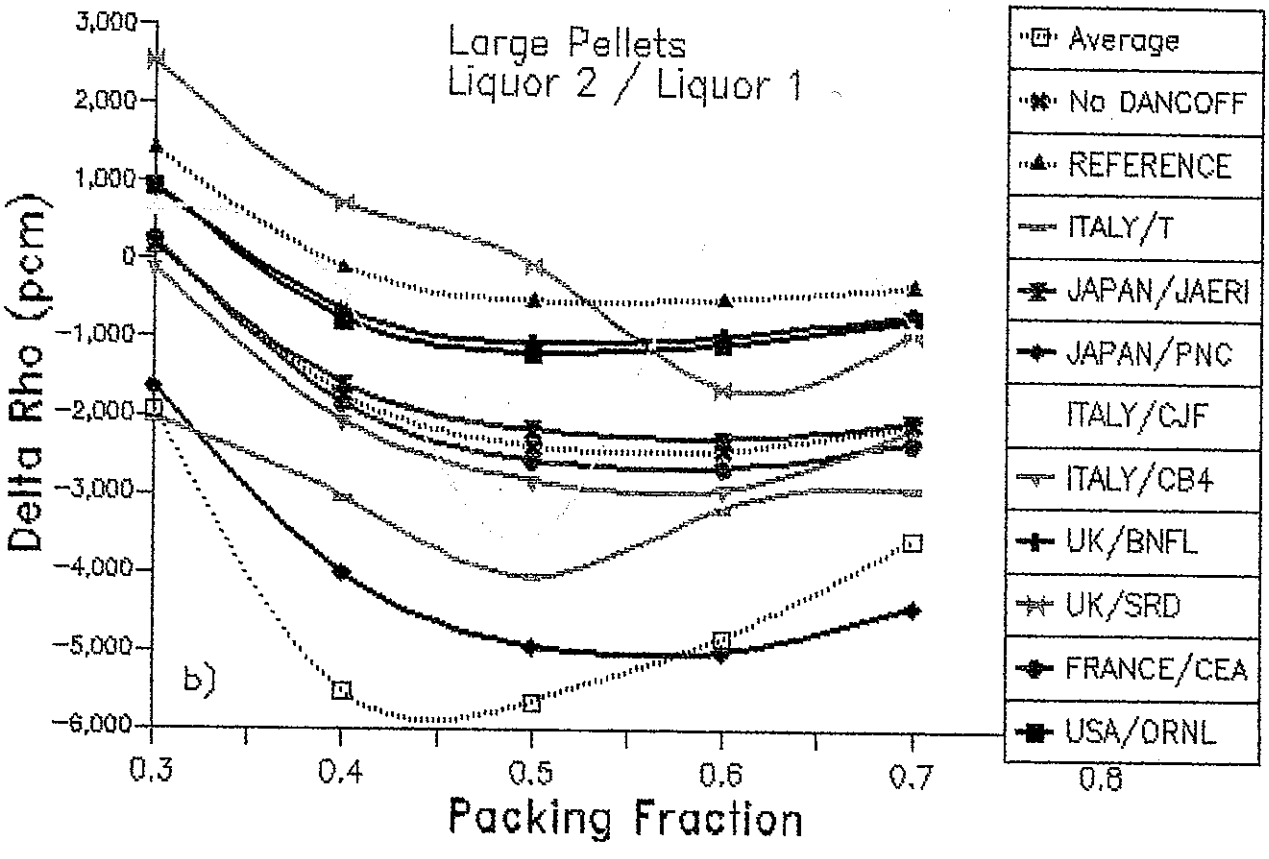

Figure 11 : THE EFFECT OF THE DOUBLE HETEROGENEITY. Reactivity changes in international criticality calculations linked to the introduction of 300 g/l of uranium in the nitric acid solution.

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B - ANALYSIS OF THE OECD/NEA CRITICALITY WORKING GROUP CALCULATIONS THROUGH A NEUTRON BALANCE EVALUATION

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I.2 Treatment and Identification of Submitted Data

II - PRESENTATION OF 1990 RESULTS

II.1 A Description of New Contributions (1990)

II.2 1990 k_∞ Results and a Comparison to the 1988 k_∞ Results

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III.2 Results of the Decomposition

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APPENDIX I Data as Supplied by Participants

APPENDIX II Normalized Reaction Rates

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B - ANALYSIS OF THE OECD/NEA CRITICALITY WORKING GROUP CALCULATIONS THROUGH A NEUTRON BALANCE EVALUATION

H.J.SMITH - A.SANTAMARINA

INTRODUCTION

Following our June 1989 studies (1,2) to resolve the large range of discrepancies in international calculations for fuel dissolver benchmark problem 20, we were requested to examine similar disagreements (a dispersion of approximately 12000 pcm) in the problem 19 calculations. While both problems 19 and 20 treat fuel dissolver situations in which fuel pellets are bathed in solutions bearing dissolved uranium, there are major differences between the two cases; the dissolved uranium in problem 19 represents only 3.3% of the fuel pellet mass whereas in problem 20 it could go as high as 50% , two extreme pellet sizes are considered in problem 19, the range of moderation in problem 19 is extended to extreme values. Thus, as a result of the low concentration of uranium in the solution it is unlikely that erroneous self-shielding calculations,

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which fail to account for the shadow effect between solution and pellets, could account for all of the dispersion observed in problem 19. Indeed we have shown in other work that the error introduced by inappropriate self-shielding calculations for a similar case of fissile solution is in the range 1500 to 4000 pcm depending on the self-shielding approximation used. The aim of this paper is, therefore, to understand the factors leading to the origin of the wide spread of results from the various contributing laboratories.

To achieve this objective we selected a bounding subset of the problem 19 parametrizations for analysis. For the cases thus defined we requested that the participants complete a standard table of all relevant reaction rates in three energy groups based on their calculations of June 1988.

We have carried out a physics analysis of these data by means of a neutron balance based on the reaction rates. The infinite multiplication factor was evaluated by three methods of decomposition : phenomenological (eg. resonance escape probability etc), historical (by energy group) and spatial. Several reactivity comparisons such as the effect of changing from small to large pellets, the effect of uranium in the solution and the effect of changes in the level of moderation were also carried out. In this manner a comparison of the participants results enabled us to identify the origin of the discrepancies ; the major factors are shown to be the calculation of the resonance escape probability, difficulties in "tight" lattices, in general, as well as some particular cross sections which may require reevaluation.

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I - FRAMEWORK OF THE CALCULATIONS

I.1 Description of the Dissolver

The heterogeneous medium treated in this exercise is a realistic case, representative of fuel dissolver contents, which was suggested by BNFL.

A spherical pellet geometry is used and corresponds to two sizes of UO2 PWR fuel (r=0.05 and 1.0 cm), enriched to 4.0 % in ^{235}U. These pellets bathe either in a solution of nitric acid (7.5M) containing 1.0 g/l of gadolinium nitrate or in a nitric acid solution (3.0M) containing 1.0 g/l gadolinium nitrate and 300 g/l uranyl nitrate. The pellets are arranged on a square lattice for which the Packing Fraction (PF = V(UO2) / V(cell)) takes the values PF = 0.3, 0.4, 0.5, 0.6, 0.7. The physical characteristics of this system are given in Table 1 (the concentrations are in E+24 at/cm^3).

The specificity of this benchmark is linked to the study of the effects of pellet size and the level of moderation during dissolution. These effects are maximised by using two extreme pellet sizes, r=1.0 cm and r=0.05 cm, and extremes of moderation PF=0.3 and PF=0.7.

From a neutronics point of view ,the packing fraction = 0.3, corresponds to a "cold" PWR. The PF = 0.4 case corresponds to a PWR at nominal conditions . The level of ^{238}U resonance captures will

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therefore be quite weak. The PF=0.5, 0.6, 0.7 cases correspond to highly undermoderated light water lattices. The extreme value of PF=0.7 corresponds to a moderation level, V(H2O)/V(UO2) = 0.43, which represents the most undermoderated reactor concept studied in France. The level of ^{238}U resonance captures is particularly high in this case. In this manner exercise 19 permits us to study the calculational uncertainties as a function of the moderation level. On the other hand the differentiation of situations with a 'pure' moderator (Liquor 1) and situations with fuel dissolved in the solution (Liquor 2) also allows us to demonstrate errors linked to the fuel double heterogeneity. The realistic load of 300 g/l of uranyl nitrate in the second solution corresponds to a weak concentration of fuel representing merely 3.3% of the fuel in the pellet.

Hence the results of calculations for the first solution elucidate disagreements which are independent of the double heterogeneity (pellet size, undermoderation). Those for the second solution present the disagreements linked to the double heterogeneity as well as to the other problems . The different cases allow us to study the effect of the double heterogeneity as a function of the moderation level ; this effect increases as the packing fraction increases from PF=0.3 to PF=0.7.

Hereafter the calculations are classified in four categories : Small and Large pellets in Liquor 1, Small and Large pellets in Liquor 2. An identification code was devised from the underlined items and the packing fraction to associate computer results with each case e.g. S3L1 represents small pellets at PF=0.3 in Liquor 1.

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I.2 Treatment and Identification of Submitted Data

As reaction rate data sheets were received from the participants the value of the ratio of the sum of the production rates to the sum of the absorption rates was evaluated as a preliminary test to check for inconsistencies. The value of k_∞ thus obtained was also used as an internal check to ensure that data had not been improperly transcribed when creating the computer files. Copies of the data sheets as submitted by the participants are given in reference 3. A number of participants chose to perform the requested calculations several times with varying calculational options or data libraries. Not all of the options could be subjected to the neutron balance analysis because of the volume of effort required. However, options that we felt provided new insight were analyzed. The normalized reaction rates are included in the Appendix I.

Data sets and analysis results are identified in this report in terms of the country and organization reporting them. Calculations were performed with a variety of codes and data libraries. In some cases where a given participant contributed more than one set of data, the identification code was altered to reflect the different codes or libraries used. Table 2 presents a listing of the contributors, identification logos, codes and data libraries used for this study.

II - PRESENTATION OF 1990 RESULTS

Tables 3 and 4 present summaries of the k_∞ values from both the 1988 and 1990 versions of the problem 19 benchmark calculations for

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Liquor 1 and Liquor 2 respectively. The third column entitled "1990-Other" gives the results of new calculations the aim of which is to supply reference values.

It was impossible, in some cases, to repeat exactly, all the 1988 calculations which are evaluated theoretically in the companion paper. Therefore, the behaviour of all 1988 results cannot be analyzed by the neutron balance method. Of those contributions that did attempt to reproduce the 1988 results we find significant differences in the current values. Table 5 presents a summary of reactivity changes between 1988 and 1990 results. In other cases the calculations were attempted with new methods. We commence below with a description of the current calculations and we note any changes from the 1988 calculations for each contributor. The reference numbers after certain names indicates private communication with the contributor for the purpose of clarification.

II.1 A Description of New Contributions (1990)

FRANCE : APOLLO calculations were carried out with the extensively validated CEA-86 data library and the PIC method . This calculation is intended to provide reference results.

US/ORNL : Both the 1988 calculations and 1990 calculations were performed with the ROLAIDS/XSDRNPM modules of an unspecified version of the SCALE package . A 27-group library based on ENDF/BIV was used each time. A change in computer system is noted . The results for the two sets of calculations are very close.

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UK/SRD (4) : The 1988 calculations were carried out using MONK 6.3 and the UKAEA 'point data' library . The T-hole option, which transforms the given geometry to a close-packed cubic array was used . The results of two sets of calculations were supplied in 1990 . Both sets used the code MONK 6A with the UKAEA 'point data' set . No data set changes were indicated . One set of results, designated UK/SRD-A , was calculated using the 'square-hole' option which preserves the specified square lattice geometry . Results are given only for packing fractions PF=0.3, 0.5 . For PF=0.7 the spacing is so tight that the spherical pellets protrude beyond the sides of the required solution cube. The second set, designated UK/SRD-B , was calculated with the T-hole option to avoid the geometry problem at PF=0.7 . Table 5 shows the deviations between the 1988 and 1990 'T-hole' results . In the case of Liquor 1 , there are significant changes of reactivity with no apparent consistency . It is felt that perhaps there were convergence problems in one of the calculation sets but we cannot specify the origin of these differences . In the case of Liquor 2 , there are also significant reactivity changes but they exhibit consistent trends as functions of PF . These changes tend to bring the results closer to the reference APOLLO/PIC results . The 'square-hole' results (not calculated in 1988) , which in theory represent the actual geometry, show large deviations from the T-hole results in the case of large pellets . In this report we have kept

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the '-A' and '-B' results as two distinct data sets. The trends of the 1988 and 1990 MONK results are illustrated in Figures 1, 2 which show the reactivity deviations from the APOLLO/PIC reference values as functions of packing fraction for small and large pellets in Liquor 1 and small and large pellets in Liquor 2 respectively.

UK/BNFL (5) : The 1988 results were calculated with WIMSE and the WIMS 81 data library . The 1990 results were calculated with WIMSE and the WIMS 86 data library. The theoretical study presented in the companion paper shows that for the various reactivity 'tests' (S/L, L2/L1 etc) that the 1988 results were in excellent agreement with the APOLLO/PIC values , essentially parallel as functions of PF although approximately 1800 pcm higher in value . The use of the WIMS 86 library has produced an overall drop in the absolute reactivity levels . The reduction , however , is itself a function of PF or moderation level . Thus the reactivity 'tests' S/L and L2/L1 remain unchanged with the change in library but the law of variation with moderation is different. These trends are illustrated in Figures 3, 4 which show the reactivity deviations from the APOLLO/PIC reference values as functions of packing fraction for small and large pellets in Liquor 1 and small and large pellets in Liquor 2 respectively.

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ITALY/ XS/CB4 MC/CJF (6) : In 1988 two sets of results were reported by Casaccia; a set using XSDRNPM from the SCALE0 package with a 27-group cross section library and a set using MCNP with a library based on the JEF1 data file . In both cases the small pellets are reported as being treated as a homogeneous mixture while the large pellets are treated as 'normal' heterogeneous mixtures . 'Normal' means that in the case of XSDRNPM calculations appropriate DANCOFF factors were input for the pellet and solution . In the 1990 calculations , the small pellet cases are treated as discrete pellets in both codes . The 1990 XSDRNPM results show increased deviations at the two extreme values of PF. The 1990 XSDRNPM calculations were also performed with a 218-group library based on ENDF/BIV but the reaction rates were not submitted.The 1988 MCNP results showed erratic behaviour as functions of PF (see ref. 3) which are attributed to the misinterpretation of atomic number densities as physical densities as a result of an erroneous minus sign flag in the input . The MCNP results no longer behave erratically . The 1990 MCNP results were also calculated using the BMCCS1 library in the SCALE package . The reaction rates were submitted but not subjected to the neutron balance analysis.

JAPAN/ JAE/ANI (7) : The 1988 results of the ANISN calculations showed erratic behaviour as a function of PF and the reactivity effect of changing small pellets to large pellets (S/L) seemed to indicate that ANISN was not well adapted to treating

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micro-pellets . These results have been since interpreted as due to an inappropriate boundary condition on the cell. The 1990 results show very large differences from the values reported in 1988 as a result of changing the boundary condition . The erratic behaviour of 1988 is not repeated in these results . There now appears to be no problem with calculations involving 'micro-pellets'.

JAPAN/ JAE/VIM : JAERI contributed additional results for the 1990 calculations from the Monte Carlo code VIM with a continuous-energy library based on ENDF/BIV.

ITALY/ MC/T : Trisaia contributed a set of results for the 1990 calculations from MCNP with the ENEA JEF1-based library. These results are highly consistent with the corresponding values from the Casaccia calculations (within 1 standard deviation) . The reaction rates were submitted but not in a form that could be readily analyzed by the neutron balance program . The reaction rate tables were included in reference 3 for completeness.

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II.2 1990 k_∞ Results and a Comparison to the 1988 k_∞ Results

Because there were significant differences in results submitted in 1990 from those submitted in 1988, the comparison analysis on 1988 results, presented in the companion paper, was repeated to verify that the conclusions made therein remained valid for the new results.

Table 6 presents the reactivity deviations of the participants' 1990 results from the reference APOLLO/PIC values ($\ln(k_\infty i/k_\infty ref)$ in pcm). These deviations are plotted in Figures 5 and 6 for small and large pellets in Liquor 1 and for small and large pellets in Liquor 2 respectively, as functions of packing fraction. We can state that for Liquor 1, the 1990 k_∞ values are dispersed within the same range as the 1988 values , although the deviation of individual results increases as a function of moderation. Figure 6 shows that the range of dispersion has decreased from 9000 pcm to 5000 pcm for large pellets in Liquor 2 (fissile liquor). This spread reduction indicates that some improvements have been implemented in the modelling of the fuel double heterogeneity (except for the XSDRNPM calculation).

Table 7 presents the reactivity changes with respect to the reactivity value at PF=0.3 ($\ln(k_\infty(PF=x)/k_\infty(PF=0.3))$ for each contributor). This comparison of reactivity changes, as functions of packing fraction, from the value of each participant at PF=0.3, is plotted in Figures 7 and 8 for small and large pellets in Liquor 1 and for small and large pellets in Liquor 2 respectively. The ITA-

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LY/XSDRNPM are worse in 1990 than in 1988 showing a considerable underestimation of the k_∞ with deceasing moderation. Except for this contribution, we can state that for small pellets in Liquor 1, the spread in results has basically the same range as reported in 1988 but the JAERI/ANISN and UK MONK 6A results are no longer higher than the APOLLO/PIC reference values as they once were; large pellets in Liquor 1 have the same range of dispersion as in the 1988 calculations. In the case of Liquor 2, results for small pellets have same general range of dispersion, except for the ITALY/XSDRNPM 1990 calculation which presents a supplementary problem ($\Delta\rho$=-4000 pcm) linked to the double-heterogeneity effect; the high JAERI/ANISN results are now in the same range as the others, the erratic behaviour previously observed in ITALY/TRISAIA/XSDRNPM results was not repeated in the 1990 MCNP calculations. The 1990 MCNP results from Trisaia are consistent with other calculations; large pellets have the same general range of dispersion, the erratic ITALY/CASACCIA/MCNP results with the JEF1 file in 1988 are not reproduced in 1990.

Table 8 presents a summary of reactivity effects in changing small pellets to large pellets in both Liquor 1 and Liquor 2, and from changing Liquor 2 to Liquor 1 with both small and large pellets. The former reactivity data, $\rho S-\rho L$ corresponding to the pellet size effect is plotted in Figure 9. We note that for Liquor 1, if the UK/SRD-A results are omitted the general range of dispersion over the moderation range is much improved, from 6000 (1988) to 2500 pcm ; for Liquor 2 one can make the same comment as above, now about

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4000 pcm over the entire range of moderation compared to 10000 pcm in the 1988 calculation. The latter data, the fuel liquor reactivity worth $\rho L2-\rho L1$ which induces the fuel double heterogeneity effect, are presented in Figure 10. In the case of small pellets, the general range of dispersion is slightly decreased, with the suppression of erratic behaviour as a function of packing fraction ; but we note that Sn methods are still underestimating the positive reactivity effect of the fissile solution by -3000 pcm (ANISN) and -4000 pcm (XSDRNPM) ; in the case of large pellets, the range of dispersion is smaller than for the 1988 results, now 3000 pcm compared to the previous spread of 5000 pcm.

We can state that the conclusions of the reference study of 1988 results, described in the companion paper, remain almost unchanged, with a trend to spread reduction regarding reactivity changes. The computed reactivity effects of changing small pellets to large pellets are now more consistent among the participants and demonstrate an improvement in micro-pellet modelling. We can also state that the erratic values observed in some 1988 results have disappeared in the current calculations, due to the correct use of the calculational tools.

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III - K∞ SYNTHESIS TECHNIQUES AND THE ANALYSIS OF DEVIATIONS FROM THE REFERENCE CASE

A computer program was written to synthesize k∞ from the participants reaction rates by three methods to provide insight into the nature and origin of the discrepancies. These methods are described below with the derivations and definitions of the various quantities used.

The authors felt that the root of the problem lay in the calculation of k∞ since keff is basically achieved as a result of a multiplicative leakage correction to k∞, which should, in general, be well treated by all codes. The validity of this assumption was demonstrated in reference 1.

III.1.1 - Phenomenological Model

The phenomenological method synthesizes the value of k_∞ from the types of parameters used in the four-factor formula. In this manner one can search for sys ematic discrepancies in calculation of physical processes. k_∞ is defined as :

$$k_\infty = \epsilon_8 \cdot \epsilon_5 \cdot p \cdot f \cdot \eta$$

where the various factors are defined in terms of the reaction rates as follows :

$\epsilon_8 = (P_8^1 + P_5^{tot})/P_5^{tot}$	^{238}U Fast Fission Factor
$\epsilon_5 = P_5^{tot}/P_5^2$	^{235}U Fast Fission Factor
$p = A_{tot}^2/A_{tot}^{tot}$	Resonance Escape Probability
$f = A_{fuel}^2/A_{tot}^2$	Thermal Utilization Factor
$\eta = P_5^2/A_{fuel}^2$	Eta-factor (thermal neutrons per thermal absorption in the fuel)

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and the reaction rate symbols follow the conventions :

P = productions
A = absorptions and
P_i^j = productions for isotope i in group j etc...

The deviations from the values of the reference case, of each factor, for the results of each participant, were calculated in pcm, using the following formula :

$$\frac{\Delta k_\infty}{k} = \frac{\Delta \epsilon_8}{\epsilon_8} + \frac{\Delta \epsilon_5}{\epsilon_5} + \frac{\Delta p}{p} + \frac{\Delta f}{f} + \frac{\Delta \eta}{\eta}$$

where the quantities $\frac{\Delta x}{x}$ were calculated as $\ln(x/x_{ref})$

III.1.2 - Historical Model

The historical model synthesizes k_∞ as the sum of contributions from each energy group with appropriate weighting factors. The objective of the derivation was to achieve a separation into factors that could be classified cleanly as dependent or not-dependent on a single energy group. It can be shown that k_∞ can be expressed as a summation of contributions from each energy group weighted by two factors which describe the probability of arrival in each group and the probability of absorption in each group. Clearly the probability of arrival in group i is independent of group i events whereas the probability of absorption in group i is a function of the group i properties. In this formulation k_∞ can be expressed as follows :

$$k_\infty = k1.(1-p1) + p1.k2.(1-p2) + p1.p2.k3\ (1-p3) + \ldots$$

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where, for example, in the third term, p1.p2, (the probability of escaping both groups 1 and 2 without absorption) represents the probability of arrival in group 3, (1-p3) represents the probability of absorption in group 3 and k3 represents the group 3 contribution to the neutron multiplication factor (productions/absorptions).

The deviations from the values of the reference case, of each factor, for the results of each participant were calculated, in pcm, using the following formula :

$$\frac{\Delta k_\infty}{k_\infty} = \sum_{g=1}^{ngp} \left(\frac{\Delta k_g}{k_g} + \frac{\Delta(1-p_g)}{(1-p_g)} + \frac{\Delta \prod_{m=1}^{g-1} p_m}{\prod_{m=1}^{g-1} p_m} \right) \cdot W_g$$

where the quantities $\frac{\Delta x}{x}$ were calculated as $\ln(x/x_{ref})$ and the W_g were calculated as :

$$W_g = (W_{gref} + W_{gi})/2 \qquad \begin{array}{l}(\text{ref = reference value,} \\ \quad i \quad = \text{participant's value})\end{array}$$

and

$$W_{gi} = \frac{k_g \cdot (1 - p_g) \cdot \prod_{m=1}^{g-1} p_m}{\sum_{g=1}^{ngp} k_g \cdot (1 - p_g) \cdot \prod_{m=1}^{g-1} p_m}$$

Deviations are tabulated as $W_g \cdot \ln (x/x_{ref})$ to preserve the pcm totals. The W_g are essentially constant with variation less than 2 %.

III.1.3 - Spatial Model

The spatial model synthesizes k_∞ as the sum of contributions from each spatial region in the cell with appropriate weighting factors. It can be shown that k_∞ can be expressed as :

$$k_\infty = k1 \,.\, W1 + k2 \,.\, W2$$

where k1 and k2 are the contributions to the neutron multiplication factor from the pellet and the solution regions respectively and W1 and W2 are weighting factors defined below :

$$W1 = \frac{A1}{A1 + A2} \qquad W2 = \frac{A2}{A1 + A2}$$

The deviations from the values of the reference case, of each factor, for the results or each participant were calculated, in pcm, using the following formula :

$$\frac{\Delta k_\infty}{k_\infty} = \frac{W1.k1}{W1.k1 + W2.k2} \cdot \left[\frac{\Delta W1}{W1} + \frac{\Delta k1}{k1}\right] + \frac{W2.k2}{W1.k1 + W2.k2} \cdot \left[\frac{\Delta W2}{W2} + \frac{\Delta k2}{k2}\right]$$

where the quantities $\frac{\Delta x}{x}$ were calculated as $\ln(x/x_{ref})$.

Deviations are tabulated as the product of the weighting function and $\ln(x/x_{ref})$.

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III.2 Results of the Decomposition

The results of the k∞ synthesis program are summarized in a series of tables and graphs. Tables 9 to 20 present the calculated values of the parameters described in section III.1 for each participant, for each of the 12 cases that were calculated. Tables 9.1 to 20.1 present the deviations, in pcm, of the calculated values of the parameters for the participants from the reference values in each of the 12 cases. These deviations are calculated as described in section III.1 . All reaction rates were normalized to one absorption in the cell and expressed as a percent of that one absorption. The normalized reaction rates are presented in APPENDIX I .

The variation of each parameter calculated in the neutron balance analysis is plotted in a series of graphs as a function of packing fraction . An individual figure shows two graphs (Liquor 1 cases, upper graph, Liquor 2 cases, lower graph). Each graph contains the values obtained by all participants. The parameters appear in the same order as they appear in Table 9 (FF8, FF5, ...W(2)). The phenomenological parameters for small pellets are presented in Figures 11 to 15; for the historical model in Figures 16 to 19; for the spatial model in Figures 20 to 22. Figure 22 differs from the other figures in that there are no Liquor 1 results for k∞ because there is no fissile material in the solution. Thus both k∞(solution) and W(solution) are presented in the same figure. This sequence is repeated for large pellets in Figures 23 to 27, Figures 28 to 31 and Figures 32 to 34 respectively.

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While these figures are comprehensive and indicate deviations from the general trends the scales are not sensitive enough to show the impact of the deviations. Several significant compensating trends were observed in the deviation of phenomenological factors from the reference values. Hence these deviations from the reference values for chosen parameters are displayed for each contributor individually in Figures 35 to 41 for small pellets and Figures 42 to 48 for large pellets.

III.3 Analysis of the Results of the k_∞ Calculations in the Light of the Neutron Balance

III.3.1 Data Library Problems

If we examine the results of the neutron balance analysis for Liquor 1, PF=0.3 cases, the observed deviations can be mainly attributed to data library differences since we have avoided the effects of 'tight' lattices and the fuel double heterogeneity. In tracing various problems related to the cross sections it was necessary to evaluate the deviations of certain reaction rates and reaction rate ratios of the participants from the reference values. Table 21 presents the deviations of reaction rates

((RRi-RRref)*100/RRref)

for the groups 1,2 and 3 capture and fission rates of ^{235}U and ^{238}U. Table 22 presents the reaction rate ratio α^5 (the ratio of captures to fissions for ^{235}U) for each of the three energy groups and the average over all energies, the ratio α^8 for the fast neutrons as well as the percentage deviations from the reference values as defined above for the reaction rates. The following observations can be made :

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US/ORNL-ROLAIDS

Figures 12 and 24 representing the ^{235}U Fast Fission Factor, ε5, for small and large pellets respectively, show that the US/ORNL values are significantly greater than the values of other contributors. Figures 13 and 25 representing the resonance escape probability, p, for small and large pellets respectively, show that the US/ORNL values are significantly lower than the values of other contributors. Figures 35 and 42 (small and large pellets respectively) show the deviations of the US/ORNL values from the reference values for both of these parameters (ε5, + 7000 pcm and p, - 9000 pcm at PF = 0.5). The Oak-Ridge team has recently analyzed the potential sources of these discrepancies (personal communication from R.M. Westfall to A. Santamarina, January 8, 1991) ; L. Petrie pointed out that in their 27-energy group structure the fast-thermal interface is at 0.4 eV rather than at 0.625 eV as specified for the reaction rate analysis. Two sets of neutron balance breakdown were run, using the XSDRNPM activities at 0.4 eV as before, and using an interface at 0.8 eV corresponding to the next highest broad-group energy boundary. The 0.8 eV values were in close agreement with the APOLLO reference values, thus the ORNL discrepant values for the ^{235}U fast fission factor and the system resonance escape are apparently the result of the mismatch in the epithermal-thermal interface energy.

Otherwise, the problem of the increasingly low k_∞ value with undermoderation remains in the ORNL-ROLAIDS calculations. Appendix II points out that the disagreement originates in the ^{238}U resonance capture rates ; the discrepancy is mainly linked to the first macrogroup, i.e E > 5 KeV, wich reflects the unrealistic use of unshielded cross-sections in the unresolved range.

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UK/SRD-MONK 6A

Two sets of results were submitted from calculations with MONK 6A; the 'A' set using the square-hole geometry option and the 'B' set using the T-hole option. All figures indicate erratic results on the part of the square-hole calculations whereas all figures indicate reasonably good agreement with the reference results for the T-hole calculations. The square-hole results will not be discussed further since the problem seems to be related to the geometry option.

Despite the generally good agreement between the MONK 6A T-hole results and the reference results in reactivity variation tests (Figures 7,8,9,10) , Figures 5 and 6 show that, on an absolute scale, the MONK k_∞ values are always an average 3000 pcm higher than the reference results . Figures 16 and 28 show that a major cause is the group 1 contribution to k_∞ . While Figures 18 and 30 do not show the effect well due to the scale of the graphs, the group 2 contribution to k_∞ is higher than the reference value by an amount equal to the group 1 contribution. Table 21 shows serious deviations from the reference values for the ^{235}U fast captures (-57.2%), ^{235}U fast fissions (-21.1%) and ^{238}U fast captures (-48.1%). The MONK values are significantly different from all other contributors. Table 22 also shows that the ratio of fast captures to fast fissions for both ^{235}U and ^{238}U, is remarkably different (-44.5% and -49.7% respectively) from the values of all other contributors, indicating directly that the cross sections are significantly different from those in all other data libraries used for this study .

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UK/BNFL-WIMSE

WIMSE results show excellent agreement with the reference values in all reactivity variation tests. The k_∞ values seem to be consistently slightly higher (1000 to 1800 pcm) than reference values but Table 21 shows only deviations in reaction rates that are within experimental measurement errors. The slightly high ^{235}U thermal fission rate and the slightly low ^{235}U thermal capture rate (vis à vis the reference values) would both act to elevate the η value as observed in Figures 15 and 27. Table 22 shows that the ratio fast captures to fast fissions for 235U is low by 12.5%. This is the only feature which varies significantly from the reference value and the values of all other contributors except the UK/SRD-MONK 6A value. Compared to the APOLLO value, the deviation in k_∞ is further assisted by ^{238}U fast fissions which is 6% higher. The slight deviation with moderation ratio is due to the Gd absorption rate which is 4% lower in WIMSE than in APOLLO.

ITALY/XS/CB4

Figures 16 and 28 show that the group 1 contribution to k_∞ is very low. This can be understood in terms of the strong fast capture rates , vis à vis the reference values , in ^{235}U (+13%) and ^{238}U (+19%). While this data base has the same provenance as the ROLAIDS data base and shows identical deviations in these two parameters, Table 21, the group 1 k_∞ is lower than the ROLAIDS value because it is not raised by the ^{235}U epithermal fission rate, which is low, (-5%), as opposed to the ROLAIDS value which is high

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(+17%). Table 22 shows the ratio epithermal fissions to epithermal captures somewhat stronger than the values of most of the other contributors. All of these points should lead to k_∞ values which are reasonably consistent with the reference values, but they do not because Ieff238 is smaller, a result of a significantly lower (-14.4%) thermal absorption rate in gadolinium in the Italian code system that is not evident in the ROLAIDS system. This is also responsible for the significantly higher values of thermal utilization shown in Figures 14 and 26 (+6000 pcm on k_∞ for large pellets at PF=0.3). As the neutron spectrum hardens in the PF=0.5-0.7 lattices, the gadolinium becomes less important and the k_∞ falls with respect to the reference values as expected.

JAPAN/JAE/ANI

Figures 11 and 23 show that the ANISN calculations give high values of the ^{238}U fast fission factor. Figures 16 and 28 show that the group 1 k_∞ values are also high. Both of these effects result from the high value of the ^{238}U fast fission rate (+15%) shown in Table 21.

ITALY/MC/CJF and ITALY/MC/T

The MCNP calculations show no remarkable deviations (greater than would be expected on the basis of experimental uncertainties) from any of the reference values of the calculated parameters displayed in the figures. Tables 21 and 22 show no remarkable deviations from the reference values of the reaction rates or reaction

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rate ratios. The slightly higher value of resonance absorption, particularly ^{238}U resonance capture (+5.2%), leads to a lower value of resonance escape probability which is amplified as the spectrum hardens.

JAPAN/JAE/VIM

The VIM calculations show no remarkable deviations from any of the reference values of the calculated parameters displayed in the figures. Tables 21 and 22 show no remarkable deviations from the reference values of the reaction rates or reaction rate ratios. The slightly higher value of resonance absorption, particularly ^{238}U resonance capture (+3.9%), leads to a lower value of resonance escape probability which is amplified as the spectrum hardens.

III.3.2 Variation of Reactivity with Packing Fraction

If we examine the results of calculations for Liquor 1 cases, it is possible to understand the increasing dispersion of k_∞ values with increasing PF. Figures 7 and 8 show for small and large pellets respectively that the XSDRNPM calculations are responsible for the maximum dispersion while all other results are grouped reasonably close to the reference values. Figures 16 and 28 show that the lowest values of the group 1 contribution to k_∞ also come from XSDRNPM. The graphs for the group 2 contributions are not so informative due to the scale, however, the group 2 contributions to k_∞ are very high at PF=0.3 and gradually come into very good agreement with the reference values at PF=0.7. These trends are

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summarized below

	PF=0.3			PF=0.5			PF=0.7		
	k_∞	k1	k2	k_∞	k1	k2	k_∞	k1	k2
XSDRNPM	3445	-697	4220	-876	-1723	1338	-3958	-3192	151

It is clear that the sum of the two trends for k1 and k2 results in the exagerated dispersion as a function of packing fraction and it is also clear that each trend is a result of a significant error in a cross section as discussed above. The errors are in each case amplified by changes in packing fraction but in opposite senses. On the one hand the too strong captures in ^{235}U and ^{238}U which create the initially low value of k1 at PF=0.3 become stronger still as the spectrum becomes harder. On the other hand the too low thermal absorptions in gadolinium at PF=0.3, causing the too high k2 value, approach reference values as the spectrum hardens and the importance of gadolinium is minimized.

III.3.3 Methodology Problems : the L2/L1 Effect for Fissile Liquors

The reactivity test of changing the fissile liquor, L2, to non fissile liquor, L1, referred to herein as the L2/L1 effect, demonstrates effects due to the fuel double heterogeneity.

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Figure 10 shows the variation of this reactivity ratio with PF for both small and large pellets. We observe that there is reasonably good grouping of results around the reference values for all calculations except XSDRNPM and ANISN. (UK/SRD-A calculations are not included in this comment because the deviations are apparently due to a malfunctioning geometry routine.) These two codes give results that underestimate the reactivity of the dissolver in fissile solution cases. The resonance self-shielding methodology used in each case represents the ND (No DANCOFF) model described in the companion paper.

In looking at the details of the various analyses, we can see in Figures 13 and 25 (phenomenological -resonance escape probability in Liquor 2), Figures 16 and 28 (group 1 - k_∞), Figures 20 and 32(pellet - k_∞), that the modification of p, k_∞1 and k_∞(pellet) with the fissile solution is not correct in XSDRNPM and ANISN calculations. The k_∞ factors of the fissile solutions (Figures 22 and 34) point out more clearly that the standard Sn calculations are not able to compute the actual ^{238}U resonance capture.

Figures 38 and 39 clearly show the reactivity differences, for small pellets, due to incorrect self-shielding calculations in the ND model for XSDRNPM and ANISN respectively. In the Liquor 1 results at PF=0.3 there is almost complete agreement on the value of the resonance escape probability between both of these codes and the APOLLO/PIC calculations. However The Liquor 2 results at PF=0.3 are almost 5000 pcm lower than the reference values. The differences increase to approximately 10000 pcm at PF=0.7 as the harder spectrum

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amplifies the errors due to the ND model. This behaviour is repeated in Figures 45 and 46 for the large pellets.

III.3.4 Effect of Pellet Size

a) The Sn calculations submitted in 1990 have corrected whatever faults caused the erratic behaviour in 1988 calculations of k_∞ of small pellet cases. Thus it appears that Sn cell calculation methods are well-adapted to calculate the Small/Large reactivity effect and the 1988 results were in fact a problem of utilization of the tool.

b) As for the MONK 6A continuous-energy Monte Carlo calculations we can state that there is a problem with the Small/Large reactivity effect when the square-hole geometry option is used (Figure 6) . For the Liquor 1 calculation the S/L is 6200 pcm greater than the reference value at PF=0.3. The neutron balance analysis points out that this effect is due to the thermal utilization , f . Table 9.1 shows that for small pellets ln(f/fAPOLLO) = +2100 pcm and Table 15.1 shows that for large pellets ln(f/fAPOLLO) = -4100 pcm , a total of 6200 pcm due to an unrealistically large decrease of the Gd worth in the MONK 6A calculation.

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IV - "REFERENCE" RESULTS

In this chapter we will attempt to provide precise results which, in the absence of critical experiments, may serve as reference values for the different calculations in this benchmark.

In our opinion precise and reliable calculations can be obtained from APOLLO/PIC, MCNP with the JEF-1 library and VIM. WIMSE calculations are also very satisfactory from the methodology point of view and can be used as a reference for the reactivity effects S/L and L2/L1 (fissile liquors) as well as the absolute k_∞.

Figures 49 and 50 show the variation of k_∞ for these codes, as functions of packing fraction, for the small and large pellets in Liquor 1 and the small and large pellets in Liquor 2 respectively. The 1988 WIMS results obtained with the WIMS 81 library are also included.

We can see that APOLLO/PIC and WIMSE results are extremely close over the entire range of packing fraction. The continuous-energy Monte Carlo results from both MCNP and VIM are somewhat lower in absolute value but exhibit identical behaviour as functions of packing fraction. The 'average' deviation, in pcm, of the Monte Carlo results from the APOLLO/PIC values are summarized below:

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PF	Liquor 1		Liquor 2	
	Small	Large	Small	Large
0.3	-278	-1755	-675	-2011
0.5	-1173	-1450	-1309	-2242
0.7	-1752	-1289	-2588	-2150

The maximum reactivity spreads in pcm among the "reference" calculations, not including the 1988 WIMS results, are summarized below:

PF	Liquor 1		Liquor 2	
	Small	Large	Small	Large
0.3	2360	3765	2551	3214
0.5	2661	2888	2223	3105
0.7	2139	1689	2798	2602

Figure 51 shows the S/L effect for the "reference" calculations for Liquor 1 and Liquor 2. We can observe here also the tendency for the collision probability routines to group together and for the Monte Carlo results to group together. However, the maximum dispersion for Liquor 1 calculations is 1500 pcm, for Liquor 2 calculations 2000 pcm. Hence we can conclude that the increase of the dissolver reactivity with small pellets arises in well-moderated dissolver media and amounts to +4000 +/-1000 pcm (PF=0.3 - 300 g/lU - 1 g/lGd).

Figure 52 shows the fissile liquor effect L2/L1 for small and

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large pellets. The reference calculations for small pellets are consistent within 1000 pcm. The fissile liquor worth is positive for well-moderated dissolver media and amounts to +2200+/-300 pcm in the PF=0.3 case ; the fissile liquor worth becomes negligible , 0+/-500 pcm for tight lattices, PF=0.6-0.7. The MCNP/Casaccia value of L2/L1 worth at PF=0.7 looks slightly underestimated but this could be due to statistical effects since they are within quoted 2σ uncertainties. However, code utilization may also contribute to this effect since the TRISAIA calculations with MCNP follow the APOLLO and WIMSE results with a high degree of fidelity.

In the case of large pellets the maximum dispersion is about 1000 pcm. For PF > 0.5 the Monte Carlo codes supply a fissile liquor reactivity worth 500 - 1000 pcm lower than the APOLLO/PIC result. This consistency in the fissile liquor worth demonstrates that the reference self-shielding methods are able to account for the fuel double heterogeneity effect within +/-1000 pcm in realistic dissolver media. This conclusion is supported by Figure 53, which plots the contributions to the L2/L1 reactivity effect from the resonance escape probability. We can see that the behaviour of this parameter is consistent in almost all calculations ; only the MCNP/Casaccia calculation gives a different p(L2)/p(L1) effect in the small pellet case, which can explain the observed differences in the L2/L1 effect.

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V - CONCLUSIONS

The neutron balance analysis of reaction rates and the intercomparison of the results of international calculations for OECD criticality benchmark problem no 19 has permitted us to understand the origin of the unacceptable dispersion of the calculated k_∞ values for UO2 fuel undergoing dissolution.

In contrast to the evaluation of the 'sister problem no 20' (1,2) wherein the conception of the problem exagerated the effects of the fuel double heterogeneity, which thus dwarfed all other problems by comparison, we found that deviations in results for the realistic problem no 19 arise from five main sources:

- differences in library data
- the effects of changes in the level of moderation
- extreme pellet sizes
- code utilization
- methodology for the evaluation of self-shielding and fuel double heterogeneity effect.

The 'reference' results were calculated using a generalized collision probability routine, PIC, in the French code APOLLO in conjunction with the extensively validated data library CEA86. This procedure permitted us to provide accurate results at the extreme values of moderation. The analysis permits the following detailed conclusions:

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The effect of 'fissile liquor', in the realistic case of 300 g/l of dissolved uranium treated here, is positive and increases by 2000 pcm the reactivity of the dissolver at PF=0.3. The reactivity effect is negligible in undermoderated lattices corresponding to the case of nitric acid solution poisoned with 1 g-l of Gd treated herein.

The size of fuel pellets is an important parameter since the reactivity of a well-moderated, poisoned, dissolver (PF<0.3) rises by 3000 pcm during dissolution. On the other hand the dissolution of fuel pellets in an undermoderated lattice results in a reactivity loss of -3000 to -4000 pcm (constant moderation ratio assumption).

The maximum dispersion observed in the k_∞ values of 'selected' reference calculations are as follows:

small pellets, Liquor 1 2200 pcm

large pellets, Liquor 1 3700 pcm (PF=0.3) to 1700 (PF==.7)

small pellets, Liquor 2 2500 pcm

large pellets, Liquor 2 2600 pcm.

Differences in Library Data

We find little evidence of problems with data in the thermal energy range with the exceptions of the gadolinium thermal absorption rate in the Italian version of the ENDF/BIV-based 27-group library (-14% vis à vis the APOLLO value). On the contrary there is substantial evidence of significant differences in both the epithermal and fast regions.

Calculations using the SCALE package (ROLAIDS, XSDRNPM) have

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^{235}U fast capture rates which are 13% higher and ^{238}U fast capture rates which are 20% higher than the APOLLO-CEA86 values. The ratio of fast captures to fast fissions in ^{238}U is also high by about 22% in both cases. This is in contrast also to the results of MCNP, VIM and WIMSE which are in close agreement with the APOLLO results for the reaction rates. The ANISN α^8 value is not so good (-15.5%) due to a high (+15.3%) ^{238}U fast fission rate.

MONK 6A also has serious differences for the fast capture rates in ^{235}U (-57%) and ^{238}U (-48%) and in the fast reaction rate ratios α^5 (-44.5%) and α^8(-49.7).

The two SCALE calculations do not agree on ^{235}U epithermal fission rates (ROLAIDS +17%, XSDRNPM -5%) or on the ratio of epithermal captures to fissions (ROLAIDS -11.7%, XSDRNPM +5.1%).

The Effects of Changes in the Level of Moderation

The moderation dependent deviations from the APOLLO/PIC results for k_∞ can be traced in each case to a significantly different cross section either at the fast or thermal end of the energy range whose effect is then amplified as the spectrum hardens or softens with the changing packing fraction. When all contributors are included, the maximum spread at PF=0.7 in the normalized reactivity deviations (ie compared to the reactivity at PF=0.3) is about 7000 pcm on the average. However, all contributors except XSDRNPM have a dispersion at PF=0.7 of between 1200 and 3500 pcm.

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Extreme Pellet Sizes

The erratic behaviour of this effect observed in the 1988 results (see companion paper) was not reproduced in the 1990 results.

On a 'macroscopic level' :

MONK 6A seems to have a geometry problem in the 'square-hole' option. The XSDRNPM results are functionally correct but displaced as to absolute value as a result of the interaction of cross section anomalies and the amplification effects of changing moderation on these anomalies. Excluding these two the other contributors agree within a dispersion of 2000 pcm for Liquors 1 and 2.

On a 'microscopic level' :

The "reference" cases show a distinct 1000 pcm gap at PF=0.3 which may indicate that in the highly moderated lattices there may be a distinction between the way collision probability routines and Monte Carlo codes 'see' the particles of different sizes. The difference disappears gradually as packing fraction increases. The "reference" calculations show a dispersion of 1500 pcm at PF=0.3 dropping to 1000 pcm at PF=0.7.

Code Utilization

The erratic behaviour of various results submitted to the 1988 exercise have since been attributed to operational errors such as the selection of inappropriate boundary conditions or mistaken units.

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Methodology for the Evaluation of Self-Shielding in the Calculation of Effective Cross Sections

When preparing effective cross sections for multigroup calculations, care must be taken to correctly account for 'self-shielding' effects. This has been done in the past by means of the DANCOFF factor. However, as we have shown (1,2,3) when there is a fuel double heterogeneity, the DANCOFF formulation is no longer valid. One must use a generalized collision probability method (PIC), the subgroups method(WIMSE) or the hyperfine slowing down treatment(ROLAIDS) to obtain a realistic evaluation of the effective cross sections. Codes which fail to account for the shadowing effect between fuel and solution (ANISN, XSDRNPM) overestimate the resonance capture cross section. The model thus obtained, referred to as the No DANCOFF model in this report, has been shown theoretically in the companion paper to underestimate dissolver reactivity by -2000 pcm for the large pellets to -3000 for the small pellets. The deviations of results from ANISN and XSDRNPM straddle these values. Further discrepancies are attributable to cross section anomalies.

Monte Carlo codes using continuous-energy data libraries are the definitive method to avoid self-shielding calculations because each neutron is treated individually in its encounters with the nuclei of its environment. One does not expect to observe 'self-shielding' effects in this type of calculation. However, the analysis of this study shows that results from both MCNP and VIM exhibit small but definite shifts in the value of the calculated resonance escape probability which are consistent with the self-shielding problem in multigroup problems. It has been suggested that this may

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be due to the use of an 'average' cross section for the unresolved resonance region of ^{238}U which should in fact be altered as a function moderation.

The dispersion of the L2/L1 effect for the 'selected' reference calculations is within 1000 pcm for all PF and pellet sizes.

This study confirms the need to use rigorous methods in the calculation of systems which involve the fuel double heterogeneity and the importance of periodic benchmarking exercises for probing the efficacity of criticality codes, data libraries and the users.

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TABLE 1

DISSOLVER CHARACTERISTICS FOR THIS STUDY

Solution	Fuel Zone	Solution Zone
Liquor 1		
7.5M nitric acid	^{235}U = 9.3984 E-4	-
+ 1.0 g/l GdNO3	^{238}U = 2.2272 E-2	-
	^{16}O = 4.6399 E-2	3.9072 E-2
	^{14}N = -	4.5173 E-3
	H = -	5.5554 E-2
	^{155}Gd= -	5.7070 E-7
	^{157}Gd= -	6.0134 E-7
Liquor 2		
3.0M nitric acid	^{235}U = 9.3984 E-4	3.0750 E-5
+ 1.0 g/l GdNO3 +	^{238}U = 2.2272 E-2	7.2868 E-4
300 g/l uranyl	^{16}O = 4.6399 E-2	3.8174 E-2
nitrate	^{14}N = -	3.3258 E-3
	H = -	5.5162 E-2
	^{155}Gd= -	5.7070 E-7
	^{157}Gd= -	6.0134 E-7

PF	Cell Radii (cm)	
	r=0.05	r=1.0
0.3	0.07469	1.49380
0.4	0.06786	1.35721
0.5	0.06300	1.25992
0.6	0.05928	1.18563
0.7	0.05631	1.12625

Energy Group Structure

Group 1	Fast	10 MeV ≤ En ≤ 5 keV
Group 2	Epithermal	5 keV ≤ En ≤ 0.625 eV
Group 3	Thermal	0.625 eV ≤ En ≤ 0

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TABLE 2

IDENTIFICATION SYMBOLS FOR THE INTERNATIONAL PARTICIPANTS CODES AND DATA LIBRARIES FOR THIS STUDY

France,	Commissariat à l'Energie Atomique,		
	1990	APOLLO-PIC CEA 86 Data Library	FRANCE/CEAREF
USA,	Oak Ridge National Laboratory		
	1988,1990	SCALE/ROLAIDS/XSDRNPM ENDF/BIV Data Library	USA/ORNL
UK,	Safety and Reliability Directorate		
	1988 1990	MONK 6.3 MONK 6A Point Data Library Calculations with Square-hole Calculations with T-hole	 UK/SRD-A UK/SRD-B
UK,	British Nuclear Fuels Limited		
		WIMSE	
	1988	WIMS81 Data Library	
	1990	WIMS86 Data Library	UK/BNFL
Italy,	Energia Nucleare e Energia Alternive, Casaccia		
	1988,1990	SCALE 0/NITAWL/XSDRNPM	
	1988,1990	MCNP JEF1 Data Library ENDF/BIV Data Library	 ITALY/MC/CJF ITALY/XS/CB4
Italy,	Energia Nucleare e Energia Alternive, Trisaia		
	1990	MCNP JEF1 Data Library	 ITALY/T ITALY/MC/T
Japan,	Japan Atomic Energy Research Institute		
	1988,1990	ANISN	JAP/JAE/ANI
	1990	VIM	JAP/JAE/VIM
		ENDF/BIV Data Library	JAPAN/JAERI

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TABLE 3

A SUMMARY OF K-INFINITY VALUES
FOR BENCHMARK EXERCISE 19 CALCULATIONS

LIQUOR 1 (1988/1990)

		1988 K-infinity		1990 K-infinity		1990-OTHER K-infinity	
		R=0.05	R=1.0	R=0.05	R=1.0	R=0.05	R=1.0
FRANCE/CEARF							
APOLLOPIC	0.3			1.02705	1.00458		
	0.4			1.10909	1.12329		
	0.5			1.13554	1.17167		
	0.6			1.12061	1.16373		
	0.7			1.07192	1.11032		
USA/ORNL							
R-XSDRNPM	0.3	1.01860	0.99070	1.01940	0.99010		
	0.4	1.09120	1.10790				
	0.5	1.10890	1.14950	1.11060	1.15080		
	0.6	1.08670	1.13290				
	0.7	1.03370	1.07220	1.03610	1.07520		
UK/SRD				(a)		(b)	
MONK 6.3	0.3	1.06500	1.01580	1.067	0.981	1.066	1.024
	0.4	1.15830	1.14100				
	0.5	1.18050	1.19620	1.167	1.180	1.161	1.196
	0.6	1.16620	1.20730				
	0.7	1.11420	1.15380	-	-	1.106	1.136
UK/BNFL		(c)		(d)			
WIMSE	0.3	1.04550	1.02200	1.0418	1.0176		
	0.4	1.12680	1.14210				
	0.5	1.15190	1.19010	1.1425	1.1804		
	0.6	1.13640	1.18110				
	0.7	1.08910	1.12720	1.0724	1.1107		
ITALY/ENEA-CB4							
XSDRNPM	0.3	1.05770	1.02830	1.06314	1.03545		
	0.4	1.12020	1.13330				
	0.5	1.13500	1.17190	1.12556	1.18078		
	0.6	1.11010	1.15920				
	0.7	1.05650	1.09690	1.02712	1.09445		
ITALY/ENEA-CJF							
MCNP	0.3	1.02980	0.99980	1.03080	0.99410		
(e)	0.4	1.10920	1.11070				
	0.5	1.13140	1.18170	1.13200	1.16280		
	0.6	1.11160	1.16170				
	0.7	1.05180	1.12420	1.05680	1.10000		
JAPAN/JAERI						(f)	
ANISN	0.3	0.99500	1.02060	1.04860	1.00320	1.0175	0.9800
	0.4	1.07940	1.13970				
	0.5	1.11660	1.19020	1.16010	1.18190	1.1125	1.1468
	0.6	1.11280	1.18470				
	0.7	1.05800	1.12900	1.08920	1.13270	1.0497	1.0921
ITALY/ENEA-T						(g)	
XSDRNPM	0.3	1.00590	0.99560			1.0338	0.9995
	0.4	1.06900	1.11160				
	0.5	1.09340	1.15800			1.1296	1.1646
	0.6	1.09500	1.15310				
	0.7	1.09000	1.10190			1.0606	1.1067

Note: (a) MONK 6A with correct geometry and UKAEA point data library.
(b) MONK 6A using the T-hole option to permit the PF=0.7 case.
(c) WIMSE using the WIMS 81 library.
(d) WIMSE using the WIMS 86 library.
(e) MCNP results with the JEF-1 point library.
(f) VIM results library not identified.
(g) MCNP results with the JEF-1 library.

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TABLE 4

A SUMMARY OF K-INFINITY VALUES
FOR BENCHMARK EXERCISE 19 CALCULATIONS

LIQUOR 2 (1988/1990)

		1988 K-infinity		1990 K-infinity		1990-OTHER K-infinity	
		R=0.05	R=1.0	R=0.05	R=1.0	R=0.05	R=1.0
FRANCE/CEARF							
APOLLOPIC	0.3			1.05097	1.01889		
	0.4			1.11877	1.12205		
	0.5			1.13729	1.16564		
	0.6			1.11958	1.15807		
	0.7			1.07445	1.10694		
USA/ORNL							
R-XSDRNPM	0.3	1.04020	1.00020	1.04080	1.00010		
	0.4	1.10070	1.09950				
	0.5	1.11230	1.13600	1.11390	1.13730		
	0.6	1.08740	1.12090				
	0.7	1.03350	1.06450	1.03570	1.06730		
UK/SRD				(a)		(b)	
MONK 6.3	0.3	1.09560	1.04200	1.083	1.005	1.082	1.028
	0.4	1.16990	1.14940				
	0.5	1.18960	1.19570	1.165	1.177	1.172	1.178
	0.6	1.15660	1.18780				
	0.7	1.11400	1.14350	-	-	1.090	1.118
UK/BNFL		(c)		(d)			
WIMSE	0.3	1.06830	1.03170	1.0641	1.0274		
	0.4	1.13710	1.13480				
	0.5	1.15580	1.17750	1.1460	1.1676		
	0.6	1.13720	1.16980				
	0.7	1.08900	1.11970	1.0719	1.1030		
ITALY/ENEA-CB4							
XSDRNPM	0.3	1.07980	1.02710	1.04101	1.02975		
	0.4	1.13020	1.11000				
	0.5	1.13760	1.13920	1.09091	1.14452		
	0.6	1.10930	1.12560				
	0.7	1.05310	1.07340	1.00417	1.06687		
ITALY/ENEA-CJF							
MCNP	0.3	1.05210	1.00650	1.05050	1.00230		
(e)	0.4	1.11980	1.10560				
	0.5	1.13200	1.14010	1.12420	1.14770		
	0.6	1.11690	1.16890				
	0.7	1.06080	1.11480	1.04480	1.08820		
JAPAN/JAERI						(f)	
ANISN	0.3	0.97410	1.02270	1.04110	1.00810	1.0373	0.9949
	0.4	1.08290	1.12150				
	0.5	1.09320	1.16470	1.13620	1.15650	1.1208	1.1319
	0.6	1.08510	1.15800				
	0.7	1.04030	1.10600	1.07240	1.10890	1.0492	1.0785
ITALY/ENEA-T						(g)	
XSDRNPM	0.3	0.99950	0.97540			1.0587	1.0082
	0.4	1.06060	1.07820				
	0.5	1.07460	1.11200			1.1305	1.1520
	0.6	1.08230	1.11710				
	0.7	1.07900	1.07030			1.0605	1.0935

NOTE: (a) MONK 6A with 'correct' geometry and UKAEA point data library.
(b) MONK 6A using the T-hole option to permit the PF=0.7 case.
(c) WIMSE using the WIMS 81 library.
(d) WIMSE using the WIMS 86 library.
(e) MCNP results with JEF-1 point library.
(f) VIM results library not identified.
(g) MCNP results with JEF-1 library.

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TABLE 5

A SUMMARY OF REACTIVITY DIFFERENCES BETWEEN
1988 and 1990 k_∞ VALUES

	P.F.	Liquor 1 Small	Liquor 1 Large	Liquor2 Small	Liquor2 Large
US/ORNL	0.3	+79	-60	+58	-10
R-XSDRNPM	0.5	+153	+113	+144	+114
	0.7	+232	+279	+213	+263
UK/SRD-B	0.3	+94	+804	-1249	-1353
MONK 6.3	0.5	-1666	-17	-1491	-1491
	0.7	-739	-1555	-2178	-2255
UK/BNFL	0.3	-354	-431	-394	-418
WIMSE	0.5	-819	-818	-852	-844
	0.7	-1545	-1475	-1583	-1503
ITALY/CB4	0.3	+513	+693	-3658	+258
XSDRNPM	0.5	-835	+755	-4191	+466
	0.7	-2820	-224	-4758	-610
ITALY/CJF	0.3	+97	-572	-152	-418
MCNP	0.5	+53	-1612	-691	+664
	0.7	+474	-2176	-1520	-2415
JAPAN/JAERI	0.3	+5247	-1720	+6652	-1438
ANISN	0.5	+3822	-700	+3858	-707
	0.7	+2906	+327	+3039	+262

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TABLE 6

A SUMMARY OF THE Δρ(PCM) DEVIATIONS FROM THE REFERENCE APOLLO/PIC VALUES FOR EXERCISE 19 INTERNATIONAL CALCULATIONS MAY 1990

		Δρ Liquor 1		Δρ Liquor 2	
		R=0.05	R=1.0	R=0.05	R=1.0
USA/ORNL					
R-XSDRNPM	0.3	-748	-1452	-972	-1861
	0.5	-2221	-1797	-2078	-2461
	0.7	-3399	-3214	-3673	-3647
UK/SRD-A					
MONK 6.3	0.3	3816	-2375	3002	-1372
	0.5	2733	708	2407	970
	0.7	-	-	-	-
UK/SRD-B					
MONK 6.3	0.3	3722	1915	2910	890
	0.5	2217	2055	3006	1055
	0.7	3130	2287	1437	994
UK/BNFL					
WIMSE	0.3	1426	1288	1242	832
	0.5	611	742	763	168
	0.7	40	34	-238	-356
ITALY/ENEA/CB4					
XSDRNPM	0.3	3454	3027	-952	1060
	0.5	-883	775	-4164	-1829
	0.7	-4269	-1440	-6765	-3687
JAPAN/JAERI					
ANISN	0.3	2077	-137	-944	-1065
	0.5	2140	869	-10	-787
	0.7	1599	1996	-190	1769
ITALY/ENEA/CJF					
MCNP	0.3	364	-1049	-45	-1642
	0.5	-312	-760	-1158	-1551
	0.7	-1421	-934	-2798	-1707
JAPAN/JAERI					
VIM	0.3	-934	-2477	-1309	-2383
	0.5	-2050	-2145	-1461	-2937
	0.7	-2095	-1655	-2378	-2603
ITALY/ENEA/T					
MCNP	0.3	655	-507	733	-1055
	0.5	-524	-605	-599	-1177
	0.7	-1062	-327	-1307	-1222

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TABLE 7

A SUMMARY OF THE Δρ(PCM) FROM ρ(PF=0.3) AS FUNCTIONS OF MODERATION FOR EXERCISE 19 INTERNATIONAL CALCULATIONS MAY 1990

		Δρ Liquor 1		Δρ Liquor 2	
		R=0.05	R=1.0	R=0.05	R=1.0
FRANCE/CEARF					
APOLLO	0.3	0	0	0	0
	0.4	7685	11169	6252	9644
	0.5	10042	15386	7893	13456
	0.6	8718	14706	6324	12804
	0.7	4276	10079	2210	8289
USA/ORNL					
R-XSDRNPM	0.3	0	0	0	0
	0.5	8569	15041	6788	12856
	0.7	1625	8246	-491	6500
UK/SRD-A					
MONK 6.3	0.3	0	0	0	0
	0.5	8959	18470	7299	15798
	0.7	-	-	-	-
UK/SRD-B					
MONK 6.3	0.3	0	0	0	0
	0.5	8537	15527	7990	13620
	0.7	3684	10380	737	8393
UK/BNFL					
WIMSE	0.3	0	0	0	0
	0.5	9227	14841	7415	12792
	0.7	2895	8754	730	7100
ITALY/ENEA/CB4					
XSDRNPM	0.3	0	0	0	0
	0.5	5705	13134	4682	10567
	0.7	-3447	5542	-3603	3541
JAPAN/JAERI					
ANISN	0.3	0	0	0	0
	0.5	10105	16393	8741	13733
	0.7	3799	12141	2962	9530
ITALY/ENEA/CJF					
MCNP	0.3	0	0	0	0
	0.5	9365	15675	6781	13546
	0.7	2491	10123	-544	8223
JAPAN/JAERI					
VIM	0.3	0	0	0	0
	0.5	8926	15718	7742	12901
	0.7	3116	10831	1141	8068
ITALY/ENEA/T					
MCNP	0.3	0	0	0	0
	0.5	8862	15288	6562	13333
	0.7	2559	10188	179	8122

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TABLE 8

REACTIVITY VARIATIONS FOR BENCHMARK EXERCISE 19
INTERNATIONAL CALCULATIONS MAY 1990

	PF	Liquor 1 S/L	Liquor 2 S/L	Small L2/L1	Large L2/L1
FRANCE/CEA					
APOLLO/REF	0.3	2212	3100	2302	1414
	0.4	-1272	- 293	869	-110
	0.5	-3132	-2462	154	-516
	0.6	-3776	-3380	-92	-488
	0.7	-3520	-2979	236	-305
USA/ORNL					
R-XSDRNPM	0.3	2916	3989	2078	1005
	0.5	-3556	-2079	297	-1180
	0.7	-3704	-3005	-39	-737
UK/SRD-A					
MONK 6.3	0.3	8403	7475	1488	2417
	0.5	-1108	-1025	-171	-255
	0.7	-	-	-	-
UK/SRD-B					
MONK 6.3	0.3	4020	5120	1490	390
	0.5	-2970	-510	943	-1516
	0.7	-2676	-2536	-1457	-1597
UK/BNFL					
WIMSE	0.3	2350	3510	2118	958
	0.5	-3263	-1867	306	-1090
	0.7	-3509	-2860	-47	-696
ITALY/ENEA/CB4					
XSDRNPM	0.3	2639	1088	-2104	-552
	0.5	-4789	-4797	-3127	-3119
	0.7	-6349	-6057	-2260	-2552
JAPAN/JAERI					
ANISN	0.3	4426	3221	-718	487
	0.5	-1862	-1771	-2082	-2173
	0.7	-3916	-3347	-1554	-2124
ITALY/ENEA/CJF					
MCNP	0.3	3628	4690	1886	824
	0.5	-2683	-2072	-69	-1305
	0.7	-4004	-4066	-1143	-1080
JAPAN/JAERI					
VIM	0.3	3758	4178	1927	1507
	0.5	-3034	-985	743	-1305
	0.7	-3963	-2754	-48	-1257
ITALY/ENEA/T					
MCNP	0.3	3374	4888	2380	867
	0.5	-3051	-1884	80	-1088
	0.7	-4255	-3064	-94	-1200

9421795

TABLE 9

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S3L1 (SMALL PELLET, R=0.05 CM, PF=0.3, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.02710	1.06690	1.21330	0.65306	0.64847	1.87360
US/ORNL R-XSDRNPM	1.01950	1.06620	1.25870	0.62404	0.65140	1.86870
UK/SRD-A MONK 6.3	1.06730	1.06830	1.21410	0.66028	0.66222	1.88210
UK/SRD-B MONK 6.3	1.06600	1.06740	1.21990	0.65918	0.65949	1.88330
UK/BNFL WIMSE	1.04180	1.07000	1.21400	0.64565	0.65757	1.88890
ITALY/CB4 XSRDNPM	1.06310	1.06350	1.19590	0.65175	0.68637	1.86860
JAPAN/JAERI ANISN	1.04980	1.07880	1.22340	0.65059	0.65367	1.87040
ITALY/CJEF MCNP	1.03080	1.06940	1.21650	0.64189	0.65652	1.88030
JAPAN/JAERI VIM	1.01760	1.06580	1.21800	0.64580	0.64919	1.86960

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.02710	0.67340	1.00000	0.34694	1.21490	0.65306	1.00000
US/ORNL R-XSDRNPM	1.01950	0.69111	1.00000	0.37596	1.21730	0.62404	1.00000
UK/SRD-A MONK 6.3	1.06730	0.71941	1.00000	0.33972	1.24640	0.66028	1.00000
UK/SRD-B MONK 6.3	1.06600	0.72567	1.00000	0.34082	1.24200	0.65918	1.00000
UK/BNFL WIMSE	1.04180	0.67675	1.00000	0.35435	1.24210	0.64565	1.00000
ITALY/CB4 XSRDNPM	1.06310	0.65245	1.00000	0.34825	1.28250	0.65175	1.00000
JAPAN/JAERI ANISN	1.04980	0.72795	1.00000	0.34941	1.22260	0.65059	1.00000
ITALY/CJEF MCNP	1.03080	0.66592	1.00000	0.35811	1.23440	0.64189	1.00000
JAPAN/JAERI VIM	1.01760	0.65994	1.00000	0.35420	1.21370	0.64580	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.02710	1.35760	0.75652	0.00000	0.24348
US/ORNL R-XSDRNPM	1.01950	1.33060	0.76616	0.00000	0.23384
UK/SRD-A MONK 6.3	1.06730	1.40090	0.76189	0.00000	0.23811
UK/SRD-B MONK 6.3	1.06600	1.40110	0.76086	0.00000	0.23914
UK/BNFL WIMSE	1.04180	1.36180	0.76500	0.00000	0.23500
ITALY/CB4 XSRDNPM	1.06310	1.36310	0.77993	0.00000	0.22008
JAPAN/JAERI ANISN	1.04980	1.38520	0.75784	0.00000	0.24216
ITALY/CJEF MCNP	1.03080	1.34840	0.76447	0.00000	0.23553
JAPAN/JAERI VIM	1.01760	1.34040	0.75915	0.00000	0.24085

94210096

TABLE 9.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE S3L1 (SMALL PELLET, R=0.05 CM, PF=0.3, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-743.	-66.	3674.	-4545.	451.	-262.
UK/SRD-A MONK 6.3	3839.	131.	66.	1099.	2098.	453.
UK/SRD-B MONK 6.3	3717.	47.	543.	933.	1685.	516.
UK/BNFL WIMSE	1421.	290.	58.	-1141.	1393.	813.
ITALY/CB4 XSRDNPM	3445.	-319.	-1444.	-201.	5680.	-267.
JAPAN/JAERI ANISN	2186.	1109.	829.	-379.	799.	-171.
ITALY/CJEF MCNP	360.	234.	263.	-1725.	1234.	357.
JAPAN/JAERI VIM	-929.	-103.	387.	-1118.	111.	-214.

HISTORICAL MODEL

BY GROUP

USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-743.	626.	0.	1937.	150.	-3449.	0.
UK/SRD-A MONK 6.3	3839.	1508.	0.	-480.	1976.	849.	0.
UK/SRD-B MONK 6.3	3717.	1717.	0.	-409.	1699.	718.	0.
UK/BNFL WIMSE	1421.	114.	0.	484.	1707.	-880.	0.
ITALY/CB4 XSRDNPM	3445.	-697.	0.	83.	4220.	-156.	0.
JAPAN/JAERI ANISN	2186.	1829.	0.	167.	483.	-290.	0.
ITALY/CJEF MCNP	360.	-256.	0.	727.	1227.	-1329.	0.
JAPAN/JAERI VIM	-929.	-462.	0.	473.	-76.	-862.	0.

SPATIAL MODEL

BY REGION

USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-743.	-2009.	1266.	0.	0.
UK/SRD-A MONK 6.3	3839.	3140.	707.	0.	0.
UK/SRD-B MONK 6.3	3717.	3154.	572.	0.	0.
UK/BNFL WIMSE	1421.	309.	1115.	0.	0.
ITALY/CB4 XSRDNPM	3445.	404.	3047.	0.	0.
JAPAN/JAERI ANISN	2186.	2012.	174.	0.	0.
ITALY/CJEF MCNP	360.	-680.	1045.	0.	0.
JAPAN/JAERI VIM	-929.	-1275.	347.	0.	0.

9421197

TABLE 10

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S5L1 (SMALL PELLET, R=0.05 CM, PF=0.5, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.13550	1.10710	1.42440	0.46616	0.82667	1.86860
US/ORNL R-XSDRNPM	1.11060	1.10940	1.52570	0.42606	0.82762	1.86080
UK/SRD-A MONK 6.3	1.16670	1.10690	1.44280	0.46826	0.83312	1.87260
UK/SRD-B MONK 6.3	1.16140	1.10810	1.44480	0.46707	0.83208	1.86650
UK/BNFL WIMSE	1.14240	1.11490	1.42660	0.45721	0.83462	1.88240
ITALY/CB4 XSDRNPM	1.12560	1.10760	1.40300	0.45922	0.84803	1.86000
JAPAN/JAERI ANISN	1.16010	1.12650	1.44950	0.45906	0.83149	1.86140
ITALY/CJF MCNP	1.13210	1.11590	1.44050	0.45143	0.83386	1.87090
JAPAN/JAERI VIM	1.11290	1.10850	1.43760	0.45315	0.82723	1.86300

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.13550	0.77828	1.00000	0.53384	1.54470	0.46616	1.00000
US/ORNL R-XSDRNPM	1.11060	0.79181	1.00000	0.57394	1.54010	0.42606	1.00000
UK/SRD-A MONK 6.3	1.16670	0.82020	1.00000	0.53174	1.56010	0.46826	1.00000
UK/SRD-B MONK 6.3	1.16140	0.81820	1.00000	0.53293	1.55310	0.46707	1.00000
UK/BNFL WIMSE	1.14240	0.78136	1.00000	0.54279	1.57110	0.45721	1.00000
ITALY/CB4 XSDRNPM	1.12560	0.74203	1.00000	0.54078	1.57740	0.45922	1.00000
JAPAN/JAERI ANISN	1.16010	0.83122	1.00000	0.54094	1.54770	0.45906	1.00000
ITALY/CJF MCNP	1.13210	0.77989	1.00000	0.54857	1.56000	0.45143	1.00000
JAPAN/JAERI VIM	1.11290	0.75799	1.00000	0.54685	1.54110	0.45315	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.13550	1.24930	0.90895	0.00000	0.09105
US/ORNL R-XSDRNPM	1.11060	1.21420	0.91469	0.00000	0.08531
UK/SRD-A MONK 6.3	1.16670	1.28050	0.91108	0.00000	0.08892
UK/SRD-B MONK 6.3	1.16140	1.27450	0.91129	0.00000	0.08871
UK/BNFL WIMSE	1.14240	1.24970	0.91416	0.00000	0.08584
ITALY/CB4 XSDRNPM	1.12560	1.22500	0.91891	0.00000	0.08109
JAPAN/JAERI ANISN	1.16010	1.27440	0.91035	0.00000	0.08965
ITALY/CJF MCNP	1.13210	1.23880	0.91385	0.00000	0.08615
JAPAN/JAERI VIM	1.11290	1.22120	0.91129	0.00000	0.08871

9421098

TABLE 10.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE S5L1 (SMALL PELLET, R=0.05 CM, PF=0.5, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-2217.	207.	6870.	-8995.	115.	-418.
UK/SRD-A MONK 6.3	2711.	-18.	1283.	449.	777.	214.
UK/SRD-B MONK 6.3	2255.	90.	1422.	195.	652.	-112.
UK/BNFL WIMSE	606.	702.	154.	-1939.	957.	736.
ITALY/CB4 XSDRNPM	-876.	45.	-1514.	-1500.	2551.	-461.
JAPAN/JAERI ANISN	2143.	1737.	1747.	-1535.	581.	-386.
ITALY/CJF MCNP	-300.	792.	1124.	-3211.	866.	123.
JAPAN/JAERI VIM	-2010.	126.	922.	-2831.	68.	-300.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-2217.	668.	0.	2807.	-183.	-5509.	0.
UK/SRD-A MONK 6.3	2711.	1940.	0.	-146.	625.	283.	0.
UK/SRD-B MONK 6.3	2255.	1854.	0.	-63.	341.	123.	0.
UK/BNFL WIMSE	606.	146.	0.	613.	1070.	-1224.	0.
ITALY/CB4 XSDRNPM	-876.	-1723.	0.	467.	1338.	-958.	0.
JAPAN/JAERI ANISN	2143.	2479.	0.	498.	121.	-957.	0.
ITALY/CJF MCNP	-300.	77.	0.	1012.	619.	-2017.	0.
JAPAN/JAERI VIM	-2010.	-975.	0.	889.	-147.	-1786.	0.

SPATIAL MODEL

		BY REGION				
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)	
US/ORNL R-XSDRNPM	-2217.	-2850.	629.	0.	0.	
UK/SRD-A MONK 6.3	2711.	2467.	234.	0.	0.	
UK/SRD-B MONK 6.3	2255.	1997.	257.	0.	0.	
UK/BNFL WIMSE	606.	32.	572.	0.	0.	
ITALY/CB4 XSDRNPM	-876.	-1964.	1090.	0.	0.	
JAPAN/JAERI ANISN	2143.	1989.	154.	0.	0.	
ITALY/CJF MCNP	-300.	-844.	538.	0.	0.	
JAPAN/JAERI VIM	-2010.	-2275.	257.	0.	0.	

9421099

TABLE 11

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S7L1 (SMALL PELLET, R=0.05 CM, PF=0.7, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.07190	1.17380	2.05380	0.25715	0.92938	1.86050
US/ORNL R-XSDRNPM	1.03620	1.18400	2.35240	0.21655	0.92843	1.85050
UK/SRD-B MONK 6.3	1.10570	1.18210	2.10110	0.25317	0.93578	1.87920
UK/BNFL WIMSE	1.07240	1.19160	2.05660	0.25015	0.93429	1.87240
ITALY/CB4 XSDRNPM	1.03030	1.18580	2.03060	0.24657	0.93816	1.84980
JAPAN/JAERI ANISN	1.08950	1.21050	2.14810	0.24299	0.93275	1.84870
ITALY/CJF MCNP	1.05680	1.19670	2.09990	0.24194	0.93443	1.86010
JAPAN/JAERI VIM	1.04900	1.18140	2.09110	0.24700	0.92999	1.84850

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.07190	0.84440	1.00000	0.74285	1.72910	0.25715	1.00000
US/ORNL R-XSDRNPM	1.03620	0.84778	1.00000	0.78345	1.71810	0.21655	1.00000
UK/SRD-B MONK 6.3	1.10570	0.88447	1.00000	0.74683	1.75850	0.25317	1.00000
UK/BNFL WIMSE	1.07240	0.84653	1.00000	0.74985	1.74940	0.25015	1.00000
ITALY/CB4 XSDRNPM	1.03030	0.79955	1.00000	0.75343	1.73540	0.24657	1.00000
JAPAN/JAERI ANISN	1.08950	0.88575	1.00000	0.75701	1.72440	0.24299	1.00000
ITALY/CJF MCNP	1.05680	0.83932	1.00000	0.75806	1.73820	0.24194	1.00000
JAPAN/JAERI VIM	1.04900	0.82917	1.00000	0.75300	1.71900	0.24700	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.07190	1.09870	0.97560	0.00000	0.02440
US/ORNL R-XSDRNPM	1.03620	1.06000	0.97756	0.00000	0.02244
UK/SRD-B MONK 6.3	1.10570	1.13170	0.97706	0.00000	0.02294
UK/BNFL WIMSE	1.07240	1.09720	0.97733	0.00000	0.02267
ITALY/CB4 XSDRNPM	1.03030	1.05240	0.97899	0.00000	0.02101
JAPAN/JAERI ANISN	1.08950	1.11600	0.97628	0.00000	0.02372
ITALY/CJF MCNP	1.05680	1.08140	0.97728	0.00000	0.02273
JAPAN/JAERI VIM	1.04900	1.07450	0.97626	0.00000	0.02374

94210100

TABLE 11.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM
CASE S7L1 (SMALL PELLET, R=0.05 CM, PF=0.7, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-3387.	865.	13574.	-17184.	-102.	-539.
UK/SRD-B MONK 6.3	3104.	705.	2277.	-1560.	686.	1000.
UK/BNFL WIMSE	47.	1505.	136.	-2760.	527.	637.
ITALY/CB4 XSDRNPM	-3958.	1017.	-1136.	-4201.	940.	-577.
JAPAN/JAERI ANISN	1629.	3079.	4489.	-5664.	362.	-636.
ITALY/CJF MCNP	-1419.	1932.	2220.	-6097.	542.	-22.
JAPAN/JAERI VIM	-2160.	645.	1800.	-4027.	66.	-647.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-3387.	245.	0.	3262.	-247.	-6649.	0.
UK/SRD-B MONK 6.3	3104.	2741.	0.	316.	689.	-638.	0.
UK/BNFL WIMSE	47.	148.	0.	552.	480.	-1136.	0.
ITALY/CB4 XSDRNPM	-3958.	-3192.	0.	827.	151.	-1744.	0.
JAPAN/JAERI ANISN	1629.	2870.	0.	1133.	-109.	-2264.	0.
ITALY/CJF MCNP	-1419.	-358.	0.	1203.	213.	-2478.	0.
JAPAN/JAERI VIM	-2160.	-1074.	0.	801.	-240.	-1650.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-3387.	-3586.	201.	0.	0.
UK/SRD-B MONK 6.3	3104.	2959.	150.	0.	0.
UK/BNFL WIMSE	47.	-137.	177.	0.	0.
ITALY/CB4 XSDRNPM	-3958.	-4305.	347.	0.	0.
JAPAN/JAERI ANISN	1629.	1562.	70.	0.	0.
ITALY/CJF MCNP	-1419.	-1587.	172.	0.	0.
JAPAN/JAERI VIM	-2160.	-2227.	68.	0.	0.

9123191

TABLE 12

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S3L2 (SMALL PELLET, R=0.05 CM, PF=0.3, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.05100	1.07000	1.22510	0.63837	0.67051	1.87320
US/ORNL R-XSDRNPM	1.04080	1.06960	1.27390	0.60727	0.67327	1.86810
UK/SRD-A MONK 6.3	1.08880	1.07300	1.23320	0.63920	0.67651	1.90280
UK/SRD-B MONK 6.3	1.08180	1.07180	1.23260	0.64106	0.68302	1.87010
UK/BNFL WIMSE	1.06420	1.07350	1.22630	0.62976	0.67961	1.88860
ITALY/CB4 XSDRNPM	1.04100	1.06970	1.21300	0.60715	0.70744	1.86790
JAPAN/JAERI ANISN	1.04210	1.08530	1.24050	0.61192	0.67627	1.87040
ITALY/CJF MCNP	1.04940	1.07400	1.23650	0.61564	0.68315	1.87890
JAPAN/JAERI VIM	1.03520	1.06990	1.22960	0.62728	0.67114	1.86900

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.05100	0.68904	1.00000	0.36163	1.25600	0.63837	1.00000
US/ORNL R-XSDRNPM	1.04080	0.70525	1.00000	0.39273	1.25770	0.60727	1.00000
UK/SRD-A MONK 6.3	1.08880	0.73727	1.00000	0.36080	1.28720	0.63920	1.00000
UK/SRD-B MONK 6.3	1.08180	0.73269	1.00000	0.35894	1.27730	0.64106	1.00000
UK/BNFL WIMSE	1.06420	0.69102	1.00000	0.37024	1.28350	0.62976	1.00000
ITALY/CB4 XSDRNPM	1.04100	0.60759	1.00000	0.39285	1.32150	0.60715	1.00000
JAPAN/JAERI ANISN	1.04210	0.69082	1.00000	0.38808	1.26490	0.61192	1.00000
ITALY/CJF MCNP	1.04940	0.67433	1.00000	0.38436	1.28360	0.61564	1.00000
JAPAN/JAERI VIM	1.03520	0.66634	1.00000	0.37272	1.25430	0.62728	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.05100	1.36700	0.71361	0.26361	0.28639
US/ORNL R-XSDRNPM	1.04080	1.33830	0.72189	0.26847	0.27811
UK/SRD-A MONK 6.3	1.08880	1.41160	0.71531	0.27789	0.28469
UK/SRD-B MONK 6.3	1.08180	1.40150	0.71758	0.26951	0.28242
UK/BNFL WIMSE	1.06420	1.37010	0.72094	0.27366	0.27906
ITALY/CB4 XSDRNPM	1.04100	1.34080	0.72042	0.26842	0.27958
JAPAN/JAERI ANISN	1.04210	1.37290	0.70446	0.25358	0.29554
ITALY/CJF MCNP	1.04940	1.34680	0.72365	0.27059	0.27635
JAPAN/JAERI VIM	1.03520	1.34330	0.71523	0.26144	0.28477

94210102

TABLE 12.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE S3L2 (SMALL PELLET, R=0.05 CM, PF=0.3, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-975.	-37.	3906.	-4994.	411.	-273.
UK/SRD-A MONK 6.3	3533.	280.	659.	130.	891.	1568.
UK/SRD-B MONK 6.3	2888.	168.	610.	420.	1848.	-166.
UK/BNFL WIMSE	1248.	326.	98.	-1358.	1348.	819.
ITALY/CB4 XSDRNPM	-956.	-28.	-993.	-5014.	5361.	-283.
JAPAN/JAERI ANISN	-850.	1420.	1249.	-4232.	855.	-150.
ITALY/CJF MCNP	-152.	373.	926.	-3626.	1868.	304.
JAPAN/JAERI VIM	-1515.	-9.	367.	-1753.	94.	-224.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-975.	585.	0.	2076.	101.	-3738.	0.
UK/SRD-A MONK 6.3	3533.	1628.	0.	-55.	1863.	99.	0.
UK/SRD-B MONK 6.3	2888.	1475.	0.	-179.	1278.	319.	0.
UK/BNFL WIMSE	1248.	69.	0.	562.	1649.	-1034.	0.
ITALY/CB4 XSDRNPM	-956.	-2933.	0.	1931.	3898.	-3845.	0.
JAPAN/JAERI ANISN	-850.	64.	0.	1745.	532.	-3186.	0.
ITALY/CJF MCNP	-152.	-522.	0.	1475.	1648.	-2748.	0.
JAPAN/JAERI VIM	-1515.	-799.	0.	720.	-103.	-1334.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-975.	-1969.	1071.	131.	-211.
UK/SRD-A MONK 6.3	3533.	2979.	221.	381.	-43.
UK/SRD-B MONK 6.3	2888.	2315.	515.	157.	-99.
UK/BNFL WIMSE	1248.	210.	948.	269.	-186.
ITALY/CB4 XSDRNPM	-956.	-1796.	881.	130.	-173.
JAPAN/JAERI ANISN	-850.	400.	-1198.	-279.	226.
ITALY/CJF MCNP	-152.	-1382.	1297.	187.	-255.
JAPAN/JAERI VIM	-1515.	-1623.	210.	-59.	-41.

9423193

TABLE 13

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S5L2 (SMALL PELLET, R=0.05 CM, PF=0.5, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.13730	1.11020	1.43830	0.45674	0.83469	1.86820
US/ORNL R-XSDRNPM	1.11380	1.11260	1.54610	0.41659	0.83551	1.86030
UK/SRD-A MONK 6.3	1.16480	1.11400	1.45520	0.45893	0.84189	1.85970
UK/SRD-B MONK 6.3	1.17160	1.11670	1.44920	0.45924	0.84442	1.86690
UK/BNFL WIMSE	1.14600	1.11810	1.44260	0.44803	0.84260	1.88210
ITALY/CB4 XSDRNPM	1.09090	1.11490	1.42870	0.43046	0.85557	1.85960
JAPAN/JAERI ANISN	1.13830	1.13410	1.47500	0.43445	0.83929	1.86630
ITALY/CJF MCNP	1.12410	1.11440	1.46160	0.43816	0.84199	1.87070
JAPAN/JAERI VIM	1.12190	1.10990	1.45230	0.44680	0.83510	1.86520

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.13730	0.78240	1.00000	0.54326	1.55940	0.45674	1.00000
US/ORNL R-XSDRNPM	1.11380	0.79927	1.00000	0.58341	1.55430	0.41659	1.00000
UK/SRD-A MONK 6.3	1.16480	0.82475	1.00000	0.54107	1.56570	0.45893	1.00000
UK/SRD-B MONK 6.3	1.17160	0.82782	1.00000	0.54076	1.57650	0.45924	1.00000
UK/BNFL WIMSE	1.14600	0.78896	1.00000	0.55197	1.58590	0.44803	1.00000
ITALY/CB4 XSDRNPM	1.09090	0.71289	1.00000	0.56954	1.59100	0.43046	1.00000
JAPAN/JAERI ANISN	1.13830	0.80948	1.00000	0.56555	1.56640	0.43445	1.00000
ITALY/CJF MCNP	1.12410	0.77241	1.00000	0.56184	1.57510	0.43816	1.00000
JAPAN/JAERI VIM	1.12190	0.76991	1.00000	0.55320	1.55770	0.44680	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.13730	1.24710	0.88271	0.31057	0.11729
US/ORNL R-XSDRNPM	1.11380	1.21450	0.88777	0.31715	0.11223
UK/SRD-A MONK 6.3	1.16480	1.27480	0.88402	0.32616	0.11598
UK/SRD-B MONK 6.3	1.17160	1.27910	0.88594	0.33683	0.11406
UK/BNFL WIMSE	1.14600	1.25030	0.88726	0.32492	0.11274
ITALY/CB4 XSDRNPM	1.09090	1.21050	0.87206	0.27591	0.12794
JAPAN/JAERI ANISN	1.13830	1.26960	0.86763	0.27749	0.13237
ITALY/CJF MCNP	1.12410	1.22720	0.88666	0.31770	0.11334
JAPAN/JAERI VIM	1.12190	1.23010	0.88277	0.30658	0.11723

9410104

TABLE 13.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM
CASE S5L2 (SMALL PELLET, R=0.05 CM, PF=0.5, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-2088.	216.	7227.	-9201.	98.	-424.
UK/SRD-A MONK 6.3	2389.	342.	1168.	478.	859.	-456.
UK/SRD-B MONK 6.3	2971.	584.	755.	546.	1159.	-70.
UK/BNFL WIMSE	762.	709.	298.	-1925.	943.	741.
ITALY/CB4 XSDRNPM	-4165.	422.	-670.	-5926.	2471.	-461.
JAPAN/JAERI ANISN	88.	2130.	2520.	-5003.	550.	-102.
ITALY/CJF MCNP	-1167.	378.	1607.	-4153.	871.	134.
JAPAN/JAERI VIM	-1363.	-27.	969.	-2200.	49.	-161.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-2088.	845.	0.	2825.	-198.	-5556.	0.
UK/SRD-A MONK 6.3	2389.	1995.	0.	-153.	251.	297.	0.
UK/SRD-B MONK 6.3	2971.	2133.	0.	-174.	678.	340.	0.
UK/BNFL WIMSE	762.	315.	0.	599.	1050.	-1200.	0.
ITALY/CB4 XSDRNPM	-4165.	-3470.	0.	1762.	1258.	-3716.	0.
JAPAN/JAERI ANISN	88.	1320.	0.	1560.	274.	-3062.	0.
ITALY/CJF MCNP	-1167.	-488.	0.	1278.	621.	-2575.	0.
JAPAN/JAERI VIM	-1363.	-606.	0.	683.	-68.	-1371.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-2088.	-2564.	553.	67.	-141.
UK/SRD-A MONK 6.3	2389.	2126.	143.	158.	-36.
UK/SRD-B MONK 6.3	2971.	2451.	353.	263.	-91.
UK/BNFL WIMSE	762.	248.	498.	145.	-127.
ITALY/CB4 XSDRNPM	-4165.	-2883.	-1175.	-381.	280.
JAPAN/JAERI ANISN	88.	1731.	-1668.	-362.	389.
ITALY/CJF MCNP	-1167.	-1557.	432.	73.	-110.
JAPAN/JAERI VIM	-1363.	-1329.	7.	-41.	-2.

9421015

TABLE 14

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE S7L2 (SMALL PELLET, R=0.05 CM, PF=0.7, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.07440	1.17550	2.07210	0.25441	0.93201	1.86030
US/ORNL R-XSDRNPM	1.03570	1.18670	2.38940	0.21204	0.93098	1.85030
UK/SRD-B MONK 6.3	1.09350	1.18130	2.12120	0.24938	0.94238	1.85690
UK/BNFL WIMSE	1.07210	1.19430	2.08380	0.24560	0.93687	1.87210
ITALY/CB4 XSDRNPM	1.00410	1.19340	2.08100	0.23240	0.94070	1.84950
JAPAN/JAERI ANISN	1.07310	1.21670	2.19610	0.23185	0.93498	1.85270
ITALY/CJF MCNP	1.04480	1.18830	2.17840	0.23145	0.93843	1.85830
JAPAN/JAERI VIM	1.04820	1.18420	2.12870	0.24100	0.93246	1.85030

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.07440	0.84945	1.00000	0.74559	1.73380	0.25441	1.00000
US/ORNL R-XSDRNPM	1.03570	0.85083	1.00000	0.78796	1.72260	0.21204	1.00000
UK/SRD-B MONK 6.3	1.09350	0.87543	1.00000	0.75062	1.74990	0.24938	1.00000
UK/BNFL WIMSE	1.07210	0.85009	1.00000	0.75440	1.75390	0.24560	1.00000
ITALY/CB4 XSDRNPM	1.00410	0.78140	1.00000	0.76760	1.73980	0.23240	1.00000
JAPAN/JAERI ANISN	1.07310	0.87417	1.00000	0.76815	1.73220	0.23185	1.00000
ITALY/CJF MCNP	1.04480	0.83425	1.00000	0.76855	1.74390	0.23145	1.00000
JAPAN/JAERI VIM	1.04820	0.83318	1.00000	0.75900	1.72540	0.24100	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.07440	1.10100	0.96229	0.39658	0.03772
US/ORNL R-XSDRNPM	1.03570	1.05900	0.96441	0.40450	0.03559
UK/SRD-B MONK 6.3	1.09350	1.11710	0.96587	0.42690	0.03413
UK/BNFL WIMSE	1.07210	1.09640	0.96421	0.41665	0.03579
ITALY/CB4 XSDRNPM	1.00410	1.04280	0.94918	0.28223	0.05082
JAPAN/JAERI ANISN	1.07310	1.11370	0.94986	0.30371	0.05014
ITALY/CJF MCNP	1.04480	1.06780	0.96485	0.41318	0.03515
JAPAN/JAERI VIM	1.04820	1.07320	0.96309	0.39561	0.03691

94210106

TABLE 14.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE S7L2 (SMALL PELLET, R=0.05 CM, PF=0.7, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-3668.	948.	14248.	-18217.	-111.	-539.
UK/SRD-B MONK 6.3	1762.	492.	2342.	-1997.	1106.	-183.
UK/BNFL WIMSE	-214.	1587.	563.	-3524.	520.	632.
ITALY/CB4 XSDRNPM	-6767.	1511.	429.	-9049.	928.	-582.
JAPAN/JAERI ANISN	-121.	3445.	5812.	-9286.	318.	-409.
ITALY/CJF MCNP	-2794.	1083.	5003.	-9458.	686.	-108.
JAPAN/JAERI VIM	-2469.	737.	2695.	-5415.	48.	-539.

HISTORICAL MODEL

BY GROUP

USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-3668.	100.	0.	3418.	-247.	-6952.	0.
UK/SRD-B MONK 6.3	1762.	1793.	0.	400.	374.	-808.	0.
UK/BNFL WIMSE	-214.	45.	0.	698.	468.	-1431.	0.
ITALY/CB4 XSDRNPM	-6767.	-4955.	0.	1726.	140.	-3679.	0.
JAPAN/JAERI ANISN	-121.	1743.	0.	1811.	-36.	-3644.	0.
ITALY/CJF MCNP	-2794.	-1086.	0.	1825.	231.	-3769.	0.
JAPAN/JAERI VIM	-2469.	-1153.	0.	1063.	-196.	-2186.	0.

SPATIAL MODEL

BY REGION

USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-3668.	-3835.	217.	28.	-81.
UK/SRD-B MONK 6.3	1762.	1432.	366.	100.	-136.
UK/BNFL WIMSE	-214.	-413.	197.	69.	-73.
ITALY/CB4 XSDRNPM	-6767.	-5355.	-1352.	-480.	420.
JAPAN/JAERI ANISN	-121.	1131.	-1282.	-375.	400.
ITALY/CJF MCNP	-2794.	-3019.	262.	57.	-98.
JAPAN/JAERI VIM	-2469.	-2522.	82.	-3.	-30.

9411107

TABLE 15

A SUMMARY OF K-INFINITY SYNTHESIS FACTORS

CASE L3L1 (LARGE PELLET, R=1.0 CM, PF=0.3, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.00460	1.07470	1.21680	0.72411	0.56584	1.87490
US/ORNL R-XSDRNPM	0.99011	1.07470	1.27010	0.69537	0.55875	1.86690
UK/SRD-A MONK 6.3	0.98073	1.07690	1.21980	0.73485	0.54295	1.87130
UK/SRD-B MONK 6.3	1.02390	1.07420	1.23240	0.72186	0.57181	1.87370
UK/BNFL WIMSE	1.01760	1.07840	1.21760	0.71671	0.57241	1.88910
ITALY/CB4 XSDRNPM	1.03540	1.07100	1.19820	0.71954	0.60062	1.86700
JAPAN/JAERI ANISN	1.00380	1.08930	1.23290	0.70935	0.56420	1.86750
ITALY/CJF MCNP	0.99247	1.07990	1.22460	0.71837	0.55849	1.87050
JAPAN/JAERI VIM	0.98006	1.07500	1.22220	0.72118	0.55350	1.86880

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.00460	0.85676	1.00000	0.27589	1.06090	0.72411	1.00000
US/ORNL R-XSDRNPM	0.99011	0.86906	1.00000	0.30463	1.04310	0.69537	1.00000
UK/SRD-A MONK 6.3	0.98073	0.88289	1.00000	0.26515	1.01600	0.73485	1.00000
UK/SRD-B MONK 6.3	1.02390	0.90052	1.00000	0.27814	1.07140	0.72186	1.00000
UK/BNFL WIMSE	1.01760	0.85644	1.00000	0.28329	1.08140	0.71671	1.00000
ITALY/CB4 XSDRNPM	1.03540	0.81499	1.00000	0.28046	1.12140	0.71954	1.00000
JAPAN/JAERI ANISN	1.00380	0.88217	1.00000	0.29065	1.05360	0.70935	1.00000
ITALY/CJF MCNP	0.99247	0.85934	1.00000	0.28164	1.04470	0.71836	1.00000
JAPAN/JAERI VIM	0.98006	0.83961	1.00000	0.27882	1.03440	0.72118	1.00000

SPATIAL MODEL

	BY REGION				
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.00460	1.49660	0.67126	0.00000	0.32874
US/ORNL R-XSDRNPM	0.99011	1.46460	0.67604	0.00000	0.32396
UK/SRD-A MONK 6.3	0.98073	1.51030	0.64936	0.00000	0.35064
UK/SRD-B MONK 6.3	1.02390	1.51680	0.67503	0.00000	0.32498
UK/BNFL WIMSE	1.01760	1.49840	0.67914	0.00000	0.32086
ITALY/CB4 XSDRNPM	1.03540	1.48680	0.69644	0.00000	0.30356
JAPAN/JAERI ANISN	1.00380	1.48990	0.67372	0.00000	0.32628
ITALY/CJF MCNP	0.99248	1.48760	0.66717	0.00000	0.33283
JAPAN/JAERI VIM	0.98006	1.47750	0.66331	0.00000	0.33669

94210103

TABLE 15.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L3L1 (LARGE PELLET, R=1.0 CM, PF=0.3, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-1453.	0.	4287.	-4050.	-1261.	-428.
UK/SRD-A MONK 6.3	-2405.	204.	246.	1472.	-4129.	-192.
UK/SRD-B MONK 6.3	1903.	-47.	1274.	-311.	1050.	-64.
UK/BNFL WIMSE	1286.	344.	66.	-1027.	1154.	754.
ITALY/CB4 XSDRNPM	3020.	-345.	-1540.	-633.	5965.	-422.
JAPAN/JAERI ANISN	-80.	1349.	1314.	-2059.	-290.	-395.
ITALY/CJF MCNP	-1215.	483.	639.	-796.	-1307.	-235.
JAPAN/JAERI VIM	-2473.	28.	443.	-405.	-2205.	-326.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-1453.	358.	0.	2491.	-1267.	-3032.	0.
UK/SRD-A MONK 6.3	-2405.	712.	0.	-941.	-3299.	1123.	0.
UK/SRD-B MONK 6.3	1903.	1195.	0.	195.	748.	-237.	0.
UK/BNFL WIMSE	1286.	-9.	0.	627.	1461.	-784.	0.
ITALY/CB4 XSDRNPM	3020.	-1140.	0.	375.	4282.	-489.	0.
JAPAN/JAERI ANISN	-80.	717.	0.	1279.	-521.	-1554.	0.
ITALY/CJF MCNP	-1215.	72.	0.	494.	-1170.	-606.	0.
JAPAN/JAERI VIM	-2473.	-479.	0.	250.	-1930.	-309.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-1453.	-2161.	709.	0.	0.
UK/SRD-A MONK 6.3	-2405.	911.	-3317.	0.	0.
UK/SRD-B MONK 6.3	1903.	1341.	560.	0.	0.
UK/BNFL WIMSE	1286.	120.	1167.	0.	0.
ITALY/CB4 XSDRNPM	3020.	-657.	3683.	0.	0.
JAPAN/JAERI ANISN	-80.	-449.	366.	0.	0.
ITALY/CJF MCNP	-1214.	-603.	-611.	0.	0.
JAPAN/JAERI VIM	-2473.	-1284.	-1191.	0.	0.

9421109

TABLE 16

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE L5L1 (LARGE PELLET, R= 0.5 CM, PF=0.5, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.17170	1.10660	1.40500	0.52035	0.77448	1.86990
US/ORNL R-XSDRNPM	1.15080	1.10850	1.50410	0.47828	0.77558	1.86080
UK/SRD-A MONK 6.3	1.18000	1.11040	1.42560	0.51812	0.76879	1.87140
UK/SRD-B MONK 6.3	1.19590	1.10870	1.41510	0.51732	0.78363	1.88030
UK/BNFL WIMSE	1.18060	1.11420	1.40530	0.51043	0.78435	1.88320
ITALY/CB4 XSDRNPM	1.18080	1.10520	1.37610	0.51865	0.80468	1.86030
JAPAN/JAERI ANISN	1.18270	1.12720	1.43180	0.50394	0.78106	1.86190
ITALY/CJF MCNP	1.16280	1.11450	1.41950	0.51380	0.76460	1.87090
JAPAN/JAERI VIM	1.14640	1.10860	1.41140	0.52062	0.75615	1.86110

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.17170	0.87167	1.00000	0.47965	1.44820	0.52035	1.00000
US/ORNL R-XSDRNPM	1.15080	0.88283	1.00000	0.52172	1.44320	0.47828	1.00000
UK/SRD-A MONK 6.3	1.18000	0.90181	1.00000	0.48188	1.43870	0.51812	1.00000
UK/SRD-B MONK 6.3	1.19590	0.89842	1.00000	0.48268	1.47350	0.51732	1.00000
UK/BNFL WIMSE	1.18060	0.87141	1.00000	0.48957	1.47710	0.51043	1.00000
ITALY/CB4 XSDRNPM	1.18080	0.84013	1.00000	0.48135	1.49690	0.51865	1.00000
JAPAN/JAERI ANISN	1.18270	0.90688	1.00000	0.49606	1.45420	0.50394	1.00000
ITALY/CJF MCNP	1.16280	0.87989	1.00000	0.48620	1.43050	0.51380	1.00000
JAPAN/JAERI VIM	1.14640	0.86308	1.00000	0.47938	1.40730	0.52062	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.17170	1.34360	0.87200	0.00000	0.12800
US/ORNL R-XSDRNPM	1.15080	1.30750	0.88020	0.00000	0.11980
UK/SRD-A MONK 6.3	1.18000	1.35780	0.86902	0.00000	0.13098
UK/SRD-B MONK 6.3	1.19590	1.36360	0.87699	0.00000	0.12302
UK/BNFL WIMSE	1.18060	1.34270	0.87927	0.00000	0.12073
ITALY/CB4 XSDRNPM	1.18080	1.33160	0.88672	0.00000	0.11328
JAPAN/JAERI ANISN	1.18270	1.34850	0.87708	0.00000	0.12292
ITALY/CJF MCNP	1.16280	1.34060	0.86737	0.00000	0.13263
JAPAN/JAERI VIM	1.14640	1.32980	0.86205	0.00000	0.13795

9421U110

TABLE 16.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L5L1 (LARGE PELLET, R=0.5 CM, PF=0.5, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-1800.	172.	6816.	-8431.	142.	-488.
UK/SRD-A MONK 6.3	706.	343.	1456.	-429.	-737.	80.
UK/SRD-B MONK 6.3	2044.	190.	716.	-584.	1174.	555.
UK/BNFL WIMSE	757.	684.	21.	-1925.	1266.	709.
ITALY/CB4 XSDRNPM	774.	-127.	-2078.	-327.	3825.	-515.
JAPAN/JAERI ANISN	934.	1844.	1889.	-3204.	846.	-429.
ITALY/CJF MCNP	-762.	711.	1027.	-1267.	-1284.	53.
JAPAN/JAERI VIM	-2183.	180.	454.	52.	-2395.	-472.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-1800.	482.	0.	3182.	-215.	-5239.	0.
UK/SRD-A MONK 6.3	706.	1232.	0.	168.	-420.	-274.	0.
UK/SRD-B MONK 6.3	2044.	1087.	0.	226.	1109.	-374.	0.
UK/BNFL WIMSE	757.	-11.	0.	735.	1266.	-1234.	0.
ITALY/CB4 XSDRNPM	774.	-1289.	0.	124.	2151.	-213.	0.
JAPAN/JAERI ANISN	934.	1460.	0.	1240.	261.	-2023.	0.
ITALY/CJF MCNP	-762.	340.	0.	491.	-784.	-808.	0.
JAPAN/JAERI VIM	-2183.	-355.	0.	-20.	-1837.	33.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-1800.	-2724.	936.	0.	0.
UK/SRD-A MONK 6.3	706.	1051.	-342.	0.	0.
UK/SRD-B MONK 6.3	2044.	1477.	571.	0.	0.
UK/BNFL WIMSE	757.	-67.	830.	0.	0.
ITALY/CB4 XSDRNPM	774.	-897.	1674.	0.	0.
JAPAN/JAERI ANISN	934.	364.	581.	0.	0.
ITALY/CJF MCNP	-762.	-224.	-532.	0.	0.
JAPAN/JAERI VIM	-2183.	-1032.	-1148.	0.	0.

9410111

TABLE 17

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE L7L1 (LARGE PELLET, R=1.0 CM, PF=0.7, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.11030	1.16830	1.97980	0.28477	0.90535	1.86190
US/ORNL R-XSDRNPM	1.07520	1.17790	2.25360	0.24130	0.90658	1.85150
UK/SRD-B MONK 6.3	1.13610	1.16990	2.01890	0.28549	0.90811	1.85530
UK/BNFL WIMSE	1.11070	1.18550	1.97810	0.27674	0.91344	1.87360
ITALY/CB4 XSDRNPM	1.09440	1.17400	1.92110	0.28460	0.92127	1.85080
JAPAN/JAERI ANISN	1.13340	1.20170	2.05870	0.27135	0.91179	1.85180
ITALY/CJF MCNP	1.10000	1.18530	2.01700	0.27041	0.91436	1.86090
JAPAN/JAERI VIM	1.09190	1.17560	2.00970	0.27507	0.90664	1.85320

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.11030	0.88126	1.00000	0.71523	1.68570	0.28477	1.00000
US/ORNL R-XSDRNPM	1.07520	0.88329	1.00000	0.75870	1.67850	0.24130	1.00000
UK/SRD-B MONK 6.3	1.13610	0.91680	1.00000	0.71451	1.68480	0.28549	1.00000
UK/BNFL WIMSE	1.11070	0.88080	1.00000	0.72326	1.71140	0.27674	1.00000
ITALY/CB4 XSDRNPM	1.09440	0.85149	1.00000	0.71540	1.70510	0.28460	1.00000
JAPAN/JAERI ANISN	1.13340	0.92676	1.00000	0.72866	1.68850	0.27134	1.00000
ITALY/CJF MCNP	1.10000	0.87701	1.00000	0.72959	1.70150	0.27041	1.00000
JAPAN/JAERI VIM	1.09190	0.86867	1.00000	0.72493	1.68020	0.27507	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.11030	1.14870	0.96658	0.00000	0.03342
US/ORNL R-XSDRNPM	1.07520	1.10830	0.97014	0.00000	0.02986
UK/SRD-B MONK 6.3	1.13610	1.17450	0.96728	0.00000	0.03272
UK/BNFL WIMSE	1.11070	1.14550	0.96958	0.00000	0.03042
ITALY/CB4 XSDRNPM	1.09440	1.12780	0.97039	0.00000	0.02961
JAPAN/JAERI ANISN	1.13340	1.16770	0.97063	0.00000	0.02937
ITALY/CJF MCNP	1.10000	1.13420	0.96982	0.00000	0.03018
JAPAN/JAERI VIM	1.09190	1.12840	0.96761	0.00000	0.03239

9410112

TABLE 17.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L7L1 (LARGE PELLET,R=1.0 CM, PF=0.7, LIQUOR 1)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-3212.	818.	12953.	-16564.	136.	-560.
UK/SRD-B MONK 6.3	2297.	137.	1956.	253.	304.	-355.
UK/BNFL WIMSE	36.	1461.	-86.	-2860.	890.	626.
ITALY/CB4 XSDRNPM	-1442.	487.	-3010.	-60.	1743.	-598.
JAPAN/JAERI ANISN	2059.	2819.	3908.	-4827.	709.	-544.
ITALY/CJF MCNP	-932.	1445.	1861.	-5174.	990.	-54.
JAPAN/JAERI VIM	-1671.	623.	1499.	-3466.	142.	-468.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-3212.	137.	0.	3513.	-173.	-6701.	0.
UK/SRD-B MONK 6.3	2297.	2262.	0.	-58.	-23.	108.	0.
UK/BNFL WIMSE	36.	-30.	0.	637.	650.	-1228.	0.
ITALY/CB4 XSDRNPM	-1442.	-1932.	0.	13.	501.	-26.	0.
JAPAN/JAERI ANISN	2059.	2929.	0.	1082.	69.	-2021.	0.
ITALY/CJF MCNP	-932.	-278.	0.	1142.	397.	-2201.	0.
JAPAN/JAERI VIM	-1671.	-823.	0.	771.	-140.	-1483.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-3212.	-3580.	368.	0.	0.
UK/SRD-B MONK 6.3	2297.	2221.	72.	0.	0.
UK/BNFL WIMSE	36.	-279.	310.	0.	0.
ITALY/CB4 XSDRNPM	-1442.	-1836.	393.	0.	0.
JAPAN/JAERI ANISN	2059.	1640.	418.	0.	0.
ITALY/CJF MCNP	-932.	-1270.	335.	0.	0.
JAPAN/JAERI VIM	-1671.	-1783.	106.	0.	0.

9424013

TABLE 18

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE L3L2 (LARGE PELLET, R=1.0 CM, PF=0.3, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.01890	1.07770	1.22860	0.68784	0.59688	1.87450
US/ORNL R-XSDRNPM	1.00010	1.07810	1.28530	0.65392	0.59120	1.86670
UK/SRD-A MONK 6.3	1.00720	1.08450	1.23970	0.69544	0.57299	1.88020
UK/SRD-B MONK 6.3	1.02850	1.08030	1.23690	0.68309	0.59996	1.87810
UK/BNFL WIMSE	1.02730	1.08200	1.23060	0.67622	0.60418	1.88840
ITALY/CB4 XSDRNPM	1.02970	1.07540	1.21230	0.66883	0.63263	1.86670
JAPAN/JAERI ANISN	1.00830	1.09410	1.24790	0.66335	0.59601	1.86770
ITALY/CJF MCNP	1.00270	1.08280	1.23950	0.67349	0.59071	1.87800
JAPAN/JAERI VIM	0.99564	1.07920	1.23560	0.67928	0.58754	1.87070

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.01890	0.79871	1.00000	0.31216	1.11880	0.68784	1.00000
US/ORNL R-XSDRNPM	1.00010	0.80445	1.00000	0.34608	1.10360	0.65392	1.00000
UK/SRD-A MONK 6.3	1.00720	0.84710	1.00000	0.30456	1.07730	0.69544	1.00000
UK/SRD-B MONK 6.3	1.02850	0.81651	1.00000	0.31691	1.12680	0.68309	1.00000
UK/BNFL WIMSE	1.02730	0.79003	1.00000	0.32378	1.14090	0.67622	1.00000
ITALY/CB4 XSDRNPM	1.02980	0.72439	1.00000	0.33117	1.18100	0.66883	1.00000
JAPAN/JAERI ANISN	1.00830	0.80146	1.00000	0.33665	1.11320	0.66335	1.00000
ITALY/CJF MCNP	1.00270	0.78282	1.00000	0.32651	1.10930	0.67349	1.00000
JAPAN/JAERI VIM	0.99564	0.77649	1.00000	0.32072	1.09910	0.67928	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.01890	1.50280	0.61657	0.24083	0.38343
US/ORNL R-XSDRNPM	1.00010	1.46510	0.61962	0.24258	0.38038
UK/SRD-A MONK 6.3	1.00720	1.52820	0.59093	0.25452	0.40907
UK/SRD-B MONK 6.3	1.02850	1.50860	0.61874	0.24921	0.38126
UK/BNFL WIMSE	1.02730	1.49940	0.62282	0.24779	0.37718
ITALY/CB4 XSDRNPM	1.02980	1.46480	0.63708	0.26611	0.36292
JAPAN/JAERI ANISN	1.00830	1.47630	0.62036	0.24347	0.37964
ITALY/CJF MCNP	1.00270	1.48390	0.61164	0.24493	0.38837
JAPAN/JAERI VIM	0.99564	1.48350	0.60825	0.23813	0.39175

9421014

TABLE 18.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L3L2 (LARGE PELLET, R=1.0 CM, PF=0.3, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-1862.	37.	4512.	-5057.	-956.	-417.
UK/SRD-A MONK 6.3	-1155.	629.	899.	1099.	-4085.	304.
UK/SRD-B MONK 6.3	938.	241.	673.	-693.	515.	192.
UK/BNFL WIMSE	821.	398.	163.	-1704.	1216.	739.
ITALY/CB4 XSDRNPM	1054.	-214.	-1336.	-2803.	5817.	-417.
JAPAN/JAERI ANISN	-1046.	1510.	1559.	-3625.	-146.	-363.
ITALY/CJF MCNP	-1603.	472.	883.	-2108.	-1039.	186.
JAPAN/JAERI VIM	-2309.	139.	568.	-1252.	-1577.	-203.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-1862.	187.	0.	2698.	-1010.	-3734.	0.
UK/SRD-A MONK 6.3	-1155.	1473.	0.	-617.	-2833.	824.	0.
UK/SRD-B MONK 6.3	938.	547.	0.	375.	536.	-521.	0.
UK/BNFL WIMSE	821.	-270.	0.	902.	1473.	-1283.	0.
ITALY/CB4 XSDRNPM	1064.	-2333.	0.	1412.	4118.	-2133.	0.
JAPAN/JAERI ANISN	-1046.	88.	0.	1935.	-373.	-2697.	0.
ITALY/CJF MCNP	-1603.	-502.	0.	1123.	-640.	-1582.	0.
JAPAN/JAERI VIM	-2309.	-698.	0.	669.	-1337.	-942.	0.

SPATIAL MODEL

		BY REGION				
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)	
US/ORNL R-XSDRNPM	-1862.	-2308.	448.	66.	-73.	
UK/SRD-A MONK 6.3	-1155.	1513.	-3835.	536.	628.	
UK/SRD-B MONK 6.3	938.	350.	319.	313.	-52.	
UK/BNFL WIMSE	821.	-206.	917.	259.	-149.	
ITALY/CB4 XSDRNPM	1064.	-2325.	2971.	920.	-507.	
JAPAN/JAERI ANISN	-1046.	-1617.	557.	99.	-91.	
ITALY/CJF MCNP	-1603.	-1148.	-728.	157.	119.	
JAPAN/JAERI VIM	-2309.	-1173.	-1233.	-104.	198.	

9423115

TABLE 19

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE L5L2 (LARGE PELLET, R=1.0 CM, PF=0.5, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.16570	1.11010	1.42100	0.50267	0.78633	1.86950
US/ORNL R-XSDRNPM	1.13740	1.11310	1.52840	0.45641	0.78738	1.86040
UK/SRD-A MONK 6.3	1.17700	1.11740	1.45010	0.49690	0.78248	1.86810
UK/SRD-B MONK 6.3	1.17840	1.11610	1.43420	0.49746	0.79069	1.87150
UK/BNFL WIMSE	1.16770	1.11890	1.42460	0.48869	0.79613	1.88280
ITALY/CB4 XSDRNPM	1.14450	1.11200	1.39980	0.48464	0.81576	1.85990
JAPAN/JAERI ANISN	1.15610	1.13380	1.45790	0.47455	0.79299	1.85860
ITALY/CJF MCNP	1.14770	1.12090	1.44150	0.48727	0.77936	1.87040
JAPAN/JAERI VIM	1.13170	1.11420	1.43280	0.49410	0.77082	1.86120

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.16570	0.85799	1.00000	0.49733	1.47010	0.50267	1.00000
US/ORNL R-XSDRNPM	1.13740	0.86245	1.00000	0.54359	1.46480	0.45641	1.00000
UK/SRD-A MONK 6.3	1.17700	0.89566	1.00000	0.50310	1.46180	0.49690	1.00000
UK/SRD-B MONK 6.3	1.17840	0.88002	1.00000	0.50254	1.47980	0.49746	1.00000
UK/BNFL WIMSE	1.16770	0.85101	1.00000	0.51131	1.49900	0.48869	1.00000
ITALY/CB4 XSDRNPM	1.14450	0.79403	1.00000	0.51536	1.51720	0.48464	1.00000
JAPAN/JAERI ANISN	1.15610	0.86913	1.00000	0.52545	1.47380	0.47455	1.00000
ITALY/CJF MCNP	1.14770	0.85304	1.00000	0.51273	1.45780	0.48727	1.00000
JAPAN/JAERI VIM	1.13170	0.83584	1.00000	0.50590	1.43470	0.49410	1.00000

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.16570	1.35290	0.82822	0.26268	0.17178
US/ORNL R-XSDRNPM	1.13740	1.31170	0.83387	0.26223	0.16613
UK/SRD-A MONK 6.3	1.17700	1.37020	0.82485	0.26667	0.17515
UK/SRD-B MONK 6.3	1.17840	1.36650	0.82769	0.27462	0.17231
UK/BNFL WIMSE	1.16770	1.34710	0.83347	0.26948	0.16653
ITALY/CB4 XSDRNPM	1.14450	1.31540	0.83625	0.27200	0.16375
JAPAN/JAERI ANISN	1.15610	1.33790	0.83093	0.26245	0.16907
ITALY/CJF MCNP	1.14770	1.34080	0.82113	0.26144	0.17887
JAPAN/JAERI VIM	1.13170	1.33060	0.81557	0.25238	0.18443

9421016

TABLE 19.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L5L2 (LARGE PELLET, R=1.0 CM, PF=0.5, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-2458.	270.	7286.	-9654.	133.	-488.
UK/SRD-A MONK 6.3	965.	655.	2027.	-1155.	-491.	-75.
UK/SRD-B MONK 6.3	1084.	539.	925.	-1042.	553.	107.
UK/BNFL WIMSE	171.	790.	253.	-2821.	1239.	709.
ITALY/CB4 XSDRNPM	-1835.	171.	-1503.	-3653.	3674.	-515.
JAPAN/JAERI ANISN	-827.	2112.	2564.	-5757.	843.	-585.
ITALY/CJF MCNP	-1556.	968.	1432.	-3112.	-890.	48.
JAPAN/JAERI VIM	-2960.	369.	827.	-1720.	-1992.	-445.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-2458.	202.	0.	3461.	-221.	-5897.	0.
UK/SRD-A MONK 6.3	965.	1609.	0.	432.	-354.	-722.	0.
UK/SRD-B MONK 6.3	1084.	940.	0.	386.	414.	-656.	0.
UK/BNFL WIMSE	171.	-302.	0.	1024.	1228.	-1779.	0.
ITALY/CB4 XSDRNPM	-1835.	-2803.	0.	1288.	2013.	-2331.	0.
JAPAN/JAERI ANISN	-827.	491.	0.	2093.	156.	-3566.	0.
ITALY/CJF MCNP	-1556.	-216.	0.	1139.	-526.	-1949.	0.
JAPAN/JAERI VIM	-2960.	-967.	0.	632.	-1536.	-1084.	0.

SPATIAL MODEL

	BY REGION				
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-2458.	-2973.	654.	-7.	-129.
UK/SRD-A MONK 6.3	965.	1221.	-392.	59.	76.
UK/SRD-B MONK 6.3	1084.	961.	-61.	175.	12.
UK/BNFL WIMSE	171.	-413.	607.	99.	-120.
ITALY/CB4 XSDRNPM	-1835.	-2702.	927.	135.	-186.
JAPAN/JAERI ANISN	-827.	-1072.	314.	-3.	-61.
ITALY/CJF MCNP	-1556.	-863.	-826.	-19.	161.
JAPAN/JAERI VIM	-2960.	-1596.	-1478.	-160.	284.

9421017

TABLE 20

A SUMMARY OF THE K-INFINITY SYNTHESIS FACTORS

CASE L7L2 (LARGE PELLET, R=1.0 CM, PF=0.7, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
FRANCE/CEAREF APOLLO	1.10690	1.17100	2.00480	0.27859	0.90914	1.86160
US/ORNL R-XSDRNPM	1.06730	1.18190	2.29690	0.23333	0.91018	1.85120
UK/SRD-B MONK 6.3	1.11830	1.17560	2.02290	0.27805	0.90886	1.86100
UK/BNFL WIMSE	1.10290	1.18940	2.01020	0.26857	0.91706	1.87290
ITALY/CB4 XSDRNPM	1.06690	1.18160	1.96780	0.26815	0.92468	1.85060
JAPAN/JAERI ANISN	1.10920	1.20860	2.10490	0.25710	0.91558	1.85220
ITALY/CJF MCNP	1.08820	1.19000	2.06530	0.25925	0.91790	1.86060
JAPAN/JAERI VIM	1.07900	1.17880	2.05180	0.26465	0.91064	1.85110

HISTORICAL MODEL

BY GROUP

USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
FRANCE/CEAREF APOLLO	1.10690	0.88081	1.00000	0.72141	1.69250	0.27859	1.00000
US/ORNL R-XSDRNPM	1.06730	0.87930	1.00000	0.76667	1.68500	0.23333	1.00000
UK/SRD-B MONK 6.3	1.11830	0.89765	1.00000	0.72195	1.69140	0.27805	1.00000
UK/BNFL WIMSE	1.10290	0.87726	1.00000	0.73143	1.71750	0.26857	1.00000
ITALY/CB4 XSDRNPM	1.06690	0.83078	1.00000	0.73185	1.71120	0.26815	1.00000
JAPAN/JAERI ANISN	1.10920	0.90618	1.00000	0.74291	1.69580	0.25709	1.00000
ITALY/CJF MCNP	1.08820	0.87130	1.00000	0.74075	1.70780	0.25925	1.00000
JAPAN/JAERI VIM	1.07900	0.86064	1.00000	0.73535	1.68560	0.26465	1.00000

SPATIAL MODEL

BY REGION

USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
FRANCE/CEAREF APOLLO	1.10690	1.15520	0.94300	0.30860	0.05700
US/ORNL R-XSDRNPM	1.06730	1.11220	0.94470	0.29952	0.05530
UK/SRD-B MONK 6.3	1.11830	1.17060	0.94034	0.29431	0.05966
UK/BNFL WIMSE	1.10290	1.14920	0.94471	0.31207	0.05529
ITALY/CB4 XSDRNPM	1.06690	1.11860	0.93854	0.27708	0.06146
JAPAN/JAERI ANISN	1.10920	1.16190	0.93958	0.28894	0.06042
ITALY/CJF MCNP	1.08820	1.13450	0.94417	0.30398	0.05583
JAPAN/JAERI VIM	1.07900	1.12760	0.94182	0.29215	0.05818

94219118

TABLE 20.1

A SUMMARY OF DEVIATIONS FROM THE REFERENCE MODEL IN PCM

CASE L7L2 (LARGE PELLET, R=1.0 CM, PF=0.7, LIQUOR 2)

PHENOMENOLOGICAL MODEL (4 - FACTOR)

USER	KINF	FF8	FF5	PESC	F	ETA
US/ORNL R-XSDRNPM	-3643.	926.	13602.	-17729.	114.	-560.
UK/SRD-B MONK 6.3	1025.	392.	899.	-194.	-31.	-32.
UK/BNFL WIMSE	-362.	1559.	269.	-3663.	867.	605.
ITALY/CB4 XSDRNPM	-3681.	901.	-1863.	-3819.	1695.	-593.
JAPAN/JAERI ANISN	207.	3160.	4872.	-8028.	706.	-506.
ITALY/CJF MCNP	-1704.	1609.	2973.	-7195.	959.	-54.
JAPAN/JAERI VIM	-2553.	664.	2317.	-5133.	165.	-566.

HISTORICAL MODEL

		BY GROUP					
USER	KINF	KINF(1)	PAR(1)	PAB(1)	KINF(2)	PAR(2)	PAB(2)
US/ORNL R-XSDRNPM	-3643.	-103.	0.	3668.	-176.	-7041.	0.
UK/SRD-B MONK 6.3	1025.	1092.	0.	43.	-28.	-82.	0.
UK/BNFL WIMSE	-362.	-233.	0.	797.	619.	-1546.	0.
ITALY/CB4 XSDRNPM	-3681.	-3345.	0.	822.	470.	-1635.	0.
JAPAN/JAERI ANISN	207.	1677.	0.	1734.	80.	-3289.	0.
ITALY/CJF MCNP	-1704.	-634.	0.	1544.	375.	-2996.	0.
JAPAN/JAERI VIM	-2553.	-1344.	0.	1111.	-171.	-2154.	0.

SPATIAL MODEL

		BY REGION			
USER	KINF	KINF(1)	W(1)	KINF(2)	W(2)
US/ORNL R-XSDRNPM	-3643.	-3734.	177.	-47.	-47.
UK/SRD-B MONK 6.3	1025.	1303.	-278.	-75.	72.
UK/BNFL WIMSE	-362.	-513.	178.	18.	-48.
ITALY/CB4 XSDRNPM	-3681.	-3168.	-467.	-172.	120.
JAPAN/JAERI ANISN	207.	569.	-358.	-104.	92.
ITALY/CJF MCNP	-1704.	-1780.	122.	-24.	-33.
JAPAN/JAERI VIM	-2553.	-2380.	-123.	-87.	33.

9[illegible]9

TABLE 21

A SUMMARY OF REACTION RATE DIFFERENCES BETWEEN SUBMITTED AND REFERENCE VALUES (LIQUOR 1, PF=0.3)

		(RRi-RRref)*100/RRref		
		group 1 (fast)	group 2 (epithermal)	group 3 (thermal)
US/ORNL	^{235}U			
R-XSDRNPM	cap	+12.8	+3.4	-2.3
	fiss	+9.4	+17.1	-4.2
	^{238}U			
	cap	+20.1	+5.2	-5.0
	fiss	-2.2		
UK/SRD-B	^{235}U			
MONK 6.3	cap	-57.2	+6.9	+0.9
	fiss	-21.1	+9.6	+2.8
	^{238}U			
	cap	-48.1	-1.2	+4.3
	fiss	+3.2		
UK/BNFL	^{235}U			
WIMSE	cap	-5.4	+4.9	-2.7
	fiss	+8.1	-0.2	+0.6
	^{238}U			
	cap	+3.9	+1.5	+1.3
	fiss	+5.9		
ITALY/CB4	^{235}U			
XSDRNPM	cap	+13.0	-0.2	+5.9
	fiss	+9.6	-5.0	+5.4
	^{238}U			
	cap	+19.0	-1.3	+7.1
	fiss	-2.0		
JAPAN/JAERI	^{235}U			
ANISN	cap	-3.4	+4.0	+1.2
	fiss	+2.1	+4.9	+0.2
	^{238}U			
	cap	-2.5	-4.8	+1.0
	fiss	+15.3		
ITALY/CJF	^{235}U			
MCNP	cap	-2.0	+0.4	+0.3
	fiss	-1.6	+1.0	-0.8
	^{238}U			
	cap	-5.6	+5.2	+1.2
	fiss	+4.0		
JAPAN/JAERI	^{235}U			
VIM	cap	+0.3	-0.2	-0.6
	fiss	+0.0	+0.7	-1.1
	^{238}U			
	cap	-0.8	+3.9	-0.9
	fiss	-2.7		

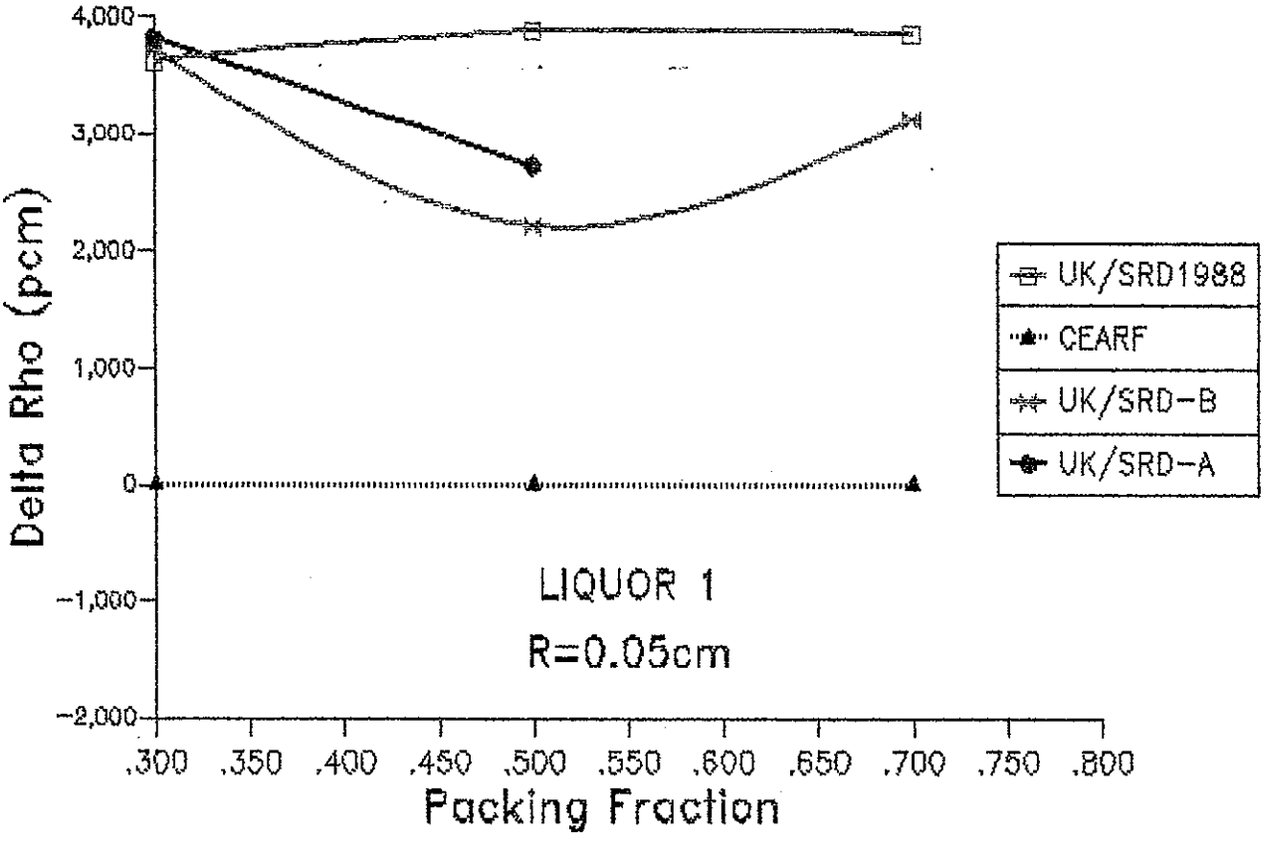
9421 9120

TABLE 22

A SUMMARY OF REACTION RATE RATIOS AND THE DIFFERENCES
BETWEEN SUBMITTED AND REFERENCE VALUES
(LIQUOR 1, PF=0.3)

	$\alpha^5(1)$ (fast)	$\alpha^5(2)$ (epithermal)	$\alpha^5(3)$ (thermal)	α^5 (average)	$\alpha^8(1)$ (fast)
FRANCE/CEAREF APOLLO/PIC	.1970	.5081	.1739	.2260	.9815
US/ORNL R-XSDRNPM	.2032 +3.2	.4488 -11.7	.1774 +0.2	.2274 +0.6	1.2128 +23.6
UK/SRD-B MONK 6.3	.1093 -44.5	.4955 -2.5	.1708 -1.8	.2231 -1.3	.4937 -49.7
UK/BNFL WIMSE	.1724 -12.5	.5339 +5.1	.1682 -3.3	.2243 -0.8	.9629 -1.9
ITALY/CB4 XSDRNPM	.2033 +3.2	.5338 +5.1	.1746 +0.4	.2260 +0.0	1.1918 +21.4
JAPAN/JAERI ANISN	.1865 -5.3	.5039 -0.8	.1756 +1.0	.2285 +1.1	.8295 -15.5
ITALY/CJF MCNP	.1963 -0.4	.5051 -0.6	.1758 +1.0	.2279 +0.8	.8909 -9.2
JAPAN/JAERI VIM	.1976 +0.3	.5032 -1.0	.1747 +0.5	.2267 +0.3	1.0000 +1.9

9429121



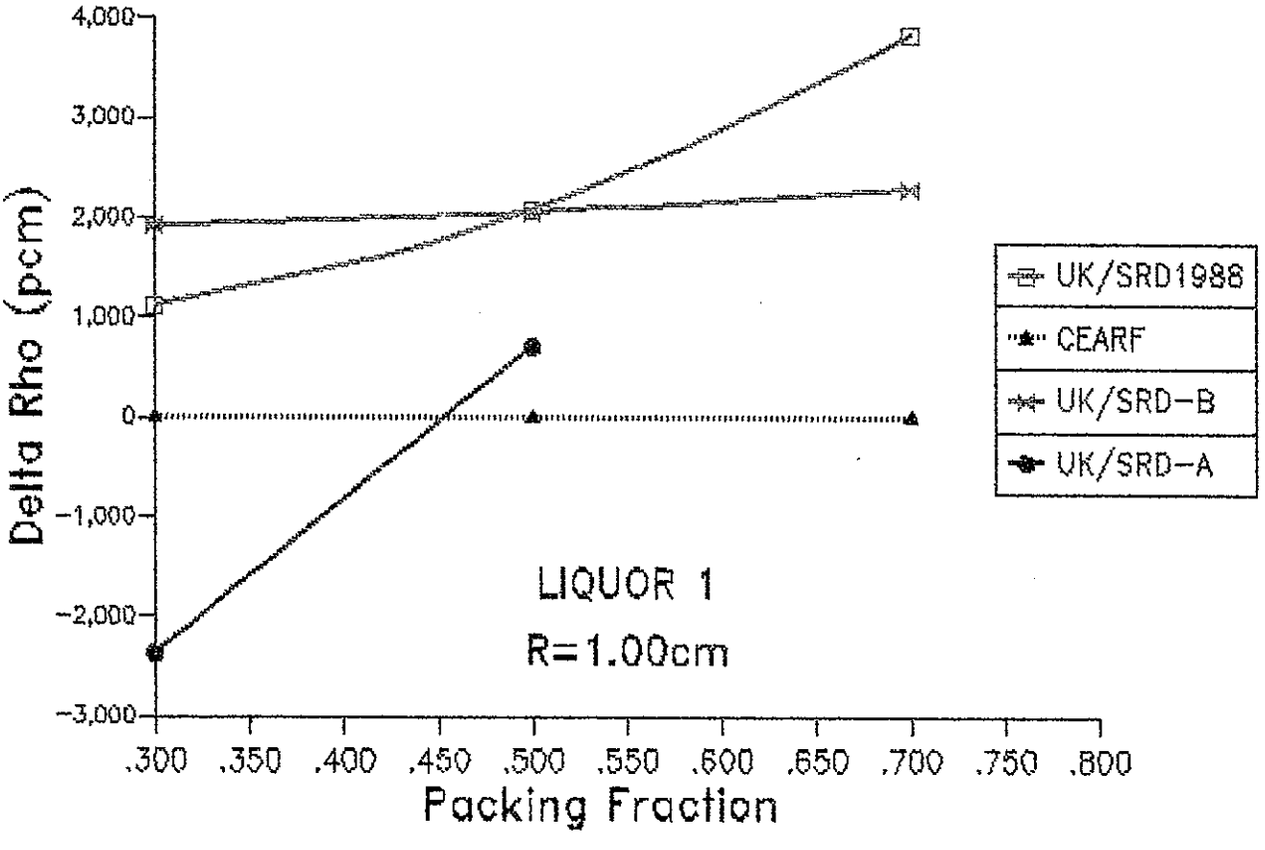
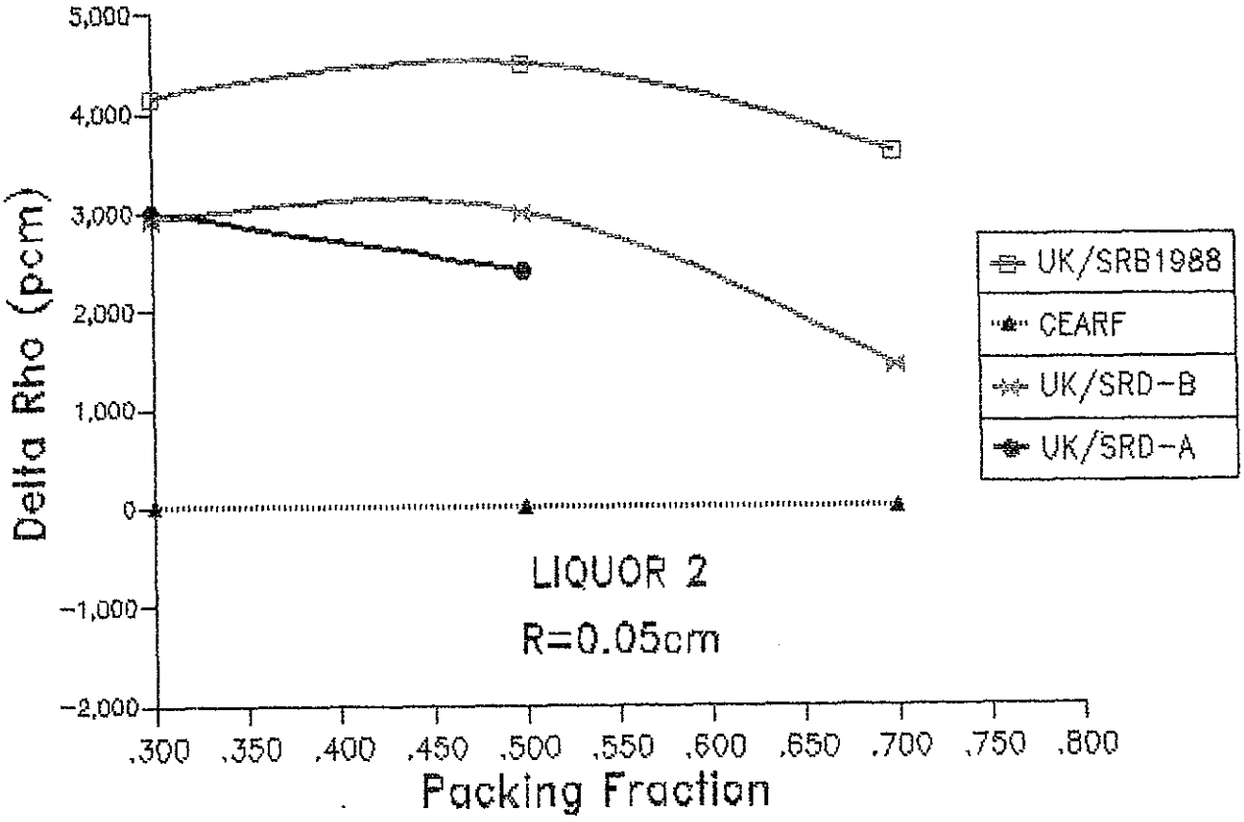


Figure 1 : A comparison of reactivity deviations from APOLLO/PIC reference calculations , of UK/SRD k∞ results submitted to the June 1988 and May 1990 OECD/NEA Criticality Working Group meetings showing the effects of changing from MONK 6.3 to MONK 6A ;small pellets,large pellets in Liquor 1.

9421 0122



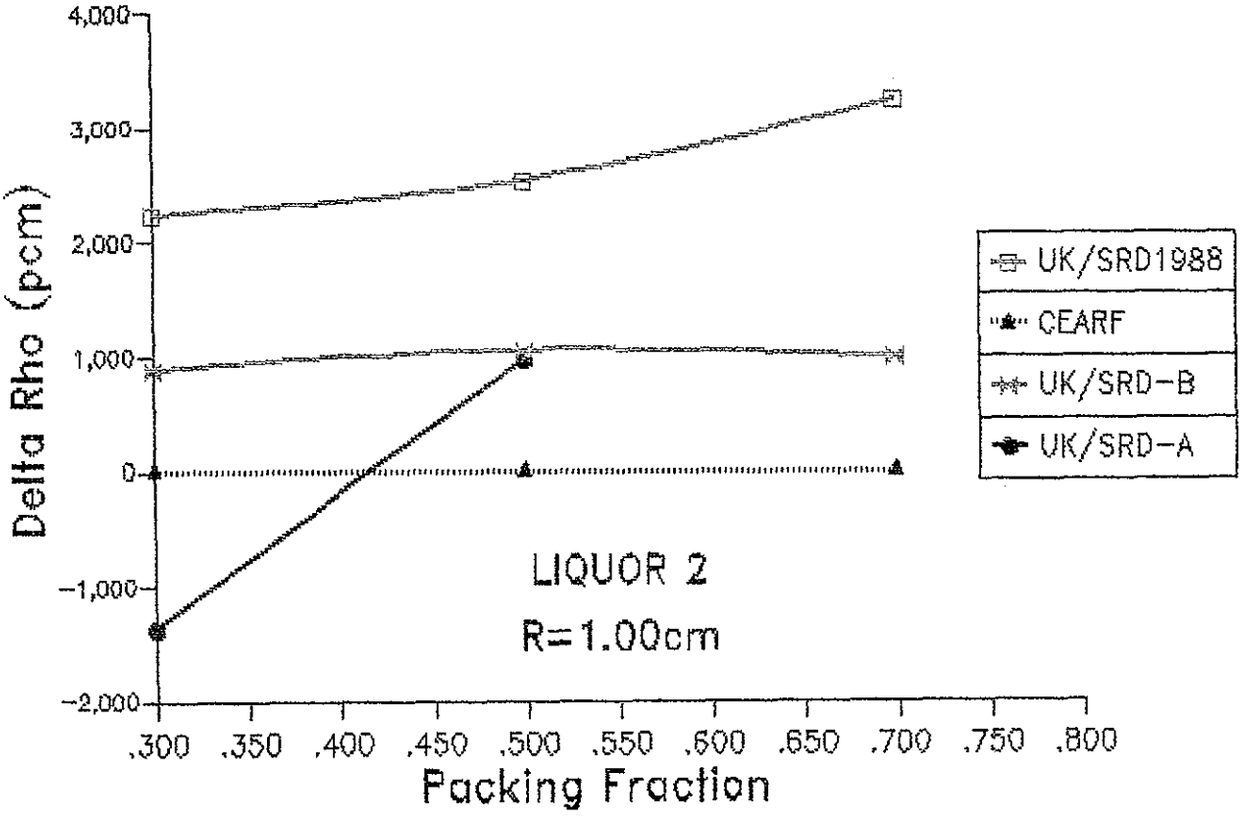


Figure 2 : A comparison of reactivity deviations from APOLLO/PIC reference calculations , of UK/SRD k∞ results submitted to the June 1988 and May 1990 OECD/NEA Criticality Working Group meetings showing the effects of changing from MONK 6.3 to MONK 6A ;small pellets,large pellets in Liquor 2.

94210123

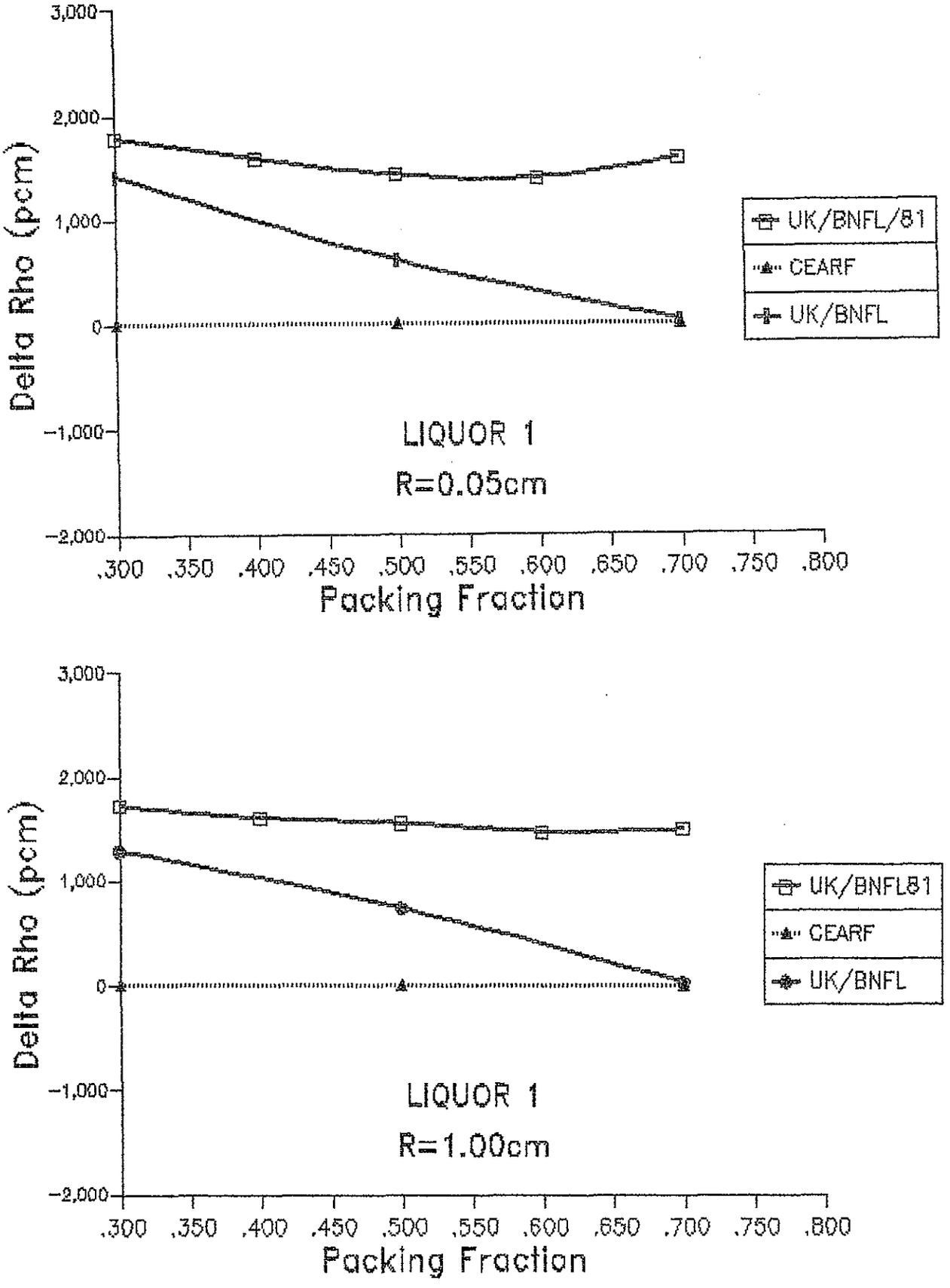
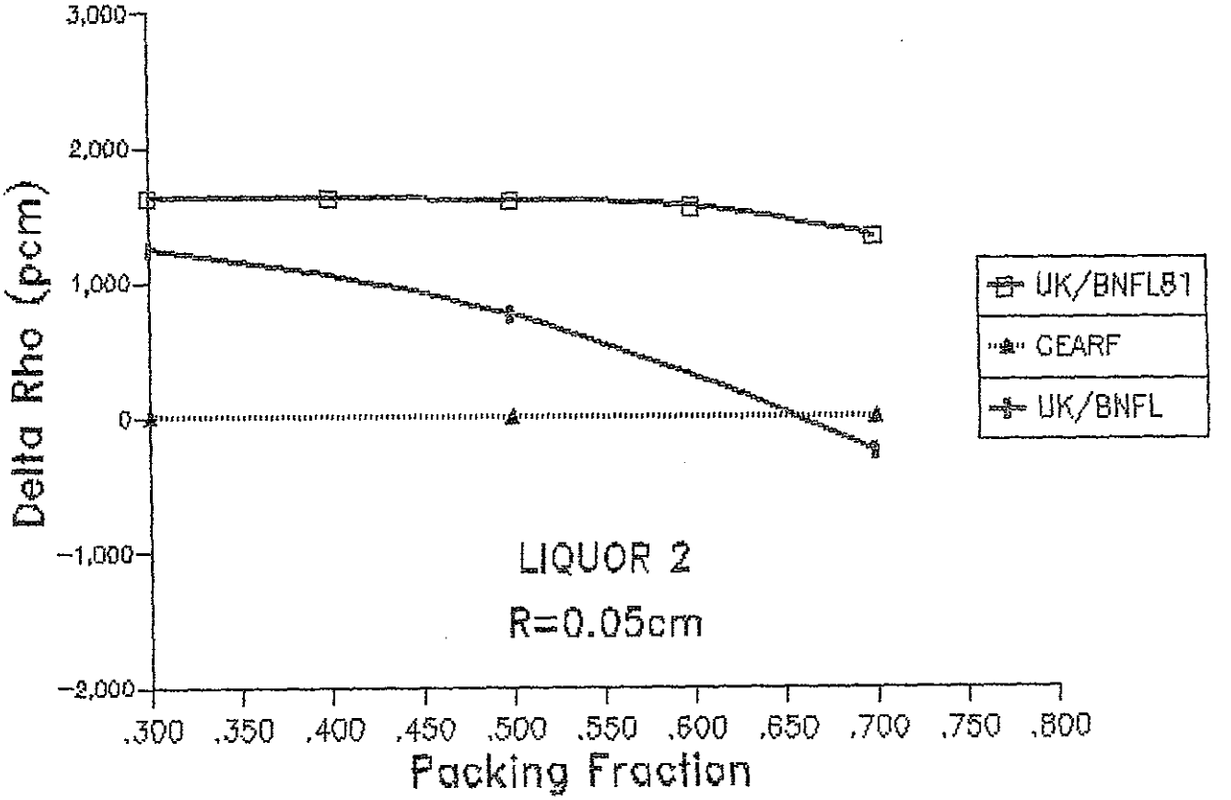


Figure 3 : A comparison of reactivity deviations from APOLLO/PIC reference calculations, of UK/BNFL k∞ results submitted to the June 1988 and May 1990 OECD/NEA Criticality Working Group meetings showing the effects of changing from data library WIMS 81 to WIMS 86;small pellets,large pellets in Liquor 1.

94210124



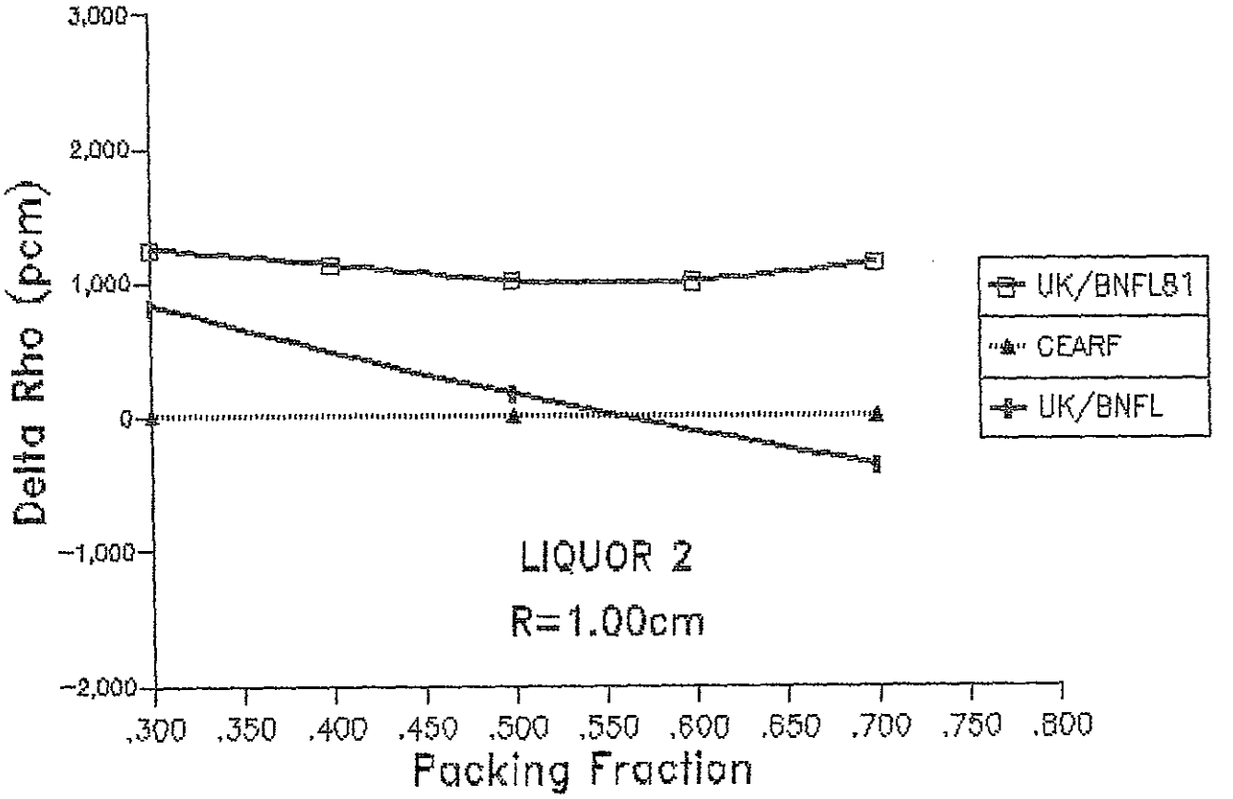
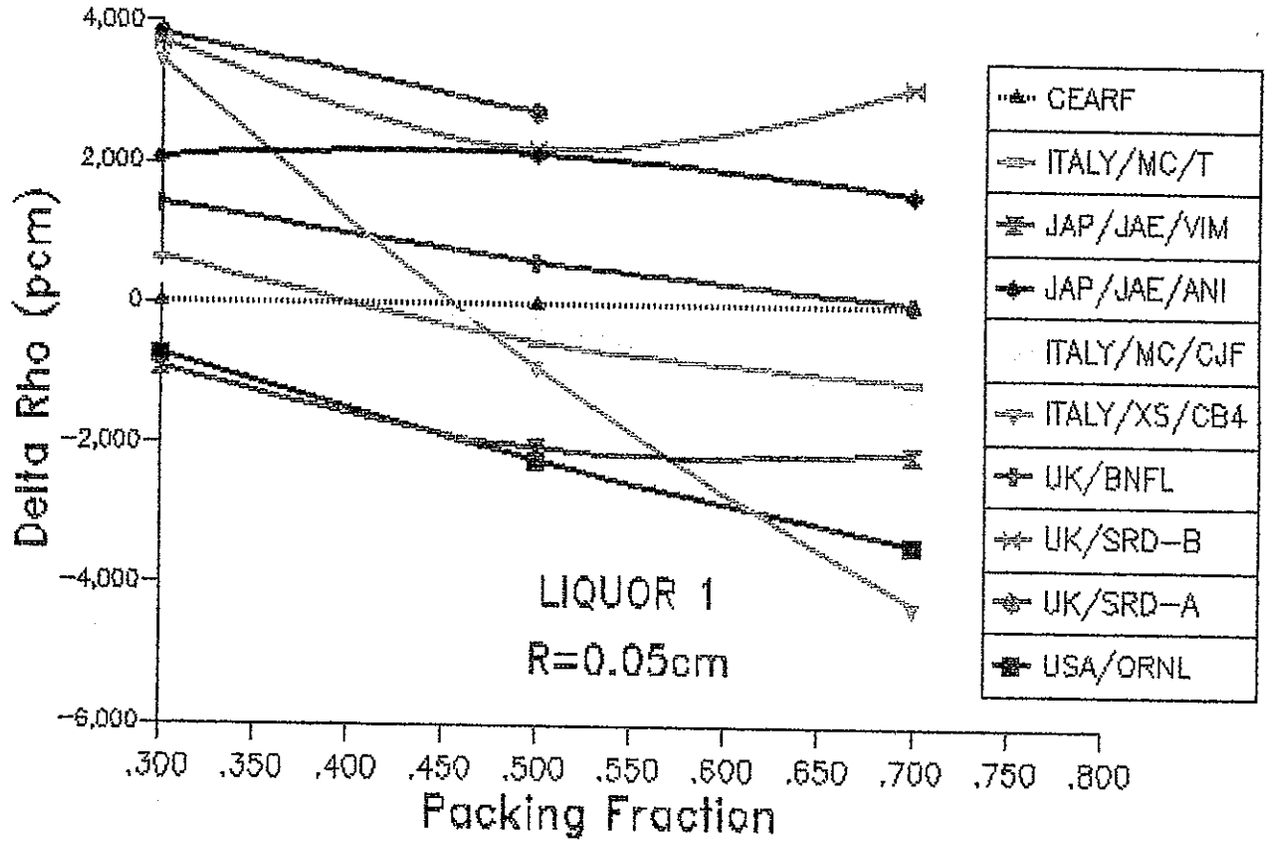


Figure 4 : A comparison of reactivity deviations from APOLLO/PIC reference calculations, of UK/BNFL k∞ results submitted to the June 1988 and May 1990 OECD/NEA Criticality Working Group meetings showing the effects of changing from data library WIMS 81 to WIMS 86;small pellets,large pellets in Liquor 2.

94210125



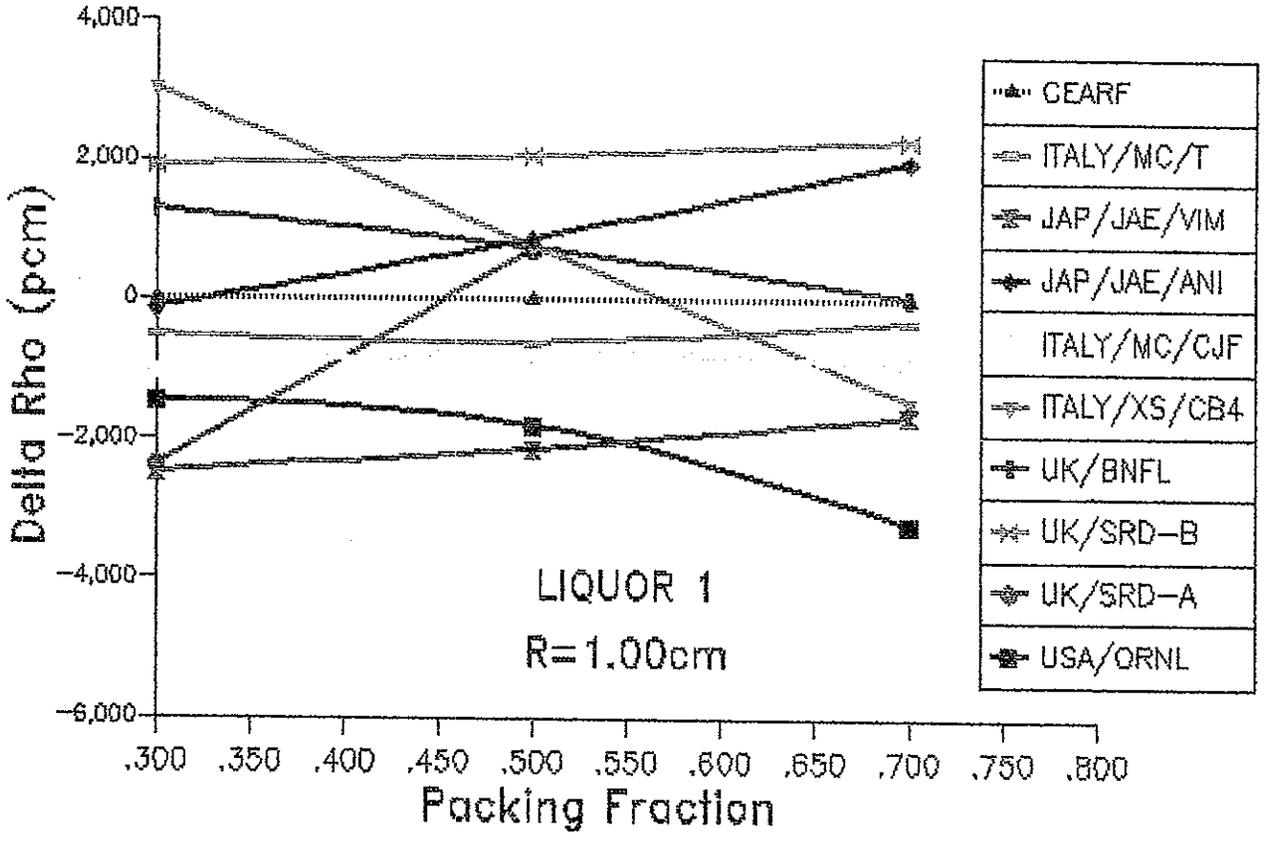


Figure 5 : A comparison of reactivity deviations from APOLLO/PIC reference calculations , of international k_∞ results submitted to the May 1990 OECD/NEA Criticality Working Group;small pellets,large pellets in Liquor 1.

94210126

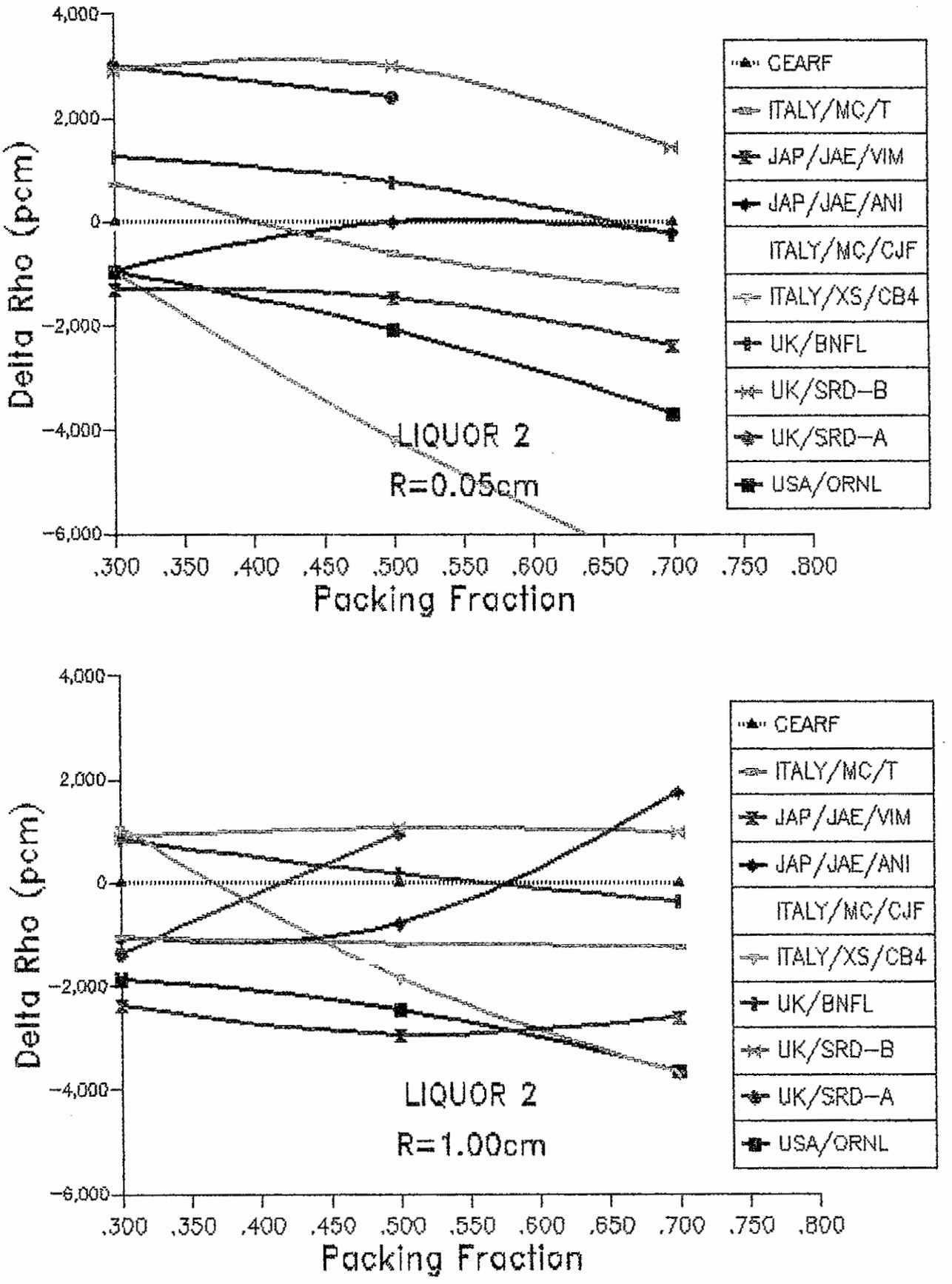
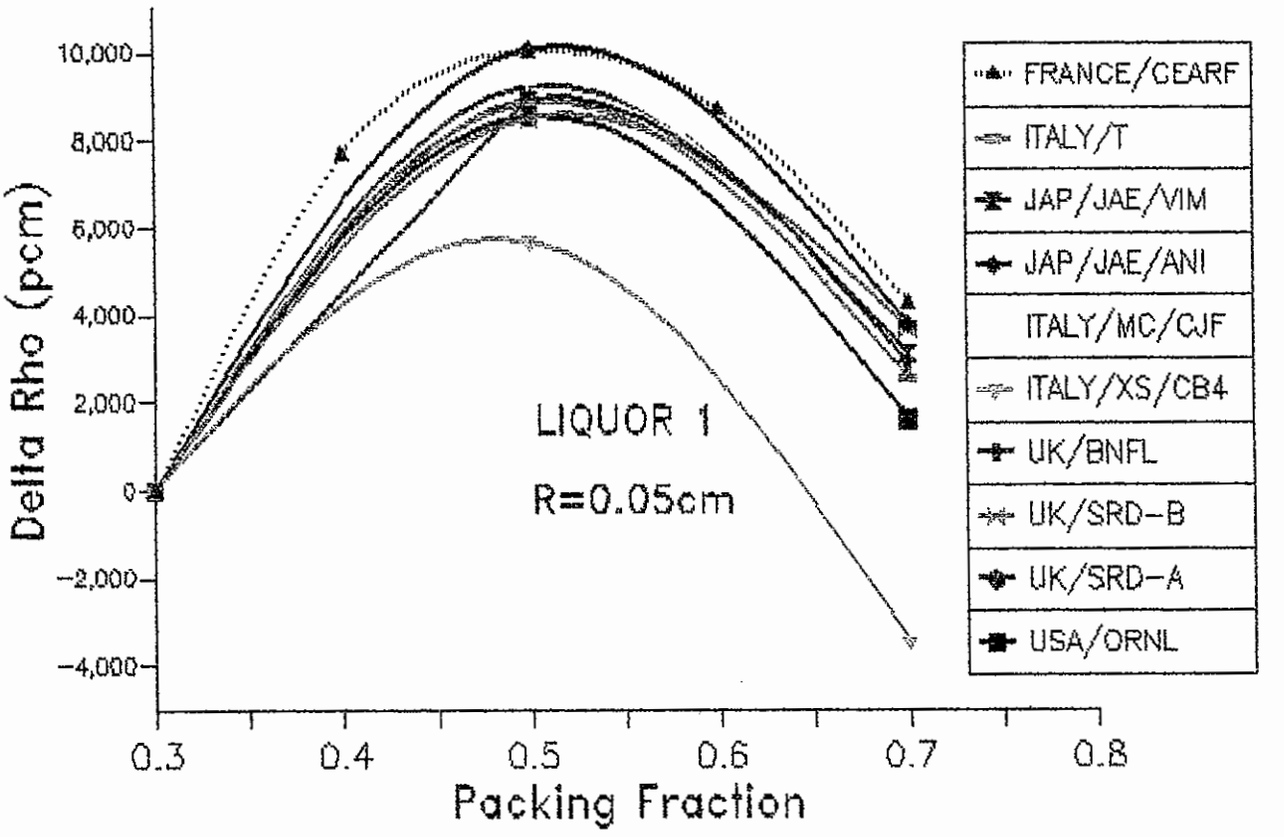


Figure 6 : A comparison of reactivity deviations from APOLLO/PIC reference calculations , of international k_∞ results submitted to the May 1990 OECD/NEA Criticality Working Group;small pellets,large pellets in Liquor 2.

94210127



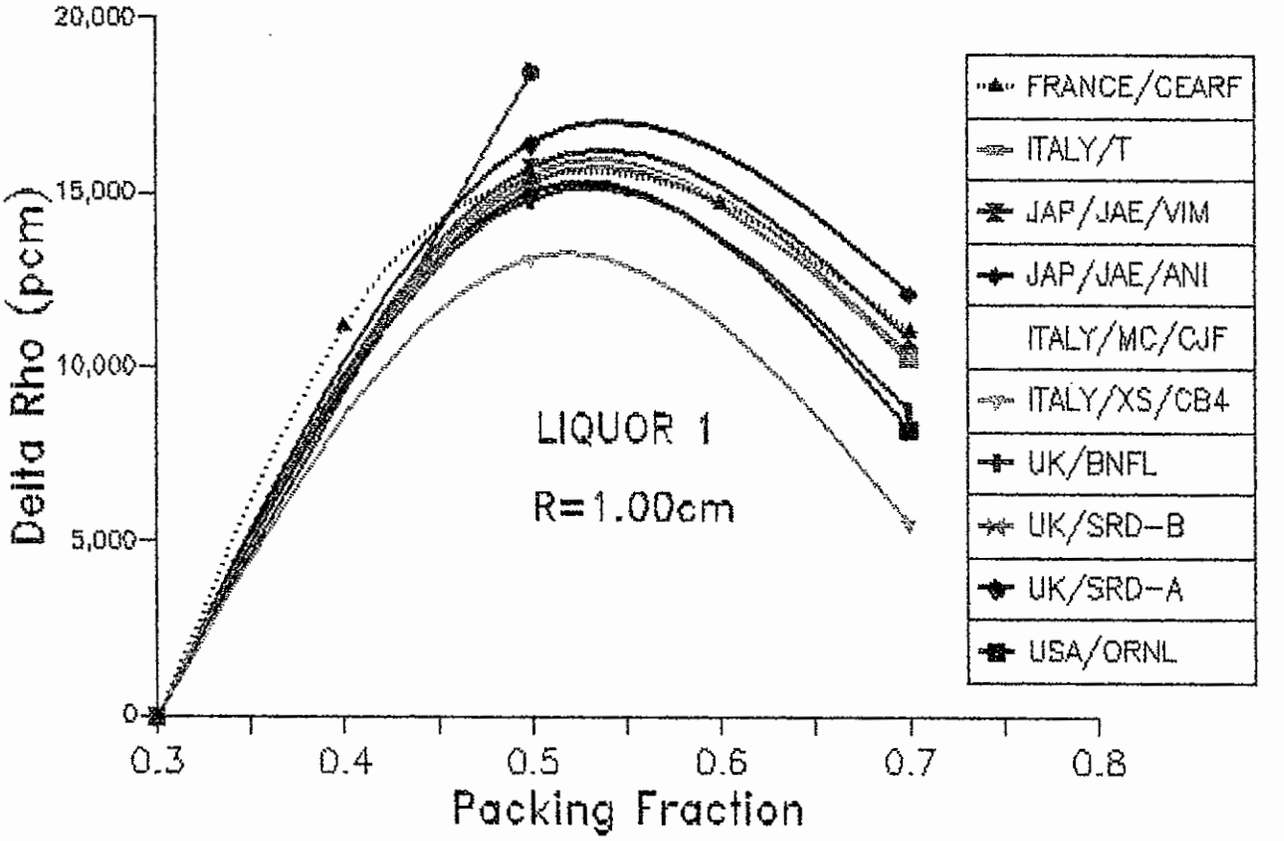
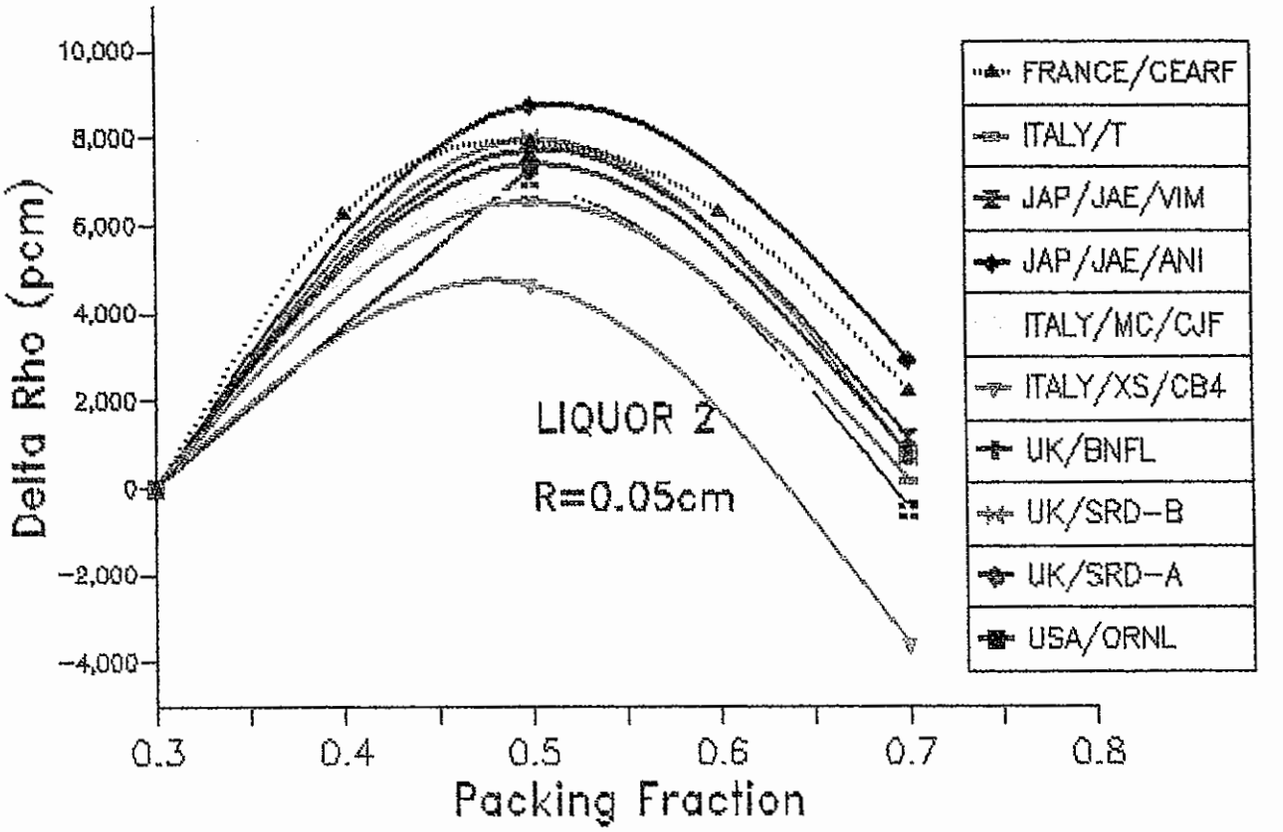


Figure 7 : VARIATION WITH MODERATION LEVEL. A comparison of the calculated reactivity changes from the value at PF=0.3, as a function of Packing Fraction for the international calculations; small pellets, large pellets, in Liquor 1.

9421011



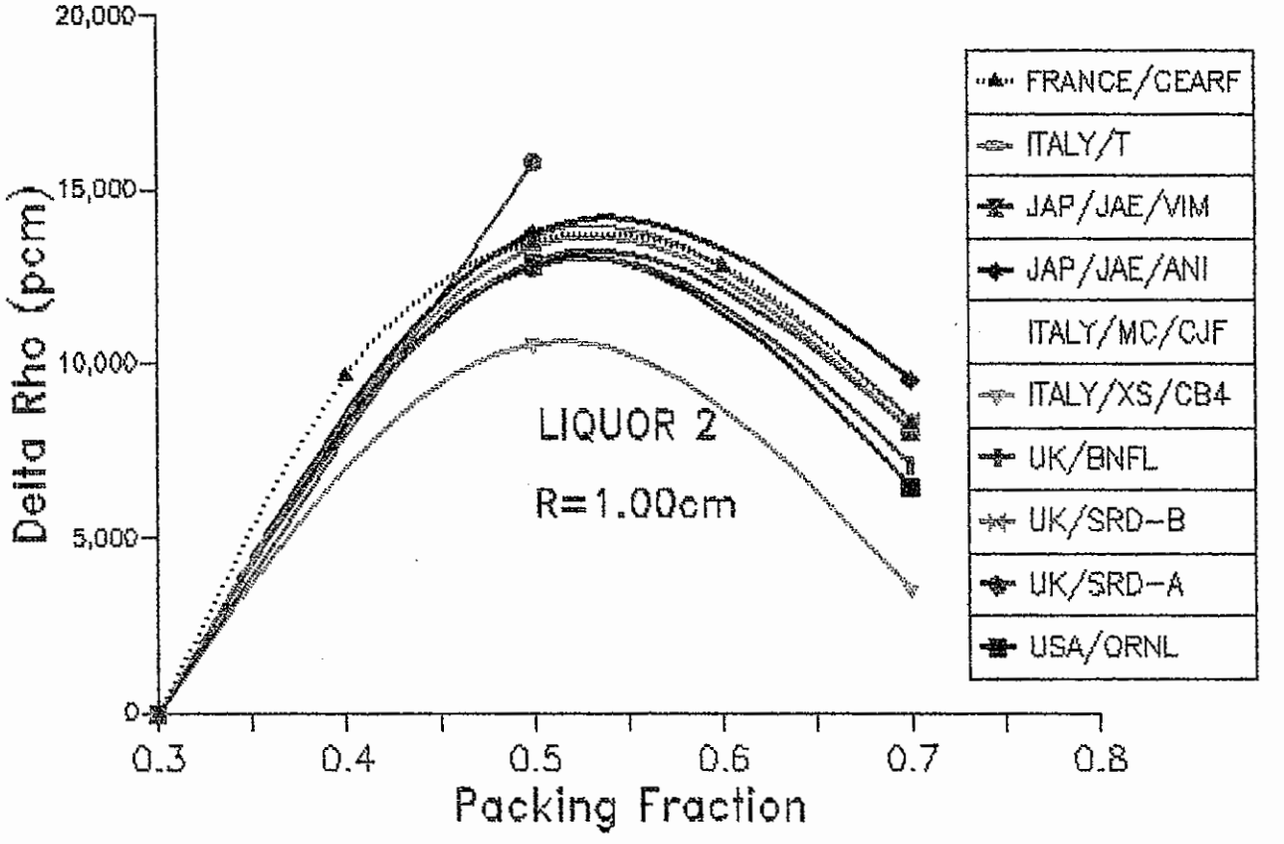


Figure 8 : VARIATION WITH MODERATION LEVEL. A comparison of the calculated reactivity changes from the value at PF=0.3, as a function of Packing Fraction for the international calculations; small pellets, large pellets, in Liquor 2.

9421U129

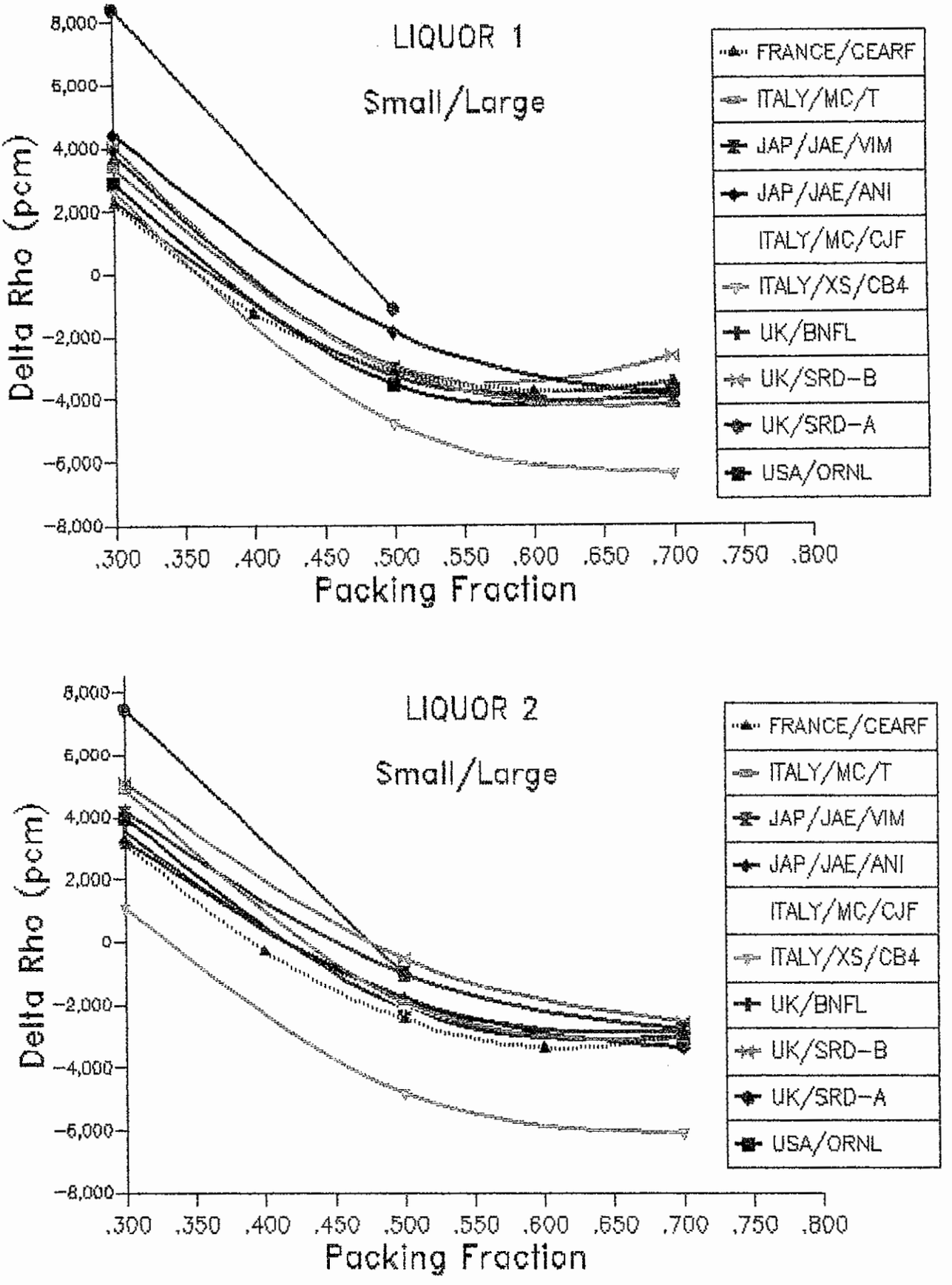
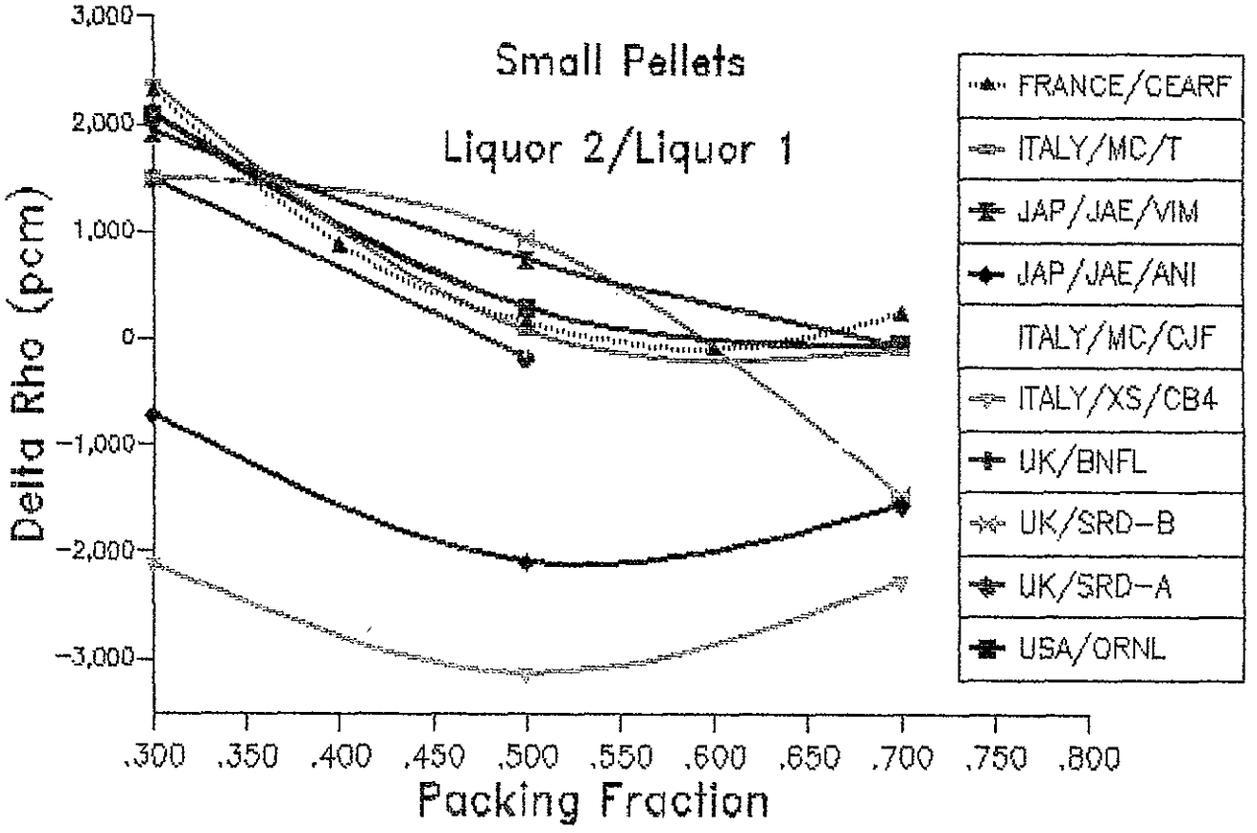


Figure 9 : THE EFFECT OF GEOMETRY. A comparison of reactivity changes in international criticality calculations which result from changing small pellets to large pellets ; in Liquor 1 and Liquor 2.

94210130



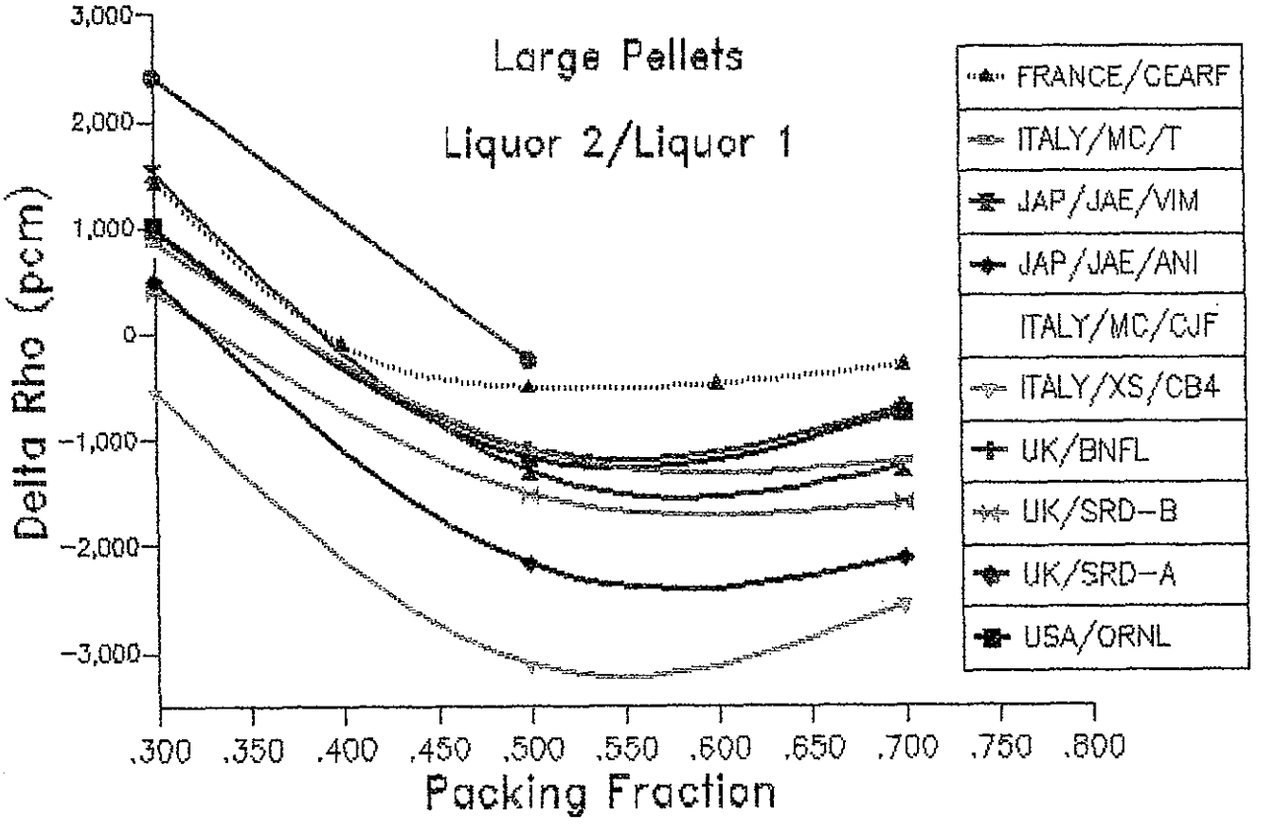
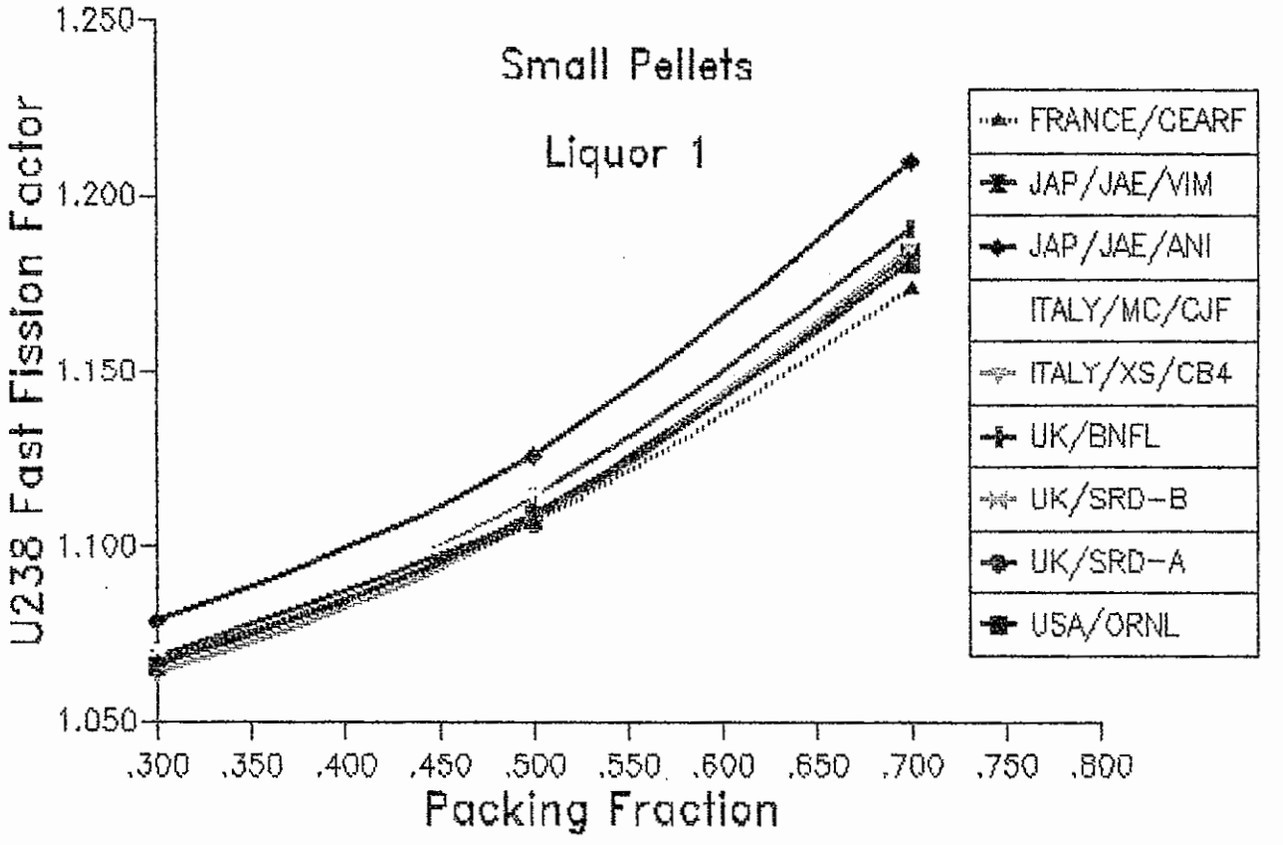


Figure 10 : THE EFFECT OF THE DOUBLE HETEROGENEITY . A comparison of reactivity changes in international criticality calculations linked to the introduction of 300 g/l of uranium in the nitric acid solution; small pellets and large pellets.

94210131



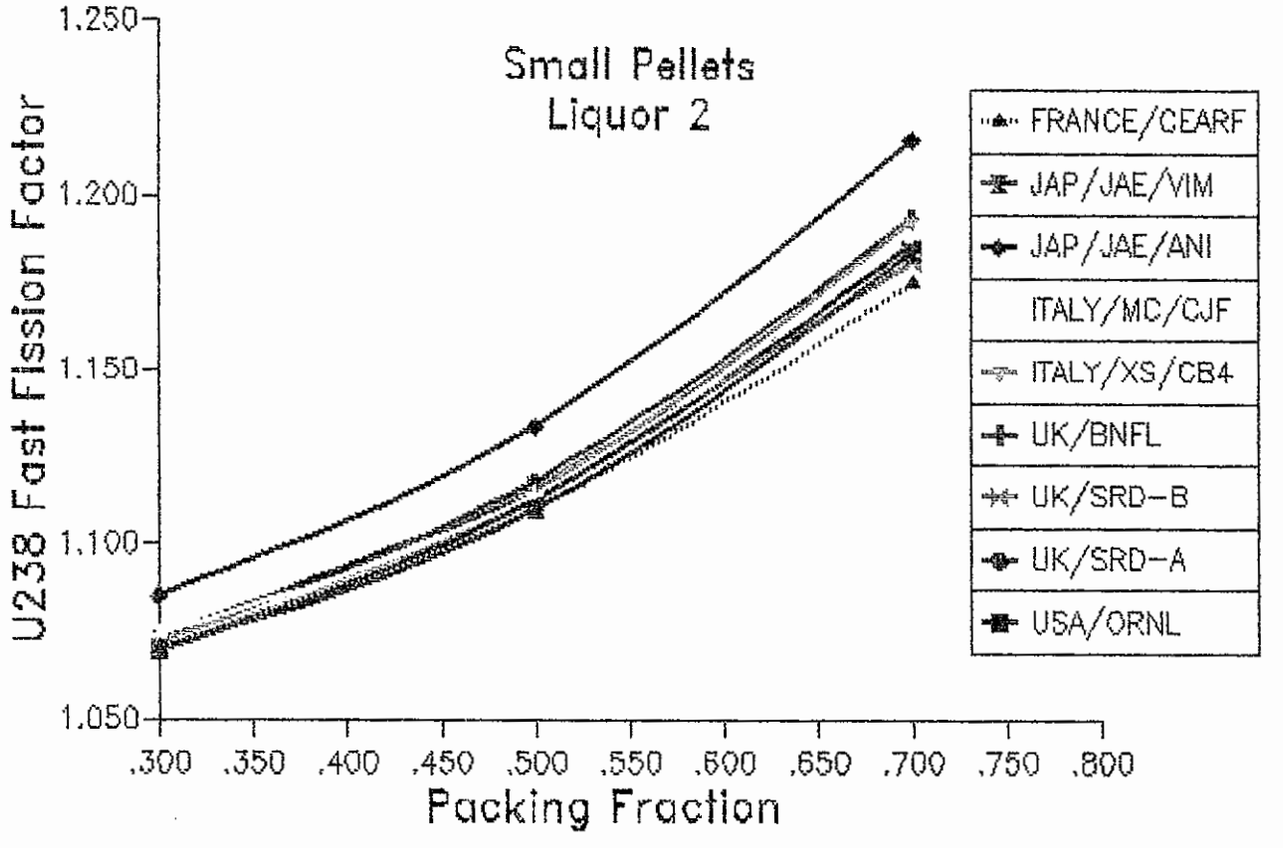
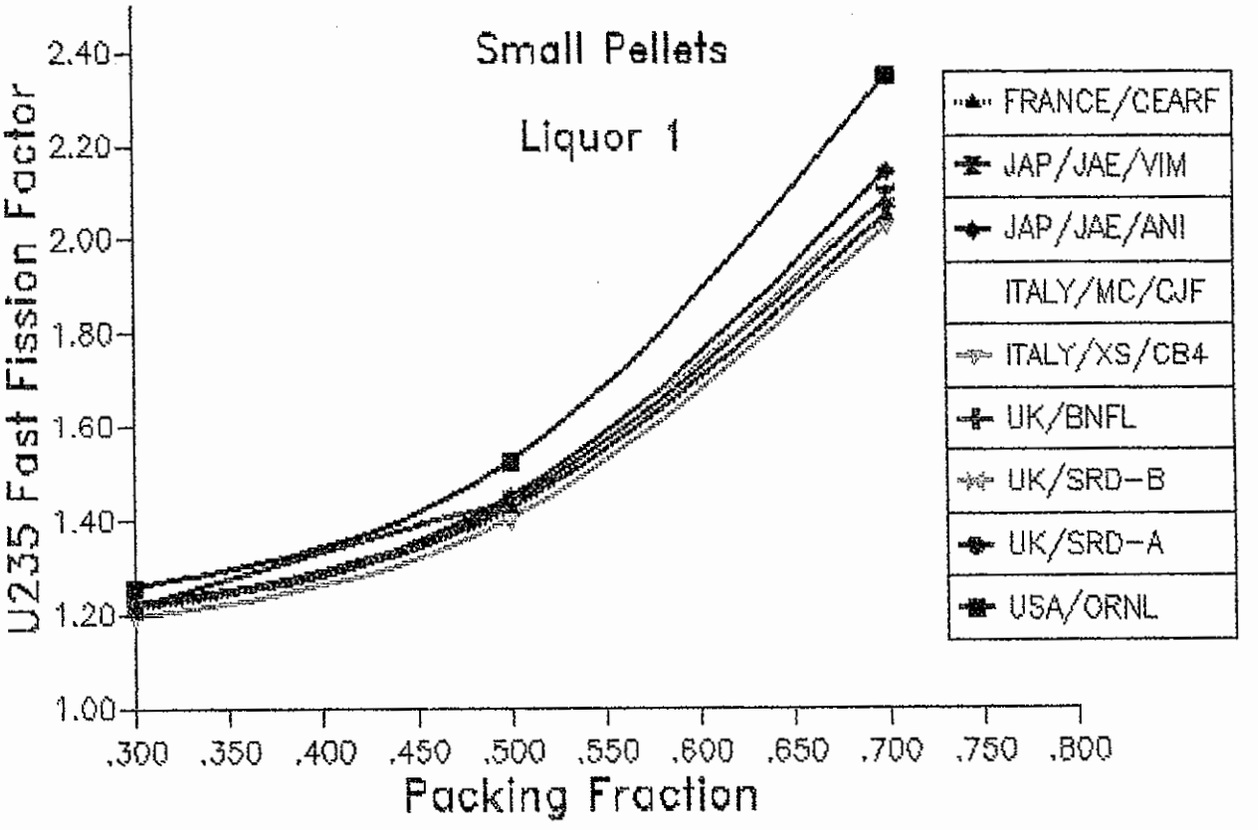


Figure 11: A comparison of the ^{238}U Fast Fission Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

94210132



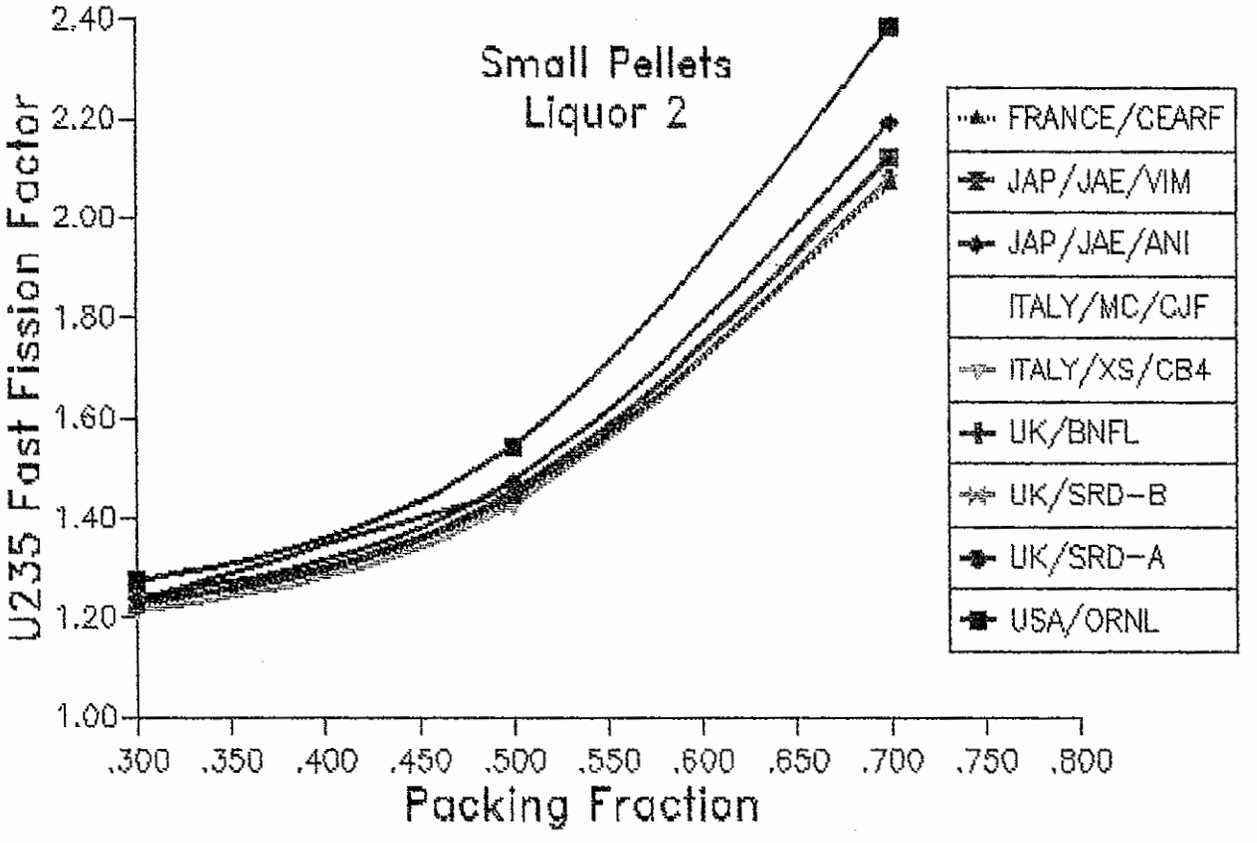
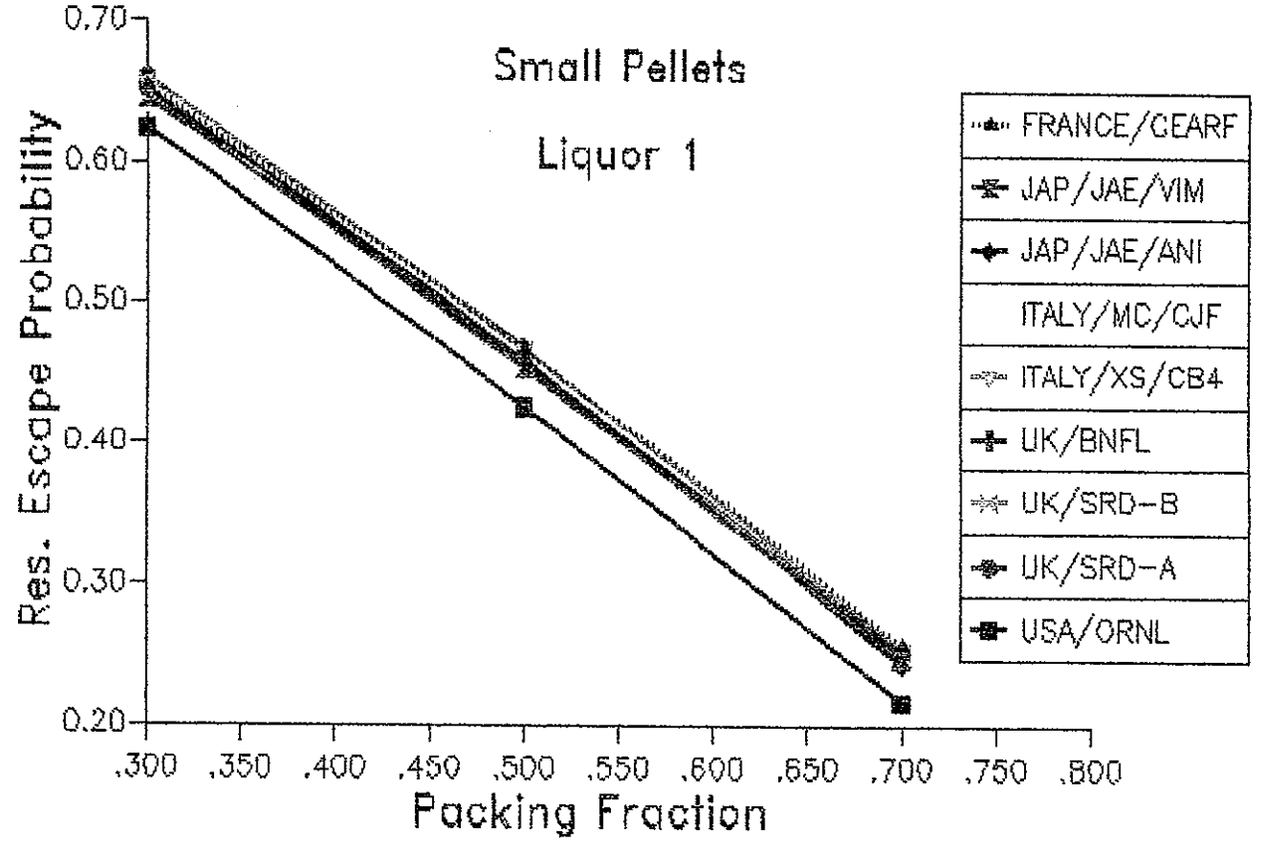


Figure 12: A comparison of the ^{235}U Fast Fission Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421013



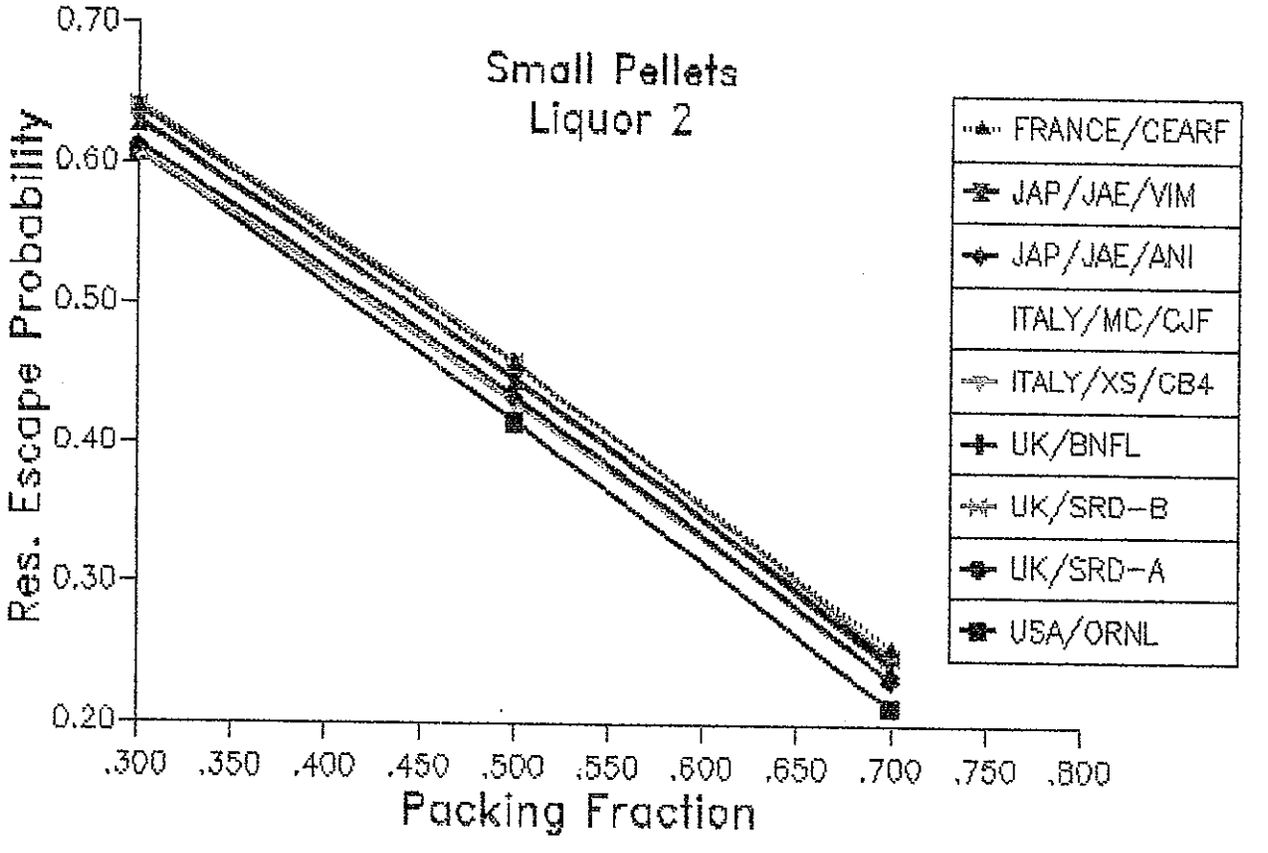
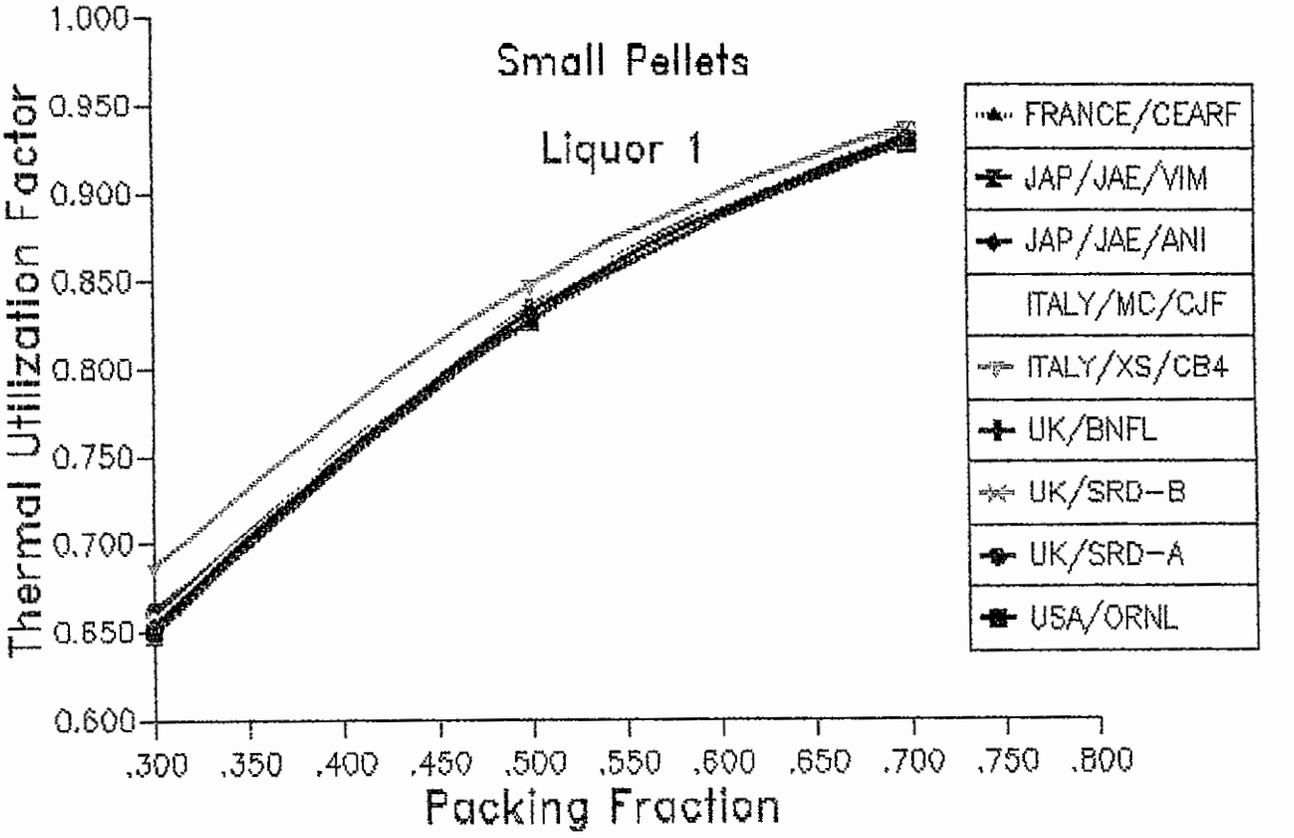


Figure 13: A comparison of the Resonance Escape Probability as a function of packing fraction as calculated by the participants in the May 1990 exercise . Small pellets in Liquor 1 and Liquor 2.

9421134



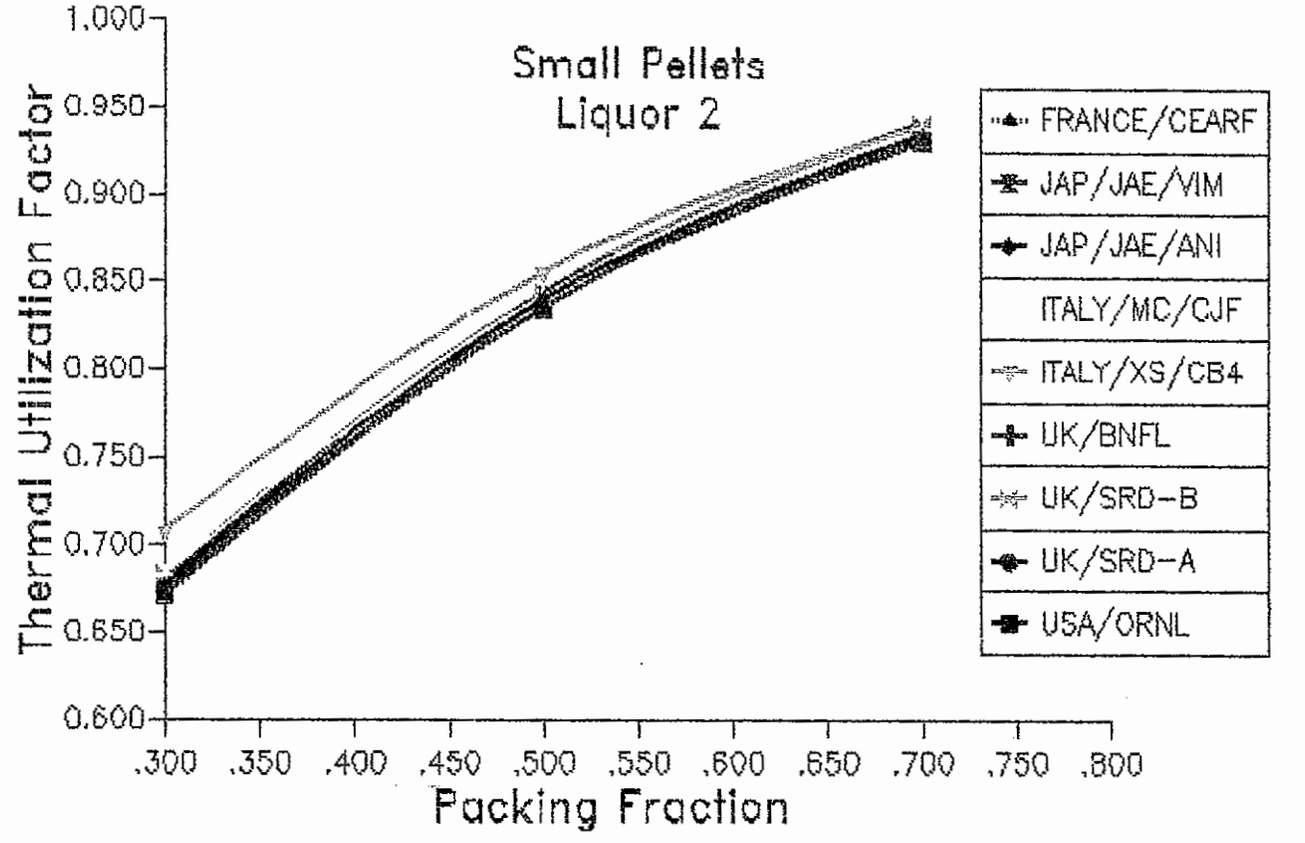
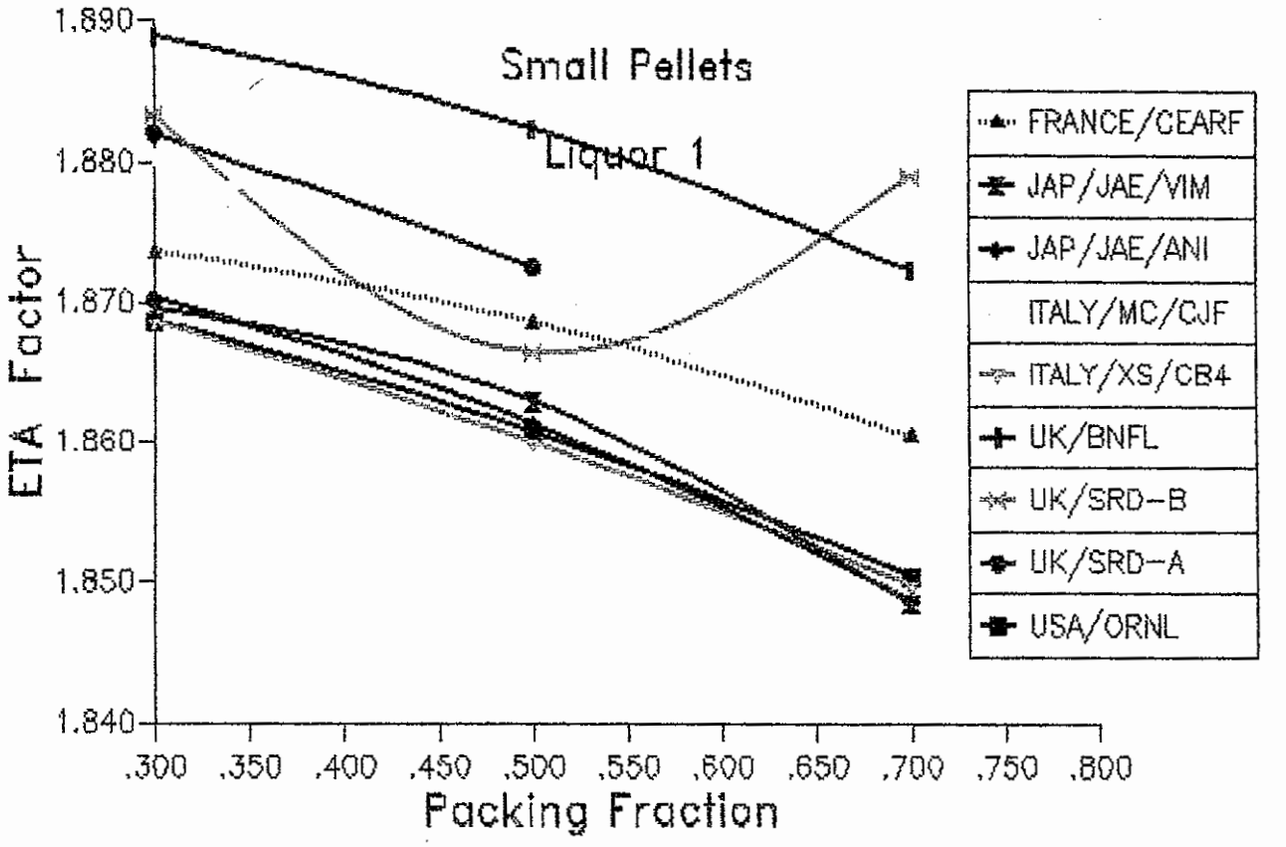


Figure 14: A comparison of the Thermal Utilization Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421 0135



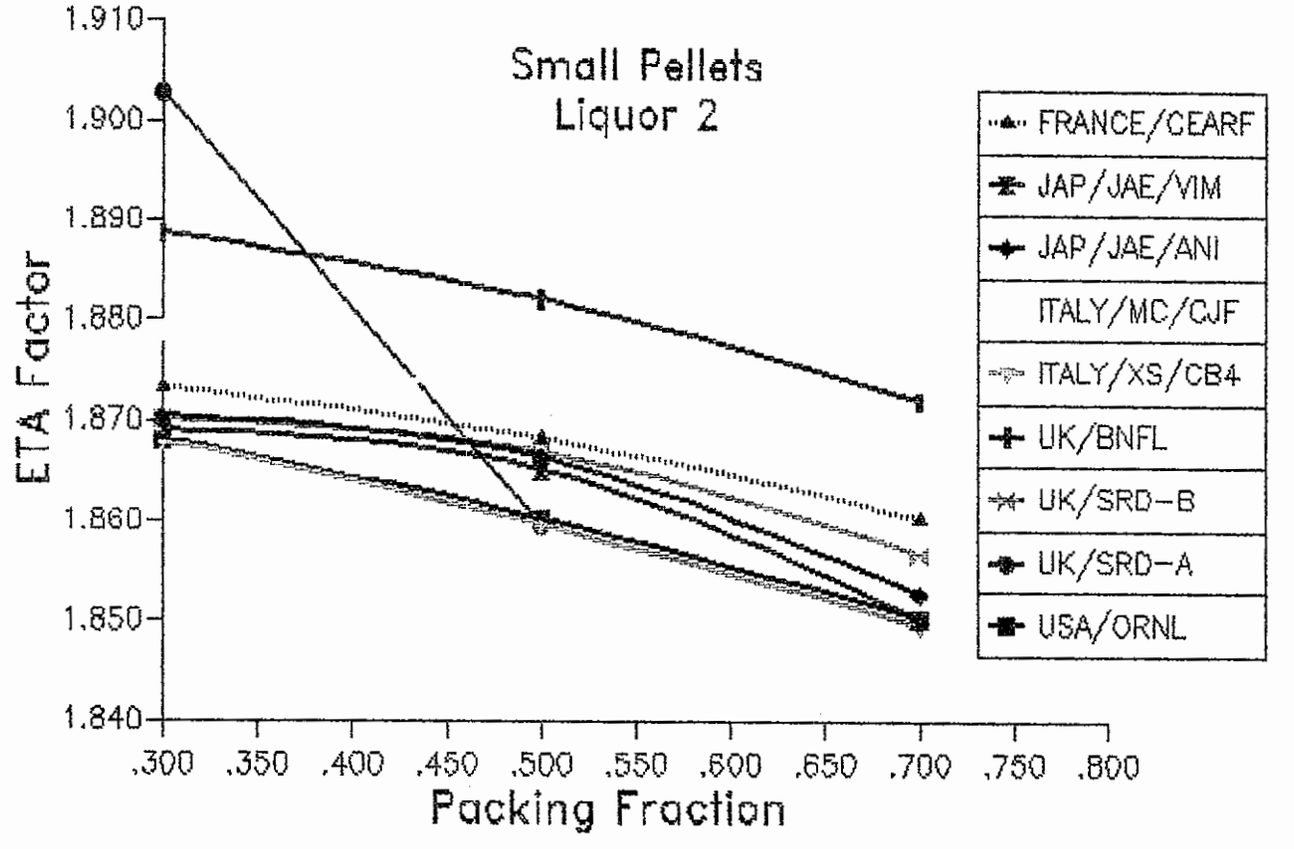
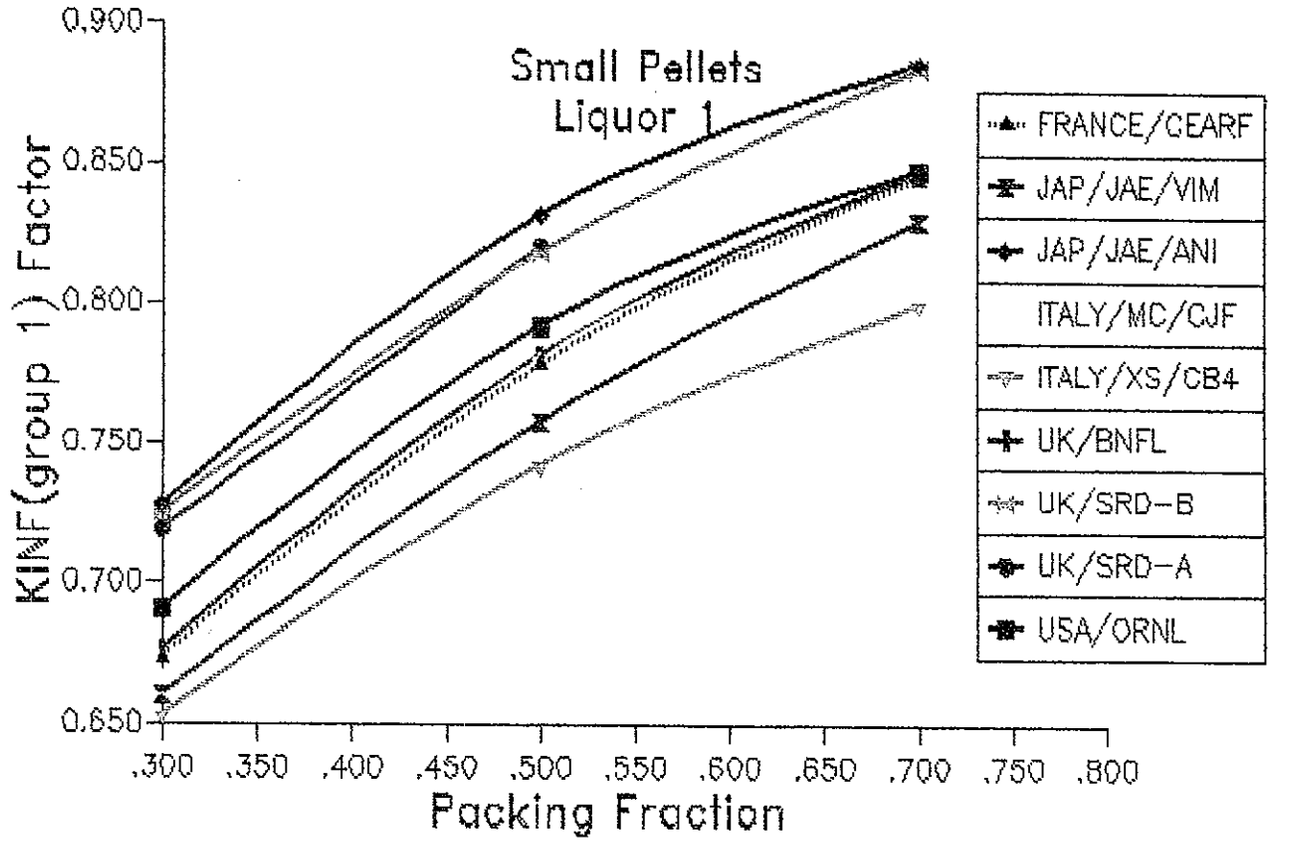


Figure 15: A comparison of the ETA-Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421136



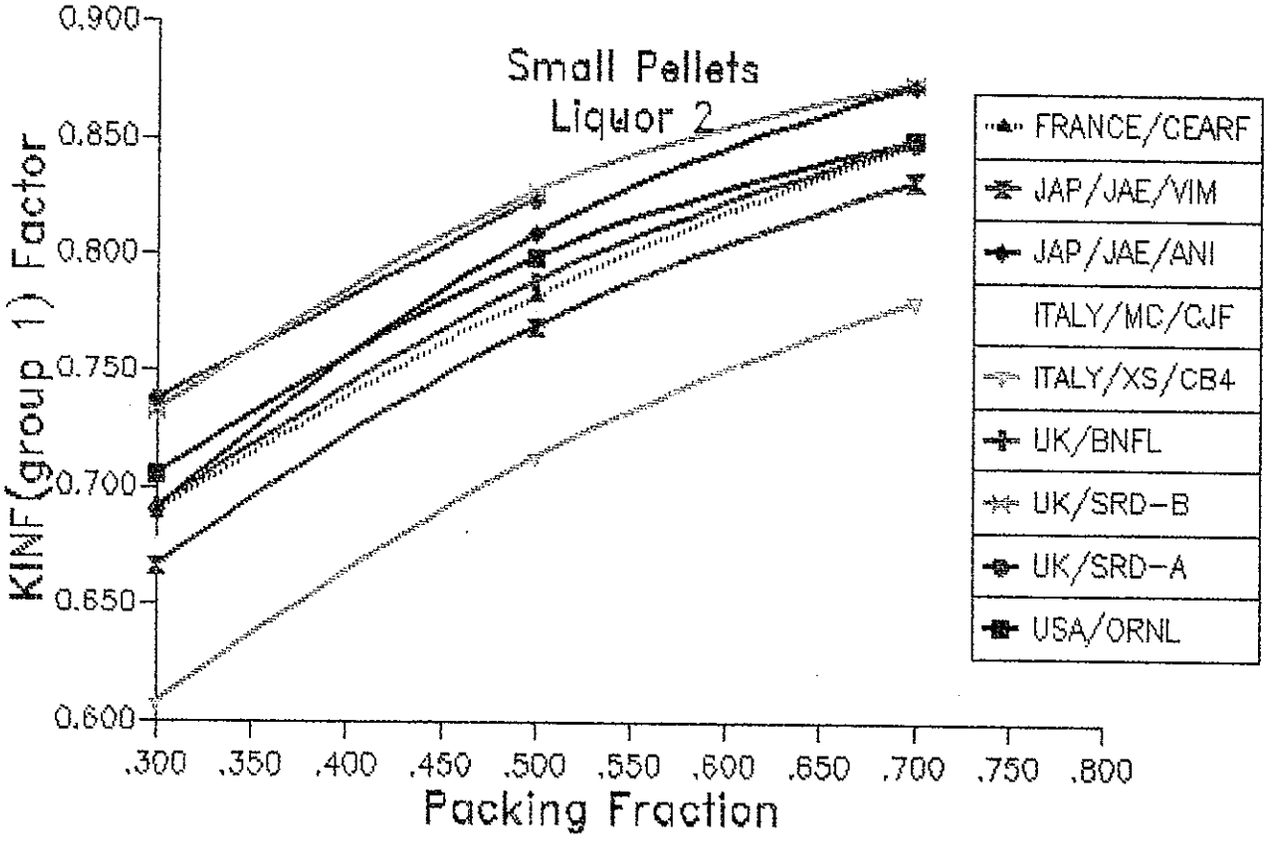
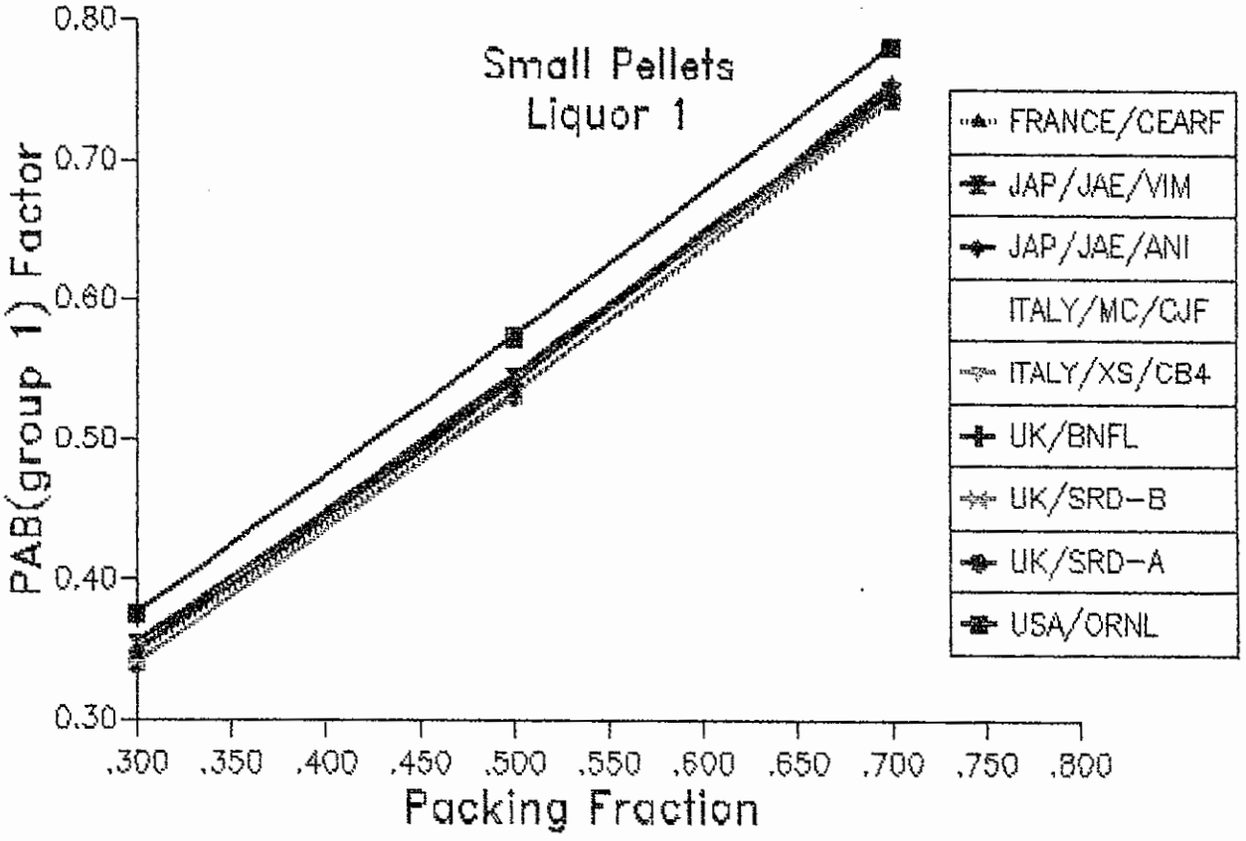


Figure 16: A comparison of the KINF(1) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421137



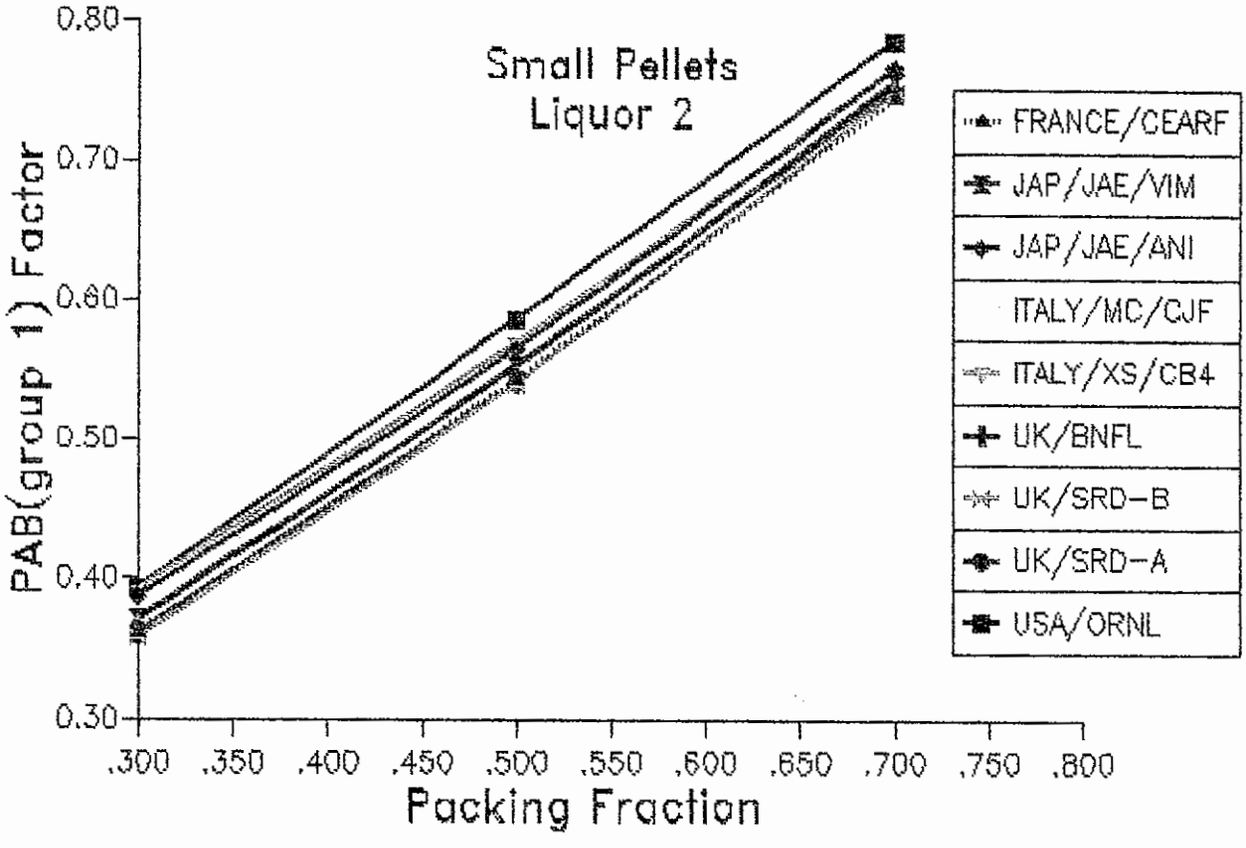
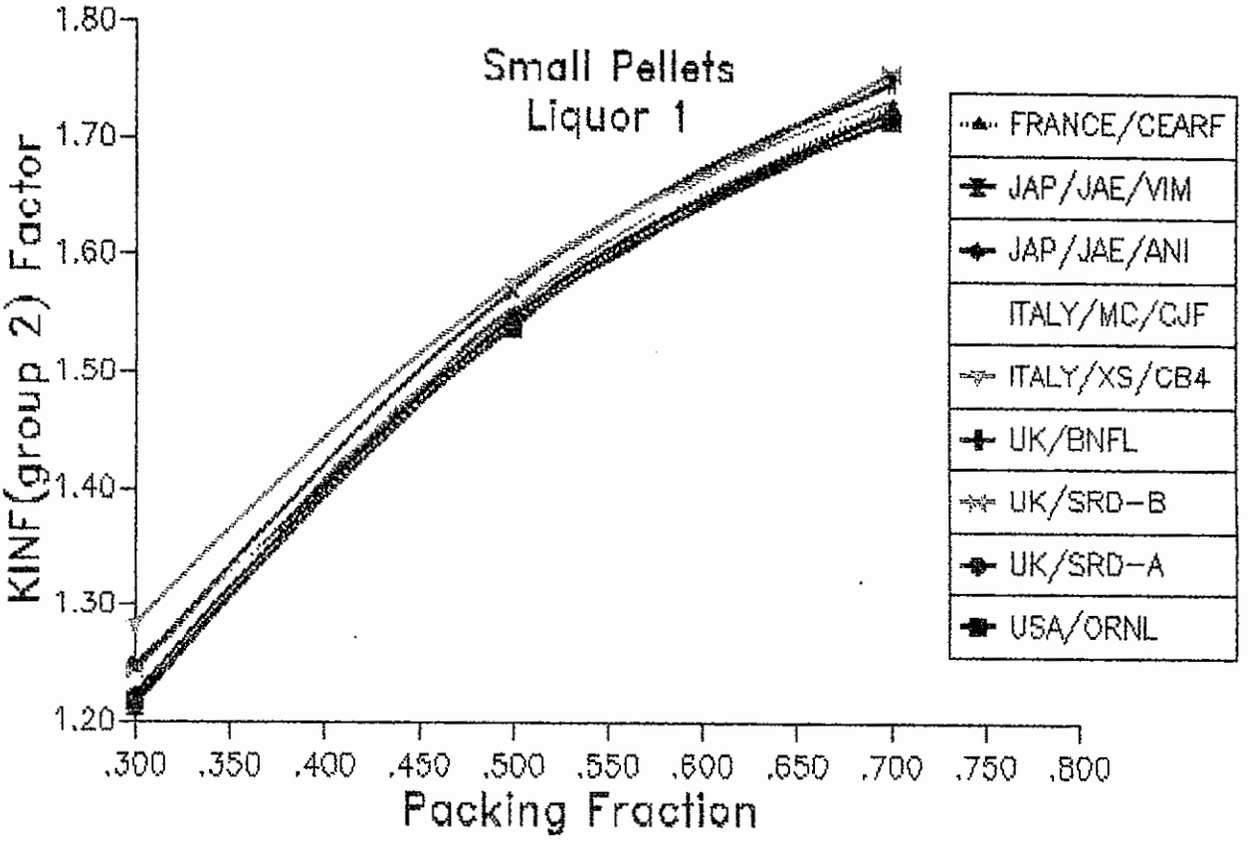


Figure 17: A comparison of the PAB(1) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421013B



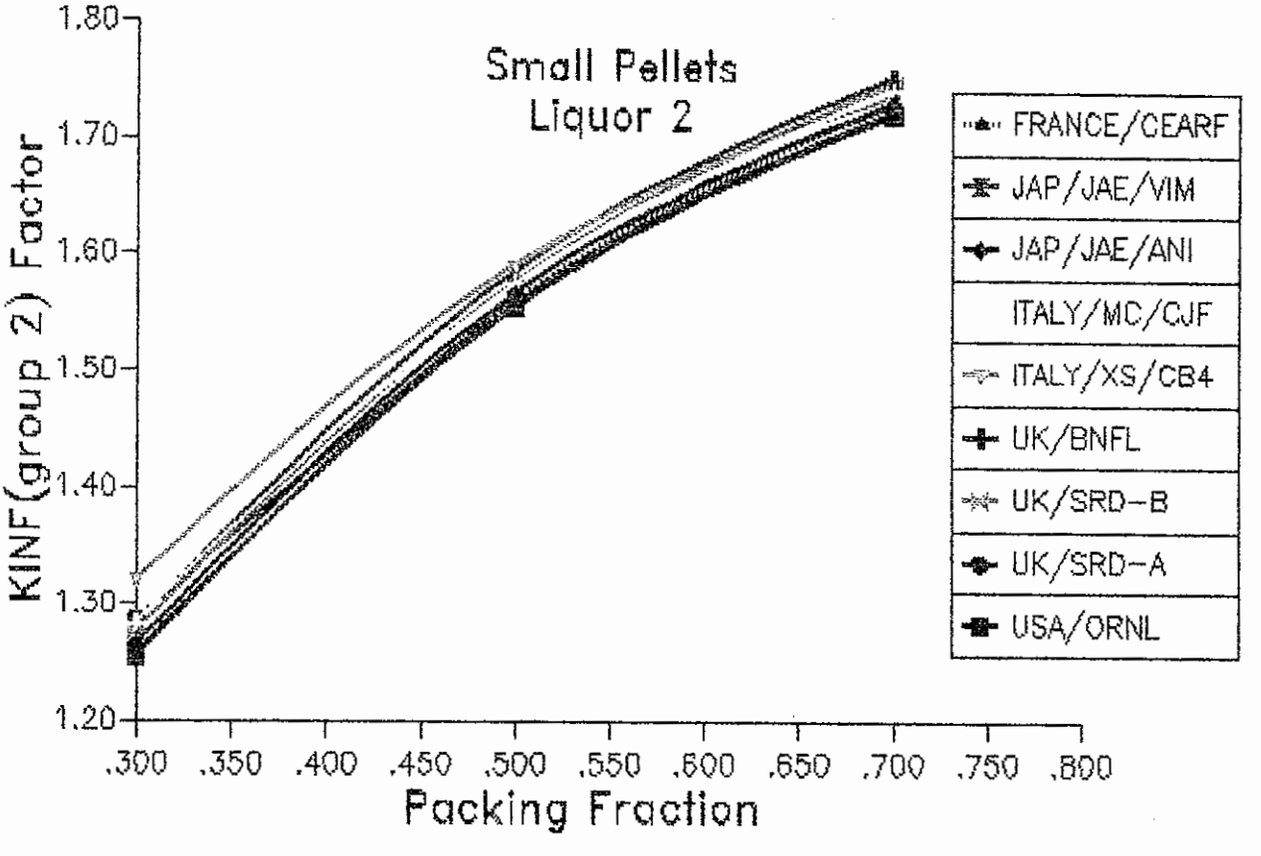
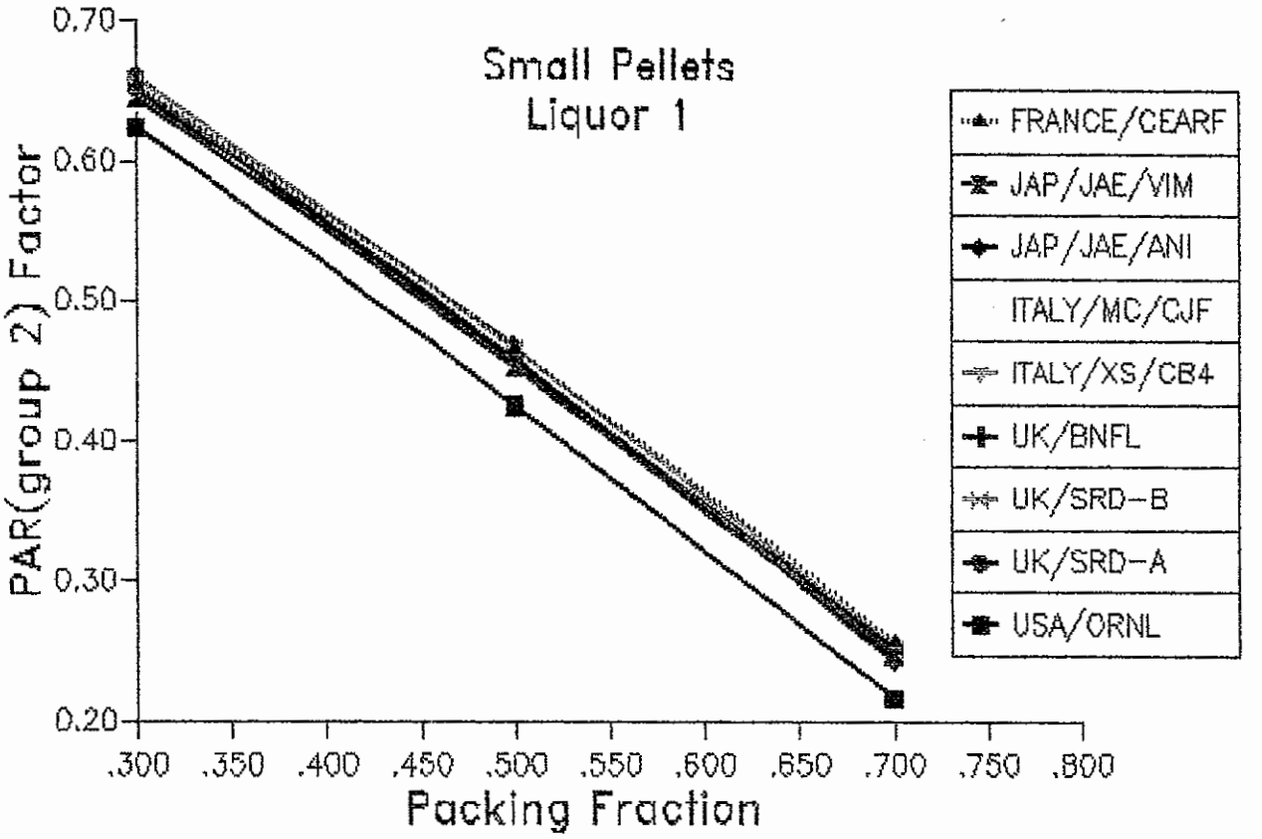


Figure 18: A comparison of the KINF(2) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421039



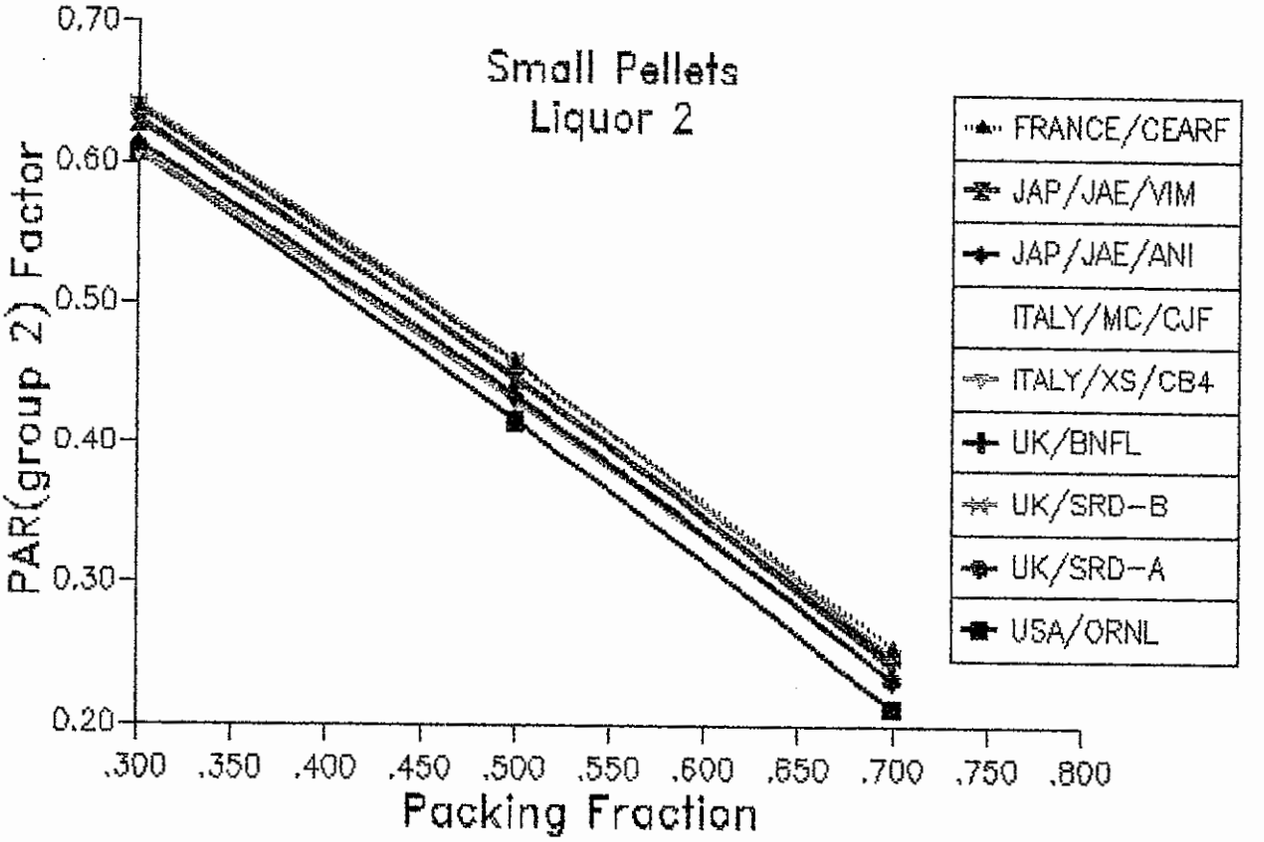


Figure 19: A comparison of the PAR(2) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421040

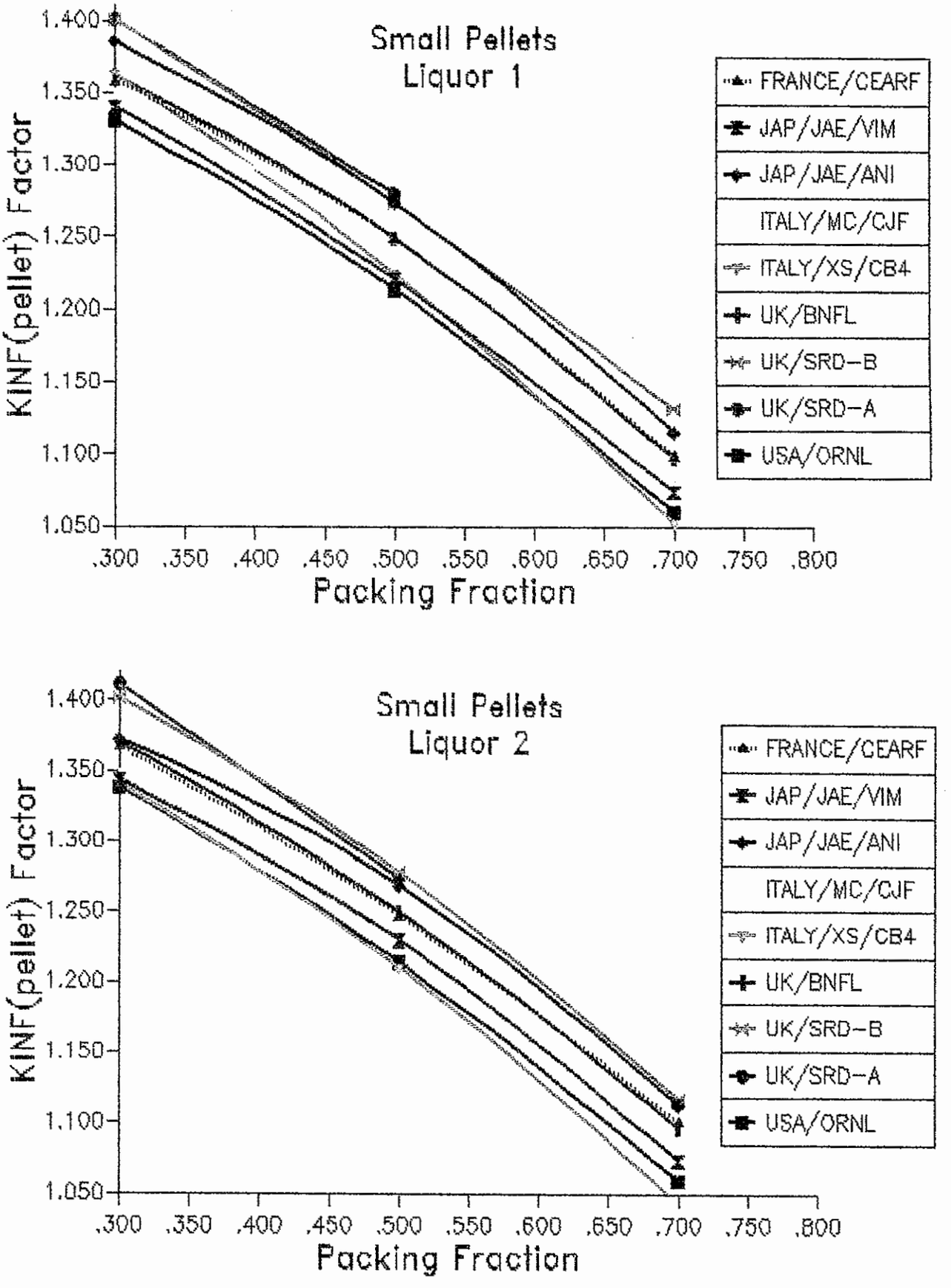
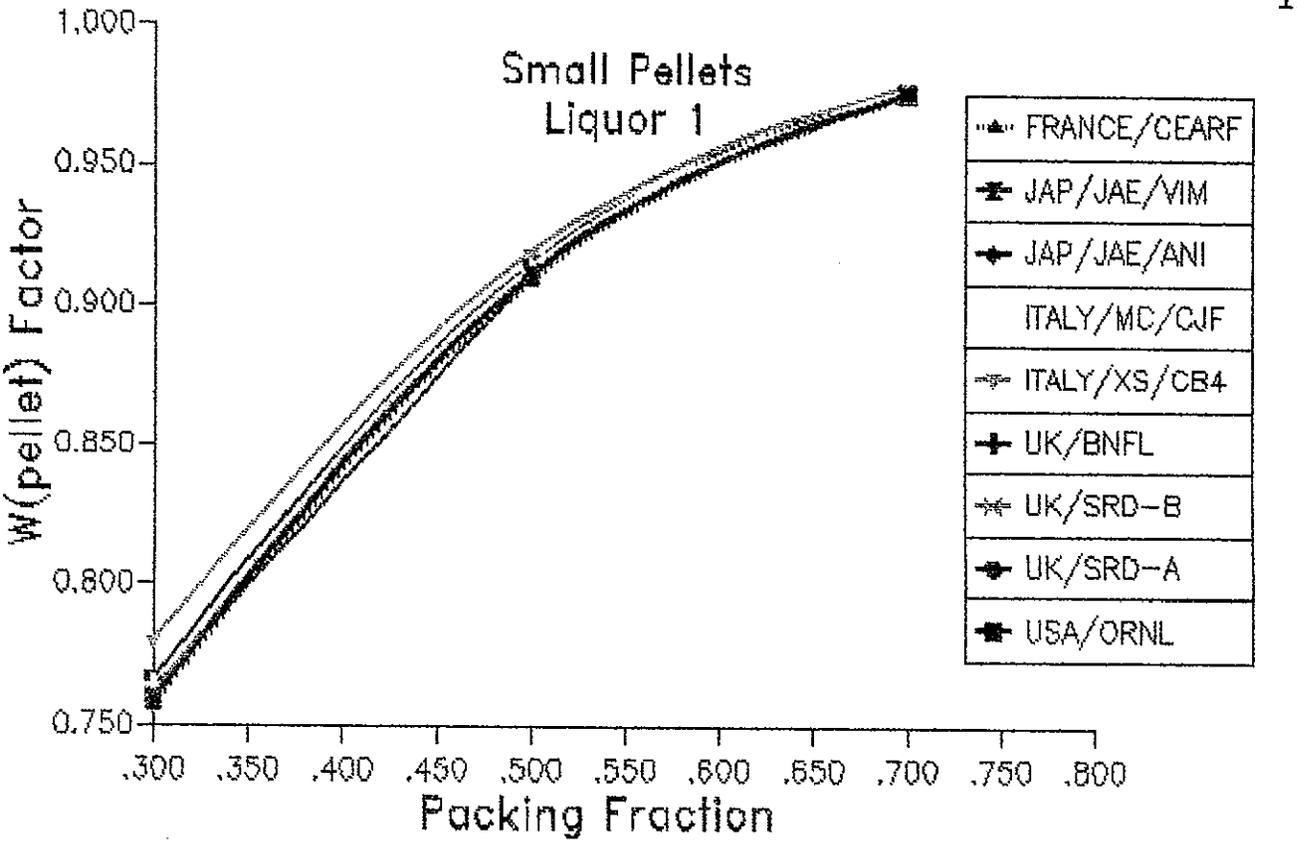


Figure 20: A comparison of the KINF(pellet) - Spatial Model as a function of packing fraction as calculated by the participants in the May 1990 exercise . Small pellets in Liquor 1 and Liquor 2.

9421141



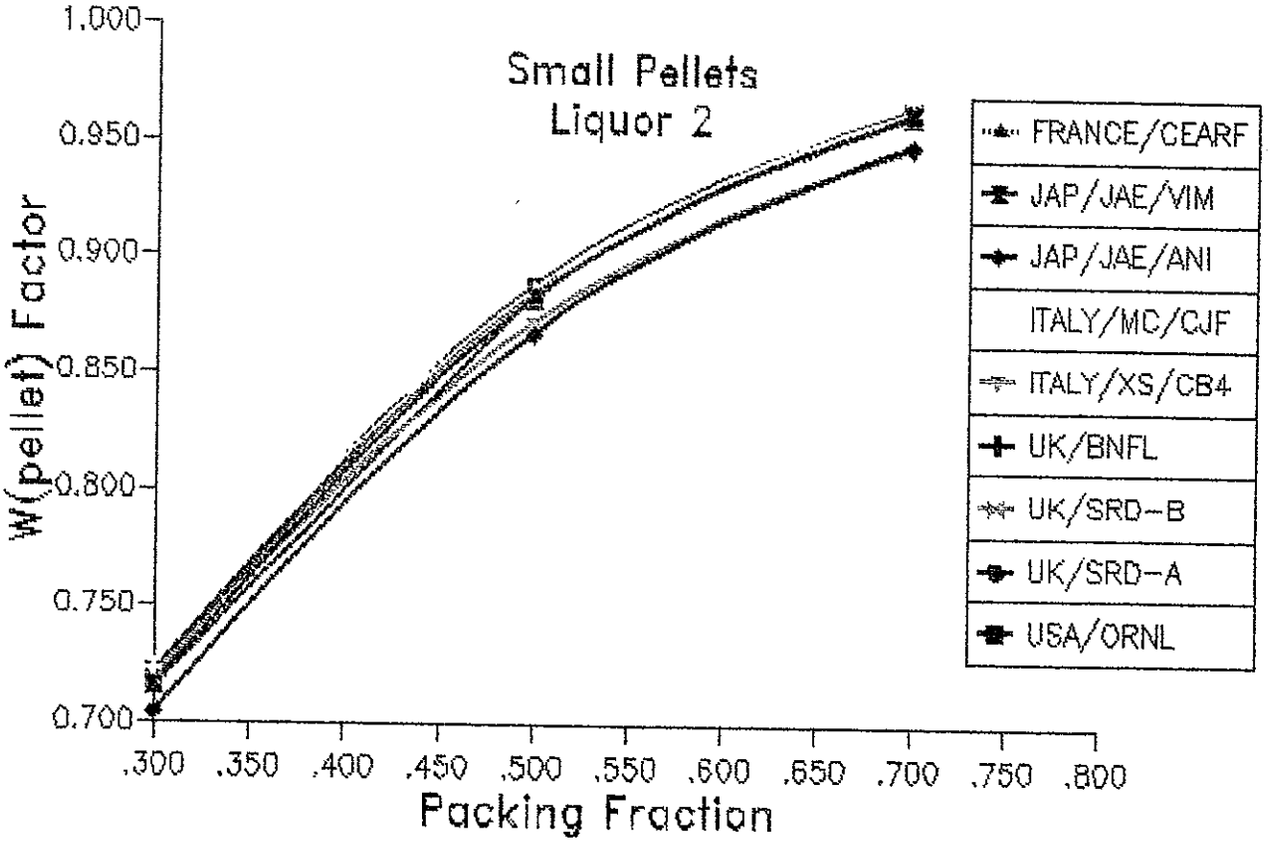
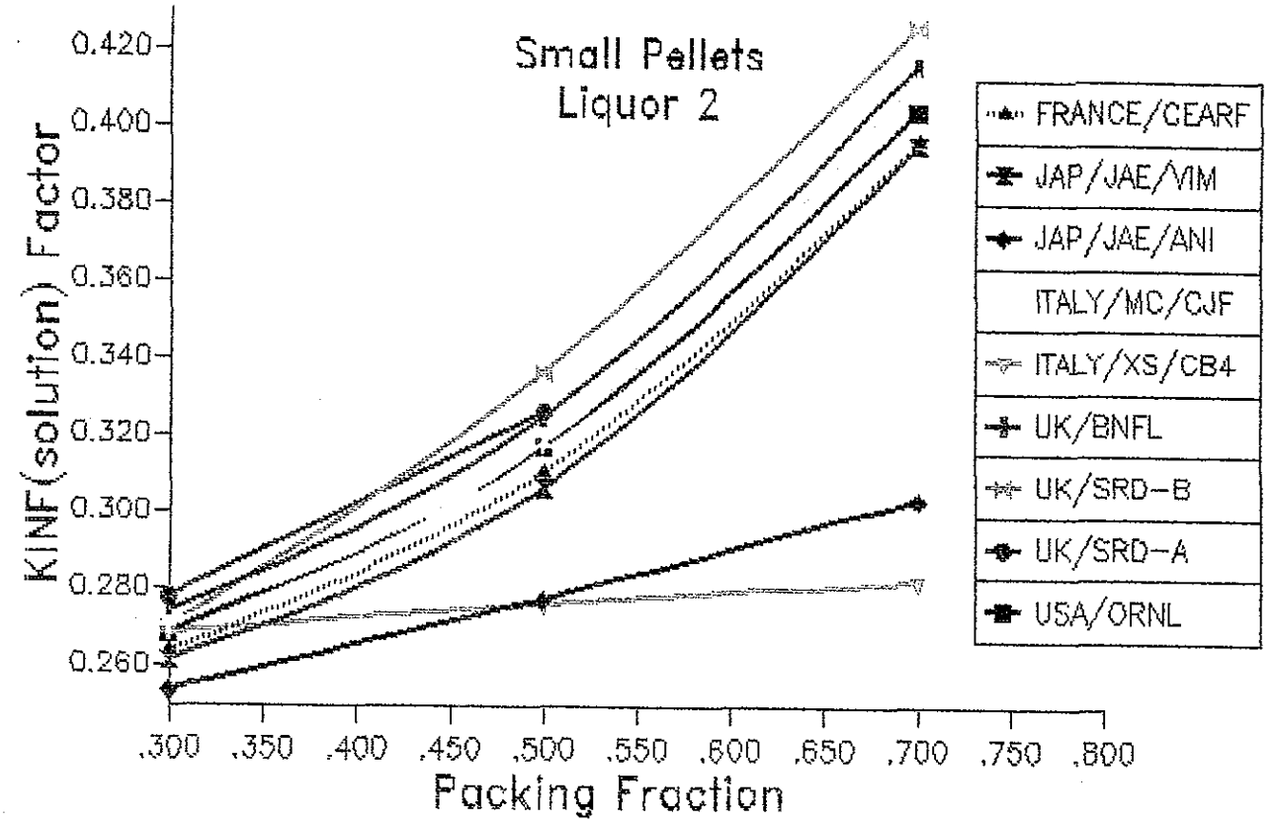


Figure 21: A comparison of the W(pellet) - Spatial Model as a function of packing fraction as calculated by the participants in the May 1990 exercise . Small pellets in Liquor 1 and Liquor 2.

9-4210142



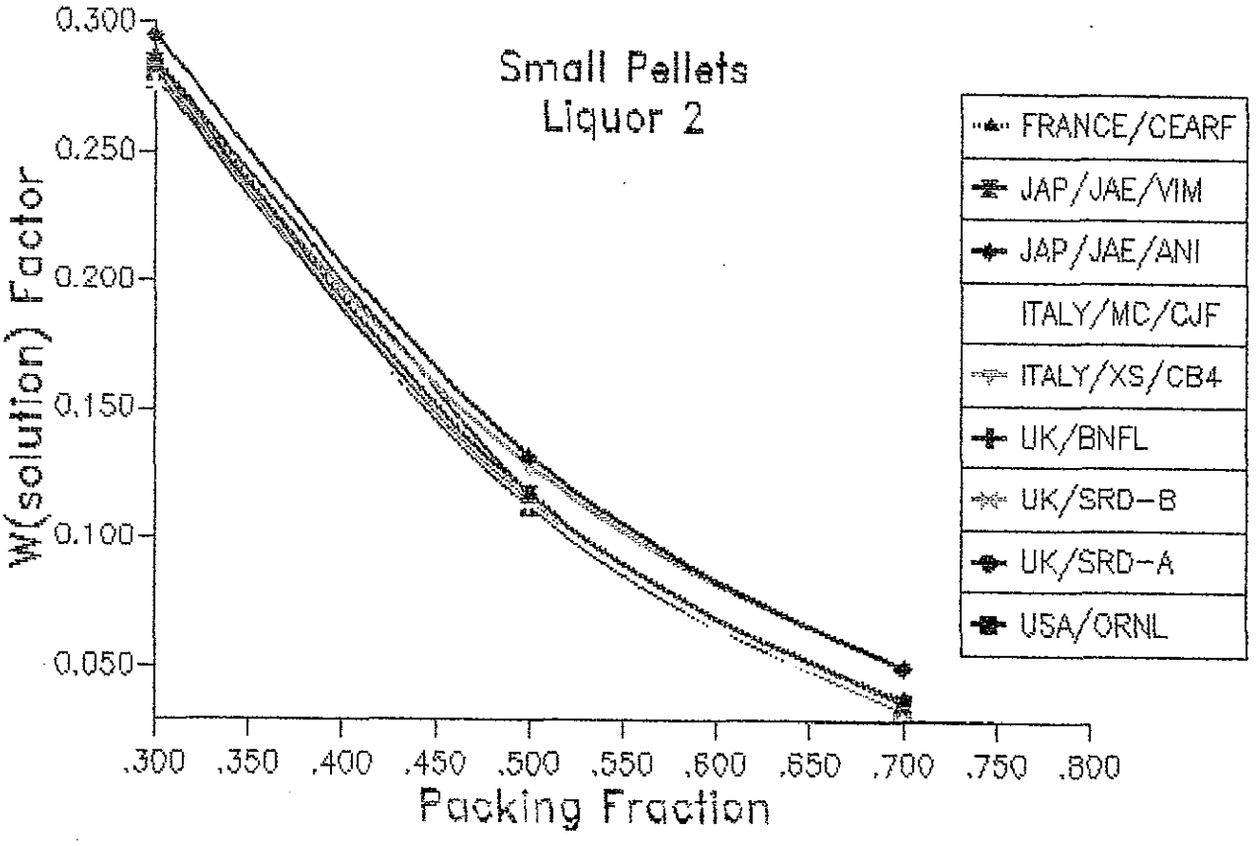
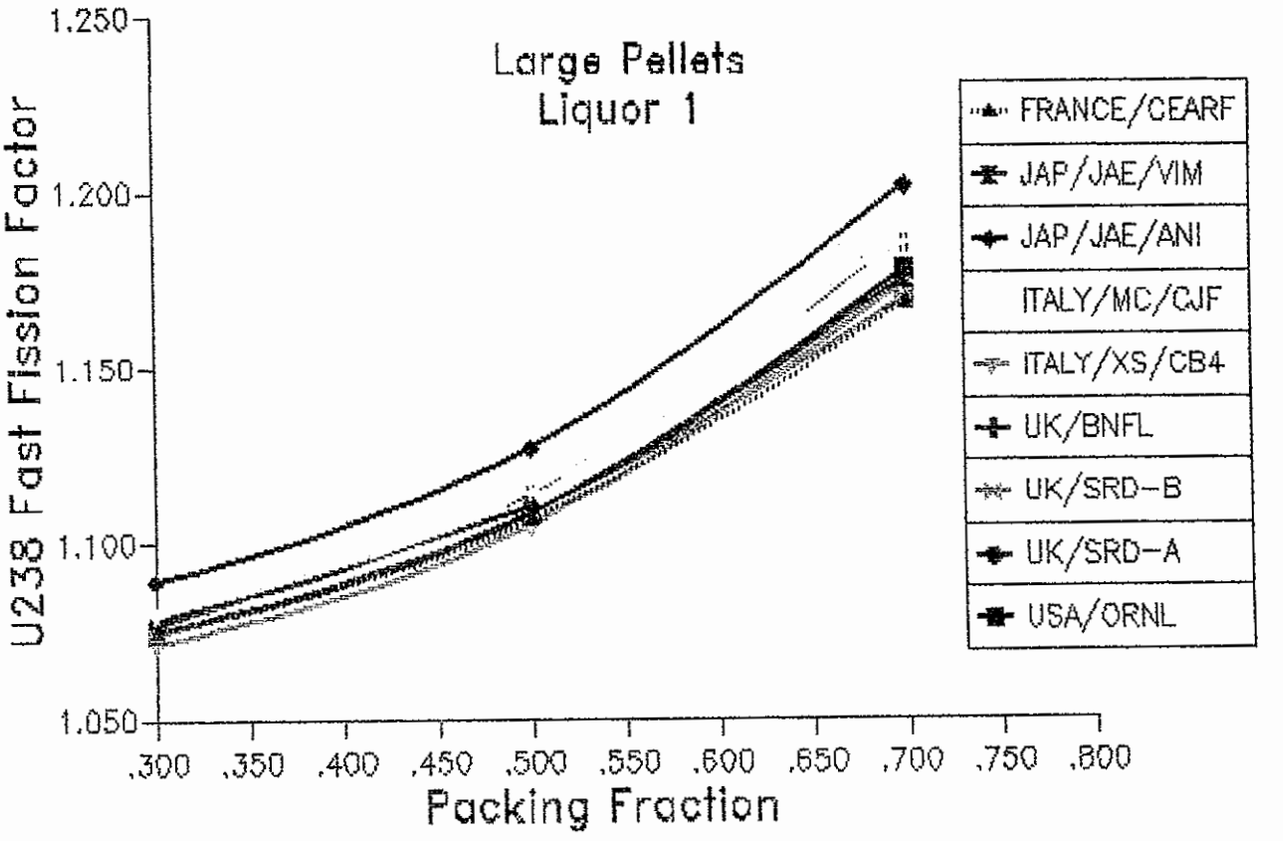


Figure 22: A comparison of the KINF(solution) and W(solution) - Spatial Model as functions of packing fraction as calculated by the participants in the May 1990 exercise . Small pellets in Liquor 2.

94210143



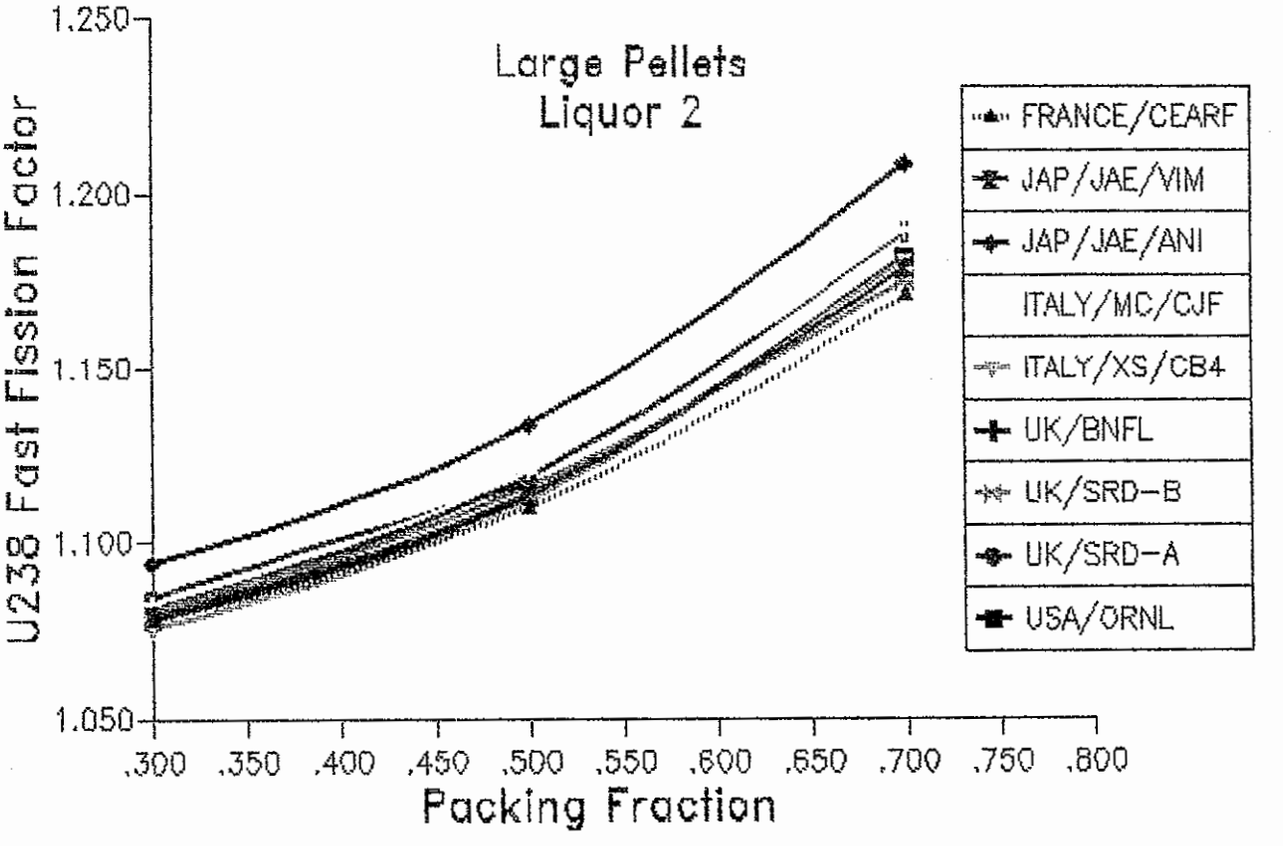


Figure 23: A comparison of the ^{238}U Fast Fission Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421044

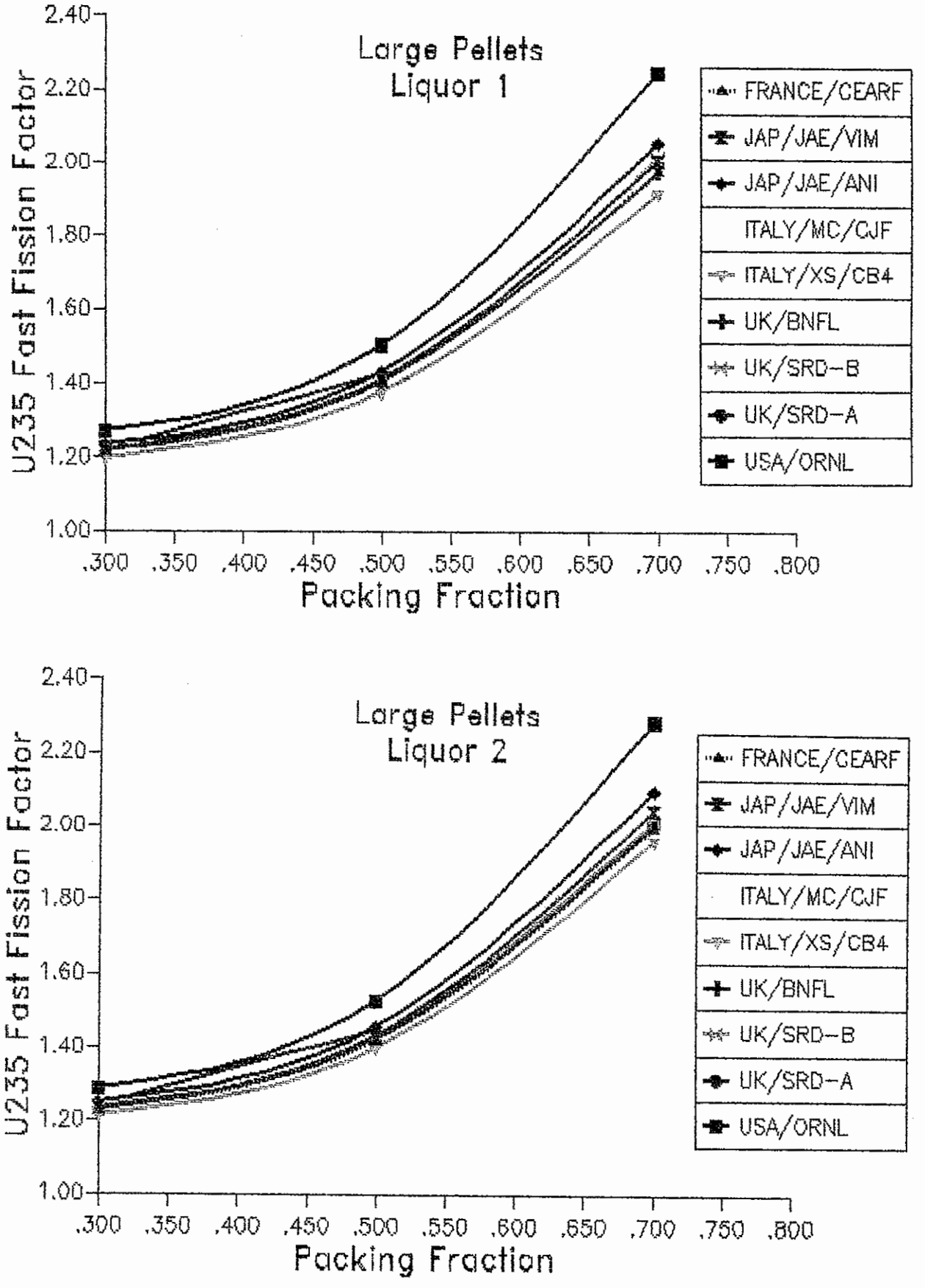


Figure 24: A comparison of the ^{235}U Fast Fission Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421045

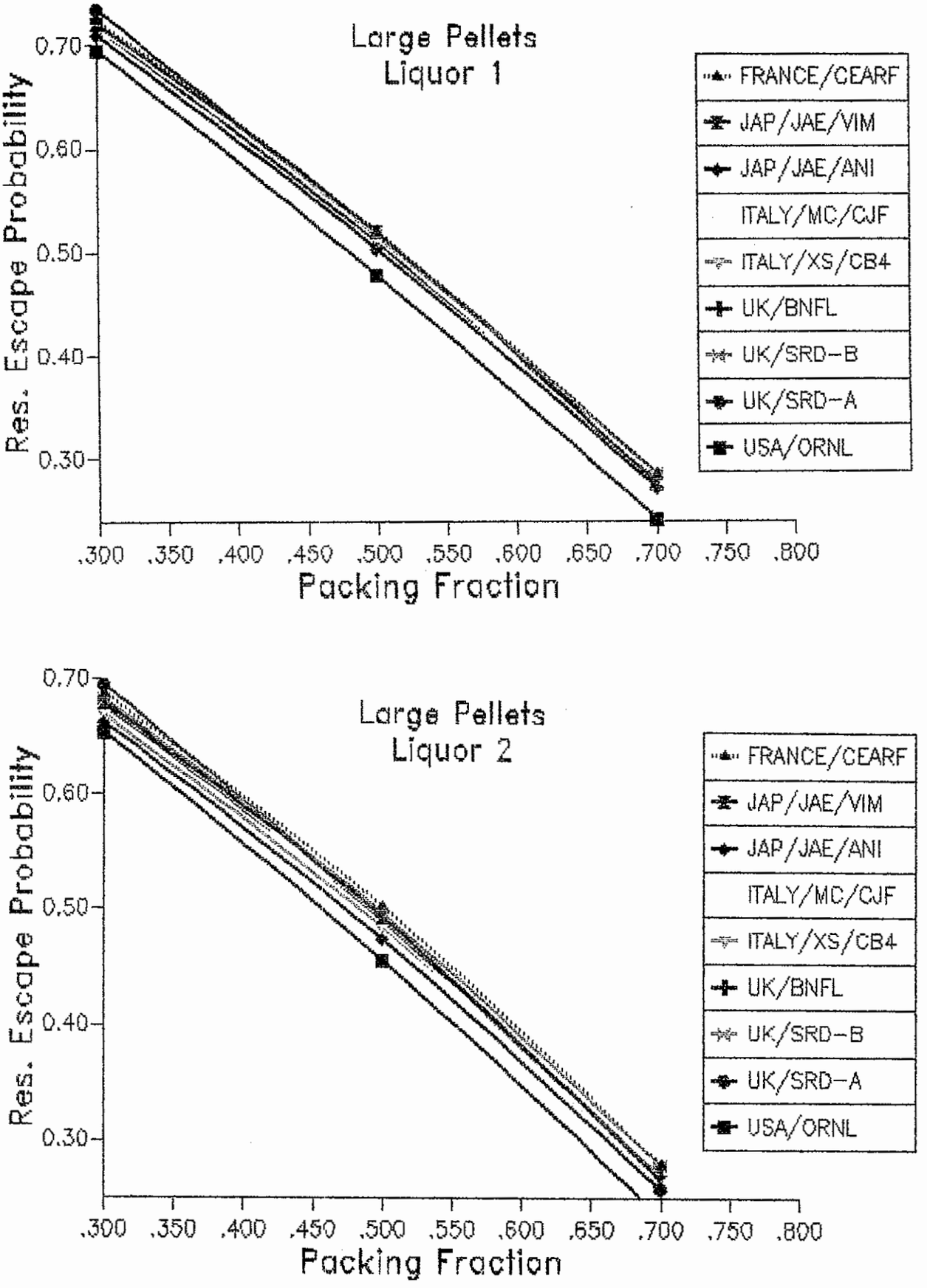
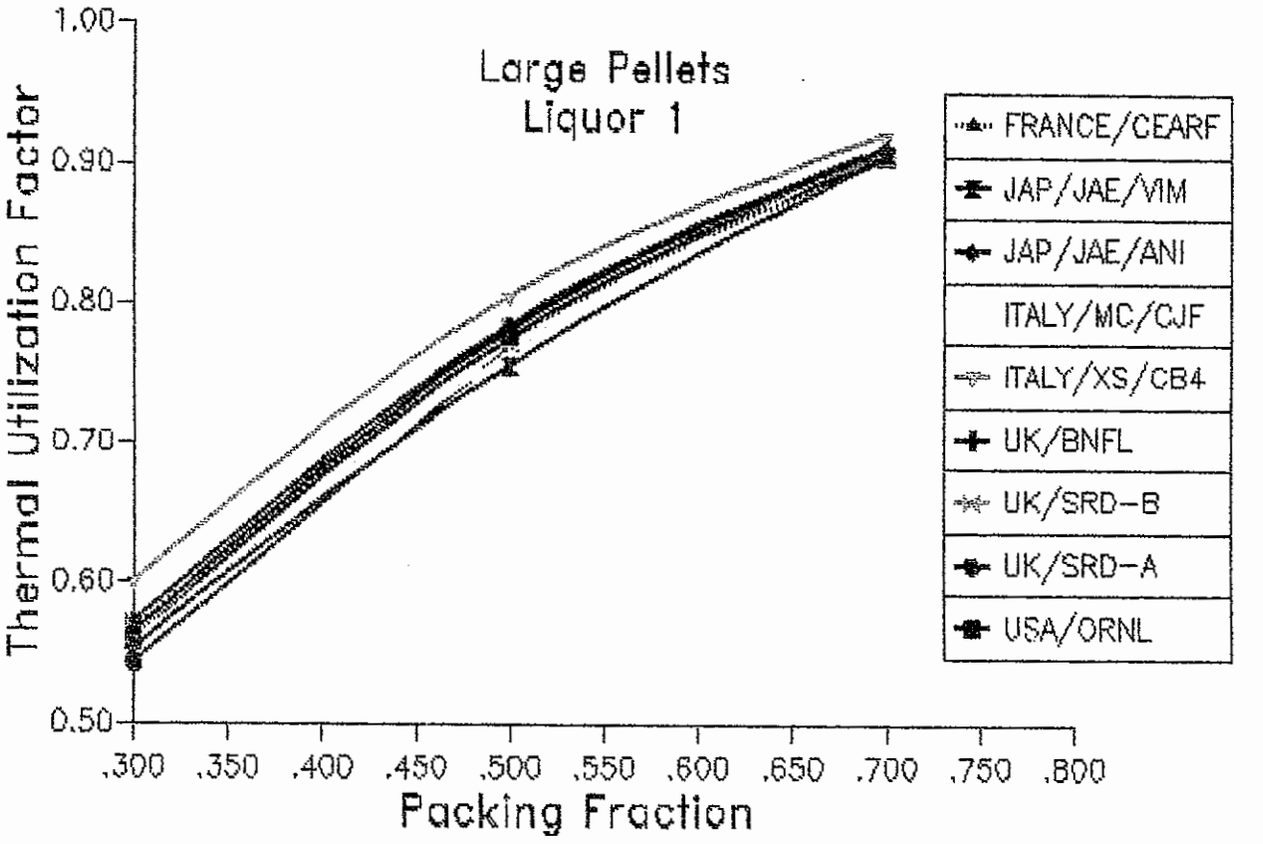


Figure 25: A comparison of the Resonance Escape Probability as a function of packing fraction as calculated by the participants in the May 1990 exercise . Large pellets in Liquor 1 and Liquor 2.

9421014 6



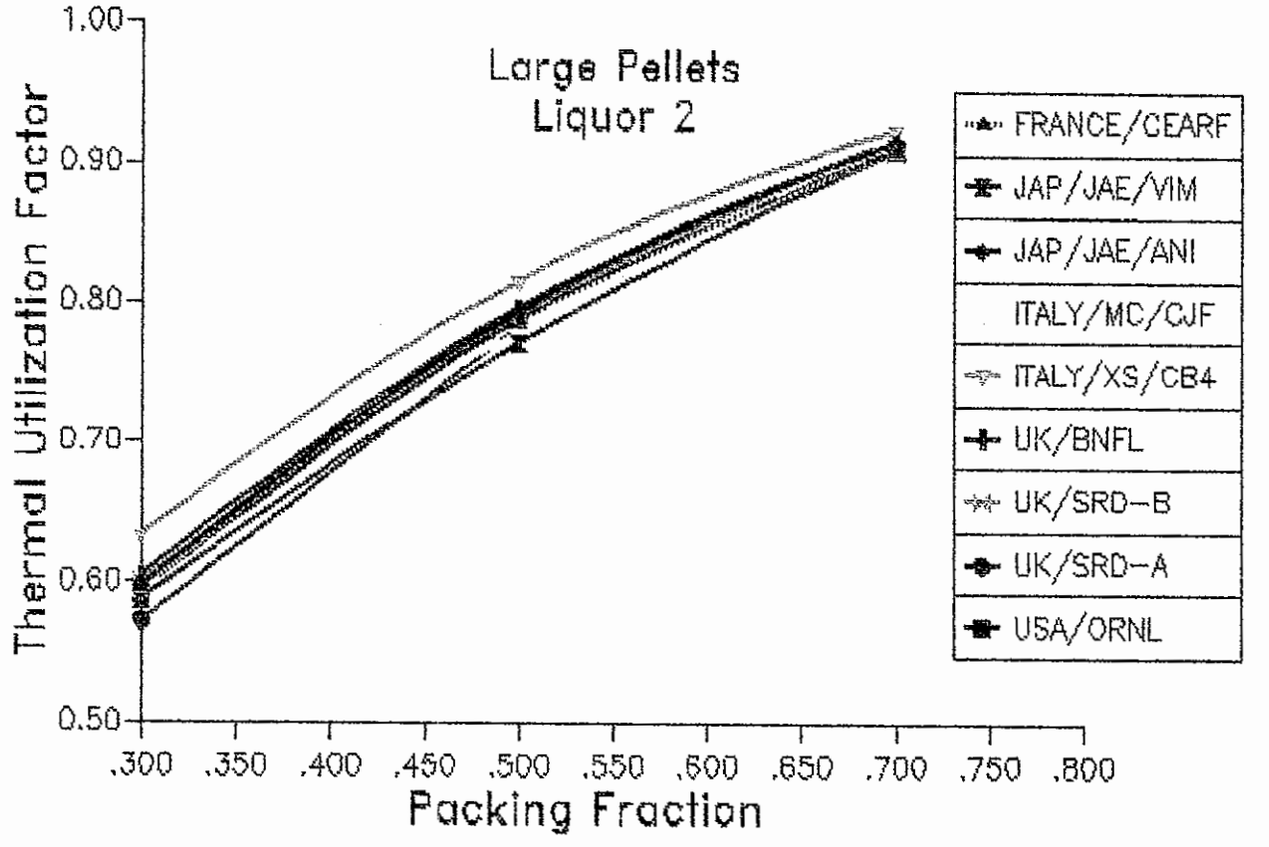
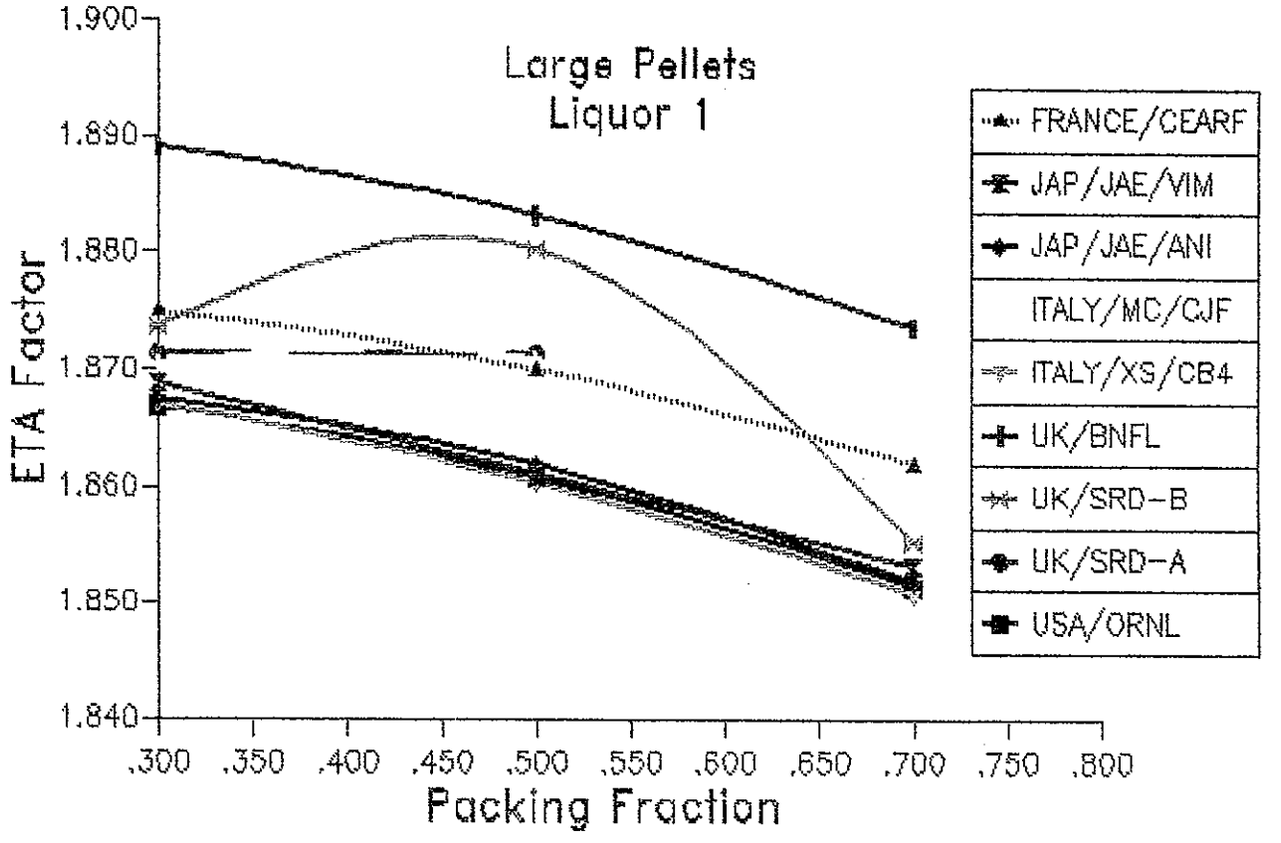


Figure 26: A comparison of the Thermal Utilization Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421317



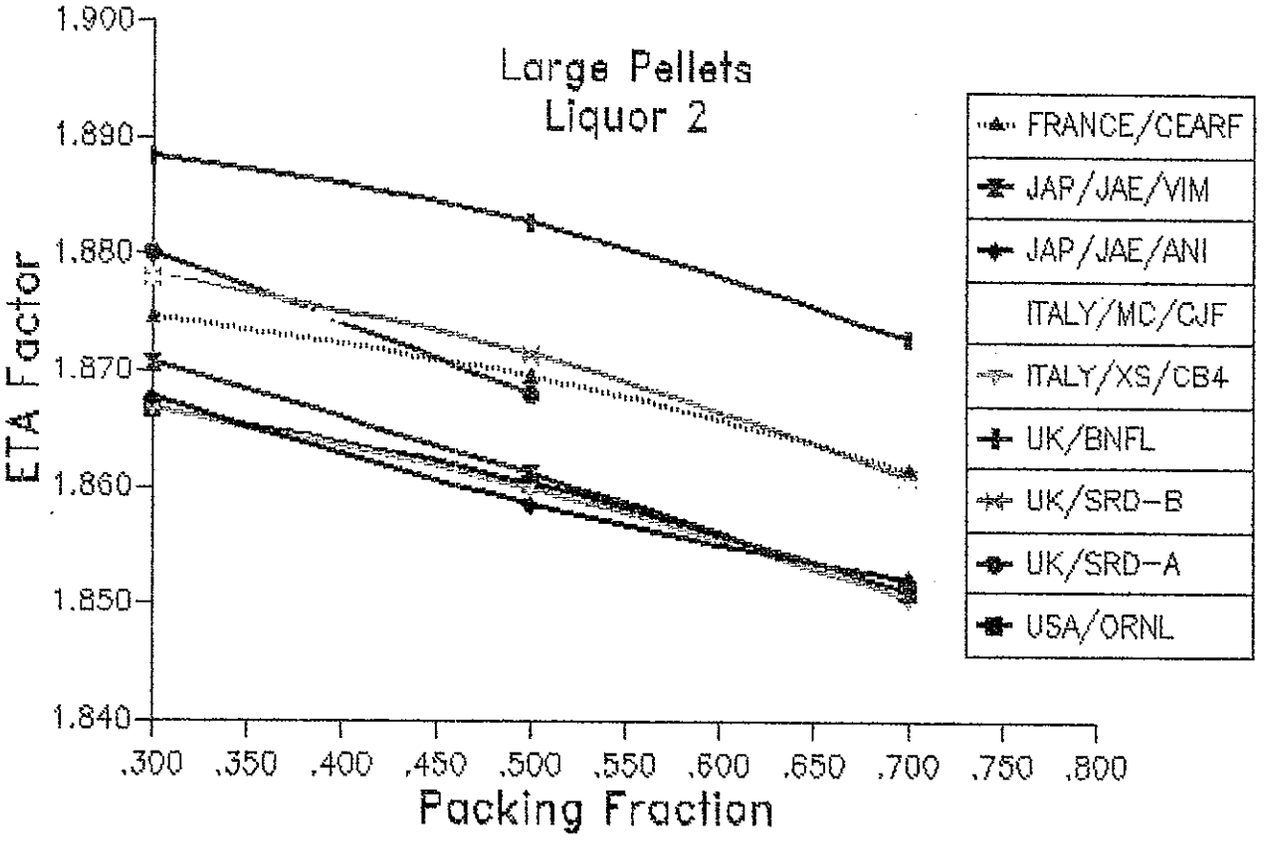
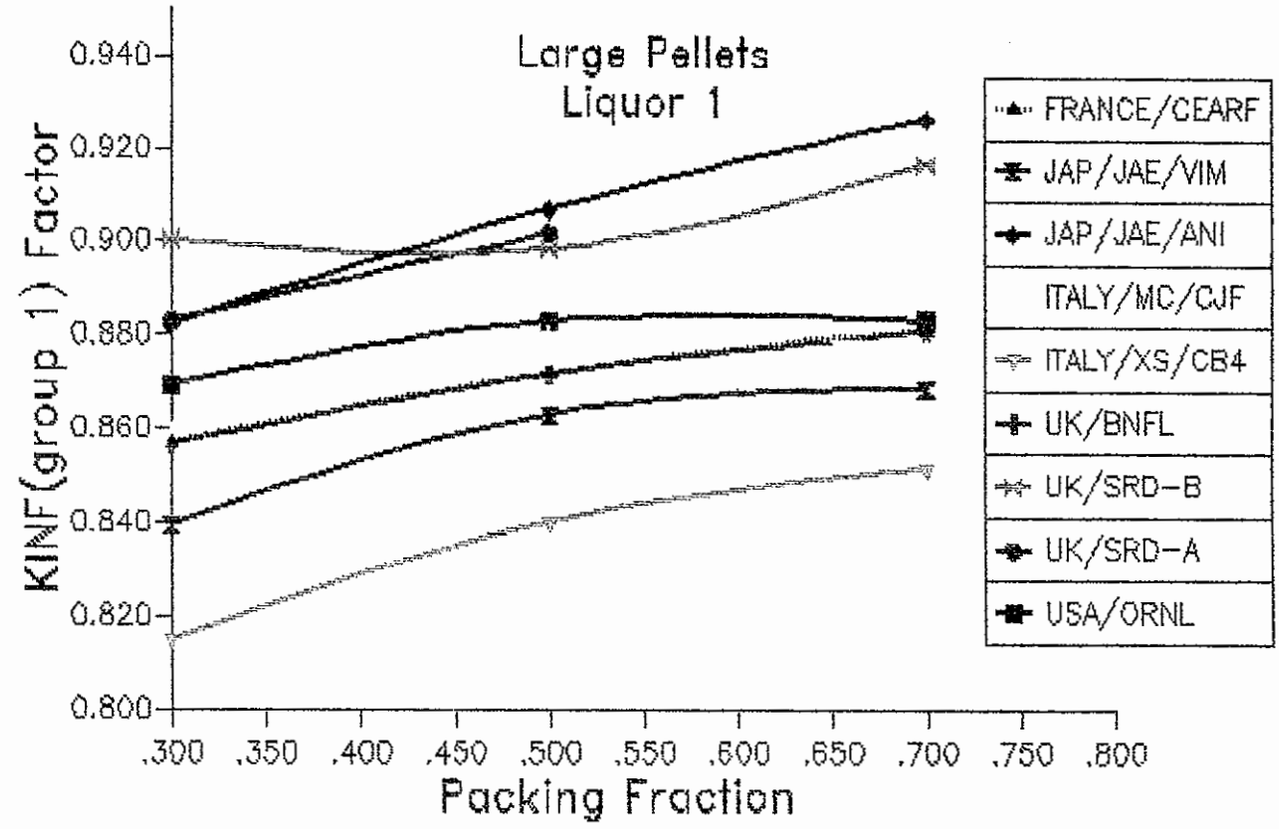


Figure 27: A comparison of the ETA-Factor as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.



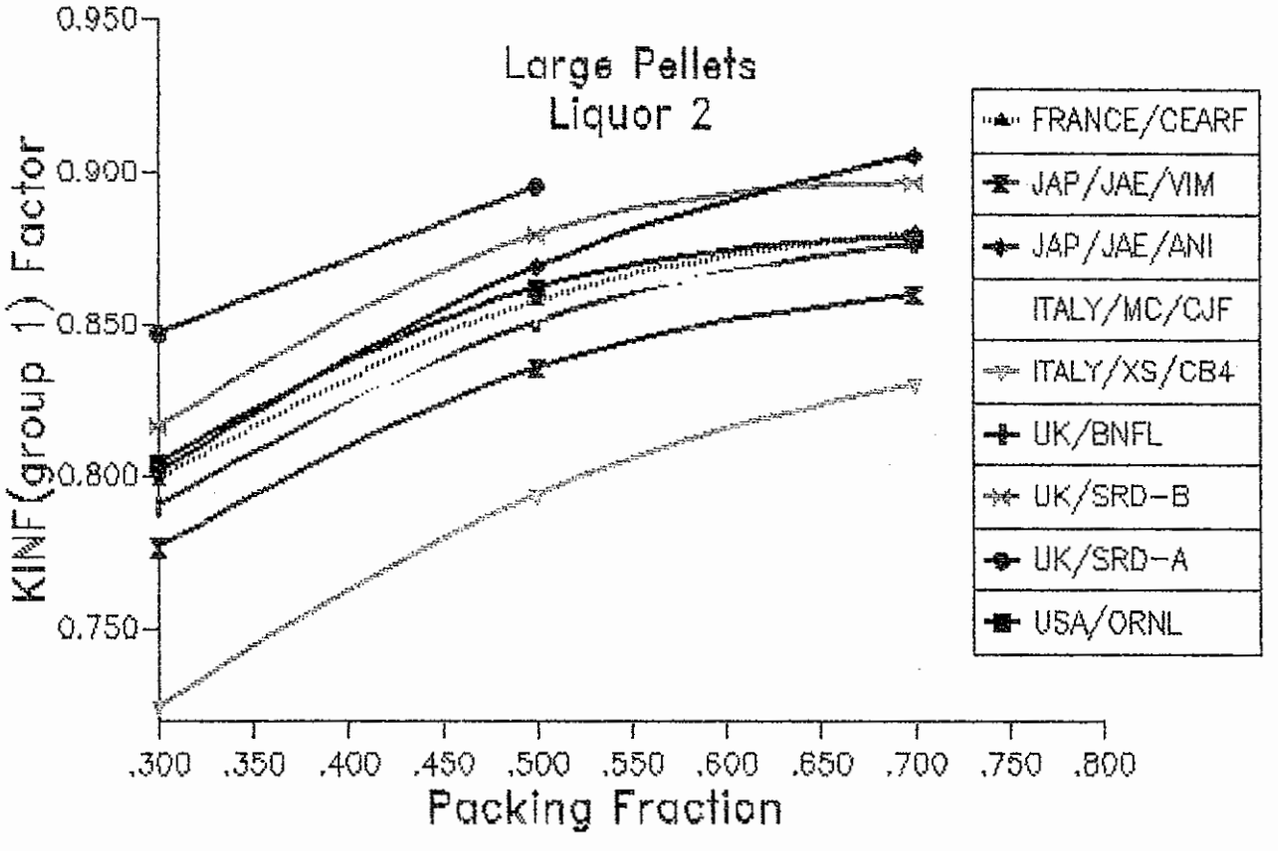
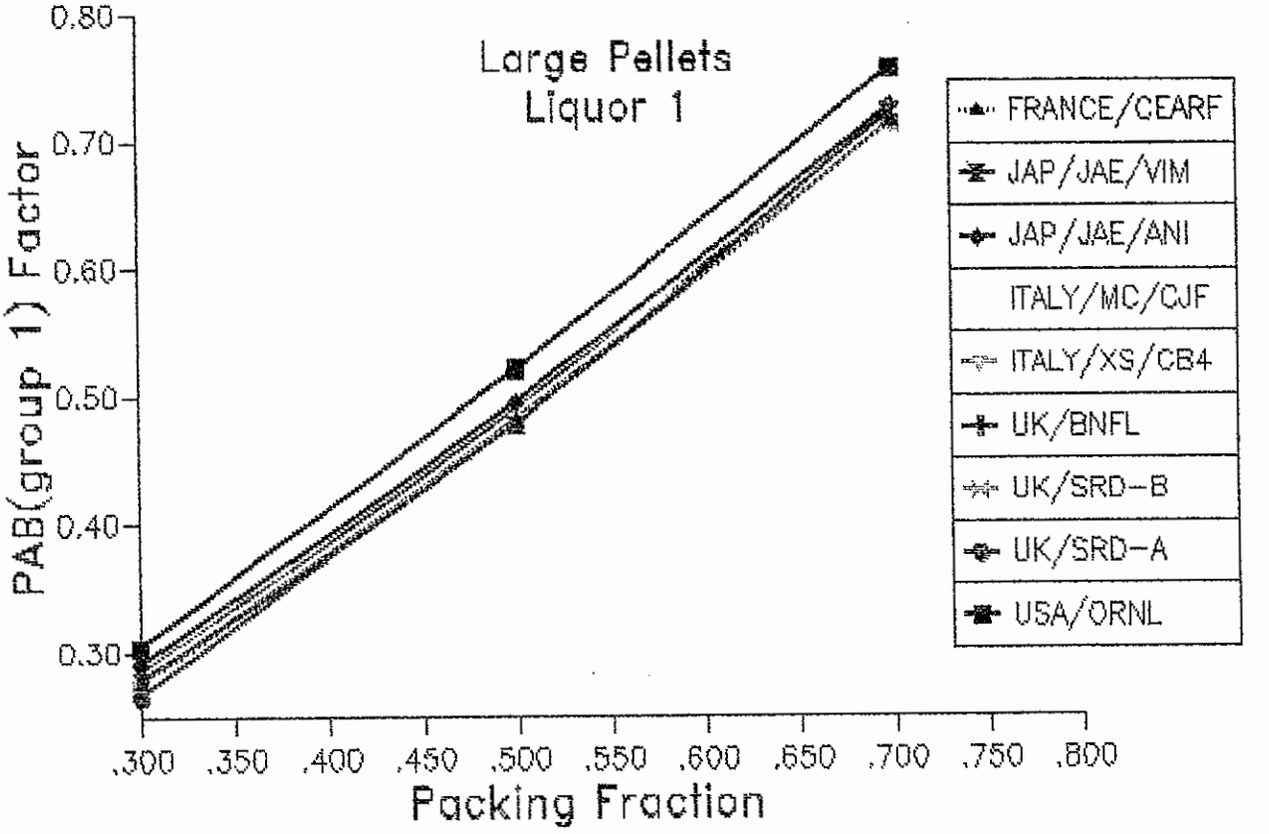


Figure 28: A comparison of the KINF(1) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421B149



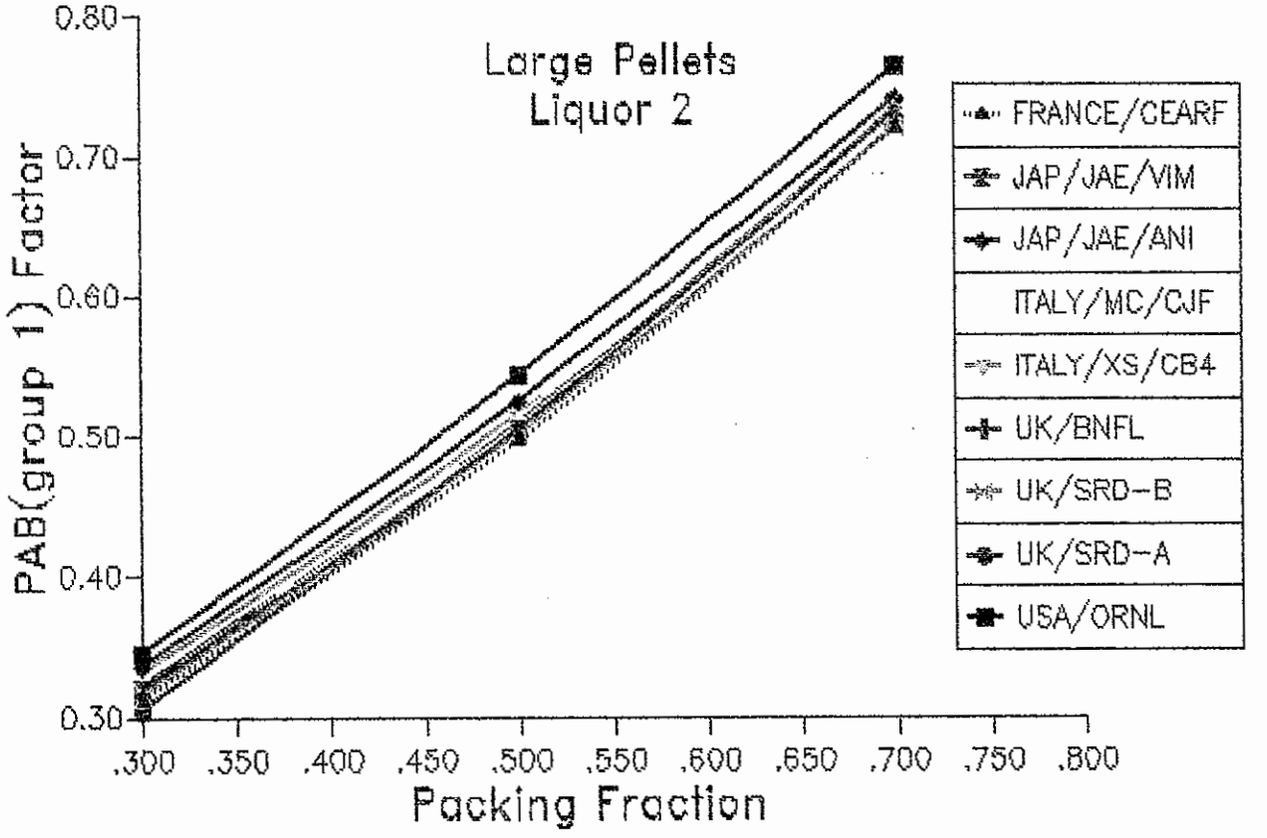
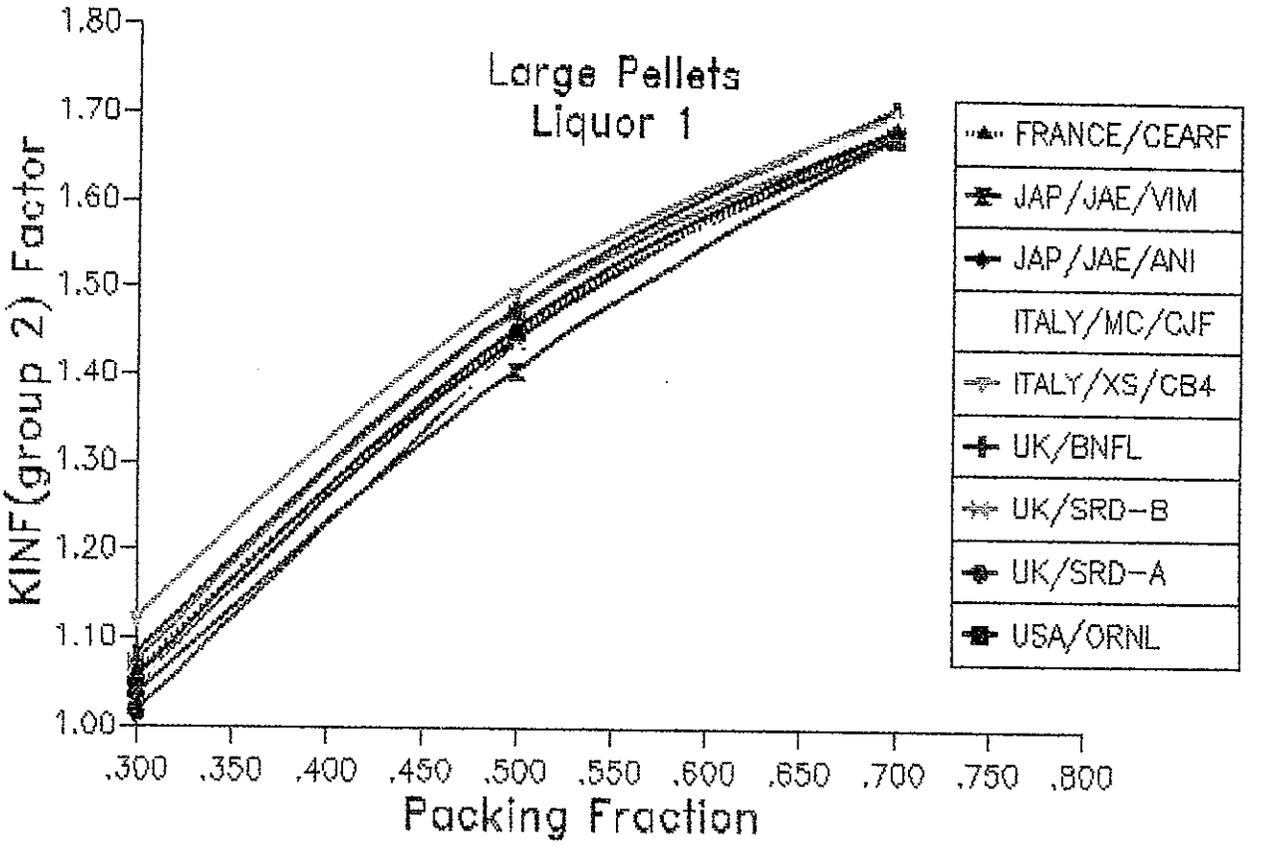


Figure 29: A comparison of the PAB(1) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421190



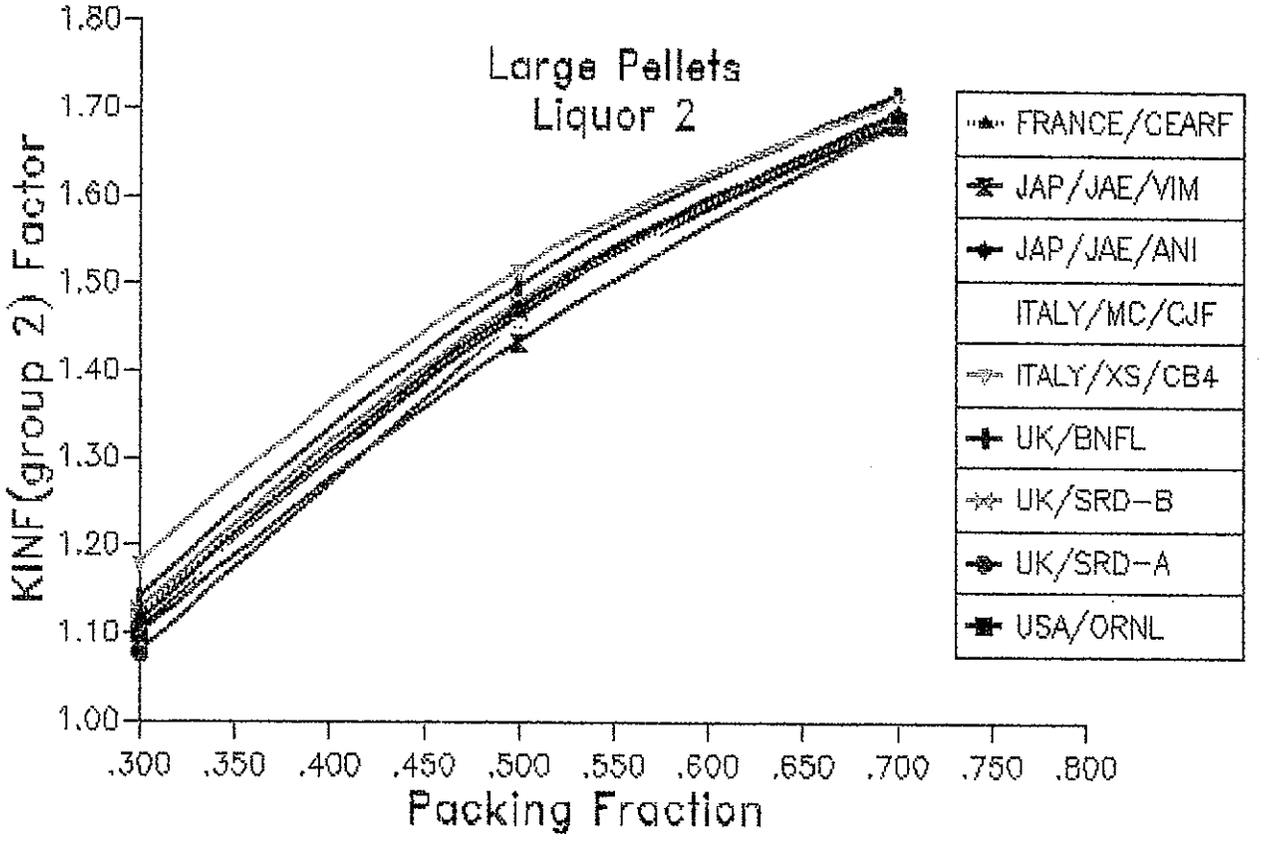
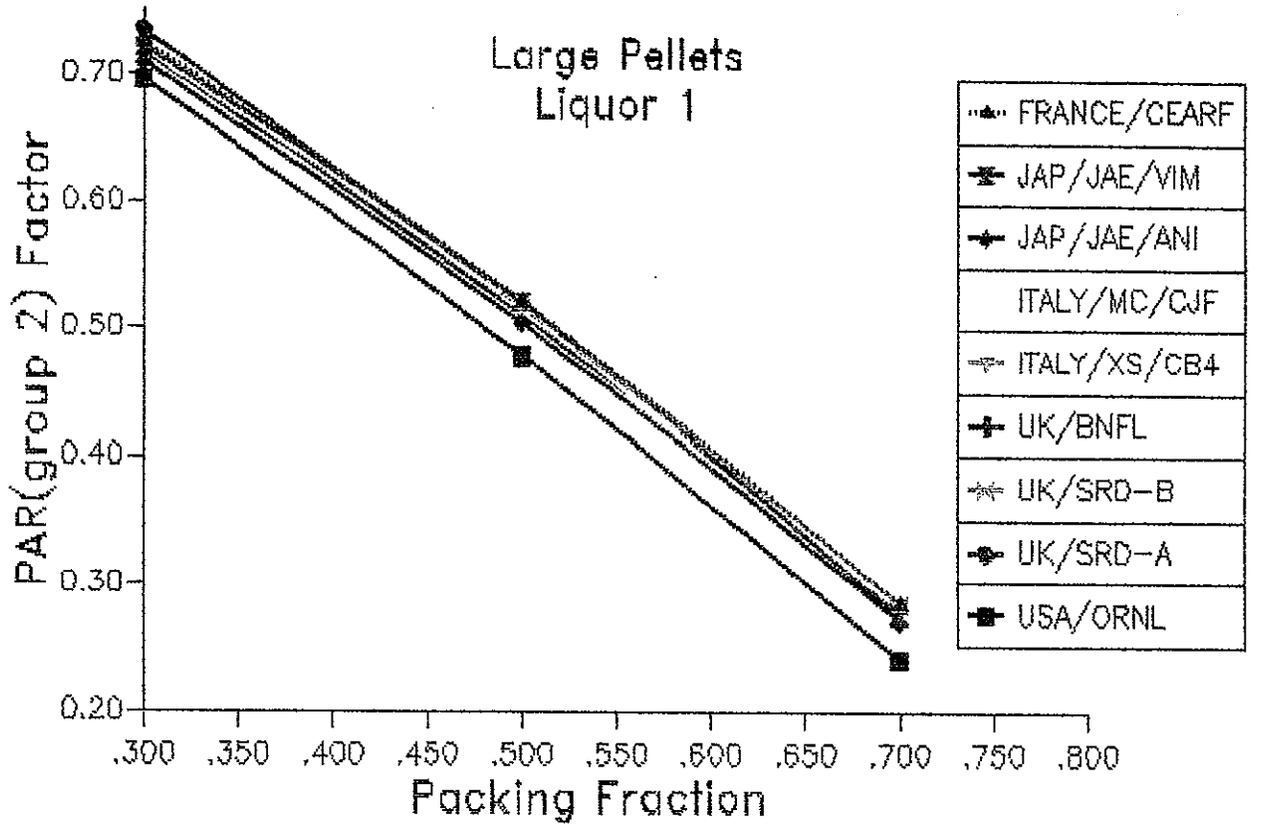


Figure 30: A comparison of the KINF(2) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421U151



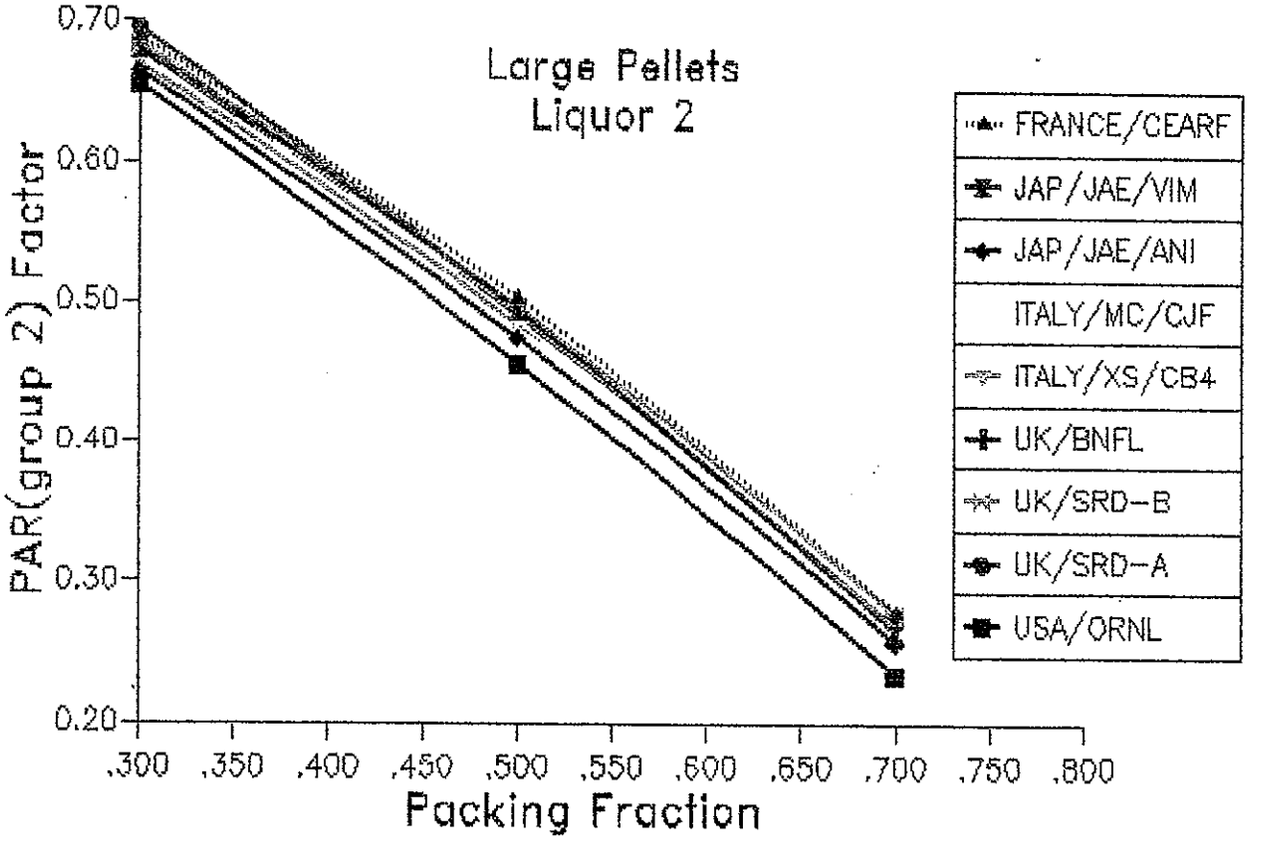
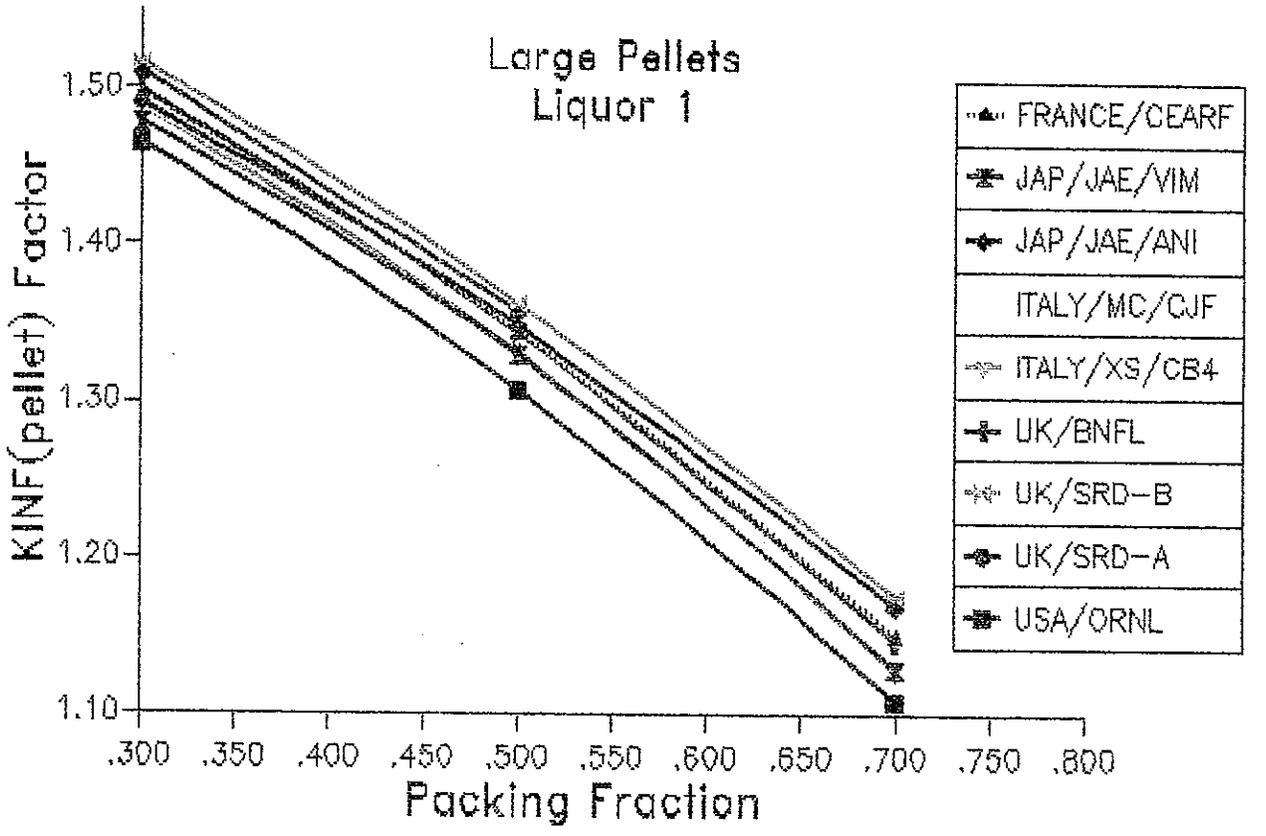


Figure 31: A comparison of the PAR(2) - Historical Model as a function of packing fraction as calculated by the participants in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421052



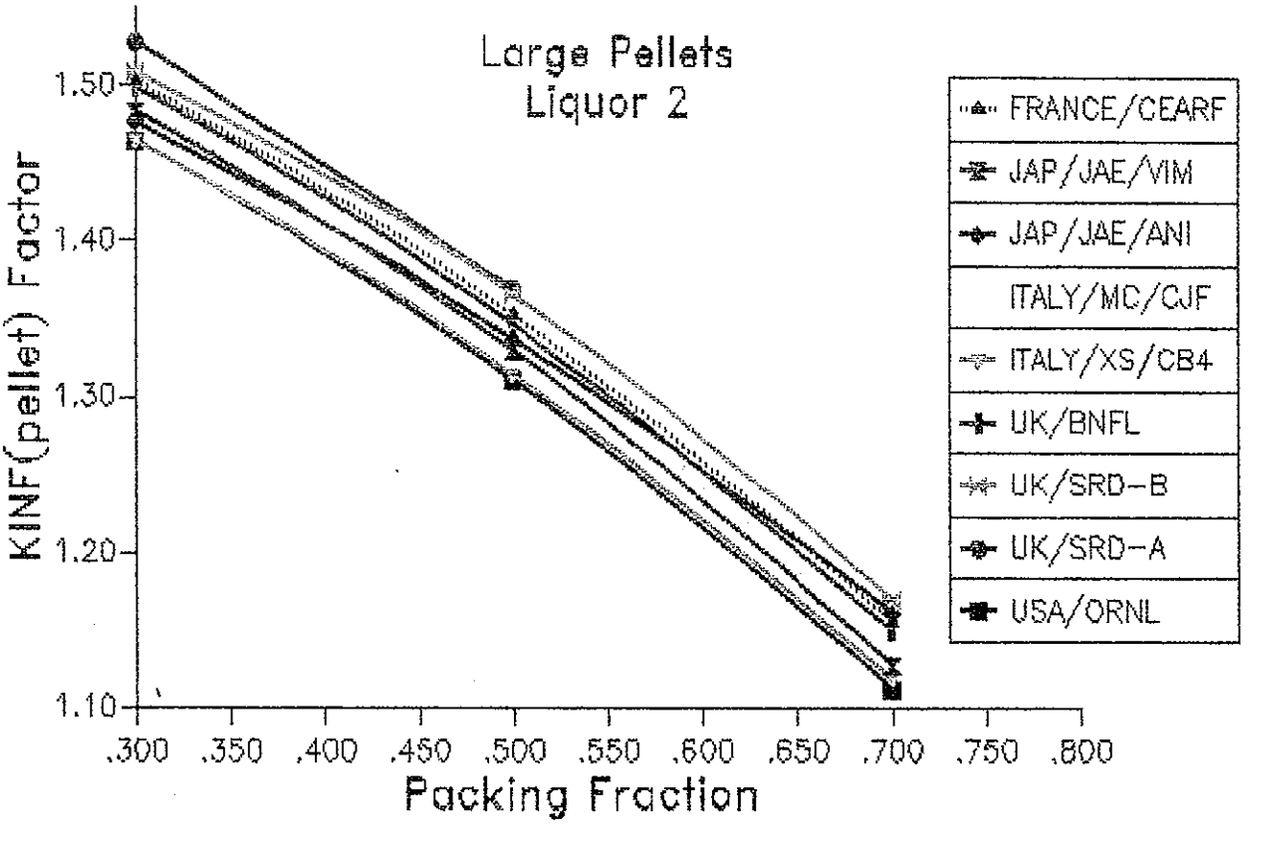
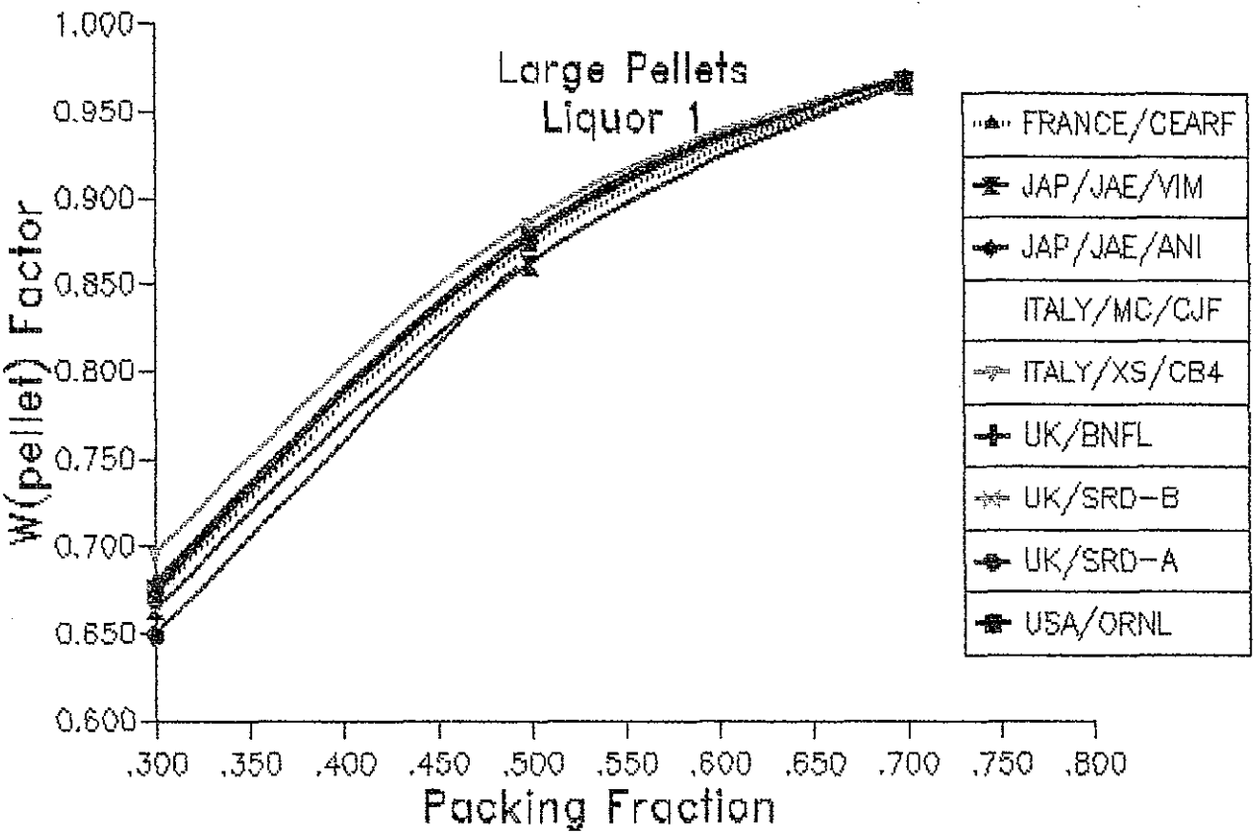


Figure 32: A comparison of the KINF(pellet) - Spatial Model as a function of packing fraction as calculated by the participants in the May 1990 exercise . Large pellets in Liquor 1 and Liquor 2.

9421153



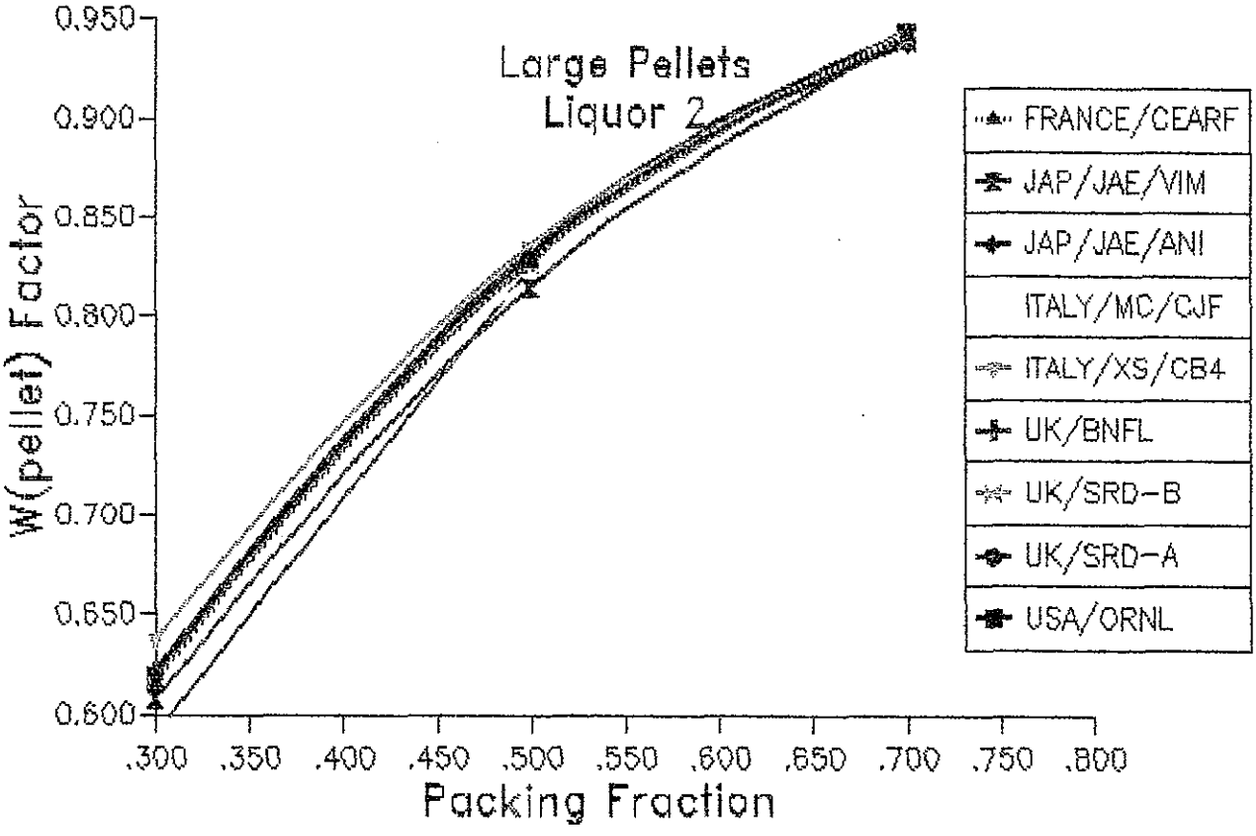
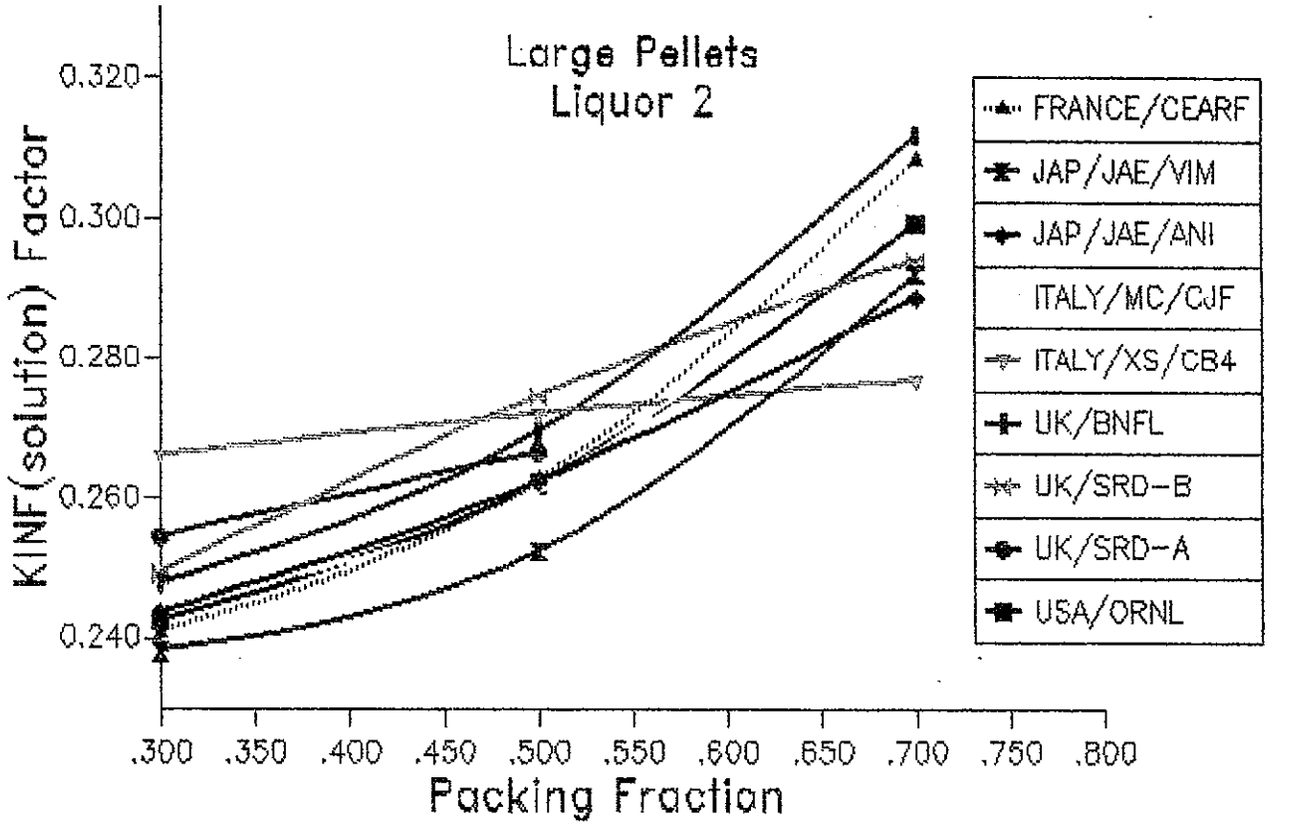


Figure 33: A comparison of the W(pellet) - Spatial Model as a function of packing fraction as calculated by the participants in the May 1990 exercise . Large pellets in Liquor 1 and Liquor 2.

9421154



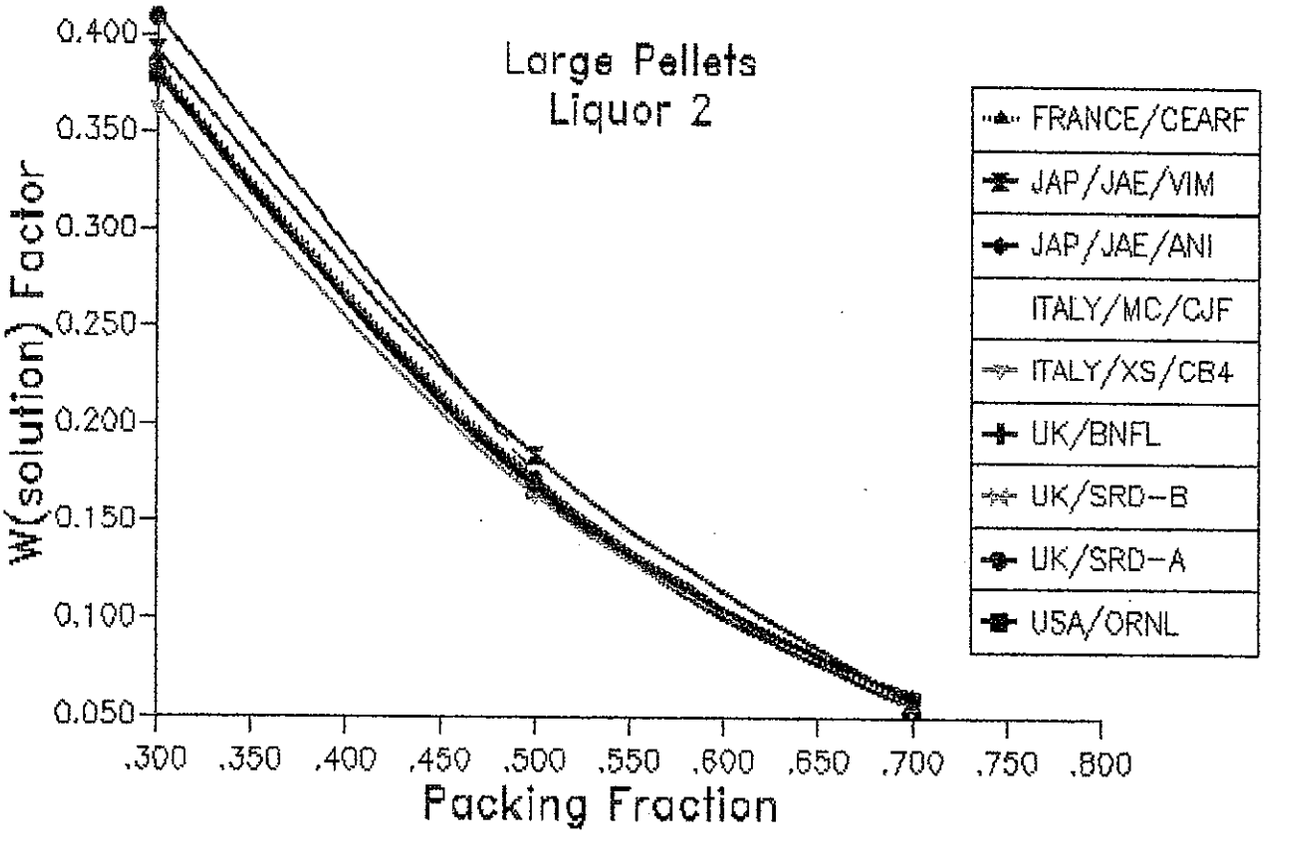


Figure 34: A comparison of the KINF(solution) and W(solution) - Spatial Model as functions of packing fraction as calculated by the participants in the May 1990 exercise . Large pellets in Liquor 2.

9421055

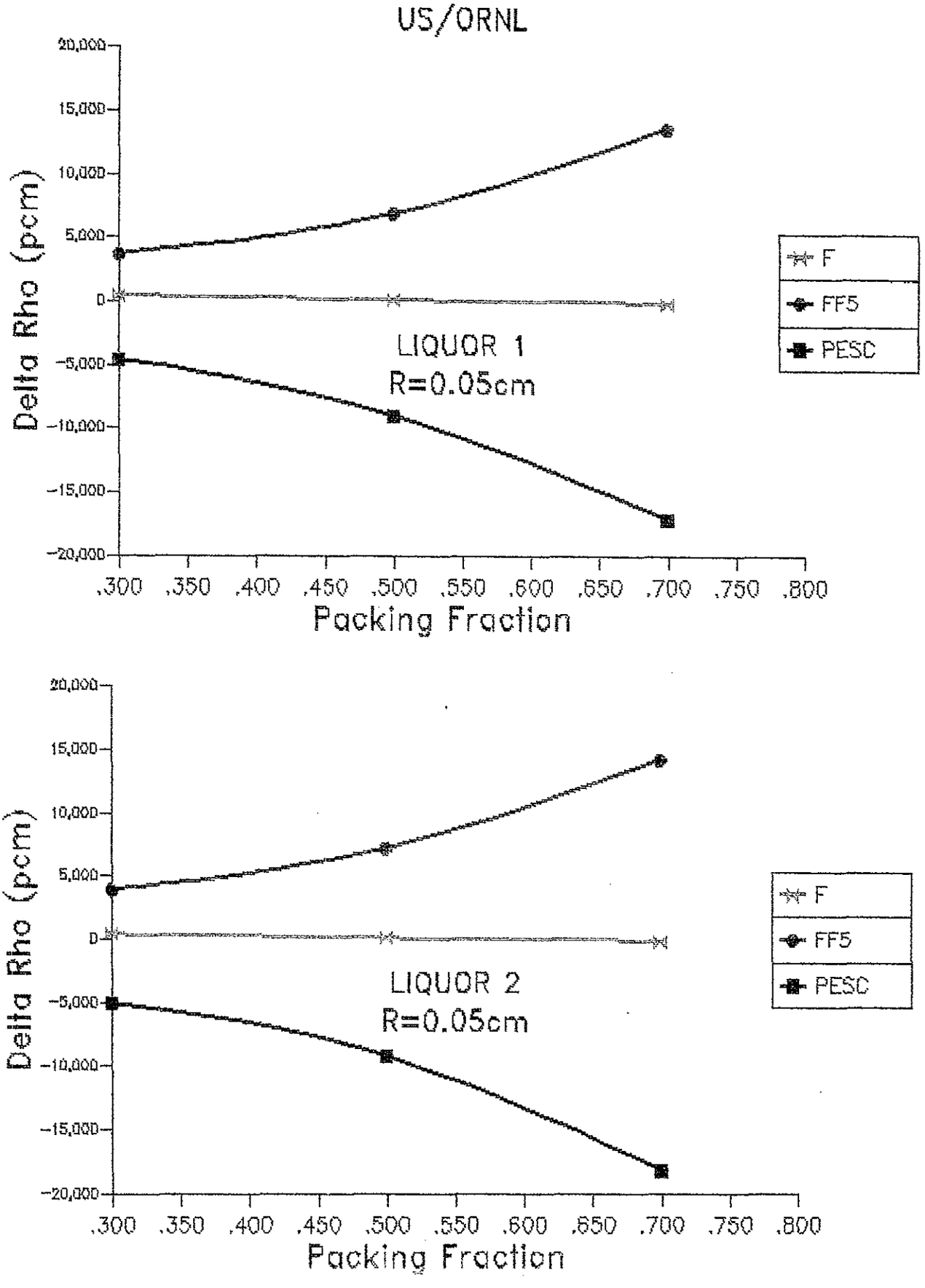


Figure 35: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by US/ORNL in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421156

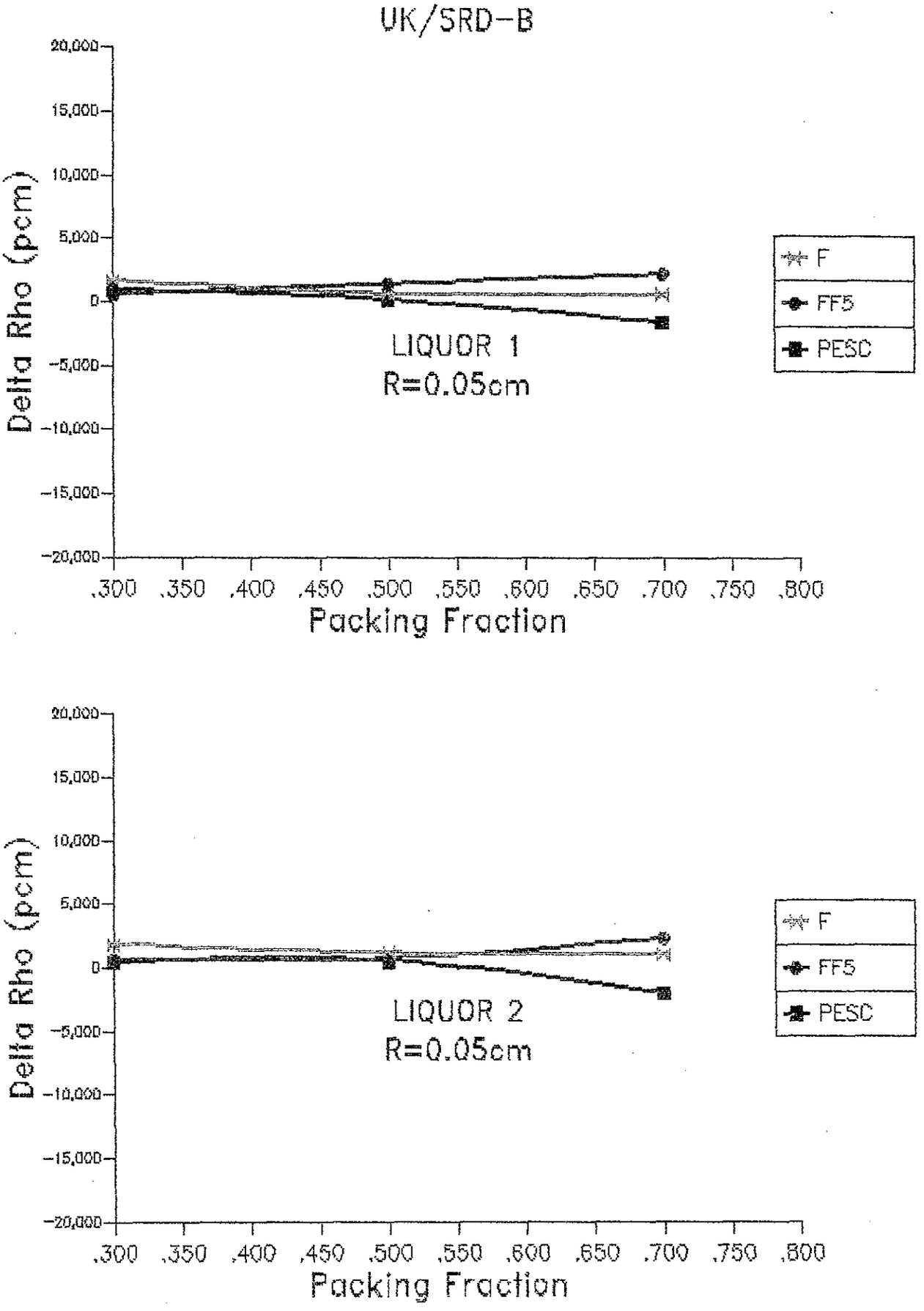


Figure 36: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by UK/SRD-B in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

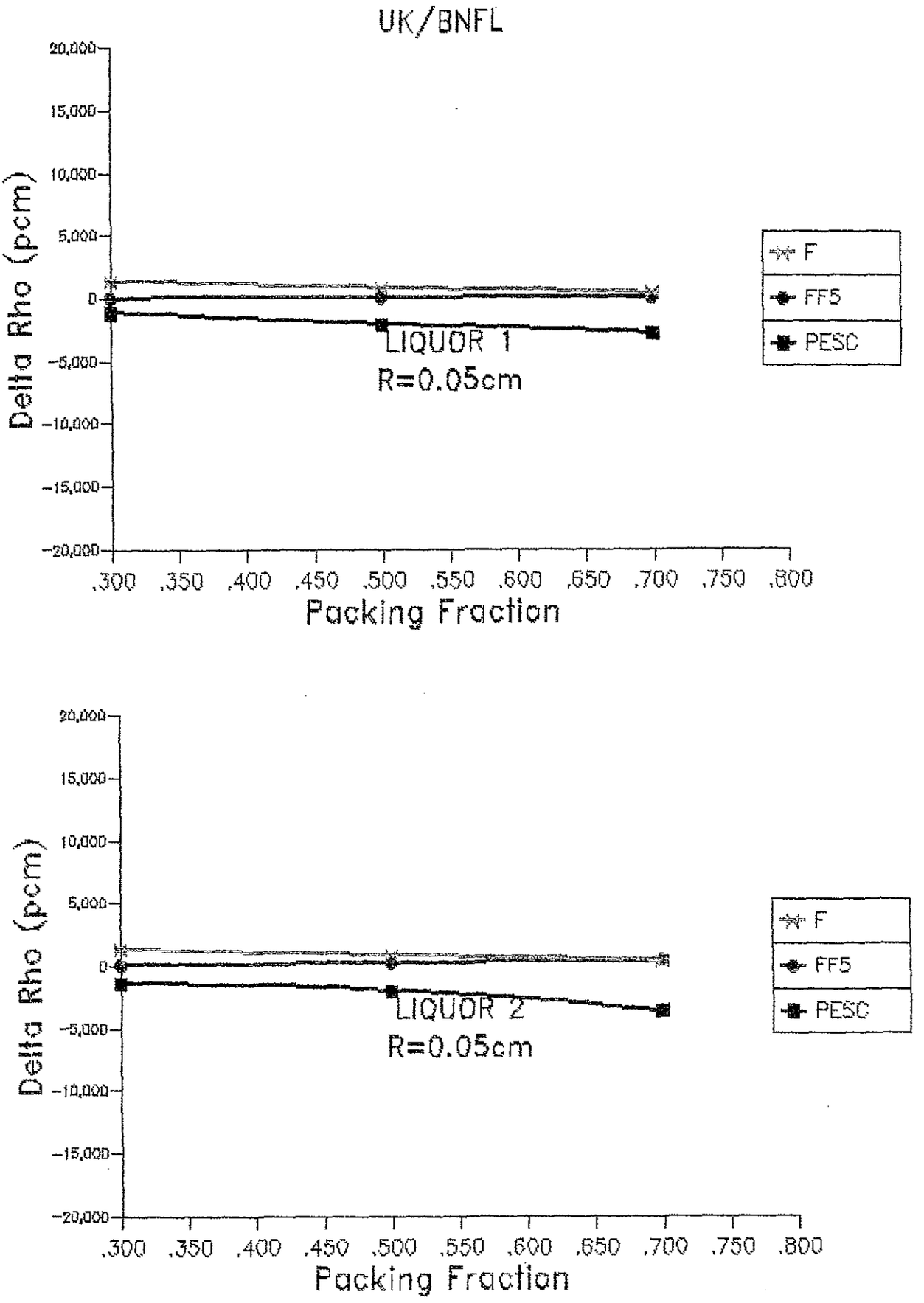
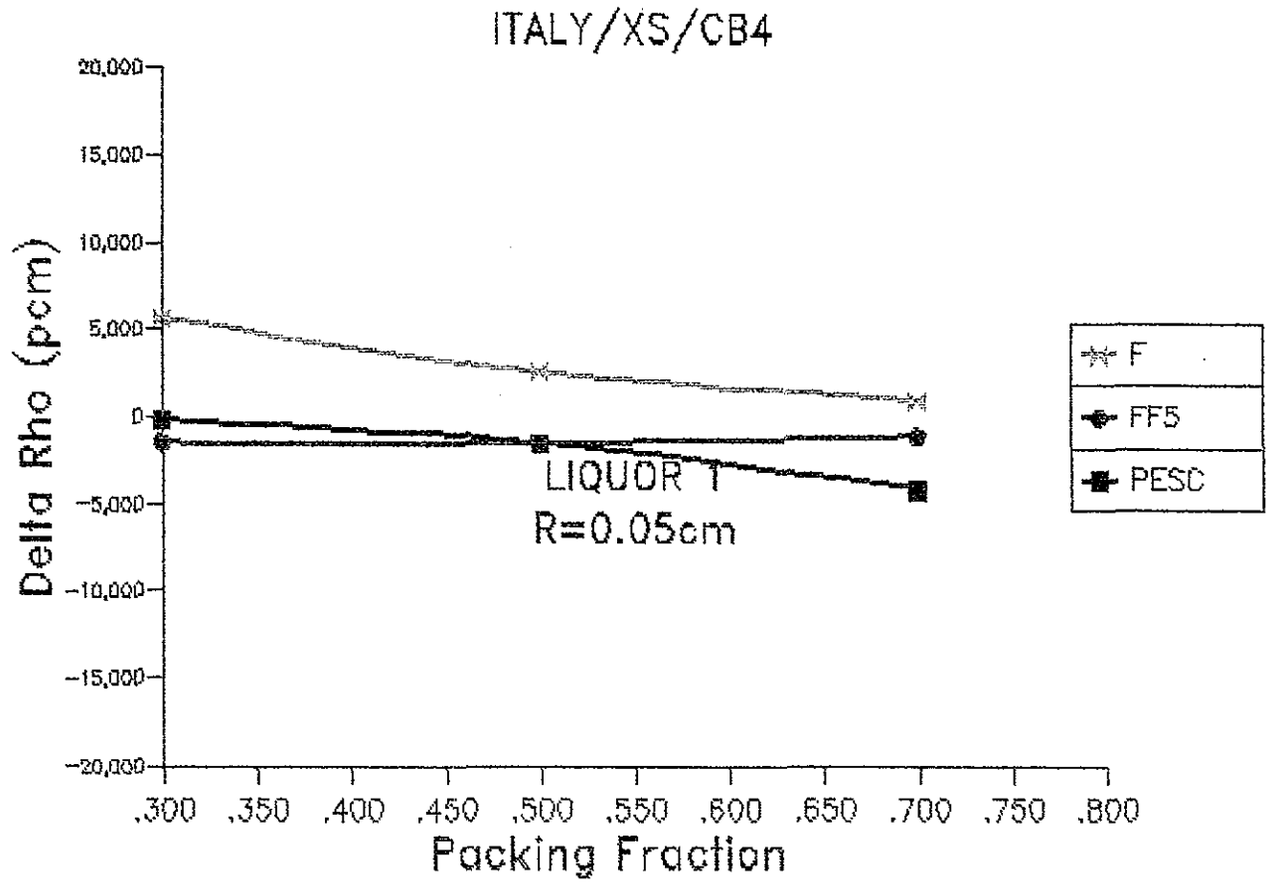


Figure 37: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by UK/BNFL in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421[illegible]3



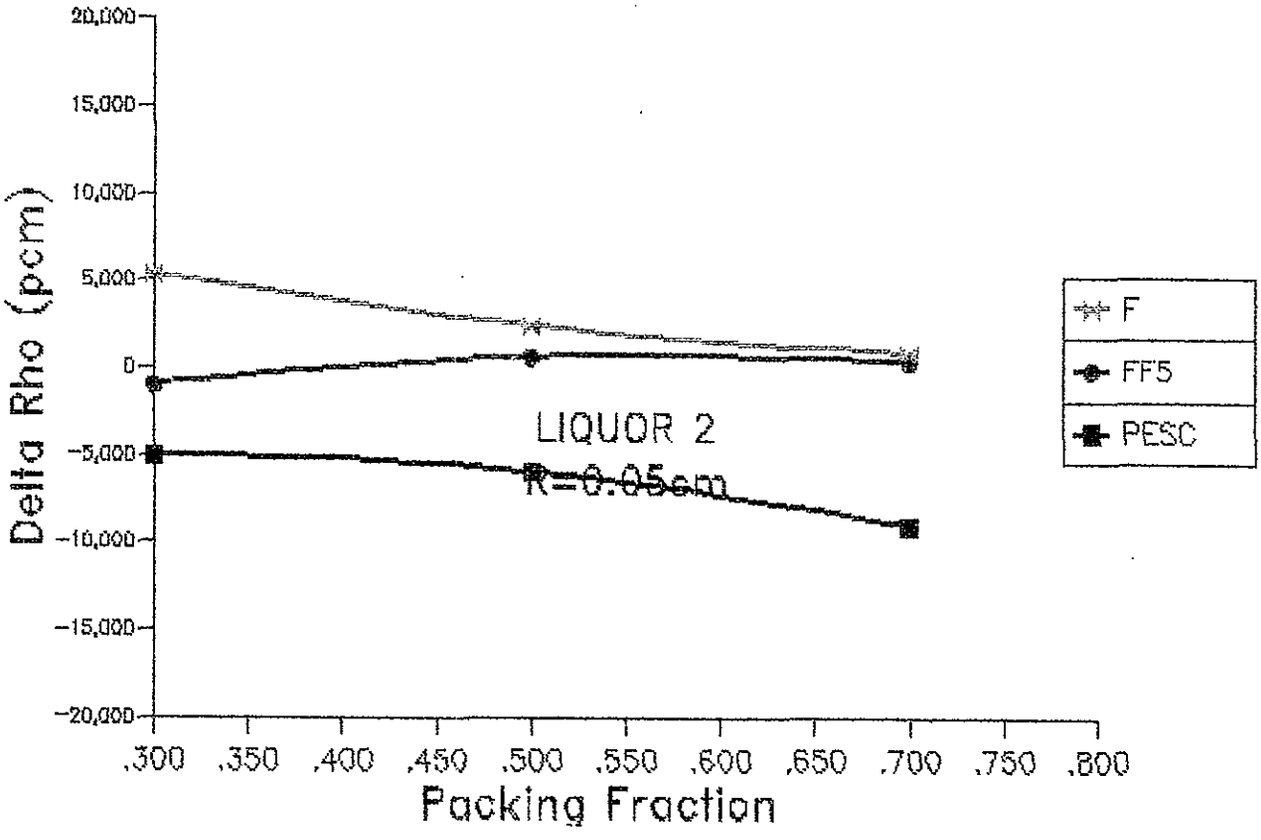


Figure 38: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by ITALY/XS/CB4 in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421059

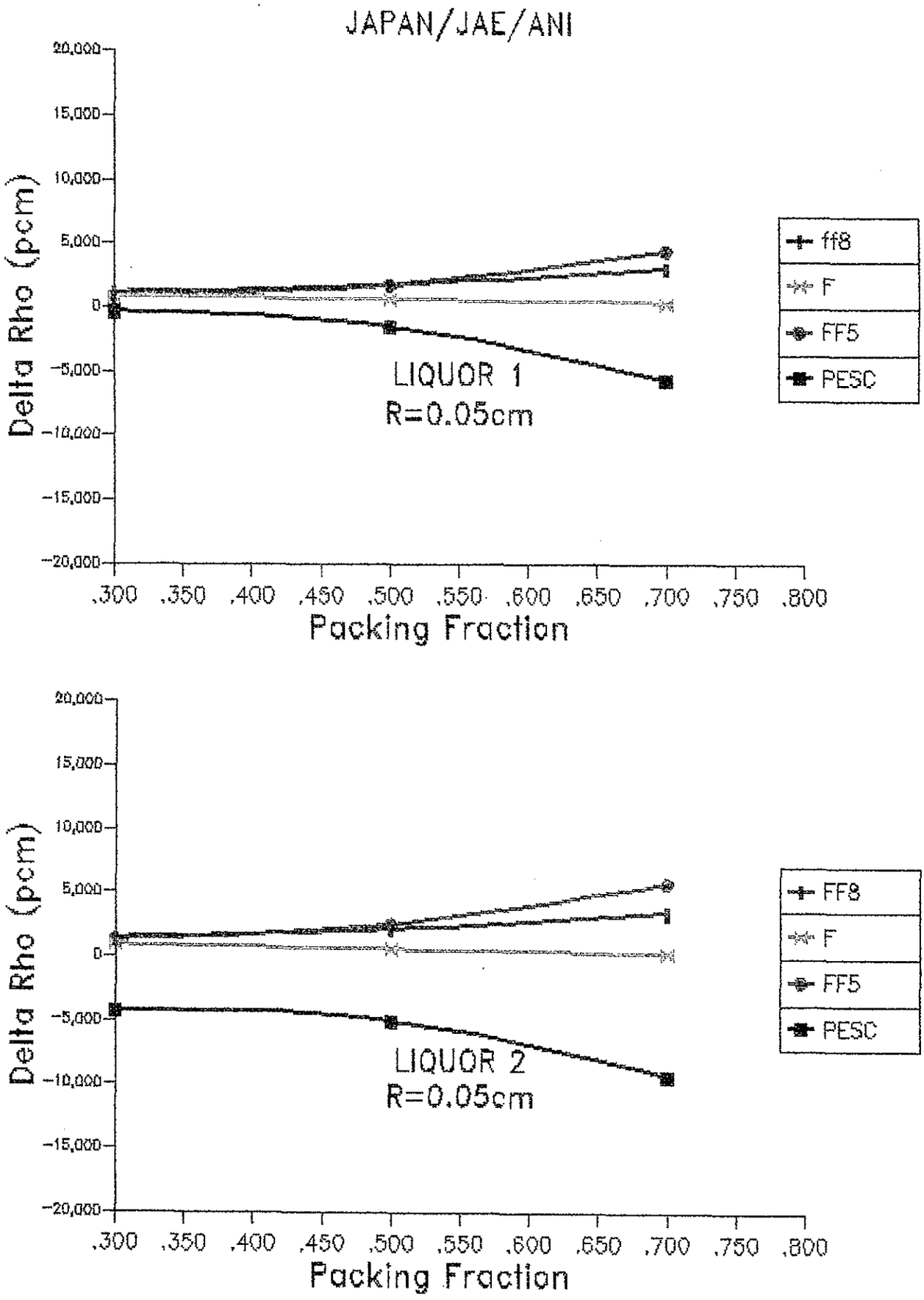


Figure 39: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5), ^{238}U Fast Fission Factor (FF8) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction, as calculated by JAPAN/JAE/ANI in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421010160

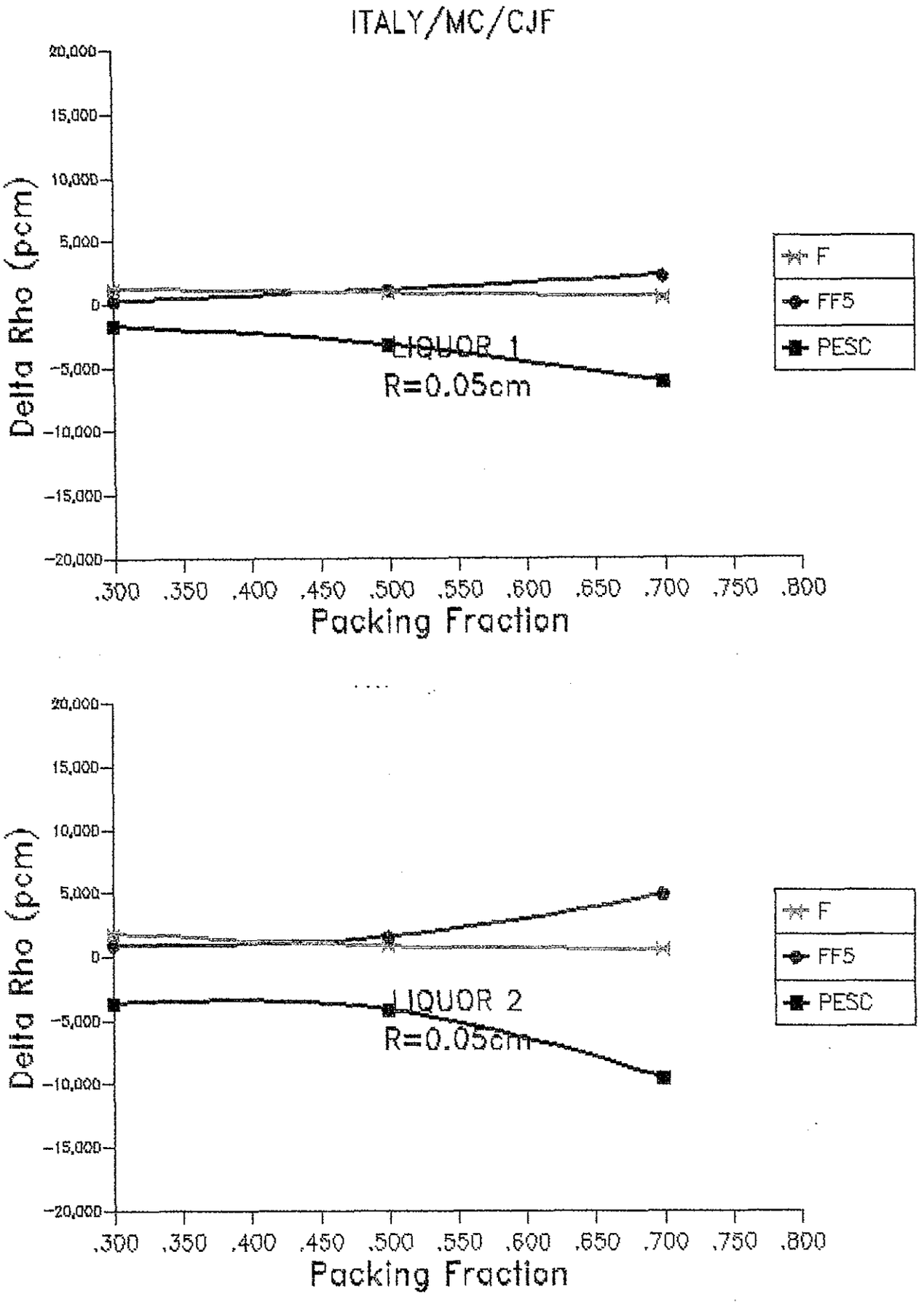


Figure 40: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by ITALY/MC/CJF in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

94210161

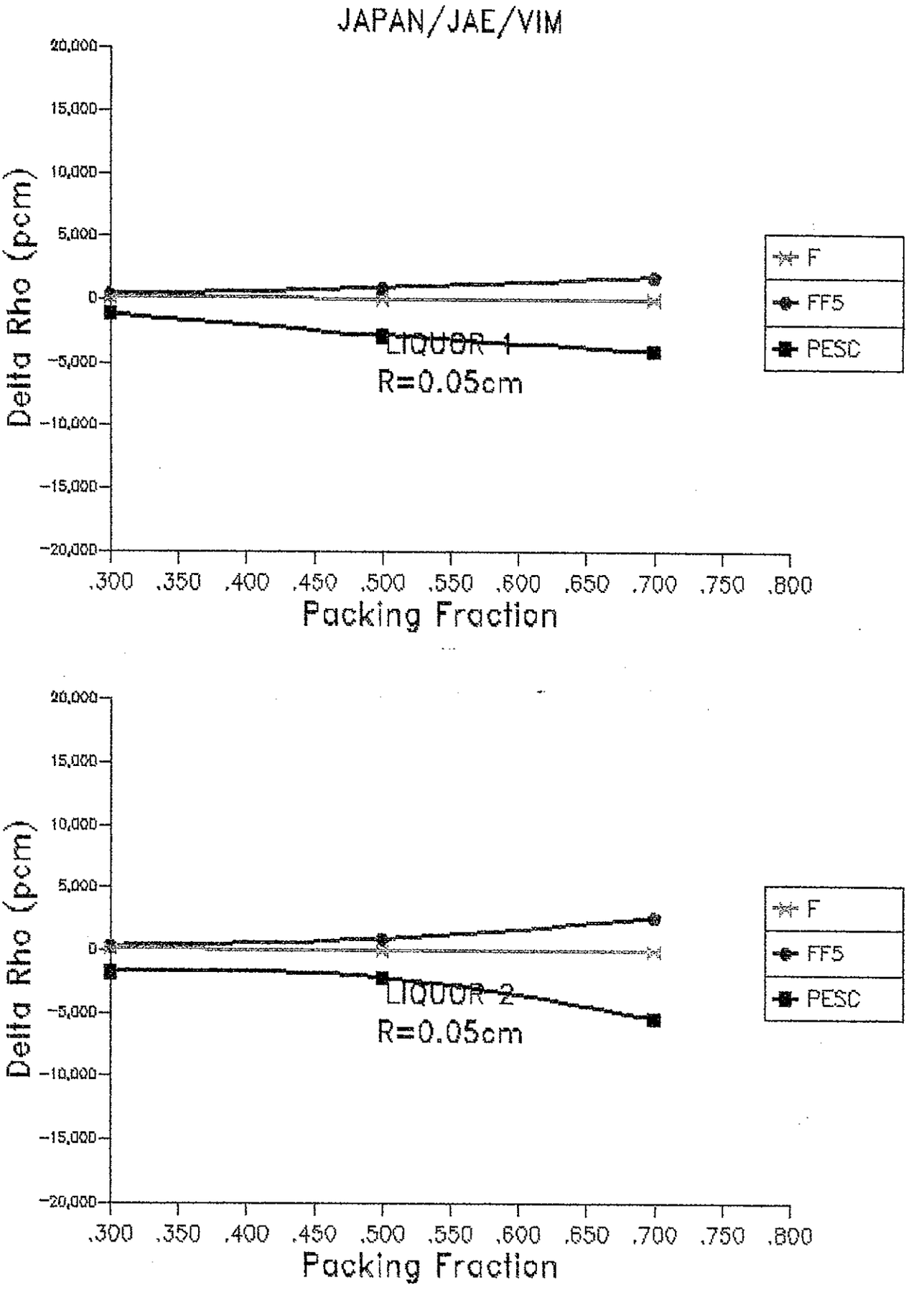
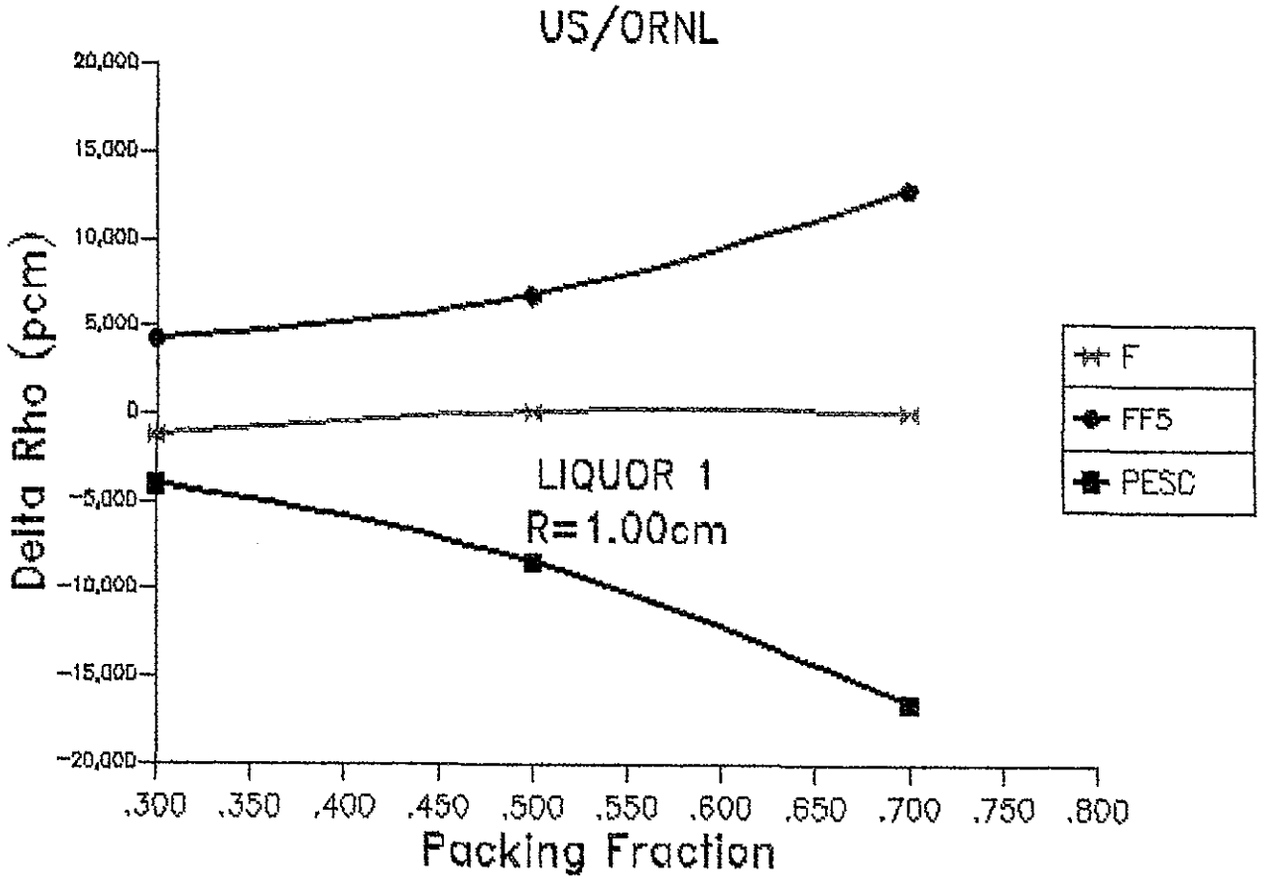


Figure 41: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by JAPAN/JAE/VIM in the May 1990 exercise. Small pellets in Liquor 1 and Liquor 2.

9421[illegible]02



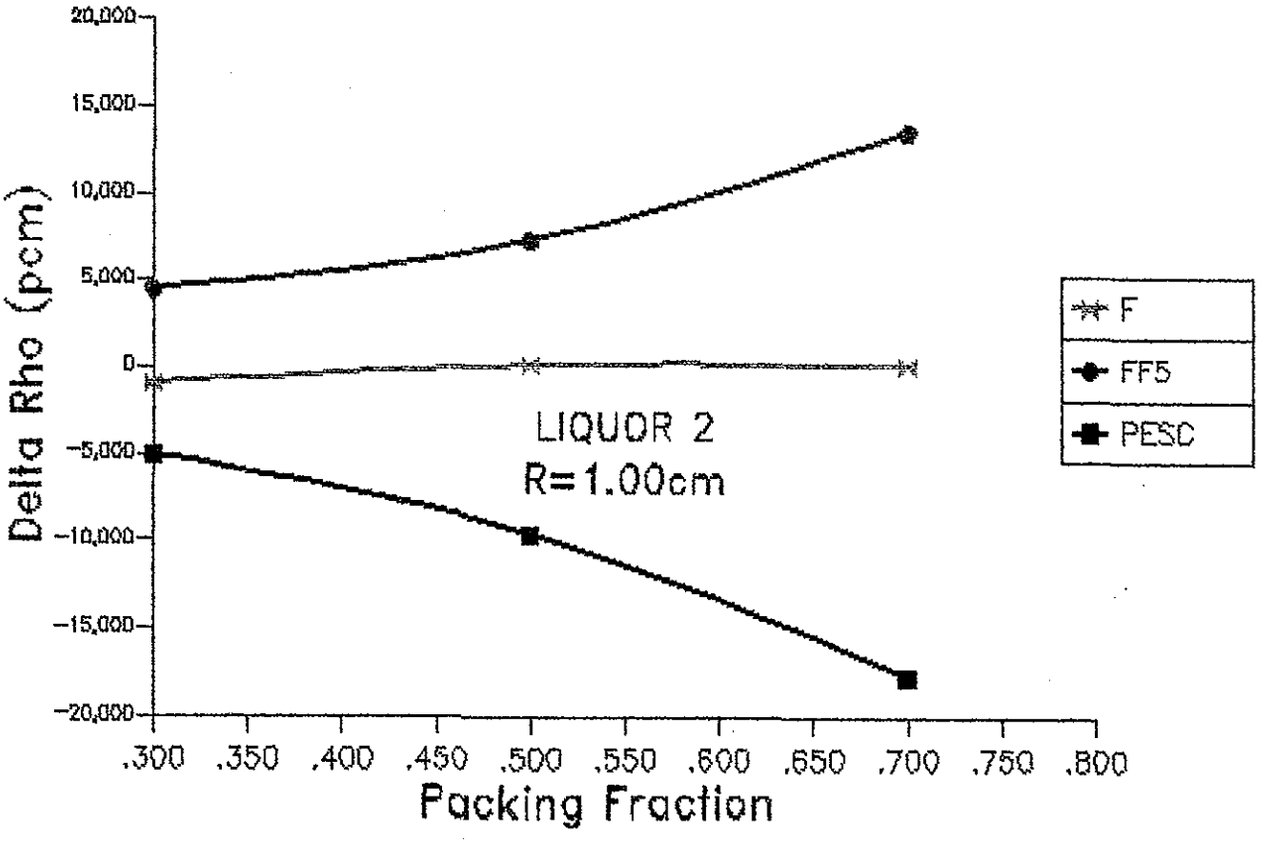


Figure 42: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by US/ORNL in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

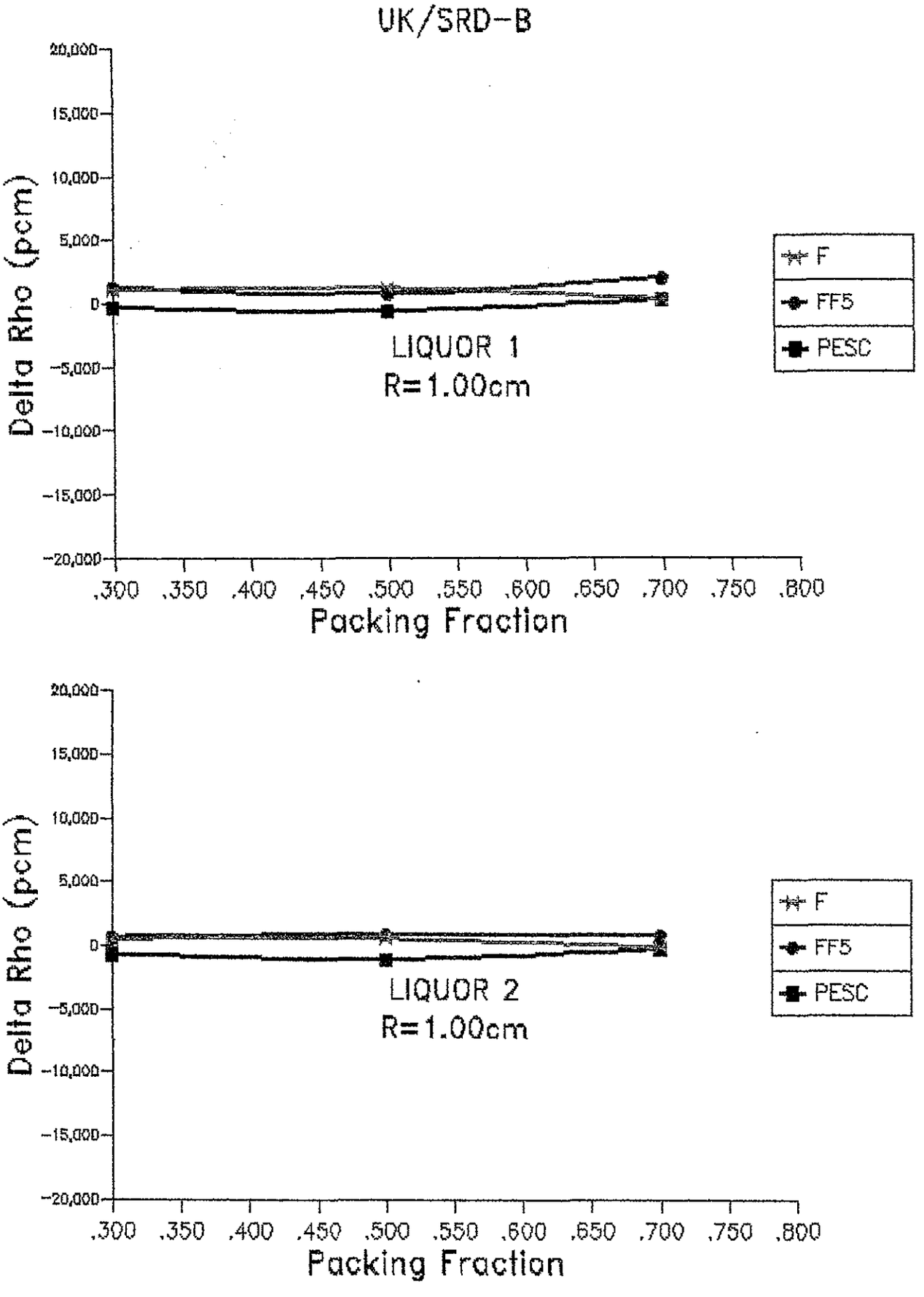


Figure 43: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by UK/SRD-B in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421154

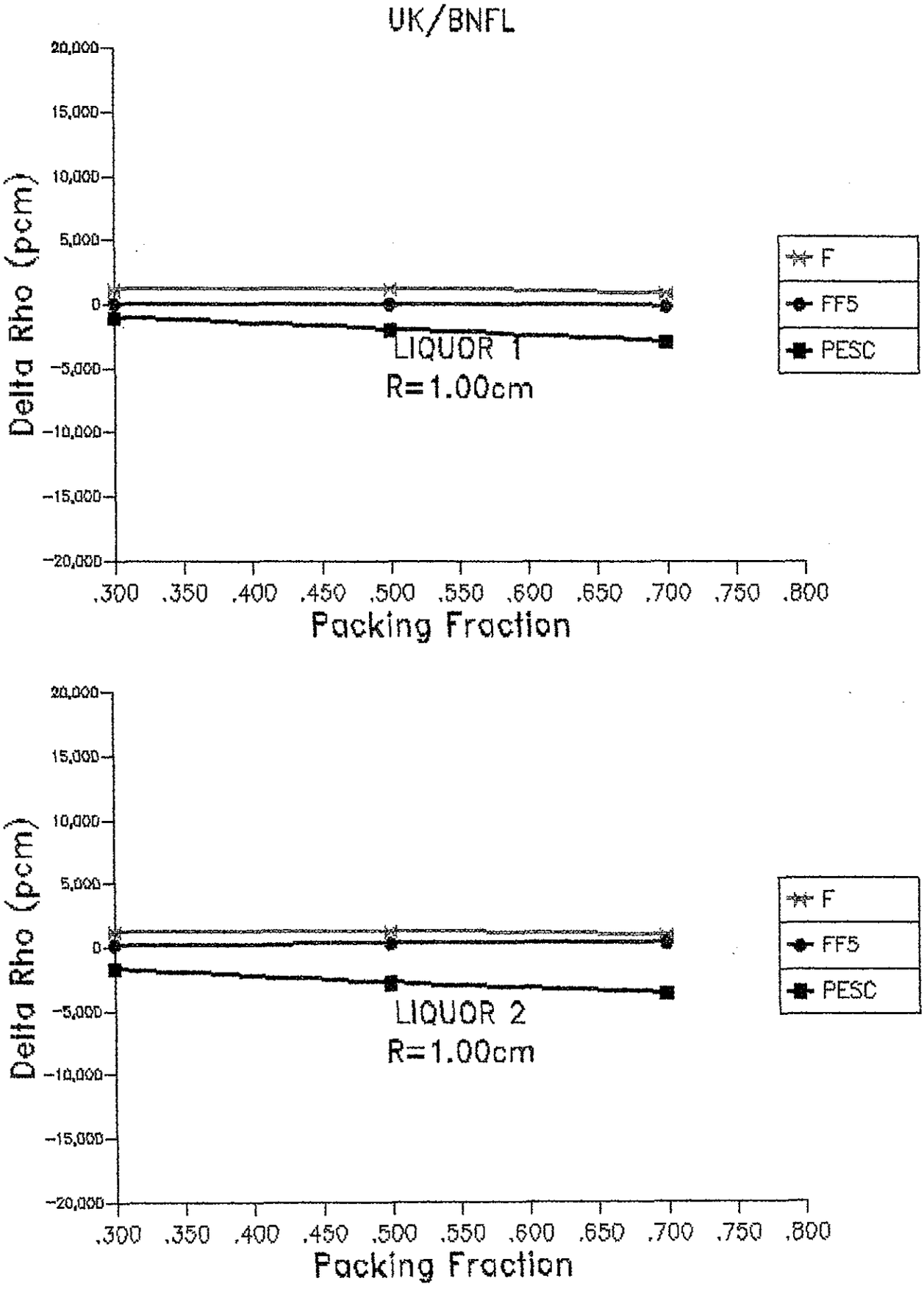


Figure 44: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by UK/BNFL in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

94210165

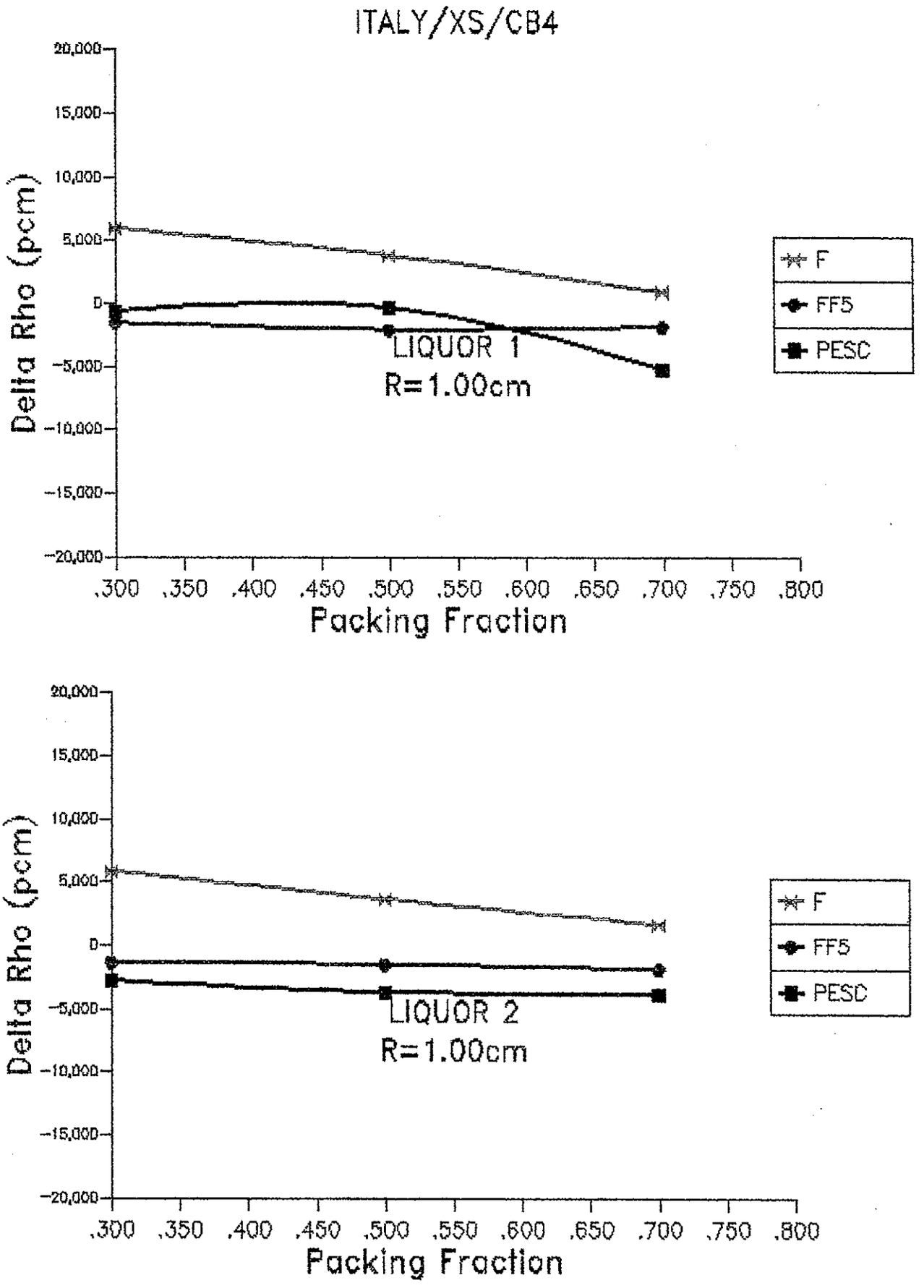


Figure 45: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by ITALY/XS/CB4 in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421136

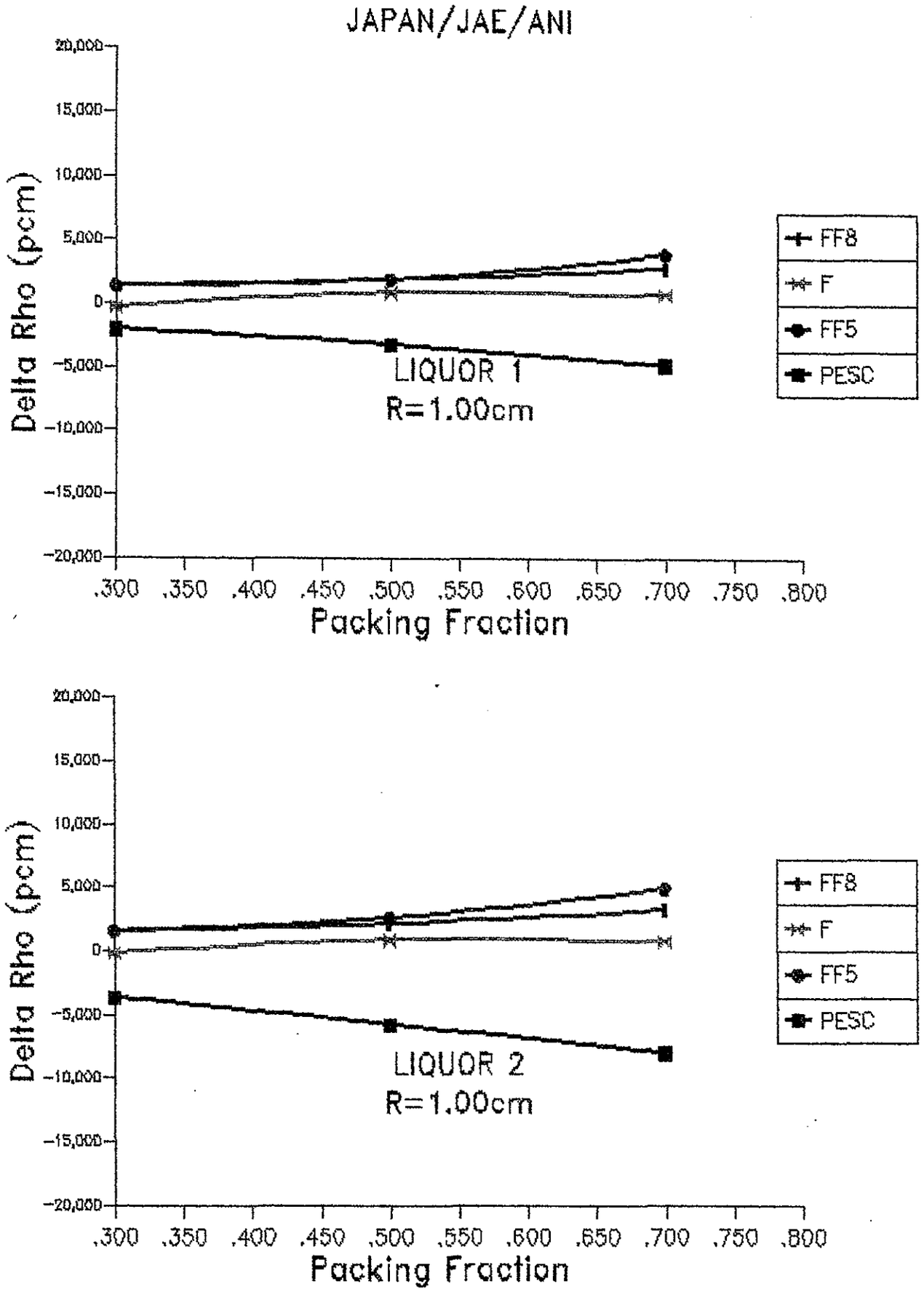


Figure 46: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC), ^{235}U Fast Fission Factor (FF5), ^{238}U Fast Fission Factor (FF8) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction, as calculated by JAPAN/JAE/ANI in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

94213167

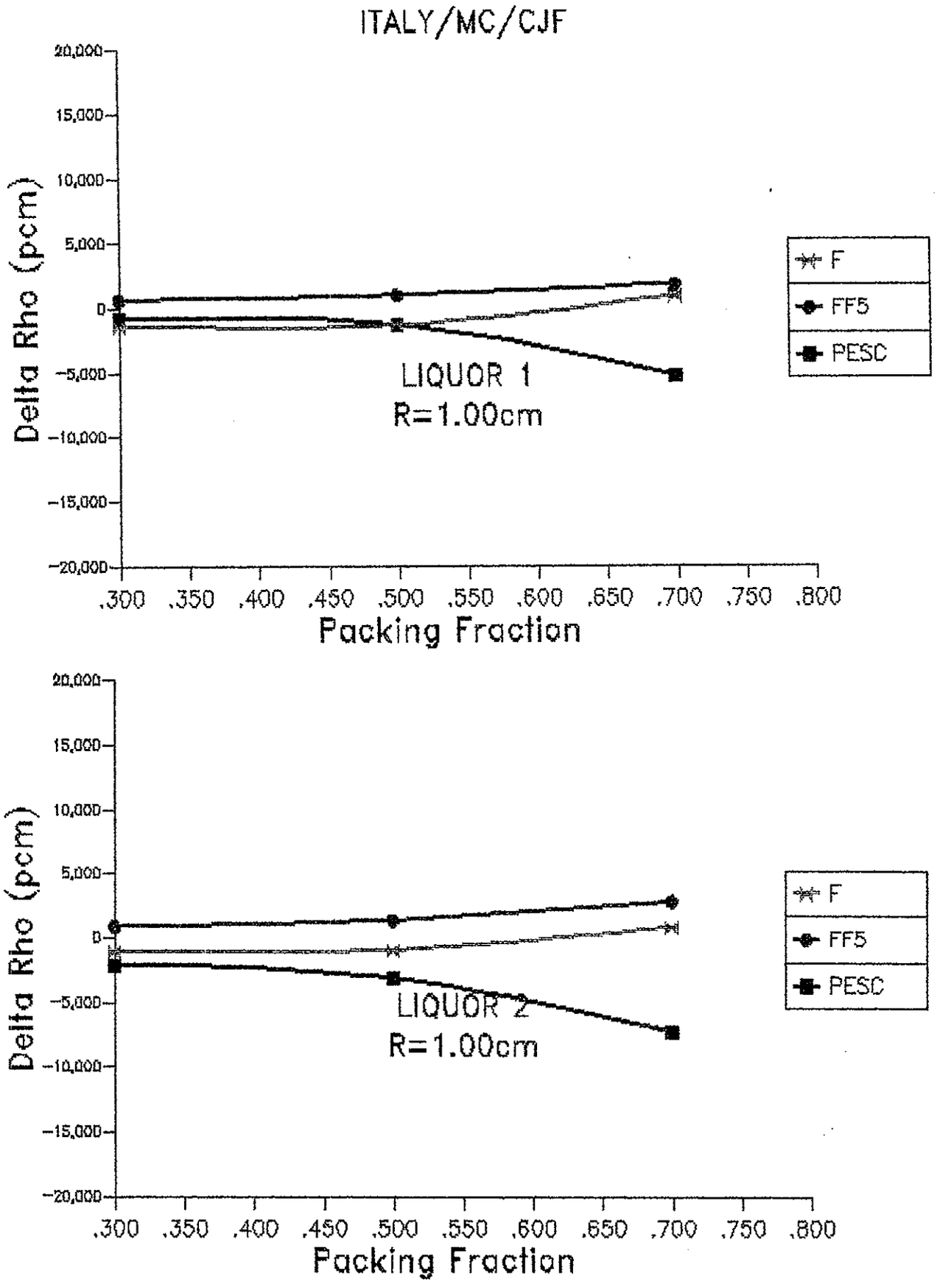


Figure 47: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by ITALY/MC/CJF in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9412010168

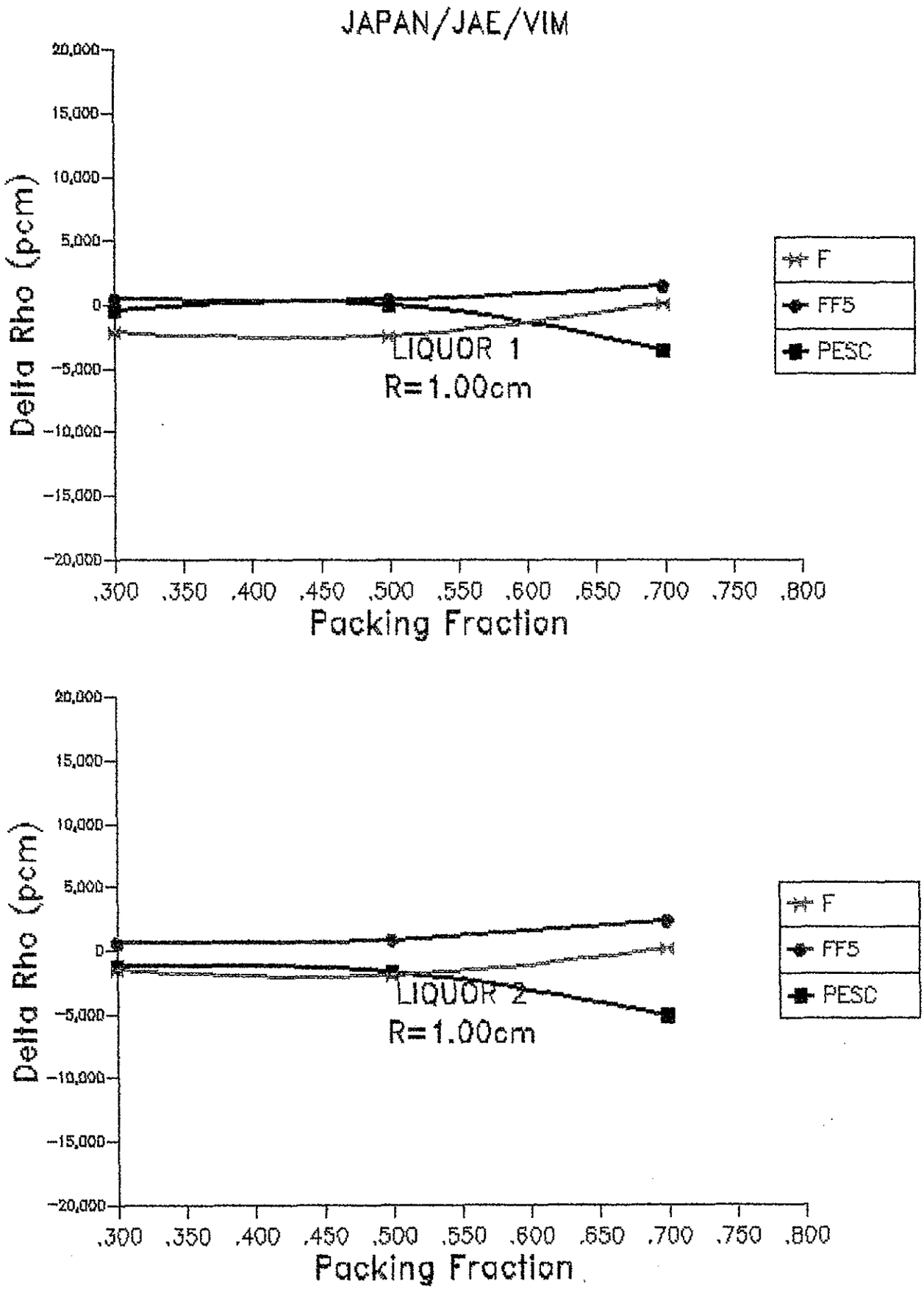
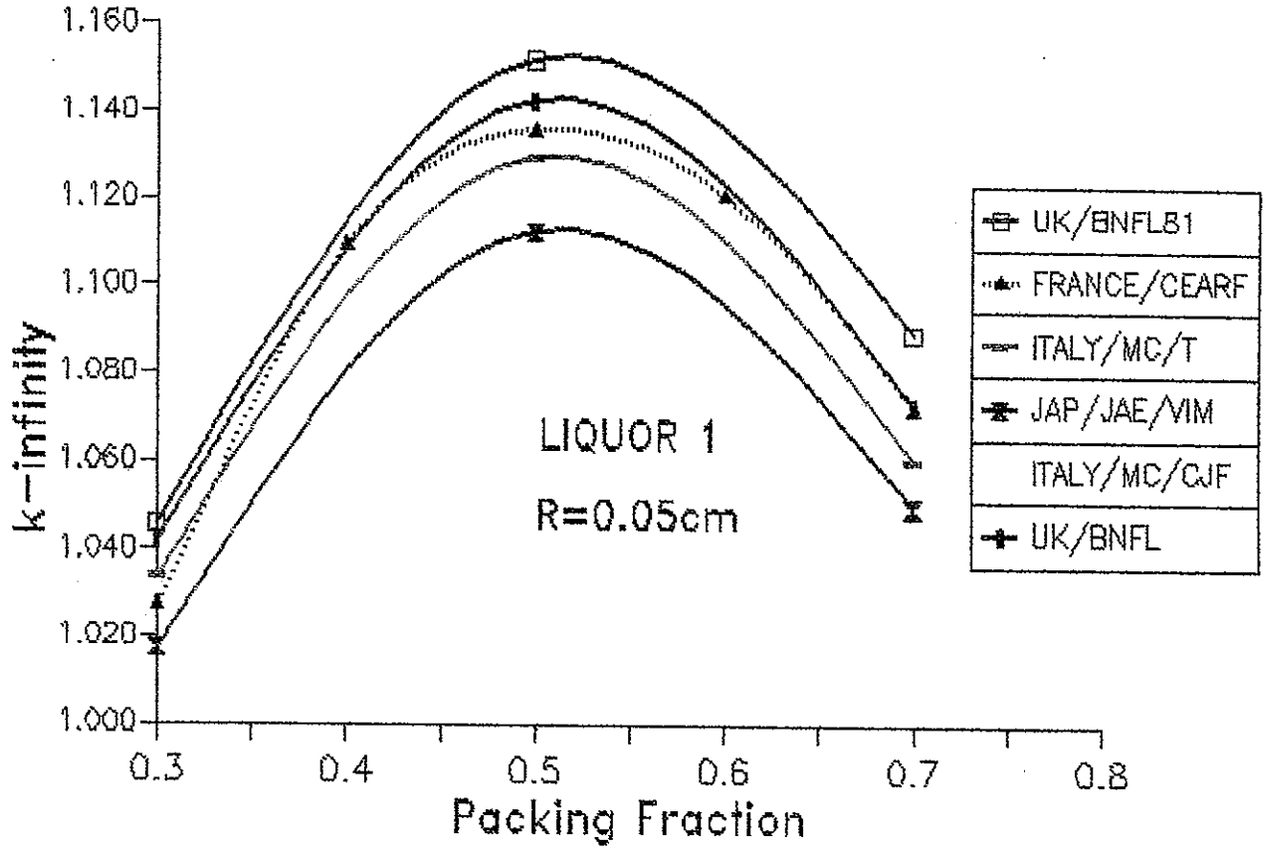


Figure 48: A comparison of the reactivity deviations, in pcm, of the Resonance Escape Probability (PESC) , ^{235}U Fast Fission Factor (FF5) and the Thermal Utilization Factor (F) from the reference APOLLO/PIC values as functions of packing fraction , as calculated by JAPAN/JAE/VIM in the May 1990 exercise. Large pellets in Liquor 1 and Liquor 2.

9421[illegible]9



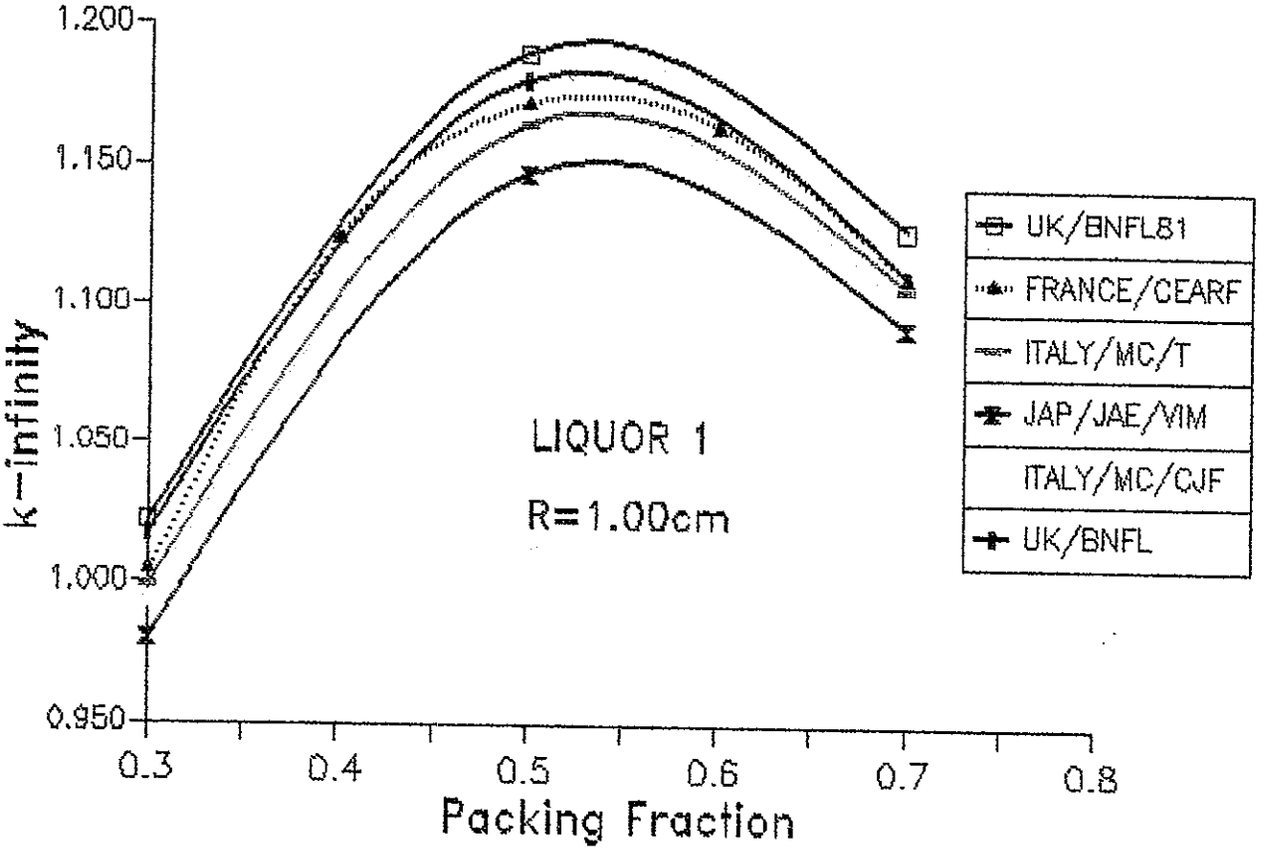
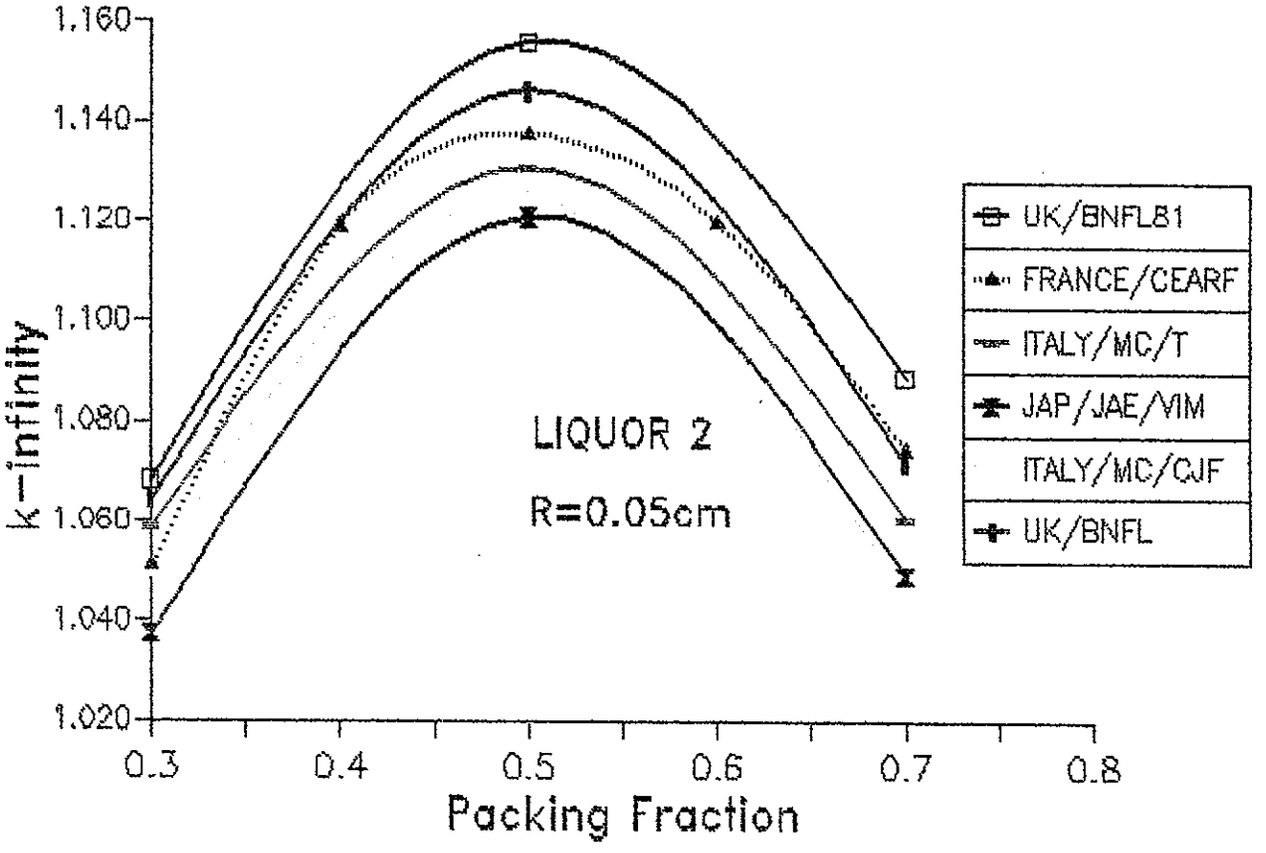


Figure 49: A comparison of k∞ values from "reference" calculations submitted to the May 1990 OECD/NEA Criticality Working Group meeting ;small pellets ,large pellets in Liquor 1.

9421170



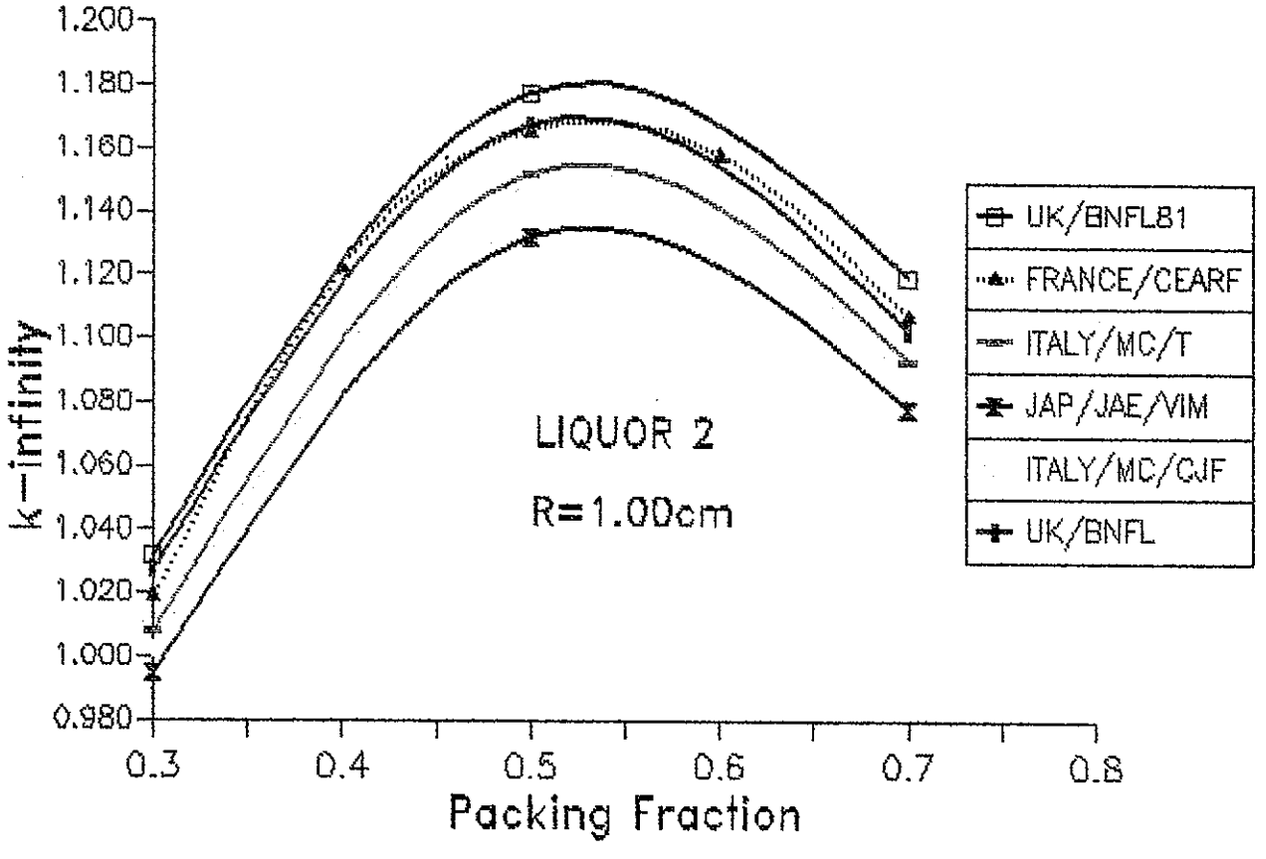
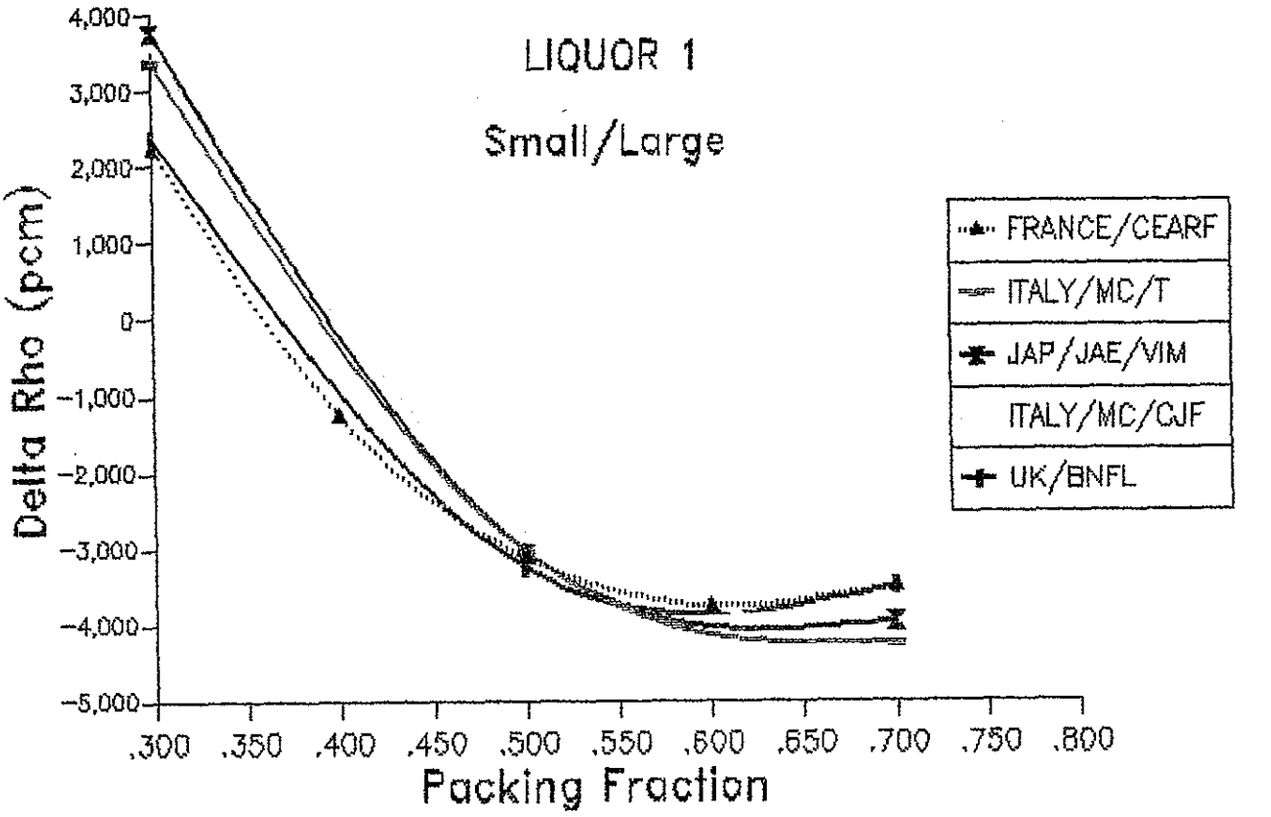


Figure 50: A comparison of k∞ values from "reference" calculations submitted to the May 1990 OECD/NEA Criticality Working Group meeting ;small pellets ,large pellets in Liquor 2.

9421071



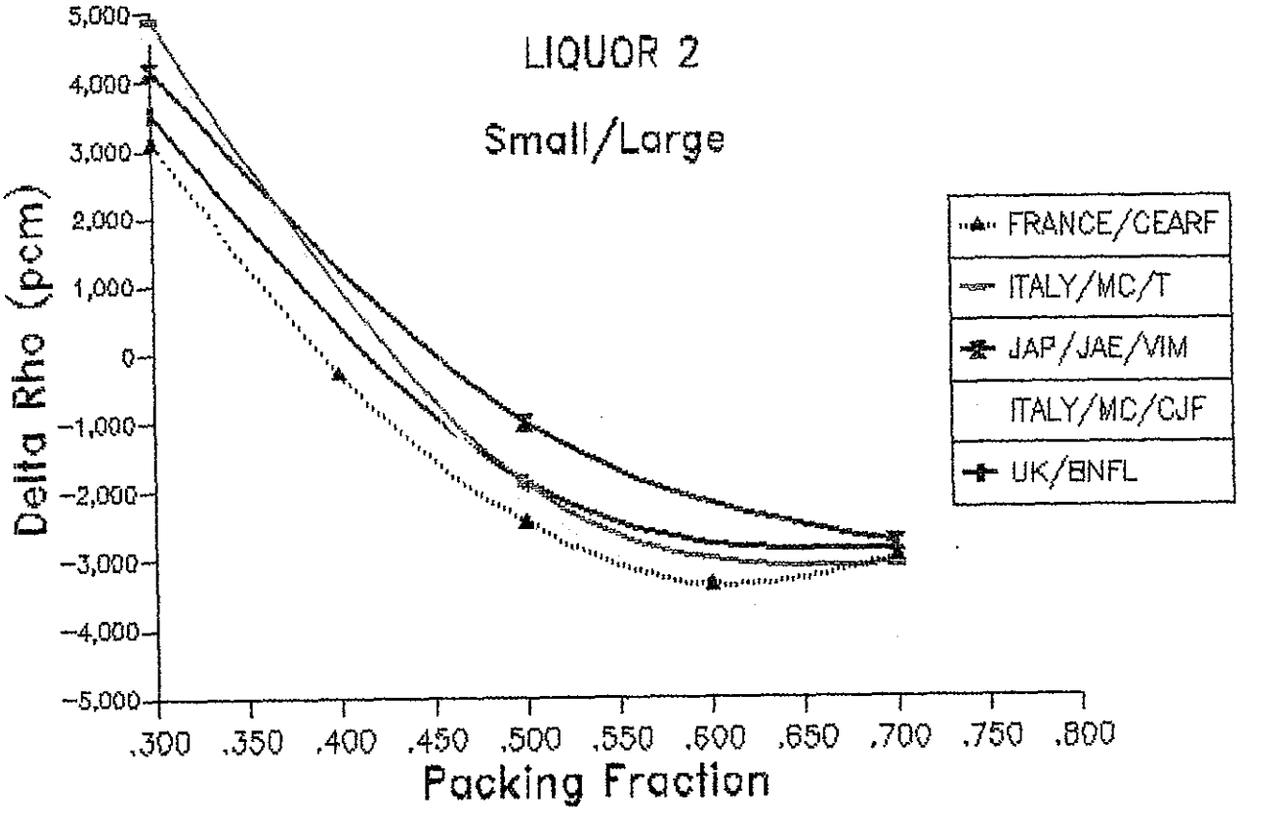
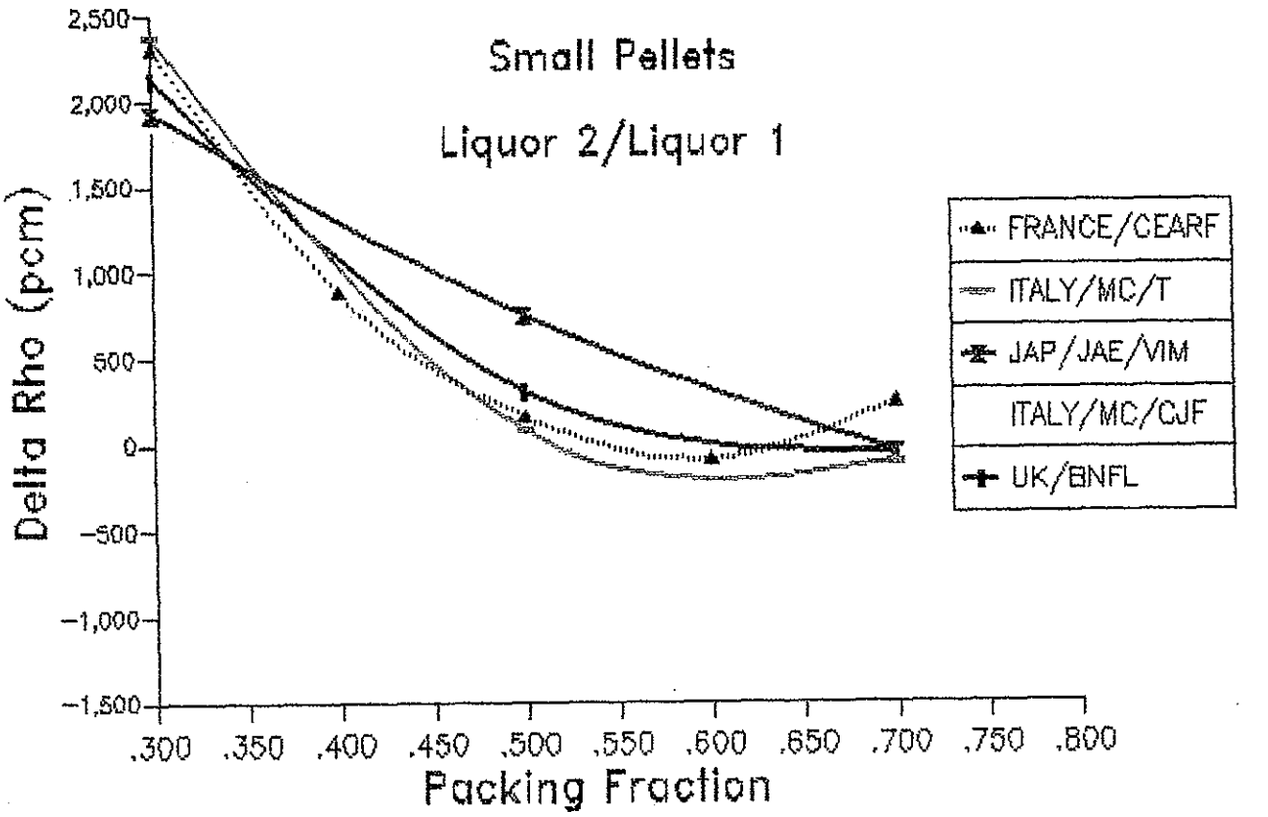


Figure 51: A comparison of S/L reactivity worths from "reference" calculations submitted to the May 1990 OECD/NEA Criticality Working Group meeting ; Liquor 1 and Liquor 2.

9402 0172



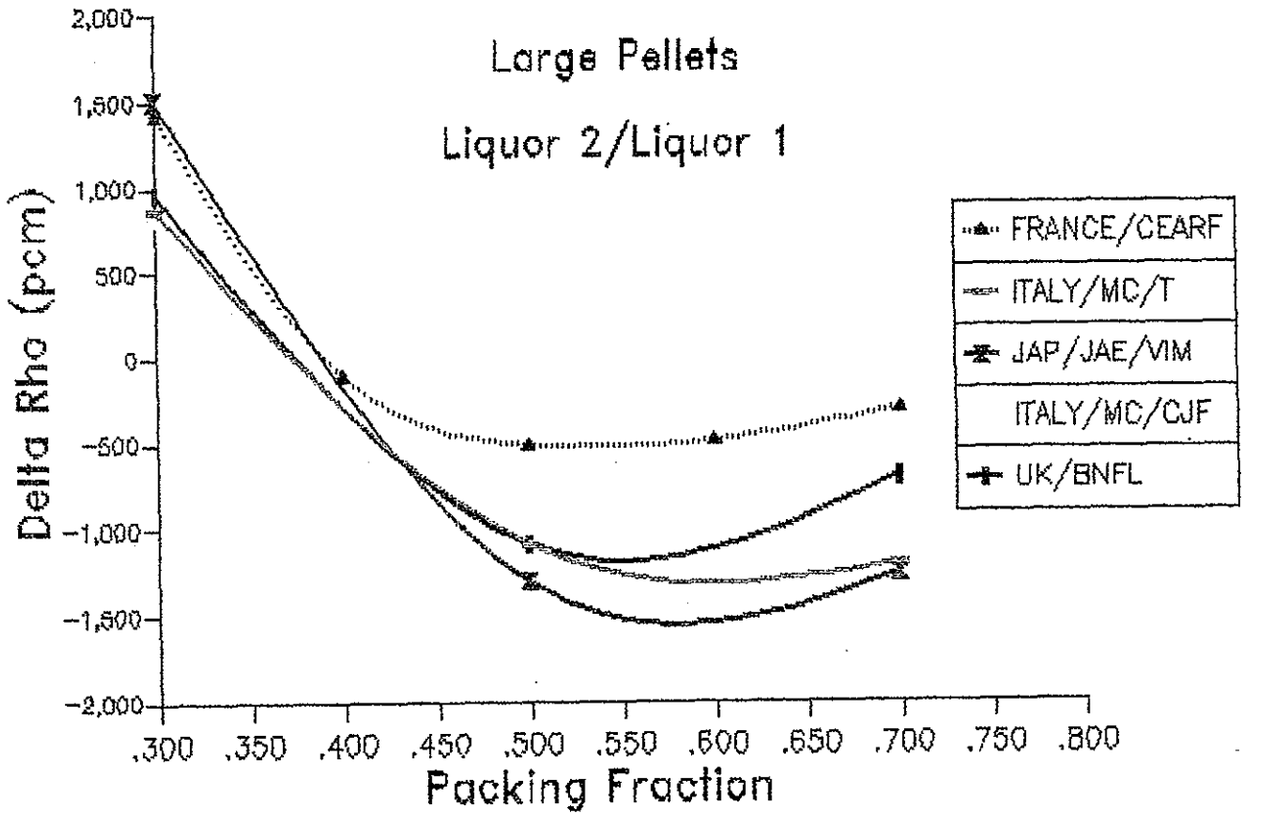
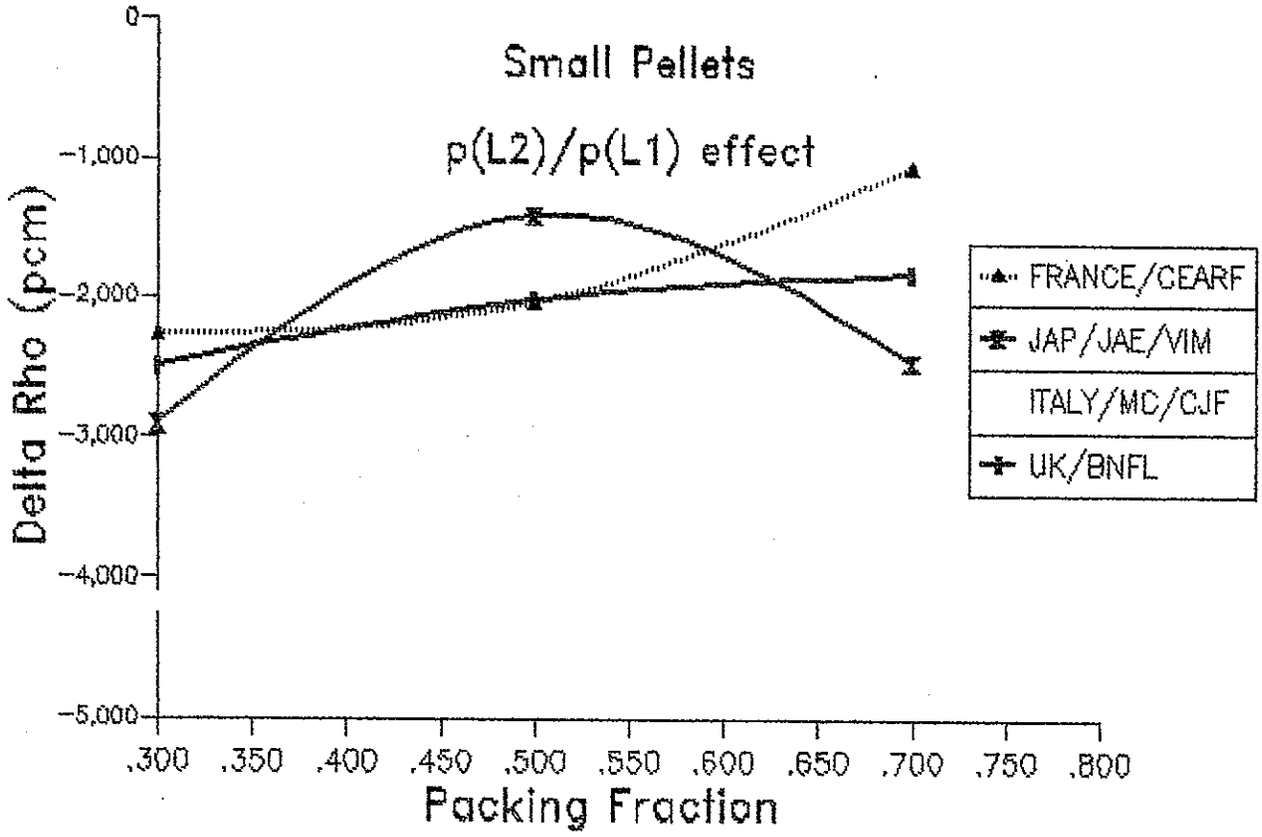


Figure 52: A comparison of L2/L1 reactivity worths from "reference" calculations submitted to the May 1990 OECD/NEA Criticality Working Group meeting ; small pellets, large pellets.

9421173



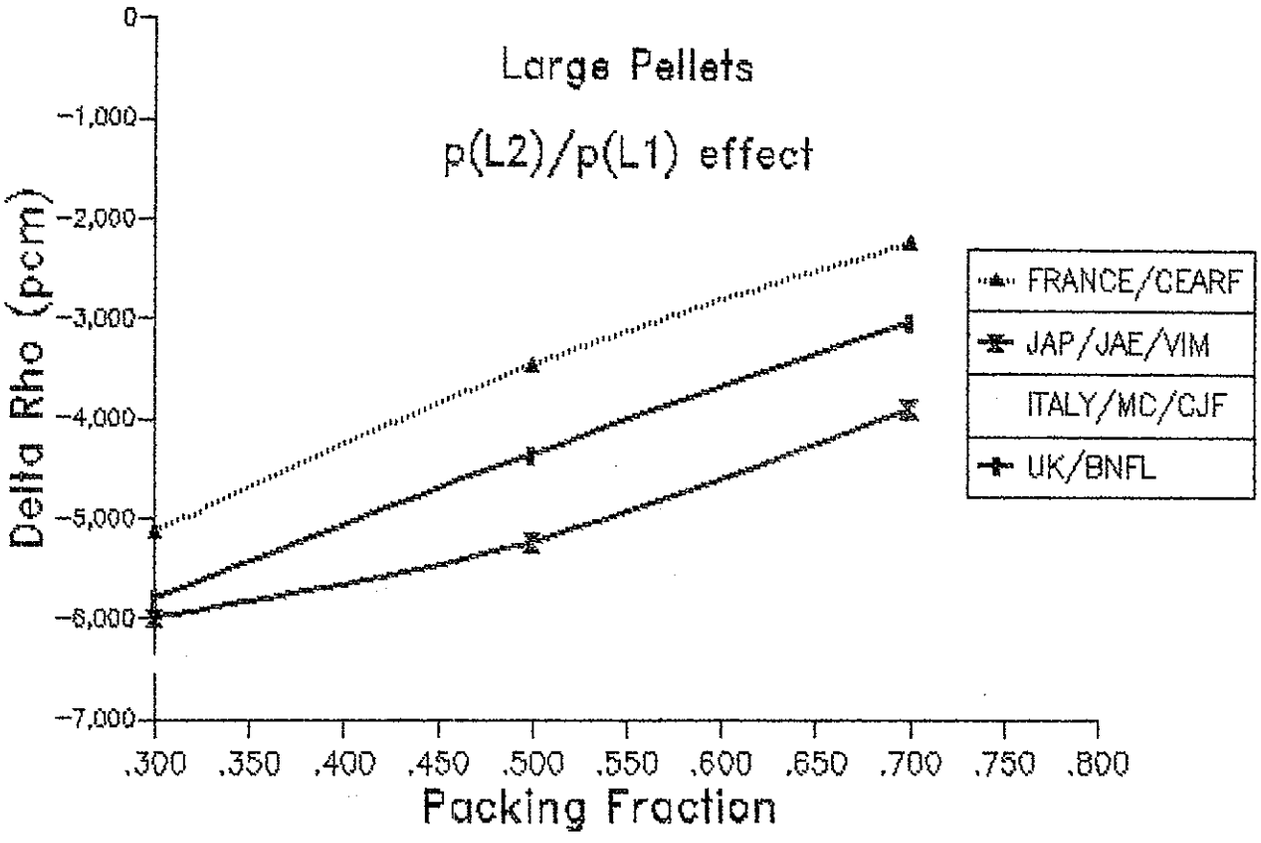


Figure 53: A comparison of the resonance escape probability contribution to the L2/L1 reactivity worths from "reference" calculations submitted to the May 1990 OECD/NEA Criticality Working Group meeting ; small pellets, large pellets.

9421174

APPENDIX I

NORMALIZED REACTION RATES

9421975

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S3L1 (PF=0.3, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 1)

FRANCE/CEAREF APOLLO PROD/ABS= 1.02707 NU= 2.44356

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1597	3.1206	5.7022	8.9825	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2511	18.4109	3.8589	24.5209	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1138	0.0001	0.0017	0.1156	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4192	2.7536	3.1728
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4773	0.2016	1.2974	1.9763
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2218	0.0003	0.0034	0.2254
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0017	0.0691	18.9023	18.9731
TOTAL	2.5247	21.5316	9.5627	33.6189	0.7008	0.6901	22.9567	24.3475

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8105	6.1421	32.7857	39.7383	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.2936	0.0000	0.0000	2.2936	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1042	6.1421	32.7857	42.0320	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.0621	14.8642	79.3418	96.2681	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.4363	0.0000	0.0000	6.4363	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.4984	14.8642	79.3418	102.7044	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 1.01947 NU= 2.44271

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1802	3.2281	5.5730	8.9813	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.7206	19.3750	3.6665	25.7621	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1405	0.0001	0.0005	0.1411	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.5579	2.6316	3.1896
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4409	0.2593	1.2237	1.9239
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2745	0.0002	0.0010	0.2757
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0032	0.0939	17.8985	17.9956
TOTAL	3.0413	22.6032	9.2400	34.8845	0.7186	0.9113	21.7549	23.3847

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8866	7.1930	31.4116	39.4911	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.2432	0.0004	0.0000	2.2436	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1298	7.1934	31.4116	41.7347	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.2555	17.3984	75.9658	95.6197	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.3293	0.0009	0.0000	6.3303	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.5848	17.3993	75.9658	101.9499	0.0000	0.0000	0.0000	0.0000

9421176

UK/SRD-A MONK 6.3 PROD/ABS= 1.06730 NU= 2.45441

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.0500	3.2274	5.8853	9.1627	0.0000	0.0000	0.0000	0.0000
CAP	92238	1.1391	18.3150	3.9768	23.4309	0.0000	0.0000	0.0000	0.0000
CAP	160	0.1099	0.0000	0.0000	0.1099	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4696	2.9876	3.4572
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.4996	0.2498	1.3389	2.0883
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1998	0.0000	0.0000	0.1998
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0899	17.9760	18.0659
TOTAL		1.2990	21.5424	9.8621	32.7034	0.6994	0.8093	22.3025	23.8113

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.5695	6.6447	33.8630	41.0772	0.0000	0.0000	0.0000	0.0000
FIS	92238	2.4081	0.0000	0.0000	2.4081	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		2.9776	6.6447	33.8630	43.4853	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	1.4588	16.1570	82.2940	99.9098	0.0000	0.0000	0.0000	0.0000
PRD	92238	6.8245	0.0000	0.0000	6.8245	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.2833	16.1570	82.2940	106.7343	0.0000	0.0000	0.0000	0.0000

UK/SRD-B MONK 6.3 PROD/ABS= 1.06600 NU= 2.45441

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.0699	3.3363	5.7537	9.1599	0.0000	0.0000	0.0000	0.0000
CAP	92238	1.1687	18.2000	4.0256	23.3943	0.0000	0.0000	0.0000	0.0000
CAP	160	0.0999	0.0000	0.0000	0.0999	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.5094	2.9168	3.4262
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.4495	0.1998	1.3685	2.0178
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2198	0.0000	0.0000	0.2198
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0899	18.1600	18.2499
TOTAL		1.3385	21.5363	9.7793	32.6541	0.6693	0.7991	22.4453	23.9137

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.6393	6.7326	33.6930	41.0649	0.0000	0.0000	0.0000	0.0000
FIS	92238	2.3674	0.0000	0.0000	2.3674	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.0067	6.7326	33.6930	43.4323	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	1.6482	16.3520	81.8700	99.8702	0.0000	0.0000	0.0000	0.0000
PRD	92238	6.7326	0.0000	0.0000	6.7326	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.3808	16.3520	81.8700	106.6028	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.04169 NU= 2.45476

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1511	3.2747	5.5494	8.9752	0.0000	0.0000	0.0000	0.0000
CAP	92238	2.3388	18.6781	3.9076	24.9245	0.0000	0.0000	0.0000	0.0000
CAP	160	0.1612	0.0000	0.0003	0.1615	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0072	0.4443	2.7867	3.2381
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3593	0.2045	1.2829	1.8466
CAP	160	0.0000	0.0000	0.0000	0.0000	0.3148	0.0000	0.0005	0.3153
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0604	18.0382	18.0994
TOTAL		2.6510	21.9528	9.4573	34.0611	0.6821	0.7091	22.1083	23.4995

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8765	6.1334	32.9967	40.0066	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4288	0.0000	0.0000	2.4288	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3053	6.1334	32.9967	42.4353	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.2348	14.9285	80.1920	97.3552	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.8163	0.0000	0.0000	6.8163	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.0511	14.9285	80.1920	104.1715	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSRDNPM PROD/ABS= 1.06309 NU= 2.44176

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1805	3.1162	6.0358	9.3325	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.6793	18.1683	4.1340	24.9815	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1409	0.0001	0.0006	0.1415	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0095	0.3907	2.9501	3.3503
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4419	0.1814	1.3717	1.9950
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2752	0.0001	0.0011	0.2764
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0032	0.2648	16.1180	16.3859
TOTAL	3.0006	21.2845	10.1704	34.4555	0.7298	0.8370	20.4409	22.0077

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8880	5.8376	34.5638	41.2893	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.2482	0.0000	0.0000	2.2482	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1361	5.8376	34.5638	43.5375	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.2591	14.1196	83.5896	99.9683	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.3434	0.0000	0.0000	6.3434	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.6025	14.1196	83.5896	106.3117	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.04979 NU= 2.45433

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1543	3.2458	5.7704	9.1705	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.1939	17.5316	3.8970	23.6225	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2174	0.0001	0.0005	0.2180	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0074	0.4558	2.7950	3.2582
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.5009	0.2114	1.3023	2.0146
CAP 160	0.0000	0.0000	0.0000	0.0000	0.4208	0.0002	0.0011	0.4220
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0010	0.0872	18.4332	18.5213
TOTAL	2.5656	20.7775	9.6679	33.0110	0.9301	0.7545	22.5316	24.2162

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8275	6.4416	32.8591	40.1282	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.6448	0.0000	0.0000	2.6448	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.4722	6.4416	32.8591	42.7730	0.0000	0.0000	0.0000	0.0000

9421178

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1439	15.6281	79.5432	97.3152	0.0000	0.0000	0.0000	0.0000
PRD 92238	7.6638	0.0000	0.0000	7.6638	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.8077	15.6281	79.5432	104.9789	0.0000	0.0000	0.0000	0.0000

ITALY/CJEF MCNP PROD/ABS= 1.03081 NU= 2.45981

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1566	3.1342	5.7177	9.0084	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.1255	19.3590	3.9051	25.3896	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1421	0.0001	0.0005	0.1428	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4448	2.7903	3.2426
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4664	0.2064	1.2943	1.9671
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2739	0.0002	0.0011	0.2751
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.1041	17.9621	18.0676
TOTAL	2.4242	22.4933	9.6233	34.5408	0.7493	0.7554	22.0478	23.5525

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.7978	6.2046	32.5183	39.5207	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.3859	0.0000	0.0000	2.3859	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1837	6.2046	32.5183	41.9065	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.0370	15.1189	79.2371	96.3929	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.6910	0.0000	0.0000	6.6910	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.7279	15.1189	79.2371	103.0839	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 1.01758 NU= 2.44234

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1602	3.1133	5.6660	8.9395	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2324	19.1203	3.8241	25.1767	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1341	0.0001	0.0005	0.1347	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4285	2.7529	3.1890
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4485	0.1992	1.2814	1.9290
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2623	0.0001	0.0010	0.2635
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0011	0.0823	18.6197	18.7031
TOTAL	2.5267	22.2336	9.4906	34.2509	0.7195	0.7101	22.6550	24.0846

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8109	6.1866	32.4344	39.4318	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.2324	0.0000	0.0000	2.2324	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.0432.	6.1866	32.4344	41.6641	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.0722	15.0159	78.3831	95.4712	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.2867	0.0000	0.0000	6.2867	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.3589	15.0159	78.3831	101.7578	0.0000	0.0000	0.0000	0.0000

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S5L1 (PF=0.5, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 1)

FRANCE/CEAREF APOLLO PROD/ABS= 1.13553 NU= 2.45613

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3445	5.4591	5.2355	11.0391	0.0000	0.0000	0.0000	0.0000
CAP 92238	4.7327	25.1537	3.5435	33.4299	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1872	0.0002	0.0016	0.1890	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3070	1.0870	1.3940
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3585	0.1482	0.5125	1.0193
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1571	0.0002	0.0014	0.1587
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0016	0.0517	6.4789	6.5323
TOTAL	5.2645	30.6130	8.7806	44.6581	0.5173	0.5071	8.0798	9.1042

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6427	10.9132	29.7535	42.3094	0.0000	0.0000	0.0000	0.0000
FIS 92238	3.9234	0.0000	0.0000	3.9234	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.5661	10.9132	29.7535	46.2327	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.1521	26.4092	72.0030	102.5642	0.0000	0.0000	0.0000	0.0000
PRD 92238	10.9840	0.0000	0.0000	10.9840	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.1361	26.4092	72.0030	113.5483	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 1.11060 NU= 2.45676

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3867	5.5445	4.9192	10.8505	0.0000	0.0000	0.0000	0.0000
CAP 92238	5.7994	26.1673	3.2098	35.1766	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2311	0.0002	0.0004	0.2318	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0086	0.3925	0.9817	1.3829
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3374	0.1826	0.4565	0.9765
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1942	0.0001	0.0004	0.1947
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0029	0.0684	5.9055	5.9768
TOTAL	6.4173	31.7120	8.1295	46.2588	0.5431	0.6437	7.3440	8.5308

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.8146	12.3636	27.1307	41.3089	0.0000	0.0000	0.0000	0.0000
FIS 92238	3.8962	0.0008	0.0000	3.8970	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.7108	12.3645	27.1307	45.2060	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.5874	29.9052	65.6138	100.1065	0.0000	0.0000	0.0000	0.0000
PRD 92238	10.9484	0.0020	0.0000	10.9504	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.5359	29.9072	65.6138	111.0569	0.0000	0.0000	0.0000	0.0000

9421780

UK/SRD-A MONK 6.3 PROD/ABS= 1.16670 NU= 2.46681

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1796	5.4591	5.2695	10.9082	0.0000	0.0000	0.0000	0.0000
CAP	92238	2.4751	26.5970	3.6727	32.7448	0.0000	0.0000	0.0000	0.0000
CAP	160	0.1597	0.0000	0.0000	0.1597	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3194	1.2575	1.5769
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3792	0.1597	0.5489	1.0878
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1397	0.0000	0.0000	0.1397
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0798	6.0080	6.0878
TOTAL		2.8144	32.0561	8.9422	43.8127	0.5190	0.5589	7.8144	8.8922

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.1277	12.1160	30.0700	43.3137	0.0000	0.0000	0.0000	0.0000
FIS	92238	3.9820	0.0000	0.0000	3.9820	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.1097	12.1160	30.0700	47.2957	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.9142	29.4310	73.0540	105.3992	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.2680	0.0000	0.0000	11.2680	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		14.1822	29.4310	73.0540	116.6672	0.0000	0.0000	0.0000	0.0000

UK/SRD-B MONK 6.3 PROD/ABS= 1.16140 NU= 2.46760

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1397	5.7973	5.3383	11.2753	0.0000	0.0000	0.0000	0.0000
CAP	92238	2.5444	26.3920	3.6719	32.6083	0.0000	0.0000	0.0000	0.0000
CAP	160	0.1796	0.0000	0.0000	0.1796	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2993	1.0976	1.3969
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3492	0.1596	0.5388	1.0477
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1397	0.0000	0.0000	0.1397
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0798	6.2064	6.2862
TOTAL		2.8637	32.1893	9.0102	44.0632	0.4889	0.5388	7.8428	8.8706

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.0876	12.1330	29.8540	43.0746	0.0000	0.0000	0.0000	0.0000
FIS	92238	3.9912	0.0000	0.0000	3.9912	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.0788	12.1330	29.8540	47.0658	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.7939	29.4750	72.5400	104.8089	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.3350	0.0000	0.0000	11.3350	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		14.1289	29.4750	72.5400	116.1439	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.14242 NU= 2.46915

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3299	5.6891	5.0261	11.0451	0.0000	0.0000	0.0000	0.0000
CAP	92238	5.0351	25.2205	3.5821	33.8376	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2644	0.0000	0.0002	0.2647	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0065	0.3239	1.0860	1.4164
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2762	0.1490	0.5001	0.9253
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2221	0.0000	0.0002	0.2223
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0008	0.0444	5.9751	6.0204
TOTAL		5.6294	30.9096	8.6084	45.1474	0.5056	0.5173	7.5615	8.5844

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.7910	10.7202	29.5506	42.0618	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.2061	0.0000	0.0000	4.2061	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.9971	10.7202	29.5506	46.2679	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.5411	26.1005	71.8314	102.4730	0.0000	0.0000	0.0000	0.0000
PRD 92238	11.7702	0.0000	0.0000	11.7702	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	16.3113	26.1005	71.8314	114.2432	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSDRNPM PROD/ABS= 1.12560 NU= 2.45606

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3861	5.3486	5.2871	11.0219	0.0000	0.0000	0.0000	0.0000
CAP 92238	5.6574	25.4455	3.7034	34.8063	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2309	0.0001	0.0005	0.2315	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2817	1.1210	1.4027
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3370	0.1307	0.5212	0.9890
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1940	0.0001	0.0004	0.1945
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0029	0.1837	5.3357	5.5223
TOTAL	6.2745	30.7943	8.9909	46.0596	0.5339	0.5962	6.9784	8.1085

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.8120	10.1750	29.9512	41.9382	0.0000	0.0000	0.0000	0.0000
FIS 92238	3.8912	0.0000	0.0000	3.8912	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.7032	10.1750	29.9512	45.8294	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.5806	24.6122	72.4344	101.6272	0.0000	0.0000	0.0000	0.0000
PRD 92238	10.9338	0.0000	0.0000	10.9338	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.5144	24.6122	72.4344	112.5609	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.16012 NU= 2.46897

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3337	5.7019	5.2410	11.2766	0.0000	0.0000	0.0000	0.0000
CAP 92238	4.6998	24.1505	3.5675	32.4177	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3511	0.0001	0.0005	0.3518	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0067	0.3317	1.0923	1.4307
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3778	0.1533	0.5051	1.0362
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2926	0.0001	0.0004	0.2931
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0009	0.0665	6.1378	6.2053
TOTAL	5.3847	29.8525	8.8089	44.0460	0.6780	0.5517	7.7356	8.9653

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6735	11.4239	29.3613	42.4587	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.5295	0.0000	0.0000	4.5295	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	6.2030	11.4239	29.3613	46.9882	0.0000	0.0000	0.0000	0.0000

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PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.2789	27.6578	71.0485	102.9852	0.0000	0.0000	0.0000	0.0000
PRD	92238	13.0272	0.0000	0.0000	13.0272	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		17.3062	27.6578	71.0485	116.0124	0.0000	0.0000	0.0000	0.0000

ITALY/CJF MCNP PROD/ABS= 1.13210 NU= 2.47420

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3385	5.4880	5.1755	11.0021	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.5644	26.2482	3.5656	34.3782	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2527	0.0001	0.0005	0.2534	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3243	1.0927	1.4170
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3567	0.1505	0.5069	1.0140
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2044	0.0001	0.0004	0.2050
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0013	0.0771	5.9006	5.9790
TOTAL		5.1556	31.7364	8.7417	45.6337	0.5625	0.5520	7.5006	8.6150

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6245	11.0381	28.9032	41.5657	0.0000	0.0000	0.0000	0.0000
FIS	92238	4.1903	0.0000	0.0000	4.1903	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.8148	11.0381	28.9032	45.7560	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.1263	26.8958	70.4283	101.4504	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.7623	0.0000	0.0000	11.7623	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.8886	26.8958	70.4283	113.2127	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 1.11290 NU= 2.45731

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3447	5.3752	5.1254	10.8452	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.7158	26.5761	3.4869	34.7787	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2188	0.0001	0.0005	0.2194	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3107	1.0690	1.3798
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3407	0.1439	0.4956	0.9801
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1828	0.0001	0.0004	0.1833
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0010	0.0622	6.2644	6.3276
TOTAL		5.2792	31.9513	8.6127	45.8433	0.5245	0.5169	7.8293	8.8708

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6485	10.8902	28.8740	41.4127	0.0000	0.0000	0.0000	0.0000
FIS	92238	3.8765	0.0000	0.0000	3.8765	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.5250	10.8902	28.8740	45.2892	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.1862	26.3762	69.8371	100.3996	0.0000	0.0000	0.0000	0.0000
PRD	92238	10.8902	0.0000	0.0000	10.8902	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.0764	26.3762	69.8371	111.2898	0.0000	0.0000	0.0000	0.0000

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S7L1 (PF=0.7, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 1)

FRANCE/CEAREF APOLLO PROD/ABS= 1.07191 NU= 2.47518

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7027	7.9525	3.2871	11.9424	0.0000	0.0000	0.0000	0.0000
CAP 92238	9.3576	30.4548	2.2370	42.0493	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2598	0.0003	0.0011	0.2611	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.1785	0.2938	0.4724
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2317	0.0870	0.1386	0.4573
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0938	0.0001	0.0004	0.0943
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.0315	1.3830	1.4159
TOTAL	10.3201	38.4075	5.5252	54.2528	0.3269	0.2971	1.8158	2.4399

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.0967	16.1544	18.3734	37.6245	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.6818	0.0000	0.0000	5.6818	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.7785	16.1544	18.3734	43.3062	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	7.7630	39.0934	44.4639	91.3204	0.0000	0.0000	0.0000	0.0000
PRD 92238	15.8692	0.0000	0.0000	15.8692	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	23.6322	39.0934	44.4639	107.1896	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 1.03618 NU= 2.47825

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7769	7.8009	2.8751	11.4528	0.0000	0.0000	0.0000	0.0000
CAP 92238	11.5349	30.7844	1.8459	44.1652	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3216	0.0002	0.0002	0.3220	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2128	0.2404	0.4531
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2237	0.0992	0.1118	0.4347
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1159	0.0001	0.0001	0.1161
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.0402	1.1976	1.2403
TOTAL	12.6334	38.5855	4.7213	55.9401	0.3421	0.3523	1.5498	2.2442

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4396	17.2331	15.3832	36.0560	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.7537	0.0016	0.0000	5.7553	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.1934	17.2348	15.3832	41.8114	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.6297	41.6834	37.2042	87.5174	0.0000	0.0000	0.0000	0.0000
PRD 92238	16.0989	0.0038	0.0000	16.1026	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	24.7286	41.6872	37.2042	103.6200	0.0000	0.0000	0.0000	0.0000

9421184

UK/SRD-B MONK 6.3 PROD/ABS= 1.10571 NU= 2.48930

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.2594	8.6984	3.1322	12.0900	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.7282	33.9753	2.2344	40.9380	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2594	0.0000	0.0000	0.2594	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2195	0.3092	0.5287
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2095	0.0998	0.1596	0.4688
CAP	160	0.0000	0.0000	0.0000	0.0000	0.0998	0.0000	0.0000	0.0998
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0399	1.1571	1.1970
TOTAL		5.2469	42.6737	5.3667	53.2873	0.3092	0.3591	1.6259	2.2943

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	2.2145	17.8452	18.3242	38.3838	0.0000	0.0000	0.0000	0.0000
FIS	92238	6.0350	0.0000	0.0000	6.0350	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.2495	17.8452	18.3242	44.4188	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	5.6560	43.3624	44.5194	93.5378	0.0000	0.0000	0.0000	0.0000
PRD	92238	17.0372	0.0000	0.0000	17.0372	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		22.6931	43.3624	44.5194	110.5750	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.07240 NU= 2.49100

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6780	8.1470	3.1150	11.9400	0.0000	0.0000	0.0000	0.0000
CAP	92238	10.1800	29.9400	2.2560	42.3760	0.0000	0.0000	0.0000	0.0000
CAP	160	0.3654	0.0000	0.0001	0.3656	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0055	0.1881	0.2901	0.4837
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1848	0.0864	0.1336	0.4048
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1317	0.0000	0.0001	0.1318
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0007	0.0261	1.2200	1.2468
TOTAL		11.2234	38.0870	5.3711	54.6815	0.3227	0.3007	1.6438	2.2672

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.3930	15.4800	18.0000	36.8730	0.0000	0.0000	0.0000	0.0000
FIS	92238	6.1780	0.0000	0.0000	6.1780	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.5710	15.4800	18.0000	43.0510	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.5470	37.6900	43.7600	89.9970	0.0000	0.0000	0.0000	0.0000
PRD	92238	17.2400	0.0000	0.0000	17.2400	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		25.7870	37.6900	43.7600	107.2370	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSDRNPM PROD/ABS= 1.03025 NU= 2.47874

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7801	7.5411	3.1449	11.4661	0.0000	0.0000	0.0000	0.0000
CAP	92238	11.2500	31.2061	2.2943	44.7504	0.0000	0.0000	0.0000	0.0000
CAP	160	0.1162	0.0001	0.0001	0.1164	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0074	0.1601	0.2936	0.4610
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2243	0.0743	0.1365	0.4351
CAP	160	0.0000	0.0000	0.0000	0.0000	0.0116	0.0001	0.0001	0.0118
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0025	0.0964	1.0945	1.1935
TOTAL		12.1464	38.7472	5.4393	56.3329	0.2458	0.3308	1.5247	2.1014

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4524	14.6496	17.6927	35.7946	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.7690	0.0000	0.0000	5.7690	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2213	14.6496	17.6927	41.5636	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.6614	35.4363	42.7895	86.8872	0.0000	0.0000	0.0000	0.0000
PRD 92238	16.1412	0.0000	0.0000	16.1412	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	24.8026	35.4363	42.7895	103.0284	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.08953 NU= 2.49346

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.6766	8.1797	3.1476	12.0039	0.0000	0.0000	0.0000	0.0000
CAP 92238	9.4027	29.8720	2.1752	41.4499	0.0000	0.0000	0.0000	0.0000
CAP 160	0.4782	0.0002	0.0003	0.4786	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0057	0.1864	0.2807	0.4728
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2456	0.0865	0.1303	0.4624
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1714	0.0001	0.0001	0.1716
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0008	0.0413	1.2229	1.2651
TOTAL	10.5574	38.0519	5.3231	53.9324	0.4235	0.3143	1.6340	2.3719

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.1175	16.6401	17.3418	37.0994	0.0000	0.0000	0.0000	0.0000
FIS 92238	6.5959	0.0000	0.0000	6.5959	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.7134	16.6401	17.3418	43.6953	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	7.9091	40.1969	41.9010	90.0069	0.0000	0.0000	0.0000	0.0000
PRD 92238	18.9456	0.0000	0.0000	18.9456	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	26.8547	40.1969	41.9010	108.9525	0.0000	0.0000	0.0000	0.0000

ITALY/CJF MCNP PROD/ABS= 1.05684 NU= 2.49668

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.6904	7.6686	3.1426	11.5016	0.0000	0.0000	0.0000	0.0000
CAP 92238	9.2081	32.1235	2.2065	43.5381	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3614	0.0002	0.0003	0.3619	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0060	0.1808	0.2825	0.4692
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2394	0.0839	0.1310	0.4543
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1312	0.0001	0.0001	0.1314
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0012	0.0436	1.1729	1.2177
TOTAL	10.2599	39.7923	5.3494	55.4017	0.3777	0.3084	1.5865	2.2726

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.0444	15.8328	17.2587	36.1359	0.0000	0.0000	0.0000	0.0000
FIS 92238	6.1934	0.0000	0.0000	6.1934	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2378	15.8328	17.2587	42.3293	0.0000	0.0000	0.0000	0.0000

9421036

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.6757	38.5790	42.0545	88.3092	0.0000	0.0000	0.0000	0.0000
PRD	92238	17.3732	0.0000	0.0000	17.3732	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		25.0489	38.5790	42.0545	105.6824	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 1.04892 NU= 2.47455

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7000	7.7359	3.1719	11.6078	0.0000	0.0000	0.0000	0.0000
CAP	92238	9.2970	31.8186	2.1975	43.3131	0.0000	0.0000	0.0000	0.0000
CAP	160	0.3122	0.0002	0.0003	0.3127	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0060	0.1780	0.2844	0.4684
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2267	0.0826	0.1322	0.4416
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1124	0.0001	0.0001	0.1125
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0383	1.3125	1.3517
TOTAL		10.3092	39.5547	5.3697	55.2336	0.3459	0.2990	1.7292	2.3741

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1222	15.9093	17.5997	36.6312	0.0000	0.0000	0.0000	0.0000
FIS	92238	5.7572	0.0000	0.0000	5.7572	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.8794	15.9093	17.5997	42.3884	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.8453	38.4807	42.4580	88.7839	0.0000	0.0000	0.0000	0.0000
PRD	92238	16.1082	0.0000	0.0000	16.1082	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		23.9534	38.4807	42.4580	104.8921	0.0000	0.0000	0.0000	0.0000

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S3L2 (PF=0.3, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 2)

FRANCE/CEAREF APOLLO PROD/ABS= 1.05093 NU= 2.44448

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1605	3.0783	5.3510	8.5899	0.0122	0.2372	0.4159	0.6653
CAP	92238	2.2568	16.8730	3.6213	22.7511	0.1748	2.2015	0.2814	2.6577
CAP	160	0.1131	0.0001	0.0016	0.1149	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4112	2.5667	2.9778
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3497	0.1467	0.8968	1.3931
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2155	0.0003	0.0031	0.2189
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0018	0.0683	17.5672	17.6372
TOTAL		2.5304	19.9515	8.9739	31.4558	0.7540	3.0651	21.7309	25.5500

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8117	6.0724	30.7430	37.6272	0.0617	0.4664	2.3884	2.9165
FIS	92238	2.2763	0.0000	0.0000	2.2763	0.1724	0.0000	0.0000	0.1724
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.0881	6.0724	30.7430	39.9035	0.2341	0.4664	2.3884	3.0889

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.0645	14.6949	74.3973	91.1567	0.1569	1.1287	5.7800	7.0656
PRD	92238	6.3883	0.0000	0.0000	6.3883	0.4839	0.0000	0.0000	0.4839
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.4528	14.6949	74.3973	97.5450	0.6408	1.1287	5.7800	7.5495

US/ORNL R-XSDRNPM PROD/ABS= 1.04082 NU= 2.44410

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1811	3.1836	5.2086	8.5732	0.0138	0.2454	0.4039	0.6631
CAP	92238	2.7322	17.7902	3.4251	23.9475	0.2083	2.3483	0.2655	2.8221
CAP	160	0.1398	0.0001	0.0005	0.1404	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0095	0.5452	2.4400	2.9947
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3236	0.1879	0.8412	1.3527
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2669	0.0002	0.0009	0.2680
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0032	0.0926	16.5595	16.6552
TOTAL		3.0531	20.9738	8.6342	32.6610	0.8253	3.4196	20.5110	24.7559

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8886	7.1001	29.3093	37.2980	0.0676	0.5450	2.2735	2.8862
FIS	92238	2.2313	0.0004	0.0000	2.2317	0.1694	0.0000	0.0000	0.1694
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.1199	7.1005	29.3093	39.5297	0.2370	0.5451	2.2735	3.0555

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.2601	17.1734	70.8813	90.3148	0.1720	1.3184	5.4982	6.9885
PRD	92238	6.2955	0.0009	0.0000	6.2965	0.4779	0.0001	0.0000	0.4780
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.5556	17.1743	70.8813	96.6112	0.6499	1.3185	5.4982	7.4665

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UK/SRD-A MONK 6.3 PROD/ABS= 1.08878 NU= 2.45769

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0799	3.3563	5.2842	8.7204	0.0100	0.2697	0.3996	0.6793
CAP 92238	1.2486	16.9613	3.3963	21.6061	0.0999	2.3175	0.3097	2.7270
CAP 160	0.1199	0.0000	0.0000	0.1199	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0100	0.4195	2.7370	3.1665
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3396	0.1398	0.8790	1.3585
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1898	0.0000	0.0000	0.1898
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0699	17.0613	17.1313
TOTAL	1.4484	20.3176	8.6804	30.4464	0.6493	3.2165	21.3866	25.2523

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.6293	6.6527	31.3752	38.6572	0.0400	0.5194	2.4773	3.0367
FIS 92238	2.4274	0.0000	0.0000	2.4274	0.1798	0.0000	0.0000	0.1798
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.0567	6.6527	31.3752	41.0846	0.2198	0.5194	2.4773	3.2165

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.6482	16.1725	76.2466	94.0673	0.1099	1.2586	6.0333	7.4018
PRD 92238	6.9024	0.0000	0.0000	6.9024	0.5094	0.0000	0.0000	0.5094
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.5506	16.1725	76.2466	100.9697	0.6193	1.2586	6.0333	7.9112

UK/SRD-B MONK 6.3 PROD/ABS= 1.08180 NU= 2.47235

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0601	3.1347	5.4782	8.6730	0.0000	0.2404	0.4707	0.7111
CAP 92238	1.2619	17.2260	3.8558	22.3437	0.0901	2.4937	0.2804	2.8643
CAP 160	0.0901	0.0000	0.0000	0.0901	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4006	2.5639	2.9645
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3205	0.1302	0.9214	1.3721
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2704	0.0000	0.0000	0.2704
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.1202	16.8350	16.9552
TOTAL	1.4121	20.3607	9.3340	31.1068	0.6810	3.3850	21.0714	25.1375

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.5809	6.3395	31.3670	38.2874	0.0701	0.5108	2.3335	2.9144
FIS 92238	2.3636	0.0000	0.0000	2.3636	0.1903	0.0000	0.0000	0.1903
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	2.9445	6.3395	31.3670	40.6510	0.2604	0.5108	2.3335	3.1047

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.5123	16.1240	76.2140	93.8503	0.1803	1.2319	5.6685	7.0807
PRD 92238	6.7201	0.0000	0.0000	6.7201	0.5308	0.0000	0.0000	0.5308
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.2324	16.1240	76.2140	100.5704	0.7111	1.2319	5.6685	7.6115

UK/BNFL WIMSE PROD/ABS= 1.06414 NU= 2.45631

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1519	3.2331	5.1942	8.5792	0.0116	0.2492	0.4030	0.6638
CAP 92238	2.3481	17.1307	3.6621	23.1409	0.1791	2.2711	0.2838	2.7340
CAP 160	0.1606	0.0000	0.0002	0.1609	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0071	0.4352	2.5911	3.0334
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2635	0.1485	0.8848	1.2969
CAP 160	0.0000	0.0000	0.0000	0.0000	0.3066	0.0000	0.0005	0.3071
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0009	0.0596	16.7007	16.7611
TOTAL	2.6606	20.3638	8.8566	31.8810	0.7688	3.1636	20.8639	24.7963

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8783	6.0592	30.8612	37.7988	0.0668	0.4659	2.3941	2.9268
FIS	92238	2.4141	0.0000	0.0000	2.4141	0.1833	0.0000	0.0000	0.1833
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.2924	6.0592	30.8612	40.2129	0.2501	0.4659	2.3941	3.1101

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.2391	14.7506	75.0130	92.0027	0.1703	1.1340	5.8182	7.1226
PRD	92238	6.7763	0.0000	0.0000	6.7763	0.5143	0.0000	0.0000	0.5143
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.0154	14.7506	75.0130	98.7789	0.6846	1.1340	5.8182	7.6369

ITALY/CB4 XSDRNPM PROD/ABS= 1.04108 NU= 2.44486

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1811	2.9923	5.3817	8.5551	0.0138	0.2565	0.4173	0.6877
CAP	92238	2.6877	17.4456	3.6918	23.8252	0.2079	4.4977	0.2861	4.9917
CAP	160	0.1400	0.0001	0.0005	0.1405	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0095	0.3675	2.6141	2.9911
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.4350	0.1265	0.9012	1.4627
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2673	0.0001	0.0010	0.2684
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0032	0.2497	14.2473	14.5002
TOTAL		3.0088	20.4380	9.0740	32.5208	0.9367	5.4981	18.4669	24.9017

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8891	5.6131	30.7886	37.2907	0.0677	0.4320	2.3882	2.8879
FIS	92238	2.2336	0.0000	0.0000	2.2336	0.1695	0.0000	0.0000	0.1695
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.1227	5.6131	30.7886	39.5243	0.2372	0.4320	2.3882	3.0575

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.2612	13.5773	74.4606	90.2991	0.1721	1.0788	5.7757	7.0265
PRD	92238	6.3023	0.0000	0.0000	6.3023	0.4784	0.0000	0.0000	0.4784
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.5635	13.5773	74.4606	96.6013	0.6505	1.0788	5.7757	7.5049

JAPAN/JAERI ANISN PROD/ABS= 1.04208 NU= 2.45736

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1553	3.1356	5.2194	8.5103	0.0118	0.2505	0.4047	0.6670
CAP	92238	2.2140	16.6299	3.5263	22.3702	0.1683	4.1274	0.2735	4.5692
CAP	160	0.2154	0.0001	0.0005	0.2159	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0074	0.4328	2.5145	2.9547
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3677	0.1493	0.8646	1.3815
CAP	160	0.0000	0.0000	0.0000	0.0000	0.4087	0.0002	0.0009	0.4098
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0010	0.0840	16.4296	16.5145
TOTAL		2.5847	19.7656	8.7462	31.0965	0.9649	5.0440	20.4878	26.4967

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8295	6.2412	29.6534	36.7241	0.0631	0.4909	2.3041	2.8581
FIS	92238	2.6247	0.0000	0.0000	2.6247	0.1994	0.0000	0.0000	0.1994
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.4542	6.2412	29.6534	39.3488	0.2625	0.4909	2.3041	3.0575

9421190

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1439	15.1272	71.8293	89.1004	0.1633	1.1821	5.5700	6.9154
PRD 92238	7.6137	0.0000	0.0000	7.6137	0.5790	0.0000	0.0000	0.5790
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.7576	15.1272	71.8293	96.7141	0.7423	1.1821	5.5700	7.4945

ITALY/CJF MCNP PROD/ABS= 1.04942 NU= 2.46156

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1606	3.1405	5.3071	8.6082	0.0122	0.2458	0.4075	0.6655
CAP 92238	2.1811	18.2012	3.6342	24.0164	0.2664	2.5549	0.2787	3.1000
CAP 160	0.1461	0.0001	0.0005	0.1466	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0077	0.4436	2.5440	2.9952
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3440	0.1526	0.8750	1.3716
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2692	0.0002	0.0009	0.2704
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0015	0.1054	16.0867	16.1936
TOTAL	2.4877	21.3418	8.9418	32.7713	0.9010	3.5025	20.1927	24.5962

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8138	6.2702	30.1171	37.2011	0.0617	0.4840	2.3123	2.8580
FIS 92238	2.3925	0.0000	0.0000	2.3925	0.1806	0.0000	0.0000	0.1806
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.2063	6.2702	30.1171	39.5936	0.2423	0.4840	2.3123	3.0386

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.0770	15.2783	73.3869	90.7422	0.1574	1.1794	5.6345	6.9713
PRD 92238	6.7199	0.0000	0.0000	6.7199	0.5064	0.0000	0.0000	0.5064
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.7969	15.2783	73.3869	97.4621	0.6637	1.1794	5.6345	7.4777

JAPAN/JAERI VIM PROD/ABS= 1.03513 NU= 2.44099

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1610	3.0601	5.2902	8.5113	0.0122	0.2370	0.4110	0.6602
CAP 92238	2.2501	17.7005	3.5701	23.5207	0.1740	2.4501	0.2770	2.9011
CAP 160	0.1350	0.0001	0.0000	0.1351	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4160	2.5501	2.9737
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3300	0.1430	0.8769	1.3499
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2580	0.0001	0.0009	0.2591
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0011	0.0808	17.2005	17.2824
TOTAL	2.5461	20.7607	8.8603	32.1670	0.7829	3.3270	21.3164	25.4264

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8140	6.1002	30.2009	37.1151	0.0618	0.4690	2.3501	2.8809
FIS 92238	2.2401	0.0000	0.0000	2.2401	0.1700	0.0000	0.0000	0.1700
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.0541	6.1002	30.2009	39.3552	0.2318	0.4690	2.3501	3.0509

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.0801	14.7004	73.0022	89.7827	0.1580	1.1300	5.6802	6.9682
PRD 92238	6.2902	0.0000	0.0000	6.2902	0.4770	0.0000	0.0000	0.4770
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.3702	14.7004	73.0022	96.0729	0.6350	1.1300	5.6802	7.4452

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S5L2 (PF=0.5, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 2)

FRANCE/CEAREF APOLLO PROD/ABS= 1.13733 NU= 2.45699

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3463	5.3663	5.0160	10.7285	0.0113	0.1779	0.1666	0.3558
CAP 92238	4.7570	24.3972	3.3952	32.5494	0.1586	1.1900	0.1128	1.4614
CAP 160	0.1865	0.0002	0.0015	0.1883	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3018	1.0343	1.3362
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2631	0.1081	0.3616	0.7328
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1530	0.0002	0.0013	0.1544
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0016	0.0513	6.1532	6.2061
TOTAL	5.2898	29.7637	8.4127	43.4662	0.5876	1.8293	7.8298	10.2467

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6473	10.7695	28.4860	40.9028	0.0538	0.3556	0.9463	1.3557
FIS 92238	3.9032	0.0000	0.0000	3.9032	0.1273	0.0000	0.0000	0.1273
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.5505	10.7695	28.4860	44.8060	0.1811	0.3556	0.9463	1.4830

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.1628	26.0609	68.9351	99.1588	0.1359	0.8605	2.2901	3.2865
PRD 92238	10.9291	0.0000	0.0000	10.9291	0.3563	0.0000	0.0000	0.3563
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.0919	26.0609	68.9351	110.0879	0.4923	0.8605	2.2901	3.6429

US/ORNL R-XSDRNPM PROD/ABS= 1.11379 NU= 2.45753

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3886	5.4929	4.7051	10.5866	0.0127	0.1810	0.1560	0.3497
CAP 92238	5.8264	25.1940	3.0684	34.0887	0.1905	1.2451	0.1017	1.5374
CAP 160	0.2304	0.0002	0.0004	0.2310	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0086	0.3853	0.9315	1.3255
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2480	0.1329	0.3212	0.7021
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1891	0.0001	0.0003	0.1896
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0029	0.0678	5.5997	5.6704
TOTAL	6.4454	30.6870	7.7739	44.9063	0.6519	2.0124	7.1104	9.7747

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.8207	12.2529	25.9160	39.9896	0.0595	0.4027	0.8596	1.3218
FIS 92238	3.8828	0.0008	0.0000	3.8837	0.1267	0.0000	0.0000	0.1267
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.7035	12.2538	25.9160	43.8733	0.1862	0.4028	0.8596	1.4486

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.6018	29.6370	62.6728	96.9115	0.1503	0.9741	2.0789	3.2033
PRD 92238	10.9105	0.0020	0.0000	10.9125	0.3560	0.0001	0.0000	0.3561
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.5123	29.6389	62.6728	107.8240	0.5064	0.9742	2.0789	3.5595

9421392

UK/SRD-A MONK 6.3 PROD/ABS= 1.16480 NU= 2.47041

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1397	5.7990	5.1003	11.0390	0.0000	0.2096	0.1996	0.4092
CAP	92238	2.4953	25.4720	3.6231	31.5904	0.0798	1.2277	0.1397	1.4473
CAP	160	0.1597	0.0000	0.0000	0.1597	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3294	0.9881	1.3175
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2595	0.1297	0.4292	0.8184
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1797	0.0000	0.0000	0.1797
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0499	5.8389	5.8888
TOTAL		2.7947	31.2710	8.7234	42.7891	0.5190	1.9463	7.5956	10.0609

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.0879	11.8770	28.6160	41.5809	0.0499	0.3793	0.9582	1.3874
FIS	92238	4.0323	0.0000	0.0000	4.0323	0.1497	0.0000	0.0000	0.1497
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.1202	11.8770	28.6160	45.6132	0.1996	0.3793	0.9582	1.5371

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.7947	28.8650	69.5380	101.1977	0.1297	0.9183	2.3156	3.3636
PRD	92238	11.4980	0.0000	0.0000	11.4980	0.4192	0.0000	0.0000	0.4192
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		14.2927	28.8650	69.5380	112.6957	0.5489	0.9183	2.3156	3.7828

UK/SRD-B MONK 6.3 PROD/ABS= 1.17160 NU= 2.47011

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1796	5.7380	5.1791	11.0967	0.0100	0.1996	0.1696	0.3792
CAP	92238	2.5247	25.4070	3.5226	31.4543	0.0898	1.2075	0.1098	1.4071
CAP	160	0.1597	0.0000	0.0000	0.1597	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0100	0.3293	1.0678	1.4071
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2595	0.1197	0.3892	0.7684
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1497	0.0000	0.0000	0.1497
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0599	5.6881	5.7480
TOTAL		2.8640	31.1450	8.7017	42.7107	0.5189	1.9160	7.4245	9.8594

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.1177	11.7750	28.8300	41.7227	0.0200	0.3992	0.9680	1.3871
FIS	92238	4.1613	0.0000	0.0000	4.1613	0.1597	0.0000	0.0000	0.1597
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.2790	11.7750	28.8300	45.8840	0.1796	0.3992	0.9680	1.5468

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.8839	28.6000	70.0430	101.5269	0.0599	0.9780	2.3551	3.3929
PRD	92238	11.7950	0.0000	0.0000	11.7950	0.4491	0.0000	0.0000	0.4491
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		14.6789	28.6000	70.0430	113.3219	0.5089	0.9780	2.3551	3.8420

UK/BNFL WIMSE PROD/ABS= 1.14602 NU= 2.47052

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3316	5.6391	4.8141	10.7848	0.0108	0.1859	0.1596	0.3563
CAP	92238	5.0571	24.2805	3.4341	32.7716	0.1654	1.2050	0.1138	1.4842
CAP	160	0.2638	0.0000	0.0002	0.2640	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0065	0.3187	1.0330	1.3582
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2029	0.1087	0.3528	0.6644
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2165	0.0000	0.0002	0.2167
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0008	0.0440	5.6661	5.7110
TOTAL		5.6525	29.9196	8.2484	43.8205	0.6030	1.8624	7.3255	9.7908

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.7960	10.6302	28.2906	40.7168	0.0587	0.3499	0.9382	1.3468
FIS	92238	4.1881	0.0000	0.0000	4.1881	0.1367	0.0000	0.0000	0.1367
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.9841	10.6302	28.2906	44.9049	0.1954	0.3499	0.9382	1.4835

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.5541	25.8905	68.7714	99.2159	0.1487	0.8519	2.2800	3.2807
PRD	92238	11.7202	0.0000	0.0000	11.7202	0.3826	0.0000	0.0000	0.3826
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		16.2743	25.8905	68.7714	110.9362	0.5313	0.8519	2.2800	3.6633

ITALY/CB4 XSDRNPM PROD/ABS= 1.09091 NU= 2.45901

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3877	5.1625	4.8410	10.3913	0.0127	0.1950	0.1605	0.3682
CAP	92238	5.6783	24.5723	3.3959	33.6465	0.1897	3.4089	0.1125	3.7111
CAP	160	0.2299	0.0001	0.0005	0.2305	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0086	0.2666	1.0201	1.2953
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3380	0.0917	0.3517	0.7814
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1887	0.0001	0.0004	0.1892
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0029	0.1744	4.8449	5.0222
TOTAL		6.2959	29.7349	8.2374	44.2682	0.7406	4.1368	6.4900	11.3674

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.8163	9.8365	27.4098	39.0626	0.0593	0.3323	0.9087	1.3004
FIS	92238	3.8741	0.0000	0.0000	3.8741	0.1264	0.0000	0.0000	0.1264
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.6904	9.8365	27.4098	42.9367	0.1858	0.3323	0.9087	1.4268

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.5907	23.7923	66.2891	94.6721	0.1500	0.8271	2.1977	3.1748
PRD	92238	10.8862	0.0000	0.0000	10.8862	0.3552	0.0000	0.0000	0.3552
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.4769	23.7923	66.2891	105.5583	0.5052	0.8271	2.1977	3.5300

JAPAN/JAERI ANISN PROD/ABS= 1.13827 NU= 2.47617

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3348	5.5440	4.8623	10.7411	0.0109	0.1945	0.1103	0.3157
CAP	92238	4.7219	23.1583	3.3083	31.1886	0.1544	3.1279	0.1103	3.3925
CAP	160	0.3499	0.0001	0.0004	0.3505	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0067	0.3168	1.0025	1.3260
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2777	0.1093	0.3449	0.7318
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2847	0.0001	0.0004	0.2852
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0646	5.6342	5.6997
TOTAL		5.4066	28.7024	8.1710	42.2801	0.7354	3.8131	7.2025	11.7510

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6742	11.1280	27.1684	39.9707	0.0547	0.3810	0.9033	1.3390
FIS	92238	4.5114	0.0000	0.0000	4.5114	0.1474	0.0000	0.0000	0.1474
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		6.1856	11.1280	27.1684	44.4821	0.2021	0.3810	0.9033	1.4863

9421194

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.2908	26.9679	65.8660	97.1247	0.1404	0.9223	2.1855	3.2482
PRD 92238	13.0328	0.0000	0.0000	13.0328	0.4251	0.0000	0.0000	0.4251
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	17.3237	26.9679	65.8660	110.1576	0.5654	0.9223	2.1855	3.6733

ITALY/CJF MCNP PROD/ABS= 1.12414 NU= 2.47304

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3442	5.3961	4.9099	10.6502	0.0113	0.1776	0.1633	0.3521
CAP 92238	4.6408	25.7676	3.3825	33.7908	0.1519	1.3803	0.1124	1.6446
CAP 160	0.2244	0.0001	0.0005	0.2249	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0070	0.3200	1.0206	1.3476
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2573	0.1101	0.3510	0.7184
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1852	0.0001	0.0004	0.1857
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0013	0.0761	5.5514	5.6288
TOTAL	5.2093	31.1639	8.2928	44.6660	0.6140	2.0642	7.1990	9.8773

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6311	10.9626	27.4119	40.0056	0.0533	0.3598	0.9122	1.3253
FIS 92238	3.9939	0.0000	0.0000	3.9939	0.1309	0.0000	0.0000	0.1309
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.6251	10.9626	27.4119	43.9996	0.1842	0.3598	0.9122	1.4562

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.1344	26.7123	66.7927	97.6393	0.1351	0.8767	2.2229	3.2347
PRD 92238	11.1720	0.0000	0.0000	11.1720	0.3660	0.0000	0.0000	0.3660
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.3063	26.7123	66.7927	108.8113	0.5010	0.8767	2.2229	3.6006

JAPAN/JAERI VIM PROD/ABS= 1.12196 NU= 2.46018

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3448	5.3507	4.9422	10.6377	0.0113	0.1764	0.1644	0.3520
CAP 92238	4.7031	25.2092	3.3679	33.2802	0.1584	1.3551	0.1116	1.6251
CAP 160	0.2222	0.0001	0.0005	0.2228	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0069	0.3079	1.0263	1.3411
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2491	0.1056	0.3527	0.7075
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1823	0.0001	0.0004	0.1828
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0010	0.0614	5.9884	6.0508
TOTAL	5.2700	30.5601	8.3105	44.1406	0.6090	2.0065	7.6439	10.2594

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6441	10.8609	27.7999	40.3049	0.0538	0.3577	0.9277	1.3392
FIS 92238	3.8362	0.0000	0.0000	3.8362	0.1246	0.0000	0.0000	0.1246
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.4803	10.8609	27.7999	44.1411	0.1784	0.3577	0.9277	1.4637

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.1750	26.3053	67.3575	97.8377	0.1365	0.8649	2.2419	3.2433
PRD 92238	10.7613	0.0000	0.0000	10.7613	0.3507	0.0000	0.0000	0.3507
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	14.9362	26.3053	67.3575	108.5990	0.4872	0.8649	2.2419	3.5941

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE S7L2 (PF=0.7, R=0.05 CM, 100% UO2 IN PELLET - LIQUOR 2)

FRANCE/CEAREF APOLLO PROD/ABS= 1.07450 NU= 2.47576

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7063	7.8957	3.2163	11.8183	0.0099	0.1116	0.0456	0.1671
CAP 92238	9.4132	29.7516	2.1899	41.3547	0.1345	0.5694	0.0310	0.7350
CAP 160	0.2592	0.0003	0.0010	0.2605	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.1769	0.2856	0.4625
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1703	0.0640	0.0999	0.3342
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0915	0.0001	0.0004	0.0919
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.0315	1.3438	1.3767
TOTAL	10.3787	37.6476	5.4072	53.4335	0.4076	0.9534	1.8063	3.1674

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.1078	16.0516	17.9734	37.1329	0.0436	0.2264	0.2549	0.5248
FIS 92238	5.6641	0.0000	0.0000	5.6641	0.0794	0.0000	0.0000	0.0794
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.7719	16.0516	17.9734	42.7970	0.1230	0.2264	0.2549	0.6043

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	7.7897	38.8461	43.4946	90.1303	0.1092	0.5479	0.6168	1.2739
PRD 92238	15.8203	0.0000	0.0000	15.8203	0.2219	0.0000	0.0000	0.2219
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	23.6100	38.8461	43.4946	105.9506	0.3311	0.5479	0.6168	1.4958

US/ORNL R-XSDRNPM PROD/ABS= 1.03568 NU= 2.47918

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7804	7.7444	2.7853	11.3101	0.0109	0.1092	0.0395	0.1596
CAP 92238	11.5846	30.2392	1.7874	43.6112	0.1624	0.5587	0.0254	0.7465
CAP 160	0.3209	0.0002	0.0002	0.3214	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.2092	0.2311	0.4476
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1646	0.0724	0.0797	0.3166
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1130	0.0001	0.0001	0.1132
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.0399	1.1527	1.1950
TOTAL	12.6860	37.9837	4.5730	55.2427	0.4608	0.9894	1.5283	2.9785

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4520	17.1088	14.8904	35.4511	0.0484	0.2408	0.2113	0.5005
FIS 92238	5.7415	0.0016	0.0000	5.7431	0.0804	0.0000	0.0000	0.0804
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.1934	17.1104	14.8904	41.1942	0.1288	0.2408	0.2113	0.5809

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.6596	41.3833	36.0125	86.0554	0.1213	0.5824	0.5111	1.2147
PRD 92238	16.0644	0.0038	0.0000	16.0682	0.2250	0.0001	0.0000	0.2250
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	24.7239	41.3871	36.0125	102.1235	0.3463	0.5824	0.5111	1.4398

9421396

UK/SRD-B MONK 6.3 PROD/ABS= 1.09350 NU= 2.48873

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3193	8.5421	3.2033	12.0647	0.0000	0.1197	0.0599	0.1796
CAP 92238	4.7201	33.9590	2.2553	40.9344	0.0399	0.6486	0.0299	0.7185
CAP 160	0.2395	0.0000	0.0000	0.2395	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.1696	0.2694	0.4391
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1497	0.0599	0.1098	0.3193
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0599	0.0000	0.0000	0.0599
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0499	1.0578	1.1077
TOTAL	5.2789	42.5011	5.4586	53.2386	0.2495	1.0478	1.5268	2.8241

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	2.0756	17.6630	17.7230	37.4616	0.0299	0.2595	0.2295	0.5189
FIS 92238	5.8876	0.0000	0.0000	5.8876	0.0699	0.0000	0.0000	0.0699
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	7.9632	17.6630	17.7230	43.3492	0.0998	0.2595	0.2295	0.5888

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	5.3188	42.9100	43.0700	91.2988	0.0798	0.6187	0.5688	1.2673
PRD 92238	16.5950	0.0000	0.0000	16.5950	0.1896	0.0000	0.0000	0.1896
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	21.9138	42.9100	43.0700	107.8938	0.2694	0.6187	0.5688	1.4569

UK/BNFL WIMSE PROD/ABS= 1.07210 NU= 2.49215

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.6813	8.0937	3.0243	11.7993	0.0095	0.1141	0.0429	0.1665
CAP 92238	10.2209	29.4226	2.1922	41.8357	0.1433	0.5434	0.0311	0.7178
CAP 160	0.3649	0.0000	0.0001	0.3651	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0055	0.1854	0.2797	0.4706
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1360	0.0632	0.0955	0.2947
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1285	0.0000	0.0001	0.1286
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0007	0.0259	1.1751	1.2018
TOTAL	11.2671	37.5164	5.2166	54.0001	0.4236	0.9321	1.6244	2.9801

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4053	15.3814	17.4716	36.2583	0.0477	0.2167	0.2478	0.5123
FIS 92238	6.1626	0.0000	0.0000	6.1626	0.0863	0.0000	0.0000	0.0863
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.5679	15.3814	17.4716	42.4208	0.1340	0.2167	0.2478	0.5986

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.5768	37.4633	42.4738	88.5139	0.1202	0.5276	0.6024	1.2502
PRD 92238	17.2015	0.0000	0.0000	17.2015	0.2408	0.0000	0.0000	0.2408
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	25.7783	37.4633	42.4738	105.7155	0.3610	0.5276	0.6024	1.4910

ITALY/CB4 XSDRNPM PROD/ABS= 1.00418 NU= 2.48120

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7810	7.3085	2.9303	11.0197	0.0109	0.1213	0.0415	0.1738
CAP 92238	11.2594	30.2825	2.1409	43.6828	0.1622	2.1156	0.0303	2.3081
CAP 160	0.3207	0.0002	0.0003	0.3211	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.1524	0.2719	0.4316
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2284	0.0524	0.0937	0.3746
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1129	0.0001	0.0001	0.1131
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.0921	1.0124	1.1070
TOTAL	12.3611	37.5912	5.0714	55.0236	0.5243	2.5339	1.4500	4.5082

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.4526	14.2230	16.4852	34.1609	0.0484	0.2114	0.2337	0.4934
FIS	92238	5.7366	0.0000	0.0000	5.7366	0.0803	0.0000	0.0000	0.0803
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.1892	14.2230	16.4852	39.8975	0.1287	0.2114	0.2337	0.5738

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.6609	34.4021	39.8687	82.9316	0.1214	0.5230	0.5651	1.2095
PRD	92238	16.0505	0.0000	0.0000	16.0505	0.2248	0.0000	0.0000	0.2248
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.7114	34.4021	39.8687	98.9821	0.3461	0.5230	0.5651	1.4343

JAPAN/JAERI ANISN PROD/ABS= 1.07313 NU= 2.50158

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6797	7.9903	2.9776	11.6476	0.0095	0.1233	0.0422	0.1751
CAP	92238	9.4440	29.0738	2.0552	40.5730	0.1323	1.9249	0.0292	2.0865
CAP	160	0.4772	0.0002	0.0003	0.4777	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0057	0.1795	0.2637	0.4488
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1805	0.0618	0.0908	0.3330
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1664	0.0001	0.0001	0.1666
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0008	0.0403	1.1529	1.1941
TOTAL		10.6009	37.0643	5.0331	52.6983	0.4953	2.3298	1.5790	4.4040

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1279	16.2412	16.3415	35.7107	0.0439	0.2426	0.2316	0.5181
FIS	92238	6.5767	0.0000	0.0000	6.5767	0.0921	0.0000	0.0000	0.0921
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.7046	16.2412	16.3415	42.2874	0.1360	0.2426	0.2316	0.6102

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.9402	39.4001	39.6006	86.9408	0.1113	0.5855	0.5614	1.2582
PRD	92238	18.8479	0.0000	0.0000	18.8479	0.2647	0.0000	0.0000	0.2647
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		26.7880	39.4001	39.6006	105.7886	0.3760	0.5855	0.5614	1.5229

ITALY/CJF MCNP PROD/ABS= 1.04477 NU= 2.49237

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6893	7.7986	2.9893	11.4771	0.0097	0.1107	0.0422	0.1625
CAP	92238	9.1759	32.0976	2.0945	43.3680	0.1286	0.6189	0.0295	0.7770
CAP	160	0.3048	0.0002	0.0003	0.3052	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0059	0.1821	0.2657	0.4537
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1648	0.0627	0.0914	0.3189
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1077	0.0001	0.0001	0.1079
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0011	0.0436	1.0678	1.1125
TOTAL		10.1700	39.8964	5.0841	55.1504	0.4178	1.0181	1.4967	2.9326

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.0205	16.1295	16.3341	35.4840	0.0424	0.2277	0.2303	0.5004
FIS	92238	5.8517	0.0000	0.0000	5.8517	0.0822	0.0000	0.0000	0.0822
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.8722	16.1295	16.3341	41.3357	0.1246	0.2277	0.2303	0.5826

9421198

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.6005	39.3014	39.8022	86.7042	0.1066	0.5548	0.5613	1.2227
PRD	92238	16.3243	0.0000	0.0000	16.3243	0.2297	0.0000	0.0000	0.2297
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	23.9248	39.3014	39.8022	103.0285	0.3363	0.5548	0.5613	1.4524

JAPAN/JAERI VIM PROD/ABS= 1.04814 NU= 2.47550

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7008	7.6832	3.0574	11.4413	0.0098	0.1082	0.0435	0.1615
CAP	92238	9.3111	31.3679	2.1243	42.8032	0.1370	0.5827	0.0301	0.7498
CAP	160	0.3087	0.0002	0.0003	0.3092	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0059	0.1787	0.2730	0.4576
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1668	0.0614	0.0939	0.3221
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1092	0.0001	0.0001	0.1093
CAP	155,7GD	0.0000	0.0000	0.0000	0.0000	0.0009	0.0391	1.2607	1.3007
	TOTAL	10.3206	39.0512	5.1819	54.5537	0.4296	0.9702	1.7012	3.1010

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1269	15.8825	16.9744	35.9837	0.0438	0.2243	0.2412	0.5093
FIS	92238	5.7673	0.0000	0.0000	5.7673	0.0807	0.0000	0.0000	0.0807
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	8.8942	15.8825	16.9744	41.7510	0.1245	0.2243	0.2412	0.5900

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.8618	38.4157	40.9966	87.2742	0.1102	0.5420	0.5827	1.2349
PRD	92238	16.0810	0.0000	0.0000	16.0810	0.2253	0.0000	0.0000	0.2253
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	23.9428	38.4157	40.9966	103.3552	0.3355	0.5420	0.5827	1.4602

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE L3L1 (PF=0.3, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 1)

FRANCE/CEARE? APOLLO PROD/ABS= 1.00459 NU= 2.44608

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1645	2.9500	5.4979	8.6124	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2873	11.3013	3.7282	17.3168	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1227	0.0001	0.0016	0.1244	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4603	3.6480	4.1083
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4629	0.2211	1.7184	2.4023
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2141	0.0003	0.0045	0.2189
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0017	0.0758	26.0661	26.1436
TOTAL	2.5745	14.2514	9.2276	26.0535	0.6787	0.7575	31.4369	32.8731

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8604	5.9753	31.7437	38.5794	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4906	0.0000	0.0000	2.4906	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3509	5.9753	31.7437	41.0700	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1916	14.4602	76.8181	93.4699	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.9849	0.0000	0.0000	6.9849	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.1765	14.4602	76.8181	100.4548	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 0.99012 NU= 2.44558

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1843	3.0624	5.3350	8.5817	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.7892	12.0711	3.5244	18.3847	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1510	0.0001	0.0005	0.1516	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0094	0.6162	3.5838	4.2095
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4285	0.2863	1.6664	2.3813
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2654	0.0002	0.0014	0.2670
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0031	0.1040	25.4317	25.5388
TOTAL	3.1245	15.1336	8.8598	27.1179	0.7066	1.0068	30.6832	32.3966

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9343	7.1158	29.9940	38.0441	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4416	0.0004	0.0000	2.4420	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3759	7.1162	29.9940	40.4860	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3806	17.2113	72.5372	92.1290	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.8816	0.0009	0.0000	6.8825	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2622	17.2122	72.5372	99.0116	0.0000	0.0000	0.0000	0.0000

9421200

UK/SRD-A MONK 6.3 PROD/ABS= 0.98073 NU= 2.45686

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0699	2.9961	5.3730	8.4390	0.0000	0.0000	0.0000	0.0000
CAP 92238	1.2783	11.3850	3.7951	16.4584	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1198	0.0000	0.0000	0.1198	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0100	0.4594	3.9948	4.4642
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4294	0.2197	1.9674	2.6165
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2497	0.0000	0.0000	0.2497
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.1099	27.6240	27.7338
TOTAL	1.4680	14.3811	9.1681	25.0172	0.6891	0.7890	33.5862	35.0643

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.5792	6.1420	30.7300	37.4512	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4668	0.0000	0.0000	2.4668	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.0460	6.1420	30.7300	39.9180	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.4881	14.9210	74.6630	91.0721	0.0000	0.0000	0.0000	0.0000
PRD 92238	7.0009	0.0000	0.0000	7.0009	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.4890	14.9210	74.6630	98.0730	0.0000	0.0000	0.0000	0.0000

UK/SRD-B MONK 6.3 PROD/ABS= 1.02390 NU= 2.45740

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0799	3.0860	5.4230	8.5889	0.0000	0.0000	0.0000	0.0000
CAP 92238	1.2284	11.8550	4.0248	17.1082	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1398	0.0000	0.0000	0.1398	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.5493	3.7152	4.2645
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4594	0.2696	1.7377	2.4667
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2197	0.0000	0.0000	0.2197
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0899	25.4570	25.5469
TOTAL	1.4481	14.9410	9.4478	25.8369	0.6791	0.9088	30.9099	32.4978

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.7191	6.6314	31.8290	39.1795	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4868	0.0000	0.0000	2.4868	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.2059	6.6314	31.8290	41.6663	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.8576	16.1190	77.3400	95.3166	0.0000	0.0000	0.0000	0.0000
PRD 92238	7.0708	0.0000	0.0000	7.0708	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.9284	16.1190	77.3400	102.3874	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.01762 NU= 2.45785

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1553	3.0811	5.3451	8.5815	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.3970	11.5602	3.7991	17.7563	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1732	0.0000	0.0003	0.1735	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0071	0.4881	3.7141	4.2093
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3496	0.2246	1.7100	2.2842
CAP 160	0.0000	0.0000	0.0000	0.0000	0.3040	0.0000	0.0007	0.3047
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0009	0.0662	25.2205	25.2876
TOTAL	2.7256	14.6413	9.1444	26.5113	0.6616	0.7790	30.6453	32.0858

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9298	5.9541	31.8806	38.7645	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.6381	0.0000	0.0000	2.6381	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.5679	5.9541	31.8806	41.4026	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3740	14.4903	77.5015	94.3659	0.0000	0.0000	0.0000	0.0000
PRD 92238	7.3981	0.0000	0.0000	7.3981	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.7722	14.4903	77.5015	101.7640	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSDRNPM PROD/ABS= 1.03535 NU= 2.44422

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1840	2.9256	5.8291	8.9387	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.7125	11.4559	4.0235	18.1919	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1506	0.0001	0.0005	0.1512	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0094	0.4257	4.0499	4.4850
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4276	0.1976	1.8832	2.5084
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2648	0.0002	0.0015	0.2665
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0031	0.2902	22.8012	23.0945
TOTAL	3.0471	14.3816	9.8532	27.2819	0.7050	0.9137	28.7358	30.3545

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9324	5.6288	33.3619	39.9231	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4358	0.0000	0.0000	2.4358	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3682	5.6288	33.3619	42.3588	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3758	13.6148	80.6841	96.6747	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.8652	0.0000	0.0000	6.8652	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2410	13.6148	80.6841	103.5399	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.00379 NU= 2.45647

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1584	3.0593	5.4310	8.6487	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2720	11.6592	3.6971	17.6283	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2302	0.0001	0.0005	0.2308	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.4923	3.6871	4.1867
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4863	0.2282	1.7140	2.4285
CAP 160	0.0000	0.0000	0.0000	0.0000	0.4066	0.0002	0.0014	0.4082
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0010	0.0929	25.5107	25.6046
TOTAL	2.6607	14.7186	9.1285	26.5078	0.9012	0.8135	30.9132	32.6279

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8729	6.2581	30.8919	38.0229	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.8401	0.0000	0.0000	2.8401	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.7130	6.2581	30.8919	40.8630	0.0000	0.0000	0.0000	0.0000

9421202

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.2621	15.1470	74.7384	92.1475	0.0000	0.0000	0.0000	0.0000
PRD 92238	8.2312	0.0000	0.0000	8.2312	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	10.4933	15.1470	74.7384	100.3786	0.0000	0.0000	0.0000	0.0000

ITALY/CJF MCNP PROD/ABS= 0.99252 NU= 2.46319

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1635	2.9023	5.5874	8.6532	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2297	11.6549	3.7345	17.6190	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1537	0.0001	0.0005	0.1543	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4929	3.8354	4.3358
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4515	0.2287	1.7791	2.4593
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2670	0.0002	0.0014	0.2686
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.1171	26.1021	26.2206
TOTAL	2.5469	14.5573	9.3223	26.4265	0.7275	0.8388	31.7180	33.2843

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8588	6.0168	30.7997	37.6753	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.6189	0.0000	0.0000	2.6189	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.4777	6.0168	30.7997	40.2941	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1953	14.6608	75.0492	91.9052	0.0000	0.0000	0.0000	0.0000
PRD 92238	7.3472	0.0000	0.0000	7.3472	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.5425	14.6608	75.0492	99.2524	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 0.98006 NU= 2.44518

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1637	2.9065	5.3963	8.4664	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.2617	11.7052	3.6703	17.6371	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1458	0.0001	0.0005	0.1464	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0075	0.4692	3.7695	4.2462
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4295	0.2182	1.7459	2.3936
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2520	0.0002	0.0014	0.2535
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0011	0.0907	26.6839	26.7756
TOTAL	2.5712	14.6117	9.0671	26.2499	0.6900	0.7783	32.2006	33.6689

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8590	5.9419	30.8501	37.6510	0.0000	0.0000	0.0000	0.0000
FIS 92238	2.4303	0.0000	0.0000	2.4303	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.2894	5.9419	30.8501	40.0813	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1922	14.3835	74.5958	91.1715	0.0000	0.0000	0.0000	0.0000
PRD 92238	6.8346	0.0000	0.0000	6.8346	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.0269	14.3835	74.5958	98.0062	0.0000	0.0000	0.0000	0.0000

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE L5L1 (PF=0.5, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 1)

FRANCE/CEAREF APOLLO PROD/ABS= 1.17166 NU= 2.45581

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3488	5.3373	5.4581	11.1442	0.0000	0.0000	0.0000	0.0000
CAP 92238	4.7448	19.7066	3.7017	28.1531	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1917	0.0002	0.0016	0.1935	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3388	1.4894	1.8282
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3506	0.1633	0.7019	1.2158
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1532	0.0002	0.0019	0.1553
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0016	0.0570	9.5418	9.6004
TOTAL	5.2853	25.0441	9.1614	39.4908	0.5055	0.5593	11.7350	12.7998

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6824	10.8553	31.1387	43.6764	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.0328	0.0000	0.0000	4.0328	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.7153	10.8553	31.1387	47.7093	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.2535	26.2685	75.3563	105.8782	0.0000	0.0000	0.0000	0.0000
PRD 92238	11.2874	0.0000	0.0000	11.2874	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.5409	26.2685	75.3563	117.1656	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 1.15079 NU= 2.45626

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3896	5.4370	5.1698	10.9964	0.0000	0.0000	0.0000	0.0000
CAP 92238	5.8443	20.7061	3.3831	29.9335	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2365	0.0002	0.0005	0.2371	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0086	0.4358	1.3605	1.8049
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3306	0.2027	0.6326	1.1659
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1897	0.0002	0.0005	0.1904
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0029	0.0760	8.7399	8.8188
TOTAL	6.4703	26.1433	8.5534	41.1670	0.5318	0.7147	10.7336	11.9801

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.8503	12.4504	28.5409	42.8416	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.0097	0.0005	0.0000	4.0102	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.8600	12.4509	28.5409	46.8518	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.6800	30.1147	69.0236	103.8183	0.0000	0.0000	0.0000	0.0000
PRD 92238	11.2616	0.0019	0.0000	11.2635	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.9416	30.1166	69.0236	115.0818	0.0000	0.0000	0.0000	0.0000

9421204

UK/SRD-A MONK 6.3 PROD/ABS= 1.18000 NU= 2.46815

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1198	5.6604	5.4008	11.1810	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.6255	21.3440	3.7536	27.7231	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1897	0.0000	0.0000	0.1897	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0100	0.3694	1.6073	1.9867
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3294	0.1697	0.8086	1.3078
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1597	0.0000	0.0000	0.1597
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0799	9.5637	9.6436
TOTAL	2.9350	27.0044	9.1544	39.0937	0.4992	0.6189	11.9796	13.0977

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.2279	11.7500	30.6780	43.6559	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.1529	0.0000	0.0000	4.1529	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.3808	11.7500	30.6780	47.8088	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	3.1746	28.5520	74.5430	106.2696	0.0000	0.0000	0.0000	0.0000
PRD 92238	11.7300	0.0000	0.0000	11.7300	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	14.9046	28.5520	74.5430	117.9996	0.0000	0.0000	0.0000	0.0000

UK/SRD-B MONK 6.3 PROD/ABS= 1.19590 NU= 2.46842

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1498	5.7414	5.5018	11.3930	0.0000	0.0000	0.0000	0.0000
CAP 92238	2.5462	21.4480	3.6645	27.6587	0.0000	0.0000	0.0000	0.0000
CAP 160	0.1997	0.0000	0.0000	0.1997	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3894	1.4878	1.8772
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3595	0.1697	0.7489	1.2781
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1198	0.0000	0.0000	0.1198
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0699	8.9566	9.0265
TOTAL	2.8957	27.1894	9.1663	39.2514	0.4793	0.6291	11.1933	12.3016

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.2981	11.6430	31.3730	44.3141	0.0000	0.0000	0.0000	0.0000
FIS 92238	4.1338	0.0000	0.0000	4.1338	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.4319	11.6430	31.3730	48.4479	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	3.3550	28.2880	76.2260	107.8690	0.0000	0.0000	0.0000	0.0000
PRD 92238	11.7220	0.0000	0.0000	11.7220	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.0770	28.2880	76.2260	119.5910	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.18059 NU= 2.46935

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3333	5.5294	5.2574	11.1202	0.0000	0.0000	0.0000	0.0000
CAP 92238	5.0794	19.8816	3.7653	28.7263	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2704	0.0000	0.0003	0.2707	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0065	0.3571	1.4811	1.8448
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2709	0.1643	0.6821	1.1173
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2168	0.0000	0.0003	0.2171
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0008	0.0489	8.8437	8.8934
TOTAL	5.6832	25.4110	9.0230	40.1171	0.4951	0.5704	11.0072	12.0726

9411205

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.8321	10.6409	31.0125	43.4855	0.0000	0.0000	0.0000	0.0000
FIS	92238	4.3243	0.0000	0.0000	4.3243	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		6.1565	10.6409	31.0125	47.8098	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.6484	25.9120	75.3960	105.9564	0.0000	0.0000	0.0000	0.0000
PRD	92238	12.1010	0.0000	0.0000	12.1010	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		16.7493	25.9120	75.3960	118.0574	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSDRNPM PROD/ABS= 1.18072 NU= 2.45522

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3894	5.2188	5.6563	11.2644	0.0000	0.0000	0.0000	0.0000
CAP	92238	5.6696	19.4334	3.9759	29.0789	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2361	0.0001	0.0005	0.2367	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0086	0.3143	1.5597	1.8826
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3301	0.1459	0.7252	1.2011
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1894	0.0001	0.0006	0.1901
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0029	0.2060	7.8447	8.0536
TOTAL		6.2951	24.6523	9.6327	40.5801	0.5310	0.6663	10.1301	11.3274

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.8485	10.1374	32.1010	44.0869	0.0000	0.0000	0.0000	0.0000
FIS	92238	4.0029	0.0000	0.0000	4.0029	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.8514	10.1374	32.1010	48.0898	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.6753	24.5205	77.6351	106.8310	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.2427	0.0000	0.0000	11.2427	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.9179	24.5205	77.6351	118.0736	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.18271 NU= 2.47201

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3366	5.5262	5.3968	11.2596	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.7396	19.8148	3.6941	28.2485	0.0000	0.0000	0.0000	0.0000
CAP	160	0.3555	0.0002	0.0005	0.3561	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0067	0.3595	1.4537	1.8199
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3684	0.1673	0.6771	1.2128
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2848	0.0001	0.0006	0.2855
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0711	8.9017	8.9737
TOTAL		5.4316	25.3412	9.0914	39.8642	0.6608	0.5980	11.0331	12.2918

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.7027	11.2516	30.2698	43.2241	0.0000	0.0000	0.0000	0.0000
FIS	92238	4.6201	0.0000	0.0000	4.6201	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		6.3228	11.2516	30.2698	47.8442	0.0000	0.0000	0.0000	0.0000

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PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.3612	27.2827	73.2849	104.9288	0.0000	0.0000	0.0000	0.0000
PRD	92238	13.3426	0.0000	0.0000	13.3426	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		17.7039	27.2827	73.2849	118.2714	0.0000	0.0000	0.0000	0.0000

ITALY/CJF MCNP PROD/ABS= 1.16274 NU= 2.47319

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3474	5.2557	5.3886	10.9917	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.6874	20.0619	3.7327	28.4820	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2466	0.0002	0.0005	0.2473	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0069	0.3653	1.6092	1.9815
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3436	0.1695	0.7464	1.2596
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1932	0.0001	0.0006	0.1940
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0013	0.0878	9.7383	9.8274
TOTAL		5.2815	25.3177	9.1218	39.7210	0.5451	0.6228	12.0946	13.2624

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6825	10.9016	30.1617	42.7458	0.0000	0.0000	0.0000	0.0000
FIS	92238	4.2677	0.0000	0.0000	4.2677	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.9502	10.9016	30.1617	47.0134	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.2700	26.5645	73.4944	104.3288	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.9449	0.0000	0.0000	11.9449	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		16.2148	26.5645	73.4944	116.2737	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 1.14644 NU= 2.45257

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3479	5.1596	5.3683	10.8758	0.0000	0.0000	0.0000	0.0000
CAP	92238	4.7023	19.9821	3.6783	28.3626	0.0000	0.0000	0.0000	0.0000
CAP	160	0.2247	0.0001	0.0005	0.2253	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0069	0.3499	1.6105	1.9673
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3310	0.1630	0.7456	1.2397
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1779	0.0001	0.0006	0.1787
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0010	0.0700	10.3390	10.4100
TOTAL		5.2749	25.1418	9.0471	39.4637	0.5169	0.5831	12.6957	13.7956

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6900	10.7366	30.3211	42.7478	0.0000	0.0000	0.0000	0.0000
FIS	92238	3.9964	0.0000	0.0000	3.9964	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.6864	10.7366	30.3211	46.7442	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.2947	25.8475	73.2677	103.4098	0.0000	0.0000	0.0000	0.0000
PRD	92238	11.2337	0.0000	0.0000	11.2337	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.5284	25.8475	73.2677	114.6435	0.0000	0.0000	0.0000	0.0000

9[illegible]297

CASE L7L1 (PF=0.7, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 1)

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

FRANCE/CEAREF APOLLO PROD/ABS= 1.11030 NU= 2.47362

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7065	7.9007	3.5345	12.1416	0.0000	0.0000	0.0000	0.0000
CAP 92238	9.3483	27.6085	2.4103	39.3670	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2615	0.0003	0.0011	0.2629	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.1951	0.3993	0.5945
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2282	0.0949	0.1883	0.5114
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0923	0.0001	0.0005	0.0929
CAP155_7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.0343	2.1072	2.1429
TOTAL	10.3162	35.5094	5.9459	51.7715	0.3219	0.3244	2.6954	3.3417

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.1279	16.1933	19.8354	39.1566	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.7290	0.0000	0.0000	5.7290	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155_7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.8569	16.1933	19.8354	44.8856	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	7.8415	39.1892	48.0024	95.0331	0.0000	0.0000	0.0000	0.0000
PRD 92238	15.9988	0.0000	0.0000	15.9988	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155_7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	23.8403	39.1892	48.0024	111.0319	0.0000	0.0000	0.0000	0.0000

US/ORNL R-XSDRNPM PROD/ABS= 1.07525 NU= 2.47658

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7779	7.7678	3.1199	11.6656	0.0000	0.0000	0.0000	0.0000
CAP 92238	11.5469	28.0564	2.0087	41.6120	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3236	0.0002	0.0003	0.3241	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.2339	0.3267	0.5679
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2207	0.1090	0.1519	0.4816
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1143	0.0001	0.0001	0.1145
CAP155_7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.0439	1.7757	1.8221
TOTAL	12.6484	35.8244	5.1288	53.6016	0.3447	0.3869	2.2544	2.9860

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4630	17.4006	16.7477	37.6113	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.8039	0.0015	0.0000	5.8055	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155_7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2669	17.4021	16.7477	43.4167	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.6896	42.0881	40.5043	91.2820	0.0000	0.0000	0.0000	0.0000
PRD 92238	16.2364	0.0038	0.0000	16.2402	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155_7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	24.9260	42.0919	40.5043	107.5222	0.0000	0.0000	0.0000	0.0000

9421[illegible]3

UK/SRD-B MONK 6.3 PROD/ABS= 1.13610 NU= 2.48621

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3292	8.3591	3.5013	12.1896	0.0000	0.0000	0.0000	0.0000
CAP 92238	4.9277	31.0620	2.6234	38.6131	0.0000	0.0000	0.0000	0.0000
CAP 160	0.2294	0.0000	0.0000	0.2294	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2194	0.4489	0.6683
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1895	0.1097	0.1895	0.4888
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0698	0.0000	0.0000	0.0698
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0598	1.9850	2.0448
TOTAL	5.4863	39.4211	6.1247	51.0321	0.2594	0.3890	2.6234	3.2718

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	2.1347	17.9150	19.8010	39.8507	0.0000	0.0000	0.0000	0.0000
FIS 92238	5.8454	0.0000	0.0000	5.8454	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	7.9801	17.9150	19.8010	45.6961	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	5.4663	43.5410	48.1000	97.1073	0.0000	0.0000	0.0000	0.0000
PRD 92238	16.4990	0.0000	0.0000	16.4990	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	21.9653	43.5410	48.1000	113.6063	0.0000	0.0000	0.0000	0.0000

UK/BNFL WIMSE PROD/ABS= 1.11063 NU= 2.48941

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.6800	8.0572	3.3591	12.0964	0.0000	0.0000	0.0000	0.0000
CAP 92238	10.2103	27.2308	2.4391	39.8802	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3676	0.0000	0.0002	0.3678	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0055	0.2051	0.3865	0.5971
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1824	0.0943	0.1780	0.4547
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1297	0.0000	0.0001	0.1298
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0007	0.0285	1.8311	1.8602
TOTAL	11.2579	35.2881	5.7983	52.3443	0.3183	0.3278	2.3956	3.0418

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4241	15.4805	19.4806	38.3851	0.0000	0.0000	0.0000	0.0000
FIS 92238	6.2292	0.0000	0.0000	6.2292	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.6533	15.4805	19.4806	44.6143	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.6233	37.7011	47.3614	93.6858	0.0000	0.0000	0.0000	0.0000
PRD 92238	17.3805	0.0000	0.0000	17.3805	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	26.0038	37.7011	47.3614	111.0663	0.0000	0.0000	0.0000	0.0000

ITALY/CB4 XSDRNPM PROD/ABS= 1.09449 NU= 2.47545

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7791	7.5491	3.5579	11.8862	0.0000	0.0000	0.0000	0.0000
CAP 92238	11.1829	26.8396	2.5961	40.6186	0.0000	0.0000	0.0000	0.0000
CAP 160	0.3232	0.0002	0.0003	0.3238	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.1813	0.4046	0.5932
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2204	0.0841	0.1881	0.4927
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1141	0.0001	0.0002	0.1143
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.1100	1.6480	1.7605
TOTAL	12.2853	34.3889	6.1544	52.8286	0.3444	0.3756	2.2408	2.9608

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.4650	14.8850	20.0657	38.4157	0.0000	0.0000	0.0000	0.0000
FIS	92238	5.7980	0.0000	0.0000	5.7980	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.2630	14.8850	20.0657	44.2137	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.6943	36.0042	48.5283	93.2268	0.0000	0.0000	0.0000	0.0000
PRD	92238	16.2193	0.0000	0.0000	16.2193	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.9136	36.0042	48.5283	109.4460	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI ANISN PROD/ABS= 1.13347 NU= 2.49561

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6793	8.1474	3.4363	12.2629	0.0000	0.0000	0.0000	0.0000
CAP	92238	9.4323	27.0916	2.3805	38.9044	0.0000	0.0000	0.0000	0.0000
CAP	160	0.4781	0.0002	0.0003	0.4786	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0057	0.2052	0.3765	0.5874
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.0241	0.0951	0.1743	0.2935
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1683	0.0001	0.0001	0.1685
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0008	0.0444	1.8426	1.8879
TOTAL		10.5896	35.2392	5.8171	51.6459	0.1989	0.3448	2.3936	2.9373

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1474	16.7330	18.9243	38.8047	0.0000	0.0000	0.0000	0.0000
FIS	92238	6.6135	0.0000	0.0000	6.6135	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.7610	16.7330	18.9243	45.4183	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.9681	40.5379	45.8167	94.3227	0.0000	0.0000	0.0000	0.0000
PRD	92238	19.0239	0.0000	0.0000	19.0239	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		26.9920	40.5379	45.8167	113.3466	0.0000	0.0000	0.0000	0.0000

ITALY/CJF MCNP PROD/ABS= 1.10002 NU= 2.49261

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6960	7.7294	3.4353	11.8608	0.0000	0.0000	0.0000	0.0000
CAP	92238	9.2841	28.9589	2.4071	40.6501	0.0000	0.0000	0.0000	0.0000
CAP	160	0.3418	0.0002	0.0003	0.3423	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0059	0.2027	0.3790	0.5876
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2284	0.0941	0.1758	0.4983
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1203	0.0001	0.0001	0.1205
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0011	0.0494	1.7610	1.8116
TOTAL		10.3219	36.6886	5.8427	52.8532	0.3558	0.3463	2.3159	3.0180

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.0906	16.0081	18.8832	37.9819	0.0000	0.0000	0.0000	0.0000
FIS	92238	6.1496	0.0000	0.0000	6.1496	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.2402	16.0081	18.8832	44.1315	0.0000	0.0000	0.0000	0.0000

9421270

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.7853	39.0067	46.0121	92.8042	0.0000	0.0000	0.0000	0.0000
PRD	92238	17.1956	0.0000	0.0000	17.1956	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.9809	39.0067	46.0121	109.9998	0.0000	0.0000	0.0000	0.0000

JAPAN/JAERI VIM PROD/ABS= 1.09188 NU= 2.47506

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7052	7.6627	3.4412	11.8091	0.0000	0.0000	0.0000	0.0000
CAP	92238	9.3233	28.8101	2.3908	40.5241	0.0000	0.0000	0.0000	0.0000
CAP	160	0.3111	0.0002	0.0003	0.3117	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0060	0.1961	0.3871	0.5892
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2251	0.0913	0.1801	0.4965
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1090	0.0001	0.0001	0.1092
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0426	2.0007	2.0442
TOTAL		10.3396	36.4730	5.8324	52.6449	0.3410	0.3301	2.5680	3.2391

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1611	16.0056	19.1067	38.2734	0.0000	0.0000	0.0000	0.0000
FIS	92238	5.8420	0.0000	0.0000	5.8420	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.0031	16.0056	19.1067	44.1154	0.0000	0.0000	0.0000	0.0000

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.9528	38.7135	46.2162	92.8825	0.0000	0.0000	0.0000	0.0000
PRD	92238	16.3057	0.0000	0.0000	16.3057	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.2585	38.7135	46.2162	109.1882	0.0000	0.0000	0.0000	0.0000

CASE L3L2 (PF=0.3, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 2)

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

FRANCE/CEAREF APOLLO PROD/ABS= 1.01898 NU= 2.44706

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1651	2.8612	4.9835	8.0098	0.0122	0.2550	0.5320	0.7991
CAP 92238	2.2834	10.0110	3.3789	15.6733	0.1752	4.2730	0.3601	4.8083
CAP 160	0.1209	0.0001	0.0014	0.1224	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4401	3.2731	3.7132
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3404	0.1568	1.1433	1.6406
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2091	0.0003	0.0039	0.2133
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0017	0.0731	23.3087	23.3835
TOTAL	2.5693	12.8723	8.3639	23.8055	0.7387	5.1982	28.6211	34.5580

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8569	5.8088	28.7386	35.4044	0.0610	0.4946	3.0629	3.6184
FIS 92238	2.4500	0.0000	0.0000	2.4500	0.1677	0.0000	0.0000	0.1677
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3069	5.8088	28.7386	37.8544	0.2286	0.4946	3.0629	3.7861

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.1817	14.0577	69.5486	85.7880	0.1549	1.1968	7.4123	8.7640
PRD 92238	6.8721	0.0000	0.0000	6.8721	0.4705	0.0000	0.0000	0.4705
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.0537	14.0577	69.5486	92.6600	0.6254	1.1968	7.4123	9.2345

US/ORNL R-XSDRNPM PROD/ABS= 1.00000 NU= 2.44665

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1848	2.9685	4.7883	7.9415	0.0137	0.2645	0.5246	0.8028
CAP 92238	2.7939	10.8273	3.1610	16.7822	0.2071	4.6945	0.3450	5.2466
CAP 160	0.1489	0.0001	0.0004	0.1494	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0094	0.5835	3.1744	3.7673
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3157	0.2011	1.0944	1.6111
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2594	0.0002	0.0012	0.2608
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0032	0.0994	22.4621	22.5647
TOTAL	3.1276	13.7959	7.9497	24.8732	0.8085	5.8432	27.6015	34.2533

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9316	6.8832	26.8663	34.6811	0.0669	0.5787	2.9739	3.6195
FIS 92238	2.4062	0.0004	0.0000	2.4066	0.1649	0.0000	0.0000	0.1650
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3378	6.8836	26.8663	37.0877	0.2319	0.5787	2.9739	3.7844

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3727	16.6487	64.9731	83.9944	0.1701	1.3997	7.1919	8.7617
PRD 92238	6.7823	0.0009	0.0000	6.7833	0.4653	0.0001	0.0000	0.4654
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.1550	16.6496	64.9731	90.7776	0.6354	1.3998	7.1919	9.2271

9-21-272

UK/SRD-A MONK 6.3 PROD/ABS= 1.00720 NU= 2.46035

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0899	2.84[illegible]	4.7262	7.6638	0.0000	0.2498	0.5895	0.8393
CAP 92238	1.2390	10.122[illegible]	3.2674	14.6285	0.0799	4.3765	0.4297	4.8861
CAP 160	0.1099	0.0000	0.0000	0.1099	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4796	3.8069	4.2865
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2898	0.1399	1.2990	1.7286
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2398	0.0000	0.0100	0.2498
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0899	24.5804	24.6704
TOTAL	1.4389	12.9698	7.9936	22.4023	0.6095	5.3357	30.7155	36.6607

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.6295	6.0851	27.4078	34.1224	0.0400	0.5895	3.4273	4.0568
FIS 92238	2.5680	0.0000	0.0000	2.5680	0.1898	0.0000	0.0000	0.1898
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1974	6.0851	27.4078	36.6903	0.2298	0.5895	3.4273	4.2466

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.6187	14.7879	66.5968	83.0034	0.1099	1.4388	8.3233	9.8721
PRD 92238	7.3041	0.0000	0.0000	7.3041	0.5396	0.0000	0.0000	0.5396
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.9228	14.7879	66.5968	90.3075	0.6495	1.4388	8.3233	10.4116

UK/SRD-B MONK 6.3 PROD/ABS= 1.02850 NU= 2.45864

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.0799	2.9873	4.9456	8.0128	0.0100	0.3197	0.5595	0.8892
CAP 92238	1.2689	11.1100	3.3969	15.7758	0.0899	4.3161	0.3996	4.8057
CAP 160	0.1199	0.0000	0.0000	0.1199	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4396	3.3770	3.8166
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3097	0.1599	1.1690	1.6386
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2398	0.0000	0.0000	0.2398
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0899	22.7800	22.8699
TOTAL	1.4687	14.0973	8.3425	23.9085	0.6494	5.3252	28.2851	34.2597

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.6494	6.3043	28.5140	35.4677	0.0200	0.4796	3.1672	3.6668
FIS 92238	2.4978	0.0000	0.0000	2.4978	0.1998	0.0000	0.0000	0.1998
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.1472	6.3043	28.5140	37.9655	0.2198	0.4796	3.1672	3.8666

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	1.6685	15.3260	69.2880	86.2825	0.0599	1.1789	7.6831	8.9219
PRD 92238	7.0636	0.0000	0.0000	7.0636	0.5795	0.0000	0.0000	0.5795
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.7321	15.3260	69.2880	93.3461	0.6394	1.1789	7.6831	9.5014

UK/BNFL WIMSE PROD/ABS= 1.02732 NU= 2.45877

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1557	2.9921	4.8111	7.9589	0.0115	0.2669	0.5165	0.7949
CAP 92238	2.4000	10.3602	3.4231	16.1833	0.1792	4.5541	0.3615	5.0948
CAP 160	0.1711	0.0000	0.0002	0.1713	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0071	0.4640	3.3061	3.7772
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2573	0.1583	1.1290	1.5446
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2975	0.0000	0.0006	0.2981
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0009	0.0635	22.3304	22.3948
TOTAL	2.7269	13.3523	8.2344	24.3135	0.7535	5.5068	27.6441	33.9044

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9265	5.7731	28.6706	35.3702	0.0660	0.4964	3.0731	3.6355
FIS 92238	2.5981	0.0000	0.0000	2.5981	0.1785	0.0000	0.0000	0.1785
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.5246	5.7731	28.6706	37.9682	0.2445	0.4964	3.0731	3.8140

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3640	14.0503	69.6814	86.0957	0.1683	1.2080	7.4691	8.8455
PRD 92238	7.2881	0.0000	0.0000	7.2881	0.5008	0.0000	0.0000	0.5008
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.6522	14.0503	69.6814	93.3839	0.6691	1.2080	7.4691	9.3463

ITALY/CB4 XSDRNPM PROD/ABS= 1.02975 NU= 2.44663

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1843	2.8086	5.1434	8.1362	0.0137	0.2739	0.5666	0.8542
CAP 92238	2.7144	11.0129	3.5570	17.2844	0.2062	4.8248	0.3853	5.4163
CAP 160	0.1484	0.0001	0.0005	0.1490	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0094	0.3996	3.5295	3.9385
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.4231	0.1375	1.2169	1.7775
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2586	0.0001	0.0013	0.2601
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0032	0.2732	19.8239	20.1001
TOTAL	3.0471	13.8216	8.7009	25.5696	0.9141	5.9091	25.5234	32.3466

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.9290	5.4097	29.4040	35.7427	0.0667	0.4589	3.2573	3.7830
FIS 92238	2.3981	0.0000	0.0000	2.3981	0.1644	0.0000	0.0000	0.1644
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.3271	5.4097	29.4040	38.1408	0.2312	0.4589	3.2573	3.9474

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	2.3659	13.0846	71.1114	86.5619	0.1696	1.1474	7.8774	9.1944
PRD 92238	6.7595	0.0000	0.0000	6.7595	0.4639	0.0000	0.0000	0.4639
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.1254	13.0846	71.1114	93.3214	0.6335	1.1474	7.8774	9.6583

JAPAN/JAERI ANISN PROD/ABS= 1.00817 NU= 2.45934

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1594	2.9596	4.8430	7.9621	0.0118	0.2651	0.5262	0.8030
CAP 92238	2.2720	11.0613	3.2985	16.6318	0.1674	4.5840	0.3538	5.1051
CAP 160	0.2272	0.0001	0.0004	0.2277	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.4644	3.2586	3.7303
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.3577	0.1594	1.1161	1.6333
CAP 160	0.0000	0.0000	0.0000	0.0000	0.3966	0.0002	0.0012	0.3980
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0010	0.0891	22.4215	22.5116
TOTAL	2.6587	14.0210	8.1420	24.8216	0.9419	5.5621	27.6773	34.1813

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	0.8700	6.0389	27.5037	34.4125	0.0622	0.5162	3.0095	3.5878
FIS 92238	2.8002	0.0000	0.0000	2.8002	0.1933	0.0000	0.0000	0.1933
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	3.6702	6.0389	27.5037	37.2127	0.2555	0.5162	3.0095	3.7812

0401914

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.2521	14.6487	66.5670	83.4678	0.1604	1.2456	7.2745	8.6806
PRD	92238	8.1116	0.0000	0.0000	8.1116	0.5620	0.0000	0.0000	0.5620
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		10.3637	14.6487	66.5670	91.5795	0.7225	1.2456	7.2745	9.2427

ITALY/CJF MCNP PROD/ABS= 1.00270 NU= 2.46506

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1650	2.8281	4.8588	7.8519	0.0121	0.2577	0.5454	0.8152
CAP	92238	2.2479	10.7462	3.3467	16.3408	0.1639	4.7162	0.3711	5.2512
CAP	160	0.1517	0.0001	0.0005	0.1522	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4691	3.3952	3.8719
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3323	0.1614	1.1677	1.6614
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2626	0.0002	0.0013	0.2640
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0014	0.1123	23.0010	23.1147
TOTAL		2.5646	13.5744	8.2059	24.3450	0.7798	5.7169	28.4817	34.9784

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8590	5.8568	27.5434	34.2592	0.0606	0.5051	3.1182	3.6839
FIS	92238	2.5591	0.0000	0.0000	2.5591	0.1741	0.0000	0.0000	0.1741
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.4181	5.8568	27.5434	36.8184	0.2347	0.5051	3.1182	3.8580

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.1938	14.2717	67.1148	83.5804	0.1945	1.2308	7.5980	9.0233
PRD	92238	7.1799	0.0000	0.0000	7.1799	0.4887	0.0000	0.0000	0.4887
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.3737	14.2717	67.1148	90.7603	0.6832	1.2308	7.5980	9.5120

JAPAN/JAERI VIM PROD/ABS= 0.99565 NU= 2.44921

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.1662	2.8127	4.8646	7.8434	0.0122	0.2572	0.5395	0.8090
CAP	92238	2.2922	10.4099	3.3131	16.0152	0.1732	4.7045	0.3633	5.2410
CAP	160	0.1451	0.0001	0.0004	0.1457	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0076	0.4504	3.3432	3.8012
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3233	0.1551	1.1511	1.6295
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2512	0.0002	0.0012	0.2526
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0011	0.0874	23.5223	23.6108
TOTAL		2.6035	13.2226	8.1782	24.0043	0.7686	5.6548	28.9207	35.3441

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	0.8668	5.7955	27.7263	34.3887	0.0612	0.5015	3.1029	3.6656
FIS	92238	2.4323	0.0000	0.0000	2.4323	0.1652	0.0000	0.0000	0.1652
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		3.2991	5.7955	27.7263	36.8210	0.2263	0.5015	3.1029	3.8307

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	2.2121	14.0133	67.1638	83.3892	0.1561	1.2111	7.4971	8.8644
PRD	92238	6.8465	0.0000	0.0000	6.8465	0.4644	0.0000	0.0000	0.4644
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.0586	14.0133	67.1638	90.2357	0.6206	1.2111	7.4971	9.3289

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE L5L2 (PF=0.5, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 2)

FRANCE/CEAREF APOLLO PROD/ABS= 1.16567 NU= 2.45693

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3505	5.2295	5.1327	10.7128	0.0113	0.1957	0.2247	0.4316
CAP 92238	4.7549	18.0828	3.4812	26.3189	0.1605	2.9395	0.1520	3.2520
CAP 160	0.1906	0.0002	0.0015	0.1924	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3289	1.3875	1.7165
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2577	0.1176	0.4849	0.8602
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1495	0.0002	0.0017	0.1514
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0016	0.0558	8.8668	8.9242
TOTAL	5.2960	23.3126	8.6155	37.2241	0.5806	3.6377	11.1175	15.3358

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.6854	10.6547	29.2555	41.5956	0.0533	0.3840	1.2810	1.7183
FIS 92238	4.0059	0.0000	0.0000	4.0059	0.1245	0.0000	0.0000	0.1245
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.6913	10.6547	29.2555	45.6015	0.1778	0.3840	1.2810	1.8428

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.2602	25.7854	70.7994	100.8450	0.1347	0.9292	3.1000	4.1639
PRD 92238	11.2136	0.0000	0.0000	11.2136	0.3486	0.0000	0.0000	0.3486
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.4738	25.7854	70.7994	112.0585	0.4833	0.9292	3.1000	4.5125

US/ORNL R-XSDRNPM PROD/ABS= 1.13733 NU= 2.45765

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3913	5.3218	4.8045	10.5177	0.0127	0.1985	0.2087	0.4199
CAP 92238	5.8688	19.1224	3.1419	28.1330	0.1897	3.3161	0.1363	3.6422
CAP 160	0.2354	0.0002	0.0004	0.2360	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.4185	1.2507	1.6692
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2433	0.1443	0.4312	0.8188
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1851	0.0002	0.0005	0.1857
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0029	0.0738	8.0215	8.0982
TOTAL	6.4955	24.4444	7.9469	38.8866	0.6337	4.1514	10.0490	14.8341

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.8547	12.1711	26.4825	40.5083	0.0590	0.4334	1.1620	1.6544
FIS 92238	3.9894	0.0008	0.0000	3.9903	0.1241	0.0000	0.0000	0.1241
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.8441	12.1720	26.4825	44.4986	0.1831	0.4335	1.1620	1.7785

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	4.6899	29.4395	64.0451	98.1745	0.1491	1.0484	2.8101	4.0076
PRD 92238	11.2047	0.0002	0.0000	11.2049	0.3487	0.0001	0.0000	0.3488
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.8947	29.4397	64.0451	109.3795	0.4978	1.0484	2.8101	4.3564

9421216

UK/SRD-A MONK 6.3 PROD/ABS= 1.17695 NU= 2.47031

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1597	5.5788	4.8702	10.6087	0.0000	0.2096	0.2495	0.4591
CAP 92238	2.6547	19.5811	3.6926	25.9284	0.0798	3.1736	0.1697	3.4231
CAP 160	0.1996	0.0000	0.0000	0.1996	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3293	1.5269	1.8563
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2395	0.1198	0.5090	0.8683
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1697	0.0000	0.0000	0.1697
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0699	8.7725	8.8423
TOTAL	3.0140	25.1599	8.5628	36.7367	0.4890	3.9022	11.2275	15.6187

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.3174	11.6265	28.5624	41.5063	0.0299	0.3992	1.3373	1.7664
FIS 92238	4.2415	0.0000	0.0000	4.2415	0.1297	0.0000	0.0000	0.1297
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.5589	11.6265	28.5624	45.7478	0.1597	0.3992	1.3373	1.8962

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	3.4032	28.2435	69.3911	101.0378	0.0699	0.9780	3.2435	4.2914
PRD 92238	11.9864	0.0000	0.0000	11.9864	0.3792	0.0000	0.0000	0.3792
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.3896	28.2435	69.3911	113.0242	0.4491	0.9780	3.2435	4.6707

UK/SRD-B MONK 6.3 PROD/ABS= 1.17840 NU= 2.46946

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.1597	5.5606	5.0115	10.7318	0.0000	0.2196	0.2296	0.4492
CAP 92238	2.7054	19.7460	3.6139	26.0653	0.0699	3.2545	0.1797	3.5041
CAP 160	0.1797	0.0000	0.0000	0.1797	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.3993	1.4775	1.8768
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.2196	0.1398	0.5391	0.8985
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1198	0.0000	0.0000	0.1198
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0599	8.3957	8.4556
TOTAL	3.0448	25.3066	8.6254	36.9768	0.4093	4.0731	10.8216	15.3040

FISSIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	1.2479	11.3410	28.9810	41.5699	0.0399	0.4492	1.3178	1.8070
FIS 92238	4.2228	0.0000	0.0000	4.2228	0.1198	0.0000	0.0000	0.1198
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	5.4707	11.3410	28.9810	45.7927	0.1597	0.4492	1.3178	1.9268

PRODUCTIONS

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	3.1946	27.5630	70.4200	101.1776	0.1098	1.0981	3.1946	4.4025
PRD 92238	11.9300	0.0000	0.0000	11.9300	0.3294	0.0000	0.0000	0.3294
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	15.1246	27.5630	70.4200	113.1076	0.4392	1.0981	3.1946	4.7319

UK/BNFL WIMSE PROD/ABS= 1.16770 NU= 2.47038

CAPTURES

	REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.3349	5.4190	4.9000	10.6539	0.0108	0.2028	0.2124	0.4260
CAP 92238	5.1000	18.3700	3.5120	26.9820	0.1658	3.1980	0.1501	3.5139
CAP 160	0.2693	0.0000	0.0002	0.2695	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0064	0.3442	1.3670	1.7176
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1992	0.1174	0.4668	0.7834
CAP 160	0.0000	0.0000	0.0000	0.0000	0.2117	0.0000	0.0003	0.2120
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0008	0.0475	8.1290	8.1773
TOTAL	5.7042	23.7890	8.4122	37.9054	0.5948	3.9099	10.3256	14.8302

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.8360	10.4300	28.8800	41.1460	0.0581	0.3782	1.2530	1.6893
FIS	92238	4.2990	0.0000	0.0000	4.2990	0.1339	0.0000	0.0000	0.1339
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		6.1350	10.4300	28.8800	45.4450	0.1920	0.3782	1.2530	1.8232

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.6560	25.3800	70.2100	100.2460	0.1473	0.9207	3.0450	4.1130
PRD	92238	12.0360	0.0000	0.0000	12.0360	0.3748	0.0000	0.0000	0.3748
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		16.6920	25.3800	70.2100	112.2820	0.5221	0.9207	3.0450	4.4878

ITALY/CB4 XSDRNPM PROD/ABS= 1.14448 NU= 2.45806

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3909	5.0313	5.1371	10.5594	0.0126	0.2118	0.2225	0.4469
CAP	92238	5.6891	18.7681	3.6171	28.0743	0.1891	3.7353	0.1541	4.0786
CAP	160	0.2348	0.0001	0.0005	0.2354	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0086	0.2914	1.4031	1.7031
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.3317	0.1003	0.4837	0.9156
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1847	0.0001	0.0005	0.1853
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0029	0.1925	7.0413	7.2367
TOTAL		6.3147	23.7996	8.7547	38.8690	0.7296	4.5313	9.3052	14.5662

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.8516	9.7857	29.1353	40.7726	0.0589	0.3582	1.2671	1.6842
FIS	92238	3.9798	0.0000	0.0000	3.9798	0.1238	0.0000	0.0000	0.1238
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.8314	9.7857	29.1353	44.7524	0.1827	0.3582	1.2671	1.8080

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.6820	23.6696	70.4637	98.8153	0.1488	0.8927	3.0643	4.1058
PRD	92238	11.1781	0.0000	0.0000	11.1781	0.3479	0.0000	0.0000	0.3479
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.8601	23.6696	70.4637	109.9934	0.4968	0.8927	3.0643	4.4537

JAPAN/JAERI ANISN PROD/ABS= 1.15603 NU= 2.47120

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3371	5.3500	4.9423	10.6295	0.0108	0.2058	0.2138	0.4305
CAP	92238	4.7534	18.9936	3.3811	27.1281	0.1531	3.4706	0.1442	3.7679
CAP	160	0.3530	0.0001	0.0005	0.3536	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0066	0.3411	1.3226	1.6703
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2705	0.1173	0.4554	0.8433
CAP	160	0.0000	0.0000	0.0000	0.0000	0.2774	0.0001	0.0005	0.2781
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0685	8.0449	8.1144
TOTAL		5.4435	24.3438	8.3238	38.1111	0.7195	4.2035	10.1815	15.1044

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.7005	10.9387	27.7446	40.3838	0.0540	0.4018	1.2033	1.6590
FIS	92238	4.5943	0.0000	0.0000	4.5943	0.1432	0.0000	0.0000	0.1432
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		6.2947	10.9387	27.7446	44.9781	0.1972	0.4018	1.2033	1.8022

9421218

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.3656	26.5513	67.0246	97.9415	0.1382	0.9716	2.9137	4.0235
PRD	92238	13.2259	0.0000	0.0000	13.2259	0.4137	0.0000	0.0000	0.4137
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		17.5915	26.5513	67.0246	111.1674	0.5519	0.9716	2.9137	4.4372

ITALY/CJF MCNP PROD/ABS= 1.14773 NU= 2.47516

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3497	5.0968	4.9817	10.4282	0.0112	0.1979	0.2340	0.4431
CAP	92238	4.7198	18.7986	3.4487	26.9671	0.1506	3.4776	0.1601	3.7882
CAP	160	0.2481	0.0001	0.0005	0.2487	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0069	0.3493	1.4587	1.8149
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2548	0.1202	0.5017	0.8766
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1910	0.0001	0.0005	0.1916
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0013	0.0845	8.7906	8.8764
TOTAL		5.3176	23.8955	8.4308	37.6439	0.6157	4.2295	11.1456	15.9908

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6927	10.6597	27.8321	40.1844	0.0530	0.3921	1.3207	1.7658
FIS	92238	4.2876	0.0000	0.0000	4.2876	0.1316	0.0000	0.0000	0.1316
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.9802	10.6597	27.8321	44.4720	0.1846	0.3921	1.3207	1.8974

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.2962	25.9740	67.8171	98.0872	0.1344	0.9554	3.2183	4.3081
PRD	92238	12.0110	0.0000	0.0000	12.0110	0.3687	0.0000	0.0000	0.3687
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		16.3071	25.9740	67.8171	110.0982	0.5031	0.9554	3.2183	4.6768

JAPAN/JAERI VIM PROD/ABS= 1.13171 NU= 2.45733

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.3497	5.0015	4.9616	10.3128	0.0113	0.1963	0.2361	0.4437
CAP	92238	4.7325	18.7307	3.3974	26.8606	0.1584	3.5170	0.1594	3.8348
CAP	160	0.2262	0.0008	0.0005	0.2274	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0069	0.3338	1.4646	1.8052
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2441	0.1146	0.5031	0.8618
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1754	0.0001	0.0005	0.1760
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0010	0.0672	9.3554	9.4235
TOTAL		5.3084	23.7329	8.3595	37.4008	0.5970	4.2289	11.7192	16.5450

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	1.6937	10.4613	27.9964	40.1514	0.0532	0.3876	1.3351	1.7758
FIS	92238	4.0052	0.0000	0.0000	4.0052	0.1225	0.0000	0.0000	0.1225
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		5.6989	10.4613	27.9964	44.1566	0.1757	0.3876	1.3351	1.8984

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	4.3041	25.3064	67.6497	97.2601	0.1345	0.9375	3.2380	4.3101
PRD	92238	11.2583	0.0000	0.0000	11.2583	0.3447	0.0000	0.0000	0.3447
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		15.5624	25.3064	67.6497	108.5184	0.4792	0.9375	3.2380	4.6548

A SUMMARY OF PARTICIPANTS REACTION RATES
NORMALIZED TO ONE ABSORPTION IN THE CELL AND
EXPRESSED AS A PERCENTAGE OF THE ABSORPTION RATE

CASE L7L2 (PF=0.7, R=1.0 CM, 100% UO2 IN PELLET - LIQUOR 2)

FRANCE/CEAREF APOLLO PROD/ABS= 1.10690 NU= 2.47447

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7099	7.8141	3.4124	11.9365	0.0099	0.1239	0.0614	0.1953
CAP 92238	9.3855	26.3642	2.3275	38.0771	0.1382	1.5258	0.0417	1.7057
CAP 160	0.2608	0.0003	0.0011	0.2622	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0000	0.1916	0.3822	0.5738
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1679	0.0691	0.1337	0.3706
CAP 160	0.0000	0.0000	0.0000	0.0000	0.0900	0.0001	0.0005	0.0906
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0014	0.0339	2.0149	2.0502
TOTAL	10.3562	34.1786	5.7410	50.2758	0.4074	1.9445	2.6344	4.9863

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.1382	16.0351	19.1374	38.3107	0.0433	0.2464	0.3453	0.6350
FIS 92238	5.7092	0.0000	0.0000	5.7092	0.0782	0.0000	0.0000	0.0782
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	8.8474	16.0351	19.1374	44.0199	0.1215	0.2464	0.3453	0.7132

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	7.8662	38.8053	46.3133	92.9848	0.1085	0.5963	0.8356	1.5403
PRD 92238	15.9444	0.0000	0.0000	15.9444	0.2185	0.0000	0.0000	0.2185
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	23.8105	38.8053	46.3133	108.9292	0.3270	0.5963	0.8356	1.7588

US/ORNL R-XSDRNPM PROD/ABS= 1.06727 NU= 2.47767

CAPTURES

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP 92235	0.7814	7.6684	2.9783	11.4281	0.0109	0.1195	0.0525	0.1829
CAP 92238	11.5956	26.7999	1.9164	40.3118	0.1620	1.7520	0.0338	1.9479
CAP 160	0.3229	0.0002	0.0003	0.3234	0.0000	0.0000	0.0000	0.0000
CAP H	0.0000	0.0000	0.0000	0.0000	0.0073	0.2274	0.3090	0.5437
CAP 14N	0.0000	0.0000	0.0000	0.0000	0.1624	0.0786	0.1065	0.3476
CAP 160	0.0000	0.0000	0.0000	0.0000	0.1115	0.0001	0.0001	0.1117
CAP155,7GD	0.0000	0.0000	0.0000	0.0000	0.0025	0.0431	1.6802	1.7258
TOTAL	12.6999	34.4685	4.8949	52.0633	0.4566	2.2208	2.1822	4.8596

FISSIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS 92235	3.4747	17.1666	15.9717	36.6130	0.0481	0.2590	0.2843	0.5913
FIS 92238	5.7900	0.0016	0.0000	5.7916	0.0793	0.0000	0.0000	0.0793
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	9.2647	17.1682	15.9717	42.4046	0.1274	0.2590	0.2843	0.6706

PRODUCTIONS

		REGION 1				REGION 2			
	FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD 92235	8.7180	41.5228	38.6277	88.8684	0.1207	0.6264	0.6875	1.4345
PRD 92238	16.1979	0.0038	0.0000	16.2017	0.2218	0.0001	0.0000	0.2219
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD 160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	24.9159	41.5266	38.6277	105.0701	0.3425	0.6264	0.6875	1.6564

9421U220

UK/SRD-B MONK 6.3 PROD/ABS= 1.11833 NU= 2.48738

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.2893	8.1506	3.3720	11.8120	0.0100	0.1297	0.0798	0.2195
CAP	92238	4.7886	30.5479	2.4143	37.7508	0.0698	1.7659	0.0499	1.8856
CAP	160	0.2195	0.0000	0.0000	0.2195	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.2394	0.4090	0.6485
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1596	0.0798	0.1496	0.3891
CAP	160	0.0000	0.0000	0.0000	0.0000	0.0798	0.0000	0.0000	0.0798
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0599	1.9754	2.0352
TOTAL		5.2974	38.6985	5.7863	49.7822	0.3192	2.2747	2.6637	5.2576

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	2.2048	17.2455	18.9656	38.4158	0.0200	0.2195	0.3891	0.6285
FIS	92238	5.8362	0.0000	0.0000	5.8362	0.0798	0.0000	0.0000	0.0798
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.0409	17.2455	18.9656	44.2520	0.0998	0.2195	0.3891	0.7083

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	5.6167	41.9102	46.0804	93.6073	0.0499	0.5287	0.9478	1.5264
PRD	92238	16.4715	0.0000	0.0000	16.4715	0.2295	0.0000	0.0000	0.2295
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		22.0881	41.9102	46.0804	110.0788	0.2793	0.5287	0.9478	1.7558

UK/BNFL WIMSE PROD/ABS= 1.10300 NU= 2.49029

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6832	7.9620	3.2170	11.8622	0.0095	0.1247	0.0566	0.1908
CAP	92238	10.2500	26.0600	2.3370	38.6470	0.1436	1.6680	0.0406	1.8522
CAP	160	0.3670	0.0000	0.0002	0.3672	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0055	0.2001	0.3671	0.5727
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1343	0.0682	0.1254	0.3279
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1267	0.0000	0.0001	0.1268
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0007	0.0280	1.7350	1.7637
TOTAL		11.3002	34.0220	5.5542	50.8763	0.4203	2.0889	2.3248	4.8341

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.4350	15.3000	18.6500	37.3850	0.0474	0.2340	0.3287	0.6101
FIS	92238	6.2120	0.0000	0.0000	6.2120	0.0851	0.0000	0.0000	0.0851
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.6470	15.3000	18.6500	43.5970	0.1325	0.2340	0.3287	0.6952

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.6510	37.2600	45.3300	91.2410	0.1193	0.5696	0.7991	1.4880
PRD	92238	17.3300	0.0000	0.0000	17.3300	0.2375	0.0000	0.0000	0.2375
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		25.9810	37.2600	45.3300	108.5710	0.3568	0.5696	0.7991	1.7255

ITALY/CB4 XSDRNPM PROD/ABS= 1.06686 NU= 2.47804

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7822	7.3264	3.3065	11.4150	0.0109	0.1340	0.0577	0.2026
CAP	92238	11.2239	26.1035	2.4166	39.7440	0.1618	2.3526	0.0414	2.5559
CAP	160	0.3224	0.0002	0.0003	0.3228	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0073	0.1725	0.3731	0.5530
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.2252	0.0594	0.1286	0.4132
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1113	0.0001	0.0001	0.1115
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0025	0.1050	1.5178	1.6253
TOTAL		12.3284	33.4300	5.7234	51.4818	0.5190	2.8236	2.1188	5.4614

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.4747	14.4677	18.6458	36.5882	0.0481	0.2313	0.3256	0.6051
FIS	92238	5.7806	0.0000	0.0000	5.7806	0.0791	0.0000	0.0000	0.0791
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.2553	14.4677	18.6458	42.3687	0.1273	0.2313	0.3256	0.68421

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.7174	34.9950	45.0955	88.8079	0.1206	0.5732	0.7876	1.4814
PRD	92238	16.1711	0.0000	0.0000	16.1711	0.2214	0.0000	0.0000	0.2214
PRD	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.8885	34.9950	45.0955	104.9790	0.3421	0.5732	0.7876	1.7028

JAPAN/JAERI ANISN PROD/ABS= 1.10925 NU= 2.49636

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6810	7.9332	3.2111	11.8252	0.0095	0.1322	0.0562	0.1979
CAP	92238	9.4542	26.2451	2.2269	37.9262	0.1312	2.1473	0.0386	2.3171
CAP	16O	0.4762	0.0002	0.0003	0.4767	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0057	0.1958	0.3499	0.5514
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1770	0.0674	0.1203	0.3646
CAP	16O	0.0000	0.0000	0.0000	0.0000	0.1640	0.0001	0.0001	0.1642
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0008	0.0432	1.7000	1.7440
TOTAL		10.6114	34.1785	5.4382	50.2281	0.4882	2.5861	2.2651	5.3394

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1514	16.3038	17.6956	37.1508	0.0434	0.2575	0.3112	0.6121
FIS	92238	6.5812	0.0000	0.0000	6.5812	0.0904	0.0000	0.0000	0.0904
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.7326	16.3038	17.6956	43.7319	0.1338	0.2575	0.3112	0.7025

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.9730	39.4671	42.8472	90.2872	0.1103	0.6233	0.7526	1.4862
PRD	92238	18.8885	0.0000	0.0000	18.8885	0.2595	0.0000	0.0000	0.2595
PRD	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		26.8615	39.4671	42.8472	109.1758	0.3698	0.6233	0.7526	1.7457

ITALY/CJF MCNP PROD/ABS= 1.08818 NU= 2.49389

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.6997	7.6404	3.2513	11.5914	0.0092	0.1208	0.0567	0.1866
CAP	92238	9.3603	27.8953	2.2780	39.5336	0.1299	1.8086	0.0393	1.9778
CAP	16O	0.3411	0.0002	0.0003	0.3416	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0059	0.1972	0.3552	0.5584
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1692	0.0679	0.1222	0.3593
CAP	16O	0.0000	0.0000	0.0000	0.0000	0.1173	0.0001	0.0001	0.1175
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0012	0.0483	1.6511	1.7006
TOTAL		10.4012	35.5358	5.5296	51.4666	0.4327	2.2428	2.2246	4.9001

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1081	15.8584	17.8584	36.8248	0.0428	0.2424	0.3128	0.5981
FIS	92238	6.1261	0.0000	0.0000	6.1261	0.0844	0.0000	0.0000	0.0844
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	16O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		9.2342	15.8584	17.8584	42.9509	0.1272	0.2424	0.3128	0.6825

9421422

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	7.8279	38.6424	43.5142	89.9845	0.1079	0.5907	0.7623	1.4609
PRD	92238	17.1361	0.0000	0.0000	17.1361	0.2361	0.0000	0.0000	0.2361
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.9641	38.6424	43.5142	107.1207	0.3440	0.5907	0.7623	1.6970

JAPAN/JAERI VIM PROD/ABS= 1.07893 NU= 2.47692

CAPTURES

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
CAP	92235	0.7140	7.5612	3.2592	11.5344	0.0099	0.1193	0.0583	0.1875
CAP	92238	9.4265	27.7780	2.2664	39.4709	0.1374	1.8251	0.0400	2.0025
CAP	160	0.3059	0.0002	0.0003	0.3063	0.0000	0.0000	0.0000	0.0000
CAP	H	0.0000	0.0000	0.0000	0.0000	0.0060	0.1905	0.3640	0.5606
CAP	14N	0.0000	0.0000	0.0000	0.0000	0.1645	0.0658	0.1254	0.3556
CAP	160	0.0000	0.0000	0.0000	0.0000	0.1053	0.0001	0.0001	0.1055
CAP155,7GD		0.0000	0.0000	0.0000	0.0000	0.0009	0.0418	1.8753	1.9180
TOTAL		10.4464	35.3394	5.5258	51.3116	0.4240	2.2427	2.4631	5.1297

FISSIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
FIS	92235	3.1890	15.7442	18.1510	37.0842	0.0439	0.2407	0.3249	0.6095
FIS	92238	5.7863	0.0000	0.0000	5.7863	0.0790	0.0000	0.0000	0.0790
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FIS155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		8.9752	15.7442	18.1510	42.8704	0.1229	0.2407	0.3249	0.6885

PRODUCTIONS

		REGION 1				REGION 2			
		FAST	EPI	THERMAL	TOTAL	FAST	EPI	THERMAL	TOTAL
PRD	92235	8.0225	38.2074	43.8231	90.0530	0.1103	0.5816	0.7872	1.4792
PRD	92238	16.1454	0.0000	0.0000	16.1454	0.2206	0.0000	0.0000	0.2206
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	14N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRD155,7GD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL		24.1679	38.2074	43.8231	106.1984	0.3309	0.5816	0.7872	1.6998

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