Nancy Osgood - Air Transport of the TN-BGC1 Package - Request for AdditionalInformation

From: "FALGOUX Jean-Louis" <jeanlouis.falgoux@areva.com>
To: "Nancy Osgood" <NLO@nrc.gov>, <michael.conroy@dot.gov>
Date: 12/12/2007 12:59:51 PM
Subject: Air Transport of the TN-BGC1 Package - Request for AdditionalInformation
CC: <rick.boyle@dot.gov>, "Jack Edlow" <jedlow@edlow.com>, <mconde@edlow.com>, "Robert Nelson" <RAN@nrc.gov>, "Zhian Li" <ZXL1@nrc.gov>

Dear All,

I am forwarding additional information which should respond to some of your questions.

I know that these answers are not 100% satisfactory but please be aware that the issue of the moderating material is being prepared for the new SAR and a full detailed report will be available once it is translated with approval of French Competent authorities by mid 2008.

The same questions have been reviewed by other competent authorities including UK, Russia, France, So Africa and Australia. Our responses have satisfied their requirements nonetheless while this in itself may not satisfy we just thought you should be aware of this fact and will forward to you as many replies as you need for validation of both contents. We hope it will be the same for you.

I remain you that we need first (and if possible before the end of this year) the air validation for content 26 (TRIGA Fuel) as a shipment is scheduled by early 2008 and just after for content 11 (Uranium metal).

In any case, this agreement will be terminated by June 08, 30 as the french validation will expire.

Thanks for your support,

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Subject: Air Transport of the TN-BGC1 Package - Request for AdditionalInformation
Creation Date 12/12/2007 12:59:15 PM
From: "FALGOUX Jean-Louis" <jeanlouis.falgoux@areva.com>

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Recipients
nrc.gov
EBGWPO01.HQGWDO01
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Post Office	Route
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	edlow.com
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Files	Size	Date & Time
MESSAGE	1284	12/12/2007 12:59:15 PM
TEXT.htm	2538	
TN-BGC1 RAI Answers from CERCA.doc	25088	
Mime.822	41317	

Options

Expiration Date:	None
Priority:	High
ReplyRequested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Junk Mail Handling Evaluation Results
Message is eligible for Junk Mail handling
This message was not classified as Junk Mail

Junk Mail settings when this message was delivered
Junk Mail handling disabled by User
Junk Mail handling disabled by Administrator
Junk List is not enabled
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TN-BGC1 BY AIR

1. Provide the detailed derivation of the quantity of moderating material assumed to be present in a single packaging (2000 g water). Specifically,

   (a) Show the numerical calculations that resulted in this quantity, and relate the mass of moderating material (water) to the materials of construction of the packaging that might act as a moderator (e.g., wood).

   CERCA's answer: In order to explain the 2 000 g water which have been assumed to be present in a single packaging, our experts have considered 17 kg of wood with a maximum of moisture of 10 %. You obtained 1 700 g which have been changed for 2 000 g for safety considerations.

   (b) Clarify why moderating materials other than water (e.g., the carbon present in wood) are not considered in the analysis.

   No moderating material other than water from the wood has been considered. Our experts understand your remarks specifically for the carbon present in the wood.

   That's why, following also the French Authority request, in the next Safety Analysis Report scheduled for mid 2008, the perimeter will be changed and other moderating materials such as C from the wood, will be considered.

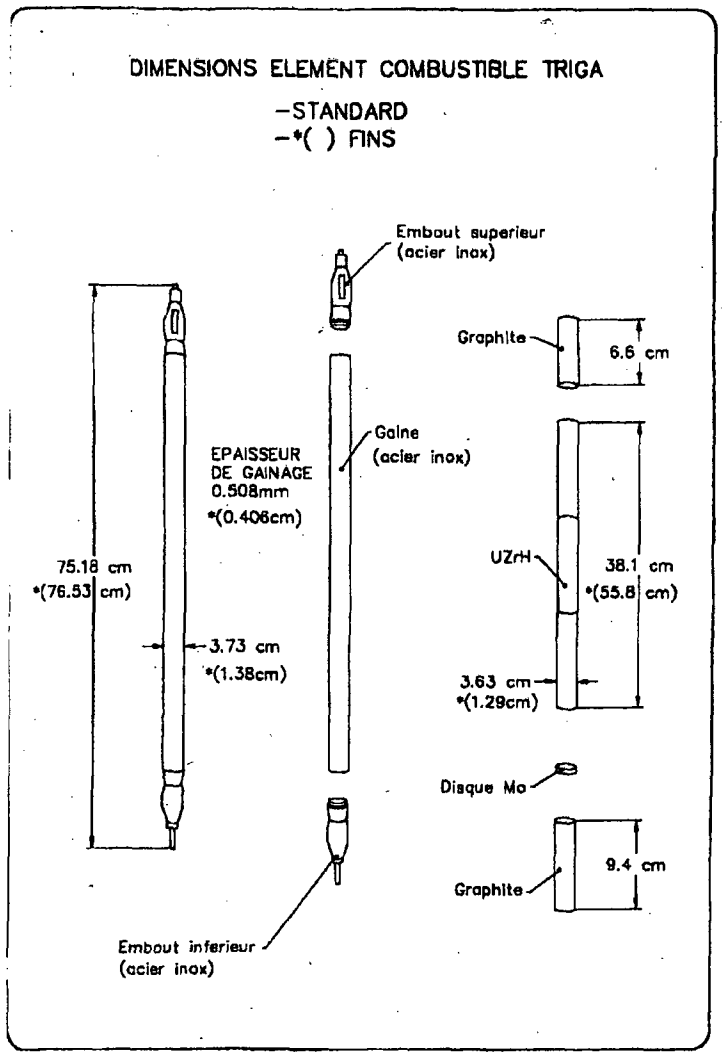
   (c) Provide specific information on the degree of moisture assumed to be present in the wood, and provide an appropriate reference for this quantity. Describe any assumptions made regarding possible moisture absorption into the wood during package service life.

   In the manufacturing specification of the TN-BGC1 casks, the specification of the wood includes a maximum of 10% of moisture (water). The values were lower.

   Concerning assumptions made regarding possible moisture absorption into the wood during package service life, we can say that the shock absorber part of the TN-BGC01, which contains the wood, is sealed which does not allow any water intrusion. Furthermore, the package are always shipped and stored in dry places.

   (d) Clarify whether any plastics or other polymers that could act as a moderator (e.g., plastic wrapping, foams, or gaskets), are present in the packaging or are considered in the assumed quantity of water.

   As explain in the new certificate (difference between the previous revision (Haa) and the latest (Hag) you are reviewing, plastic bags or other polymers present in the packaging are not allowed.



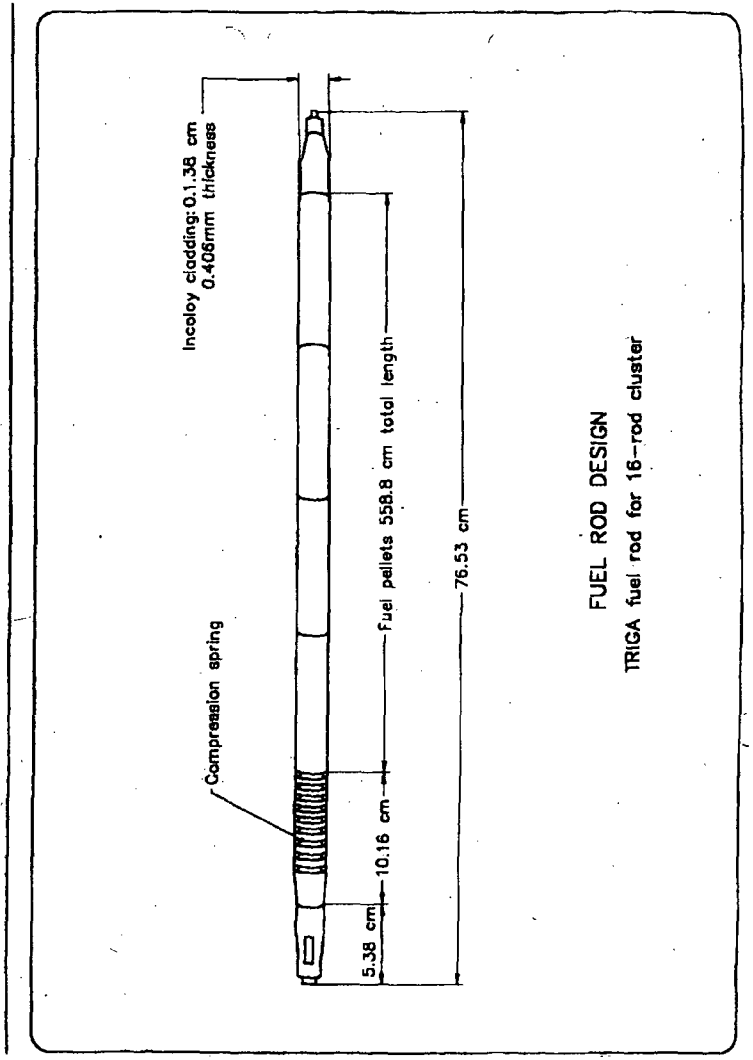
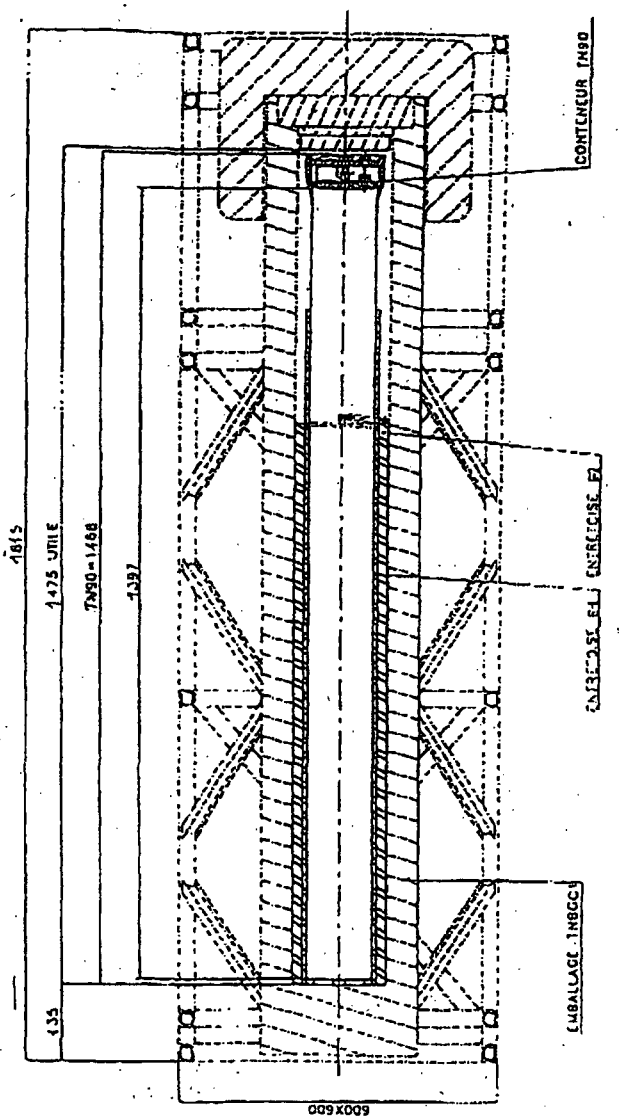


FIGURE 1 : Dimensions des éléments TRIGA

FIGURE 2 : Schéma de l'emballage TN BGC1 chargé d'un conteneur de conditionnement TN 90.



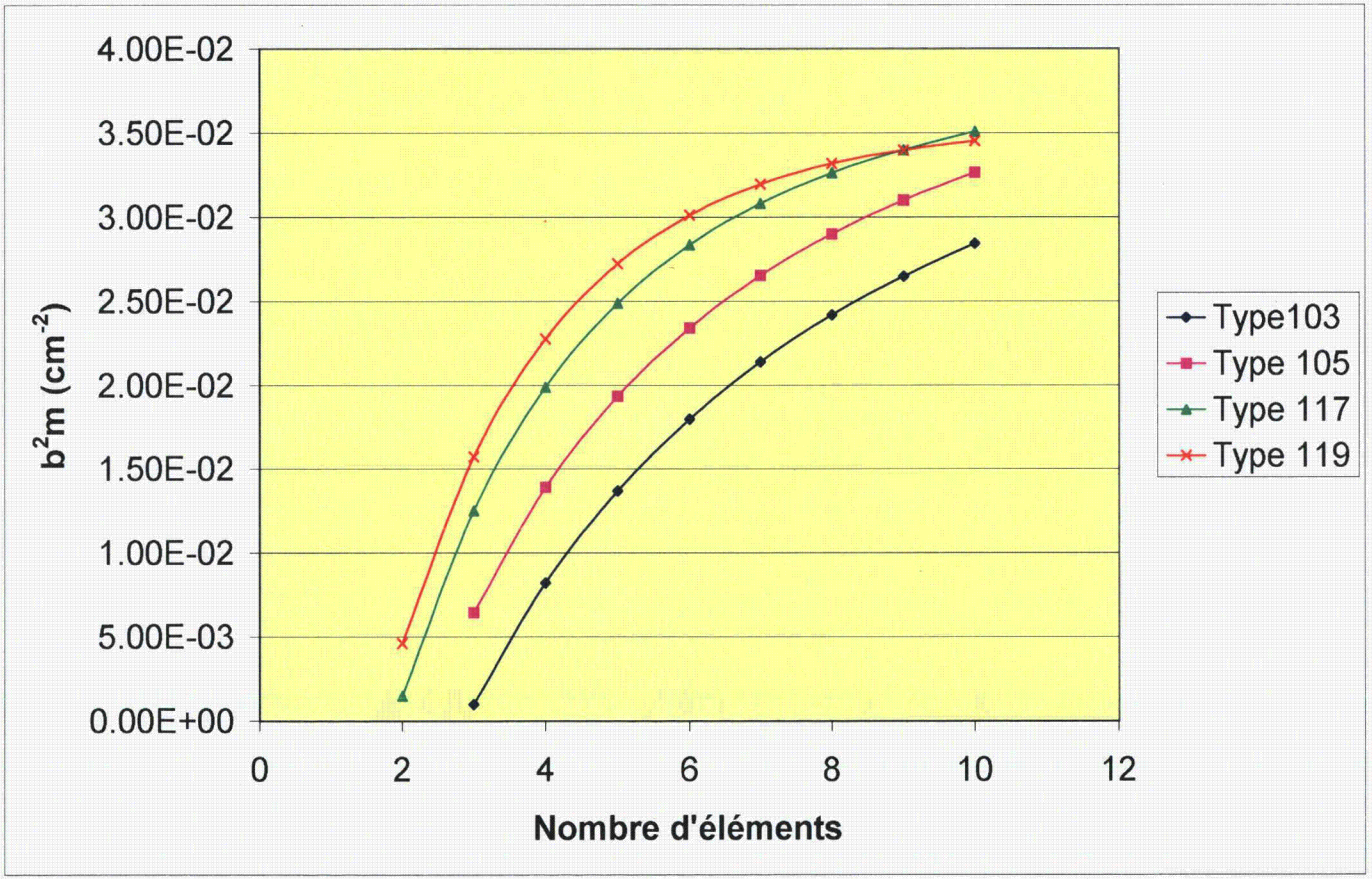


FIGURE 3 : Comparaison des milieux fissiles $UZrH_2$-H_2O - Eléments standard

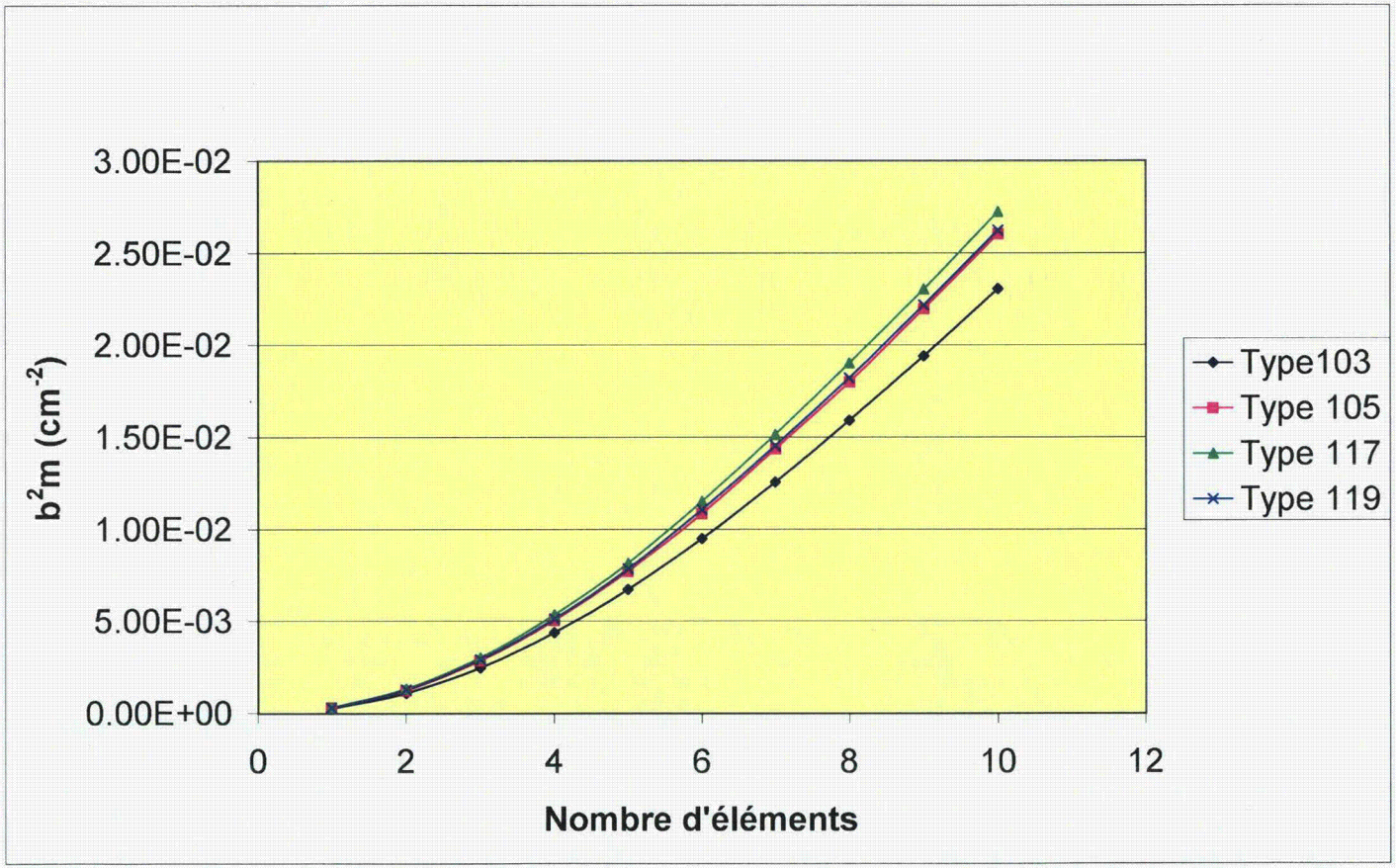


FIGURE 4 : Comparaison des milieux fissiles $UZrH_2$-Air - Eléments standard

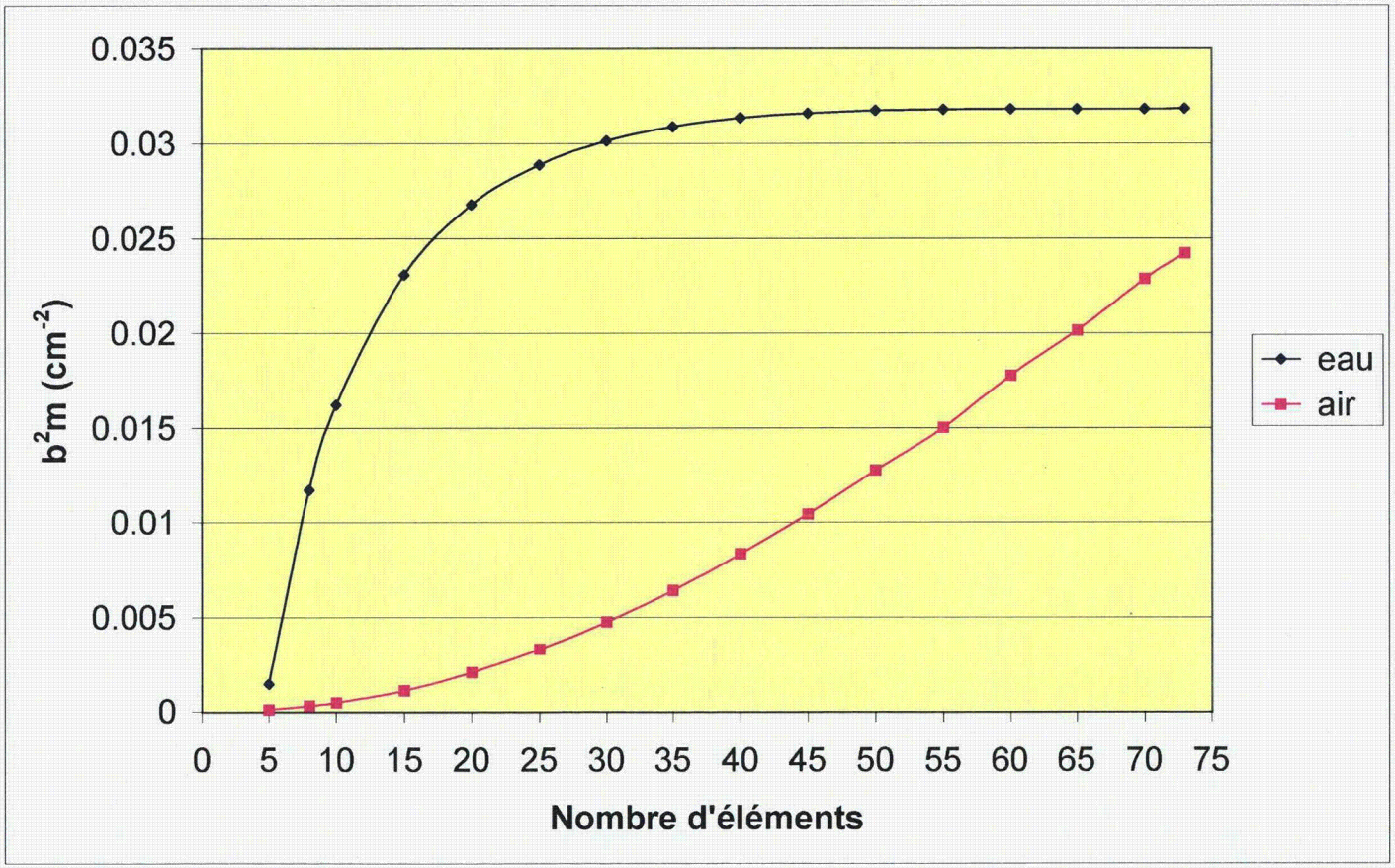
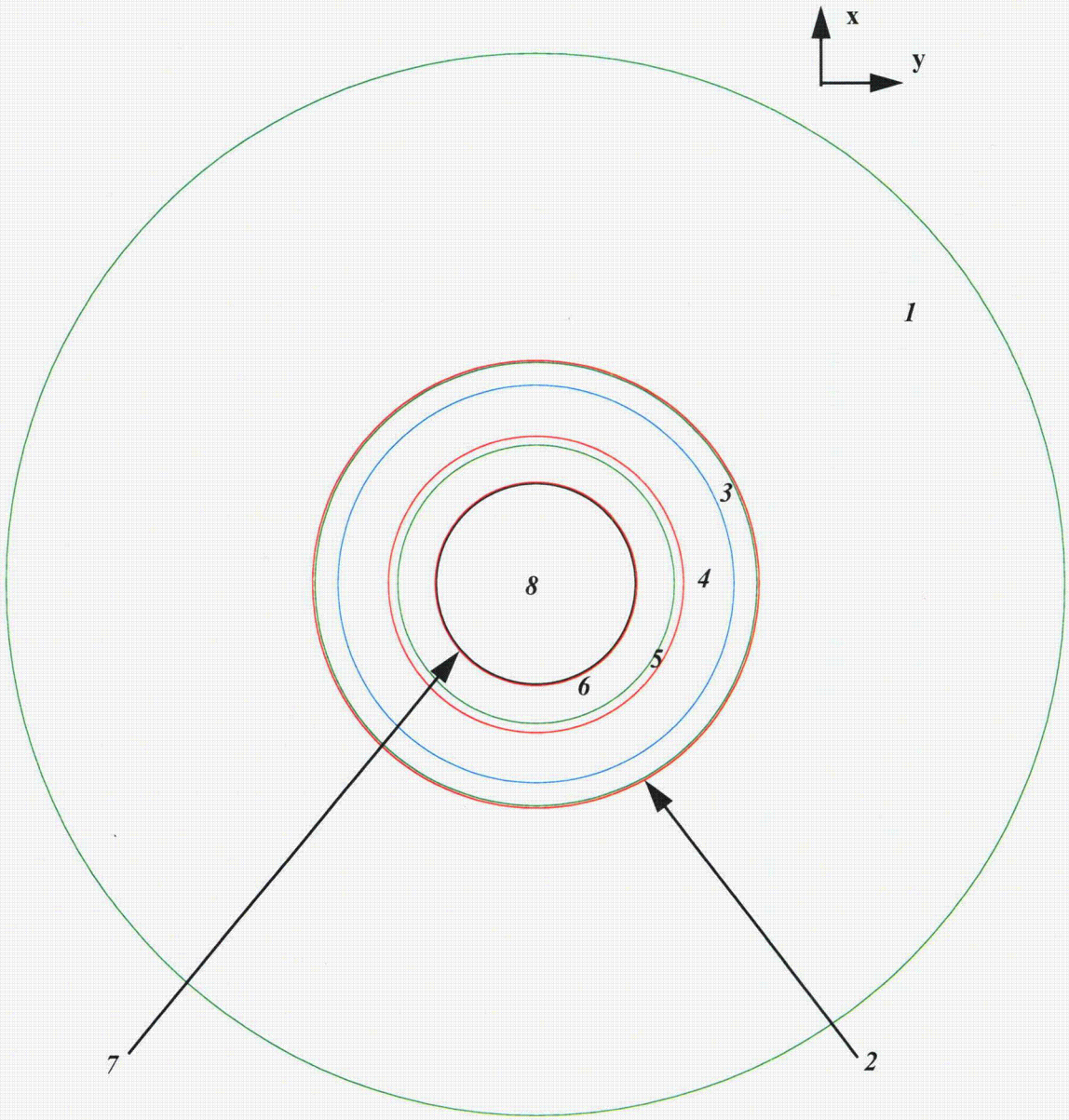


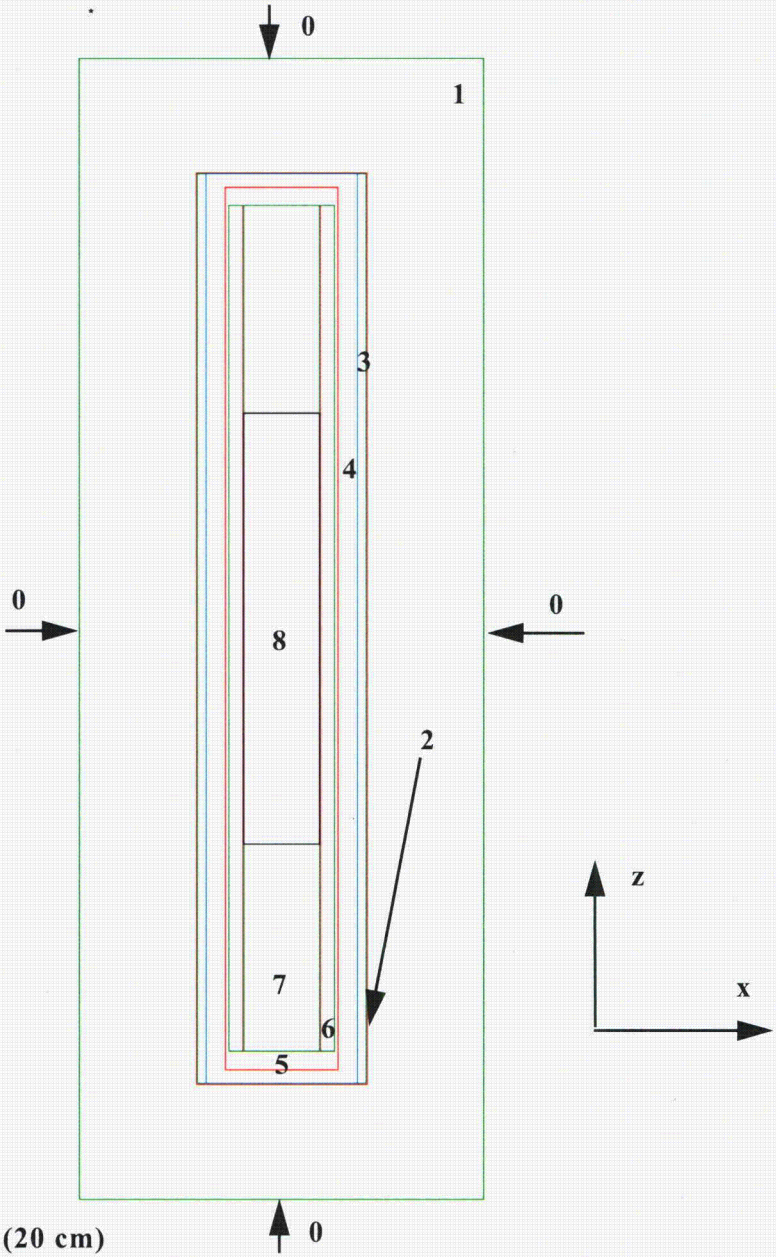
FIGURE 5 : Comparaison des milieux fissiles $UZrH_2$-H_2O et Air - Eléments finis

FIGURE 6 : Modélisation MORET4 - Coupe radiale du colis isolé



1 : couronne d'eau (20 cm)
2 : virole externe d'acier e=1.5 mm (⌀externe = 292 mm)
3 : résine brûlée(e=15 mm)
4 : résine (e=33 mm)
5 : virole en acier (e= 6 mm)
6 : cavité (⌀interne =181 mm, hauteur = 1475 mm)
7 : conteneur interne en acier (⌀interne =130 mm, e= 2 mm)
8 : milieu fissile (hauteur=752 ou 770 mm, ⌀ 130 mm)

FIGURE 7 : Modélisation MORET4 - Coupe axiale du colis isolé



1 : couronne d'eau (20 cm)
2 : virole externe d'acier e=1.5 mm (⌀externe = 292 mm)
3 : résine brûlée(e=15 mm)
4 : résine (e=33 mm)
5 : virole en acier (e= 6 mm)
6 : cavité (⌀interne =181 mm, hauteur = 1475 mm)
7 : conteneur interne en acier (⌀interne =130 mm, e= 2 mm)
8 : milieu fissile (hauteur=752 ou 770 mm, ⌀ 130 mm)

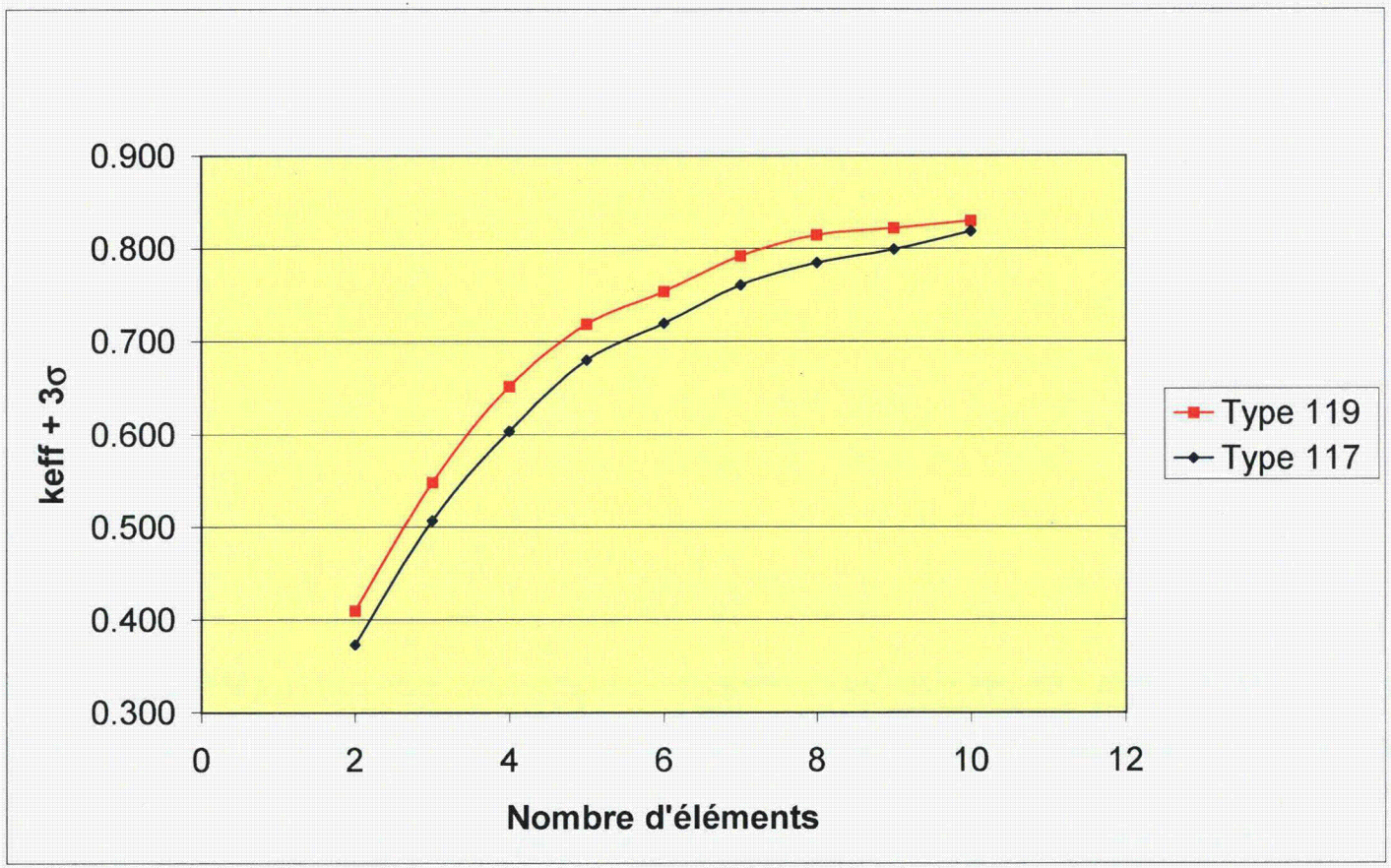


FIGURE 8 : Résultats colis isolé - TRIGA types 119 - 117 -$UZrH_2$-H_2O

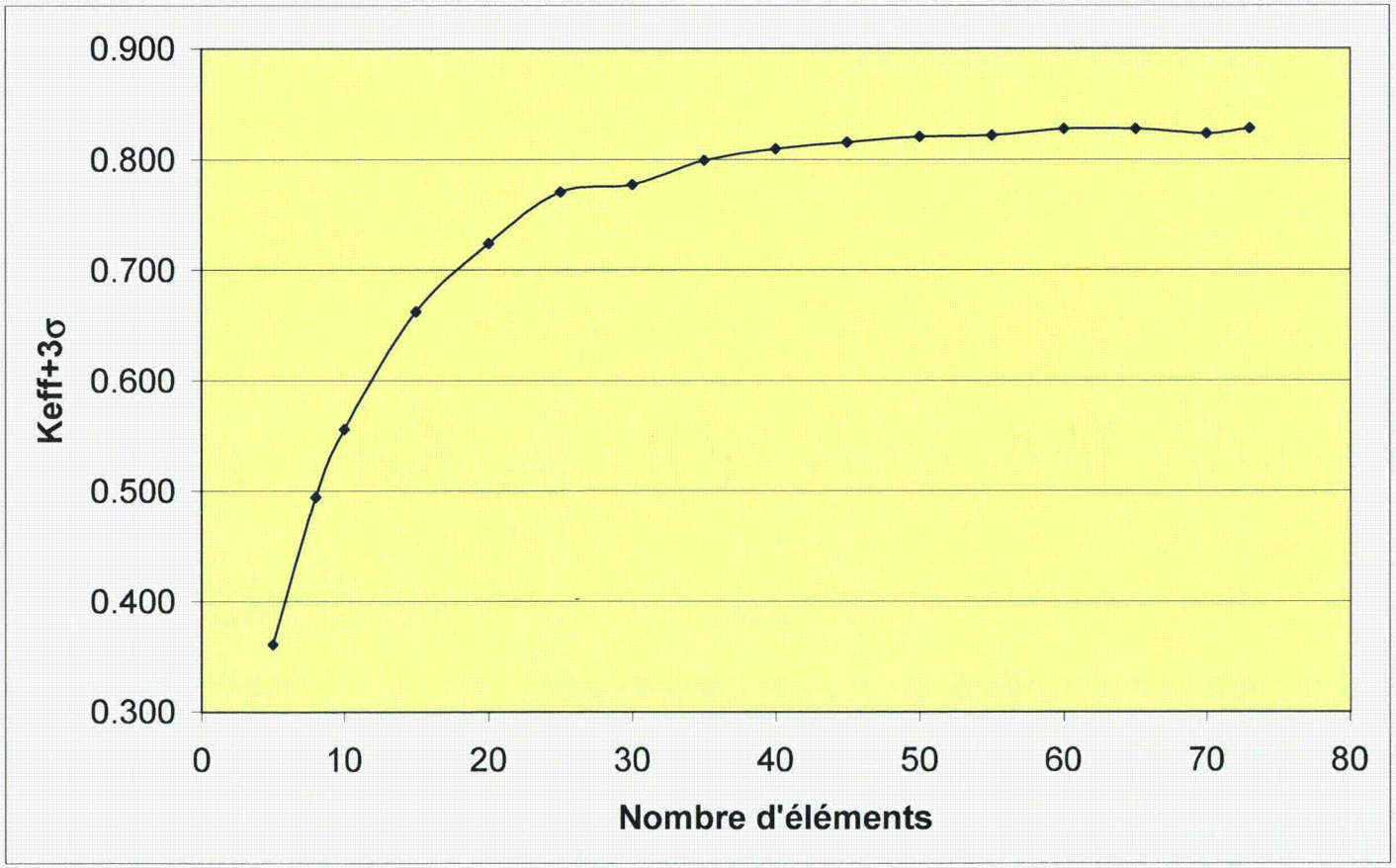
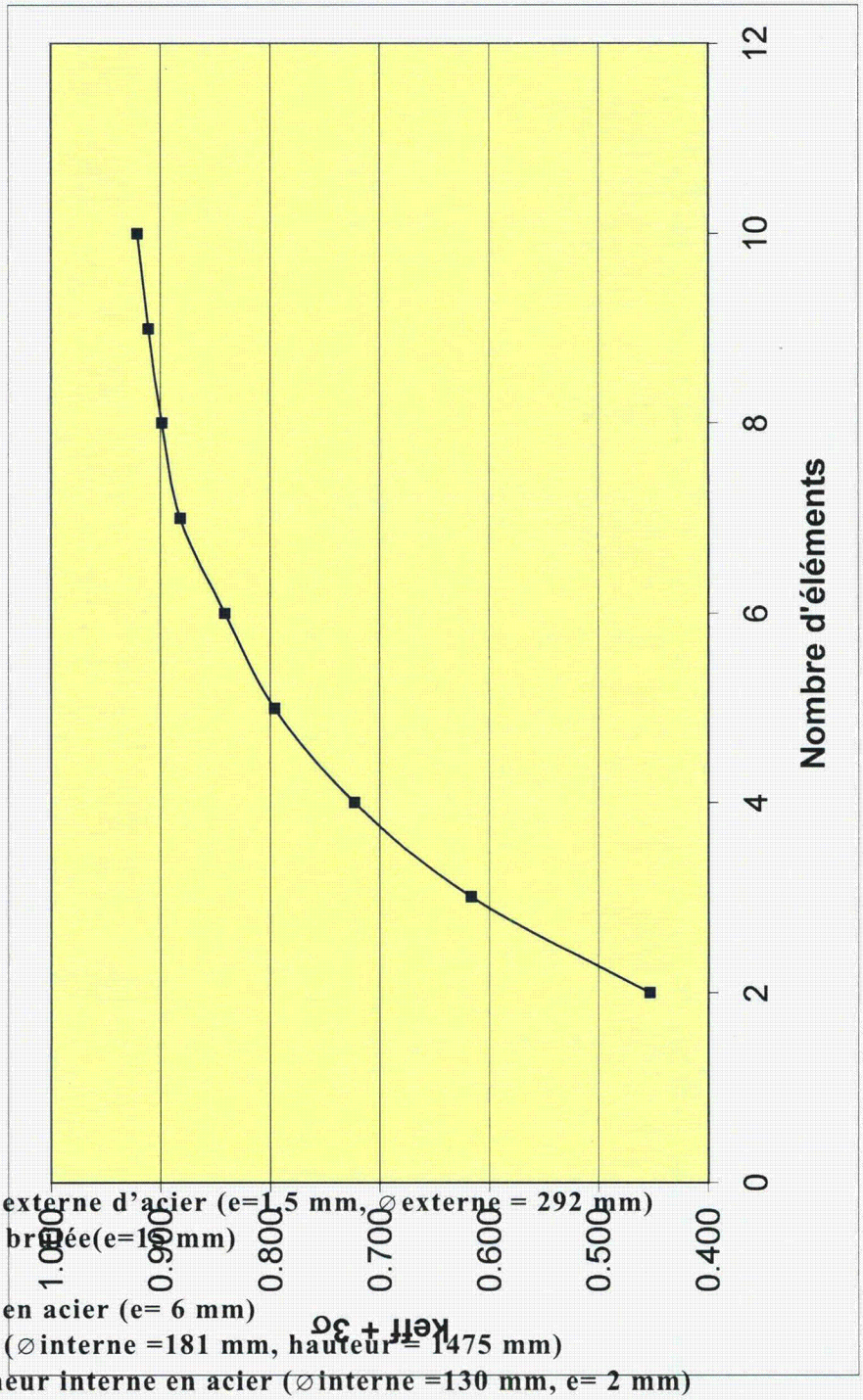


FIGURE 9 : Résultats colis isolé - TRIGA types 424 - $UZrH_2$-H_2O

FIGURE 10 : Résultats réseau de colis - TRIGA type 119 - $UZrH_2$-H_2O



1 : air
2 : virole externe d'acier (e=1,5 mm, ∅externe = 292 mm)
3 : résine brûlée(e=19 mm)
4 : résine
5 : virole en acier (e= 6 mm)
6 : cavité (∅interne =181 mm, hauteur = 1475 mm)
7 : conteneur interne en acier (∅interne =130 mm, e= 2 mm)
8 : milieu fissile (hauteur=752 mm)

FIGURE 11 : Modélisation MCNP4B - Coupe radiale du réseau de colis

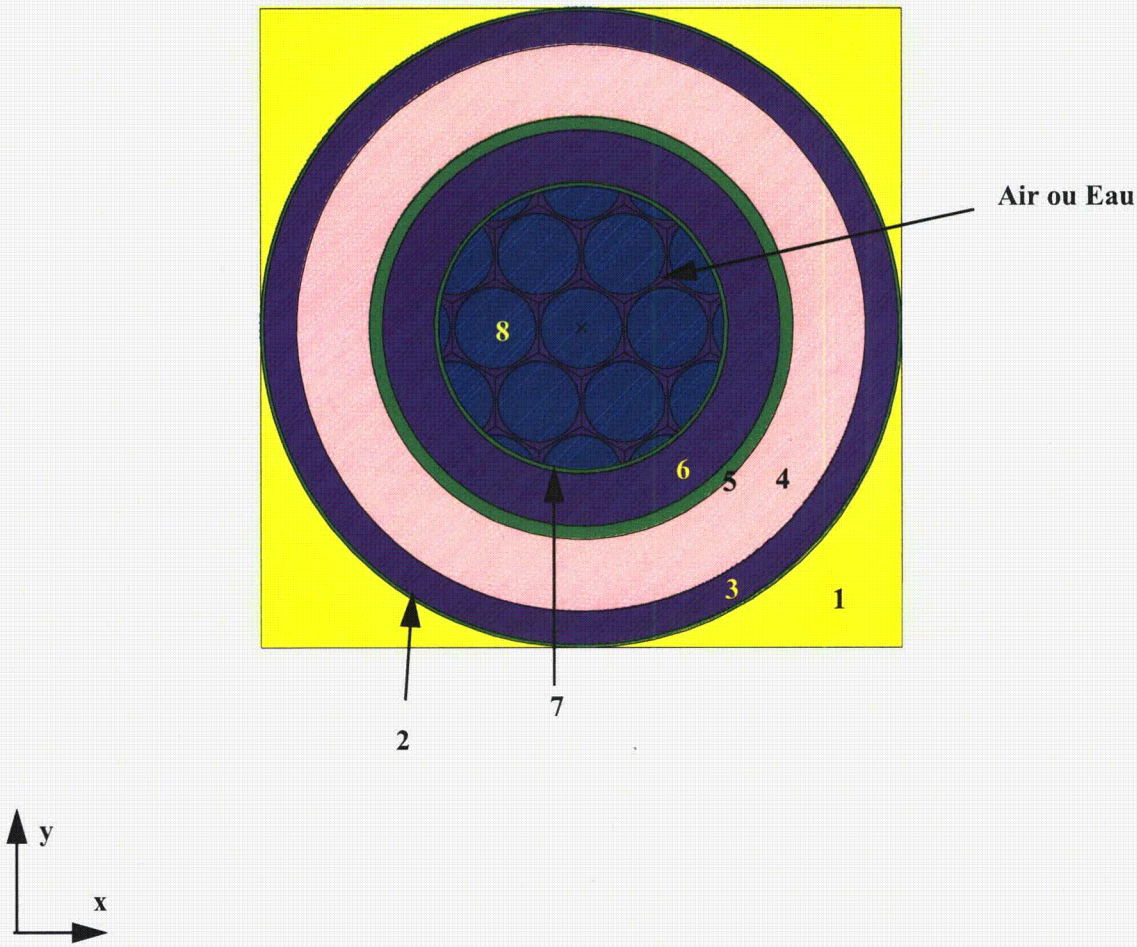
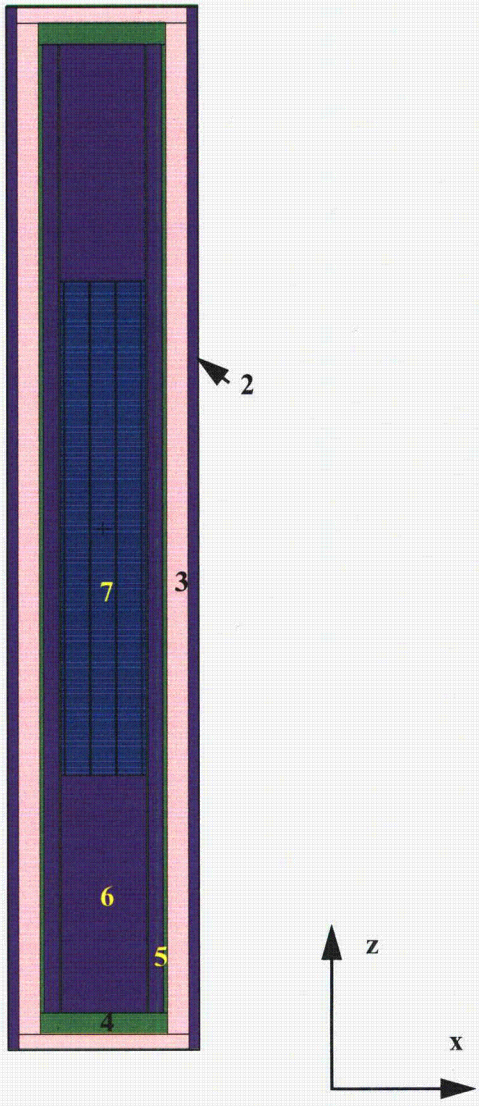


FIGURE 12 : Modélisation MCNP4B - Coupe axiale du réseau de colis



1 : virole externe d'acier (e=1.5 mm, ∅externe = 292 mm)
2 : résine brûlée (e=15 mm)
3 : résine (e=33 mm)
4 : virole en acier (e= 6 mm)
5 : cavité (∅interne =181 mm, hauteur = 1475 mm)
6 : conteneur interne en acier (∅interne =130 mm, e= 2 mm)
7 : milieu fissile (hauteur=752 mm)

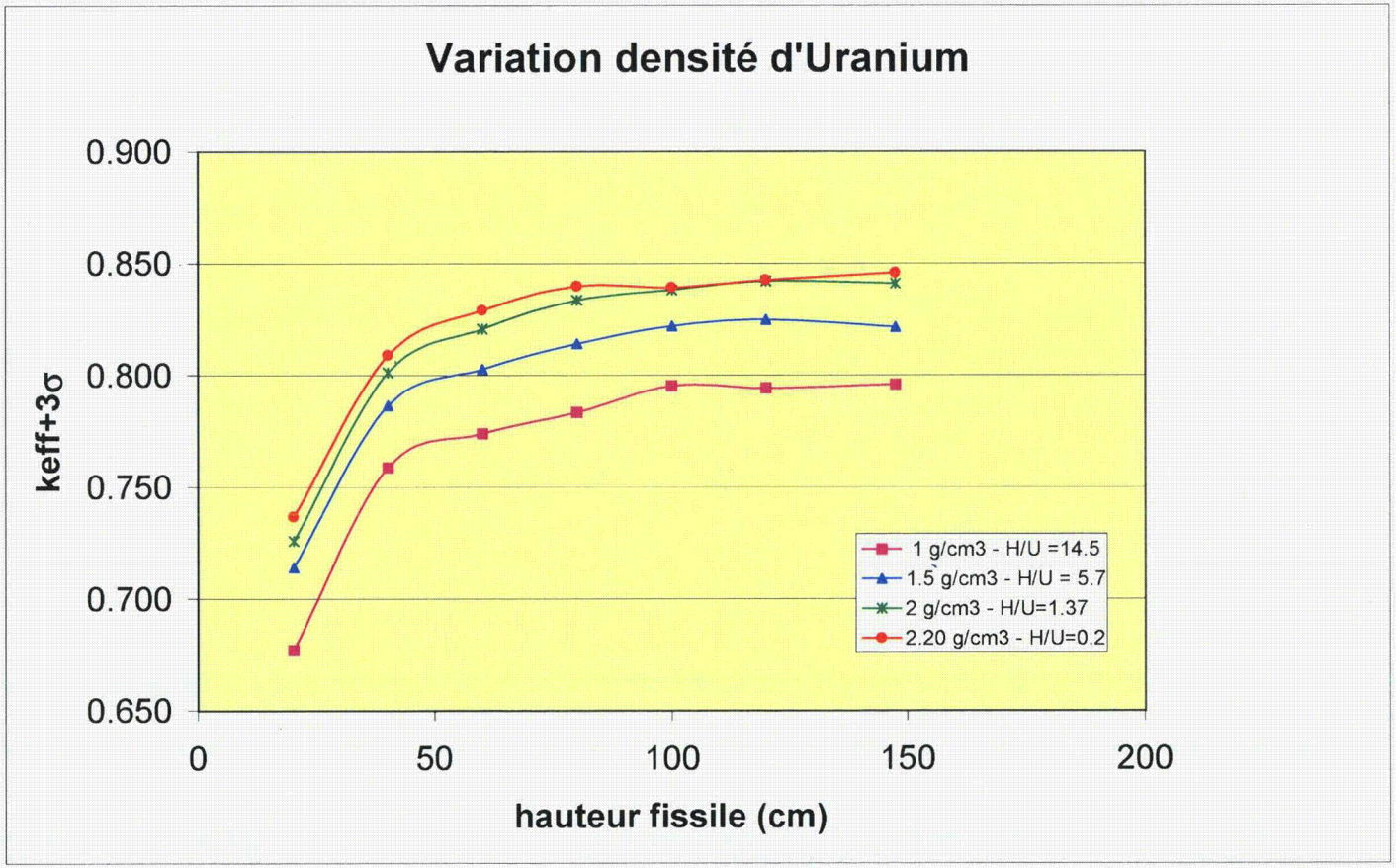


FIGURE 13 : Résultats MORET4 colis isolés- TRIGA type 119 $UZrH_2$-H_2O homogène (concentration variable, hauteur variable)

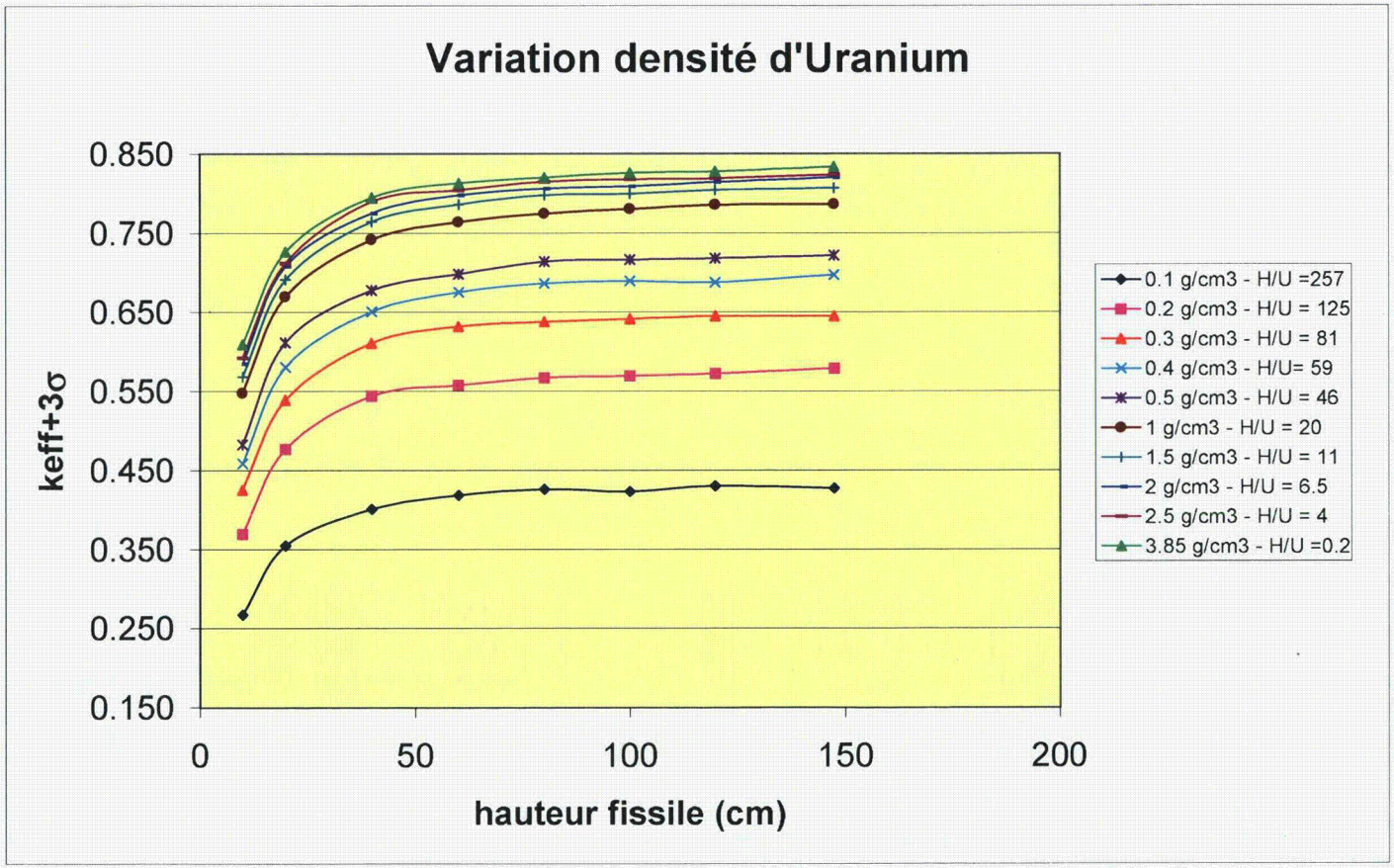
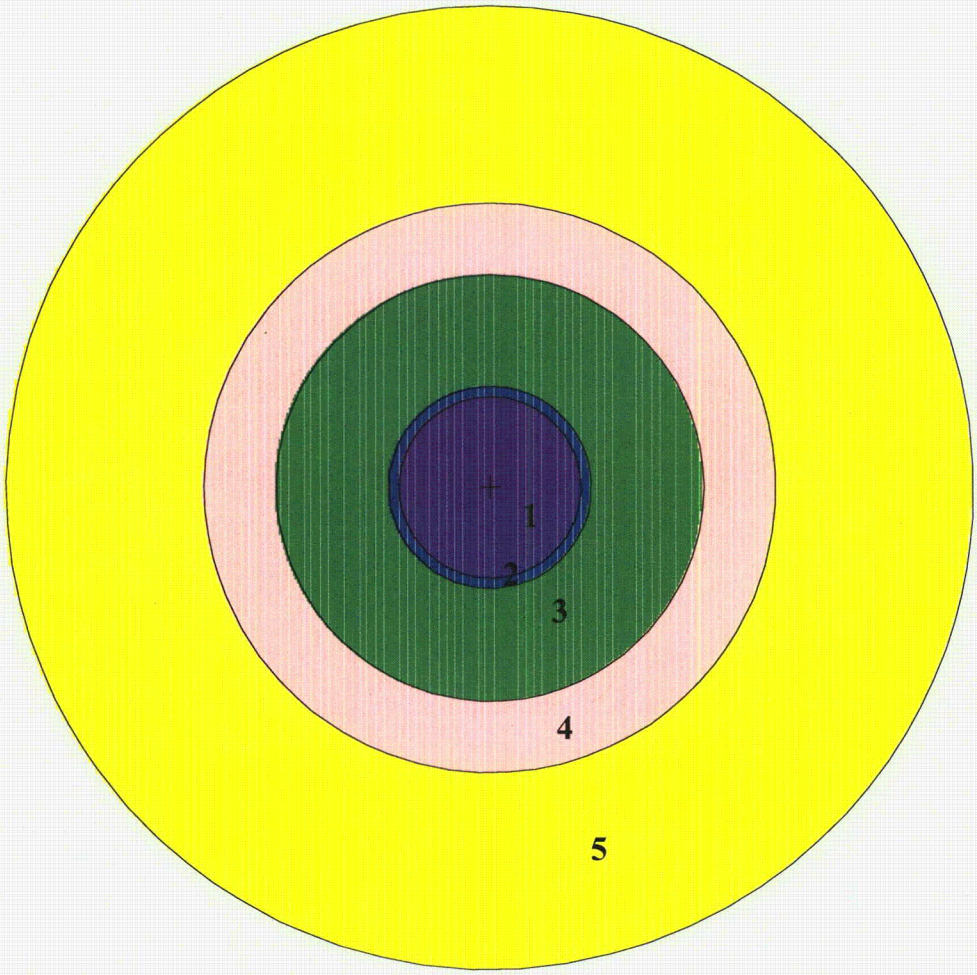


FIGURE 14 : Résultats MORET4 colis isolés- TRIGA type 424 $UZrH_2$-H_2O homogène (concentration variable, hauteur variable)

FIGURE 15 : Modélisation MCNP4B - Configuration pour le transport aérien



1 : milieu fissile "mouillé" (⌀variable)
2 : milieu fissile sec
3 : virole externe d'acier
4 : résine
5 : couronne d'eau 20 cm

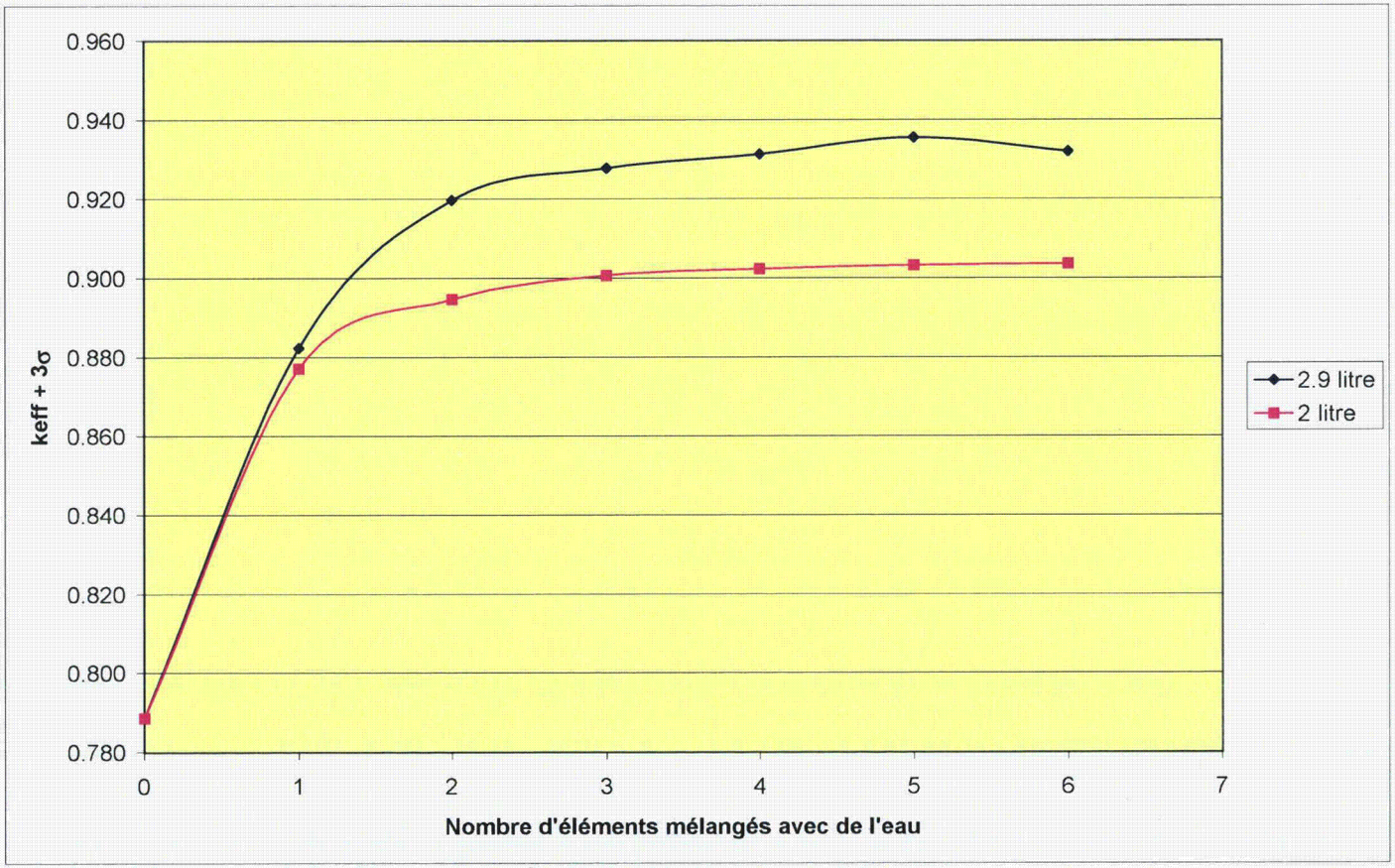


FIGURE 16 : Résultats MCNP4B - Transport aérien
Résultats 6 éléments TRIGA - Type 119 - 2.9 et 2 litres d'eau

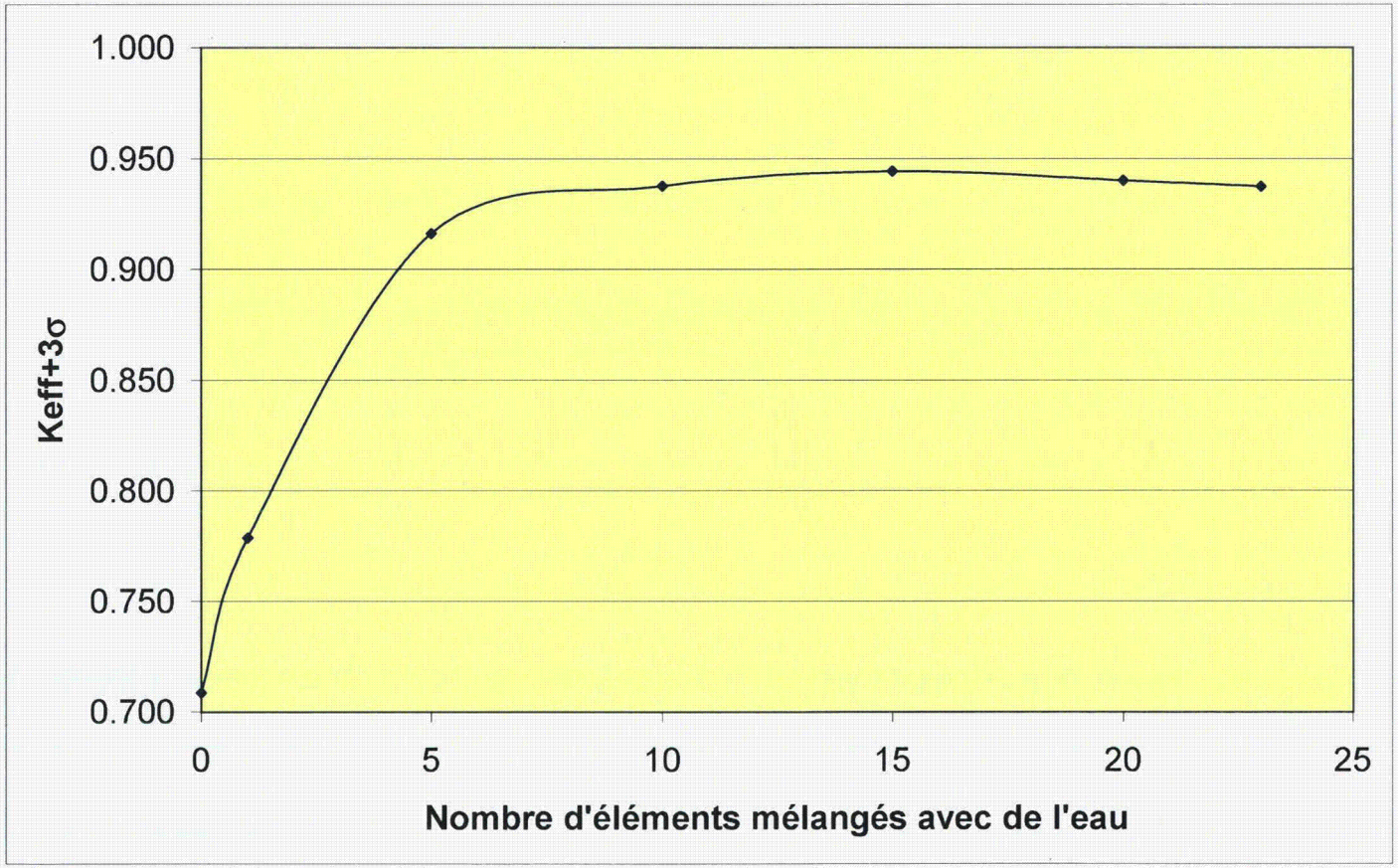


FIGURE 17 : Résultats MCNP4B - Transport aérien Résultats 23 éléments TRIGA - Type 424 - 3.65 litres d'eau