TRANSNUCLEAR
AN AREVA COMPANY

February 17, 2011
E-30551

U.S. Department of Transportation
Attn: Mr. Richard W. Boyle, Chief
Radioactive Materials Branch
1200 New Jersey Avenue, S.E.
East Building, PHH-23
Washington, DC 20590

Subject: Transnuclear, Inc. (TN) Input for the Response to the United States Nuclear Regulatory Commission (USNRC) Request for Additional Information for Revalidation of Model No. MFC-1 (Japanese Competent Authority Certificate J/105/AF-96, Rev. 2) (Docket No. 71-3043; TAC No. L24445)

References:
1. Letter from William C. Allen (NRC) to Richard W. Boyle (DOT), "Request for Additional Information for Revalidation of Model No. MFC-1 (Japanese Competent Authority Certificate J/105/AF-96, Rev. 2) (not dated)

2. Letter from Jayant Bondre (TN) to Richard W. Boyle (DOT), "Transnuclear, Inc. (TN) Input for the Response to the United States Nuclear Regulatory Commission (USNRC) Request for Supplemental Information Regarding the Validation of Japanese Competent Authority Certificate J/105/AF-96 for the Model No. MFC-1 PWR Fuel Assembly Package," August 5, 2010 (TN E-29735)

This submittal provides TN input for the DOT response to the request for additional information (RAI) forwarded by Reference 1. Enclosure 2 provides each of the NRC staff RAI items followed by a response. Certain information in the RAI responses is proprietary. Accordingly, an affidavit requesting withholding of that information is provided as Enclosure 1, and a proprietary and non-proprietary version of the RAI responses are provided as Enclosures 2 and 3, respectively. Changed safety analysis report (SAR) pages, for the proprietary and non-proprietary versions, are provided in Enclosures 6 and 7, respectively.

Related to this revalidation action, the response provided in Reference 2 to a 2010 NRC request for supplemental information is now known to have contained proprietary information. Accordingly, the Enclosure 1 affidavit requests withholding of that information as well, and a proprietary and non-proprietary version of Enclosure 1 to Reference 2 are provided as Enclosures 4 and 5, respectively.

Should the DOT staff require additional information to support review of this application, please do not hesitate to contact Don Shaw at 410-910-6878 or me at 410-910-6881.

7135 Minstrel Way, Suite 300, Columbia, MD 21045
Phone: 410-910-6900 • Fax: 410-910-6902

Sincerely,

Jayant Bondre

Jayant Bondre, PhD
Vice President - Engineering

Enclosures:

1. Affidavit Pursuant to 10 CFR 2.390
2. RAIs and Responses (proprietary version)
3. RAIs and Responses (non-proprietary version)
4. Enclosure 1 to TN E-29735, with Proprietary Markings
5. Enclosure 1 to TN E-29735, with Non-proprietary Markings
6. Changed Pages for the Safety Analysis Report for the Model MFC-1 Package (proprietary version)
7. Changed Pages for the Safety Analysis Report for the Model MFC-1 Package (non-proprietary version)

AFFIDAVIT PURSUANT
TO 10 CFR 2.390

Transnuclear, Inc.)
State of Maryland) SS.
County of Howard)

I, Jayant Bondre, depose and say that I am a Vice President of Transnuclear, Inc., duly authorized to execute this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.390 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in Enclosures 2, 4, and 6 and is listed below:

1. Portions of the response to Thermal Review item T1 in Enclosure 2 of this submittal
2. Portions of the response to Thermal RSI (request for supplemental information) No. 1 in Enclosure 1 to TN E-29735, provided in Enclosure 4 of this submittal
3. Certain changed Safety Analysis Report pages in Enclosure 6 of this submittal

I have personal knowledge of the criteria and procedures utilized by Transnuclear, Inc. in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure are portions of radioactive material transportation cask design analyses, which are owned by others and have been held in confidence by Transnuclear, Inc.

2) The information is of a type customarily held in confidence by Transnuclear, Inc. and not customarily disclosed to the public. Transnuclear, Inc. has a rational basis for determining the types of information customarily held in confidence by it.

3) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear, Inc. and the owner of the information because the information consists of descriptions of the design and analysis of transportation package for fuel, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Transnuclear, Inc. and the owner of the information, take marketing or other actions to improve their product's position or impair the position of Transnuclear, Inc.'s and the owner of the information's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

Further the deponent sayeth not.

Jayant Bondre
Vice President, Transnuclear, Inc.

Subscribed and sworn to me before this 17th day of February, 2011

Notary Public
My Commission Expires Oct / 17 / 2011

NORA M. DOUGHERTY NOTARY PUBLIC HOWARD COUNTY, MD MY COMMISSION EXPIRES OCT 17 2011

General Description Review

G1 - Clarify the fuel assembly enrichment for which the package is licensed.

The enrichment information provided by the applicant in paragraph (2) of Section 1-8 "Classification of Package" does not agree with the enrichment information provided by the applicant on page Summary-2 and in both Table 1-A.1 and paragraph 0.7.

The information is needed to determine if the requirements of paragraph 807(a) in TS-R-1 are satisfied.

Response to G1

The description in I-B is wrong, but the description in table 1-A.1 and paragraph D.7 (5.0% or less) is correct.

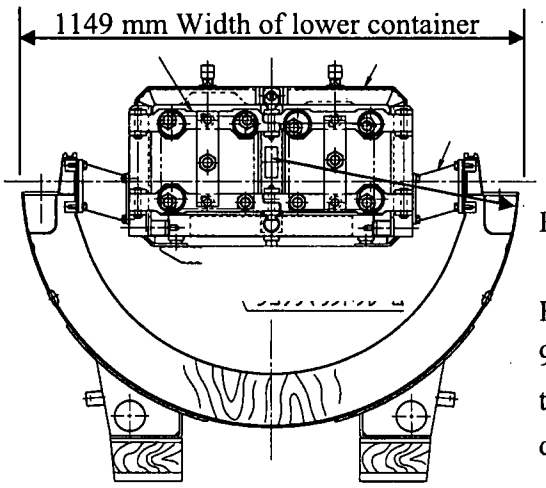
G2 - Clarify the diameter of the lower container.

The lower container diameter shown on Figure I-C.6 provided by the applicant does not agree with the diameter stated in paragraph C.2.1 (2).

This information is needed to determine if the requirements of paragraph 807(b) in TS-R-1 are satisfied.

Response to G2

The diameter of 1150 mm is correct but the dimension of 1149 mm shown in Figure I-C-6 is not diameter but rather is the maximum width of the lower container. Please refer the following figure.



R575 mm(1150 mm in diameter)

Because the flange position is slightly lower than 90-270 degrees line of the package, the width of the lower container is slightly different from its diameter.

Materials Review

M1 - Withdrawn

Thermal Review

T1 - Perform HAC thermal analysis using appropriate coefficients or prove that the analytical approach employed in the application submittal is at least as conservative as that required by the regulations.

The applicant performed a HAC thermal analysis of the package exposed to a fire, and indicated in the SAR that a value of 0.9 was used as the flame emissivity and 0.8 was used as the surface absorptivity coefficient.. During a conference call, the applicant stated that a configuration factor was calculated using the values of 0.9 for the flame emissivity and 0.8 for the surface absorptivity coefficient. The configuration factor calculated, and subsequently used in the TRUMP code to determine the maximum package temperatures, was 0.735. This value of 0.735 is considered by the staff to be non-conservative irregardless if it is used as either an emissivity or an absorptivity coefficient. In addition, the SAR does not show that using this configuration factor provides analytical results which are at least as conservative as those which would be obtained if either a flame emissivity coefficient of 0.9 or a surface absorptivity coefficient of 0.8 were employed.

Also, the applicant specified in the SAR that natural convection heat transfer from the surface of the package was employed instead of forced convection during the 30-minute HAC fire. The applicant also specified that natural convection and radiation heat transfer were used in the HAC analysis during the cooldown period. Although the staff finds the use of natural convection and radiation heat transfer appropriate during the cooldown period, the staff considers using a natural convection heat transfer coefficient during the HAC 30-minute fire a non-conservative boundary condition because the differences in the convective coefficient between natural convection and forced convection are not negligible.

This information is needed for the staff to determine if the thermal design of the MFC-1 meets the requirements of paragraph 728(a) in TS-R-1.

Response to T1

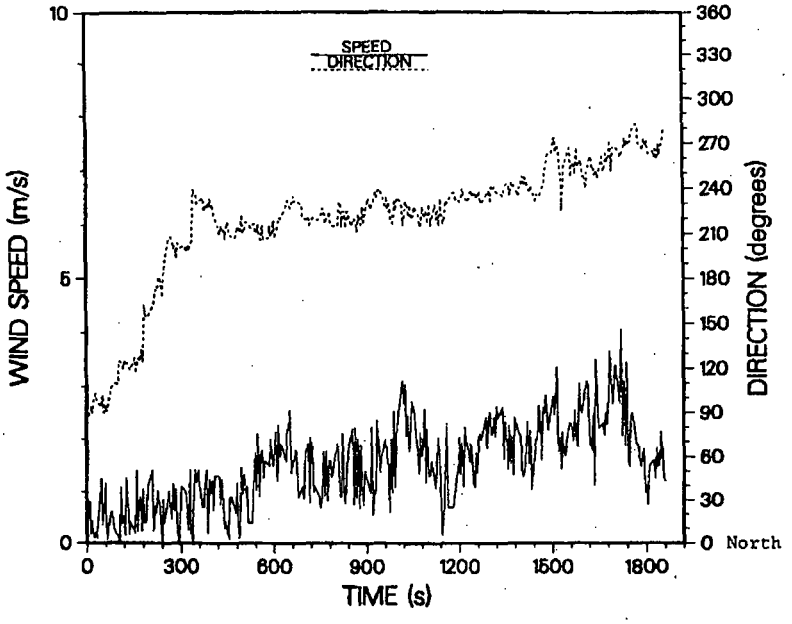
In accordance with what the NRC pointed out, the applicant has carried out the re-calculation of the maximum temperature of the fuel cladding of accommodated fuel assemblies and external/inner surface of the outer container under the following conditions

1. Analysis condition

1) *Treatment of emissivity* in the atmosphere of 800 degrees C *for 30 minutes*
SAR: atmospheric emissivity = 0.9 packaging surface = 0.8 (0.735 as configuration factor)
Re-calculation: flame emissivity of 0.9 and 100% radiation absorption from the flame

2) *Convection between the atmosphere and surface of the package* in the atmosphere of 800 degrees C *for 30 minutes*
SAR: natural convection ---Nu = 0.53(Gr*Pr)^(1/4)*
*Re-calculation: forced convection----Nu = 0.036*Pr^(1/3)*Re^0.8 (Colburn's formula)* [1]

According to Figure 1, gas velocity during a pool fire is generally assumed to be 5 m/s or less. Heat transfer coefficients were calculated considering it as 10 m/s on the conservative side. The calculation results are shown in Table 1.



Proprietary Information Withheld Pursuant to 10 CFR 2.390

3) Summary of analysis condition

Item	*Before HAC fire*	*HAC fire for 30min.*	*Post cooldown*
Isolation	*Yes*	*No*	*Yes*
Ambient	*Still air* *38 deg.*	*Engulfed by flame* *800 deg C*	*Still air* *38deg.*
Emissivity	*Package surface:0.84* *Ambient 1.0*	*Flame :0.9* *100% radiation absorption from flame into packaging surface*	*Package surface 0.6 (oxidized surface of steel)* *Ambient 1.0*
Convection (heat transfer coefficient)	*Natural convection*	*Forced convection*	*Natural convection*

The analysis model and thermal characteristics of the package components are the same as those of the SAR analysis.

2. Result of the analysis (comparison with SAR results)

The analysis results of the re-calculation are as follows;

(1) Maximum temperature

	Re-calculation		*SAR*	
	Maximum Temp.	*Time*	*Maximum Temp.*	*Time*
Surface of cladding	*490 deg. C*	*0.5h*	*440 deg. C*	*0.53h*
Internal cylinder	*698 deg. C*	*0.5h*	*656 deg. C*	*0.53h*
External cylinder	*794 deg. C*	*0.5h*	*793 deg. C*	*0.5h*
Atmosphere	*800 deg. C*	-	*800 deg. C*	-

Remark: Time (Time after commencement of HAC fire)

Time history of the temperature in the above parts is shown in the Figure 2.

(2) Internal pressure of the fuel rod

The fuel rod with the maximum initial internal pressure is type17x17with initial enrichment of 4.1%.

For this, the pressure and the stress in the fuel rod under the maximum temperature are as follows.

The fuel rods that form containment boundary of this package maintain its integrity even under hypothetical accident conditions of transport.

	Re-calculation	*SAR*
Maximum pressure	*8.34 MPa.G*	*7.79 MPa G*
Stress criteria of fuel rod	*260 MPa*	*280 MPa*
Maximum stress of fuel rod	*61.2 MPa*	*57.2 MPa*

[1] "Advisory Metrical for the IAEA Regulations for the Safe Transport of Radioactive Metrical", IAEA Safety Standards Series, No. TS-G-1.1 (ST-2)

[2] Bainbridge, B. L., and Keltner, N. R., "Heat transfer to large objects in large pool fires", J. Hazardous Materials, 20, (1988).

[3] JSME Data Book: "Heat Transfer", 4th Edition, (1986)

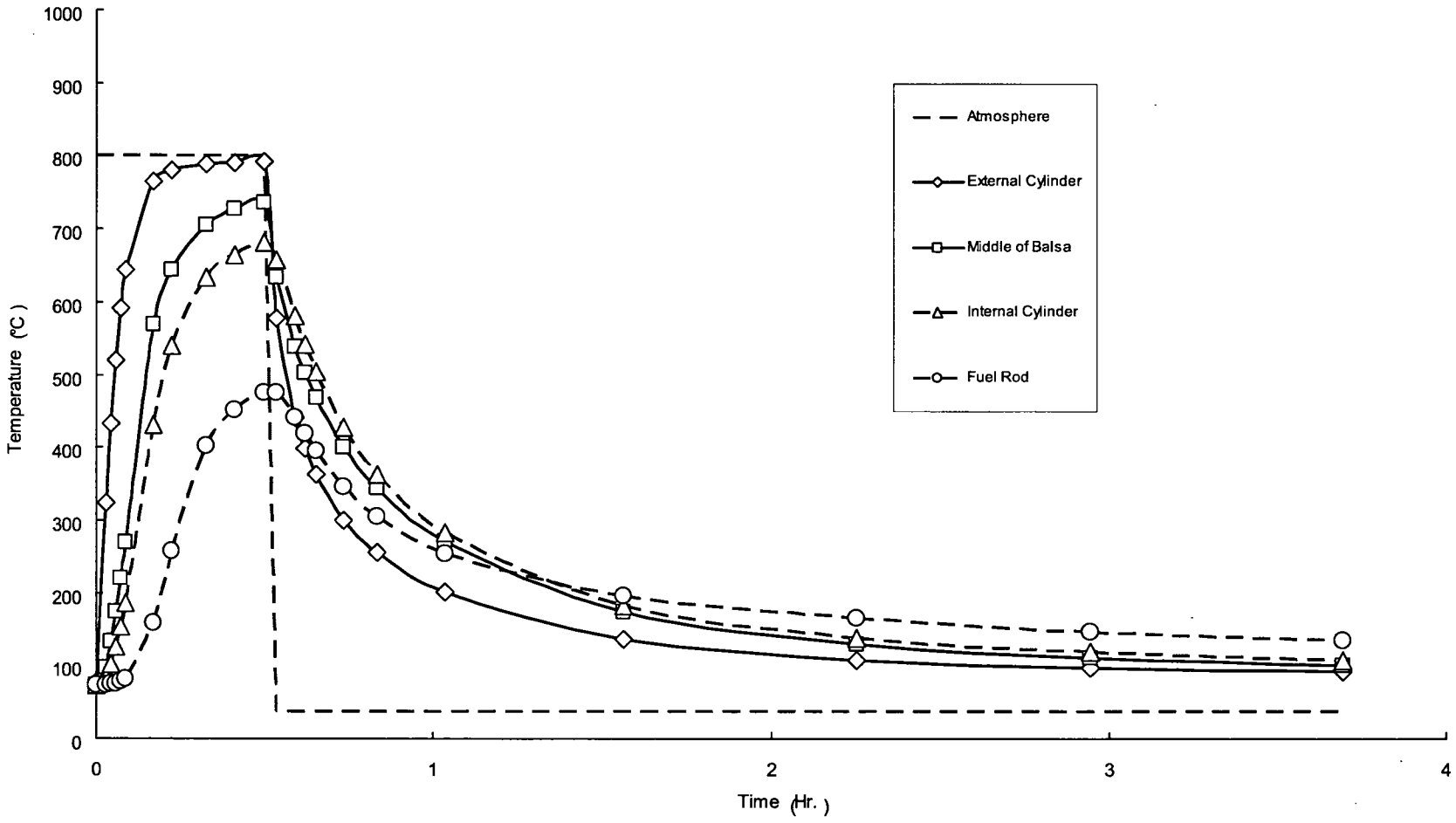


Figure 2 Temperature History of Each Part under Hypothetical Accident Conditions of Transport

T2 - Correct the temperature range of the package in the specification of the component section.

The applicant reported the temperature range of the package in the specification of the components section of the SAR II-B.3, specifically under the relief valve portion of the section. This temperature range is inconsistent with the previously specified temperature range for the package. The temperature range that was shown in the discussion is -20°C and -73°C (SAR page II-B-7) when the correct temperature range for the package is between -20°C and + 73°C (SAR page II-B-9). The applicant is required to correct the sign of the temperature range of the package.

This information is needed to for the staff to determine if the thermal design of the MFC-1 meets the requirements of IAEA TS-R-1.

Response to T2

-73 degrees C is a misprint. Therefore it will be corrected to 73 degrees C.

Operating Procedures & Maintenance Review

P1 - Withdrawn

P2 - Provide torque values for securing fuel assemblies within the package.

Paragraphs (7)(e) and (7)(f) of Section A1.2 "Loading Procedures" direct that bolts be tightened, and the flow chart "Fuel Assembly Loading Flow" shown in Figure IV-A2 directs personnel to "Check the given torque of the clamping frame retainer plates". However, torque values are not specified within Section A1.2 for any operation associated with loading fuel assemblies and no torque values were found in the Section I, "Package Description" .

This information is needed to determine if the requirements of paragraph 612 in TS-R-1 are satisfied.

Response to P2

The specified torque concerning tightening fuel assemblies is as follows;

(1) Jacking screw bolt of pressure pad incorporated in clamping frame: 784 N- cm (lateral tightening)

(2) Jacking screw of the top closure: 784 N-cm (longitudinal tightening)

P3 - Clarify the method used to secure tightening bolts (Figure IV-AS) in paragraph (8)(c) of Section A1.2 "Loading Procedures".

Neither Figures IV-AS and IV-A6 nor the instructions in paragraph (8)(c) of Section A1.2 clearly indicate what prevents the tightening bolts from being inadvertently removed during transit.

This information is needed to determine if the requirements of paragraph 612 in TS-R-1 are satisfied.

Response to P3

The procedure of the securing main body fastening bolts (40 sets) are shown as follows and the following information will be added in the paragraph (8)(c).

(1) Tighten quarter-turn bolts until specified position (90 deg. clockwise) using open ended spanner.

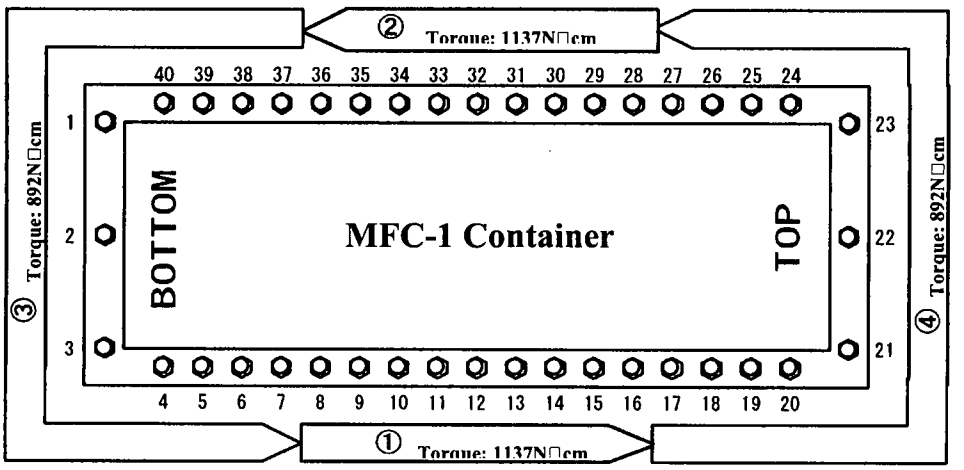
(2) Tighten setscrew of quarter-turn bolts using hexagon socket screw torque wrench 1137N-cm and 892N-cm) in accordance with the following order, (reference the following figure).

1) Tighten the first nine (No.8 to 16) bolts with torque of 1137N-cm

2) Tighten the second nine (No. 28 to 36) bolts with torque of 1137N-cm

3) Tighten the third eleven (No. 37 to 40, 1 to 7) bolts with torque of 892N-cm

4) Tighten the third eleven (No. 17 to 27) bolts with torque of 892N-cm



General Information

RSI-1: Provide the application in the proper electronic format as described on the NRC website for docketing (both the proprietary and non-proprietary versions).

The PDF requirements are listed in Section 2.9 of http://www.nrc.gov/site-help/e-submittals/guide-electronic-sub-r5.pdf. Reference Materials for Electronic Submissions can be found at http://www.nrc.gov/site-help/electronic-sub-ref-mat.html.

- It is recommended that the Applicants download the Adobe Distiller Profile (base on the version of their Acrobat Pro), and use it to convert documents into PDF. Also, Download Adobe Preflight Profile (base on the version of their Acrobat Pro), so you can verify whether your PDF(s) met NRC's requirements or not. Detailed instructions on how to download/install the Profile, and how to convert documents to PDFs are in the "Desk Reference Guide for PDF Generation" at http://adamswebsearch2.nrc.gov/idmws/doccontent.dll?library=PU_ADAMS^PBNTAD01&ID=062020192.

- In the finalizing phase, prior to submitting the documents to the NRC, the Applicants should follow the examples in "Simplified Checklist Document Submittal Checklist" to ensure their PDFs complied to NRC's requirements.

This information is required by the staff to verify the compliance with 10 CFR Part 2, Subpart J and Subpart C, Part 13, and Part 110

Response to General Information RSI-1

The reference material discussed in the RSI has been reviewed. Based on that review, the two associated Transnuclear, Inc. submittals (TN E-29032 of 2/24/10 and TN E-29369 of 4/30/10), and this submittal, have been processed into the proper electronic format, as follows:

- *The files are pdfs in version 9.3 of Adobe 9, with optical character recognition (OCR) applied, except for calculational input/output files, which must stay in the format of the computer application in which the NRC staff will use them.*
- *All file names are less than or equal to 49 characters.*
- *No files are larger than 50MB.*
- *There are no passwords or security settings.*

- *Transmittal letters, with explanatory information, are provided.*
- *The resolution of scanned pages is 300 ppi.*
- *Color is minimized but is sometimes needed for graphical clarity.*
- *The files do not contain oversized pages*
- *Hyperlinks (bookmarks) have been created in the larger documents.*
- *The files are believed to be free of viruses and free of macros.*
- *In the case of the safety analysis reports, which are living documents, the entire document is provided.*

Thermal

RSI-1: Validate the TRUMP thermal code using experimental data obtained for similar geometries as those requested, which include similar heat transfer characteristics. In lieu of the validation, the staff would accept for review a thermal evaluation based on a more commercially available code (ANSYS, SINDA/FLUINT, FLUENT, etc.).

The thermal evaluation under hypothetical accident conditions (HAC) of transport are based on the TRUMP thermal code. As stated in the application, TRUMP is a heat transfer calculation program which was developed by Lawrence Radiation Laboratory in 1968. The staff is not familiar with this code.

This information is required by the staff to verify compliance with IAEA Regulations TS-R-1, 2005 Edition.

Response to Thermal RSI-1

In order to confirm the adequacy (conservativeness) of the thermal analysis by TRUMP code in the event of HAC described in chapter II-B of safety analysis report, the analysis result is compared with the thermal test result using prototype container(full scale model) accommodating dummy fuel assembly (described in the chapter II-F of safety analysis report).

According to SAR, the maximum temperature of fuel rod in the thermal test is 115 degree C (shown in page II-F-43), on the other hand, the result in thermal analysis in chapter II-B is 440 degree C (shown in page II-B-21).

The reason why the result has such redundant conservativeness is modeling of deformation for both outer and inner surface of outer shell due to 9m horizontal (side)

drop. Although deformations of both inner and outer are partial, the residual wall (balsa-wood) thickness of the outer shell is only 23 mm (119.3 mm = thickness without deformation = ref. Table I-C-1 in page I-C-27) shown in Fig-II-B.2.

Proprietary Information Withheld
Pursuant to 10 CFR 2.390

Materials

RSI-MI Provide specific alloy designations (SA-, or UNS number.) or copies of the references for the material properties for tables II-A, Fig II-A.2,3, Table II-B.3 and tables in Sec III. Designations such as SS400 are insufficient)

The materials designations are either too broad ,such as SS400, or are Japanese designations (Sec Section III tables) . In order to verify the chemical and mechanical characteristics of these materials, the US designations (SA-, or UNS number.) or copies of the references for the material properties are needed.

This information is needed to determine compliance with TS-R-1 Section 646.

Response to Materials RSI-MI

The specific alloy designations corresponding to the Japanese standards are shown in Table 1.
The chemical components and mechanical properties for each material are shown in Table 2 and Table 3, respectively.
Inspection certificates and material test reports are also included.

Table 1 Correspondence Table for American / Japanese Standards

Material	Japanese Standard		American Standard			
	Designation	JIS No.	ASTM	ASME	AISI、SAE	UNS code
Carbon steel	SS400	G3101	A 36/A36M	SA-36/SA-36M	-	-
	SM490A	G3106	A 283/A283M Grade B	SA-283/SA-283M Grade B	-	-
	SPCC	G3141	A109/A109M Temper4,5, A1008/A1008M	SA-1008/SA-1008M	-	-
	S25C	G4051	-	-	1025	-
	STK400	G3444	A500/A500M Grade B, A501	-	-	-
Low-alloy steel	SCM435	G4053 (G4105)	-	-	4137	-
Stainless alloy	SUS304	G4304	A276 Type304	SA-276 Type304	-	S30400
Mild steel	SPHC	G3131	A1011/A1011M CS Type A,B, DS Type A,B	SA-1011/SA-1011M CS Type A,B, DS Type A,B	-	-

Table 2 Chemical components*

Designation	JIS No.	Chemical components							
		Carbon, max	Silicon, max	Manganese, max	Phosphorus, max	Sulfur, max	Nickel, max	Chromium, max	Molybdenum, max
SS400	G3101	-	-	-	0.050	0.050	-	-	-
SM490A	G3106	0.20	0.55	1.65	0.035	0.035	-	-	-
SPCC	G3141	0.15	-	0.60	0.100	0.050	-	-	-
S25C	G4051	0.22 ~ 0.28	0.15 ~ 0.35	0.30 ~ 0.60	0.030	0.035	-	-	-
STK400	G3444	0.25	-	-	0.040	0.040	-	-	-
SCM435	G4053 (G4105)	0.33 ~ 0.38	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.25	0.90 ~ 1.2	0.15 ~ 0.30
SUS304	G4304	0.08	1.00	2.00	0.045	0.030	8.00 ~ 10.50	18.00 ~ 20.00	-
SPHC	G3131	0.15	-	0.60	0.050	0.050	-	-	-

*JIS (Japanese Industrial Standard)

Table 3 Mechanical properties**

Designation	JIS No.	Sy			Su			E
		T= - 30 ~ 40	T=75	T=100	T= - 30 ~ 40	T=75	T=100	T=20
SS400	G3101	245	231	220	402	381	372	2.06
SCM435	G4053 (G4105)	784	711	685	931	847	847	2.06

T: Temperature (□) S_y: Design yield stress (N/mm^2)

S_u: Design tensile stress (N/mm^2) E: Young's modulus($\times 10^5$ N/mm^2)

** Technical standards on structures, etc. Related to nuclear facilities for power generation (Notification No. 501, 1980)

SS400

2. 3. 2:

検査証明書
INSPECTION CERTIFICATE

NKK 日本鋼管株式会社 NKK CORPORATION

本社 Head Office: 〒100 東京都千代田区丸の内1丁目1番2号 1-1-2, MARUNOUCHI, CHIYODA-KU, TOKYO 100 JAPAN

需要家 Purchaser	: MITSUBISHI HEAVY INDUSTRIES, LTD.-KOBE
需要家管理番号 Purchaser's Order No.	: 2930478
注文者 Trading Co.	: MITSUBISHI CORPORATION.
注文者照合番号 Reference No.	: ABA -1B0171N
品名 Commodity	HOT ROLLED STEEL PLATE
規格 & Specification	: JIS G3101 SS400

証明書番号 Certificate No.	A5-2732 -001 (M)
日付 Date	:1992-03-16
船番 Ship's No.	:
工事番号 Construction No.	:0A067182
契約番号 Contract No.	:AD2M146

合格 購品管 今井

D4 DDA84000

管理コードCode	製品番号 Roll No. / 鋼番 Heat No.	行番 Item No.	寸法 Size (MM) T X W X L	員数 Quantity	質量 Mass CAL	C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Cu	Ni	Cr	Mo ×100	V	Nb	T.Al ×1000	Ceq ×100	Y.P N/MM2	T.S N/MM2	El %	YR %	Bend	U.S.T	S.P.T	V&D	TEST NO.
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-8 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2									340	450	A 28		G			G	13294B
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-6 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2																G	13294B
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-5 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2																G	13294B
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-4 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2																G	13294B
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-3 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2																G	13294B
			PURCHASER'S ORDER NO :	0A06718205 SC																							
4	JK412-2 7813	001	6.00 X 1524 X 6096	1	438	12	21	66	13	2																G	13294B

(注1) (Note1) Size of Impact Test Piece: Gauge Length: A:GL=200MM(RECTAN.)
Position: T:Top, B:Bottom, F:Flange, W:Web. Direction: L:Longi. C:Trans. Z:Through-thick. RA:Reduction of Area.
Heat Treatment: N:Normalizing. Q:Quenching. T:Tempering. SR:Stress relieving. CR:Controlled Rolling. U.S.T:Ultrasonic Test.
S.P.T:Sulphur Print Test. V.&D.:Visual & Dimensions: G:Good. **:Decarburized. Y.P: Y.S: T.S: El: YR:

上記製品は検査の結果所定の規格に合格していることを証明いたします。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN TESTED AND INSPECTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION.

O.No. 2930478-0100. N.F.T.S.
DWG.No. LS-95(E004-(05)~10基分 LS-95(E005-(05)~10基分 (08)~10枚
LS-95(E011-105)~10基分 LS-95(E012-(01) (16) ~10基分

K. Hirata

MANAGER OF INSPECTION SEC.
FUKUYAMA WORKS

福山製鉄所検査室長

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6

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Head Office: 1-1-2, MARUNOUCHI, CHIYODA-KU, TOKYO 100 JAPAN

検査証明書
INSPECTION CERTIFICATE

NKK 日本鋼管株式会社 NKK CORPORATION

需要家 Purchaser 5113	: MITSUBISHI HEAVY INDUSTRIES, LTD.-KOBE	証明書番号 Certificate No.	: D3-47-006-01/01
需要家管理番号 Purchaser's Order No.	: 2930478	日付 Date	: 1992-04-07
注文者 Trading Co.	: MITSUBISHI CORPORATION.	船番 Ship's No.	:
注文者照合番号 Reference No.	: KBF -1B01730	工事番号 Construction No.	: 0A067182
品名 Commodity	HOT ROLLED STEEL SHEET	契約番号 Contract No.	: DD3M004
規格 Specification	: JIS G3101 SS400		

Code	製品番号 Roll No. / 鋼番 Heat No.	行番 Item No.	寸法 Size T X W X L(MM)	員数 LOT Quantity	質量 CAL Mass	C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Cu	Ni	Cr	Mo	V	Nb	T.Al	Ceq	Y.P N/MM2	T.S N/MM2	El %	YR %	Bend	U.S	S.P	V.D	TEST NO.
			PURCHASER'S ORDER NO :0A0671820 7 SC																								
4	32601401 8250	001	4.50X 1524 X 6096	2 14	4592	16		68	11	4									291	444	D 39		G			G	3EW4 A 01
			TOTAL	2 14	4592KGS																						
	SPECIFIED VALUE																		(N/MM2)								
	STANDARD			LADLE	MIN				-	-									245	400	21						
					MAX				50	50									-	510	-						
		BEND TEST				R:1.50T																					

(Note1) Size of Impact Test Piece: Gauge Length. D:GL=50MM(RECTAN.)
Position. T:Top. B:Bottom. F:Flange. W:Web. Direction. L:Longi. C:Trans. Z:Through-thick. RA:Reduction of Area.
Heat Treatment. N:Normalizing. Q:Quenching. T:Tempering. SR:Stress relieving. CR:Controlled Rolling. U-S-T:Ultrasonic Test.
S.P.T:Sulphur Print Test. V.&D.:Visual & Dimensions G:Good. Decarburized. Y.P: Y.S: T.S: El: YR:

上記製品は検査の結果指定の規格に合格していることを証明いたします。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN TESTED AND INSPECTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION.

K. Hirata

MANAGER OF INSPECTION SEC.
FUKUYAMA WORKS

福山製鉄所検査室

O.No. 2930478-0100 N.F.T.S
DWG.No LS-95CE004-(22),(29) LS-95CE005-(02),(04),(06),(16)
LS-95CE011-(06),(43) LS-95CE012-(02),(30) } ~10基分

福山製鉄所：〒721 広島県福山市鋼管町1番地 FUKUYAMA WORKS: 1,KOKAN-CHO,FUKUYAMA 721 JAPAN

SCM435

Purchaser : 三菱重工業㈱神戸造船所
(需 要 家)

P. O. No. 2930478 ØA387191-01 SC
(客先注文番号)

MATERIAL TEST REPORT
(材料試験成績書)

Date : Sept. 3rd 1992
(発行年月日)
Report No. 57B1
(成績書番号)

TAKENAKA SEISAKUSHO CO., LTD.
(株式会社 竹中製作所)
Head Office: 178 Hishie, Higashi-Osaka.
本 社 東大阪市東江178番地

合格 購品管 今井

Oct, T 八内アイ

Material Spec. : JIS G4105(1979) SCM435
(鋼種規格)

Heat No. 05510
(鋼 番)

Lot No. —
(ロット番号)

Arr. No.
(整理番号)

Steel Works (製鋼所)	Dimension (寸法)	Chemical Composition (化学成分) (%×100 Except P, S)													
		Elements (成分)	C%	Si%	Mn%	P% (%×1000)	S% (%×1000)	Cu%	Ni%	Cr%	Mo%	V%	Ni+Cr%		
	ダャッキスクリュー (M24x2)	Specification (規格)	33 –38	15 –35	60 –85	max 30	max 30	max 30	max 25	90 –120	15 –30	—	—		
AS	25 mm	Results (成績)	36	25	78	17	21	11	6	109	16	—	—		

Items (項目)	Test Temp. (試験温度)	Test Piece (試験片寸法)	Yield Point (降伏点)	Tensile Strength (引張強さ)	Elongation (伸び)	Reduction of Area (絞り)	Impact Test (衝撃試験) 20°C JIS Z2202 3号試験片 U, 2mm(10x10) kgfm/cm²		Hardness (硬さ)	Heat Treatment (熱処理)			
										Normalizing (焼ならし)	Quenching (焼入)	Tempering (焼戻)	
Specification (規格)	°C	JIS Z2201 4号試験片 mm	kgf/mm² min 80	kgf/mm² min 95	% min 15	% min 50	min 8	Avg min —	HB 269 –331	—	°C 830 –880	°C 530 –630	
Results (成績)	22	14x50	96	105	19	60	16 15 15	—	321	—	870	600	
											1.17Hr O.Q	2.12Hr W.C	

We hereby certify that the material described herein has been manufactured and tested satisfactorily in accordance with the requirements of the above specification.
(上記の通り検査の結果、指定の規格に合格していることを証明致します。)

Certified by 岡府 清
Inspection Section (検査部門)

Steel Works (製鋼所)

KSL: Kobe Steel, Ltd. (株式会社 神戸製鋼所)
NS: Nippon Steel Corporation (新日本製鐵株式会社)
SM: Sumitomo Metal Industries Ltd. (住友金属工業株式会社)
KSC: Kawasaki Steel Corporation. (川崎製鐵株式会社)
AS: Aichi Steel Works, Ltd. (愛知製鋼株式会社)
DS: Daido Steel Co., Ltd. (大同特殊鋼株式会社)
SS: Sanyo Special Co., Ltd. (山陽特殊製鋼株式会社)
TS: Toa Steel Co., Ltd. (トーア・スチール株式会社)

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SM490A

4.4.16

検査証明書
INSPECTION CERTIFICATE

NKK 日本鋼管株式会社 NKK CORPORATION

本社 Head Office: 〒100 東京都千代田区丸の内1丁目1番2号 1-1-2, MARUNOUCHI, CHIYODA-KU, TOKYO 100 JAPAN

需要家 Purchaser	: MITSUBISHI HEAVY INDUSTRIES, LTD.-KOBE
需要家管理番号 Purchaser's Order No.	: 2930478
注文者 Trading Co.	: MITSUBISHI CORPORATION.
注文者照合番号 Reference No.	: ABA -1B0172N
品名 Commodity	: HOT ROLLED STEEL PLATE
規格 Specification	: JIS G3106 SM490A

証明書番号 Certificate No.	: A5-3785 -001 (M)
日付 Date	: 1992-03-23
船番 Ship's No.	:
工事番号 Construction No.	: 0A067183
契約番号 Contract No.	: AD2M147

D4 DDA84000

管理コード Code	製品番号 Roll No. / 鋼番 Heat No.	行番 Item No.	寸法 Size T X W X L (MM)	員数 Quantity	質量 Mass CAL	C x100	Si x100	Mn x100	P x1000	S x1000	Cu	Ni	Cr	Mo	V	Nb	T.Al	Ceq	Y.P N/MM2	T.S N/MM2	El %	YR %	Bend	UST	SP	V&D	TEST NO.
			PURCHASER'S ORDER NO : 0A06718301 SC																								
4	KA813-4 8022	001	6.00 X 3048 X 5000	1	718	15	24	146	16	3									371	528	A 27					G	15443B
			PURCHASER'S ORDER NO : 0A06718301 SC																								
4	KA813-3 8022	001	6.00 X 3048 X 5000	1	718	15	24	146	16	3																G	15443B
			PURCHASER'S ORDER NO : 0A06718301 SC																								
4	KA813-2 8022	001	6.00 X 3048 X 5000	1	718	15	24	146	16	3																G	15443B
			TOTAL	3	2154KGS																						
	SPECIFIED VALUE																		(N/MM2)								
	STANDARD			LADLE	MIN	-	-	-	-	-									325	490	17						
					MAX	20	55	160	35	35									-	610	-						

(注1) (Note1) Size of Impact Test Piece: 衝撃試験片寸法— Gauge Length: 標点距離— A:GL=200MM(RECTAN.)
Position: 位置—T:Top, 頭部 B:Bottom, 底部 F:Flange, フランジ W:Web, ウエブ Direction: 方向—L:Longi. 縦 C:Trans. 横 Z:Through-thick. 板厚 RA:Reduction of Area. 絞り
Heat Treatment: 熱処理— N:Normalizing, 焼準 Q:Quenching, 焼入 T:Tempering, 焼戻 SR:Stress relieving, 応力除去 CR:Controlled Rolling, 制御圧延 U-S-T:Ultrasonic Test, 超音波探傷
S.P.T:Sulphur Print Test, サルファープリント V.&D.:Visual & Dimensions: 外観・寸法 G:Good, 良 脱炭—Decarburized, 脱炭 Y.P:降伏点 Y.S:耐力 T.S:引張強さ El:伸び YR:降伏比

上記製品は検査の結果指定の規格に合格していることを証明いたします。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN TESTED AND INSPECTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION.

K. Hirata
MANAGER OF INSPECTION SEC.
FUKUYAMA WORKS

L5-95CE031 サドルレール
01, 02

福山製鉄所: 〒721 広島県福山市鋼管町1番地 FUKUYAMA WORKS: 1,KOKAN-CHO,FUKUYAMA 721 JAPAN

福山製鉄所検査室

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Boron stainless steel (Skin)

ORDER No. 製番 OA-A-02-4127 INVOICE No. 出荷案内書番号 06-6004

CUSTOMER ORDER No. 契約番号 29304780A027174-01SC

CUSTOMER 注文元 アサヒスティール(株)

DESTINATION 納入先 三菱重工業(株) 神戸造船所

INSPECTION CERTIFICATE
検査証明書

NIPPON METAL INDUSTRY CO., LTD. 日本金属工業株式会社

WORKS 製造所 相模原製造所 TEL 0427(79)1813

DATE 発行日 1992. 6. 3

仕様書番号 OAE-6822 Rev. 0

SPECIFICATION 規格

TYPE 種類	NTK304Bo	FINISH 仕様 仕上	#80-2	SIZE 寸法	4.5 X 980.0 X 4,280.0

No.	HEAT NO.	CHARGE NO.	QUANTITY 数量	MASS 質量 Kg	PLATE NO.	TEST DETAIL(試験項目)
1	2294203	0S0078	1	146	233975	

CHEMICAL COMPOSITION 化学成分 (%)

No.	C	Si	Mn	P	S	Ni	Cr	B				
Max	0.030	1.00	2.00	0.045	0.030	13.00	20.00					
Min						9.00	18.00	1.00				
1L	0.013	0.61	1.76	0.019	0.001	9.45	18.53	1.11				
1C	0.012	0.61	1.75	0.019	0.002	9.48	18.58	1.13	ハシ			
1C	0.012	0.62	1.76	0.019	0.002	9.48	18.57	1.13	チュウオウ			

No.	DIMENSIONS & SURFACE CONDITION 寸法及び外観	Yield Strength 耐力 0.2% kgf/mm2	Tensile Strength 引張強さ kgf/mm2	Elongation 伸び %	Hardness 硬さ HRB	結晶粒度試験	比重
Max					99		
Min		25	55	14			7.75
1	リョウ	33	67	20	94	チョッカク	7.90
		37	69	20	94	ヘイコウ	

NOTE(記事)
固溶化熱処理・・・1140℃ X 5.5 分 水冷
T.P JIS Z 2201 13B号
プラント名・・・MFC-1型 新燃料輸送容器

H4. 6. 3
三菱重工 神製 小原洋光

合格 品管 今井

We hereby certify that the material herein described has been manufactured and tested in accordance with the standards and specification specified by the customer and satisfies those requirements. 上記の注文品は、御指定の規格又は仕様に従って製造され試験されたものであり、その要求事項を満足していることを証明します。

Certificate No. (ミルシートNo.)
92060021503 A *

A. Monma
MANAGER OF Q.A.DEPARTMENT

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Enclosure 7 to TN E-30551

Changed Pages for the Safety Analysis Report for the Model MFC-1 Package (non-proprietary version)

Pages Included:

- I-B-1
- IV-A-4
- IV-A-4-1 (new page)

I-B Classification of Package

This package is designed as a type A packaging containing fissile material.

(1) Contents in this package are PWR new fuels, which are made of uranium 235 of natural uranium enriched 5wt% or less. The A_2 value of the uranium 235 is unlimited. Rev.

(2) This package contains 15g or more fissile material, uranium 235.

(h) Fix the hexagon bolts, and tighten the jackscrews for fixing nozzles on the top end with tightening torque of 784N-cm . Rev

(7) Housing of cross frame

(a) Install the wire attached to the crane to the eye plate above the cross frame with shackles.

(b) Remove the stabilizing bars from the cross frame, and fix them in place with hexagon bolts.

(c) Put back the cross frame in a horizontal position slowly, and put back the crossbar in place.

(d) Tighten and fix the hexagon bolts to the cradle assembly. Rev

(e) Tighten the support grid pads on the top nozzle with the tightening torque of 784N-cm using a torque wrench. Furthermore, tighten the fixing nuts not to loosen bolts. Rev

(f) Tighten the support grid pads on the clamping frames with the tightening torque of 784N-cm using a torque wrench. Furthermore, tighten the fixing nuts.

(g) Check the O-rings.

(h) A representative of Quality Assurance section shall inspect the results of a series of operations mentioned above.

(8) Installation of the top cover

(a) House the auxiliary legs in place, and fix them with hexagon bolts.

(b) Place the top cover on the lower container with lifting wires.

(c) Fasten the tightening bolts so that they are fixed by the bolt receptacle (See Fig. IV-A. 5 and Fig. IV-A. 6) in accordance with the following sequence Rev

1) Tighten quarter-turn bolts until specified position (90 deg. clockwise) using open ended spanner

2) Tighten setscrew of quarter-turn bolts using hexagon socket screw torque wrench (1137N·cm and 892N·cm) in accordance with the following order; (ref. following figure)

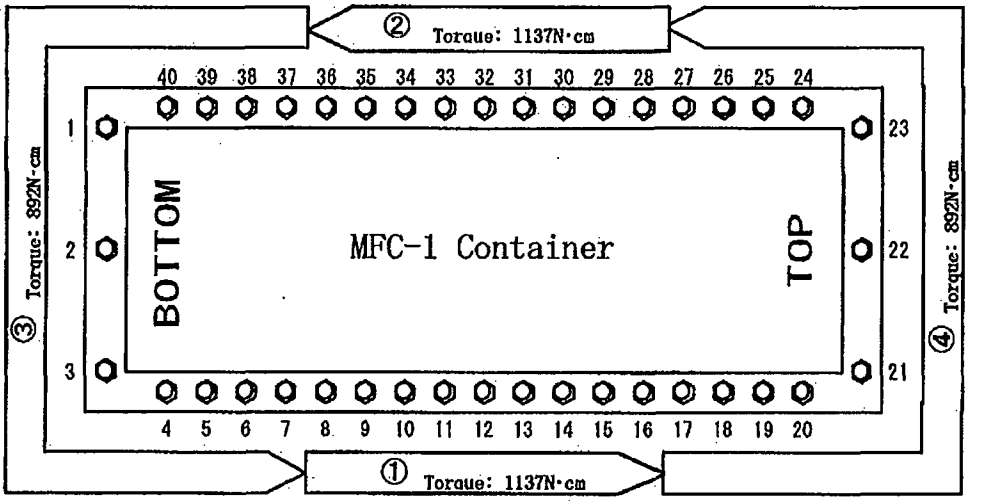
a) Tighten the first nine (No.8 to 16) bolts with torque of 1137N-cm

b) Tighten the second nine (No28 to 36) bolts with torque of 1137N-cm

c) Tighten the third eleven (No37 to 40, 1 to 7) bolts with torque of 892N-cm

d) Tighten the third eleven (No17 to 27) bolts with torque of 892N-cm

Rev



(d) Quality Assurance section shall confirm the tightening condition in the above (c).

(e) Put the seal in place to show loading completion.

(9) Measurement of dose equivalent rates

Quality Assurance section shall measure dose equivalent rates on the surfaces and at each point of 1m from the surfaces of the packaging with GM survey meters. Confirm that no measurement exceeds 2mSv/h and 0.1mSv/h respectively, and record the measurement results.

(10) Shipment

Load or unload a package with enough care not to damage its safety using a crane or a folk lift that can sufficiently withstand the total weight of the package.