UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

3581

MAY 29 1987

SGTB:RHO

Department of Transportation
ATTN: Mr. Michael E. Wangler
DMT 221
Washington, D.C. 20590

Gentlemen:

This is in response to your letter dated May 7, 1987, requesting our review and recommendation concerning your revalidation and issuance of a Competent Authority Certificate for import and export in the United States. The review concerns revalidation of German Competent Authority Certificate D/4224/B(U)F, Rev. 1.

Based on information provided by your May 7 letter, as supplemented May 27, 1987 by GNS, and for the reasons stated in the enclosed Evaluation Record, we recommend revalidation of the German certificate for the Model No. GNS-11 package subject to the requirements of 10 CFR §71.88 for the air transport of plutonium.

Sincerely,

Charles E. MacDonald, Chief
Transportation Branch
Division of Safeguards and
Transportation, NMSS

Enclosure:
Evaluation Record

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Transportation Branch Evaluation Record Model No. GNS-11 Package

By letter dated May 7, 1987, the Department of Transportation (DOT) requested our review and recommendation concerning DOE's revalidation and issuance of a Competent Authority certificate for import and export in the United States. The review concerns revalidation of German Competent Authority Certificate D/4223/B(U)F for Gesellschaft fur Nuklear-Service mbH package Model No. GNS-11.

Our review was limited to the information attached to DOT letter dated May 11, 1987, as supplemented by GNS on May 27, 1987. The information which was furnished included copies of (1) DOT Certificate USA/0381/B(U)F, Rev. 1; (2) Translation (from German) of Package Approval No. D/4224/B(U)F, Rev. Nos. 0 and 1; (3) GNS Safety Analysis Report GNS-12, Summary (October 1986); (4) GNS Criticality Calculations for the GNS-11 Transport Cask (October 29, 1986); (5) GNS letter dated May 27, 1987 to NRC; (6) GNS Drawing Nos.: B 510.11, Rev. a; B 510.11-02, Rev. c; B 510.11-23, Rev. a; and B 510.11-25; and (7) GNS Parts List (GNS-11), Rev. Nos. 0, 1 and 2.

Based on information provided by DOT letter dated May 7, 1987, by GNS on May 27, 1987, and for the reasons stated below, we recommend revalidation of the German certificate for the Model No. GNS-11 package subject to the requirements of 10 CFR §71.88 for the air transport of plutonium.

PACKAGING

The package is constructed of two right circular stainless steel shells with the annulus between them filled with lead shielding material. The outside cask diameter is 1185 mm by 1425 mm high. The cavity is 723-mm ID by 941 mm high. The cask sides are filled with 165-mm thick lead and the bottom with 138-mm thick lead. The package is provided with top and bottom steel encased, wooden impact limiters which provide an overall 1650-mm OD by 1780-mm height. The cask is provided with two bolt on trunnions for handling. The 265-mm thick steel lid is attached with 20, 30-mm diameter steel bolts and sealed with elastomer O-rings. The two lid penetrations are sealed with appropriate O-rings, plugs, and bolts. The cask primary lid is sealed with a 35-mm thick protective cover. The total weight of the loaded cask is 13,300 kg (29,300 lbs.).

CONTENTS AND FISSILE CLASS

The contents are limited to 76 watts decay heat load per cask with a minimum 180-day cooling time; and:

1. A maximum of 21 or 28 irradiated tubular MTR-type fuel assemblies depending on whether fuel basket per GNS Drawing B 500.03-15 (21 fuel assemblies) or B 510.11-28 (28 fuel assemblies) is used. The maximum U-235 enrichment of the U/Al-alloy is 80 weight percent. The initial uranium mass of each fuel assembly is limited to 173.4 g; or

2. A maximum of 33 irradiated square-shaped MTR-type fuel assemblies contained within fuel assemblies contained within fuel basket per GNS Drawing No. B 510.11-25. The maximum U-235 enrichment of the U/Al-alloy is 93 weight percent. The initial uranium mass of each fuel assembly is limited to 335 g and 268 g U-235.

Fissile Class I

STRUCTURAL

The structural design of the cask is based on a maximum g-load of 250 g's. The design g-load has been measured from drop tests performed on a full scale prototype cask. The prototype cask has design similar to the Model No. GNS-11 cask, and has identical impact limiters. The prototype cask was dropped from a height of 9 meters and the drop orientations were: side drop, bottom end drop, bottom corner drop, and top corner drop over the center of gravity. Test results have shown no detectable deformations of the cask, and the cask lid remained leaktight in all drop orientations.

In addition to the full scale prototype cask tests described above, the applicant also performed stress analyses of the cask to show that all cask components (inner vessel, outer shell, lid, lid bolts and basket) have a positive safety factor against design allowable stresses under the 250 g impact force.

Since the cask and the basket are constructed from stainless steels, no brittle fracture analysis is necessary.

THERMAL

Normal Conditions

Since the surface temperature exceeds 50°C for normal conditions, shipment must be made an as "exclusive use shipment" per 49 CFR §173.442. There were no appreciable problems with either materials properties or thermal stresses in the temperature range experienced under normal operating conditions.

Accident Conditions

The thermal behavior of the Model No. GNS-11 cask was analyzed for the hypothetical accident conditions using an internal heat load of 1.6 kilowatts (5,440 Btu/hr). There was no lead melt during the hypothetical accident conditions. The cask design incorporates an internal thermal barrier (0.2 inch air gap) between the outer stainless steel shell and the lead shielding. The maximum lead temperature during the fire test is estimated to be approximately 400°F. The seal area would experience a maximum temperature of about 270°F . This temperature is well below the maximum acceptable operating temperature for the proposed seals.

CONTAINMENT

The cask is made of Type 304 stainless steel. The lid is bolted to the body, and is sealed using two elastomer seals. The contents are MTR-type fuel assemblies.

Although a detailed containment evaluation is not provided, the application indicates that containment criteria of $10^{-6} A_2$/hr and $10^{-3} A_2$/week for normal and accident conditions is satisfied by criterion used for leak testing. The leak test specified has a sensitivity of 10^{-4} mbar-l/s, helium under standard conditions. The cask is to be leak tested prior to shipment, and reduced to 0.5 bar internal pressure.

The package has been approved by the German Competent authority (FRG), and certified as satisfying the IAEA Regulations for Safe Transport of Radioactive Materials. In addition, the staff is confident that the 10^{-4} mbar-l/s leakage test prior to shipment and reduced internal pressure will assure adequate containment for transportation.

CRITICALITY

The previously approved contents - Fissile Class I - was for 21 or 28 MTR fuel assemblies (80% enriched in U-235) with each assembly having an initial maximum mass of 174.4 grams U-235.

GNS reports in Reference 4 the methods and results of the criticality analyses in support of the contents requested. Subcriticality has been established by modeling the contents with the KENO Monte Carlo Computer program together with the Hansen-Roach 16-group neutron cross-section set. The fuel-clad-moderator regions were homogenized by flux-volume cell weighting so that each fuel assembly is represented under accident conditions as one distinct cuboid region. These homogenized assemblies are then discretely described within the finite flooded cavity with the steel baskets explicitly modeled. The SS-Pb-SS cask walls were modeled explicitly as concentric shells surrounding the fuel-basket configurations. A 100% return of all neutrons on the six faces of the last cuboid guarantees an infinite number of damaged Model No. GNS-11 casks for the k_∞ calculated. The maximum k_∞ calculated was 0.910 for 2 σ.

A review of the calculated k_∞ 's are reasonable and the computer geometric "pictures" demonstrate the actual geometric-material dispositions used in the KENO calculation.

The calculational procedure used by GNS has given reliable estimates of the multiplication factor for similar systems.

SHIELDING

External radiation levels are limited by 49 CFR §173.441. The accident conditions of transport will result in no significant increase in radiation levels from the package.

CONCLUSION

Based on our review of the statements and representations contained in the attachments to DOT's letter dated May 7, 1987, and the supplemental information provided by GNS on May 27, 1987, we have concluded that the Model No. GNS-11 package meets the applicable requirements of IAEA Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1973 Revised Edition (As Amended). We recommend DOT's revalidation and issuance of a Competent Authority certificate for import and export in the United States of the package subject to the requirement of 10 CFR §71.88 for the air transport of plutonium.

Charles E. MacDonald, Chief
Transportation Branch
Division of Safeguards and
Transportation, NMSS

Date: MAY 29 1987

GNS
Gesellschaft für Nuklear-Service mbH

Essen, den 05.11.91/Hü
G11DOT01.FAX
Kopie: Ltz

TELEFAX

Telefax-Nr.: 2892
001-202-366-3753

Anzahl übermittelter Seiten incl. Deckblatt : 1
No. of pages including cover page

an/to : Mr. A. Wendell Carriker, US DOT
Health Physicist, office Hazardous Materials
Technology

von/from : R. Hüggenberg, GNS, Essen

Betr./Ref. : Distribution of reports prepared by GNS
- Your Telefax dated Nov. 05,91

Kurzbrief/Letter Card

Dear Mr. Carriker,

referring to your telefax on Nov. 5,1991 we permit the reproduction and distribution to other parties of the reports GNS B 87/89 E, GNS B 40/86 E, GNS B 87/89 E and GNS B 28/90 E for the purpose and the use during the revalidation of the Certificate of Compliance No. D/4224/B(U)F for the cask GNS 11.

If you have further questions do not hesitate to contact us.

Sincerely yours,

G N S - Gesellschaft für Nuklear-Service mbH

i. A.

U.S. Department of Transportation
Research and Special Programs Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

TELECOPIER COVER SHEET

11-5-91
Date

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Time

Number of Pages (including this page): 2

To: Mr. Hugenberg
GNS Essen
901149 6201 7220-181

From: A. Wendell Carriker - HAZMAT
202-366-3735
Phone:

Subject: GNS 11 Cask D/4224/B(U) Rev. 0

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To: Mr. Huggenberg
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Thank you

U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

November 5, 1991

GNS Gesellschaft fur Nuklear Service mbH
Postfach 10 1253
Essen, GERMANY

Gentlemen:

Your August 28, 1991 letter requested revalidation of the German Competent Authority Certificate for the German Competent Authority Certificate No. D/4224/B(U) (Rev. 0) for the GNS 11 Cask. We wish to have the U.S. Nuclear Regulatory Commission (NRC) review several of the documents you submitted to support the request, especially the criticality information in the "Supplementary Shielding Calculation for the GNS 11 Transport Cask (Report No. GNS B 87/89 E (Rev. 0), dated June, 1989".

There is a slight problem in getting NRC to review these reports and making a recommendation because of the proprietary/all rights reserved statement on the bottom of the inside cover page to reports Nos. GNS B 40/86 E (Rev.0), GNS B 87/89 E (Rev. 0), and GNS B 28/90 E, Rev. 0. The NRC review and recommendation will be expedited if you will give us written authority to reproduce those three reports for transmission to the NRC with or without the propriety/all rights reserved statement or if you will mail us those reports without the statements.

Sincerely,

A. Wendell Carriker
Health Physicist, Office Hazardous
Materials Technology

Federal Office for Radiation Protection

Licence
D/4224/B(U)F (Rev. 2)

for a dispatch item, type B(U), for fissionable radioactive substances in nuclear safety category I in accordance with the regulations:

Regulations for the Safe Transport of Radioactive Materials, 1985 Edition (Supplement 1988) from the International Atomic Energy Agency (IAEA), Par. 714, in conjunction with the Regulations for the Safe Transport of Radioactive Materials, 1973 Revised Edition (As amended) from the IAEA, Par. 806 and 814;

Ordinance on the internal and cross-border transportation of dangerous goods by road (Dangerous Goods Ordinance, Roads - GGVS) from 22.7.1985, last amended through the 3rd Amendment to the Ordinance on the Transportation of Dangerous Goods by Road dated 18 June 1990 (German Civil Code 1, p. 1326), Annexe A, Margin no. 3755;

European Agreement on the international transportation of dangerous goods by road (ADR Agreement) dated 30 September 1957, last amended through the 9th ADR amendment dated 9.8.1990 (German Civil Code 1, II p. 838, Annexe A, Margin no. 3755);

Ordinance on the internal and cross-border transportation of dangerous goods by rail (Dangerous Goods Ordinance, Rail - GGVE) from 22.7.1985, last amended through the 3rd Amendment to the Ordinance on the Transportation of Dangerous Goods by Rail dated 6 June 1990 (German Civil Code 1, I p. 1001, Annexe, Margin no. 1755);

Regulation regarding the international transportation of dangerous goods by rail (RID Regulations) - Annexe to Schedule B of the agreement on international rail traffic (COTIF Agreement) dated 9 May 1980 (German Civil Code 1, 1985 II p. 666), last amended through the 3rd RID amendment dated 3 May 1990 (German Civil Code 1, I p. 461, Annexe, Margin no. 1755);

Ordinance on the transportation of dangerous goods by sea in the version published on 27 June 1986 (German Civil Code 1, I p. 961), last amended through the 4th Amendment to the Ordinance on the Transportation of Dangerous Goods by Sea dated 30 June 1990 (German Civil Code 1, I p. 1278), IMDG Code, German, Category 7, Section 12.1, no. 5, p. 7033;

International Maritime Dangerous Goods Code (Class 7, 8.3.3, p. 7036, Amdt 25-89);

in conjunction with the guidelines issued by the Federal Minister for Transport on 20.2.1991 (VkBl, Vol. 4, p. 231, 1991).

It is herewith confirmed that the Federal Office for Radiation Protection in Salzgitter is the body authorised by the Federal Minister for Transport in accordance with Section 22 of the IMDG Code (German).

Applicant: Gesellschaft für Nuklear Service mbH (GNS)
Lange Laube 7,
3000 Hanover 1

Description of manufacturer:
Transport containers GNS II

Manufacturer:
Responsible: GNS company

Drawings: No. B 510.11 Revision A dated 14.11.1986 from the company GNS (survey diagram) with the associated specifications Rev. 1 dated 26.11.1986

Documentation:
Safety report GNS B 37/86 from the company GNS (Rev. 1) dated December 1986 with the 2nd supplementary (amendment) delivery dated 12.12.1986,
Reports by the company GNS no. GNS B 87/89 (Rev. 0) dated June 1989, no. GNS B 28/90 (Rev. 0) dated March 1990 and no. GNS B 108/90 (Rev. o) dated October 1990,
Application by the company GNS dated 14.8.1989 (ref.: Eick/py) and 20.3.1990, (ref.: Schn/Eick TP 016/90),
Handling instructions for the loading of the transport container GNS 11, report no. GNS B 42/86 (Rev. 1),
Handling instructions for the unloading of the transport container GNS 11, report no. GNS B 45/86 (Rev. 1).

Test certificate from the Federal Institute for the Testing of Materials no. 1.5/21507 dated 4 December 1986 with the 1st amendment dated 12 December 1986 and 2nd amendment issued by the Federal Institute for the Research and Testing of Materials (BAM) on 19.2.1987, letters from BAM dated 10.9.1990 (ref.: 6.3/Kow/sera) and 27.6.1991 (ref.: 6.3/Kow).

Permissible contents:

1) Max. 28 or max. 21 - according to the version of burner element cage used - irradiated tubular MTR burner elements (type DIDO), consisting of 4 concentrically arranged fuel pipes and an external pipe which is, as a rule, removed before being inserted into the burner element cage, with the following specifications per burner element:

original degree of enrichment uranium 235:	max. 80%
chemical form:	U/A1 alloy
original quantity of uranium 235:	max. 173.4 g
original quantity of uranium:	max. 217 g
active length:	max. 61 cm
diameter of external pipe:	approx. 10.3 cm
diameter of fuel zone:	approx. 9.3 cm
cooling period:	min. 180 days
heat efficiency: (mean value):	max. 76 W (at 21 BE/ dispatch item) max. 57 W at 28 BE/ dispatch item)
activity:	max. 1.5 PBq

2) max. 33 irradiated box-type MTR burner elements (e.g. MERLIN design) each containing max. 23 sheets made of a U/A1 alloy or U/A1 dispersion encased in aluminium with the following further specifications per burner element:

original degree of enrichment uranium 235:	max. 93%
original quantity of uranium 235:	max. 268 g
original quantity of uranium	max. 335 g
active length:	max. 61 cm
sectional area:	max. 81 x 76 sq. mm
cooling period:	min. 180 days
heat efficiency (mean value):	max. 48.5 W (at 3 BE/ dispatch item)
activity:	max. 1 PBq

3) max. 33 irradiated box-type MTR burner elements (e.g. GKSS design (low-level enriched - "LEU" - elements) each containing max. 23 sheets of a U_3Si_2 or U_3O_8/A1 dispersion encased in aluminum with the following further specifications per burner element:

original level of enrichment uranium 235:	max. 20%
original quantity of uranium 235:	max. 323 g
original quantity of uranium:	max. 1635 g
active length:	max. 61 cm
sectional area: sq.mm	approx 81 x 76
cooling period:	min. 360 days
heat efficiency (mean value):	max. 48.5 W (at 33 BE/ dispatch item)
activity:	max. 1 PBq

4) max. 33 irradiated box-type MTR burner elements of the same design (e.g. GKSS, ÖFZS) as a mixed load for the 33 cage with high, medium and low-level enrichment, so-called HEU, MEU and LEU burner elements each containing max. 23 sheets made of a U/A1 alloy or U/A1 dispersion encased in aluminium with the following further specifications per burner element:

<u>original level of enrichment - uranium 235:</u>

for HEU-BE:	max. 93%
for MEU-BE:	max. 45%
for LEU-BE:	max. 20%

<u>original quantity of uranium 235:</u>

for HEU-BE:	max. 284.2 g
for MEU-BE:	max. 326.8 g
for LEU-BE:	max. 406 g

<u>original quantity of uranium:</u>

for HEU-BE:	max. 335 g
for MEU-BE:	max. 726.2 g
for LEU-BE:	max. 2030 g
active length (for all types):	max. 61 cm
sectional area:	sq.mmapprox 81 x 76
cooling period: for HEU-BE	min. 180 days
for LEU and MEU-BE	min. 360 days
heat efficiency (mean value):	max. 48.5 W (at 33 BE/ dispatch item)
activity:	max. 1 PBq

Container classification:

Type B(U)-packaging

Nuclear safety category: I

Category and transport code number:
in accordance with the dose rate according to the valid transport regulations

Ref. no.: D/4224/B(U)F

Description:

The dispatch item sample has a total volume of 13.3 t and consists, according to the drawing referred to above and the associated specifications/parts list, of a welded high-grade steel/lead construction which is sealed tightly with a lid (primary lid). In addition, the body of the container is sealed above the lid area with a protective

plate. A bearing cage is inserted into the shaft of the container in order to fix the burner elements referred to above. The bearing cage in accordance with drawing no. B 500. 03-15 accommodates 21 burner elements, the cage in accordance with drawing no. B 510.11-23 accommodates 28 tubular burner elements (DIDO design). The bearing cage in accordance with drawing no. B 510.11-25 accommodates 33 box-type burner elements (e.g. MERLIN, GKSS design). The drawings valid for the last two bearing cages mentioned and the latest specifications are listed in the two supplements to the BAM test certificate no. 1.5/21507 referred to earlier. "Sealed enclosure" is made up of the body of the container, the primary lid, including elastomer seals and bolted joints, as well as of the lid openings with their seals, threaded plugs and bolted joints. During transport, dome-shaped shock absorbers made of sheet steel with enclosed soft-wood filling are fitted to the top and bottom sides of the container. Two trunnions are bolted to the upper area of the body of the container for handling. The external dimensions of the dispatch item sample are:

Diameter (without shock absorbers):	1185 mm
Diameter (with shock absorbers):	1355 mm
Height (container body):	1460 mm
Height (with shock absorbers):	1780 mm

Additional provisions and references.

1. All quality assurance measures in the planning stage, in accompanying checks and controls and in the operating stage must be carried out in accordance with the Technical Regulation governing quality assurance (QM) and monitoring (QÜ) measures for packaging for the transportation of radioactive materials and substances (TRV 006) (VkBl. Vol. 4, p. 233, 1991).

2. This licence is only valid in conjunction with the final acceptance certificate issued for the relevant production model.

3. It should be ensured that each user of the package is registered with the BfS before using it for the first time and confirms that he has received and adhered to the test book containing, in particular, the licence certificate, the above-mentioned handling instructions and the schedule for recurring tests.

4. Each production model sample must be permanently provided with the code stated above as well as with the date (month, year) of the next recurring test.

5. Each production model sample must be subjected to the recurring tests in good time.

6. Alterations regarding the drawings, specifications/parts lists and material data sheets on which the licence is

based require BfS approval prior to commencement of production following clearance by the BAM.

7. The dispatch item must be transported as a truckload or as a sealed load where the temperature on the outside of the packaging is in excess of 50 degrees C and/or the transport code number is greater than 10. When using a container, a maximum of two dispatch items fastened inside it may be transported.

8. Special measures during transport are not required.

9. This licence does not release the sender from the obligation of complying with any regulations in any country affected by the transport of the said dispatch item.

This licence certificate is valid up to **31 December 1992.**

The dispatch item has been examined by the BfS in cooperation with the BAM. In the criticality analysis, the penetration of water into all hollow spaces and cavities was assumed under accident conditions. In the case of the trunnions, the requirements of KTA regulations 3902 and 3903 in relation to design, production and testing in compliance with the additional provisions set out above have been adhered to. With regard to the requirements set out, the dispatch item sample tested complies with the conditions for a dispatch item for fissionable radioactive materials and substances in accordance with the above-mentioned transport regulations based on the 1973 IAEA recommendations.

Information on legal rights:

An appeal can be lodged against this notification within one month of it being issued and should be submitted in writing or for the records to the Federal Office for Radiation Protection, Albert-Schweitzer-Strasse 18, 3320 Salzgitter 1.

Braunschweig, 9 July 1991

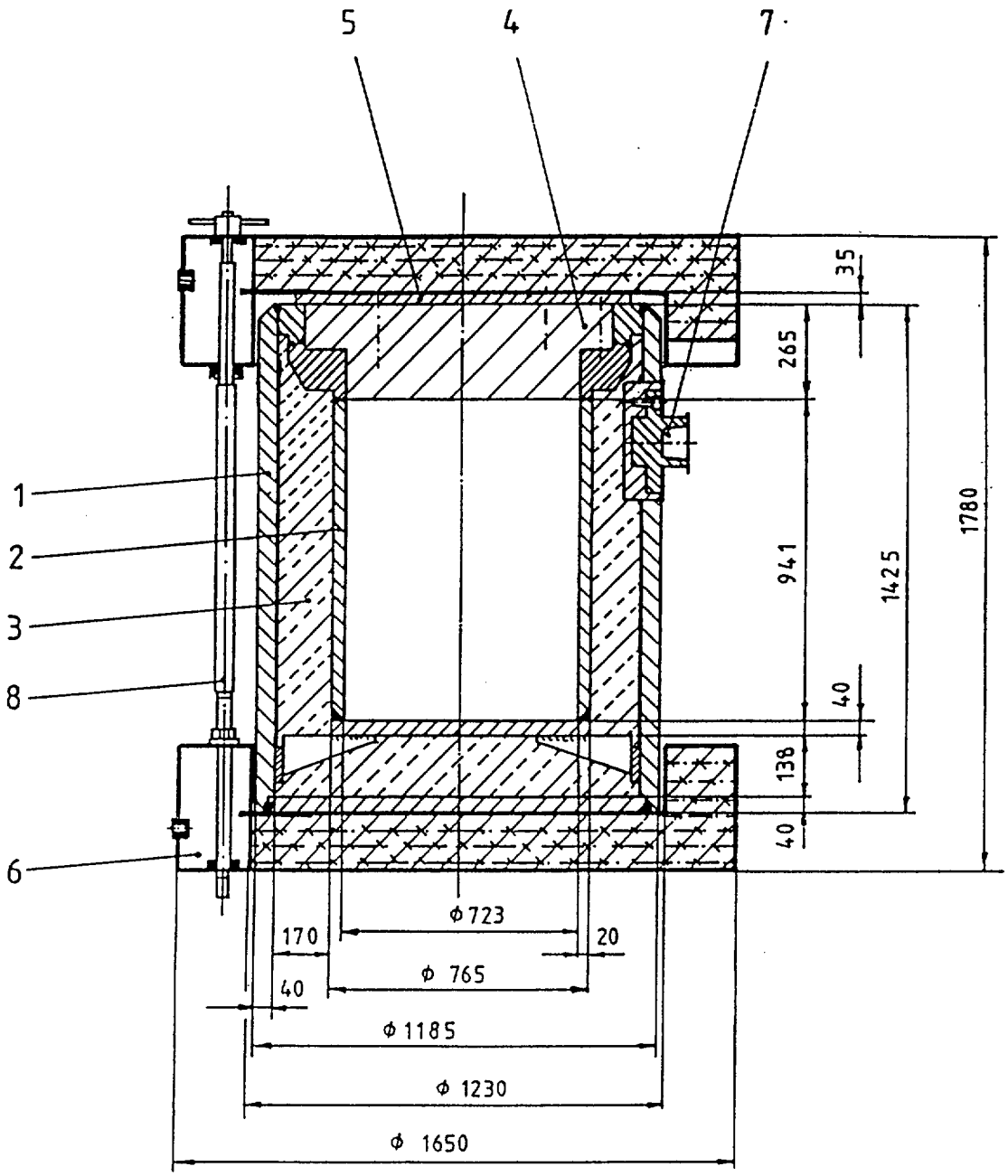
p.p.

Dr. Schweer

Encl.
Annexe
1 container drawing (fig. 1)

Annexe to licence certificate D/4224/B(U)F (Rev. 2)

Rev. no.	Date of issue	Period of validity	Reason for revision
0	12.12.1986	12.12.1987	First issue
1	15.04.1987	15.04.1990	Alterations in documentation, permissible contents description of packaging and period of validity
2	09.07.1991	31.12.1992	New version, enlargement of permissible contents changes in additional provisions, extension of period of validity.



Alle Abmessungen in mm
All Dimensions in mm

1 Außenliner
Outer Liner

2 Innenliner
Inner Liner

3 Bleiabschirmung
Lead Shielding

4 Deckel
Lid

5 Schutzplatte
Protective Plate

6 Stoßdämpfer
Shockabsorber

7 Tragzapfen
Trunnion

8 Verspannung
S.A. Fastning

Bundesamt für Strahlenschutz

Zulassungsschein

D/4224/B(U)F (Rev.2)

eines Versandstückes des Typs B(U) für spaltbare radioaktive Stoffe in der nuklearen Sicherheitsklasse I nach den Vorschriften:

Regulations for the Safe Transport of Radioactive Materials, 1985 Edition (Supplement 1988) der International Atomic Energy Agency (IAEA), § 714, in Verbindung mit den Regulations for the Safe Transport of Radioactive Materials, 1973 Revised Edition (As Amended) der IAEA, §§ 806 und 814,

Verordnung über die innerstaatliche und grenzüberschreitende Beförderung gefährlicher Güter auf Straßen (Gefahrgutverordnung Straße - GGVS) vom 22.7.1985, zuletzt geändert durch die 3. Straßen-Gefahrgut-Änderungsverordnung vom 18. Juni 1990 (BGBl. I S. 1326), Anlage A, Randnummer 3755,

Europäisches Übereinkommen über die internationale Beförderung gefährlicher Güter auf der Straße (ADR-Übereinkommen) vom 30. September 1957, zuletzt geändert durch die 9. ADR-Änderungsverordnung vom 09.08.1990 (BGBl. II S. 838), Anlage A, Randnummer 3755,

Verordnung über die innerstaatliche und grenzüberschreitende Beförderung gefährlicher Güter mit Eisenbahnen (Gefahrgutverordnung Eisenbahn - GGVE) vom 22.7.1985, zuletzt geändert durch die 3. Eisenbahn-Gefahrgut-Änderungsverordnung vom 06. Juni 1990 (BGBl. I S. 1001), Anlage, Randnummer 1755,

Ordnung für internationale Eisenbahnbeförderung gefährlicher Güter (RID-Regeln) - Anlage I zu Anhang B des Übereinkommens über den internationalen Eisenbahnverkehr (COTIF-Übereinkommen) vom 9. Mai 1980 (BGBl. 1985 II S. 666), zuletzt geändert durch die 3. RID-Änderungsverordnung vom 3. Mai 1990 (BGBl. I S. 461), Anlage, Randnummer 1755,

Gefahrgutverordnung See in der Fassung der Bekanntmachung vom 27. Juni 1986 (BGBl. I S. 961), zuletzt geändert durch die 4. See-Gefahrgut-Änderungsverordnung vom 30. Juni 1990 (BGBl. I S. 1278), IMDG-Code deutsch, Klasse 7, Abschnitt 12.1, Ziffer 5, Seite 7033,

International Maritime Dangerous Goods Code (Class 7,8.3.3, Page 7036, Amdt 25-89),

in Verbindung mit den Richtlinien des Bundesministers für Verkehr vom 20.02.1991 (VkBl. Heft 4, S. 231, 1991).

Es wird bestätigt, daß das Bundesamt für Strahlenschutz, Salzgitter, vom Bundesministerium für Verkehr autorisierte Behörde gemäß Abschnitt 22 des IMDG-Code deutsch ist.

Antragsteller: Gesellschaft für Nuklear-Service mbH (GNS),
Lange Laube 7,
3000 Hannover 1

Herstellerbezeichnung:

Transportbehälter GNS 11

Hersteller: verantwortlich: Firma GNS

Zeichnungen: Nr. B 510.11 Revision a vom 14.11.1986 der Firma GNS (Übersichts-Zeichnung) mit der dazugehörigen Stückliste Rev.1 vom 26.11.1986

Unterlagen: Sicherheitsbericht GNS B 37/86 der Firma GNS (Rev.1) vom Dezember 1986 mit der 2. Ergänzungs-(Änderungs-)lieferung vom 12.12.1986,
Berichte der Firma GNS Nr. GNS B 87/89 (Rev.0) vom Juni 1989, Nr. GNS B 28/90 (Rev.0) vom März 1990 und Nr. GNS B 108/90 (Rev.0) vom Oktober 1990,
Antrag der Firma GNS vom 14.08.1989 (Az.: Eick/py) und vom 20.03.1990, (Az.: Schn/Eick TP 016/90),
Handhabungsanleitung für die Beladung des Transportbehälters GNS 11, Bericht Nr. GNS B 42/86 (Rev.1),
Handhabungsanleitung für die Entladung des Transportbehälters GNS 11, Bericht Nr. GNS B 45/86 (Rev.1),

Prüfungszeugnis der Bundesanstalt für Materialprüfung Nr. 1.5/21507 vom 04. Dezember 1986 mit dem 1. Nachtrag vom 12. Dezember 1986 und dem 2. Nachtrag ausgestellt von der Bundesanstalt für Materialforschung und -prüfung (BAM) am 19.02.1987, Schreiben der BAM vom 10.09.1990 (Az.: 6.3/Kow/sara) und vom 27.06.1991 (Az.: 6.3/Kow)

Zulässiger Inhalt:

1) max. 28 bzw. max. 21 - entsprechend der verwendeten Version des Brennelementkorbes - bestrahlte tubulare MTR-Brennelemente (Typ DIDO), bestehend aus 4 konzentrisch angeordneten Brennstoffrohren und einem Außenrohr, das vor dem Einbringen in den Brennelementkorb in der Regel entfernt wird, mit folgenden weiteren Spezifikationen pro Brennelement:

ursprünglicher Anreicherungsgrad an Uran-235:	max. 80 %
chemische Form:	U/Al-Legierung
ursprüngliche Masse an Uran-235:	max. 173,4 g
ursprüngliche Masse an Uran:	max. 217 g
aktive Länge:	max. 61 cm
Durchmesser mit Außenrohr:	ca. 10,3 cm
Durchmesser der Brennstoffzone:	ca. 9,3 cm
Abklingzeit:	min. 180 Tage
Wärmeleistung: (Mittelwert):	max. 76 W (bei 21 BE/Versandstück)
	max. 57 W (bei 28 BE/Versandstück)
Aktivität:	max. 1,5 PBq

2) max. 33 bestrahlte kastenförmige MTR-Brennelemente (z.B. Typ MERLIN), jeweils enthaltend max. 23 Platten aus einer mit Aluminium umhüllten U/Al-Legierung oder U/Al-Dispersion mit folgenden weiteren Spezifikationen pro Brennelement:

ursprünglicher Anreicherungsgrad an Uran-235	max. 93 %
ursprüngliche Masse an Uran-235:	max. 268 g
ursprüngliche Uran-Masse:	max. 335 g
aktive Länge:	max. 61 cm
Querschnittsfläche:	max. 81 x 76 mm^2
Abklingzeit:	min. 180 Tage
Wärmeleistung: (Mittelwert):	max. 48,5 W (bei 33 BE/Versandstück)
Aktivität:	max. 1 PBq

3) max. 33 bestrahlte kastenförmige MTR-Brennelemente (z.B. Typ GKSS (niedrig angereicherte -"LEU"- Elemente), jeweils enthaltend max. 23 Platten aus einer mit Aluminium umhüllten U_3Si_2- oder U_3O_8/ Al-Dispersion mit folgenden weiteren Spezifikationen pro Brennelement:

ursprünglicher Anreicherungsgrad an Uran-235:	max. 20 %
ursprüngliche Masse an Uran-235:	max. 323 g
ursprüngliche Uran-Masse:	max. 1635 g
aktive Länge:	max. 61 cm
Querschnittsfläche:	ca. 81 x 76 mm^2
Abklingzeit:	min. 360 Tage
Wärmeleistung (Mittelwert):	max. 48,5 W (bei 33 BE/Versandstück)
Aktivität:	max. 1 PBq

4) max. 33 bestrahlte kastenförmige MTR-Brennelemente gleicher Bauart (z.B. GKSS, ÖFZS) als Mischbeladung des 33er-Tragkorbes mit hoher, mittlerer und niedriger Anreicherung, sogenannten HEU-, MEU- und LEU-Brennelementen, jeweils enthaltend max. 23 Platten aus einer mit Aluminium umhüllten U/Al-Legierung oder U/Al-Dispersion mit folgenden weiteren Spezifikationen pro Brennelement:

<u>ursprünglicher Anreicherungsgrad an Uran-235:</u>

für HEU-BE:	max.	93	%
für MEU-BE:	max.	45	%
für LEU-BE:	max.	20	%

<u>ursprüngliche Masse an Uran-235:</u>

für HEU-BE:	max.	284,2	g
für MEU-BE:	max.	326,8	g
für LEU-BE:	max.	406	g

<u>ursprüngliche Uran-Masse:</u>

für HEU-BE:	max.	335	g
für MEU-BE:	max.	726,2	g
für LEU-BE:	max.	2030	g

aktive Länge (für alle Typen):	max.	61	cm
Querschnittsfläche:	ca.	81 x 76	mm^2
Abklingzeit: für HEU-BE	min.	180	Tage
für LEU- und MEU-BE	min.	360	Tage
Wärmeleistung (Mittelwert):	max.	48,5 W (bei 33 BE/Versandstück)	
Aktivität:	max.	1	PBq

Behälterklassifizierung:

Typ B(U)-Verpackung

Nukleare Sicherheitsklasse: I

Kategorie und Transport-kennzahl: gemäß der Dosisleistung entsprechend den gültigen Verkehrsvorschriften

Kennzeichen: **D/4224/B(U)F**

Beschreibung:

Das Versandstückmuster besitzt eine Gesamtmasse von max. 13,3 t und besteht gemäß der obengenannten Zeichnung und der dazugehörigen Stückliste aus einer geschweißten Edelstahl/Blei-Konstruktion, die mit einem Deckel (Primärdeckel) dicht verschlossen wird. Zusätzlich wird der Behälterkörper über dem Deckelbereich mit einer Schutz-. platte verschlossen. Zur Fixierung der obengenannten MTR-Brennele-

mente wird in den Beschälterschacht ein Tragkorb eingesetzt. Der Tragkorb gemäß Zeichnung Nr. B 500. 03-15 dient zur Aufnahme von 21 Brennelementen, der Tragkorb gemäß Zeichnung Nr. B 510.11-23 dient zur Aufnahme von 28 tubularen Brennelementen (Typ DIDO). Der Tragkorb gemäß Zeichnung Nr. B 510.11-25 dient zur Aufnahme von 33 kastenförmigen Brennelementen (z.B. Typ MERLIN, GKSS). Die gültigen Zeichnungen für die beiden zuletzt genannten Tragkörbe und die neuesten Stücklisten sind in den beiden o.a. Nachträgen zum Prüfungszeugnis Nr. 1.5/21507 der BAM aufgeführt. Die "Dichte Umschließung" wird gebildet von dem Behälterkörper, dem Primärdeckel einschließlich Elastomerdichtringen und Verschraubung sowie von den Deckeldurchbrüchen mit den dazugehörigen Dichtringen, Stopfen und Verschraubungen. Während des Transportes sind am Behälter an der Ober- und Unterseite kappenförmige Stoßdämpfer aus einer Stahlblechkonstruktion mit gekapselter Weichholzfüllung angebracht. Im oberen Bereich sind am Behälterkörper zur Handhabung zwei Tragzapfen angeschraubt. Das Versandstückmuster besitzt die Außenabmessungen:

Durchmesser (ohne Stoßdämpfer):	1185	mm
Durchmesser (mit Stoßdämpfer):	1355	mm
Höhe (Behälterkörper):	1460	mm
Höhe (mit Stoßdämpfer):	1780	mm

Nebenbestimmungen und Hinweise:

1. Alle qualitätssichernden Maßnahmen bei der Planung, den begleitenden Kontrollen und dem Betrieb müssen entsprechend der Technischen Richtlinie über Maßnahmen zur Qualitätssicherung (QM) und -überwachung (QÜ) für Verpackungen zur Beförderung radioaktiver Stoffe (TRV 006) (VkBl. Heft 4, S. 233, 1991) erfolgen.

2. Diese Zulassung gilt nur in Verbindung mit dem für das betreffende Serienmuster erstellten Endabnahmeschein.

3. Es ist sicherzustellen, daß sich jeder Verwender der Verpackung vor der erstmaligen Benutzung bei dem BfS registrieren läßt und bestätigt, daß er das Prüfbuch, das inbesondere den Zulassungsschein, die o.g. Handhabungsanleitungen und den Plan für wiederkehrende Prüfungen enthält, erhalten hat und beachtet.

4. Jedes Serienmuster ist mit dem oben angegebenen Kennzeichen und mit dem Datum (Monat, Jahr) der nächsten wiederkehrenden Prüfung dauerhaft zu versehen.

5. Jedes Serienmuster ist rechtzeitig wiederkehrenden Prüfungen zu unterziehen.

6. Änderungen bezüglich der Zeichnungen, Stücklisten und Werkstoffdatenblätter, die der Zulassung zugrunde liegen, bedürfen vor Beginn der Fertigung nach Freigabe durch die BAM der Genehmigung durch das BfS.

7. Das Versandstück ist als Wagenladung bzw. als geschlossene Ladung zu befördern, falls die Temperatur an der Außenseite der Verpackung 50° C übersteigt und/oder die Transportkennzahl größer als 10 ist. Bei Verwendung eines Containers dürfen max. 2 darin befestigte Versandstücke gleichzeitig befördert werden.

8. Besondere Maßnahmen während der Beförderung sind nicht erforderlich.

9. Diese Zulassung entbindet den Absender nicht von der Verpflichtung, etwaige Vorschriften des jeweiligen Landes, das vom Transport mit diesem Versandstück berührt wird, zu beachten.

Dieser Zulassungsschein gilt bis zum **31. Dezember 1992.**

Das Versandstück wurde von dem BfS in Zusammenarbeit mit der BAM geprüft. Bei der Kritikalitätsanalyse wurde das Eindringen von Wasser in alle Hohlräume unter Unfallbedingungen angenommen. Für die Tragzapfen sind die Anforderungen der KTA-Regeln 3902 und 3903 in bezug auf den Entwurf, die Fertigung und die Prüfung bei Einhaltung der o.a. Nebenbestimmungen erfüllt. Unter den genannten Voraussetzungen entspricht das geprüfte Versandstückmuster den Bedingungen für ein Versandstück für spaltbare radioaktive Stoffe gemäß den obengenannten Verkehrsvorschriften auf der Grundlage der IAEA-Empfehlungen von 1973.

Rechtsbehelfsbelehrung:

Gegen diesen Bescheid kann innerhalb eines Monats nach Bekanntgabe Widerspruch erhoben werden. Der Widerspruch ist bei dem Bundesamt für Strahlenschutz, Albert-Schweitzer-Straße 18, 3320 Salzgitter 1, schriftlich oder zur Niederschrift einzulegen.

Braunschweig, den 09. Juli 1991

Im Auftrag

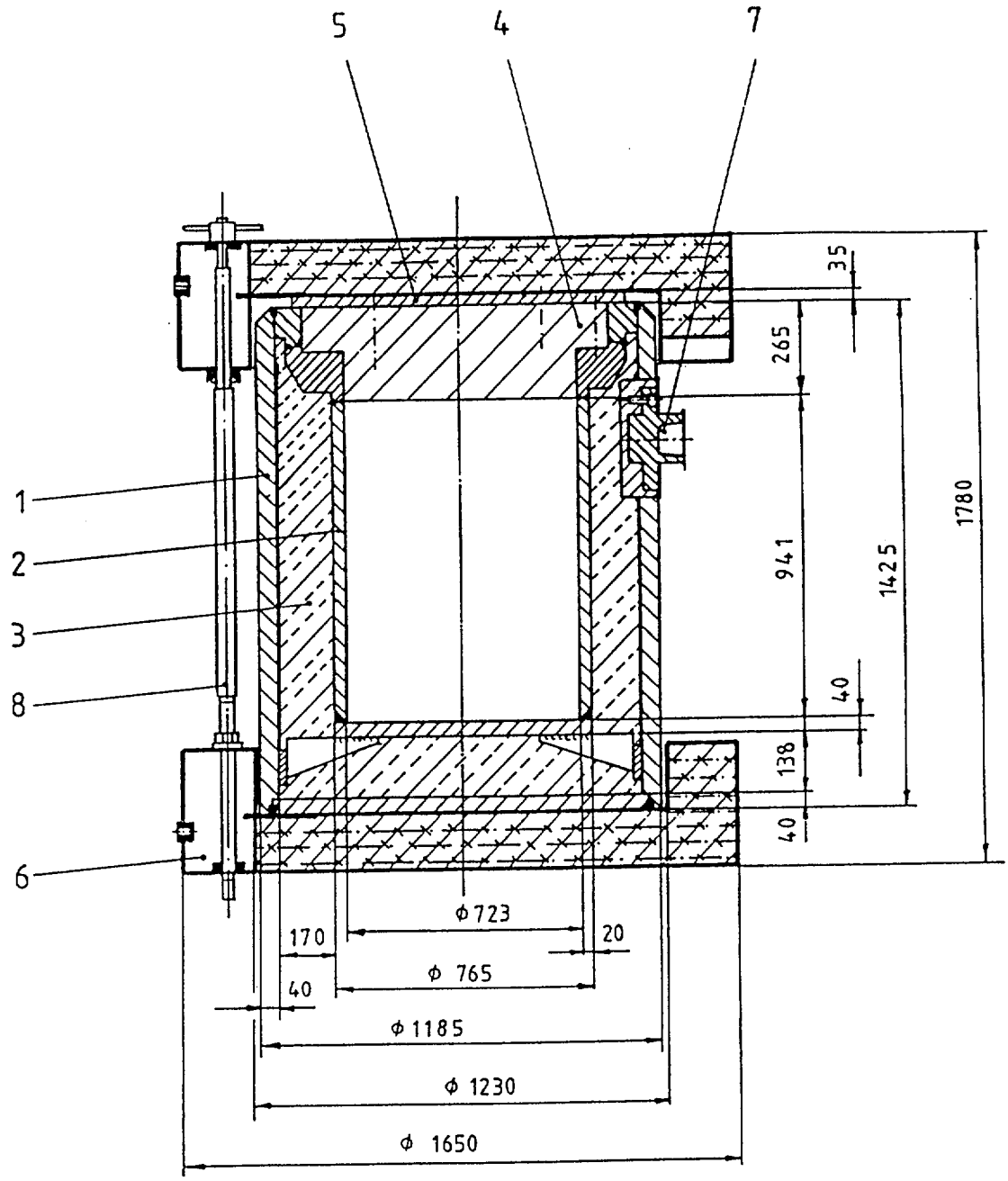
Dr. Schweer

BUNDESAMT FÜR STRAHLENSCHUTZ 6

Anlagen
Anhang
1 Behälter-Abbildung (Fig. 1)

- Anhang zum Zulassungsschein D/4224/B(U)F (Rev.2) -

Rev. Nr.	Ausstellungs-datum	Gültigkeits-dauer	Grund der Revision
0	12.12.1986	12.12.1987	Erstausstellung
1	15.04.1987	15.04.1990	Änderungen der Unterlagen, des zulässigen Inhalts, der Beschreibung der Verpackung und der Gültigkeitsdauer
2	09.07.1991	31.12.1992	Neufassung, Erweiterung des zulässigen Inhalts, geänderte Nebenbestimmungen, Verlängerung der Gültigkeitsdauer



Alle Abmessungen in mm
All Dimensions in mm

1 Außenliner
Outer Liner

2 Innenliner
Inner Liner

3 Bleiabschirmung
Lead Shielding

4 Deckel
Lid

5 Schutzplatte
Protective Plate

6 Stoßdämpfer
Shockabsorber

7 Tragzapfen
Trunnion

8 Verspannung
S.A. Fastning