

Transport of Radioactive Material Code of Practice

Format for Supplementary Labelling of
packages used for the safe transport
of radioactive material

Authors

This Code of Practice has been prepared by the Transport Container Standardisation Committee. The Committee comprised:

AWE plc
British Energy Generation Limited
Croft
Energy Solutions EU Services Limited
GE Healthcare Limited
LLWR Limited
International Nuclear Services
Magnox
NDA
Nuvia Limited
ONET Technologies
Sellafield Limited
Studsvik UK Limited
Revis Services Limited
Rolls-Royce plc
RSRL

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Comments and suggestions relating to the improvement of this Code of Practice should be addressed to the current TCSC Secretariat:

Chairman: Mr J Harvey
Secretary: Mr N A Carr

NDA
Curie Avenue
Harwell
Didcot
Oxon OX11 0RH

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FOREWORD

The purpose of this Code of Practice is to advise designers and consignors when considering supplementary marking and labelling of packages, used for the safe transport of radioactive material in the UK. Readers are advised that this document should be used in conjunction with the appropriate modal regulations and its content does not remove the need for a thorough knowledge of those regulations.

When appropriate, throughout this Code of Practice the relevant paragraph in TS-R-1 is quoted in square brackets [].

This document replaces the previous issue (June 2005), and has been revised and updated to reflect the practice for supplementary marking and labelling in the UK.

1 INTRODUCTION

This Code of Practice gives advice to Consignors on the format for supplementary labelling of packages used for the safe transport of radioactive material. It describes additional labels which are not specified in any of the applicable regulations. Experience has led to a need for such labels and their use is considered to be an example of good practice.

It should be noted that the Consignor shall comply with all specific requirements of the International Atomic Energy Agency 'Regulations' (Regulations for the Safe Transport of Radioactive Material, 2009 Edition - TS-R-1).

In addition to the IAEA Regulations it is also necessary to comply with National and International Regulations for particular modes of transport. The Code identifies these regulations that should be consulted for the specific requirements of labelling, marking and placarding.

Types of Marking and Labeling

Permanent Marking

In the UK it is common practice that the Authority incorporates the trefoil symbol into the package identification plate illustrated in Appendix A. Space is also assigned on this plate for the stamping or engraving of the Package Identification Mark.

The package identification plate nominal size has been specified, such that the information contained thereon is readily readable. Where a packaging is too small to accommodate even this standard plate in one piece the plate may be cut in two so that each part can be affixed separately.

Durable Labeling

Durable labelling can be used to supplement the Package Identification Label and provide some additional and useful information, see Appendix B. Each package of gross weight exceeding 50 kg must have its maximum gross weight prominently marked on the outermost packaging [531]. In practice, packages exceeding 25 kg gross weight are likely to be handled by mechanical means, while packages having a gross weight greater than 10 kg should only be regularly handled manually if such an operation is supported by a favourable risk assessment. Good practice should include labelling of gross weight so that the risks associated with manual handling can be properly assessed.

Although there is no requirement in the Regulations to display the owner's name and address on the packaging it is good practice to include at least an abridged version somewhere on the outer surface, e.g. 'RSRL, Harwell'. For packages which conform to Type B(U), Type B(M) or Type C space is allocated for the owner's name and address on the Package Identification Plate illustrated in Appendix A.

Related Documents

- a) IAEA Safety Standard Series TS-R-1, Regulations for the Safe Transport of Radioactive Material, 2009.
- b) The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009, SI 2009 No. 1348.
- c) United Nations - Recommendations on the Transport of Dangerous Goods, (16th Edition).
- d) Convention concerning International Carriage by Rail (COTIF) Appendix B. Uniform Rules concerning the Contract for International Carriage of Goods by Rail (CIM) Annex 1. Regulations concerning the International Carriage of Dangerous Goods by Rail, (RID) 2011.
- e) European Agreement concerning the International Carriage of Dangerous Goods by Road, (ADR) 2011.
- f) European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways, (ADN) 2011.
- g) Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO) 2011.
- h) International Maritime Dangerous Goods Code, IMDG Code.
- i) Dangerous Goods Regulations, (IATA).
- j) BS 5609: Specification for printed pressure-sensitive, adhesive-coated labels for marine use, including requirements for label base material.
- k) The Carriage of Dangerous Goods By Road Regulations 1996, Statutory Instrument 1996 No 2095 part 1.

Definitions

Authority. The term 'Authority' refers to the organisation using this Code of Practice.

Approval Authority. An organisation or an individual responsible for the approval of package designs.

Competent Authority. Competent Authority means any national or international regulatory body or authority designated or otherwise recognised as such for any purpose in connection with the Regulations. In the United Kingdom the Secretary of State for Transport is the Competent Authority for packages not associated with the Defence Nuclear Programmes and the executive functions are carried out on his behalf by the Radioactive Material Transport Division within the Department for Transport. For packages associated with the United Kingdom Defence Nuclear Programmes, the Competent Authority is the Secretary of State for Defence. The Defence Nuclear Safety Regulator (DNSR) acts on his behalf in these matters.

Competent Authority Identification Mark. Signifies approval of the package by the Competent Authority and comprises a prefix which identifies the country of origin, a package design number, a Type Code and the year of the regulations (e.g. GB/1362A/TYPE B(U)F-96) (see Appendix C).

Durable Marking. Legible information on the outside of a package or packaging which is resistant to the rigours of routine transport including the effects of weather and abrasion. Marking may be achieved by painting, printing, engraving, stamping or by other means which comply with the requirements.

Labelling. The attachment of a printed self-adhesive paper, or plastic, information sheet to the outside of the package.

Package. Packaging with its radioactive contents.

Package Design Number. A number assigned, by the Competent Authority, to a specific design of package. The package design number and a suffix letter identify the packaging components and contents which make up the complete package (e.g. 1362A) (see Appendix A). It is however common practice in the nuclear industry to use this number to identify only the packaging components.

Package Identification Number. A number which identifies uniquely a particular package - a combination of the package design number and packaging serial number (e.g. 1362/0095).

Packaging. The assembly of components necessary to enclose the radioactive contents completely.

Packaging Serial Number. A number assigned to a particular packaging which, coupled with the package design number, uniquely identifies that packaging.

Permanent Marking. A marking resistant to effects of fire and water.

2 SUPPLEMENTARY LABELLING

This section provides guidance on the use of supplementary labels, which is considered to be an example of good practice, that are in common use within UK Nuclear Industry and not an IAEA regulatory or National modal requirement.

Supplementary Package Identification Label

This label, illustrated in Appendix B, is to indicate the standard of packaging and to provide additional information concerning the package to the carrier and consignee. It is accordingly used for a single journey only. The label is made in two sizes and the one appropriate to the size of package should be used.

Use of the supplementary package identification label is an example of good practice and may be used as appropriate on any package.

The label is self-adhesive and should be affixed to a clean dry surface on the outside of the package, preferably adjacent to the Package Identification Plate, shown in Appendix A.

Any labels of this type used for a previous journey must be removed from the package or obscured before a new label is attached.

The information required to be shown on the supplementary package identification label will be clearly marked in the appropriate spaces with a waterproof agent as follows:

- (a) **Package Type.** This may be TYPE IP-1, TYPE IP-2, TYPE IP-3, TYPE A, TYPE B(U), TYPE B(M), TYPE C, TYPE H(U), TYPE H(M) or Fissile and the appropriate letters should be inserted against 'Package Type'.
- (b) **Gross Weight.** The gross weight of the package should be expressed in kilograms.
- (c) **Package Identification Number.** A number which serves to identify uniquely the package whilst in transit, and is used to refer to the package in all communications concerning packaging, transport, delivery, receipt and unpacking. The procedure for the transfer of fissile materials between establishments also makes use of this number.

When the outer packaging is expendable (and hence does not necessarily have a container serial number) its package design number followed by a unique mark, issued by the consignor, should be entered on the label. Since this group of numbers must distinguish the package from any other that could simultaneously be in transit, the mark should preferably consist of a letter code indicating the consigning establishment. An example from, say Chapelcross, would be CX 79, so that the package identification number would be 0123/CX 79.

- (d) **Approval Identification Mark.** The designs of the Type B(U), Type B(M), Type C, Type H(U), Type H(M) and Fissile packages and also transport operations carried out under special arrangements, are each identified by an approval identification mark. This is allocated by the Competent Authority and is specified on the design or shipment approval (see Appendix C). The shipment approval identification marking, if such approval is required, should be used in preference to the Competent Authority approval identification mark. This mark should be inserted in the space provided.

The designs of Industrial and Type A packages are also identified by an approval identification mark (see Appendix C). This is allocated by the approval authority and should be inserted in the space provided.

Empty and Discharged Package Labels

It should be noted that the precise definitions and application of empty and discharged labels may vary between organisations. Described below is an example of good practice for empty and discharged package labels.

Empty. Empty means that the contents of the package have been removed and the package has been thoroughly cleaned to reduce the non-fixed contamination levels to the levels specified in [425], and have external surface radiation levels below 5 microSv/h [515].

An empty packaging which had previously contained radioactive material may be transported as an excepted package provided that:

- It is in a well maintained condition and securely closed;
- The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;
- The level of internal non-fixed contamination does not exceed one hundred times the levels specified in [507]; and
- Any labels which may have been displayed on it in conformity with [536] are no longer visible.

The package must be labelled with the appropriate UN number (UN2908) on the outside of the package (see Table I of the regulations TS-R-1) [403].

Discharged. Discharged means that the contents of the package have been removed as far as reasonably practical but the package may not be Empty and may contain residual radioactive material or internal contamination (Statutory Instrument 1996 No 2095 part 1 – nominally empty).

A package discharged of its contents but containing residual radioactive material or internal contamination in excess of the non-fixed contamination limits specified in [425(c)] should only be shipped as a package category which is appropriate to the amount and form of the residual radioactivity and contamination (IAEA TS-G-1.1 520.2(b)).

Maintenance Due Date Label

The purpose of this label, illustrated in Appendix D, is to prevent the use of containers that are subject to scheduled periodic maintenance, unless they have been duly maintained.

On completion of scheduled maintenance the old label must be replaced by a new one marked with the date the next maintenance is due and the identification of the establishment that carried out the maintenance just completed.

The date must be shown as the month and year (e.g. JUNE 2010) and must be marked, in the space provided on the label, with a waterproof agent. The label is self-adhesive and should be affixed to a clean dry surface either in the recess provided on

the Package Identification Plate when that is used or, when it is not used, directly on to the container.

RADSAFE

RADSAFE is a consortium of organisations that have come together to provide expert assistance to the emergency services following an incident involving the transport of radioactive materials.

RADSAFE Placard. All vehicles or containers used for transporting radioactive material under the scheme must display either the RADSAFE or simplified RADSAFE placard(s) (see Appendix E) which mirror the current legal placards' positions.

3 LABELLING FOR RADIOACTIVE MATERIAL WITH OTHER DANGEROUS GOODS

Package Requirements

This section covers the requirements for packages containing radioactive material which has other dangerous properties, or is accompanied by non-radioactive material which is itself dangerous.

In addition to the radioactive properties, any other dangerous properties of the contents of the package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, must be taken into account in the packing, labelling, marking, placarding, storage and transport in order to be in compliance with the relevant transport regulations for dangerous goods.

The following should therefore be noted:

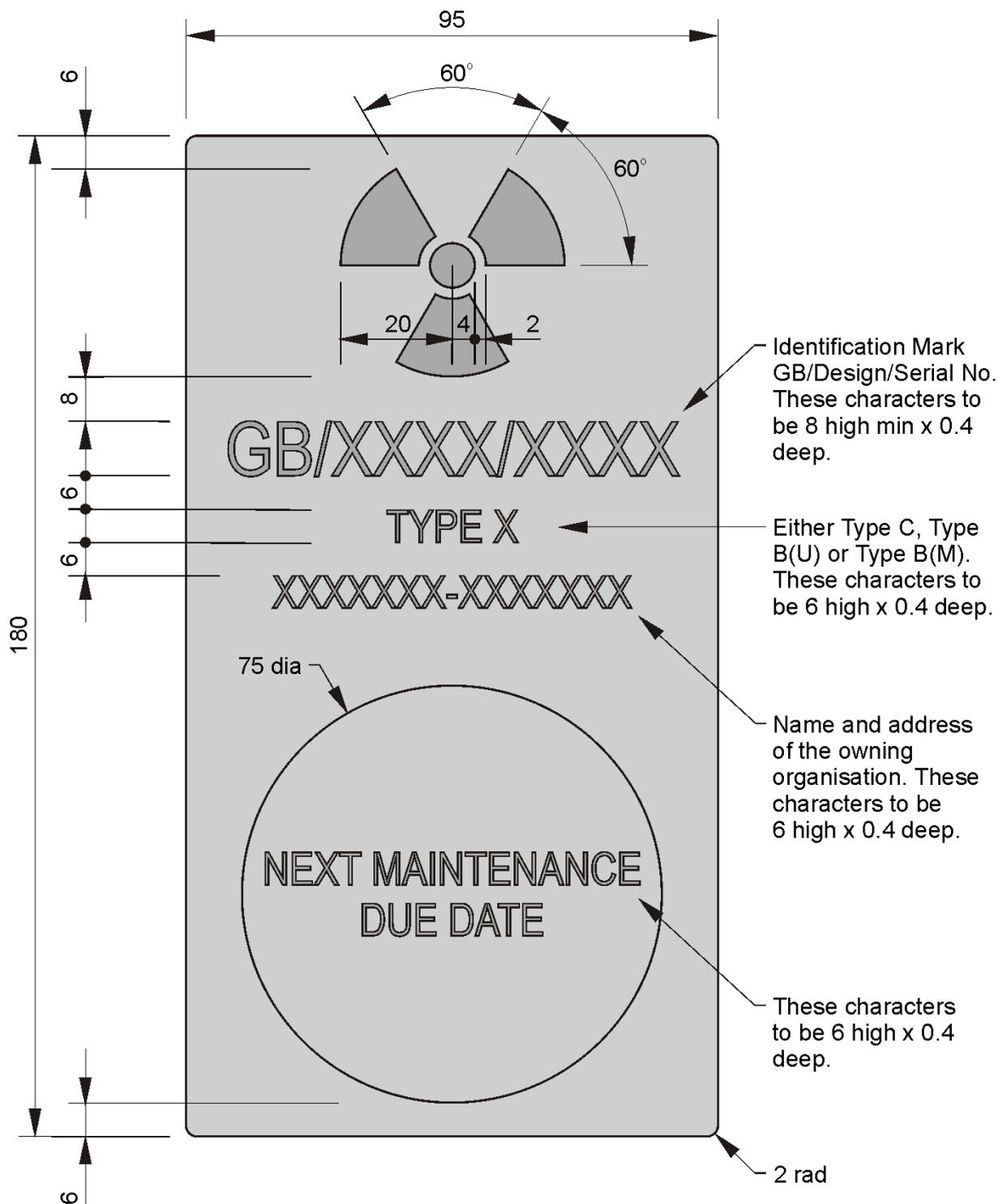
- a) Apart from 'excepted' radioactive material (where the other hazard would take precedence) radioactive materials having other hazardous properties must always be classified in Class 7 and the greatest of the additional hazards must also be identified. In the case of 'excepted' radioactive materials, the most stringent Packing Group based on the different non-radioactive hazards must be assigned to the article.
- b) Radioactive material having other hazardous characteristics, must be allocated to Packing Group I, II or III as appropriate by application of the grouping criteria corresponding to the nature of the predominant subsidiary risk.
- c) Unless contained in a Type A, Type B(U), Type B(M), Type C, Type H(U) and Type H(M) package, it must also meet the appropriate packing requirements for the subsidiary risk. It should be noted however that a Type A packaging may not meet the requirements of UN Group 1 packaging because, although it meets the requisite 1.8 m drop test, has a less onerous maximum leak rate, dependent on the package design.
- d) It is also necessary to take into account the possible formation of products having additional dangerous properties by interaction of the material with the atmosphere or with water.
- e) For radioactive materials which also possess other hazardous properties meeting the criteria for one or more of the other classes the packaging must bear the applicable subsidiary risk labels (this is not required for an uncompressed gas that is non-flammable and non-toxic).
- f) Subsidiary risk labels must be fixed adjacent to the primary hazard label.

Other issues to be considered

Note that in addition to meeting the requirements of the regulations for its radioactive properties, radioactive consignments are required to comply with the requirements specified by relevant international transport organisations and applicable provisions for each individual substance on account of its other hazardous nature. This may include

additional or specialised packing design requirements and approvals by appropriate authorities. For example, where radioactive material is transported under pressure or where internal pressure may develop during transport, the package may fall under the scope of the pressure vessel codes of the Member States of concern. Particular attention should therefore be paid at the design stage of any packaging to take into account the likely additional hazards of the radioactive material required to be transported.

APPENDIX A Package Identification Plate



Note:- Identification Plate to be manufactured from 20swg (nominal) Stainless Steel plate. Characters and trefoil symbol to be plainly marked by embossing, stamping or other means resistant to the effects of fire and water. Dimensions in millimetres.

APPENDIX B Supplementary Package Identification Label for Radioactive Material Packages

PACKAGE IDENTIFICATION No.	Approval Identification Mark
Package Type	Gross Wt.
To	
From	

Note: Markings on packages should be boldly printed, of sufficient size and sensibly located to be legible, bearing in mind the likely means of handling to be employed. A character height of 12.5mm should be considered a suitable minimum height for packages.

MATERIAL: Self-adhesive vinyl, laminated with polypropylene

Width	Height
105 mm	74 mm
210 mm	148 mm

APPENDIX C Package Approval Identification Marking

Package Design Number

Every package design, whether for an outer or inner, is allocated a design number. This number is marked on non-expendable packagings. In the UK, package design numbers are issued by the DfT and consist of four digits for Competent Authority Approved Packages.

Functions of the Package Design Number

The package design number is a convenient method of reference which may be embodied in a file number.

The package design number of the outermost container of a package coupled with a 'make-up' letter (also issued by the DfT), indicates the combination of components and contents which make up the package and forms a short means of referring to a particular complete package assembly.

When combined with an individual packaging serial number, a package identification number is created which uniquely identifies any particular package. This number is stamped or engraved on the package identification plate illustrated in Appendix B, and is thus resistant to the effects of fire and water.

Where a package requires Competent Authority approval, under [806], [809], [812], [816] and [817] of the Regulations, the Competent Authority should be notified of the serial numbers of those components of the packaging which require separate design numbers. The Competent Authority will maintain a register of these serial numbers.

The design number is extended by the addition of prefixes and suffixes to form package design and shipment approval identification marks, see Appendix L. These enable competent authorities' certificates of approval to be linked to other documentation and correspondence, and to the packages concerned.

Block Allotments of Design Numbers

Design numbers are currently issued one at a time by the Competent Authority. Some years ago they issued blocks of numbers to the main users for them to use at their discretion. Although it is likely that all of these numbers are used up, and that reorganisation in the nuclear industry has led to some of the bodies no longer existing or having merged with others, the block allocations are listed below to assist with identification of older packagings.

0001 - 1700	UKAEA
1701 - 1750	Aldermaston
1751 - 1800	Reactor Group, Risley
1801 - 1810	Sea Disposal Drums (AHP)
1811 - 1820	For Specials (Aldermaston)
1821 - 1970	TRC IPU Amersham
1971 - 1999	Reactor Group, Risley
2000 - 2099	CEGB
2500 - 3000	DfT
3001 - 3100	TRC IPU Amersham
3101 - 3150	UKAEA Northern Division

3151 - 3200	NTL
3201 - 3300	Amersham
3301 - 3350	BNFL
3351 - 3400	Harwell
3401 - 3499	AWRE
3500 - 3599	BNFL
3600 - 3699	Amersham
3700 - 3749	Harwell
3750 - 3849	Amersham
3850 - 3899	NIREX
3900 - 4399	DfT for individual allocation
4400 - 4499	BNFL
4500 - 4599	AEAT
5000 - 5999	Foreign Design DfT;

Design numbers from 5000 have been allotted by the Competent Authority to foreign packages requiring multilateral approval.

Approval Identification Marking

Each approval issued by the Competent Authority is identified by an identification mark. The mark is of the following general form:

VRI/Package Design Number/Type Code-96

VRI represents the international Vehicle Registration Identification code of the country issuing the approval certificate [828a], which for the UK is GB.

Package Design Number see paragraph above.

The Type Code must be one or more of the following, in the order listed, to indicate the type of approval to which the mark relates:

TYPE AF	Type A package design for fissile material
TYPE B(U)	Type B(U) package design
TYPE B(U)F	Type B(U) package design for fissile material
TYPE B(M)	Type B(M) package design
TYPE B(M)F	Type B(M) package design for fissile material
TYPE C	Type C package design
TYPE CF	Type C package design for fissile material
TYPE IF	Industrial package design for fissile material
TYPE S	Special form radioactive materials
TYPE LD	Low dispersible radioactive material
TYPE T	Shipment
TYPE X	Special arrangement shipment

In the case of package designs for non-fissile or fissile excepted uranium hexafluoride, where none of the above codes apply, the following type codes shall be used;

- H(U) Unilateral approval
- H(M) Multilateral approval.

The suffix -96 is appended to the Type Code to indicate that the design meets the full requirements of IAEA Safety Standard Series TS-R-1, 1996.

Identification marks are used as follows:

- (a) A typical Competent Authority identification mark signifying approval of a package would be:

GB/1234A/TYPE B(M)F-96

This identifies the approval for package design 1234A as a Type B(M) package containing fissile material. It appears in the certificate and must also be marked on the package itself. Where the packaging is to be used for different contents the specification of these will be added as alternatives in a revised issue of the certificate. Where the contents are non-fissile or exempt from criticality clearance the 'F' will not be included. For an industrial package requiring criticality clearance the format of the identification mark will be as above except that there will be no Type Code letter (A, B(U), B(M) or C).

e.g. GB/0174D/TYPE IF-96

Other industrial packages (i.e. non-fissile) do not require a Competent Authority identification mark.

- (b) Where the application is different from the original application (e.g. where an applicant wishes to carry contents not previously approved), a number in brackets (1), (2) etc should be added after the packaging assembly letter.

e.g. GB/1362A(1)/TYPE B(M)F-96

starting with (1) in the case of the second application and (2), (3) etc. in subsequent cases. The identification mark granted to the original application will not contain a bracketed number after the packaging assembly letter.

- (c) Where Competent Authority validation is given to a foreign fissile package design certificate, no change in the originating country's identification mark occurs, but for reference purposes, the reference in the top right hand corner of the UK validation certificate will be the foreign Competent Authority's identification mark followed by a bracketed number, commencing with (1) for the first applicant.

e.g. USA/4540/TYPE B(U)F-96(1)

- (d) In shipment approval identification marks, different shipments (or series of shipments) will be indicated by numbers 01, 02, 03.

e.g. GB/1362A(2)03/TYPE B(M)F-96T

This represents a shipment approval linked to the package design in (a) above. It appears in the certificate but is not marked on the package. Where a series of identical shipments for the same design are approved in one Shipment Certificate, all shipments so approved will be identified by the same number. Special arrangement shipments with suffix X in

place of T are treated similarly, except that there is never a package type code letter A, B(U), or B(M).

- (e) Foreign designs e.g. USA, may have combined package design and shipment certificates. If the UK Competent Authority is approving rather than validating as part of a 'multilateral' chain, it will allot a design number from the 5000 series, and the identification marks will take the form:

Package identification mark GB/5072/TYPE B(M)F-96
 Shipment identification mark GB/5072 01/TYPE B(M)FT-96
 However, only GB/5072/TYPE B(M)F-96 is marked on the package.

- (f) Where multilateral approval is effected by validation, (i.e. the acceptance of the originating country's approval), only the identification marks issued by the country of origin of the design or shipment are used with the addition of an application number (as described in 3(b) above).
- (g) Where multilateral approval is effected by issue of certificates by successive countries, each certificate allocates its own identification mark of the country of origin of the design. If the UK is not the country of origin of design a package design number from the '5000 series' will be used in the UK identification mark. For example:

CH/28/TYPE B(M)F-96
 GB/5027/TYPE B(M)F-96

would be the identification mark for a package originally approved in Switzerland and subsequently, by a separate certificate, in the UK. A package whose design is so approved need carry only the identification marks necessary for the particular movement for which it is being used. If multilateral certification is given merely as validation, the validation certificates will not introduce new identification marks.

- (h) Revision numbers will not be included in UK identification marks on packages. They will be indicated in certificates by issue numbers. Users will be expected to make sure that packages comply with the latest revision of the certificates.

NOTES:

- (i) A similar system of identification marks identifies special form material approvals. However, the package design number is replaced by a simple serial number allocated by the Competent Authority and the Type Code is 'S'. These identification marks do not appear on packages.
- (ii) Criticality clearances are not indicated in identification marks, but may be quoted in package design approval certificates. They are designated by the package design number followed by 'TCC' and a number.
- (iii) Although only the package design approval identification mark appears on packages, all relevant identification marks must be entered on the accompanying consignor's certificate.

Package Approved by other than the Competent Authority**Package Design Number**

The Package Design Number consists of the unique container design number of the outermost container, followed by an optional letter A, B, C etc standing for the particular assembly of components and contents embodied in the complete package (as specified in the relevant package design approval certificate) for example: 1234A.

Approval Identification Mark

Each approval certificate issued will be assigned an Identification Mark. The mark shall be complementary to the system used for Competent Authority approval in the form as follows:

VRI/Package Design Number/Type Code-96

VRI represents the international Vehicle Registration Identification code of the country issuing the approval certificate [828a], which for the UK is GB.

Package Design Number, see paragraph above.

The Type Code will be as below:

TYPE IP-1 Industrial Packaging Type 1
TYPE IP-2 Industrial Packaging Type 2
TYPE IP-3 Industrial Packaging Type 3
TYPE A Type A

The suffix -96 is appended to the Type Code to indicate that the design meets the full requirements of IAEA Safety Standard Series TS-R-1, 1996.

A typical Identification Mark for other than Competent Authority approved packages will be of the form:

GB/1234A/TYPE A-96

APPENDIX D Maintenance Due Date Label



MATERIAL: Self-adhesive vinyl, laminated with polypropylene

APPENDIX E RADSAFE Placard

