

PROCEDURE FOR SAFE TRANSPORT OF RADIOACTIVE MATERIALS

PART-A

PREPARATION OF THE PACKAGE FOR TRANSPORT

- 1 Transport the source only in an approved transport container. Or use the original container in which the fresh source was received. Ensure that it is in good condition.
- 2 Load the source in the container properly and carefully.
- 3 Secure the source within the shielded container by means of appropriate locking mechanisms incorporated in the design of the shielded container.
- 4 Close the lid of the container so that the source is not released during the transport.
- 5 Load and immobilize (for eg. fixing by bolts, with the help of spacers etc) the container in an outer sturdy container such as a wooden or metallic box. Ensure that the outer container deployed is in a sound condition and is provided with locking facility and strong lifting handles.
6. Lock and seal the outer container. The seal should be tamper proof i.e. once a seal is disturbed/removed, it should not be possible to reuse. A recommended way of sealing is that the consignor may use weather proof seals (e.g. laminated and self adhesive type) with his/her signature. The key(s) of the lock(s) after putting in an envelope should be sealed with signature and handed over to the carrier to deliver the same along with the consignment (radioactive source) to the waste management agency.
7. Using a working radiation monitor, measure the maximum radiation levels on the outer surface of the package and at a distance of 1 meter from the surface and record them. The number obtained by measuring the maximum radiation level at 1 meter expressed in mSv/h multiplied by 100 (or the number obtained by measuring the maximum radiation level at 1 meter expressed in mrem/h) is called as the TRANSPORT INDEX of the package (TI).

MARKING OF THE PACKAGE:

Write/Inscribe the following information **durably, clearly and legibly** on the outer surface of the package

- 1 Name & Addresses of the CONSIGNOR and the CONSIGNEE with contact no. details.
- 2 Type of package (e.g. INDUSTRIAL PACKAGE TYPE IP-1 , TYPE IP-2, TYPE IP-3, TYPE A PACKAGE, TYPE B(U)/(M), TYPE C PACKAGE etc.).
- 3 UNITED NATIONS NUMBER (UN NUMBER), and the PROPER SHIPPING NAME (Please refer the table for common UN numbers and proper shipping names). In case of EXCEPTED PACKAGES Proper Shipping Name is not required.
- 4 Gross Weight of the package if it exceeds 30 Kg for domestic transport and 50 Kg for International transport.
- 5 Competent Authority Identification Mark along with its serial no., if it is a Type B(U) /Type B(M) / Type C package .
- 6 In case of Type IP-2, Type IP-3 & Type A Package, Vehicle Registration Code(VRI Code) of the country of origin & either the name of the manufacturer or other identification of the packaging specified by the Competent Authority of the country of origin.

LABELLING OF THE PACKAGE

Transport **Category label**, based on the criteria given in the table below, shall be affixed on two opposite sides of the package. The criteria for determination of the Category of the package are given in the table below:

Category	Maximum radiation level at The external surface of the package		Transport Index(TI)
	mSv/h	(mrem/h)	
I -WHITE	≤ 0.005	≤0.5)	≤ 0.0
II- YELLOW	>0.005 - ≤0.5	> 0.5 - ≤ 50	> 0 - ≤ 1.0
III- YELLOW	> 0.5 - ≤ 2.0	> 50 - ≤ 200	> 1.0 - ≤ 10

Both the limits should be satisfied for a package to belong to a specified category. If either of the limits is exceeded, the package would belong to the next higher category.

IMPORTANT: PLEASE NOTE THAT IF EITHER THE RADIATION LEVEL ON THE SURFACE OF THE PACKAGE IS MORE THAN 2.0 mSv/h OR TRANSPORT INDEX IS MORE THAN 10, DO NOT FORWARD THE PACKAGE FOR TRANSPORTATION WITHOUT PRIOR PERMISSION OF THE COMPETENT AUTHORITY.

UNITED NATIONS NUMBER, PROPER SHIPPING NAME

UN No.	PROPER SHIPPING NAME and description
2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL
2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – INSTRUMENTS or ARTICLES
2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM
2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE- EMPTY PACKAGING
2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY(LSA-I)
3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY(LSA-II)
3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY(LSA-III)
2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II)
2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form
3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM
2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE,
2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE

PART-B

BOOKING, STORAGE, TRANSPORT AND DELIVERY OF PACKAGE

- 1 Do not transport the package as a personal luggage in a bus or in a shared Taxi or in the passenger compartment of a train or in the passenger cabin of an aircraft.
- 2 Always book the package as an item of cargo. Do not despatch the package by post.
- 3 Declare the package as a radioactive consignment in the transport documents. For Road transport, in the L.R., the consignor shall declare the consignment by its proper shipping name.
- 4 The transport documents include
 - a) **CONSIGNOR'S DECLARATION**
 - b) **TREM CARD (TRANSPORT EMERGENCY CARD)**
 - c) **INSTRUCTIONS TO THE CARRIER**
 - d) **INSTRUCTIONS ABOUT EMERGENCY MEASURES IN CASE OF TRANSPORT INCIDENTS**
- 5 Send a key of the lock along with the transport documents to the CONSIGNEE.
- 6 Do not dispatch the package without the prior permission of the COMPETENT AUTHORITY
- 7 Inform the CONSIGNEE before dispatching the package and ensure that the CONSIGNEE is prepared to receive the consignment.
- 8 Furnish the set of instructions contained in the document entitled " INSTRUCTIONS TO THE CARRIER" to the carrier while booking the package for transport.
- 9 The CONSIGNOR/ CONSIGNEE/ CARRIER should contact the competent authority immediately in the event of:
 - a) **Any untoward incident/ accident during transport**
 - b) **Non delivery of the package at the destination within the normal period.**
10. Ensure that the CONSIGNEE has received the consignment and inform the Competent Authority accordingly.
- 11. Fill in the check list (copy enclosed) to ensure that all the requirements for safe transport of radioactive material are complied with.**

DECLARATION OF RADIOACTIVE SHIPMENT

This is to certify that the package containing radioactive material as identified by the following details is safe for transport by: rail road sea air .

Package forwarded by (Consignor with contact no.)	:			
Package addressed to (Consignee with contact no.)	:			
UN Class of dangerous goods	:	7		
		Package 1	Package 2	Package 3
United Nations No	:			
Proper Shipping name	:			
Subsidiary risk, if any	:			
Name of Radioactive material	:			
Quantity/Activity of Radioactive material	:			
No. of sources in each package	:			
Package details	:			
Dimensions of the package	:			
Weight of the package	:			
Type of package*	:			
Radiation level on the surface of the package in mSv/h	:			
Transport index of the package	:			
Category of the package	:	I-WHITE/II-YELLOW/III-YELLOW	I-WHITE/II-YELLOW/III-YELLOW	I-WHITE/II-YELLOW/III-YELLOW

* In case of Type B package, Competent Authority identification number along with serial no. should also be given.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packed, marked and labelled, and are in all respects in proper condition for transport according to the applicable regulations.

Date:

Signature:
Name and address
Seal

TREM CARD

Cargo	:	Radioactive material
Nature of Hazard	:	Radioactive material, Potential external and internal exposure
Protective device to be carried in the vehicle	:	One set each, for the driver and his assistant, of protective clothing (boots, gloves, overalls, caps). Six number of big polythene bags for collecting contaminated material
Emergency action	:	<ol style="list-style-type: none"> 1. Inspect the package visually. If it is intact, ensure onward journey in the same or another vehicle. 2. In case of fire, fight from a distance 3. If the package appears to be damaged, cordon a distance of 3 m around the package 4. Obtain the names and addresses of persons who might have been exposed to radiation and convey the particulars to the Head, RSD, AERB and to the Head, RP&AD, BARC
First aid	:	Thoroughly wash the affected skin with plenty of water.
Contact telephone numbers for advice and assistance	:	<p>a) Contact the consignor at the address given on the package</p> <p>b) Emergency Control Room, Crisis Management Group, DAE, Mumbai-400 001</p> <p>TF: 022-2202 3978 Telefax- 022-22021714 Fax-022-22830441 Mobile- +919969201364 Email- daeocr@dae.gov.in</p> <p>Alternate CMG - DAE Emergency Control Room (ECR) located at Anushakti Nagar (VSB)</p> <p>022-2599 1070 <i>Telefax – 022-25515283*</i> Fax- 022-25991080/022-25993080 Mobile- +919969201365 Email- vsbecr@npcil.co.in</p>

INSTRUCTIONS TO THE CARRIER

1. The package should be transported by the most direct route.
2. Intermediate off-loading and reloading of the package should be avoided wherever possible.
3. Package should be handled carefully. Suitable mechanical means should be deployed for handling packages weighing more than 30 kg.
4. Persons should not be allowed to sit on the package or spend more time than the necessary time in the vicinity of the package.
5. The package should not be transported along with other dangerous good such as explosives and inflammables.
6. The package should not be transported/stored together with photosensitive films/plates.
7. The package should be kept segregated from spaces occupied by passengers and public.
8. If several packages containing radioactive material are to be transported, then the total number of packages loaded in a single vehicle should be so restricted that the sum of the transport indexes of the packages does not exceed 50, except in case of exclusive use. Further the total number of packages stacked in a storage area should be so limited that in a given stack the above limit of 50 of the sum of transport indexes is not exceeded and such stacks containing radioactive consignments are separated by at least 6 meters.
9. If the shipment is under exclusive use i.e. the entire conveyance is for the proposed transport of radioactive material then (a) there should not be any intermediate loading and unloading operations of other goods. (b) Nothing other than the intended radioactive material along with its accessories should be carried in this vehicle.
10. At the destination, it should be ensured that the package is delivered to the consignee to whom it is indeed addressed.
11. One copy of the TREMCARD should be carried in the vehicle carrying the radioactive cargo. If the package(s) get(s) involved in an accident or get(s) damaged during transport, the instructions specified in the TREMCARD should be implemented.
12. If the package is not claimed by the consignee at the destination, it should not be auctioned or otherwise disposed of. The matter should be brought to the notice of the consignor and Head, RSD, AERB, Niyamak Bhavan, Anushaktinagar, Mumbai – 400 094 and such measures as recommended in this regard by Head, RSD, AERB, Mumbai, should be duly implemented.

Instructions in writing regarding Practical Emergency Measures for Transport Incidents Involving Radioactive Cargo

1. *About the package*

Packagings which are permitted to be used for transport of radioactive materials are generally designed to prescribed standards aimed at prevention of release of the contents and of excessive exposure of public to radiation. Commonly there are two types of packages, namely, Type A and Type B(U)/(M).

Type A Packages are designed to withstand minor mishaps for eg. falling of the package from the vehicle while loading/unloading, rain, falling of small objects on to the package etc. If a Type A package is involved in a severe accident such as vehicle rolling over, then the package may be damaged through the loss of shielding or release of the contents. In such a situation follow instructions as given in para 4 & 5.

A Type B package is designed to withstand severe accidents. However, after severe accident the package may be damaged, though the chances are remote. In such a situation follow instructions as given in para 4 & 5.

2. *Nature of Hazard*

The hazard associated with radioactive consignment is exposure to radiation. Such exposure may be external and/or internal in nature. If the radioactive content is an indispersible solid or capsule, the hazard is likely to be external. If the content is in dispersible form, in the unlikely event of a severe accident, the potential for internal and some times, in addition, external exposure may exist.

3. Protective devices to be carried in the vehicle:

The driver of the vehicle and his assistant should each have some protective device if the vehicle carries a package containing dispersible radioactive material. The protective equipments should be carried in appropriate numbers

- The protective equipments include,
rubber shoes , latex gloves , coveralls, big empty polythene bags, - big(3 m x 3m) polythene sheets , cotton wool (for liquid radioactive material)

...2/-

If the vehicle does not carry any package containing dispersible radioactive material the protective equipment would not be required from radiation safety standpoint.

4. *Emergency Action and First Aid*

If an accident occurs, don't panic.

Rescue the injured. If life is at stake, save life first. It is highly unlikely that in a transport accident involving the commonly deployed small Type A and Type B(U)/(M) packages any significant hazard to the rescuer will result from radiation. If any of the packages which are damaged in the accident was containing radioactive material in a dispersible form, hold a cloth towel or a handkerchief over your mouth, and nose.

If there is fire, summon assistance from the local public and fire brigade. Fight fire from a distance. Follow these instructions:

- fight fire as far upwind as possible
- keep out of smoke, fumes and dust
- wear the coverall, gloves and shoes and cover mouth and nose with handkerchief.
- spend minimum time near the package
- keep bystanders upwind at least 5 m away

Inspect the packages. If the packages appear to be intact, ensure onward journey in the same vehicle. If the vehicle can not be released for onward journey for a long time, then arrange for onward journey of the package in some other vehicle.

If the package appears to be damaged, wrap it in a polythene bag, segregate the package and cordon a distance of 5 m around the package.

If the contents of the package appear to have spilled, then take the following measures:

- assume that the area and the objects on which the spillage has occurred are contaminated.
- wear the shoes, gloves and coveralls
- collect the spillage, using cotton wool, in a polythene bag.
- wrap the damaged package in polythene bags.
- cover the contaminated objects and contaminated area with polythene sheets.
- do not eat, drink or smoke within the cordon.
- take measures to prevent a fire accident.
- seek assistance from AERB/BARC as directed in para 5 below.
- do not allow the public within the cordon unless so advised by the radiological safety authorities from AERB/BARC, Mumbai.

All persons who were engaged in the emergency response measures should carefully and thoroughly wash the affected parts of the skin with plenty of water. Obtain the names and addresses of persons who may have been exposed to radiation and convey the particulars to the Head, RSD, AERB, Niyamak Bhavan, Anushaktinagar, Mumbai – 400 094.

5. *Telephones for Advice and Assistance*

For advice and assistance contact:

**Chairman, Crisis Management Group, DAE, Mumbai – 400 001,
Tel.(round the clock) 022-22023978, 22830441, 2286 2595
Fax 022-22830441**

While seeking advice and assistance furnish the following particulars:

- the place where the accident occurred
- the date and time of occurrence of the incident
- whether the incident involved impact, fire or both
- details of emergency action taken
- the condition of the packages, whether damage/spillage suspected
- the name and addresses of persons who may have been exposed to radiation.

Act exactly in accordance with the instructions given by the above authorities.

Onward journey of the packages which were damaged in the incident may be arranged only after obtaining clearance from the above authorities.

6. *General*

Every driver should ensure that he is completely familiar with the 'Instructions in Writing' and the procedures recommended in the TREMCARD. Prior to undertaking the journey, the driver should ensure that he carries the following items with him:

the '**Instructions in Writing.....**'

the '**TREMCARD**'

the protective devices as specified in para 3 above.

The assistant accompanying the driver should also be familiar with these instructions.