

Sr.No.:

To be filled in AERB
Authorisation No.:
Date : / /

FORM-V

**GOVERNMENT OF INDIA
ATOMIC ENERGY REGULATORY BOARD**

**APPLICATION FOR AUTHORISATION TO DISPOSE OF RADIOACTIVE WASTES /
DECAYED / UNUSED SOURCES (BY SMALL INSTALLATIONS) Under G.S.R.-125
Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987-Rule 15(1)**

PART- A

(To be filled in by all Institutions)

Particulars of the Institution

1. Name, Designation & Official :
Address of the applicant
(with Tel. Nos., FAX No. &
e-mail address during and
after office hrs.)
2. Name & Address of Head of :
the Institution
3. Address of Agency to whom the :
radioactive waste or decayed/
unused sources are sent for
disposal (if applicable)
4. Ref. No. & Date of most recent :
Authorisation/NOC of BARC
to use radioactive source(s)
5. (a) Name of the Radiological Safety :
Officer (RSO) of the Institution

(b) Qualification, training and
experience of the RSO
6. Number of staff members in :
the Institution experienced in
radioactive waste disposal

PART- B

(To be filled in by Institutions disposing sealed sources used in Industrial Applications, Nucleonic Gauges and Logging Devices)

1. Source(s) from radiography camera(s) to be disposed annually in the next three years :

Details of Camera		Radionuclide	Number of source replacements per year	Maximum activity of the decayed source(s) to be sent for disposal	Remarks
Make & Model	Sr.No				

2. Source(s) from nucleonic gauge(s)/logging device(s) to be disposed :

Make and model of gauge/logging device	Purpose and type of gauge/device	Total number of gauges/devices of each model and type	Radio-nuclide present in the source	Activity of individual decayed source(s) to be sent for disposal	Remarks

3. Any other source(s) to be disposed in the next three years : (e.g. Reference standards, Irradiators, Gamma Chambers). Please specify details of the source(s) and the equipment. (Attach additional sheet(s) if required).

PART-C

(To be filled in by Hospitals and Research Institutions disposing sealed sources)

1. Source(s) from brachytherapy equipment to be disposed in the next three years :

Sr. No.	Make & Model of the equipment	Description of decayed source(s) & the radionuclide present	No. & activity (with date) of each source	Total activity of sources to be sent for disposal in a year	Proposed date(s) of disposal	Remarks

2. Source(s) from teletherapy unit(s) to be disposed in the next three years :

Make and model of the unit	Details of the decayed source(s) and the radionuclide present	Name and address of the original supplier of the source	Present activity of the source (with date)	Proposed date of disposal (month and year)	Remarks *

* In case of teletherapy source head with depleted Uranium, the total weight of Uranium to be disposed should be stated.

3. Any other source(s) to be disposed in the next three years : (e.g. Reference standards, Irradiators, Gamma Chambers). Please specify details of the source(s) and the equipment. (Attach additional sheet(s) if required).

PART-D

(To be filled in by Institutions disposing unsealed sources)

1. Brief description of the nature of work to be carried out with radioisotopes :

2. Proposed activity of each radioisotope to be procured in a year and the duration of the above programme:

3. Details of Radio Active Waste (RAW) proposed to be disposed annually in the next three years:

Waste Particulars	Waste Form		
	Solid	Liquid	Gaseous
(i) Description of unsealed RAW			
(a) General contents of the waste :			
(b) Chemical characteristics :			
(ii) Nature of conditioning of waste (if any) *			
(iii) Annual volume of conditioned waste (m ³ /y) :			
(iv) Radionuclides present in the waste :			
(v) Total activity, per year, of each radionuclide present in the waste (MBq/y) :			
(vi) Mode of disposal of waste (for local disposal) :			
(vii) Location of disposal (for local disposal) :			
(viii) Remarks (if any) :			

* Elaborate, e.g. Dilution, Delay for decay, Incineration, Compaction, Fixation and Solidification.

PART-E

(To be filled in by all Institutions)

1. Facilities and procedures for waste management operations :

Procedures	Facilities for each waste form		
	Solid	Liquid	Gaseous
(a) Collection :			
(b) Transfer :			
(c) Interim storage :			
(d) Disposal :			
(e) Monitoring & Surveillance for radioactivity.			

2. Please enclose a **sketch of the site**, indicating the **location(s)** of RAW disposal and the radioisotope laboratory/installation. Specify the nature of **environment**, including the nature of **occupancies**, upto a radius of 200 meters around the **burial pit(s)**, the **incinerator** and the **discharge point(s) for liquid/gaseous effluents** (as applicable).
(Please provide a brief description of the design and capacity of the incinerator, if it is to be used).

3. Any other relevant information :

4. Undertaking

We hereby certify that -

- (a) all the statements made above are correct to the best of our knowledge and belief;
- (b) the radioactive waste will not be disposed of except as specified in this application;
- (c) radioactive waste will not be moved from the authorised site without prior approval of the competent authority;
- (d) any change in personnel, equipment and working conditions from that given in this application will be made only with the approval of the competent authority;
- (e) full facilities will be accorded to any authorised representative of the competent authority to inspect the installation where the radioactive waste is handled;
- (f) radiation monitoring and surveillance will be provided to ensure adequate protection for workers and the public;
- (g) radioactive waste will not be sold, rented or transferred to any other institution, without prior approval of the competent authority; and
- (h) all stipulations, that may be made from time to time by the competent authority under Radiation Protection Rules, 1971 and Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987, will be duly implemented.

Place :

Date :

Signature :

Name (Applicant) :

Signature :

Name (Head of the Institution) :

Seal of the Institution :

To be mailed to:-

**The Chairman,
Atomic Energy Regulatory Board,
Niyamak Bhavan, Anushaktinagar,
Mumbai - 400 094.**

(Please read AERB's Guidance Material pertaining to this Form before filling it)

GOVERNMENT OF INDIA
ATOMIC ENERGY REGULATORY BOARD

GUIDANCE MATERIAL

**INSTRUCTIONS FOR FILLING-UP FORM-V VIZ. APPLICATION FOR AUTHORISATION
TO DISPOSE OF RADIOACTIVE WASTES / DECAYED / UNUSED SOURCES (BY
SMALL INSTALLATIONS) UNDER RULE 15 (1) OF
G.S.R.-125: ATOMIC ENERGY (SAFE DISPOSAL OF RADIOACTIVE WASTES) RULES
1987.**

This information is being provided with a view to assist the applicants in furnishing the requisite information in Form-V to the competent authority. The parts and numbers listed below correspond to the same parts and numbers as listed in Form-V. Some parts of the Form, e.g. Part A and Part E are to be filled by all applicants. Other parts are to be filled as relevant. The information in the application should cover only those wastes which will be disposed of in the next 3 years.

PART A

1. **Applicant** is the Officer-in-Charge of waste disposal operations in the installation. The applicant functions on behalf of the head of the institution.
2. **Head of the institution** could be the applicant himself, specially in very small installations. Head of the institution is ultimately responsible for ensuring compliance with the regulations.
3. **Agency for Waste disposal** is the organisation which will receive sealed sources and/or radioactive waste from the applicant for ultimate disposal. Examples of such agencies are (i) Board of Radiation and Isotope Technology (BRIT) for disposal of decayed sealed sources used in industrial radiography or radiotherapy and (ii) Waste Management Division, Bhabha Atomic Research Centre, Mumbai for disposal of packages containing unsealed radioactive wastes.
4. **The reference number and the date of authorisation** to handle radioactive material, issued by Atomic Energy Regulatory Board or the concerned Division of Bhabha Atomic Research Centre (e.g. present Radiological Protection and Advisory Division or the earlier Radiation Protection Services Division or Division of Radiological Protection) is to be furnished here.
5. **Radiological Safety Officer (RSO)** is an employee who is so designated by the head of the institution and who, on the basis of his/her technical expertise, is eligible for approval by the competent authority to supervise safe disposal of the radioactive wastes and to undertake the required radiation surveillance of the installation and its surroundings for ensuring continued safety of the people and the environment. The applicant or the head of the institution may also function as the RSO in case he possesses the requisite radiation protection expertise.
6. **Staff members** specifically identified for undertaking actual operations of disposal of radioactive wastes and duly trained by the institution for this purpose, are to be mentioned here. It is implied that adequate number of such staff members shall always be maintained by the institution.

PART B

Industrial Sealed Sources

1. **Radiography Sources** : The table should provide identification of the equipment from which the decayed sources will be sent for disposal in the next 3 years. The maximum anticipated number of annual source replacements for each camera are to be mentioned in the table alongwith the maximum anticipated activity of the decayed sources at the time of shipment for disposal. It is understood that long lived sources like Co-60 will appear in the application only if a source replacement is due in the next 3 years.
2. **Nucleonic Gauges/Logging Devices Sources** : The table should provide identification of the equipment and the type of equipment (e.g. density gauge, thickness gauge, X-ray fluorescence analyser) and the total number of each type of such equipment from which the decayed sources will be removed and sent for disposal. The activities of these sources at the time of proposed disposal are to be indicated in this table.
3. **Any other Sources** : Any other sealed sources to be disposed off (e.g. from an industrial irradiator or reference standards etc.) may be mentioned here furnishing full details of the equipment in which the sources are being used, the radionuclide and the activity that will be disposed off along with the proposed time of disposal.

NOTE : In case the institution is required to undertake unanticipated waste disposal operations, not included in the initial application, separate application may be sent to the competent authority for issuance of authorisation as and when required.

PART C

Medical Sealed Sources

1. **Brachytherapy sources** : Details are to be furnished in respect of (i) Ir-192 brachytherapy sources to be disposed of regularly and (ii) the long-lived sources, e.g. Co-60 and Cs- 137, proposed to be disposed of in the coming 3 years. The number of sources of each type and the total activity of each type of sources at the time of disposal, are to be indicated in the respective columns of the table. If sources are from a remote after loading unit, the make and model of the unit may be indicated in the remarks column. Also the total activity of Ir-192 to be disposed of annually should be indicated in the remarks column. The year of procurement of the sources, other than Ir-192, should be indicated.
2. **Teletherapy sources** : Details in respect of teletherapy source(s) to be disposed of in the next 3 years may be indicated appropriately. The make and model of the teletherapy unit(s) as well as year of procurement of the teletherapy source(s) may be indicated in the remarks column.
3. **Any other sources** : Details of other sources such as radionuclide present, number and date of procurement, nature of use and activity at the proposed time of disposal should be provided.

NOTE : In case of unanticipated waste disposal operations, separate application may be submitted to the competent authority for authorisation as and when required.

PART D

Unsealed Sources

1. Brief description and objective(s) of the programme, in which radioisotopes are used, should be given. Examples are radiopharmaceuticals used in nuclear medicine for diagnosis/therapy or radiochemicals employed in tracer research, metabolism studies, etc.
2. Amount procured each year should be stated, for each radioisotope.

3. Unsealed Radioactive Waste

This section is intended to provide information in respect of unsealed radioactive wastes. The information required under clauses 3(i) to 3(viii) is to be provided separately for each type of waste i.e. for solid, liquid and gaseous wastes, as may be applicable. The following explanatory notes may be considered in this regard :-

- (i) **Details of Unsealed Radioactive Waste** should include the following :
 - (a) **General Contents** of waste should provide information about materials constituting the bulk of waste e.g. paper, glass, plastic, metal etc. Disposable packaging provided for the wastes (e.g. polythene bags or cardboard/wooden/metallic crates for solid wastes, and carboys with their material of construction for liquid wastes), should also be described. and
 - (b) **chemical characteristics** should mention the properties such as organic/inorganic, flammable, toxic, combustible, pyrophoric etc. Liquid waste may, in addition, be described for its pH and dissolved/suspended solids.
- (ii) **Conditioning of wastes** e.g. through pH control, dilution, incineration, compaction, fixation, solidification or temporary storage to allow for decay of activity etc. should be indicated as per proposed plan.
- (iii) The post-conditioning **Volume** of waste to be released annually should be stated.
- (iv) All the **Radionuclides** which are present in significant quantities, or are important from other radiation safety considerations, should be mentioned.
- (v) **Total Activity** to be disposed annually should be mentioned separately for each radionuclide present as stated in sub-clause(iv). Note : Institution has to ensure that the maximum limits on total activity as well as on activity concentrations, prescribed in the Table at the end of this Guidance Material are not exceeded for any radionuclide. Further, when two or more radionuclides are to be disposed of, the sum of quotients of 'actual activities, and their respective maximum limits' given in this Table should not exceed unity. Similarly the sum of the quotients of 'actual concentrations and the respective maximum limits' given in the Table should not exceed unity.
- (vi) **Mode of Local Disposal** : In case of solid wastes state if they are to be disposed of in earthen/concrete pits stating their dimensions and proposed thickness of top cover when the pit is to be closed finally. In case of liquid wastes, state if it is to be disposed of in sewer, soak pit or any other water body and the method of discharge e.g. by pumping or gravity draining.

(vii) **Location of Disposal (Local):** Identify through appropriate description, the site of solid waste burial and the point of release of liquid wastes into the common drainage of the institution/locality. These should also be identified further in the drawing of the disposal site(s) that is to be attached with the application as required under Part E, clause 2.

(viii) **Remarks :** Elaborate any additional information so as to highlight characterisation of radioactive wastes and safety related aspects in the proposed methods of conditioning, or modes of disposal, if not covered fully under clauses (i) to(vii) in this part.

PART E

Part E is intended to furnish requires information in respect of facilities available in the installation for safely undertaking operations related to radioactive waste management.

1. Facilities and procedures

(a) **Collection** : Mention the facilities available e.g. polythene lined wastebins for collection of solid wastes, and corrosion resistant carboys or delay tanks for collection of liquid wastes.

Gases : In most cases it is possible to release contaminated air directly through the fumehood exhaust system without exceeding the DAC limits for the public at the discharge point. In rare cases, where it is not so, absorbent filters in exhaust air or scrubbing of exhaust fumes may be provided.

(b) **Transfer** : State the type of container employed during transfer of waste/sources e.g. carboys, sturdy polythene bags, radiography camera.

(c) **Interim Storage** : State where the waste is stored e.g. (i) in an exclusive area or room, delay tank, deep freezer etc. or (ii) storage pit.

(d) **Disposal** : Identify the disposal methods for solid, liquid and gaseous wastes briefly such as for :

(i) Solids : Burial pits, municipal dumping site or waste management agency e.g. BRIT etc.

(ii) Liquids : Sanitary sewerage system, soak-pit, waste management agency etc.

(iii) Gaseous wastes : Incineration facility, fume hood etc.

(e) **Monitoring & Surveillance** : Specify the make and type of available radiation survey meter(s), equipment(s) for contamination monitoring, and counter(s) for estimation of total activity contents of the wastes and the activity concentration. Indicate also the type of personnel monitoring badges being used by radiation workers (TLD/Film badge).

2. Site Layout, Environment and Occupancies :

(a) The layout of the site should indicate the location(s) of :

(i) radioisotope laboratory/installation. (Do not show the internal layout of the laboratory.),

(ii) storage/burial pits for the radioactive wastes, and

(iii) the point(s) of release of the active effluents from the laboratory and the point where the effluents enter sewerage system/soak pit.

(b) The layout should also indicate, upto 200 m radius around the above sites, the presence of buildings/installations, any river, surface water bodies or well(s) and related environment e.g. vegetation.

3. Any other information :

Additional information, relevant to safety aspects in management of radioactive wastes, which is not covered in this form sufficiently but which the institution desires to highlight, may be provided under this clause on page 5 of the Form or attached separately. Of special interest are (i) features built into the design of the handling/storage facilities to prevent accidental release of wastes to the environment, (ii) procedures to conduct monitoring and surveillance of the waste disposal operations, personnel and areas and (iii) maintenance of records.

4. Undertaking

The undertaking, on page 6 of the Form, is a legal requirement and it has to be signed by the applicant and the head of the institution. The undertaking has to be stamped with the seal of the institution, as a part of the legal requirement. It may be noted that certain responsibilities have to be discharged by these two persons, as per the undertaking, after the authorisation is issued to the institution. The advice of the radiological safety officer of the installation will be very helpful to fulfill these as well as all other regulatory requirements and the authorities of the installation are advised to consult him in all matters related to radiological safety.

Table : Disposal limits for radionuclides.

Radionuclides	For sanitary sewerage systems/soak pit		For ground burial
	Maximum limit on total discharge per day (MBq)	Maximum limit of average monthly concentration of radioactivity in the effluent discharged (MBq/m ³)	Maximum activity in the pit (MBq)
H-3	92.50	3700	9250
C-14	18.50	740	1850
Na-24	3.70	222	370
P-32	3.70	18.5	370
S-35	18.50	74	1850
Cl-36	0.37	74	37
Ca-45	3.70	10.1	370
Kr-85	---	---	3700
Fe-59	---	---	370
Sr-89	0.37	11.1	37
Zr-95 + Nb-95	3.70	74	370
Mo-99 + Tc-99m	3.70	185	---
Mo-99	---	---	370
Ru-106 + Rh-106	0.37	14.8	37
Sn-124	0.37	25.9	37
I-125	3.70	22.2	37
I-131	3.70	22.2	37
Ba-140 + La-140	0.37	29.6	37
Ce-144 + Pr-144	0.37	11.1	37
Ir-192	3.70	37	370
Po-210	0.037	0.74	3.7

Notes :

- (i) The activity should be corrected for decay during interim storage/delay of the waste, for applying these limits.
- (ii) The total activity, discharged locally by the institution in the environment, shall not exceed 37 GBq in any one year.
- (iii) The activity in the effluents should be in soluble and dispersible form.
- (iv) Disposal of radioactive wastes, in earthen pit(s) or a soak pit, should not lead to migration of activity into nearby water bodies. Therefore, land topography and underground geological/hydrological characteristics should be considered when establishing these facilities.
- (v) The size of each earthen pit may be 120 cm x 120 cm. Depth of each pit should be decided keeping in view the anticipated volume of waste to be buried; a top layer of 120 cm thick compact earth should be ensured when the pit head is finally closed.**
- (vi) The number of pits needed will be governed by the waste volume/activity to be disposed. However, not more than 12 pits should be excavated in a year; minimising the number by conditioning of waste : reduction of volume or delay and decay etc. Successive burial pits should be separated by a distance of at least 180 cm.**
- (vii) The burial ground should be located in an isolated area belonging to the institution and duly fenced off to prevent unauthorised access to the pits.**
- (viii) The contents of a pit may be removed for disposal as normal waste, after its activity has decayed (or dispersed e.g. in case of H-3 and C-14) to below detection limits, and the same pit reused.**
- (ix) Environmental monitoring, for presence of any contamination in nearby soil, water etc. should be conducted upto a radial distance of 200 m around the disposal site(s), if more than**

20 GBq (540 mCi) of activity is discharged in the environment in the past one year by the institution.

- (x) The disposal limits for radionuclides, not listed in the above table, shall be as specified by the competent authority on a case by case basis.