Workshop on safe handling of radioactive materials

Radioactive Waste Disposal

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National Environment Agency
Safeguard · Nurture · Cherish

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1 Upstream processes in Radioactive Waste Management

Upstream processes in Radioactive Waste Management

i. Evaluation prior to purchase ?

- Do we need the radioactive source?
- Are there alternatives to the use of radioactive sources ?
- Are there alternatives sources with shorter half life?
- How much radioactive waste does this process produce ?
- Can we limit purchase quantity or activity ?

ii. End of Life options for Radioactive Sources

- Are there agreements or contracts with vendors/supplier/manufacturer to take back disused sources ?
- Are the vendors/supplier/manufacturer reliable/ credible?
- What are the costs involved in managing disused sources? Are there allocated budget?

2 Adopting a Safety Culture

Adopting a Safety Culture

i. Radiation Safety Training

- Users attend planned training programme to acquire knowledge in radiation safety.
- Training based on problem anticipation and process reviews.
- Training as a consequence of accident (near miss incidents).

ii. Safety Culture

- Commitment to Radiation Safety at all levels of the organization.
- Benchmarking established radiation safety practises
- Conducting routine surveys, assessments and audits to enforce radiation safety compliance.

3 What are permitted for disposal ?

What are permitted for disposal ?

i. Lab Consumables
   - Pipette Tips, Syringes, Gloves, Vials, Tissue papers (Lab Wipe), Disposable Lab coats

ii. Animal Carcases

iii. Chemicals

Provided assessment has been carried to ensure the radioactivity is within permissible level .

4 What are prohibited from disposal ?

What are prohibited from disposal ?

i. Stock unsealed sources
   - Y-90 MicroSpheres, Vial sources

ii. Active Sealed sources
   - Cs^{137}, Co^{60}

5 Disposal Criteria

Disposal Criteria

i. Waste must be below the Exemption limit stipulated in the First Schedule of the Radiation Protection (Ionising Radiation) Regulations.

FIRST SCHEDULE

Regulation 3(1) and (2)

MAXIMUM ACTIVITIES AND ACTIVITY CONCENTRATIONS OF RADIONUCLIDES EXEMPTED FROM THE PROVISIONS OF THE ACT

Nuclide	Activity Concentration (Bq/gm)	Activity (Bq)	Nuclide	Activity concentration (Bq/g)	Activity (Bq)
H-3	$1x\ 10^{6}$	$1 x\ 10^{9}$	Fe-52	$1x\ 10^{1}$	$1 x\ 10^{6}$
Be-7	$1x\ 10^{3}$	$1 x\ 10^{7}$	Fe-55	$1x\ 10^{4}$	$1 x\ 10^{6}$
C-14	$1x\ 10^{4}$	$1 x\ 10^{7}$	Fe-59	$1x\ 10^{1}$	$1 x\ 10^{6}$
O-15	$1x\ 10^{2}$	$1 x\ 10^{9}$	Co-55	$1x\ 10^{1}$	$1 x\ 10^{6}$

ii. Inventory and source activity presented to RPNSD for assessment

- RPNSD would carry out an evaluation and provide acceptance.

6 Radioactive waste storage

Radioactive waste storage

i. Waste segregated
   - Radioactive Waste disposal bags
   - Biological Waste disposal bags

ii. Waste volume is small
   - Stored within laboratory premises

ii. Waste volume is large
   - Waste is to be contained in a separate area away from human intrusion.
   - The accumulation of waste is prohibited.
   - Storage area is to be assessed and
   - approved by RPNSD.

7 Disposal Pathways

Disposal Pathways (non-radioactive waste)

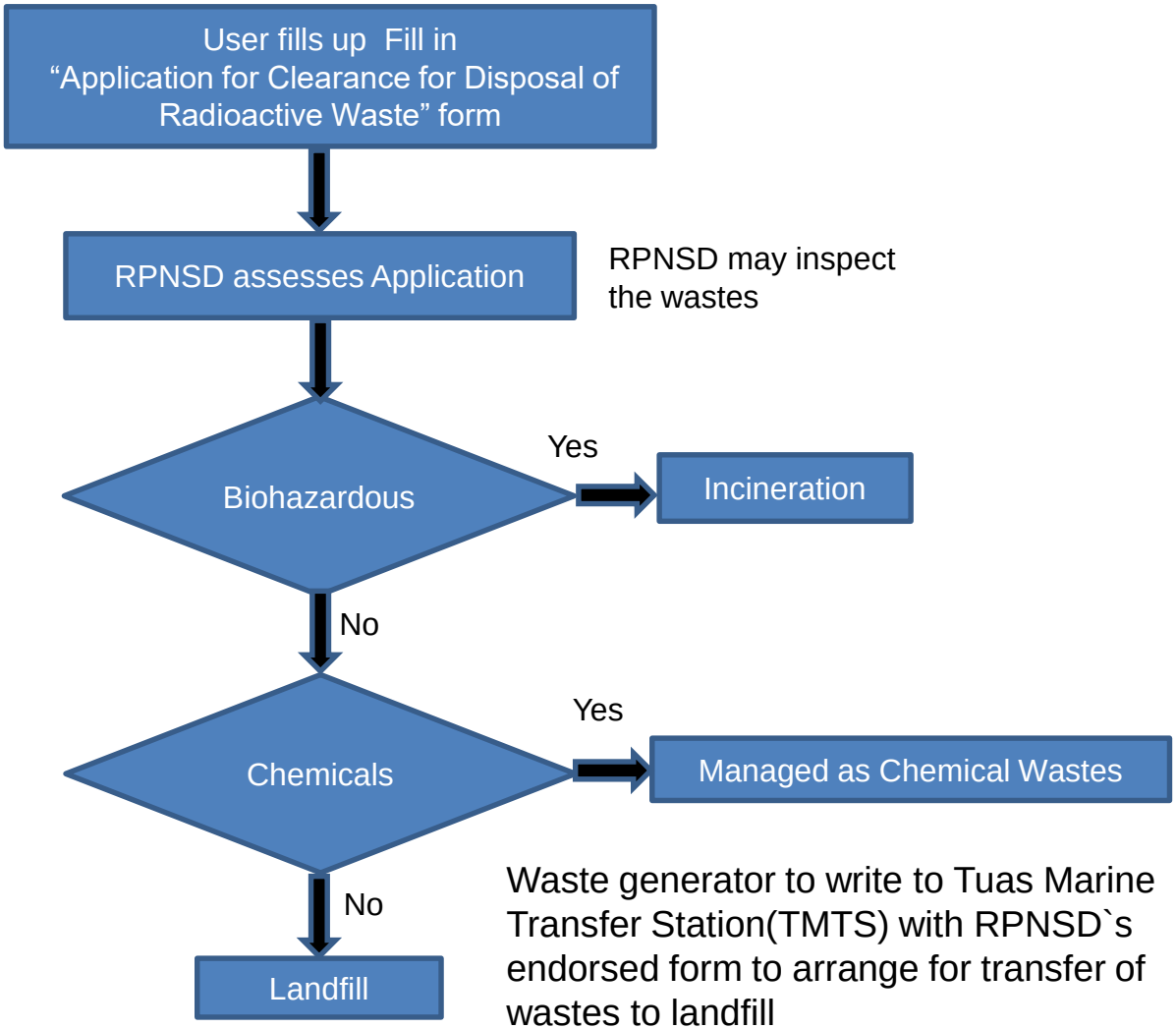
i. Incineration
   - Contaminated biohazardous waste

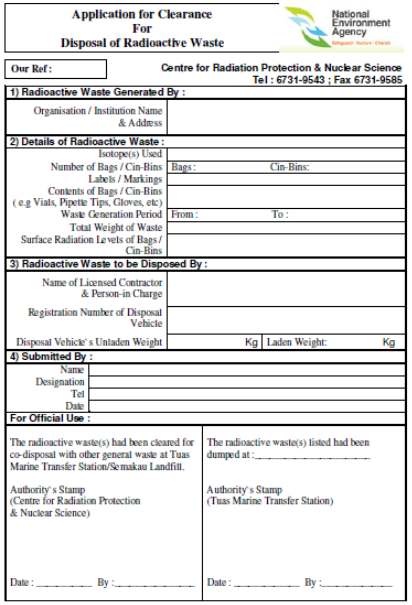
ii. Chemical Wastes
   - Contaminated chemical wastes

iii. Landfill
   - Contaminated non-biohazards waste

8 Disposal Overview & Clearance

Disposal Overview





Application for Clearance For Disposal of Radioactive Waste

National Environment Agency

Our Ref :

Centre for Radiation Protection & Nuclear Science
Tel : 6731-9543 ; Fax 6731-9585

1) Radioactive Waste Generated By :

Organisation / Institution Name & Address

2) Details of Radioactive Waste :

Isotope(s) Used

Number of Bags / Cin-Bins — Bags : Cin-Bins:

Labels / Markings

Contents of Bags / Cin-Bins (e.g Vials, Pipette Tips, Gloves, etc)

Waste Generation Period — From : To :

Total Weight of Waste

Surface Radiation Levels of Bags / Cin-Bins

3) Radioactive Waste to be Disposed By :

Name of Licensed Contractor & Person-in Charge

Registration Number of Disposal Vehicle

Disposal Vehicle' s Unladen Weight Kg | Laden Weight: Kg

4) Submitted By :

Name

Designation

Tel

Date

For Official Use :

The radioactive waste(s) had been cleared for co-disposal with other general waste at Tuas Marine Transfer Station/Semakau Landfill.

Authority' s Stamp
(Centre for Radiation Protection & Nuclear Science)

Date : _____ By : _____

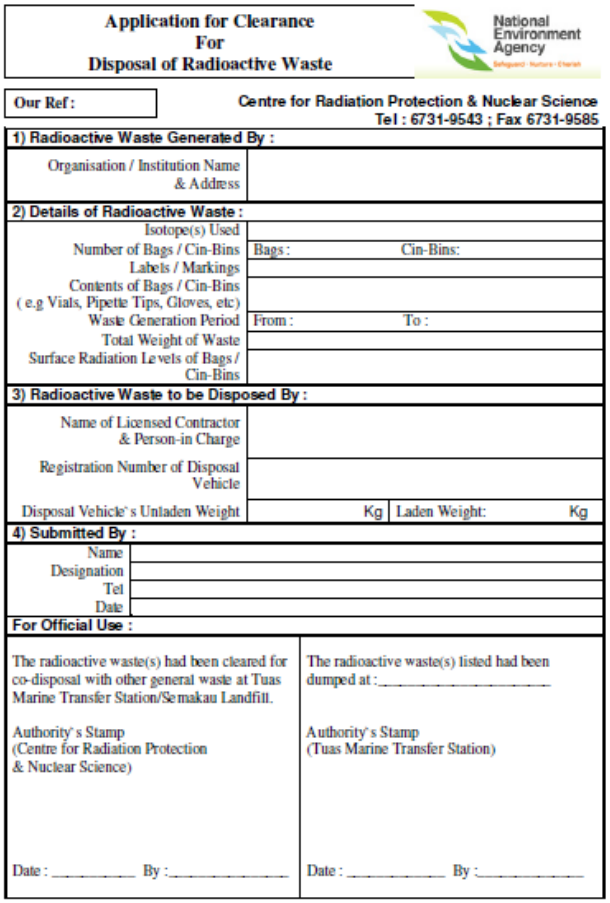
The radioactive waste(s) listed had been dumped at : _____

Authority' s Stamp
(Tuas Marine Transfer Station)

Date : _____ By : _____

Waste generator to write to Tuas Marine Transfer Station(TMTS) with RPNSD`s endorsed form to arrange for transfer of wastes to landfill

Disposal Clearance



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Waste Generation Period	From :	To :
Total Weight of Waste		
Surface Radiation Levels of Bags / Cin-Bins		
3) Radioactive Waste to be Disposed By :		
Name of Licensed Contractor & Person-in Charge		
Registration Number of Disposal Vehicle		
Disposal Vehicle' s Untaden Weight	Kg	Laden Weight: Kg
4) Submitted By :		
Name		
Designation		
Tel		
Date		
For Official Use :		

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i. Endorsed clearance form

- The form would be with the waste collector untill the disposal at landfill.

ii. Biohazards & Chemical wastes

- Endorsed form to be kept for filing by waste generator
- waste to be taken away as biohazards or chemical waste.

Our Environment

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