

12 Accumulation and Disposal of Radioactive Waste

Scope

1. This Chapter covers the requirements for accumulation and disposal of radioactive waste. This chapter should be read in conjunction with the Defence Logistics Framework concerning the management and arrangements for the disposal of all surplus materiel.
2. The transfer and sale of items containing radioactive material are addressed in Chapter 11.
3. Disposal of radioactive substances that are not waste, for example by sale, loan or transfer, is addressed in Chapter 11.
4. Radiation protection relating to transport of radioactive substances is addressed in Chapter 10. Transport operations must be undertaken in accordance with the Dangerous Goods Manual.

Introduction

5. The disposal of radioactive material in England and Wales is controlled by the Environmental Permitting Regulations 2016 (EPR16), in Scotland by the Environmental Authorisations (Scotland) Regulations 2018 (EASR18) and in Northern Ireland disposal is controlled by the Radioactive Substances Act 1993 (RSA93). EPR16/EASR18//RSA93 do not apply to MOD, but the Secretary of State for Defence has stated that standards and arrangements will be introduced that will be, so far as is reasonably practicable, at least as good as those required by legislation. Government Policy on radioactive waste management is given in the Review of Radioactive Waste Management Policy: Final Conclusions (Cm2919, July 1995). The MOD policy for the management of Defence related radioactive wastes is given at JSP392 Part 1 Chapter 1.
6. Establishments which expect to be generating radioactive waste above out of scope or exemption levels either as a result of a workplace practice or process (e.g. working with open sources) or as a result of remediation / refurbishment of buildings or remediation of contaminated land must apply to the appropriate environment agency (the Environment Agency in England and Wales, the Scottish Environment Protection Agency or the Northern Ireland Environment Agency) for an approval to accumulate and / or dispose of radioactive waste before any such work takes place. A Radioactive Waste Advisor must be consulted at the earliest opportunity to advise on regulatory issues associated with declaration, accumulation or disposal of radioactive waste where permitting is needed. Most units or establishments will not accumulate or dispose of radioactive waste, but will return items containing radioactive substances via the appropriate store's organisation as redundant / obsolete items. Following a declaration from a Project Team (PT) that items are obsolete, it will normally be the duty of the stores organisation to declare the items as waste, if they cannot be utilised elsewhere. If a PT cannot be identified, then the Defence Equipment Sales Authority (DESA) has the authority to declare items obsolete.

Statutory Requirements

7. In addition to the general requirements of the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety Regulations 1999, the following specific legislation may apply:

- a. Ionising Radiations Regulations 2017 (IRR17) (apply directly);
- b. Environmental Permitting (England and Wales) Regulations 2016 (as amended) (EPR16) (parallel arrangements);
- c. Environmental Authorisations (Scotland) Regulations 2018 (EASR18);
- d. Radioactive Substances Act 1993 (Northern Ireland) (RSA93) (as amended) and associated Exemption Orders;
- e. Carriage of Dangerous Goods and Transportable Pressure Equipment Regulations 2011 (apply directly); and
- f. High activity Sealed Radioactive Sources and Orphan Sources Regulations 2005 (HASS2005) (Northern Ireland only).

Duties

8. Duties as detailed in Chapter 39 apply.

Categorisation of Radioactive Waste

9. Radioactive waste is categorised as being either:

- a. outside the scope of regulation;
- b. exempt from the requirements for an approval from the regulatory authorities; or
- c. subject to the requirement for an approval.

10. Total activity and activity concentration limits for determining radioactive substances that are either out of scope or exempt are set down in legislation. The regulation of radioactive substance is a devolved matter; as a consequence, there are some differences in approach. Government guidance is available; for England, Wales and Northern Ireland this is: Scope of and exemptions from the radioactive substance's legislation in the England, Wales and Northern Ireland, Guidance Document, BEIS. For Scotland an authorisations guide for radioactive substances activities is available from SEPA. These guidance documents should be consulted to identify the conditions (e.g. disposal limits, disposal routes, record keeping etc.) which must be complied without the need to obtain approval or equivalent authorisation.

11. In circumstances where accumulation and / or disposal quantities exceed the exemption limits and / or where exemption conditions cannot be complied with, then an approval will be required from the appropriate environment agency (which are: in England the Environment Agency (EA), Natural Resources Wales (NRW), the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA)).

12. Units, establishment and Project Teams should consult an RPA or an RWA to

determine which category applies to obsolete equipment containing radioactive substances that are going to be disposed of or equipment incorporating radioactive substances which has become damaged and can be disposed of locally at unit level.

13. There are instances, such as in the decommissioning of facilities / equipment or following a spillage of radioactive material, where items (e.g. tools, bricks etc) or materials (e.g. soil) may be found to be contaminated or potentially contaminated with low levels of radiation. In these situations, it is important to correctly quantify the degree of contamination so that the most appropriate disposal routes can be identified. In such circumstances the appointed RPA or an RWA should be consulted.

14. To support this, the MOD has contributed to the Code of Practice (COP) Clearance and Exemption Principles, Processes and Practices for use by the Nuclear Industry – Issue 2. This document sets out industry good practice for identifying and sentencing exempt radioactive material¹.

15. The COP interprets current legislation and provides, through the use of flow charts, clear guidance for commonly found material types. Those seeking to manage the waste disposal process, working with their RPA and RWA, should incorporate the requirements of the COP into local procedures and practices for the disposal, re-use or recycling of radioactive material.

16. Following local procedures that incorporate the principles of the COP will generally be sufficient to enable individual units and establishments to demonstrate that material is being appropriately sentenced in compliance with legislative and MOD requirements.

Application for Approval to Dispose of Radioactive Waste Above Exemption Levels

17. No radioactive waste disposals other than those covered by an appropriate exemption are to be made without first obtaining an approval from the appropriate environment agency. Advice on the arrangements for disposal of radioactive material through an approved route should be sought from an RWA.

18. In addition to the requirement to keep any radiation exposure as low as reasonably practicable (ALARP) under IRR17 the process of seeking an approval from the environmental agencies will require an assessment to be made, as part of the planning process for radiation protection, to determine whether the following maximum doses could be received by individuals as a result of the planned activity:

- a. 0.3 mSv per year from any source from which radioactive discharges are first made on or after 13th May 2000; and
- b. 0.5 mSv per year from the discharges from any single site.

19. Radioactive Waste Advisers can advise on all matters related to the management of radioactive waste. It is a condition of the approvals granted by the environment agencies that Approval Holders and Operators (in this case the MOD) appoint in writing an RWA. An RWA must be consulted on the following matters:

- a. achieving and maintaining an optimal level of protection for the environment and the population;

¹ The code of practice is available at:- <http://www.cewg.co.uk>.

- b. checking the effectiveness of technical devices for protecting the environment and the population;
- c. acceptance into service, from the point of view of surveillance of radiation protection, of equipment and procedures for measuring and assessing, as appropriate, exposure and radioactive contamination of the environment and the population; and
- d. regular calibration of measuring instruments and regular checking that they are serviceable and correctly used.

20. Significant input will be required from the RWA in determining the radiological impact of the direct disposals of radioactive waste to the environment and in ensuring that the process employed in accumulating and / or disposing of radioactive waste is optimised such that the best available technique is being implemented to the extent that exposures to the environment are reduced to levels that are as low as reasonably achievable.

21. In most circumstances applications to the environment agencies are co-ordinated through Dstl. TLBs are required to make arrangements for the necessary payments for applications and subsequent annual subsistence charges. MOD establishments with their own resident RWA may apply directly to the environment agency concerned, but must keep Dstl informed by letter, as detailed in Chapter 3 to ensure that funding arrangements are put in place. MOD establishments that are (nuclear) Authorised Sites will liaise with the environment agencies directly.

22. Approval documents provided by the environment agencies via Dstl are to be held by the unit or establishment. Unless otherwise stated as a condition in the approval or approval and notification, these documents must not be displayed on any notice board. MOD (Army) establishments are to send an additional copy to CESO (Army).

Accumulation of Radioactive Waste

23. In most circumstances exempt radioactive waste should be disposed of as soon as practicable. Regulator guidance states that establishments and units making use of the Very Low-Level Waste (VLLW) Exemption provisions should not hold onto waste items for a period exceeding the next waste collection; therefore, exempt VLLW such waste shouldn't be accumulated for more than a few weeks. In the case of sealed sources (excluding HASS and sources of similar potential hazard), electrodeposited sources and tritium foil sources (above certain threshold limits – see Annex A rows 3 and 4) these items may be accumulated for a period of up to twenty-six weeks. This timeframe allows for the arrangements of contract to transfer this type of waste to a waste permitted person.

24. Where disposal within this timescale would not be practicable an approval for the accumulation of waste over a longer period must be obtained from the appropriate environment agency. Agreement to accumulate waste is required from the appropriate TLB Safety Authority who will then instruct Dstl to obtain an approval.

25. Radioactive waste is to be disposed of in accordance with the terms of any approvals and exemptions. Where it is necessary to accumulate waste, the waste should be stored in accordance with the requirements of Chapter 9 and comply with the requirements of any conditions set out in the approval.

Disposal Arrangements

26. Unless an exemption applies, discharge or disposal of radioactive waste can only take place after an approval has been received. The disposal must take place in accordance with the conditions of the approval.

27. Once a unit or establishment has no further requirement for an approval to accumulate and / or of radioactive waste, they are to inform the TLB Authority and Dstl, who will initiate proceedings to cancel / surrender the approval.

28. Values of concentrations and quantities of exempt solid radioactive waste as stated in national legislation are reproduced at Annex A. Advice on the application of this table and the exemption limits that apply to liquids and NORM waste as well-as full details of the exemption conditions that apply (which vary depending upon the type of exempt waste) should be sought from your appointed RPA or an RWA.

29. In general, the following exemption provisions must be complied with when disposing of low volume VLLW:

a. waste must be transferred to:

(1) a person who disposes of substantial quantities of non-radioactive waste for burial in landfill, incineration or recovery (which, for example, includes recycling and recovery of metals) and where the radioactive waste will be mixed with non-radioactive waste; and

(2) a person with a Permit to receive such waste.

b. a record must be kept indefinitely of the radioactive material (description, nuclide and activity) that has been disposed of including the date of disposal and the disposal route used; and

c. ensure that where practicable any marking or labelling of the waste or its container is removed before it is disposed of.

30. All sealed sources that exceed the limit in Annex A (including HASS etc.), tritium foil sources and electrodeposited sources can be disposed of without the need for an Approval, subject to compliance with certain conditions. The source must be disposed of via a person or organisation who is authorised under EPR16/EASR18/RSA93 to dispose of similar material. Additional advice on the disposal of such sources should be sought an RWA.

31. Large quantities of very low-level radioactive waste (the exemption provisions apply only to low volume VLLW) or exempt wastes such as thoriated engine casings should be disposed of through the Defence Equipment Sales Authority (DESA), MOD's central contract for the disposal of hazardous and special wastes. The appointed RPA will advise on whether this route or direct disposal via a waste contractor is most appropriate. Further details can be obtained from the DESA.

32. Spoil from the remediation of sites should be disposed of through DIO or a DIO approved contractor (see Chapter 13).

33. It should be noted that High Activity Sealed Sources (HASS) should not normally be disposed of but will generally be transferred to an organisation approved to accept such

sources, for example a manufacturer, see Chapter 3.

Disposal of radioactive special / hazardous wastes

34. In some circumstances some radioactive waste may exhibit hazardous properties not related to its radioactive properties. Hazardous waste (called special waste in Scotland) is waste which exhibits one or more of the properties that are hazardous to health or the environment. These hazardous properties are listed in the European Commission Waste Framework Directive 2008/98/EC. Properties of waste that render them hazardous include:

- a. explosive; oxidising; highly flammable and flammable; irritant; harmful; toxic; carcinogenic; corrosive; infectious; teratogenic; mutagenic; substances and preparations which emit toxic or very toxic gases in contact with water, air or an acid; substances and preparations capable by any means, after disposal, of yielding another substance e.g. leachate, which possess any of the characteristics listed above; sensitising and ecotoxic.

35. Where radioactive waste is also hazardous / special waste, disposal advice from the RPA / RWA and the appropriate local Environment Officer or SHEF representative (who can advise on 'other' waste disposal regulations) is to be sought. The disposal of certain radioactively contaminated hazardous wastes may also be available via the DESA.

Recording of Disposals

36. A record of all disposals of radioactive waste is to be kept by the Radiation Safety Officer. Records of disposals are to be kept indefinitely. Suitable forms are provided at Annex B and should be used for recording solid and liquid waste disposals, respectively. Details of gaseous or airborne particulate waste disposals should be recorded on an appropriate form containing the following information:

- a. details of disposal / discharge (e.g. to landfill via waste disposal contractor or via drain to sewer);
- b. Radionuclide, its chemical form and total activity; and
- c. date, time and duration of release (where applicable).

37. A statement of all radioactive waste disposals made in that calendar year is to be forwarded to Dstl by all Naval (including ships and submarines), RAF, Army and Defence Agency units and establishments at the end of each calendar year. This should reach Dstl by 31 March of the year following that being reported on. To assist in this procedure, Dstl will distribute blank copies of the reporting form during January of each year, included as a section of the Annual Holdings Return. Additional forms can be provided on request.

Disposal of Waste Overseas

38. Establishments situated overseas are to dispose of radioactive waste in accordance with local national regulations, where permitted to do so. Where regulations on the disposal of radioactive waste do not exist, advice should be sought from the relevant RPA / RWA or service authority.

Exempt Solid Radioactive Waste Concentration and Quantities

Radioactive waste	Maximum concentration of radionuclides	Maximum quantity of waste to be disposed of in the period stated
Solid radioactive waste, with no single item > 4×10^4 Bq	4×10^5 Bq for the sum of all radionuclides per 0.1m^3	2×10^8 Bq/year
Solid radioactive waste containing tritium and C-14 only, with no single item > 4×10^5 Bq	4×10^6 Bq of tritium and C-14 per 0.1m^3	2×10^9 Bq/year
Individual sealed sources	2×10^5 Bq for the sum of all radionuclides per 0.1m^3	1×10^7 Bq/year
Individual sealed sources (includes broken or damaged GTLSs)	2×10^{10} Bq of tritium per 0.1m^3	1×10^{13} Bq/year
Luminised articles with no single item containing > 8×10^7 Bq of Pm-147 or > 4×10^9 of tritium	8×10^7 Bq per 0.1m^3 of Pm-147 or 4×10^9 Bq per 0.1m^3 for tritium	2×10^9 Bq/year of Pm-147 or 1×10^{11} Bq/year of tritium
Solid radioactive waste which consists of magnesium alloy, thoriated tungsten or dross from hardener alloy	4% thorium by mass	No limit
Solid radioactive waste which is or contains uranium or thorium or prepared compounds of uranium or thorium in which the U-235 concentration is no more than 0.72% in the case of uranium, and the thorium is in its isotopic proportions found in nature	No limit	0.5 kg of uranium or thorium per week
Aqueous liquid radioactive waste which is or contains uranium or thorium or prepared compounds of uranium or thorium in which the U-235 concentration is no more than 0.72% in the case of uranium, and the thorium is in its isotopic proportions found in nature	No limit	0.5 kg of uranium or thorium per year
Radioactive waste in aqueous solution being human excreta	No limit	1×10^{10} Bq/year of Tc-99m and 5×10^9 Bq/year for the sum of all other radionuclides

Reference: Scope and exemptions from the radioactive substance's legislation in the England, Wales and Northern Ireland, August 2018 BEIS.

Note: The quantities and concentrations for the radioactive wastes listed above mirror those in Scotland but there are some additional General Binding Rules that must be consulted to ensure compliance.

Radioactive Waste Disposal Forms

Table B1 Radioactive Waste Disposal

Radioactive Waste Disposal

Ship or establishment _____

Package no and date	Description & nuclide	Surface dose rate $\mu\text{Sv h}^{-1}$	Surface contamination Bq cm^{-3}	Place and method of disposal	Remarks (estimated total activity if known)

