

# Pollution Inventory reporting for radioactive waste

## Annual disposals (including transfers)

### Radioactive Substances Act 1993



#### Guidance notes

<b>Subject</b>	<b>Guidance</b>
<b>Scope of reporting</b>	Reports should be provided by all persons holding a radioactive waste disposal authorisation. Reports will not be required for disposal of radionuclides which fall below the Schedule 1 limits in the Radioactive Substances Act 1993. Similarly, reports will not be required for the disposal of radioactive waste covered by exemptions orders.
<b>Authorisation Number</b>	Please enter the authorisation number for the main Radioactive Substances Act 1993 authorisation for the organisation on the site (ie the authorisation covering the majority of the disposal routes). Nuclear sites should enter the number used for charging purposes for the site. Please contact your local Agency office if you do not have this number.
<b>Releases to air, sewer and controlled waters</b>	<ul style="list-style-type: none"><li>• <b>Releases to air</b> - Releases to air means those releases from atmospheric discharge points specified in the authorisation(s) (including incinerator stacks), together with fugitive releases.</li><li>• <b>Releases to sewer</b> - Discharges to sewer are those for which the non-radioactive component is controlled under Section 118 of the Water Industry Act 1991. This section states that effluent from trade premises may only be discharged to a public sewer with the consent of the sewerage undertaker. Such consent is made in the form of a 'trade effluent consent' issued by the undertaker upon application by the occupier of the trade premises.</li><li>• <b>Controlled waters</b> - Controlled waters are as defined in Section 104 of the Water Resources Act 1991. The emissions medium should be specified as sea/coastal waters (S), estuary (E) or river/inland water (R). Definitions to be used for the purposes of this form are outlined below:<ul style="list-style-type: none"><li>– <b>Sea or Coastal waters</b> are those waters up to three miles from the coast. The detailed definition is: 'A coastal water means all the water on the landward side of a line every point of which is at a distance of three nautical miles on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate in the case of watercourses, up to the outer limit of the estuary.' The baseline referred to here is an outline round the coast of the United Kingdom which coincides with the outer edge of all estuaries and which 'rounds off' the details of the coast. Maps of the baseline are held by the Environment Agency.</li><li>– <b>Estuary</b> is defined in line with the Urban Waste Water Treatment Directive (91/271/EEC): 'estuary means the transitional area at the mouth of a river between fresh water and coastal waters. Member states shall establish the outer (seaward) limits of estuaries for the purpose of this Directive...'. Estuary boundaries have been established by the United Kingdom in pursuance of this definition, and maps of these boundaries are held by the Environment Agency.</li><li>– <b>Rivers and inland waters</b> include surface fresh waters which are defined, by default, as those inland surface waters which are not part of an estuary.</li></ul></li></ul>
<b>Release, BRT or NA</b>	An entry is required for each and every radionuclide listed, in the 'Total release' column. You must put either release data, 'BRT' or 'NA' in each box: <ul style="list-style-type: none"><li>• <b>Release</b> – where a release occurs the amount released should be reported as radioactivity in units of Becquerel (Bq) and scientific notation (eg <math>4.2 \times 10^9</math> Bq or <math>4.2 \times 10^9</math> Bq). The Agency recommends that two significant figures are used when reporting the quantity of activity released (ie <math>4.2 \times 10^9</math> rather than <math>4.21 \times 10^9</math>). When rounding figures to achieve two significant figures, round up from the number 5 or above, and down from the figure 4 or below (eg <math>1.55 \times 10^9</math> would be rounded up to <math>1.6 \times 10^9</math> and <math>1.54 \times 10^9</math> would be rounded down to <math>1.5 \times 10^9</math>).</li><li>• <b>BRT</b> – below reporting threshold level: Where the release has been determined and is found to be below the indicated annual reporting level thresholds this may be entered on the reporting form as BRT. The threshold reporting levels for a given radionuclide to a particular medium are outlined in the reporting form for each individual radionuclide to the medium concerned. If you would prefer to report the actual release to the Agency, then you may do so. However, the release will be reported as less than the relevant threshold when it is reported on the Agency's</li></ul>

website.

- **NA** – not applicable: Where no release of this radionuclide occurs to that medium this should be entered on the reporting form as N/A.

## Measurement, Calculation and Estimation

The reporting form requires that the operator state how each release has been primarily determined. There are three ways of determining the release, which are by:

- Measurement (M) - releases derived from direct monitoring results, based on actual monitoring of a radionuclide via a given discharge route.
- Calculation (C) - releases based on calculation from plant/operation specific data.
- Estimation (E) - releases based on best estimates.

The Agency does not consider that there is a hierarchy in terms of quality of data obtained by measurement, calculation or estimation.

**Measurement** includes:

- Spot sampling and analysis of effluent held in a tank prior to discharge.
- Flow proportional sampling of effluent during discharge and subsequent analysis.

**Calculation** includes:

- Derivation of total activity which has been released to sewer from records of the volumes of laboratory solutions and their reference activity concentration which have been disposed of to drain via a laboratory sink.
- Assessment of the releases to sewer from the recorded activity of radio-pharmaceutical products which have been administered to patients, combined with well characterised excretion rates for these products from patients. Use of the excretion rates contained within the Agency's Radioactive Substances Act Guidance (RASAG) may be considered to fall within this category.
- Use of well characterised radionuclide specific incinerator partitioning factors along with data on input activities to the incinerator which have been derived through calculation or measurement. In this case, measurement means sampling and analysis of the waste to be incinerated and calculation means, for example, recorded volumes and activity concentrations of waste radiochemical products.
- Use of nuclear codes to assess activity of noble gases present in fuel elements and assumption that this inventory is released to air during processing.
- Calculation of total alpha and total beta/gamma releases by summation of the individual releases of radionuclides, where the majority of these releases have been determined by measurement or calculation.

**Estimation** includes:

- Derivation of releases to air and sewer based on previous experience of the likely proportion of activity released to air and sewer from a particular type of experiment and the number of such experiments performed in a year.
- Use of incinerator partitioning factors along with data on input activities to the incinerator which have been derived through estimation. Estimation in this case includes bags of clinical waste which have been monitored with portable radiological instruments and activity content assigned on the basis of conversion factors from counts per second or dose rate to activity.
- Derivation of total alpha and total beta/gamma releases by summation of the individual releases of radionuclides, where the majority of these releases have been determined by estimation.

Where a key part of the derivation of a release is based on estimation, then the release should be considered to have been estimated, whether or not, measurement and calculation have also been used.

## Radon-222

It is only necessary to report radon-222 releases to air where there is a specific limit for this radionuclide in your authorisation. The intention is to only report process releases of radon-222. However, it is technically challenging to separate natural releases of radon-222 (eg from building materials and underlying bedrock) from process releases. There are a few significant process related releases of radon-222 in England and Wales. These are recognised by authorisation limits being placed on this particular radionuclide.

## Total alpha and total beta/gamma (excluding tritium)

The Agency is requiring that all operators report the total alpha and total beta/gamma (excluding tritium) releases to controlled water or sewer. This is to enable release data to be collated so that compliance with the targets in the UK Discharge Strategy 2002 - 2020 can be assessed. Releases of total alpha and total beta/gamma to air are not required as there are no targets for these in the UK Discharge Strategy. Some operators already have authorisations which contain total alpha and total beta/gamma limits and undertake monitoring against these limits. However, for many operators,

some calculation of the total alpha and total beta/gamma releases will need to be made.

- **Sites measuring releases of total alpha, total beta/gamma or other activity (normally nuclear sites)** - Where total alpha or total beta/gamma is measured to determine compliance with an authorisation, then best practicable means will be employed to measure the site specific mix of radionuclides. For this reason, some operators will use gas proportional counting for total beta/gamma measurements, for example, and others will use liquid scintillation counting. Whatever the method used, you should report these measurements of total alpha and/or total beta/gamma.
- **No measurements of total alpha or total beta/gamma (normally non-nuclear sites)** - Where no measurements of total alpha or total beta/gamma activity are made, then the sum of the individual releases of alpha-emitting and beta/gamma emitting radionuclides (excluding tritium) should be calculated for reporting purposes. You should report all non-alpha emitting radionuclides in the total beta/gamma category, except tritium. For example, positron emitters and electron-capture radionuclides should be reported as total beta/gamma. Tritium is excluded from the beta/gamma category because of the relatively large releases and significantly lower radiological impact compared to other beta/gamma radionuclides.

#### **Other alpha and other beta/gamma**

You may have authorised releases of other radionuclides which are not listed on the form. These releases should be accounted for under the generic categories of other alpha and other beta/gamma. You should report all non-alpha emitting radionuclides in the other beta/gamma category. For example, positron emitters and electron-capture radionuclides should be reported as other beta/gamma. The purpose of reporting against this category is to enable the Agency to identify any significant reporting omissions.

For releases to air, the categories of other alpha particulate and other beta/gamma particulate are specified. It has been judged to be unreasonable to expect nuclear operators to quantify all their releases of short-half-life noble gases under an other alpha or beta/gamma category. Hence the other alpha and other beta/gamma categories are limited to particulate releases. For some radionuclides, releases could be in either particulate or gaseous form. If you would prefer to assume that all other alpha and beta/gamma releases are particulate then you may do so rather than take disproportionate efforts in attempting to exclude the gaseous components.

#### **Transfers of radioactive waste**

Transfers of radioactive waste in any form (ie solid, liquid or gaseous) should be reported for waste movements only. This does not cover movement of radioactive substances. As indicated under note 1, transfers of radioactive waste covered by exemption orders should not be reported. Transfers of waste sealed sources should not be reported. All other transfers between different organisations or sites (ie inter-site transfers), not covered by 5a, 5b or 5c, should be reported under Part 5d Other Transfers. This will include reporting of transfers of liquid waste made via a pipeline from one organisation to another under Part 5d Other Transfers.