

# How to apply for an environmental permit

## Part RSR-B5 – New bespoke radioactive substances activity permit (burial of radioactive waste)

### Guidance notes

#### **Please read these guidance notes carefully before you fill in the form.**

Complete part RSR-B5 if you are applying for a new bespoke permit for a radioactive substances activity involving the burial of radioactive waste. You will also need to complete RSR-B3 if you wish to dispose of radioactive waste in another way.

Where you see the term 'document reference number' on the form: give the document references here and send the documents with the application form when you've completed it. If you are making a joint submission to us and HSE, specify which part (for example, chapter and/or section number) of the submission is relevant to each question.

The Environment Agency have published guidance on the disposal of radioactive waste in near surface facilities at <http://publications.environment-agency.gov.uk/pdf/GEHO0209BPJL-e-e.pdf>.

We refer to this as the General Requirements for Authorisation (GRA) for convenience. We have added some specific references to this in the guidance below.

We strongly advise you to read that guidance and the guidance to this form, and then to discuss your proposals with us before you make an application.

#### **Contents**

- 1 Other applications**
- 2 About the activities**
- 3 Operating techniques**
- 4 Disposal of radioactive waste**
- 5 Monitoring**
- 6 Radiological assessment**
- 7 Non-radiological assessment**
- 8 Radioactive waste acceptance criteria**

#### **Terminology.**

'Directive waste' means waste as defined in the Waste Framework Directive (2008/98/EC) and includes the classes of inert, non-hazardous and hazardous waste. Directive waste is normally termed 'waste' but for clarity we use the term 'directive waste' here to avoid any confusion with 'radioactive waste'. This is defined in schedule 23 of the EPR. Radioactive waste is excluded from the definition of 'directive waste' and is not subject to the provisions relating to directive waste 'Standalone RSR facility' means a facility which receives and buries only radioactive waste, and does not therefore have an EPR landfill permit.

## **1 Other applications**

Tell us if you have recently made, or you intend to make, an application for an environmental permit to operate a regulated facility, other than a radioactive substances activity, on the premises. This will enable us to coordinate our determination work.

## **2 About the activities**

### **2a What activities are you applying for?**

Tell us which radioactive substances activities you are applying for.

If you are importing radioactive waste from off-site for burial, even if you only intend to do this as a result of your participation in the National Arrangements for Incidents involving Radioactivity or in the Radsafe scheme, you need to apply to receive radioactive waste as well as for its disposal. If you are only burying radioactive waste which is already on-site you do not need to apply to receive radioactive waste.

We expect prompt burial of radioactive waste, either on the day of receipt or the next working day if waste has been delivered to the site too late to allow burial on that day. We also expect prompt return of non-compliant waste to the consignor. You do not need to apply to accumulate radioactive waste if you are promptly disposing or returning non-compliant waste. Please discuss this matter and proposed timescales with your regulator before making an application.

If you are unable to ensure prompt disposal or return of radioactive waste, or wish to accumulate radioactive waste preparatory to its burial, then you will need to apply to accumulate radioactive waste.

### **2b Is a submission to the European Commission under Article 37 of the Euratom treaty required for these activities?**

Details of when Article 37 applies are set out in the Commission Recommendation of 6 December 1999 (1999/829/Euratom): [http://ec.europa.eu/energy/nuclear/radioprotection/doc/legislation/99829\\_en.pdf](http://ec.europa.eu/energy/nuclear/radioprotection/doc/legislation/99829_en.pdf)

Your submission should be made to the Department of Energy and Climate Change (DECC) who will send it on to the Commission. You should consult DECC if you are uncertain whether a submission is required.

---

If a submission under Article 37 is required, we cannot make a decision on your application until you receive an opinion from the Commission. If you apply before the opinion is received, we will commence work on determining your application (and charge you accordingly) but we will not make a decision until the opinion has been received and we have considered its contents.

We advise you to discuss this with us whether a submission may be necessary.

## 2c Provide a technical description of your activities

Your description should include <sup>1</sup>

- a description of the facility including,
  - the geology
  - hydrogeology and surface water hydrology
  - local environment, such as actual human receptors and pathways to them around the site – such as distances, land use, population density, groundwater/aquifer use, groundwater discharge to surface water courses;
- the design of the facility including,
  - techniques for the containment of wastes, such as packaging, engineered or geological liner (or another barrier) type, and the thickness and permeability of the liner or barrier
  - techniques for leachate management
  - techniques for control of landfill gas or other emissions to air
  - techniques for the placement and covering of waste and type and performance of the cap;
- if the facility is (or is intended to be) permitted as a landfill site, the landfill classification (inert, non-hazardous or hazardous) of the cells or cells where it is proposed to dispose of radioactive waste.
- for disposal with directive waste, the proposed method of disposal (containment in small localised areas or spreading out across the site) – if necessary, describe separately for different radioactive waste types;
- the expected timeframes over which disposals of radioactive wastes to the facility may occur and the lifetime of the facility (if different). Estimated total waste disposals during those timeframes (as m<sup>3</sup>), so we can calculate the average dilution of radioactivity while disposals are being made.

Note 1: if the facility has an EPR permit for the deposit of directive waste (normally a Landfill Directive installation), or an application for such a permit has been made, and radioactive waste is to be deposited alongside directive waste, provide a short description with a reference to the relevant application that contains the detailed information.

## 3 Operating techniques

### 3a Describe how you manage the disposal of radioactive waste by burial to protect the environment and to optimise the protection of members of the public

You should:

- describe your optimisation process <sup>2</sup>
- identify and justify the techniques you are proposing as best available techniques (BAT).

Note 2: The Environment Agency have published general guidance on optimisation at <http://publications.environment-agency.gov.uk/pdf/GEHO0209BPJL-e-e.pdf>.

There is more detailed guidance in Near-surface Disposal Facilities on Land for Solid Radioactive Wastes at <http://publications.environment-agency.gov.uk/pdf/GEHO0209BPJL-e-e.pdf>

In identifying techniques, you should address both the technology you use and the way your facility is designed, built, maintained, operated and dismantled.

In justifying techniques as BAT you will need to address the following in respect of the burial of radioactive wastes throughout the lifetime of the facility and post surrender of the permit (see GRA R5, R6, R7 and R8):

- minimising the impact of those disposals on members of the public, and adequately protecting other species;
- ensuring protection of members of the public and the environment against any non-radiological properties of the waste, consistent with that provided by the current standards for the disposal of directive waste [demonstration of this is addressed in 3b].

As part of this, you will need to demonstrate you will take all necessary and reasonable measures to:

- prevent the input of radionuclides and any other hazardous substances to groundwater;
- limit the input of non-hazardous pollutants to groundwater to ensure that such inputs don't pollute groundwater.

The Government published guidance in relation to groundwater activities at <http://www.defra.gov.uk/publications/2011/06/15/pb13555-ep2010-groundwater-activities>

Your response must be based on the radioactive waste you propose to dispose of, as described in question 4.

### 3b Describe how you manage the disposal of radioactive waste by burial to protect members of the public and the environment from any non-radiological hazards of the radioactive waste.

This question does not apply if radioactive waste is disposed of with directive waste in a facility permitted as an EPR landfill site.

---

You should explain how the facility provides a level of protection against the non-radiological properties of the waste consistent with that delivered by current standards for directive waste. This does not mean that these standards need necessarily be applied but that a level of protection is achieved that is consistent with the level of protection that would be provided if these standards were applied. You must do this based on a defined range of the non-radiological properties of the waste, as described in question 4. See GRA Principle 3 and R10. We expect that the measures described in 3(a) will also largely address the non-radiological properties of the waste. However, some additional measures may be necessary to address issues such as odour, noise, and mud on roads.

In doing this, you do not need to adopt the landfill classifications (inert, non-hazardous, hazardous) or meet other specific Landfill Directive provisions. You will find guidance on these standards at <http://www.environment-agency.gov.uk/business/sectors/117568.aspx>

## **4 Disposal of radioactive waste**

### **4a Provide a description and quantitative estimates of the radioactive waste to be disposed of by burial**

Describe the radioactive waste you are proposing to dispose of in the facility, including the following information. Note that your waste acceptance criteria and procedures for waste receipt and disposal (Q8) must be consistent with the wastes you are proposing to dispose of by burial. Tell us

- where the waste will come from (you may only be able to do this in general terms, for example, 'from decommissioning nuclear power stations');
- its category (eg LLW, HV-VLLW etc);
- how much of it (mass or volume and radioactivity content) you will receive and over what period : you should specify the maximum amount you want to dispose of;
- its nature (eg packaged, bagged, loose etc);
- how you will treat or store it, if carrying out pre-treatment or storage;
- the radionuclides present in the wastes and the activity (in becquerels) of each radionuclide (or group of radionuclides) over the lifetime of the site? <sup>3</sup> Where your figures relate to groups of radionuclides, provide a statement justifying the grouping as appropriate to use in the dose assessment;
- Which radionuclides are likely to contribute significantly to the outcome of the radiological impact assessment (note – these are likely to vary depending upon the pathway);
- If the activity concentration is a factor that influences the outcome of the assessment we would expect to see these data presented;
- the conventional properties of the radioactive waste (eg its physical and chemical properties and any non-radiological hazards presented by the waste). Where relevant, provide details of any relevant limitations imposed by the landfill facility's existing Waste Acceptance Criteria.

Note 3: if proposing limits based on 'sum of fractions' (see 4(b)) provide a best estimate of the arisings of individual radionuclides.

### **4b Provide your proposed limits for the disposal of radioactive waste.**

There are a number of different approaches to limits, including limits based on a 'sum of fractions' approach. Please discuss the issue of limits with the appropriate Nuclear Regulation Group (NRG) team before making an application.

Your limits need to be consistent with the type, volume, properties and activity of the radioactive waste you are proposing to dispose of and the techniques described in question 3. Your proposals should be proportionate, simple and robust. If certain radionuclides dominate the dose impact you may consider proposing limits on those, together with a limit or limits on other groups of radionuclides.

## **5 Monitoring**

### **5a Provide a description of the sampling arrangements, techniques and systems for the measurement and assessment of emissions of radioactivity and other emissions from the facility.**

See GRA R14

Your description should:

- include details of your sampling arrangements, techniques and systems for the measurement and assessment of emissions of radioactivity and for a standalone RSR facility for other non-radioactive emissions from the facility, eg in leachate, landfill gas;
- include details of any sampling and monitoring of the performance of the facility, eg settlement, landfill gas, leachate levels <sup>4</sup>;
- demonstrate your proposals represent the best available techniques for monitoring and are proportionate to the potential impact.

Note 5: if the facility has an EPR permit for the deposit of directive waste (normally a Landfill Directive installation), or an application for such a permit has been made, and radioactive waste is to be deposited alongside directive waste, provide a short description with a reference to the relevant application, containing the detailed information.

### **5b Provide a description of your environmental monitoring programme**

See GRA R14

You should provide your proposed environmental monitoring programme for:

- establishing a pre-operational baseline (or provide the results of this if already completed);

- the operational phase of your facility;
- post-closure phase.

Your operational programme should take account of the guidance in Environmental radiological monitoring at [http://www.sepa.org.uk/radioactive\\_substances/publications/guidance.aspx](http://www.sepa.org.uk/radioactive_substances/publications/guidance.aspx)

## 6 Radiological assessment

### 6a Provide a prospective dose assessment at the proposed limits for the burial of radioactive waste

For any application to dispose of low level radioactive waste (LLW) by burial (including high volume very low level waste (HV-VLLW) you need to provide us with a radiological assessment demonstrating that radiation exposure to members of the public around the site as result of the disposal will be acceptable. The assessment should address all the key exposure situations likely to arise from disposal of radioactive waste. A simplified approach, described below, may be adequate where the hazard associated with the radioactive waste is sufficiently low that the resulting radiation exposure can relatively easily be demonstrated to be very low. For disposal of large quantities of LLW, this simplified approach is unlikely to be appropriate, and applicants should refer to our more general guidance on near surface disposal of solid radioactive waste (GRA).

You should provide as a minimum the information relevant to the selected model used for the radiological assessment, and if the application is for a stand-alone RSR facility the information relevant to the assessments undertaken in relation to the nonradiological properties of the waste.

The assessment should consider the operational phase and the post closure phase of the landfill site. For a simplified approach the following dose criteria apply:

Phase	Scenario	Criterion (mSv/y)
Operational	Normally expected to occur	0.02
	Not certain to occur	1
Post closure	Normally expected to occur	0.02
	Not certain to occur	1

If these criteria can be met using a simplified approach, then our requirements laid down in the GRA can be considered to have been met. If the criteria are not met using a simplified approach, then fuller application of the requirements of the GRA will be needed against the dose and risk criteria defined in the GRA.

The following text describes the minimum information that an applicant will need to provide in a simplified approach.

**The radiological assessment must include** radionuclide-specific doses for the main/key radionuclides, for the scenarios below and for any additional future scenarios that we have requested, or are relevant to the site.

#### Operational phase – normally expected to occur

- the impact on members of the public if wastes are stored on site prior to disposal;
- the impact on members of the public from gas and aerosols, gas flaring and re-suspension of radionuclides with dusts;
- the impact on members of the public from leachate. This should consider discharge of leachate directly into groundwater and water courses and active leachate management via sewer system where this occurs.

The Environment Agency's methodology 'initial radiological assessment methodology' (<http://publications.environment-agency.gov.uk/pdf/SCHO0106BKDT-e-e.pdf> and <http://publications.environment-agency.gov.uk/pdf/SCHO0106BKDV-e-e.pdf>) may be used for this purpose.

#### Operational phase – not certain to occur

- consequences of leachate spillage or barrier failure with quick discharge to water courses;
- waste fire and release of radioactivity to air.

#### Post closure – normally expected to occur

This should include reasonably foreseeable building on the site.

- gas release, H-3, C-14 and Rn-222 (from Ra-226);
- ongoing leachate release into nearby surface and groundwater water courses;
- external dose from the residual inventory.

#### Post closure – not certain to occur

- intrusion into the waste. A dose assessment should be made assuming intrusion occurs for reasonably foreseeable scenarios taking into account the expected end state of the site;
- overtopping of the containment system Doses should be assessed, assuming overtopping occurs;
- erosion of the burial site, caused by flooding and/or sea level rise or other events, including those that may be associated with climate change. Assess doses likely to result from erosion caused by reasonably foreseeable natural events, using the residual source at the time the scenarios might be expected to occur.

#### Environmental concentrations of radionuclides

---

For scenarios that are likely to result in the highest radiological impact we expect you to assess the concentrations of radionuclides that give rise to these impacts. These assessments may include predicted values of concentrations of radionuclides in: leachate on-site during the operational phase and in the post-closure phase; groundwater in the post-closure phase; and the waste remaining on-site post-closure or if it were disturbed, in environmental material containing waste from the site.

**We expect the radiological assessment to be reported as follows:**

- describe dose calculations and scenarios fully, in a transparent and coherent way which will allow us to review them and place them on our public register;
- describe explicitly all relevant assumptions and the key parameters for the landfill and wastes;
- present doses by each scenario by radionuclide and identify the limiting scenario identified;
- identify the radionuclides that make the major contribution to doses and identify the waste streams in which they are present;
- compare the results of the assessment with the dose criteria.

## **6b Provide an assessment of the impact on non-human species at the proposed limits for burial**

You should assess the dose-rates to reference organisms that result from your proposed disposal of radioactive waste (including any indirect input to groundwater you propose). An appropriate range of reference organisms for freshwater, marine and terrestrial ecosystems is included in the 'ERICA' Tool (see below). You should calculate worst-case dose-rates by assuming the presence of the reference organisms for the relevant ecosystem at the position of maximum environmental concentration.

Tell us which model you used to calculate these dose-rates and why it is appropriate, and set out all the data and assumptions (with reasoning) you used as input into the model, where not already covered in 6a.

You should compare the assessed dose-rates with our guideline value of 40 microGy/hour (the level below which we consider there will be no adverse effect on non-human species).

Natural Resources Wales will:

- assess the combined impact of emissions, from your and all other relevant permitted sites, on each potentially affected Natura 2000 site;
- compare those combined impacts with the 40 microGy/hour guideline value.

An appropriate tool for assessing impacts on non-human species was developed through the international 'ERICA' research project under the EC Euratom 6<sup>th</sup> Framework programme. Further information, and a free download, is available at <https://wiki.ceh.ac.uk/display/rpemain/ERICA>.

A subsequent Euratom research project, 'PROTECT' <https://wiki.ceh.ac.uk/display/rpemain/PROTECT> recommended that the 'ERICA' Tool should be used to carry out radiological assessments for non-human species, and the 'ERICA' Tool has been maintained and improved since that recommendation was made.

## **7 Non-radiological assessments**

This question applies to a standalone RSR facility only. You should assess the non-radiological impact of the wastes being disposed of. You may choose to use the various assessment tools set out in our landfill guidance to assess and justify the risk arising from the non-radiological properties of the waste. You may also use alternatives approaches. You will find guidance on the tools and assessments for landfill sites at <http://www.environment-agency.gov.uk/business/sectors/117568.aspx>

Your response must be based on the non-radiological radioactive waste you propose to dispose of, as described in question 4.

## **8 Radioactive waste acceptance criteria**

Provide details of your waste acceptance criteria and procedures for the receipt and burial of radioactive waste.

This applies to all radioactive waste, whether imported onto site or arising from other on-site operations.

Describe the waste acceptance criteria and procedures to ensure that

- where radioactive waste is imported onto site, it is accepted only where its burial would be consistent with the proposed operating techniques (Q3), the associated description of waste (Q4) and the proposed limits in Q4b;
- where radioactive waste is generated on site, it is buried only where this is consistent with the proposed operating techniques (Q3) the associated description of waste (Q4), and the proposed limits in Q4b.

The waste acceptance criteria and procedures must cover the radiological and the non-radiological properties of the radioactive waste. If you are disposing of radioactive waste at a landfill site you must consider how these criteria and procedures relate to the relevant directive waste acceptance criteria and procedures.