



Exemption guidance

Uranium and thorium

September 2011
Version 1

Radioactive Substances Act 1993

Uranium / thorium GUIDANCE

Version 1.0
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The Environmental Permitting (England and Wales) (Amendment) Regulations 2011

1 General questions

What are uranium and thorium compounds?

Uranium or thorium compounds are substances or articles (including uranium and thorium metals) in which the U-235 concentration is no more than 0.72% by mass in the case of uranium, and the thorium is in its isotopic proportions found in nature. In the case of uranium, 0.72% is the natural amount of U-235 so this can apply to natural and depleted uranium. In the case of thorium the natural isotopic ratios are variable, depending on the origin. The definition applies to chemically processed thorium provided the radionuclide ratio has not been modified for nuclear fuel.

What do “out of scope” and “exempt” mean?

Out of scope of regulation equates to ‘not radioactive’ for the purposes of the legislation. Radioactive substances which are ‘out of scope’ are not subject to any regulatory requirement under EPR or RSA93 relating to radioactive substances or radioactive waste.

Exempt means that no radioactive substances permit is required under EPR or RSA93 to keep or use such radioactive sources, or accumulate and dispose of such radioactive waste, provided that the conditions specified are met.

What is out of scope?

Uranium or thorium used as a NORM industrial activity – (ie not used for its radioactive, fissile or fertile properties, see separate guidance on NORM) is out of scope of regulation when at concentrations below those in Table 2.2 of the Government Guidance, an extract of which is shown as Table 1 below:

Table 1 – NORM industrial activities

Radionuclide	Solid or relevant liquid concentration in becquerels per gram (Bq/g)	Any other liquid concentration in becquerels per litre (Bq/l)	Gaseous concentration in becquerels per cubic metre (Bq/m ³)
Th-232sec	0.5	0.1	0.001
Th-232+	5	10	0.001
U-238sec	0.5	0.1	0.001
U-238+	5	10	0.01

The term relevant liquid and + and sec following radionuclide names is explained in the Government Guidance and separate regulatory guidance.

Uranium or thorium used for its radioactive properties is out of scope if the concentrations of radionuclides are below those in Table 2.3 of the Government Guidance an extract of which is shown as Table 2 below:

Use of uranium or thorium as neither a NORM industrial activity nor for its radioactive, fissile or fertile properties (eg keeping of rocks in a museum) is always out of scope.

Table 2 – use for radioactive, fissile or fertile properties

Radionuclide	Concentration in becquerels per gram (Bq/g)
Th-232+	0.01
Th-232sec	0.01
U-238+	1
U-238sec	0.01

The U-235 (and its daughters) component of uranium will not make a significant contribution to the overall impact, and can be omitted from consideration.

What is exempt?

The following items are exempt from permitting for keeping or using radioactive material or accumulating radioactive waste in substances or articles:

Uranium and thorium compounds (in the form of solid, liquid or gas) such as metal, chemical reagents or use in electron microscopy or thorium generators, where the activity levels are below those specified in Table 3.2 of the Government Guidance (extract below as Table 3). Note that these limits apply to the total activity kept or used on any premises and accumulated as radioactive waste.

Table 3

Radioactive material or accumulated radioactive waste type	Maximum quantity of radionuclides for each item of material or waste	Maximum quantity of radionuclides: - on any premises in items of the material or waste which satisfy the limit in column 2; or -in mobile radioactive apparatus held by a person
Thoriated tungsten or magnesium not more than 4% by mass	No limit	No limit
A uranium or thorium compound.	Up to a total of 5 kg of uranium and thorium.	Up to a total of 5 kg of uranium and thorium.

Also if you hold uranium metal in the form of bulk solid (ie not powder or swarf, eg as a weight or shielding), the regulators normally regard this as equivalent to a sealed source. See separate guidance on sealed sources. This may enable exempt accumulation (and disposal) of larger quantities waste uranium metal.

Who is this guidance for?

This guidance is for businesses and other organisations that:

- use uranium and thorium,
- supply uranium and thorium,
- receive waste uranium and thorium.

This guidance is not aimed at manufacturers of uranium and thorium.

Does it apply in England, Wales, Scotland and Northern Ireland?

Yes.

Who is responsible for deciding if my uranium and thorium are out of scope or exempt?

The person or organisation responsible for the sources, eg company or university.

Do I need to tell anyone I believe my uranium and thorium are out of scope or exempt?

No.

Where can I get more advice?

From an appropriate adviser, e.g. suitable Radiation Protection Adviser or Radioactive Waste Adviser. Or from the Environment Agency, which regulates your premises.

2 Keeping and using uranium and thorium

What premises are exempt from the need for a permit?

All types of premises may be exempt providing that the radioactivity in any given source and the total radioactivity in all the sources on the premises are less than the values specified above.

The regulations do not apply to homes and no permit is needed for them.

Can I use uranium or thorium on more than one premises?

Yes provided that the limits and conditions are met.

What do I need to do if I use more or stop using uranium or thorium?

If you need more than the limit then you must inform the relevant environmental regulator promptly, who will ask you to apply for a permit. You do not need to tell anyone that you have stopped using uranium or thorium, but you must dispose of them in accordance with the exemption.

I already have a permit for some radioactive sources, can I be exempt for others?

There is no interaction between the exemption and a permit for radioactive sources which are not covered by the exemption. For example a permit for sealed sources with activity greater than 4 MBq does not affect the ability to make use of the exemption order for uranium and thorium compounds.

It is legal to have uranium and thorium compounds listed on a permit but they still count towards the 5 kg limit for exemption. Above a total of 5 kg of uranium and thorium, they all need permitting. Some current permits may include uranium and thorium which can be exempt and these continue in operation until varied. In future only in exceptional cases will the regulators issue permits for sources which can be exempt.

Until 31 March 2012, applications to remove items from permits as a result of it becoming exempt are free of charge. After that a charge may be made.

3 Waste uranium and thorium compounds

How much waste can I hold?

As stated above you can hold up to the quantity allowed by Table 3.2 of the Government Guidance. Note that these limits apply to the total activity kept or used on any premises and accumulated as radioactive waste.

Also if you hold uranium metal in the form of bulk solid (ie not powder or swarf, eg as a weight or shielding), we normally regard this as equivalent to a sealed source. This may enable exempt accumulation (and disposal) of larger quantities waste uranium metal.

Can I store wastes?

Yes. The activity of the waste created must be minimised, and it should be disposed of as soon as reasonably practicable.

The storage must be well managed and in a dedicated location with adequate records being kept.

How should I dispose of uranium or thorium compounds?

Solid radioactive waste up to the quantities specified in Table 4 (derived from Table 3.3 of Government Guidance) can be disposed of to a person who manages (including disposal, treatment and recovery) substantial quantities of non-radioactive waste (eg by burial in landfill, incineration or recovery, with ordinary refuse) as described in section 3.6 of the Government Guidance, or to a person who holds a permit to receive it.

Table 4

Radioactive waste	Maximum concentration of radionuclides	Maximum quantity of waste to be disposed of in the period stated
Solid radioactive waste thoriated tungsten and magnesium	4% thorium by mass	No limit
Solid radioactive waste uranium or thorium compounds	No limit	0.5 kg of uranium or thorium per week
Aqueous liquid radioactive waste uranium or thorium compounds	No limit	0.5 kg of uranium or thorium per year

Also you can dispose of an unlimited amount of uranium metal in the form of bulk solid (ie not powder or swarf, eg as a weight or shielding), which we regard as equivalent to a sealed source to a person who holds a permit to receive it.

4 How can I dispose of aqueous radioactive waste – low volume to sewer

General points:

These are intended primarily for the non-nuclear sector, from which small quantities of aqueous effluent are discharged to a laboratory pipeline and ultimately to a relevant sewer (capacity > 100m³ of effluent / day at the sewerage plant), or to a person (by tanker) who is permitted to receive such waste. However, any person may use these provisions, provided that the conditions are met. For example small scale use in electron microscopy would be expected to be exempt for disposal.

The aqueous waste disposal radiological impact assessments are based on small scale disposals from, say a medical facility, in which the waste is disposed to a sewer. Other pathways to human dose (for instance, disposal to a soak away) are not covered by the impact assessment, and thus disposal routes other than to a sewer are not exempt.

Aqueous liquid waste can include entrained solids or suspensions, provided that good practice has been used to attempt to remove such solid suspensions from the waste stream prior to disposal

Exemption Provisions:

A maximum annual disposal amount of 0.5 kg per year for the sum of all uranium and thorium.

Discharges of aqueous waste to sewer may be subject to 'discharge consents' from the sewage undertaker, which set limits for non-radioactive properties of the effluent. Users should check such limitations with the sewage undertaker, and not exceed any such limits.

5 General Conditions on exemption for U + Th disposal.

Ensure that where reasonably practicable any marking or labelling of the waste or its container is removed before the person disposes of that waste.

Dispose of radioactive waste as soon as reasonably practicable after it has become waste

Maintain records of all waste disposed of to the environment.

Good practice should be used to minimise the overall activity generated for discharge.

Allow the environmental regulator access to such records or such premises as he/she may request in order to determine that the conditions in respect of that exemption are complied with.

7 How much uranium or thorium can I receive and how should I handle it?

If you receive exempt radioactive waste mixed with other waste, as part of your business of managing, treating or disposing of substantial quantities of waste which is not radioactive waste, then you are exempt from the need for a permit. In practice waste disposal companies will often not be informed by waste consignors that their waste includes exempt waste. The radiological assessment carried out for this waste type means that normal disposal or recycling arrangements are acceptable in these circumstances.

Organisations which receive exempt waste as part of substantial quantities of non-radioactive waste for disposal etc, should dispose of it in accordance with their permits for the non-radioactive waste as soon as practical and dispersed in the non-radioactive waste. The radioactive waste should not be separated from other waste.

Waste in the form of NORM waste, VLLW or alloy containing up to 4% thorium is treated as Directive waste and the same standards and controls apply.

I am a sewerage undertaker and people are discharging exempt aqueous waste to my sewer – do I need to do anything?

No. The radiological assessments carried out on the discharges potentially exempt are based on them being discharged to a sewer of capacity > 100m³ of effluent / day at the sewerage plant. If you are aware of discharges being made under this exemption to sewage works smaller than this then you should inform the person making the discharges.

Exemption example – use and disposal of uranium and thorium on a single premises, etc

Circumstances	Permitted/Exempt	Explanation
Keeping or Use:		
Jar of uranium nitrate (500 g U)	Exempt	Up to 5 kg total thorium and uranium (in U or Th compounds) exempt in radioactive material kept or used and radioactive waste accumulated
Jar of thorium nitrate (500 g U)	Exempt	
Uranium nitrate solution (250 g U)	Exempt	
Thoriated tungsten/magnesium (4%) 25kg	Exempt	Unlimited amount of thoriated alloy exempt
Natural uranium check source 111 kBq (10 g U)	Exempt	Up to 5 kg total thorium and uranium (in U or Th compounds*) exempt in radioactive material kept or used and radioactive waste accumulated
Waste accumulated:		
Jar of uranium nitrate (500 g U)	Exempt	Up to 5 kg total thorium and uranium (in U or Th compounds) exempt in radioactive material kept or used and radioactive waste accumulated
Jar of thorium nitrate (500 g U)	Exempt	
Uranium nitrate solution (250 g U)	Exempt	
Thoriated tungsten/magnesium (4%) (25 kg)	Exempt	Unlimited amount of thoriated alloy (up to 4% Th) exempt
Natural uranium check source 111 kBq (10 g U)	Exempt	Up to 5 kg total thorium and uranium (in U or Th compounds*) exempt in radioactive material kept or used and radioactive waste accumulated
Disposals (per year unless otherwise stated):		
Uranium nitrate solid (1 kg(U)/y)	Exempt	Up to 0.5 kg total uranium and thorium (in solid uranium or thorium compounds) per week
Thorium nitrate solid (1 kg(U)/y)	Exempt	
Uranium nitrate solution (0.5 kg(U)/y)	Exempt	Up to 0.5 kg total uranium and thorium (in aqueous liquid uranium or thorium compounds) per year
Thoriated tungsten/magnesium (4%) (50 kg/y)	Exempt	Unlimited amount of thoriated alloy (up to 4% Th) exempt
Natural uranium check source 111 kBq (10 g(U)/y)	Exempt	Up to 0.5 kg total uranium and thorium (in solid uranium or thorium compounds) per week

* Note – compound includes U or Th metal