Scope of Radioactive Substances Legislation in Scotland

Guidance document

November 2020

Scottish Government
Riaghaltas na h-Alba
gov.scot

Contents

Introduction and background

General

The legislative means by which radioactive substances are regulated in the United Kingdom differ between the devolved administrations; however, the effects of the legislation are broadly consistent. This guidance only applies to the regulation of radioactive substances activities in Scotland under the Environmental Authorisations (Scotland) Regulations 2018 (EASR)[1]. Separate guidance is available for England, Wales and Northern Ireland[2].

EASR transposes the aspects of European Council Directive 2013/559/Euratom[3] (BSSD 13) and the International Atomic Energy Agency basic safety standards[4] relevant to protection of the public and the environment.

EASR only applies to regulated activities. For the purposes of EASR a regulated activity is a radioactive substances activity, where a radioactive substances activity is one involving either or both radioactive material and radioactive waste.

EASR and this guidance do not apply to a person carrying on a regulated activity where the activity is a domestic activity carried on in connection with the person's private dwelling or a place where the person is resident, i.e. it does not apply to private individuals.

This guidance is about radioactive substances activities that are 'out of scope' of EASR. If an activity is 'out of scope' it is not subject to any regulatory requirements under EASR.

All terms used in this guidance have the same meaning as given in the Environmental Authorisations (Scotland) Regulations 2018.

Any references in this guidance to Tables is to the Tables as numbered in this guidance rather than as numbered in EASR.

[1] The Environmental Authorisations (Scotland) Regulations 2018, SSI 2018 No. 219
[2] Scope of an exemptions from the radioactive substances legislation in England, Wales and Northern Ireland, BEIS, Defra, Welsh Government, DAERA
[3] Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, European Commission
[4] Radiation protection and safety of radiation sources: international basic safety standards, GSR Part 3, IAEA

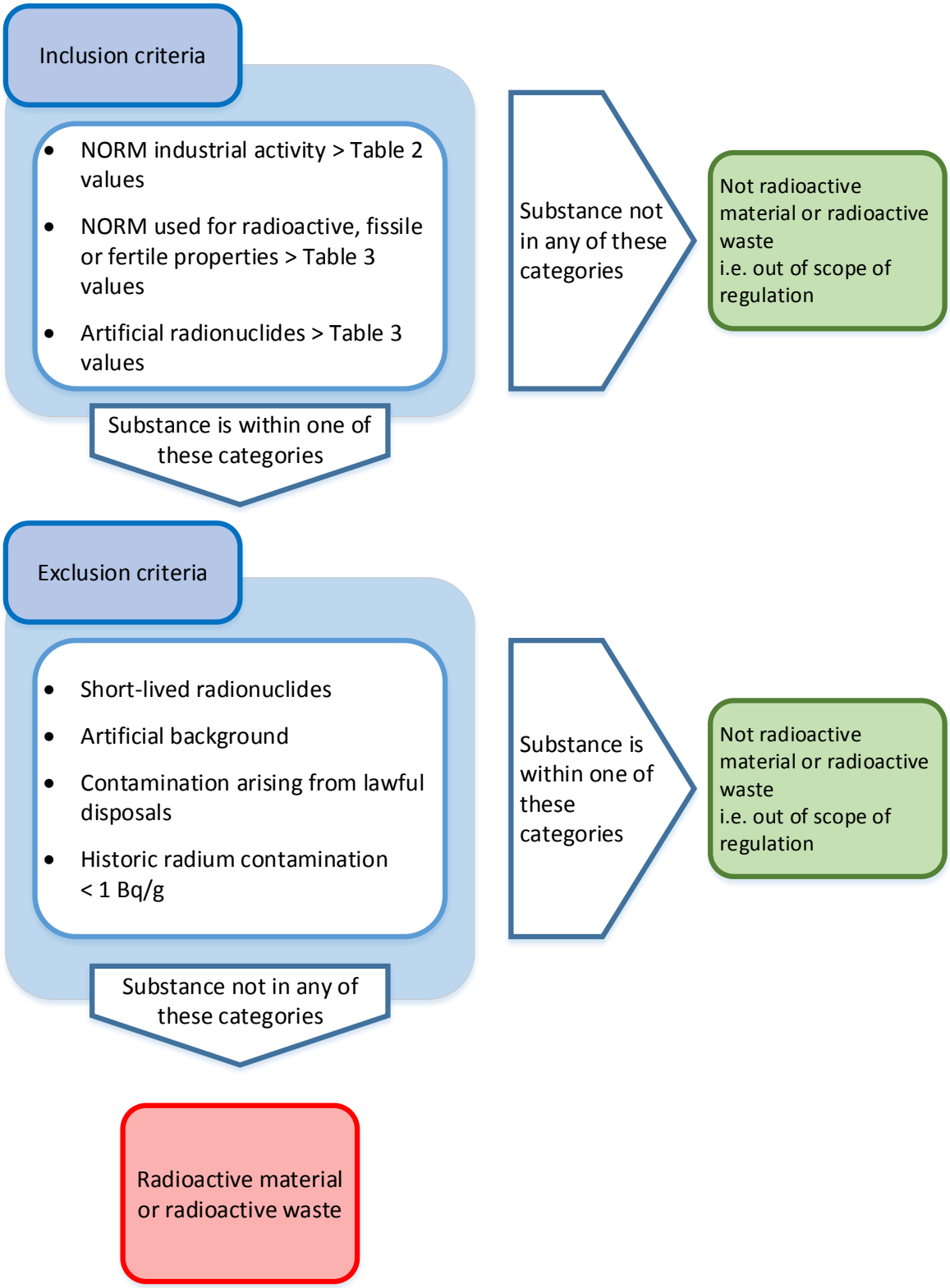
Radioactive material and radioactive waste which is ‘out of scope’ of the Environmental Authorisations (Scotland) Regulations 2018

General

The definition of radioactive material and radioactive waste and the associated decision making process is shown diagrammatically in Figure 1. The text in Figure 1 is necessarily abbreviated and should be read in conjunction with EASR and this guidance.

Any radioactive substances activity that is not specifically set out in the following sections is out of scope of EASR. A radioactive substances activity has to be specifically included in EASR for it to be considered ‘radioactive’ and fall within the scope of regulation; EASR can therefore be considered to be an ‘inclusive’ regime.

Figure 1 – Schematic presentation of the scope of the legislation



Definition of radioactive material

EASR defines a substance or article as radioactive material only if it falls within one or more of the following categories:

i. It is used in, or arises from, a NORM industrial activity listed in Table 1 of this guidance and the concentration of radionuclides in the material exceeds the values in columns 2 (solid or 'relevant liquid'), 3 (aqueous liquid) or 4 (gaseous)[5] of Table 2 of this guidance.

ii. It contains NORM listed in Table 3 of this guidance that is used for its radioactive, fissile or fertile properties and for solids and 'relevant liquids', the concentration of the radionuclides in the material exceeds the values shown in column 2 of Table 3.

iii. It contains artificial radionuclides and for solids and 'relevant liquids', the concentration of radionuclides in the material exceeds the values shown in column 2 of Table 3.

If a material falls within one or more of these categories it is still possible for it not to be classed as radioactive, and be out of scope of EASR, if it meets one of the criteria set out below:

i. All radionuclides contained in the material are of short half-life (less than 100 seconds).

ii. Its radioactivity is solely attributable to artificial background radiation.

iv. It has been previously lawfully disposed of as a waste, or is contaminated as a result of such a disposal, unless subject to a process which causes an increase in radiation exposure.

v. It has arisen from the remediation of land contaminated by Ra-226 prior to 13 May 2000 and the values are less than those given in Table 2.

Substances or articles that contain NORM and that are not used for a NORM industrial activity and that are not used for their radioactive, fissile or fertile properties are out of scope of EASR and are therefore not radioactive material.

All aqueous liquids containing either artificial radionuclides or NORM used for their radioactive, fissile or fertile properties (except 'relevant liquids') and all gases containing such radionuclides are radioactive material in scope of EASR, irrespective of concentration.

[5] Liquids and gases can contain entrained solid particulate material and gases can contain liquids in aerosol form. For the purposes of EASR, intractable particulates or aerosols are treated as an integral part of the liquid or gas.

Definition of radioactive waste

EASR defines ‘waste’ as ‘any substance or object which the holder discards or intends or is required to discard’; and defines it as ‘radioactive waste’ only if it falls within one or more of the following categories:

i. It arises from NORM industrial activities listed in Table 1, and the concentrations of radionuclides in the waste are greater than the values in columns 2 (solid or ‘relevant liquid’), 3 (aqueous liquid) or 4 (gaseous) of Table 2.

ii. It contains NORM radionuclides listed in Table 3 that are used for their radioactive, fissile or fertile properties, and, for solids and ‘relevant liquids’, the concentration of the radionuclides in the waste exceeds the values shown in column 2 of Table 3.

iii. It contains artificial radionuclides, and, for solids and ‘relevant liquids’, the concentration of radionuclides in the waste exceeds the values shown in column 2 of Table 3.

If a waste falls within one or more of these categories it is still possible for it not to be classed as radioactive, and be out of the scope of EASR, if it meets one of the five criteria set out below:

i. All radionuclides contained in the material are of short half-life (<100 seconds).

ii. Its radioactivity is solely attributable to artificial background radiation.

iii. It has been previously lawfully disposed of as a waste, or is contaminated as a result of such a disposal, unless subject to a process which causes an increase in radiation exposure.

iv. It has arisen from the remediation of land contaminated by Ra-226 prior to 13 May 2000 and the values are less than those given in Table 2.

Waste that contains NORM and that does not arise from a NORM industrial activity, and that is not used for their radioactive, fissile or fertile properties is out of scope of EASR and are therefore not radioactive waste.

All aqueous liquid waste containing either artificial radionuclides or NORM used for their radioactive, fissile or fertile properties (except ‘relevant liquids’) and all gaseous waste containing such radionuclides are radioactive waste in scope of EASR, irrespective of concentration.

Unlisted radionuclides and activities

Natural radionuclides that are not listed in Table 2 or Table 3 are out of scope of EASR. Examples of such radionuclides are potassium-40 and samarium-147. Materials or waste containing only unlisted radionuclides are not radioactive material or radioactive waste.

Radon is not included as a main entry in Table 2 or Table 3; however, it is included as a component of the decay series of some of the radionuclides that are listed. This means, for instance, that radon in natural gas is out of scope of EASR. However, where radon is present as a result of the management of radioactive material that contains radium, or the accumulation and disposal of radioactive waste that contains radium, the Government expects that the regulators will take account of any related radon exposures to the public and the environment when regulating the material or waste containing radium. For example: although radon in natural gas is out of scope of EASR (the storage, distribution and use of natural gas is not a listed industrial activity), radon exposures to the public resulting from the disposal of wastes containing radium is a legitimate regulatory consideration for such wastes and should be accounted for in any radiological impact assessment undertaken.

There is a catch-all provision in Table 3 for non-listed artificial radionuclides: 0.01 Bq/g. Alternatively, for these radionuclides only, an appropriate radionuclide-specific value can be calculated based on the concentration which gives rise to a dose to a member of the public of 10 µSv/year in accordance with the methodology in IAEA RS-G-1.7.

This means that a person may use the 'out of scope' provisions based on their own calculations, provided that the calculations are carried out using the same methodology as that which was used to calculate the values in the table. Any person considering performing this type of calculation is advised to discuss with the Scottish Environment Protection Agency beforehand.

NORM industrial activities

There are many activities involving radioactivity that are out of scope of EASR. An example is the collection, preparation and display of geological specimens which contain naturally occurring radioactive material (NORM). For the purposes of EASR, any such activities that are not listed in Table 1 do not involve radioactive material or radioactive waste. This is because, following Euratom guidance, it is believed that the radiological consequences of such activities are trivial. Only those 'NORM industrial activities' which could lead to the need for controls are regulated under EASR.

Natural background radioactivity

Naturally-occurring radionuclides in their normal setting or location are out of scope of EASR unless they have been processed for their radioactive, fissile or fertile properties. For instance, the fabric of buildings and equipment are out of scope of EASR, even if they contain background uranium.

However, the fabric of buildings or equipment that have been contaminated by radionuclides that originate from a NORM industrial activity or by radionuclides that have been used for their radioactive, fissile or fertile properties, are in scope of EASR. Most of the values in Table 2 for NORM industrial activities are based on IAEA RS-G-1.7 values. These values have been chosen as the optimum boundary between, on one hand, the average activity concentrations in soil generally

measured worldwide and, on the other hand, activity concentrations in ores, mineral sands, industrial residues and wastes. Therefore there is no need to discount background from the measured NORM. However, the background activity can be discounted for NORM radionuclides where Table 3 applies i.e. where the radionuclides have been used for their radioactive, fissile or fertile properties

The activity concentration of uranium from natural background should not be deducted when the uranium is used as a feedstock or product of a practice; for instance, the manufacture of nuclear fuel.

Artificial background radioactivity

Artificial radionuclides which are present throughout the environment, for example as a result of atmospheric weapons tests and accidents, are not in scope of EASR. An example is the run-off of rainwater from buildings that can contain Cs-137, which is in global circulation as a result of atmospheric weapons tests or the Chernobyl accident. This rainwater is not radioactive material and, if disposed of to a drain, is not radioactive waste.

If a material or waste contains both artificial radionuclides which are 'background' and additional artificial radionuclides, the background component can be discounted, if it is possible to do so, when determining if a substance exceeds the Table 3 concentrations. This background can be either measured prior to the addition of the additional radionuclides, or estimated based on prior knowledge, for example, estimated from the known provenance of the material. For example, rainwater contains known quantities of the radioisotope caesium-137 due to fallout from the atmosphere. If this concentration is known, it can be deducted from the total caesium-137 concentration in rainwater collected in storm water drainage systems on nuclear sites when deciding whether or not out of scope values have been exceeded.

The provisions in EASR which deal with artificial background are not intended to exclude radionuclides which are present in the environment as a result of authorised discharges; localised concentrations of such radionuclides should not be considered 'normal' if they can be attributed to such discharges; such contamination is explicitly addressed in a separate provision. Building further on the example of artificial background Cs-137 in rainwater, if its activity concentration is increased due to Cs-137 arising from an authorised discharge, then the additional activity concentration is not excluded by this provision, and is therefore in scope of EASR

Summation rules

Where a substance or article contains multiple radionuclides, they must all be taken into account when determining if that substance or article is in scope of EASR. Tables 2 and 3 both have summation rules that should be used.

The Table 2 summation rule is the sum of the ratios A/B where:

A. means the concentration of each radionuclide listed in column 1 of Table 2 that is present in the substance or article; and

B. means the concentration of that radionuclide specified in (as appropriate)

(i) column 2 of Table 2 where the material or waste is a solid or a ‘relevant liquid’;

(ii) column 3 of Table 2 where the material or waste is any other liquid; or

(iii) column 4 of Table 2 where the material or waste is a gas.

The Table 3 summation rule is the sum of the ratios A/B where:

A. means the concentration of each radionuclide listed in column 1 of Table 3 that is present in the material or waste, and

B. means the concentration of that radionuclide specified in column 2 of Table 3. Only when the summation rule gives an answer >1 is the material or waste radioactive.

If a substance has been identified as being or intended to be processed for its radioactive fissile or fertile properties then all of the radionuclides, including those that are of natural terrestrial or cosmic origin, that are listed in Table 3 should be considered when comparing the radionuclide concentration to the Table 3 values.

The only natural radionuclides that are listed in Table 3 are those in the U-238, U-235 and Th-232 decay chains. Other radionuclides of natural terrestrial or cosmic origin such as K-40 and Sm-147 have been deliberately omitted from Table 3 and are out of scope of EASR.

Radionuclides with a short half-life

Any substance or article that contains only radionuclides with a half-life not exceeding 100 seconds is out of scope of EASR. This applies to all normal physical forms - solid, liquid and gas. If the substance or article contains radionuclides with a half-life exceeding 100 seconds then the activity of all relevant radionuclides (in Table 1, Table 2 or Table 3 as appropriate), including those with a half-life less than 100 seconds, must be included in any calculation to determine whether the article is in or out of scope of EASR.

Historic radium contamination

A substance or article is not radioactive material or radioactive waste where it arises from the remediation of land contaminated by Ra-226 or its progeny provided that:

- The contamination occurred prior to 13 May 2000 (coming into force date of European Council Directive 96/29/Euratom);
- In the absence of Ra-226 or its progeny, the substance or article would not otherwise be radioactive material or radioactive waste; and
- The concentration of Ra-226 and its resulting progeny do not exceed the values given below (which are the same as those given in Table 2 for Ra-226+)

i. For solids or ‘relevant liquids’ 1 Bq/g
ii. For any other liquids 1 Bq/l
iii. For gases 0.01 Bq/m^3 (this does not include radon-222 and its short-lived progeny)

Gaseous NORM waste from oil and gas production

There are incidental releases of gaseous NORM waste arising from the production of oil and gas, for example from process gas flares, vents on storage tanks or fugitive releases. These gaseous discharges are out of scope of EASR so long as they are below the levels in Schedule 8, Table 1, column 4 of EASR.

Contamination by lawful disposal

A substance is not radioactive material or radioactive waste where its radionuclide content is attributable to a lawful disposal. For example, due to an authorised discharge of liquid or gaseous waste to the environment or due to migration in the environment after final closure of an authorised solid waste disposal facility.

In the case of a disposal facility designed solely for the burial of solid radioactive waste, the deposited material remains ‘radioactive waste’ until the authorisation relating to disposal has been surrendered or revoked.

However, a substance is radioactive material or radioactive waste where, following its disposal, a process occurs which results in an increase in radiation exposure to the public or radioactive contamination of the environment.

The question of what may or may not have been envisaged at the time of disposal is not straightforward. The requirement can be taken to mean those matters which may have reasonably been foreseen at the time of disposal. For example, if waste was retrieved from a solid waste disposal facility following surrender or revocation of the facility's authorisation, that waste would be radioactive waste.

As an example of an increase which is not substantial, background concentrations of tritium (H-3) are relatively high in certain locations for a variety of reasons. If tritium contaminated property is remediated (a process not foreseen at the time of disposal), this is not likely to lead to a substantial increase in dose for members of the public.

Only the radionuclides associated with the disposal should be considered when deciding whether the resulting dose is significant; background radioactivity can be discounted.

Relevant liquids

EASR defines a ‘relevant liquid’ as a non-aqueous liquid, and certain types of aqueous liquid with specified hazardous properties. The purpose of this definition is to allow such liquids to be treated, for the purposes of this legislation, as a solid because the exposure pathways are the same as those for solids.

Table 2 contains three columns, one for each of ‘solids’, ‘aqueous liquids’, and ‘gases’. Table 3 has one column – for solids. For the purposes of waste disposal, the radiological impact assessments which support the values in the tables are based on reasonable assumptions. For instance, the drinking water pathway giving rise to a human radiation dose is a major feature of the assessment for aqueous liquids, but not for solids. Solids are not usually (or legally) disposed of directly to rivers, for example, and other legislation is intended to prevent such an activity.

There are certain liquids, for instance mercury and oils, for which the drinking water pathway can also be ruled out, not least because other pollution control legislation does not allow disposal to the water environment. This legislation therefore allows such liquids to be compared with the values in the ‘solids’ column of Table 2 and Table 3; it assumes that the disposal of such material is to a conventional ‘solid’ waste route; that is, not disposed of to drains, sewers, open water or groundwater. A ‘conventional’ route includes disposal or transfer for the purposes of reuse or recycling.

There are certain aqueous liquids with specified hazardous properties which can likewise be treated as ‘solids’ for the purposes of this legislation (‘relevant liquids’). Again, the drinking water pathway can be ruled out, not least because other pollution control legislation does not allow disposals to the water environment. This legislation therefore allows such liquids to be compared with the values in the ‘solids’ column of Table 2 and Table 3; it assumes that the disposal of such materials is to a conventional ‘solid’ waste route; that is, not disposed of to drains, sewers, open water or groundwater. In order to define this class of liquids, reference is made in EASR to Council Regulation No. 1272/2008[6], which defines certain substances as being hazardous to health above specified concentration values. Aqueous liquids which exhibit acute toxicity, skin corrosion/irritation, or are acutely hazardous to the aquatic environment come within this class. Again, an assumption has been made that the disposal of such materials is to a conventional ‘solid’ waste route; that is, not disposed of to drains, sewers, open water or groundwater. A ‘conventional’ route includes disposal or transfer for the purposes of treatment, reuse or recycling.

[6] Regulation (EC) No 1272/2008, Classification, labelling and packaging of substances and mixtures, European Commission

Table 1: NORM Industrial Activities

NORM industrial activities
Production and use of thorium, or thorium compounds, and the production of products where thorium is deliberately added
Production and use of uranium compounds, and the production of products where uranium is deliberately added
Extraction and production of rare earth elements and rare earth element alloys
Mining and processing of ores other than uranium ore
Production (but not storage, distribution or use) of oil and gas
Removal and management of radioactive scales and precipitates from equipment associated with industrial activities. For example, activities such as maintenance of clinker ovens for cement production and boilers used at coal-fired power stations.
Any industrial activity utilising phosphate ore
Manufacture of titanium dioxide pigments
The extraction and refining of zircon and manufacture of zirconium compounds
Production of tin, copper, aluminium, zinc, lead and iron and steel
Activities related to coal mine de-watering plants
China clay extraction
Water treatment associated with provision of drinking water
Geothermal energy production

Table 2: Activity concentration of radionuclides: NORM industrial activities

Radionuclide	Solid or relevant liquid activity concentration (Bq/g)	Any other liquid activity concentration (Bq/l)	Gaseous activity concentration (Bq/m^3)
U-238sec	1	0.1	0.001
U-238+	5	10	0.01
U-234	5	10	0.01
Th-230	10	10	0.001
Ra-226+	1	1	0.01
Pb-210+	5	0.1	0.01
Po-210	5	0.1	0.01
U-235sec	1	0.1	0.0001
U-235+	5	10	0.01
Pa-231	5	1	0.001
Ac-227+	1	0.1	0.001
Th-232sec	1	0.1	0.001
Th-232	5	10	0.001
Ra-228+	1	0.1	0.01
Th-228+	1	1	0.001

Table 3: Activity concentration of radionuclides in ‘practices’

Radionuclide	Activity concentration (Bq/g)
H-3	10^2
Be-7	10
C-14	10
F-18	10
Na-22	0.1
Na-24	1
Si-31	10^3
P-32	10^3
P-33	10^3
S-35	10^2
Cl-36	1
Cl-38	10
K-42	100
K-43	10
Ca-45	10^2
Ca-47	10
Sc-46	0.1
Sc-47	100
Sc-48	1
V-48	1
Cr-51	10^2
Mn-51	10
Mn-52	1
Mn-52m	10
Mn-53	10^2
Mn-54	0.1
Mn-56	10
Fe-52+	10
Fe-55	10^3
Fe-59	1
Co-55	10

Radionuclide	Activity concentration (Bq/g)
Co-56	0.1
Co-57	1
Co-58	1
Co-58m	10^4
Co-60	0.1
Co-60m	10^3
Co-61	10^2
Co-62m	10
Ni-59	10^2
Ni-63	10^2
Ni-65	10
Cu-64	10^2
Zn-65	0.1
Zn-69	10^3
Zn-69m+	10
Ga-72	10
Ge-71	10^4
As-73	10^3
As-74	10
As-76	10
As-77	10^3
Se-75	1
Br-82	1
Rb-86	10^2
Sr-85	1
Sr-85m	10^2
Sr-87m	10^2
Sr-89	10^3
Sr-90+	1
Sr-91+	10
Sr-92	10

Radionuclide	Activity concentration (Bq/g)
Y-90	10^3
Y-91	10^2
Y-91m	10^2
Y-92	10^2
Y-93	10^2
Zr-93	10
Zr-95+	1
Zr-97+	10
Nb-93m	10
Nb-94	0.1
Nb-95	1
Nb-97+	10
Nb-98	10
Mo-90	10
Mo-93	10
Mo-99+	10
Mo-101+	10
Tc-96	1
Tc-96m	10^3
Tc-97	10
Tc-97m	100
Tc-99	1
Tc-99m	10^2
Ru-97	10
Ru-103+	1
Ru-105+	10
Ru-106+	0.1
Rh-103m	10^4
Rh-105	10^2
Pd-103+	10^3
Pd-109+	10^2

Radionuclide	Activity concentration (Bq/g)
Ag-105	1
Ag-108m+	0.1
Ag-110m+	0.1
Ag-111	10^2
Cd-109+	1
Cd-115+	10
Cd-115m+	10^2
In-111	10
In-113m	10^2
In-114m+	10
In-115m	100
Sn-113+	1
Sn-125	10
Sb-122	10
Sb-124	1
Sb-125+	0.1
Te-123m	1
Te-125m	10^3
Te-127	10^3
Te-127m+	10
Te-129	10^2
Te-129m+	10
Te-131	10^2
Te-131m+	10
Te-132+	1
Te-133+	1
Te-133m+	1
Te-134	10
I-123	100
I-125	100
I-126	10

Radionuclide	Activity concentration (Bq/g)
I-129	0.01
I-130	10
I-131+	1
I-132	10
I-133	10
I-134	10
I-135	10
Cs-129	10
Cs-131	10^3
Cs-132	10
Cs-134	0.1
Cs-134m	10^3
Cs-135	10^2
Cs-136	1
Cs-137+	1
Cs-138	10
Ba-131	10
Ba-140	1
La-140	1
Ce-139	1
Ce-141	100
Ce-143	10
Ce-144+	10
Pr-142	10^2
Pr-143	10^3
Nd-147	10^2
Nd-149	10^2
Pm-147	10^3
Pm-149	10^3
Sm-151	10^3
Sm-153	10^2

Radionuclide	Activity concentration (Bq/g)
Eu-152	0.1
Eu-152m	10^2
Eu-154	0.1
Eu-155	1
Gd-153	10
Gd-159	10^2
Tb-160	1
Dy-165	10^3
Dy-166	10^2
Ho-166	10^2
Er-169	10^3
Er-171	10^2
Tm-170	10^2
Tm-171	10^3
Yb-175	10^2
Lu-177	10^2
Hf-181	1
Ta-182	0.1
W-181	10
W-185	10^3
W-187	10
Re-186	10^3
Re-188	10^2
Os-185	1
Os-191	10^2
Os-191m	10^3
Os-193	10^2
Ir-190	1
Ir-192	1
Ir-194	10^2
Pt-191	10

Radionuclide	Activity concentration (Bq/g)
Pt-193m	10^3
Pt-197	10^3
Pt-197m	10^2
Au-198	10
Au-199	10^2
Hg-197	10^2
Hg-197m	10^2
Hg-203	10
Tl-200	10
Tl-201	10^2
Tl-202	10
Tl-204	1
Pb-203	10
Pb-210+	0.01
Pb-212+	1
Bi-206	1
Bi-207	0.1
Bi-210	10
Bi-212+	1
Po-203	10
Po-205	10
Po-207	10
Po-210	0.01
At-211	10^3
Ra-223+	1
Ra-224+	1
Ra-225	10
Ra-226+	0.01
Ra-227	100
Ra-228+	0.01
Ac-227+	0.01

Radionuclide	Activity concentration (Bq/g)
Ac-228	1
Th-226+	10^2
Th-227	1
Th-228+	0.1
Th-229+	0.1
Th-230	0.1
Th-231	10^2
Th-232	0.01
Th-232+	0.01
Th-232sec	0.01
Th-234+	10
Pa-230	10
Pa-231	0.01
Pa-233	10
U-230+	1
U-231	10^2
U-232+	0.1
U-233	1
U-234	1
U-235+	1
U-235sec	0.01
U-236	10
U-237	10^2
U-238+	1
U-238sec	0.01
U-239	10^2
U-240+	10^2
Np-237+	1
Np-239	10^2
Np-240	10
Pu-234	10^2

Radionuclide	Activity concentration (Bq/g)
Pu-235	10^2
Pu-236	1
Pu-237	10^2
Pu-238	0.1
Pu-239	0.1
Pu-240	0.1
Pu-241	10
Pu-242	0.1
Pu-243	10^3
Pu-244+	0.1
Am-241	0.1
Am-242	10^3
Am-242m+	0.1
Am-243+	0.1
Cm-242	10
Cm-243	1
Cm-244	1
Cm-245	0.1
Cm-246	0.1
Cm-247+	0.1
Cm-248	0.1
Bk-249	10^2
Cf-246	10^3
Cf-248	1
Cf-249	0.1
Cf-250	1
Cf-251	0.1
Cf-252	1
Cf-253	10^2
Cf-253+	1
Cf-254	1

Radionuclide	Activity concentration (Bq/g)
Es-253	10^2
Es-254+	0.1
Es-254m+	10
Fm-254	10^4
Fm-255	10^2
Any other solid or non-aqueous liquid radionuclide that is not of natural terrestrial or cosmic origin	0.01 or that concentration which gives rise to a dose to a member of the public of 10 microsieverts per year calculated by reference to guidance by IAEA RS-G-1.7

If you require this table in an accessible format, please use the contact details at the bottom of the page.

Alternatively, you can contact the Scottish Government at the following address;

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Technical considerations

Discounting of 'normal' background

The 'out of scope' levels and the exemption levels are based on the calculated values after removing background. It is the responsibility of the authorised person[7] to either:

- Use the total assessed value of any substance, or
- Be able to demonstrate how the background has been calculated and why that is appropriate.

Separate processes, giving rise to separate solid waste streams, can be treated on their own for the purposes of the above paragraphs. A 'separate process' can be defined as one in which optimisation can be achieved without compromising any optimisation steps for another process.

A substance or article is not regarded as radioactive material or radioactive waste unless the concentration of any artificial radionuclide is above the levels 'found normally in such a substance'[8].

The purpose of this provision is to remove materials and wastes containing radionuclides which are not amenable to controls because of their ubiquitous presence in the earth, its waters or atmosphere from the need for regulation. The concept applies to artificial radionuclides found in naturally occurring materials. For instance, due to historical atmospheric weapons tests and the Chernobyl accident, certain fission products are in global circulation. Obviously, such radioactivity is not amenable to control. Neither is the radioactivity in rainwater arising from the presence of these artificial radionuclides in the atmosphere.

Practical considerations of assessment also need to be taken into account. Authorised persons are expected to use good practice to determine the radiochemical assay of the waste, but where the difference between the level 'found normally in such a substance' and the increment due to additional contamination genuinely cannot be separated or reasonably measured, then the entire material can be considered as 'out of scope'.

'Head of chain' calculations

For the purposes of calculating the total activity in wastes, the head of the chain may be taken to already include all radionuclides in a decay chain (in the case of radionuclides followed by the term 'sec'), or all the listed radionuclides (in the case of the term '+').

[7] An 'authorised person' is defined in EASR (regulation 5) as any person who has been granted a permit or registration or who is carrying on a radioactive substances activity which has been notified or is subject to general binding rules.
[8] This is the terminology used in EASR. Note that, for natural radionuclides, background levels are already out of scope when the material or waste is not being used in an industrial activity or practice.

‘sec’ where it appears after a radionuclide means that, for the purpose of calculations, all radionuclides in the decay chain in secular equilibrium have been taken into account for the purposes of radiological impact assessment.

‘+’ where it appears after a radionuclide means that, for the purpose of calculations, the radionuclide includes such of its daughter radionuclides in the decay chain that are relevant for the purposes of radiological impact assessment; these radionuclides are listed in Table 4 for out of scope material.

Technical considerations

Calculations using ‘head of chain’ values can be applied to:

- Calculations of ‘out of scope’ levels for industrial activities in Table 2.
- Calculations of ‘out of scope’ levels for practices in Table 3.

Table 4: Radionuclides in secular equilibrium

Parent radionuclide	Daughter radionuclides
Fe-52+	Mn-52m
Zn-69m+	Zn-69
Sr-90+	Y-90
Sr-91+	Y-91m
Zr-95+	Nb-95m
Zr-97+	Nb-97m, Nb-97
Nb-97+	Nb-97m
Mo-99+	Tc-99m
Mo-101+	Tc-101
Ru-103+	Rh-103m
Ru-105+	Rh-105m
Ru-106+	Rh-106
Pd-103+	Rh-103m
Pd-109+	Ag-109m
Ag-108m+	Ag-108
Ag-110m+	Ag-110
Cd-109+	Ag-109m
Cd-115+	In-115m
Cd-115m+	In-115m
In-114m+	In-114
Sn-113+	In-113m
Sb-125+	Te-125m
Te-127m+	Te-127
Te-129m+	Te-129
Te-131m+	Te-131
Te-132+	I-132
Te-133+	I-133, Xe-133m, Xe-133
Te-133m+	Te-133, I-133, Xe-133m, Xe-133
I-131+	Xe-131m
Cs-137+	Ba-137m
Ce-144+	Pr-144, Pr-144m

Parent radionuclide	Daughter radionuclides
Pb-210+	Bi-210, Po-210
Pb-212+	Bi-212, Tl-208
Bi-212+	Tl-208
Ra-223+	Rn-219,
Po-215, Pb-211, Bi-211, Tl-207	
Ra-224+	Rn-220,
Po-216, Pb-212, Bi-212, Tl-208	
Ra-226+	Rn-222, Po-218, Pb-214, Bi-214, Po-214
Ra-228+	Ac-228
Ac-227+	Th-227, Fr-223, Ra-223, Rn-219, Po-215, Pb-211, Bi-211, Tl207, Po-211
Th-226+	Ra-222, Rn-218, Po-214
Th-228+	Ra-224,
Rn-220, Po-216, Pb-212, Bi-212, Tl-208	
Th-229+	Ra-225,
Ac-225, Fr-221, At-217, Bi-213, Tl-209,Pb-209	
Th-232+	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi212, Tl-208
Th-232sec	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi212, Po-212, Tl-208
Th-234+	Pa-234m, Pa-234
U-230+	Th-226, Ra-222, Rn-218, Po-214
U-232+	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208
U-235+	Th-231
U-235sec	Th-231, Pa-231, Ac-227, Th-227, Fr-223, Ra-223, Rn-219, Po215, Pb-211, Bi-211, Tl-207, Po-211
U-238+	Th-234, Pa-234m, Pa-234
U-238sec	Th-234, Pa-234m, Pa-234, U-234, Th-230, Ra-226, Rn-222, Po218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
U-240+	Np-240m, Np-240
Np-237+	Pa-233
Pu-244+	U-240, Np-240m, Np-240
Am-242m+	Np-238
Am-243+	Np-239
Cm-247+	Pu-243
Cf-253+	Cm-249
Es-254+	Bk-250
Es-254m+	Fm-254

Glossary and abbreviations

All terms used in this guidance have the same meaning as given in the Environmental Authorisations (Scotland) Regulations 2018.

Abbreviation	Meaning
EASR	Environmental Authorisations (Scotland) Regulations 2018
IAEA	International Atomic Energy Agency
HPA	Health Protection Agency
NORM	Naturally Occurring Radioactive Material
SEPA	Scottish Environment Protection Agency

Annex 1: Approach to exclusion and clearance in radioactive substances legislation in Scotland

International definitions

The IAEA definitions of the terms ‘exclusion’ and ‘clearance’ are taken from IAEA Safety Glossary, 2018 edition.

Exclusion is defined as:

‘The deliberate excluding of a particular type of exposure from the scope of an instrument of regulatory control on the grounds that is it not considered amenable to control through the regulatory instrument in question’.

Clearance is defined as:

Removal of regulatory control by the regulatory body from radioactive material or radioactive objects within notified or authorized facilities and activities.’

Euratom has developed these concepts further to derive numerical values for both ‘clearance’ and ‘exemption’. Clearance values/exemption values for bulk solid amounts are set out in Annex VII Table A of the BSSD 13. Exemption levels for moderate amounts for any type of material (solids, liquids, gases), are set out in Annex VII Table B of the BSSD 13. The general criteria for the exemption of practices or clearance of authorised practices are set out in Annex VII.

Approach to exclusion and clearance – ‘out of scope’

EASR achieves broadly the same result, in that substances and articles are ‘out of scope’, so not radioactive and not subject to regulatory controls, where they:

- are not amenable to control; or
- have radionuclide concentrations below the IAEA RS-G-1.7 (or equivalent) clearance levels.

Table 2 gives the values for NORM used in industrial activities and Table 3 for artificial radionuclides or NORM used for their radioactive, fissile or fertile properties). The section of this guidance on ‘Underpinning the out of scope numerical values’ explains the origin of the values (Table 3 derives from the BSSD 13 Table A).

Annex 2: Changes to values in Tables

This Annex shows the changes made to Tables 2 and 3 since the 2011 UK-wide guidance on the Scope and Exemptions from the Radioactive Substances legislation in the UK was published and any deviations from the BSSD 13 values.

Comparison of values in Table 2: Concentration of radionuclides: NORM industrial activities

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
U-238 sec	1	0.5	To reflect value given in BSSD 13
Ra-226 +	1	0.5	To reflect value given in BSSD 13
Th-232 sec	1	0.5	To reflect value given in BSSD 13
Th-228 +	1	0.5	To reflect value given in BSSD 13

Comparison of values in Table 3: Concentration of radionuclides in 'practices'

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
C-14	10	10	BSSD 13 value is 1 but the value kept the same for reasons documented in the BEIS consultation[9]
F-18	10	1	To reflect value given in BSSD 13
Na-24	1	0.1	To reflect value given in BSSD 13
Si-31	1000	100	To reflect value given in BSSD 13
P-32	1000	100	To reflect value given in BSSD 13
P-33	1000	100	To reflect value given in BSSD 13
Cl-38	10	1	To reflect value given in BSSD 13

[9] BEIS (2017) Revised Requirements For Radiological Protection: Regulation of Public Exposures and the Justification of Practices https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/649935/Consultation_on_BSSD_Public_Exposures_and_Justification.pdf

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
K-42	100	10	To reflect value given in BSSD 13
K-43	10	1	To reflect value given in BSSD 13
Ca-47	10	1	To reflect value given in BSSD 13
Sc-47	100	10	To reflect value given in BSSD 13
Sc-48	1	0.1	To reflect value given in BSSD 13
V-48	1	0.1	To reflect value given in BSSD 13
Cr-51	100	10	To reflect value given in BSSD 13
Mn-51	10	1	To reflect value given in BSSD 13
Mn-52	1	0.1	To reflect value given in BSSD 13
Mn-52m	10	1	To reflect value given in BSSD 13
Mn-53	100	1000	To reflect value given in BSSD 13
Mn-56	10	1	To reflect value given in BSSD 13
Fe-52+	10	1	To reflect value given in BSSD 13
Fe-55	1000	100	To reflect value given in BSSD 13
Fe-59	1	0.1	To reflect value given in BSSD 13
Co-55	10	1	To reflect value given in BSSD 13
Co-58	1	0.1	To reflect value given in BSSD 13
Co-58m	10 000	100	To reflect value given in BSSD 13
Co-62m	10	1	To reflect value given in BSSD 13
Ni-65	10	1	To reflect value given in BSSD 13
Cu-64	100	10	To reflect value given in BSSD 13
Zn-65	0.1	1	To reflect value given in BSSD 13

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Zn-69	1000	100	To reflect value given in BSSD 13
Zn-69m+	10	1	To reflect value given in BSSD 13
Ga-72	10	1	To reflect value given in BSSD 13
As-73	1000	100	To reflect value given in BSSD 13
As-74	10	1	To reflect value given in BSSD 13
As-76	10	1	To reflect value given in BSSD 13
As-77	1000	100	To reflect value given in BSSD 13
Br-82	1	0.1	To reflect value given in BSSD 13
Rb-86	100	10	To reflect value given in BSSD 13
Sr-85m	100	10	To reflect value given in BSSD 13
Sr-87m	100	10	To reflect value given in BSSD 13
Sr-89	1000	10	To reflect value given in BSSD 13
Sr-91+	10	1	To reflect value given in BSSD 13
Sr-92	10	1	To reflect value given in BSSD 13
Y-90	1000	100	To reflect value given in BSSD 13
Y-91	100	10	To reflect value given in BSSD 13
Y-91m	100	1	To reflect value given in BSSD 13
Y-92	100	10	To reflect value given in BSSD 13
Y-93	100	10	To reflect value given in BSSD 13
Zr-95+	1	0.1	To reflect value given in BSSD 13
Zr-97+	10	1	To reflect value given in BSSD 13
Nb-93m	10	100	To reflect value given in BSSD 13

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Nb-97+	10	1	To reflect value given in BSSD 13
Nb-98	10	1	To reflect value given in BSSD 13
Mo-90	10	1	To reflect value given in BSSD 13
Mo-99+	10	1	To reflect value given in BSSD 13
Mo-101+	10	1	To reflect value given in BSSD 13
Tc-96	1	0.1	To reflect value given in BSSD 13
Tc-96m	1000	10	To reflect value given in BSSD 13
Tc-97m	100	10	To reflect value given in BSSD 13
Ru-97	10	1	To reflect value given in BSSD 13
Ru-105+	10	1	To reflect value given in BSSD 13
Ru-106+	0.1	1	To reflect value given in BSSD 13
Rh-105	100	10	To reflect value given in BSSD 13
Ag-108m+	0.1	0.1	Value not given in BSSD but retained from previous legislation
Ag-111	100	10	To reflect value given in BSSD 13
Cd-109+	1	10	To reflect value given in BSSD 13
Cd-115+	10	1	To reflect value given in BSSD 13
Cd-115m+	100	10	To reflect value given in BSSD 13
In-111	10	1	To reflect value given in BSSD 13
In-113m	100	10	To reflect value given in BSSD 13
In-114m+	10	1	To reflect value given in BSSD 13
In-115m	100	10	To reflect value given in BSSD 13
Sn-125	10	1	To reflect value given in BSSD 13

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Sb-122	10	1	To reflect value given in BSSD 13
Sb-124	1	0.1	To reflect value given in BSSD 13
Sb-125+	0.1	1	To reflect value given in BSSD 13
Te-125m	1000	100	To reflect value given in BSSD 13
Te-127	1000	100	To reflect value given in BSSD 13
Te-129	100	10	To reflect value given in BSSD 13
Te-131	100	10	To reflect value given in BSSD 13
Te-131m+	10	1	To reflect value given in BSSD 13
Te-132+	1	0.1	To reflect value given in BSSD 13
Te-133+	1	1	Value of 10 is given in BSSD 13 for Te-133 but it does not include its short- lived progeny, so decision taken to retain previous legislation value which does.
Te-133m+	1	1	Value of 10 is given in BSSD 13 for Te-133m but it does not include its short-lived progeny, so decision taken to retain value from previous legislation which does.
Te-134	10	1	To reflect value given in BSSD 13
I-123	100	10	To reflect value given in BSSD 13
I-125	100	1	To reflect value given in BSSD 13
I-126	10	1	To reflect value given in BSSD 13
I-129	0.01	0.1	To reflect value given in BSSD 13
I-130	10	1	To reflect value given in BSSD 13
I-131+	1	1	Value of 10 is given in BSSD 13 for I-131 but it does not include its short-lived

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
			progeny, so decision taken to retain previous legislation value which does.
I-132	10	1	To reflect value given in BSSD 13
I-133	10	1	To reflect value given in BSSD 13
I-134	10	1	To reflect value given in BSSD 13
I-135	10	1	To reflect value given in BSSD 13
Cs-129	10	1	To reflect value given in BSSD 13
Cs-132	10	1	To reflect value given in BSSD 13
Cs-135	100	10	To reflect value given in BSSD 13
Cs-136	1	0.1	To reflect value given in BSSD 13
Cs-137+	1	1	BSSD 13 value is 1 but the value kept the same for reasons documented in the BEIS consultation[10]
Cs-138	10	1	To reflect value given in BSSD 13
Ba-131	10	1	To reflect value given in BSSD 13
Ba-140	1	0.1	To reflect value given in BSSD 13
La-140	1	0.1	To reflect value given in BSSD 13
Ce-141	100	10	To reflect value given in BSSD 13
Ce-143	10	1	To reflect value given in BSSD 13
Ce-144+	10	10	BSSD 13 gives Ce-144 rather than Ce-144+. This is a mistake in BSSD 13 as the source data (IAEA Safety Series 44, Table 1) states that progeny are included.

[10] BEIS (2017) Revised Requirements For Radiological Protection: Regulation of Public Exposures and the Justification of Practices https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/649935/Consultation_on_BSSD_Public_Exposures_and_Justification.pdf

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Pr-142	100	10	To reflect value given in BSSD 13
Pr-143	1000	100	To reflect value given in BSSD 13
Nd-147	100	10	To reflect value given in BSSD 13
Nd-149	100	10	To reflect value given in BSSD 13
Pm-147	1000	100	To reflect value given in BSSD 13
Pm-149	1000	100	To reflect value given in BSSD 13
Sm-151	1000	100	To reflect value given in BSSD 13
Sm-153	100	10	To reflect value given in BSSD 13
Eu-152m	100	10	To reflect value given in BSSD 13
Eu-155	1	10	To reflect value given in BSSD 13
Gd-159	100	10	To reflect value given in BSSD 13
Tb-160	1	0.1	To reflect value given in BSSD 13
Dy-165	1000	100	To reflect value given in BSSD 13
Dy-166	100	10	To reflect value given in BSSD 13
Ho-166	100	10	To reflect value given in BSSD 13
Er-169	1000	100	To reflect value given in BSSD 13
Er-171	100	10	To reflect value given in BSSD 13
Tm-170	100	10	To reflect value given in BSSD 13
Tm-171	1000	100	To reflect value given in BSSD 13
Yb-175	100	10	To reflect value given in BSSD 13
Lu-177	100	10	To reflect value given in BSSD 13
W-185	1000	100	To reflect value given in BSSD 13

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
W-187	10	1	To reflect value given in BSSD 13
Re-186	1000	100	To reflect value given in BSSD 13
Re-188	100	10	To reflect value given in BSSD 13
Os-191	100	10	To reflect value given in BSSD 13
Os-193	100	10	To reflect value given in BSSD 13
Ir-190	1	0.1	To reflect value given in BSSD 13
Ir-192	1	0.1	To reflect value given in BSSD 13
Ir-194	100	10	To reflect value given in BSSD 13
Pt-191	10	1	To reflect value given in BSSD 13
Pt-193m	1000	100	To reflect value given in BSSD 13
Pt-197	1000	100	To reflect value given in BSSD 13
Au-198	10	1	To reflect value given in BSSD 13
Au-199	100	10	To reflect value given in BSSD 13
Hg-197	100	10	To reflect value given in BSSD 13
Hg-197m	100	10	To reflect value given in BSSD 13
Hg-203	10	1	To reflect value given in BSSD 13
Tl-200	10	1	To reflect value given in BSSD 13
Tl-201	100	10	To reflect value given in BSSD 13
Tl-202	10	1	To reflect value given in BSSD 13
Tl-204	1	10	To reflect value given in BSSD 13
Pb-203	10	1	To reflect value given in BSSD 13
Pb-210+	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Pb-212+	1	1	Value not given in BSSD 13 but retained from previous legislation
Bi-206	1	0.1	To reflect value given in BSSD 13
Bi-210	10	10	Value not given in BSSD 13 but retained from previous legislation
Bi-212+	1	1	Value not given in BSSD 13 but retained from previous legislation
Po-203	10	1	To reflect value given in BSSD 13
Po-205	10	1	To reflect value given in BSSD 13
Po-207	10	1	To reflect value given in BSSD 13
Po-210	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
At-211	1000	100	To reflect value given in BSSD 13
Ra-223+	1	1	Value not given in BSSD 13 but retained from previous legislation
Ra-224+	1	1	Value not given in BSSD 13 but retained from previous legislation
Ra-225	10	1	To reflect value given in BSSD 13
Ra-226+	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Ra-227	100	10	To reflect value given in BSSD 13
Ra-228+	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Ac-227+	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Ac-228	1	1	Value not given in BSSD 13 but retained from previous legislation

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Th-226+	100	100	Value of 103 is given in BSSD 13 but it does not include its short-lived progeny, so decision taken to retain value from previous legislation which does.
Th-227	1	1	Value not given in BSSD 13 but retained from previous legislation
Th-228+	0.1	0.1	Value not given in BSSD 13 but retained from previous legislation
Th-229+	0.1	0.1	BSSD 13 gives Th-229 rather than Th-229+. Although the value in BSSD 13 and previous legislation are the same, the value is based on previous legislation which includes short-lived progeny.
Th-230	0.1	0.1	Value not given in BSSD 13 but retained from previous legislation
Th-231	100	100	Value not given in BSSD 13 but retained from previous legislation
Th-232	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Th-232+	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Th-232sec	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
Th-234+	10	10	Value not given in BSSD 13 but retained from previous legislation
Pa-230	10	1	To reflect value given in BSSD 13
Pa-231	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
U-230+	1	1	Value of 10 is given in BSSD 13 but it does not include its short-lived progeny, so

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
			decision taken to retain previous legislation value which does.
U-231	100	10	BSSD 13 gives U-231+ rather than U231. This is a mistake in BSSD 13 as the source data (IAEA Safety Series 44, Table 1) states that progeny are included
U-234	1	1	Value not given in BSSD 13 but retained from previous legislation
U-235+	1	1	Value not given in BSSD 13 but retained from previous legislation
U-235sec	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
U-236	10	1	To reflect value given in BSSD 13
U-237	100	10	To reflect value given in BSSD 13
U-238+	1	1	Value not given in BSSD 13 but retained from previous legislation
U-238sec	0.01	0.01	Value not given in BSSD 13 but retained from previous legislation
U-240+	100	10	To reflect value given in BSSD 13
Np-237+	1	0.1	To reflect value given in BSSD 13
Np-239	100	10	To reflect value given in BSSD 13
Np-240	10	1	To reflect value given in BSSD 13
Pu-236	1	0.1	To reflect value given in BSSD 13
Pu-237	100	10	To reflect value given in BSSD 13
Pu-241	10	1	To reflect value given in BSSD 13
Pu-243	1000	100	To reflect value given in BSSD 13

Radionuclide	Solid or 'relevant liquid' activity concentration (Bq/g)		Reason for change
	EASR (current)	Previous legislation	
Am-242	1000	100	To reflect value given in BSSD 13
Cm-242	10	1	To reflect value given in BSSD 13
Cm-243	1	0.1	To reflect value given in BSSD 13
Cm-244	1	0.1	To reflect value given in BSSD 13
Bk-249	100	10	To reflect value given in BSSD 13
Cf-246	1000	10	To reflect value given in BSSD 13
Cf-250	1	0.1	To reflect value given in BSSD 13
Cf-252	1	0.1	To reflect value given in BSSD 13
Cf-253	100	1	To reflect value given in BSSD 13
Cf-253+	100	1	BSSD 13 only gives a value for Cf-253 so for completeness the value for Cf-253+ has been retained from previous legislation.
Cf-254	1	0.1	To reflect value given in BSSD 13
Es-253	100	1	To reflect value given in BSSD 13
Es-254m+	10	1	To reflect value given in BSSD 13
Fm-254	10 000	100	To reflect value given in BSSD 13
Fm-255	100	10	To reflect value given in BSSD 13

Annex 3

Hierarchy of Legislation and Guidance

This guidance represents an aid to the interpretation of EASR. It sets out how the various scope provisions in EASR have been determined, and how each provision in some way supports the application of 'risk-informed regulation'.

The hierarchy involves three levels:

- EASR sets out the legal provisions dealing with the scope of EASR.
- Government guidance (this document) sets out the expectations of the Scottish Government with regard to EASR. It is primarily intended for use by the environmental regulators but will also assist those subject to EASR.
- Regulators' guidance (procedural guidance) sets out procedural matters in more detail. It has more detailed explanations of how EASR applies and the expectations of those that are regulated under EASR.

Underpinning of the 'out of scope' numerical values

'Out of scope' is defined in EASR by reference to various activities and threshold values. The basis on which the numerical values and waste disposal criteria have been developed are mainly related to the radiation dose that could be received by a member of the public. There are exceptions to this general concept; threshold values for 'management of radioactive material', for instance, are based on practical considerations, bearing in mind that radiation safety for workers is a matter for the health and safety regulators under the Ionising Radiations Regulations 2017[11].

Different dose criteria are used for naturally occurring radioactive materials (NORM) used in 'NORM industrial activities' (as specified in EASR), compared to those used for artificial radionuclides and NORM used for their radioactive, fissile or fertile properties.

These dose criteria have been selected as a basis for 'out of scope' as representing appropriate levels of risk below which regulation is not necessary. They are based on international standards and guidance which support the BSSD 13. The radiological impact assessments carried out by the International Atomic Energy Agency (IAEA) to support the 'out of scope' values take into account a wide variety of possible exposure pathways including water and food pathways, and assume no controls are placed on the management of radioactive material and management of radioactive waste.

For artificial radionuclides, and for NORM used for their radioactive, fissile or fertile properties (sometimes referred to as a 'practice'), the numerical values given in Table 3 for 'out of scope' are based on a radiation dose of 10 μSv/year to a member of the public. These values are given in the BSSD 13 and are taken from IAEA RS-G-1.7[12]. The term 'practice' is not used in EASR; however, it is used in BSSD 13

[11] Ionising Radiations Regulations 2017, SI 2017 No. 1075

[12] Application of the concepts of exclusion, exemption and clearance, RS-G-1.7, IAEA

and in other UK legislation and guidance. In BSSD 13 it is given a broad definition: a human activity that can increase the exposure of individuals to radiation from a radiation source. Where it appears in this guidance, it is used in a narrower sense, as a shorthand form to mean 'an activity involving artificial radionuclides or which employs the radioactive, fissile or fertile properties of NORM'.

For 'NORM industrial activities', the numerical values given in Table 2 ('out of scope' values) are based on a number of sources. For solids or 'relevant liquids, the value of 1 Bq/g for the natural decay chains is taken from IAEA RS-G-1.7 with the values for the some of the decay chain segments being taken from EC RP122 Part 2[13]. The IAEA value of 1 Bq/g is based on the consideration of the upper end of the worldwide distribution of activity concentrations in soil provided by the United Nations Scientific Committee on the Effects of Atomic Radiation. The EC RP122 Part 2 concentrations used for the decay chain segments are calculated using a dose criterion of 300 μSv/year for any member of the public. This criterion is also the basis for the values calculated for liquids other than 'relevant liquids' taken from HPA-CRCE-005[14] and gaseous concentrations[15].

The Table 2 'out of scope' values for Ra-226 are applied to management of waste arising from the remediation of land contaminated by historic radium activities as long as the contamination occurred prior to 13 May 2000 (date of coming into force of the previous European Council Directive 96/29/Euratom).

As well as numerical limits, other conditions are in place to ensure that the generation of radioactive waste is minimised and disposal limits are appropriate to mitigate consequences, so an operator can be sure that they are in control. Restrictions are placed on the type of substance or article (for example, a waste sealed source), on the disposal route (for example, to a sewer or to a landfill), or on the management of waste (for example, disposal with considerable quantities of non-radioactive waste).

[13] Radiation protection 122, Practical use of the concepts of clearance and exemption, Part II Application of the concepts of exemption and clearance to natural radiation sources, European Commission

[14] Derivation of liquid exclusion or exemption levels to support the RSA93 exemption order review, HPA-CRCE-005, HPA 2010

[15] Advised in HPA letter to DECC dated 27 August 2010

This publication is available at **www.gov.scot**

Any enquiries regarding this publication should be sent to us at
The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-80004-057-1 (web only)

Published by The Scottish Government, November 2020

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS760506 (11/20)