

### Key message

Doses of radioactive substances from 2013 to 2017 are relatively consistent and within the legal limits of 1.000 millisievert per year.



### Background

The Scottish Environment Protection Agency (SEPA) regulates the disposal of radioactive waste from licensed nuclear sites. Also it permits the keeping and use of radioactive substances and the accumulation and disposal of radioactive waste from non-nuclear industrial sites.

SEPA is required to ensure that the amount of radiation that an individual is exposed to from the authorised disposal of radioactive waste does not exceed 1.000 millisievert per year (mSv/y), which is a measurement of dose. SEPA's environmental monitoring programme allows a retrospective assessment

to be undertaken to ensure that the conditions and discharge limits in an operator's licence continue to provide the required protection of the public and the environment.

The retrospective assessments are produced on an annual basis in the Radioactivity in Food and the Environment (RIFE) report series, which are publicly available via the [SEPA website](#). For this assessment, a summary of the dose impact to exposed groups in Scotland has been reproduced for the five year period covering 2013 to 2017. The assessment breakdown is

available in the [RIFE report](#) of each year and the reader is directed to review this report for the methodology and underlying data.

Further information and international and domestic guidance on the Environmental Monitoring Programme and Habits Programme SEPA undertake to gather data is available on the SEPA website: <https://www.sepa.org.uk/environment/radioactive-substances/environmental-monitoring-and-assessment/>.

## Results

The results presented in the RIFE reports (available on the SEPA website) show that the doses to the most exposed members of the public from exposure to permitted discharges of radioactive waste from the nuclear industry across Scotland are well below the public dose limit (1.000 mSv/y) in all regions. The people most affected in terms of exposure to radiation from waste discharges in or that affect Scotland were those on the Dumfries and Galloway coast who consumed large quantities of seafood.

### Results of monitoring & dose assessments

Data collected over the period from 2013 to 2017 shows a largely stable trend in dose estimates

Site considered	Total dose To be compared to dose limit of 1.000 millisievert per year				
	2013	2014	2015	2016	2017
Effects from Sellafield (derived aquatic pathways only) measured across Dumfries and Galloway	0.044	0.045	0.037	0.044	0.035
Dounreay	0.012	0.012	0.010	0.058	0.010
Chapelcross	0.024	0.014	0.022	0.026	0.035
Hunterston	0.021	0.021	0.025	0.021	0.023
Torness	0.020	0.020	0.020	0.021	0.021
HMNB Clyde (Faslane)	<0.005	<0.005	<0.005	0.009	<0.005
Holy Loch*	<0.005	0.011	0.012	0.013	0.009
Rosyth	<0.005	<0.005	0.006	0.017	0.026

Table 1:  
Total Dose results as reported in RIFE series from 2013 - 2017.

\* Holy Loch: This site is monitored due to former activities at this location.

The results of the marine and terrestrial monitoring programmes are reported annually, together with an assessment of the impact of the discharges to the most exposed groups, in the Radioactivity in Food and the Environment (RIFE) reports (see link above). The low dose values reported in Table 1 are not indicative of a trend due to the calculation steps involved for treating environmental monitoring results at the limit of detection as either positive or zero as explained in the RIFE methodology. The data demonstrate that the doses are largely stable however, can be affected by a change in input values, such as a higher limit of detection in a single sample or a change in habits data highlighting higher consumption than previously reported. The data will vary each year due to many factors, such as sample availability, reduction in the sample mass and changes to local habits (reduced consumption). The doses to the reference groups are calculated to be significantly less than the legal dose limit of 1.000 mSv/y.

Data collected over the period from 2013 to 2017 shows a largely stable trend in dose estimates. Slight variations appear from year to year, however these are likely to be the effect of changes in regional habits (e.g. a change in the consumption

rates of specific food groups) or the impact of sample availability on the limit of detection of a particular radionuclide (e.g. where a smaller sample size has resulted in a larger limit of detection on analysis). Figure 1 depicts the total radiation doses in Scotland for 2017.

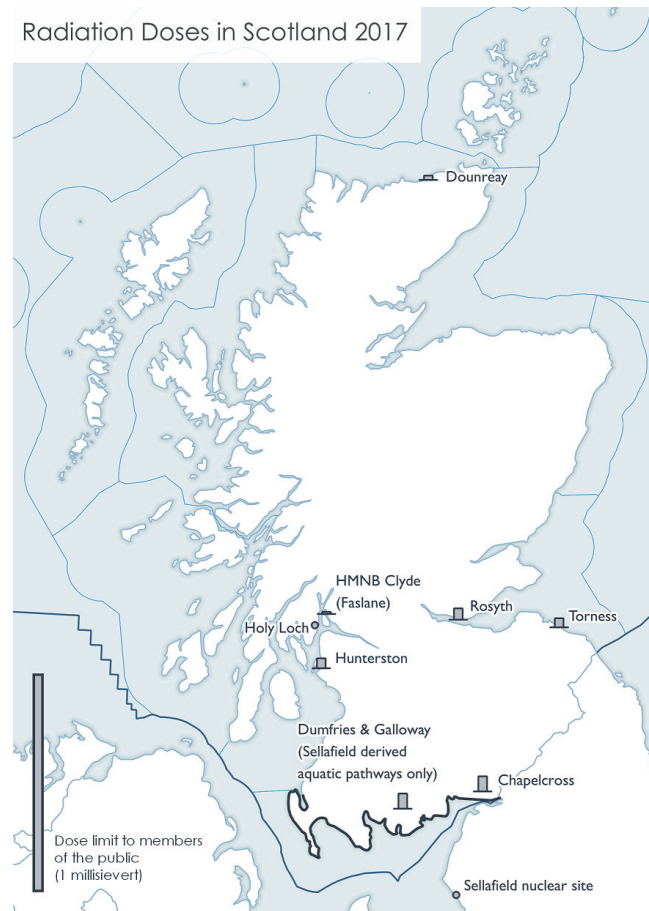


Figure 1: Total doses in Scotland due to radioactive waste discharges and direct radiation, 2017. Source: Radioactivity in Food and the Environment Report 2018 (RIFE-24). A small background monitoring programme is undertaken in Shetland and reported in the RIFE report but there are no data to include on this map.

## Conclusion

Data collected over the period from 2013 to 2017 shows a largely stable trend in dose estimates. Small variations from year to year and normally the result in a sample type change which can raise the limit of detection for a particular analyte. Overall, the results of monitoring and assessment demonstrate that the controls placed upon operators by SEPA ensure that members of the public and the environment are adequately protected (i.e. doses are significantly less than the legal dose limit of 1.000 mSv/y).









Radioactive substances will continue to be monitored each year at the same locations or as modified as required and identified in the radiological habits survey programme.

Given the nature of radioactive substances control and the SEPA oversight, these data are unsuitable for use without knowledge of the underlying assessment process and datasets. It is unlikely that any individual would seek to utilise the data for marine planning.



















## Knowledge gaps

Currently the RIFE report assesses radioactivity in food and the environment, with a focus on human health. Developments are currently underway to better understand the impacts of radioactivity on non-human species. In addition, work is ongoing to improve radioactivity exposure assessments from discharges of naturally occurring radioactive material from the oil and gas industry.

## Status and Trend assessment

Region assessed	Status with confidence	Trend with confidence	Comments
<b>Clyde</b> Hunterston HMNB Clyde (Faslane) Holy Loch	 ★★★	 ★★★	For all sites under assessment the doses calculated (and hence underlying environmental concentration data) are below the legal dose limit (1.000 mSv/y) and are relatively stable year to year.
<b>Forth and Tay</b> Torness Rosyth	 ★★★	 ★★★	For all sites under assessment the doses calculated (and hence underlying environmental concentration data) are below the legal dose limit (1.000 mSv/y) and are relatively stable year to year.
<b>North Coast</b> Dounreay	 ★★★	 ★★★	For all sites under assessment the doses calculated (and hence underlying environmental concentration data) are below the legal dose limit (1.000 mSv/y) and are relatively stable year to year.
<b>Solway</b> Effects from Sellafield (derived aquatic pathways only) measured across Dumfries and Galloway Chapelcross	 ★★★	 ★★★	For all sites under assessment the doses calculated (and hence underlying environmental concentration data) are below the legal dose limit (1.000 mSv/y) and are relatively stable year to year.

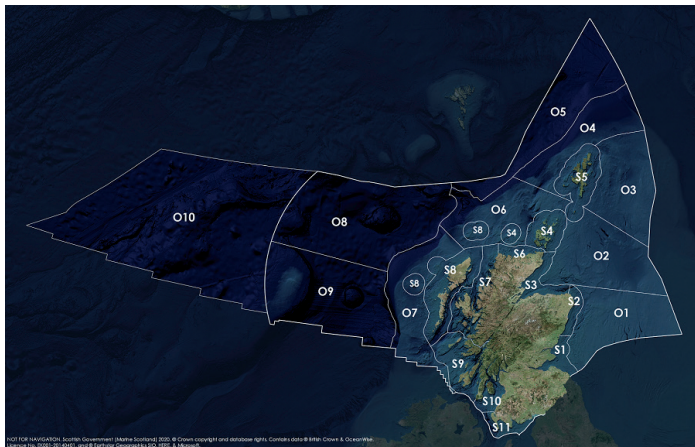
## Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	<b>Confidence assessment</b>	
	Lack of evidence / robust assessment criteria		
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas		Low
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas		Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas		High

## Overall confidence

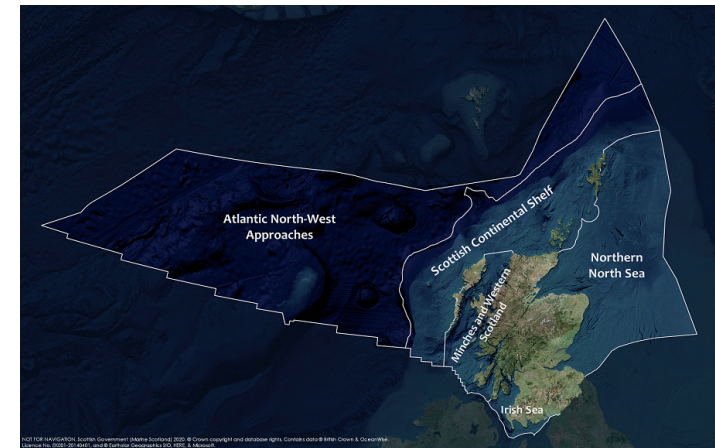


## Assessment regions

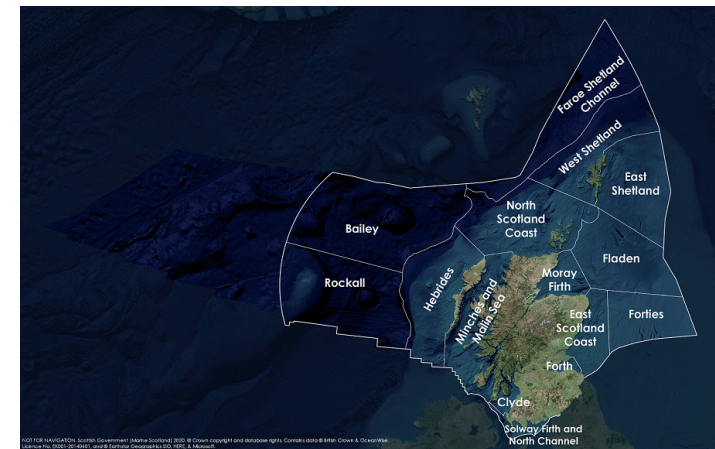


The Scottish Marine Regions (SMRs; S1 - S11) and the Scottish Offshore Marine Regions (OMRs, O1 - O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands; S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.