

Improving your local environment

Enhanced monitoring for radioactive particles

May 2013

Background

Environmental monitoring must be carried out as a condition of the environmental permits that we issue to nuclear site operators. Environmental monitoring is important in order to demonstrate that discharges from nuclear sites are being properly controlled, and to demonstrate that the impacts of discharges on people and the environment continue to be minimised.

We require that operators use the best available techniques to carry out their monitoring, and that improved techniques are used if these become available. As part of our assessment of these techniques and the results they produce we have sought the views of, and work with, a number of partner agencies and organisations including Public Health England, the Food Standards Agency, local authorities, and the independent expert Committee on Medical Aspects of Radiation in the Environment.

In 2006 Sellafield Limited tested a new, vehicle-mounted detector system to monitor local beaches for small radioactive objects and particles. This work was successful, and since May 2007 this new equipment has been used routinely to survey beaches in the vicinity of Sellafield site.

The monitoring programme has focused on beach areas between St Bees and Drigg. It has also included areas as far south as Silcroft, and up to the Solway Firth to the north. To date, a total beach area of over 1600 hectares has been monitored.

In the summer of 2011, spring of 2012 and spring of 2013, offshore monitoring trials were undertaken as part of the next stage of work to understand the full extent of particles issue.

The outcome from these trials has been reported by Sellafield Limited in its annual report which is available from its website at: <http://sustainability.sellafieldsites.com/environment/environment-page/particles-in-the-environment/>



Vehicle-mounted radioactive particle detection system

Monitoring Results to Date

Since the trials in 2006 up to 1 May 2013, 1754 radioactive objects (small particles, pebbles and stones) have been found and removed from the beaches. The majority of the finds have been found in or on sand in the stretch of beach extending around 3km north from the Sellafield site (up to and including Braystones). The numbers of finds in each of the areas monitored are shown in the following table.

These numbers also include the results of repeat surveys that have been carried out on most of the beaches. These repeat surveys show that, after time, new particles are being found on the beaches. This is not entirely surprising, as the seabed sediment and beach sediments are continually being mixed and exchanged due to tidal action.

The latest data from the beach monitoring programmes is available from the Sellafield Limited Particles in the Environment website: <http://sustainability.sellafieldsites.com/environment/environment-page/particles-in-the-environment/>

Beach location	Area surveyed Hectares	No of pebbles and stones found (objects 2mm or more in size)	No of particles found (objects less than 2mm in size)
Cumbria			
Allonby	60.43	0	5
Workington	29.62	0	2
Harrington	7.99	0	4
Parton	4.14	0	0
Whitehaven	11.43	0	9
St_Bees	253.84	0	122
Nethertown	9.17	0	0
Sellafield	473.70	482	739
Braystones	311.60	0	313
Seascale	296.30	3	54
Drigg	172.52	0	20
Silecroft	13.91	0	0
Seabed	Not applicable	0	1
Dumfries & Galloway			
Goatwell Bay	8.18	0	0
Southernness	15.74	0	0
ALL AREAS TOTAL	1668.57	485	1269

making good progress in removing these objects from the environment.

Find rates for 'alpha-rich' particles were also seen to fall between 2006 and 2009, but have increased since August 2009, coinciding with the introduction of a new, further improved detection system, which has greater sensitivity for this type of particle. Consequently we are not yet able to show conclusively that the monitoring and retrieval programme is also significantly depleting the numbers of 'alpha-rich' particles in the environment.

We asked Public Health England (PHE) (formerly the Health Protection Agency), the principal advisory body in the UK for radiation risks, to consider the increased find rate since the introduction of the new detection system. PHE concluded that there is good evidence that the higher find rate is because the new system is more sensitive and so able to detect a higher number of particles, rather than to any real increase in the number of objects on the beaches. PHE's report on this work has been published and is available at <http://www.hpa.org.uk/Publications/Radiation/CRC/EScientificAndTechnicalReportSeries/HPACRCE038/>

What Risks do the Finds Present to the Public?

Beta-rich particles, pebbles or stones: if in contact with the skin, these types of objects could cause temporary skin reddening or minor ulceration. However, the levels of these isotopes found in these objects so far are such that only very prolonged contact (many hours) in exactly the same area of skin would be necessary to cause these effects. The chance of coming into contact with such a particle, and then for it to remain in such prolonged contact with the skin, is considered to be very low.

Alpha-rich particles, pebbles or stones: although these types of objects are of little health concern if outside of the body, they could cause an increased risk of cancer if swallowed or inhaled. While a minority of these could possibly give a significant radiation dose in the long term if they were to be accidentally swallowed or inhaled, the chances of encountering, and of swallowing or inhaling such a particle are considered to be very low.

Types of Objects Being Found

The objects that have been retrieved are varied in their size, shape, and in the radioactive components that they contain. 'Particles' are considered to be objects less than 2mm in diameter, with objects larger than this being considered to be pebbles or stones. The objects are also classified according to their radionuclide composition:

- particles, pebbles or stones contaminated mainly with caesium-137, cobalt-60 or strontium-90 are classified as 'beta-rich';
- particles, pebbles or stones contaminated mainly with americium-241 and isotopes of plutonium are classified as 'alpha-rich'.

The results to date indicate that find-rates for the beta-rich particles, and for pebbles/stones, are reducing with time, suggesting that the 'detect and recover for analysis' monitoring programme is

We have asked Public Health England about the health implications for the public of the radioactive objects that had been found and recovered, and we have commissioned them to carry out a detailed assessment of risks. PHE's report on this work has been published and is available at: <http://www.hpa.org.uk/Publications/Radiation/CRCEScientificAndTechnicalReportSeries/HPACRCE018/>

Since the publication of this first report the introduction of a more sensitive monitoring system has found the find rate for the alpha rich particles to increase. We asked Public Health England to consider how this affected the findings of its original risk assessment. They have concluded that taking this increased find rate into consideration the overall health risks to the public remain very low and significantly lower than other risks that people accept when using the beaches.

Their advice remains that:

No special precautionary actions are required at this time to limit access to or use of the beaches. However, monitoring and retrieval should be continued - with emphasis on frequented areas.

We keep Public Health England informed as new information emerges, and they have agreed to keep its advice under review in light of new information.

We are continuing to work on identifying the precise origin of these contaminated objects, and to assess Sellafield Limited's arrangements for preventing further releases of radioactively contaminated solids into the environment. This work is increasingly showing that:

- there are no on-going discharges of significantly active particles into the environment;
- the finds to date are related to past events and incidents at Sellafield that occurred 25-40 years ago.

Further detail on the monitoring data compiled so far, and a map of the locations of the finds, can be obtained from Sellafield Limited:

<http://sustainability.sellafieldsites.com/environment/environment-page/particles-in-the-environment/>

What Next?

We will continue to ensure that sufficient beach monitoring is undertaken to reassure ourselves, and the public, that the risks to beach users from radioactive particles remain low.

We will also begin to focus the programme on the development of the techniques and aims for offshore monitoring. This will build on the existing beach monitoring programme as well as the trials undertaken in the summer of 2011, spring of 2012 and spring of 2013 when grab samples were taken of seabed sediments. The work will ensure that the overall programme of monitoring addresses the remaining areas of uncertainty as well as providing reassurance that the risks remain low.



Staff monitoring sediment for particles whilst onboard a vessel off the Cumbrian coast (the sediment grab can be seen hanging in the middle of the picture)

The Environment Agency will continue to focus on inspecting and auditing Sellafield Limited's arrangements for ensuring that potential releases of particles are adequately prevented or minimised, and we will provide oversight to ensure that the wider work programme is delivered effectively by Sellafield Limited.

We will also maintain our role in co-ordinating independent assessment of the risks that particles present to the public and the environment, and in providing the public and relevant partner organisations (such as local councils) with information and advice.

customer service line
03708 506 506

incident hotline
0800 80 70 60

floodline
0845 988 1188

www.environment-agency.gov.uk

Our work in this area continues to be supported by contributions from a number of partner organisations, including Public Health England (PHE), and the Food Standards Agency (FSA). We will continue to work closely with these and other relevant interested parties and agencies as appropriate, and will keep the implications of all types of environmental monitoring results under review.

Contact us

If you need any more information please do not hesitate to contact our Nuclear Regulation Group at nrgnorth@environment-agency.gov.uk.

This document is out of date and was withdrawn on 04/01/2017

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