Particles in the Environment Update for Quarter 4 2016/17

1 Beach Monitoring

1.1 Changes to Beach Find Dataset

The beach monitoring dataset has gone through a cleansing process to address a number of particles to stone corrections. Periodically, batches of particles are sent to a contract laboratory for further analysis. Detailed size analysis of these particles has shown that 32 have dimensions greater than 2 mm, and therefore should have been categorised as stones. The initial categorisation of a beach find is done when the item is recovered and packaged on the beach, and at times, it is difficult for the operators to assess exactly which item is the radioactive find in a bag containing a variety of different sediment sizes. If at all unsure, the operators always identify a beach find as a particle as they present the greater potential health risk.

In addition to the above, changes to the beach find categories are being implemented and have been agreed with the members of the Sellafield Particles Working Group. Going forward, the 'Stone' category is to be replaced by an 'Object' category. This change is being applied because finds within the stone category consist of a range of different find types including; granules, gravel, wire, pebbles and stones. The change of category from 'Stone' to 'Object' will take effect in the next reporting period and will also be captured in the 2016/17 Particles in the Environment Report.

1.2 Progress and Areas Monitored

The beach monitoring programme for the 2016/17 financial year was successfully completed to schedule. A total of 166.7 ha of beach were monitored against a programme target of 160 ha. In total, 206 particles and 50 stones were recovered during the 2016/17 financial year, see Table 1.

Table 1. Beach finds in 2017 (up to the end of March 2017)

Beach location	Area covered (ha)	No. of particles found			No. of stones found			Total Finds
		Alpha rich	Beta Rich	Other	Alpha rich	Beta Rich	Other [1]	
Allonby	10.7	0	0	0	0	0	0	**0**
St. Bees	21.9	16	0	0	0	0	0	**16**
Braystones	23.6	25	0	0	0	0	0	**25**
Sellafield	87.9	135	26	0	0	48	1	**210**
Seascale	21.5	2	0	0	0	0	1	**3**
Drigg	1.1	2	0	0	0	0	0	**2**
ALL AREAS TOTAL	**166.7**	**180**	**26**	**0**	**0**	**48**	**2**	**256**

Note 1: Two ^{226}Ra stones detected in 2016/17 and captured in the 'Other Stones' category.
Note 2: Proportion of particles as % of total finds 80.5%.

As reported previously, two of the finds detected during 2016/17 exceeded the characterisation triggers set within the draft EA intervention criteria or Public Health England (PHE) risk assessment. However, when separated from the rest of the sample by the contracted laboratory, size analysis has shown both finds to be stones.

Both finds were within the range of previous measurements and therefore do not require immediate further consideration and do not challenge the PHE risk assessment.

The PHE risk assessment states *"The conclusion, based on the currently available information, is that the overall health risks to beach users are very low and significantly lower than other risks that people accept when using the beaches".*

1.3 Find rates

Average find rates are compared with find rates over the last two financial years in Table 2 and Figures 1 - 3. For clarity of presentation, the find rates in Table 2 are rounded to the nearest whole number.

Alpha-rich particle (ARP) find rates across all beaches remain below peak Synergy 2 levels, with the Sellafield ARP find rate a third of the peak find rate in 2014/15. Two ARPs were detected on Drigg beach when the annual vehicle strandline monitoring was completed in January. The strandline monitoring was the only beach monitoring that took place at Drigg in 2016/17, with a total area of 1.09 ha being monitored.

All beta-rich finds (26 particles, 48 stones) were located on Sellafield beach during 2016/17. There have only been four beta-rich finds on beaches other than Sellafield since the introduction of the Synergy2 detection system.

Similar find rates over time indicate that the numbers of particles present at the surface of the beach at any time does not vary significantly. This provides confidence that the chance of encounter used in the PHE risk assessment is fit for purpose.

Find rates have not exceeded the Environment Agency's proposed intervention trigger levels at any of the monitored beaches.

More details including maps showing the areas monitored and the locations of finds can be found at: http://sustainability.sellafieldsites.com/environment/environment-page/particles-in-the-environment/.

Table 2. Find per hectare and area monitored for main beach areas

Beach Location	Financial Year	Area covered (ha)	Find category & Type (finds per hectare)			
			Alpha-rich Particle	Beta-rich Particle	Beta-rich Stone	Other Finds
Allonby	2014/15	13.1	<1	<0.1	No Finds	No Finds
	2015/16	10.4	No Finds	No Finds	No Finds	No Finds
	2016/17	10.7	No Finds	No Finds	No Finds	No Finds
St. Bees	2014/15	38.7	1	<0.1	No Finds	No Finds
	2015/16	21.3	2	No Finds	No Finds	<0.1
	2016/17	21.9	<1	No Finds	No Finds	No Finds
Braystones	2014/15	19.0	3	No Finds	No Finds	No Finds
	2015/16	24.3	<1	<0.1	No Finds	No Finds
	2016/17	23.6	1	No Finds	No finds	No Finds
Sellafield	2014/15	38.2	5	<1	1	No Finds
	2015/16	83.1	2	<1	<1	<0.1
	2016/17	87.9	2	<1	<1	<0.1
Seascale	2014/15	36.8	<1	<0.1	No Finds	No Finds
	2015/16	27.1	<1	No Finds	No Finds	No Finds
	2016/17	21.5	<0.1	No Finds	No Finds	<0.1
Drigg	2014/15	8.3	IA	IA	IA	IA
	2015/16	1.1	IA	IA	IA	IA
	2016/17	1.1	IA	IA	IA	IA

Note 3: ^{226}Ra and ^{60}Co finds are captured in the 'Other Finds' category.
Note 4: IA - Insufficient area coverage to estimate finds rates (<10 ha).

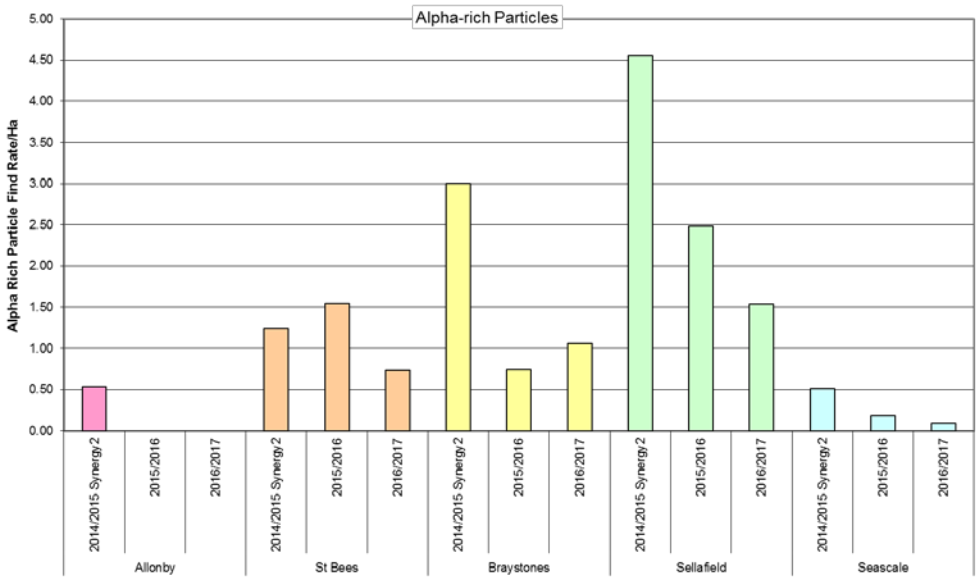

Figure 1: Alpha-rich particle find rates since the introduction of Synergy 2 in 2014/15.

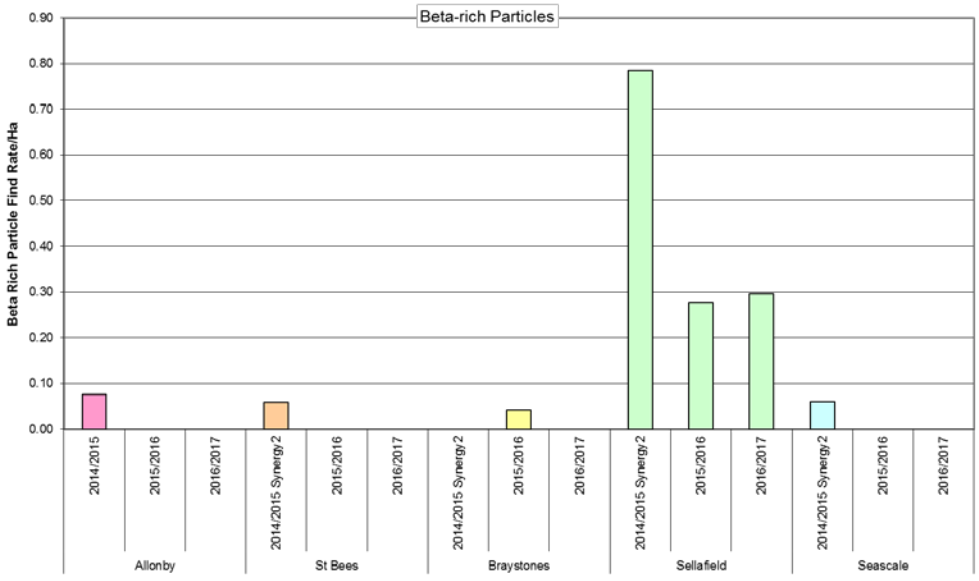

Figure 2: Beta-rich particle find rates since the introduction of Synergy 2 in 2014/15.

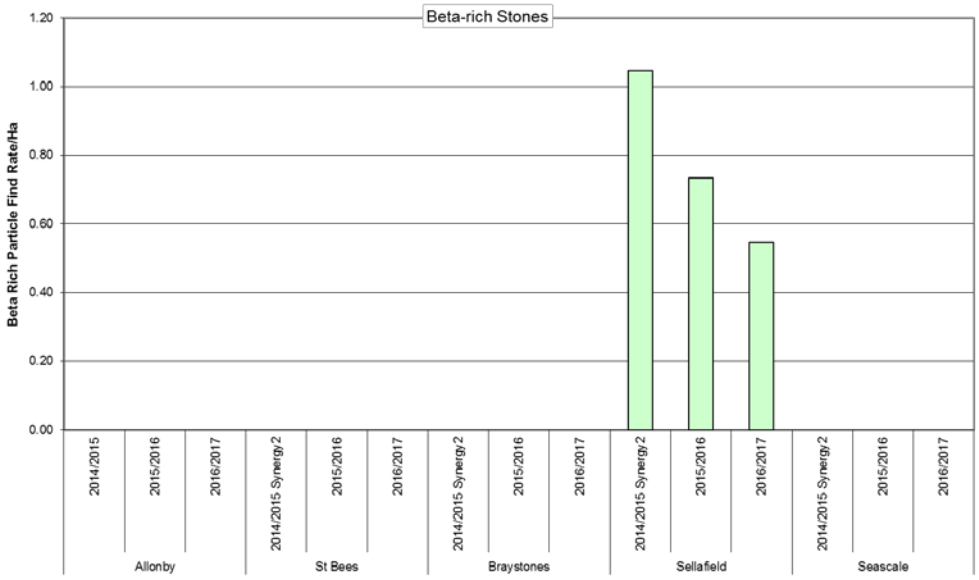

Figure 3: Beta-rich stone find rates since the introduction of Synergy 2 in 2014/15.

1.4 Find activities

The activities of alpha rich and beta rich particle finds are compared to the activities measured over the two preceding financial years in Figure 4. Data covers April 2014 until 31st March 2016 and from 1st April 2016 – 31st March 2017. Maximum particle activity recorded during this time period for ^{241}Am is 1.46E+05 Bq detected on 21/05/2015 and for ^{137}Cs is 5.91E+04 Bq detected on 07/06/2016.

Similar activities over time indicate that the activity of particles present at the surface of the beach at any time does not vary significantly. This provides confidence that the risks following encounter used in the PHE risk assessment remain fit for purpose.

1.5 2017 Beach Monitoring Programme

In a change to previous years, the 2017 beach monitoring programme will align with the calendar year rather than the financial year. This change will allow the beach monitoring programme to run alongside the wider environmental programme, making future reporting and management of the programme more efficient.

A programme of 150 ha has been developed to meet the primary aim of providing reassurance that overall risks to beach users remain at or below those estimated in the PHE risk assessment. The programme follows the familiar template of recent years, with the 150 ha to be split into three programmes:

- Sellafield programme (totalling 83 ha);
- Near-field programme (totalling 62 ha); and,
- Far-field programme (totalling 5 ha).

The 2017 monitoring programme is appended to this report.

Head of Environment, Sellafield
19/04/2017

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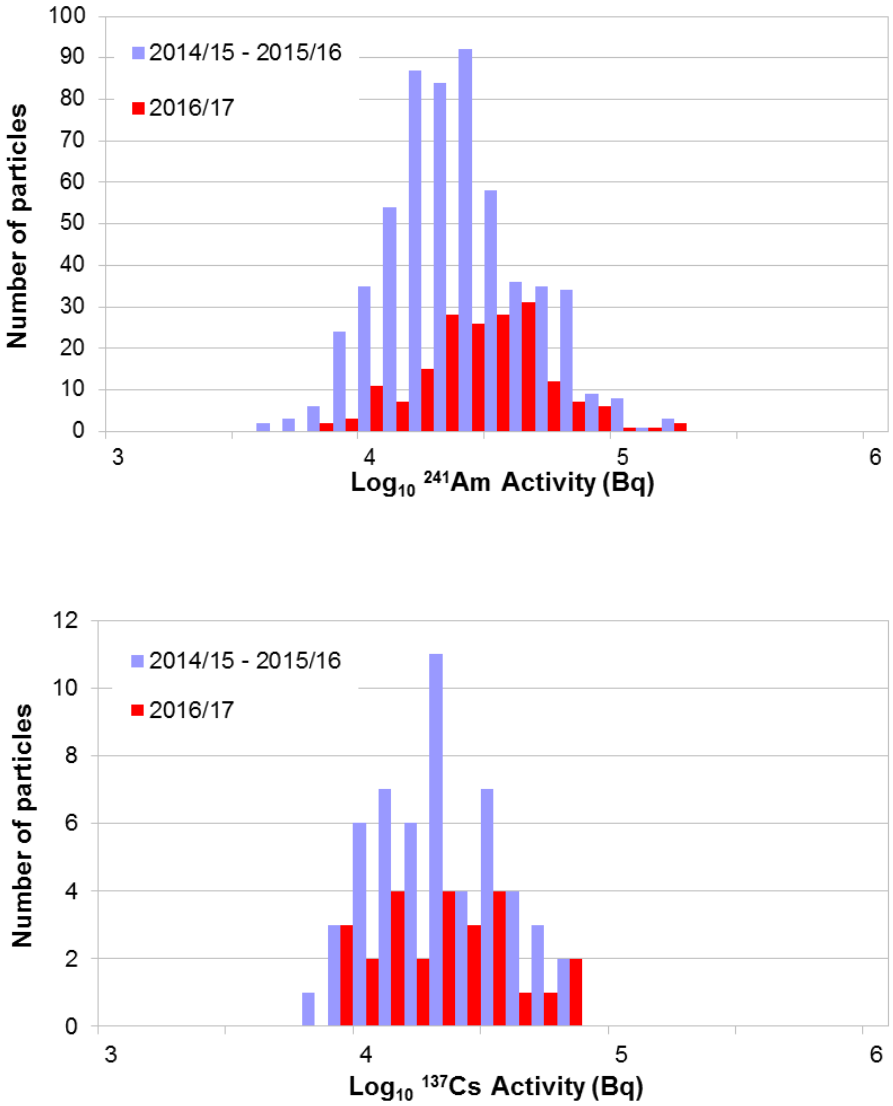

Figure 4: Radioactivity of finds classified as alpha-rich particles (upper) and beta rich particles (lower).

2017 Monitoring Programme

	Week Starting	Beach Monitoring	Sellafield Programme: Area Targets (ha)	Near-Field Programme: Target Area (ha)	Far-Field Programme: Target Area (ha)	Total available duration in week (5 days Mon-Fri)
Q1 2017	02-Jan-17	St Bees (1)		4		22:20
	09-Jan-17					23:10
	16-Jan-17	Seascale (1) and Drigg Strandline Monitoring		4		27:23
	23-Jan-17	Sellafield (1)	22			27:26
	30-Jan-17					22:54
	06-Feb-17					33:17
	13-Feb-17					24:44
	20-Feb-17					38:05
	27-Feb-17	Braystones (1)		6		22:43
	06-Mar-17					40:29
	13-Mar-17	Walking Strandline Monitoring				22:46
	20-Mar-17	St Bees (2)		4		41:23
	27-Mar-17	Seascale (2)		4		24:40
Q2 2017	03-Apr-17	Allonby (1)			5	41:33
	10-Apr-17	No Monitoring (Easter Holidays)				23:52
	17-Apr-17					31:41
	24-Apr-17	St Bees (3)		4		35:44
	01-May-17	Seascale (3)		4		32:37
	08-May-17	Sellafield (2)	28			37:37
	15-May-17					31:48
	22-May-17					41:33
	29-May-17					28:55
	05-Jun-17					41:33
	12-Jun-17					29:57
	19-Jun-17					42:44
	26-Jun-17	Braystones (2)		8		31:24
Q3 2017	03-Jul-17					42:09
	10-Jul-17	St Bees (4)		4		30:24
	17-Jul-17	Seascale (4)		4		42:34
	24-Jul-17	No Monitoring (Summer Holidays)				30:12
	31-Jul-17					42:23
	07-Aug-17					31:18
	14-Aug-17					40:16
	21-Aug-17					29:13
	28-Aug-17					33:08
	04-Sep-17	St Bees (5)		4		30:46
	11-Sep-17	Seascale (5)		4		36:15
	18-Sep-17	Walking Strandline Monitoring				28:16
	25-Sep-17	Sellafield (3)	33			33:52
Q4 2017	02-Oct-17					30:11
	09-Oct-17					30:57
	16-Oct-17					27:34
	23-Oct-17					26:41
	30-Oct-17					31:19
	06-Nov-17					24:20
	13-Nov-17					28:29
	20-Nov-17					18:53
	27-Nov-17					34:35
	04-Dec-17	Braystones (3)		8		17:00
	11-Dec-17					32:40
	18-Dec-17	Maintenance Week				10:39
	25-Dec-17	No Monitoring (Christmas Holidays)				
		Cumulative Totals ==>	**83 ha**	**62 ha**	**5 ha**	
		OVERALL TOTAL ==>	**150 ha**			