

Particles in the Environment Update for Quarter 4 2017 (1-Oct to 31-Dec)

1 Progress and Areas Monitored

The beach monitoring programme for the 2017 calendar year was successfully completed to schedule. A total of 152.1 ha of beach were monitored against a programme target of 150 ha. In total, 191 particles and 35 larger objects (all of which were stones) were recovered during 2017, see Table 1.

In October 2017 a particle was detected on Sellafield beach which exceeded the Environment Agency's intervention trigger levels¹. The beta rich particle has an associated ¹³⁷Cs activity of 1.86E+05 Bq. It is worth noting that this find is within the range of previous measurements and therefore does not challenge the PHE risk assessment². However, as it contained more than 1E+05 Bq of ¹³⁷Cs, it was sent for more detailed laboratory analysis in December 2017. When separated from the rest of the sample by the contracted laboratory, preliminary size analysis has shown that the dimensions are 0.5 x 0.2 mm. All analyses on this particle are scheduled to be completed and reported by the end of March 2018.

2 Find rates

Average find rates are compared with find rates over the last two calendar years in Table 2 and Figure 1. For clarity of presentation, the find rates in Table 2 are rounded to the nearest significant figure.

Alpha-rich particle (ARP) find rates across all beaches remain below peak Synergy 2 levels and are comparable with the find rates observed during 2015 and 2016.

Excluding the larger object (a stone) detected on Allonby beach in April, all remaining beta-rich finds during 2017 (24 particles, 34 larger objects) have been detected on Sellafield beach.

Find rates continue to be low, providing confidence that the chances of encounter used in the PHE risk assessment remains appropriate.

The Public Health England 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"*.

3 Find activities

The activities of alpha-rich and beta-rich particle finds in 2017 are compared to the activities measured since the introduction of Synergy 2 in Figure 2. Data covers 12th May 2014 until 31st December 2016 and from 1st January – 31st December 2017. The maximum particle activity recorded during this time period for ²⁴¹Am was 1.46E+05 Bq detected on 21/05/2015 and for ¹³⁷Cs was 1.86E+05 Bq detected on 03/10/2017.

Similar activities over time provides confidence that the risks following encounter used in the PHE risk assessment remain fit for purpose.

¹ <https://www.gov.uk/government/publications/sellafield-radioactive-objects-intervention-plan>

² <https://www.gov.uk/government/publications/radioactive-objects-on-beaches-near-sellafield-health-risks>

4 2018 Beach Monitoring Programme

For 2018, 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, and is once again aligned with the calendar year:

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

The 2018 monitoring programme is appended to this report.

Head of Environment, Sellafeld
19/01/2018

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Table 1: Beach finds in 2017

Beach location	Area covered (ha)	No. of particles found			No. of larger objects found			Total finds
		Alpha rich	Beta rich	Other	Alpha rich	Beta rich	Other	
Allonby	5.1	1	0	0	0	1	0	2
St. Bees	22.2	16	0	0	0	0	0	16
Braystones	21.6	27	0	0	0	0	0	27
Sellafield	80.4	114	24	0	0	34	0	172
Seascale	21.6	7	0	0	0	0	0	7
Drigg	1.1	2	0	0	0	0	0	2
ALL AREAS TOTAL	152.1	167	24	0	0	35	0	226

Note 1: Proportion of particles as % of total finds 85%.

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

Beach Location	Year	Area covered (ha)	Find category & Type (finds per hectare)			
			Alpha-rich Particle	Beta-rich Particle	Beta-rich Larger Object	Other Finds
Allonby	2015	12.6	No Finds	No Finds	No Finds	No Finds
	2016	10.7	No Finds	No Finds	No Finds	No Finds
	2017	5.1	IA	No Finds	IA	No Finds
St. Bees	2015	20.6	1	<0.1	No Finds	No Finds
	2016	22.1	1	No Finds	No Finds	<0.1*
	2017	22.2	<1	No Finds	No Finds	No Finds
Braystones	2015	20.6	1	<0.1	No Finds	No Finds
	2016	25.3	1	No Finds	No Finds	No Finds
	2017	21.6	1	No Finds	No Finds	No Finds
Sellafield	2015	79.7	2	<1	<1	No Finds
	2016	82.3	1	<1	<1	No Finds
	2017	80.4	1	<1	<1	No Finds
Seascale	2015	16.2	<1	No Finds	No Finds	No Finds
	2016	27.7	<0.1	No Finds	No Finds	No Finds
	2017	21.6	<1	No Finds	No Finds	No Finds
Drigg	2015	3.4	IA	No Finds	No Finds	No Finds
	2016	1.1	IA	No Finds	No Finds	No Finds
	2017	1.1	IA	No Finds	No Finds	No Finds

Note 2: IA - Insufficient area coverage to estimate finds rates (<10 ha). "<1" denotes values between 0.1 and 0.99, "<0.1" denotes values between zero and 0.099. * This was a single particle find containing 1.1E+04 Bq Co-60.

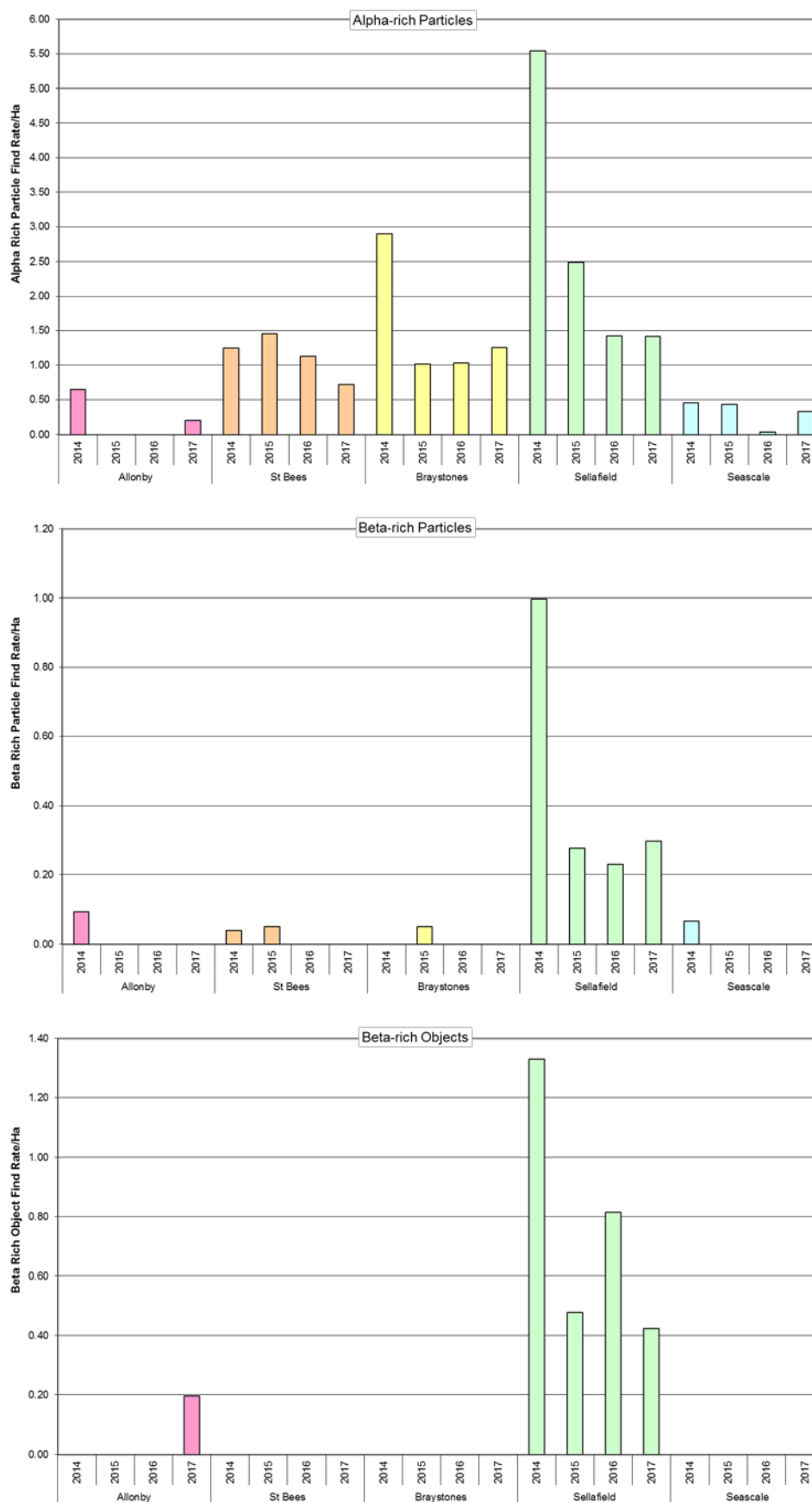


Figure 1: Alpha-rich particle (upper), beta-rich particle (middle) and beta-rich larger object (lower) find rates since the introduction of Synergy 2 in 2014.

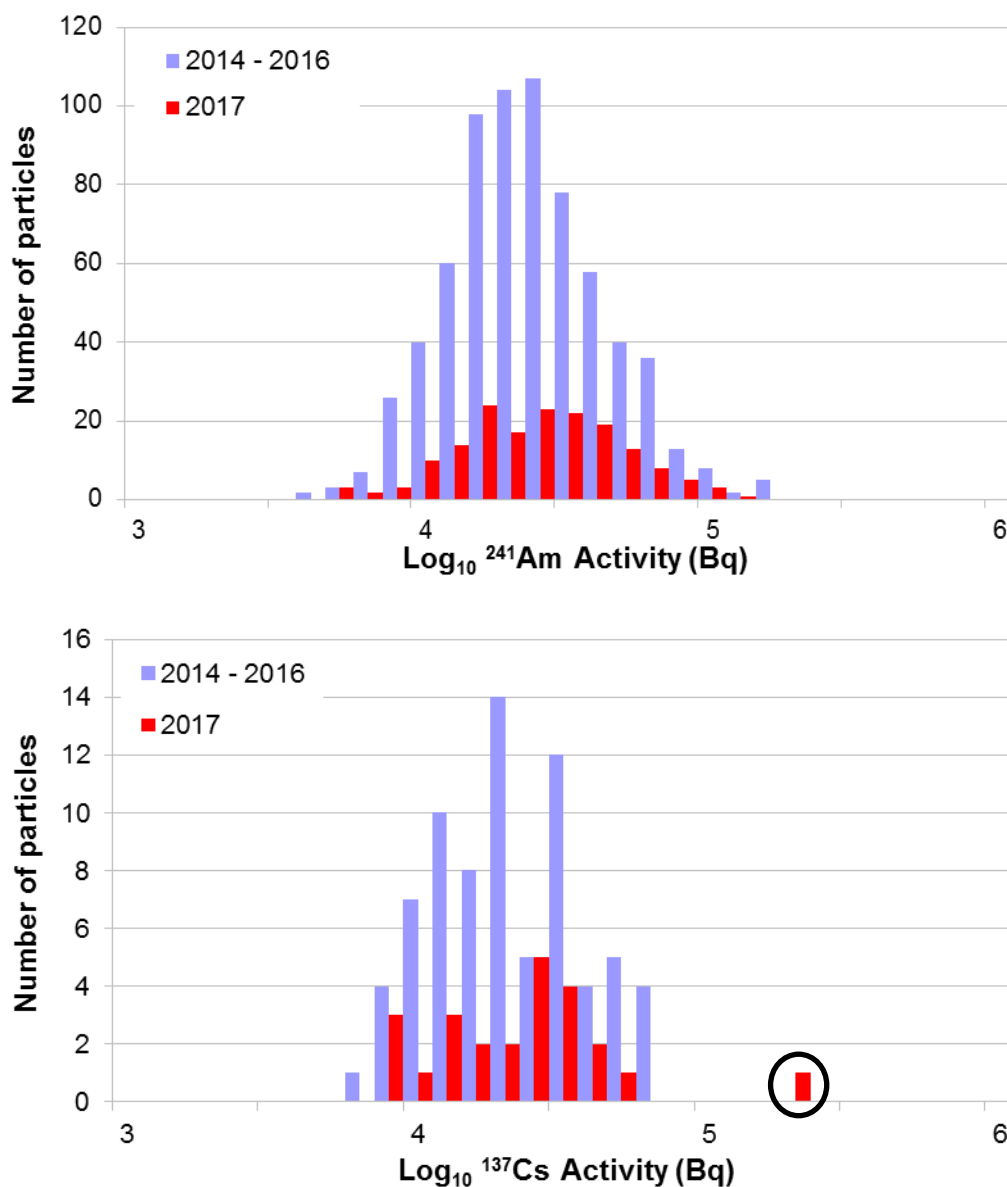


Figure 2: Radioactivity of finds classified as alpha-rich particles (upper) and beta rich particles (lower) since the introduction of Synergy 2 in May 2014. Note that the find that is circled is a beta rich particle find with an activity of 1.86+05 Bq detected on 03/10/2017. This is the second highest beta rich particle find to date (the highest being a particle with an activity of 2.92E+05 Bq found on Whitehaven beach on 13/10/2010) and has been sent for further characterisation.

	Week Starting	Beach Monitoring	Sellafield Programme: Area Targets (ha)	Near-Field Programme: Target Area (ha)	Far-Field Programme: Target Area (ha)	
Q1 2018	01-Jan-18	Sellafield (1)	20			
	08-Jan-18					
	15-Jan-18					
	22-Jan-18					
	29-Jan-18					
	05-Feb-18					
		12-Feb-18	Braystones (1)		6	
	19-Feb-18					
		26-Feb-18	No Monitoring (Biannual Maintenance)			
		05-Mar-18	Stormline Monitoring			
		12-Mar-18	St Bees (1)		4	
		19-Mar-18	Seascale (1) and Drigg Strandline Monitoring		4	
	26-Mar-18	No Monitoring (Easter Holidays)				
Q2 2018	02-Apr-18					
	09-Apr-18	St Bees (2)		4		
	16-Apr-18	Seascale (2)		4		
	23-Apr-18	Allonby (1)			5	
		30-Apr-18	Sellafield (2)	33		
	07-May-18					
	14-May-18					
	21-May-18					
	28-May-18					
	04-Jun-18					
		11-Jun-18				
	18-Jun-18					
	25-Jun-18	Braystones (2)		8		
Q3 2018	02-Jul-18					
	09-Jul-18	St Bees (3)		4		
	16-Jul-18	Seascale (3)		4		
	23-Jul-18					
	30-Jul-18					
	06-Aug-18	No Monitoring (Summer Holidays)				
	13-Aug-18	Biannual Maintenance				
	20-Aug-18					
	27-Aug-18					
		03-Sep-18	St Bees (4)		4	
		10-Sep-18	Seascale (4)		4	
		17-Sep-18	Stormline Monitoring			
Q4 2018	24-Sep-18	Sellafield (3)	30			
	01-Oct-18					
	08-Oct-18					
	15-Oct-18					
	22-Oct-18					
	29-Oct-18					
		05-Nov-18				
	12-Nov-18					
		19-Nov-18	Braystones (3)		8	
		26-Nov-18				
		03-Dec-18	St Bees (5)		4	
		10-Dec-18	Seascale (5)		4	
	17-Dec-18					
	24-Dec-18					
Cumulative Totals ==>			83 ha	62 ha	5 ha	
OVERALL TOTAL ==>			150 ha			

Figure 3: 2018 Beach Monitoring Programme