Environment Agency

Assessment of Discharges at Nuclear Power Stations

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Presentation to Nuclear restoration Services and Berkeley / Oldbury Site Stakeholder Group

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RSR High level Permit requirements

What is radiation? - UK Radioactive Waste & Materials Inventory

2.3 Operating techniques

2.3.1 The operator shall use the best available techniques to minimise the activity of radioactive waste produced on the premises that will require to be disposed of on or from the premises.

2.3.2 The operator shall use the best available techniques in respect of the disposal of radioactive waste pursuant to this permit to:

(a) minimise the activity of gaseous and aqueous radioactive waste disposed of by discharge to the environment;

(b) minimise the volume of radioactive waste disposed of by transfer to other premises;

(c) dispose of radioactive waste at times, in a form, and in a manner so as to minimise the radiological effects on the environment and members of the public.

ALARA

(as low as reasonably achievable)

2.3.4 The operator shall maintain in good repair the systems and equipment provided:

(a) to meet the requirements of conditions 2.3.1, 2.3.2 and 2.3.3;

(b) to carry out any monitoring and measurements necessary to determine compliance with the conditions of this permit;

(c) to measure and assess the exposure of members of the public and radioactive contamination of the environment.

2.3.5 The operator shall check, at an appropriate frequency, the effectiveness and maintenance of systems, equipment and procedures provided to meet the requirements of conditions 2.3.1, 2.3.2 and 2.3.3.

3.1 Disposals of radioactive waste

3.1.1 Subject to condition 3.1.4, there shall be no disposals of radioactive waste except of the types of radioactive waste and by the disposal routes specified in schedule 3.

3.1.2 The limits on disposals given in schedule 3 shall not be exceeded.

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Table S 3.1 Disposals to air						
Radioactive waste type	**Disposal outlet reference**	**Disposal outlet**	**Radionuclide or group of nuclides[1]**	**Annual limits[2]**	**Weekly Advisory Level**	**Quarterly Notification level**
Gaseous waste	All outlets A1-A16 (including approved outlets)	Site limits as specified below	Tritium	1 TBq	Not specified	Not specified
			Carbon -14	5 GBq	Not specified	Not specified
			Beta-emitting radionuclides associated with particulate matter	20 MBq	Not specified	Not specified
Gaseous waste	Approved outlets (air)	All outlets to air, not otherwise described in this table, that are approved by the Environment Agency	Tritium, Carbon-14 and beta emitting radionuclides associated with particulate matter	5% of the relevant annual limit for A1-A16	Not specified	Not specified
Gaseous waste	A1	Reactor 1 ventilation stack	No individual limits specified for these disposal outlets			
Gaseous waste	A2	Reactor 2 Ventilation stack				
Gaseous waste	A3	Caesium Removal Plant -Main Building Extract System				
Gaseous waste	A4	Caesium Removal Plant -Cells Extract System				
Gaseous waste	A5	Caesium Removal Plant -Cells Purge System				
Gaseous waste	A6	Active Effluent Treatment Plant Vent System				
Gaseous waste	A7	Active waste Vaults				
Gaseous waste	A8	Low Level Waste Complex				
Gaseous waste	A9	Shielded Area Buildings ventilation System				
Gaseous waste	A10	Shielded Area (E22-E25) – Plenum System				
Gaseous waste	A11	Shielded Area (E22-E25)-Fume System				
Gaseous waste	A12	Access Control Building (ACB) Wet Radiochemistry Laboratory				
Gaseous waste	A13	Mobile Extraction Units (MEUs)				
Gaseous waste	A14	Solid and Wet Waste Conditioning Facility				
Gaseous waste	A15	MILWEP Encapsulation Plant				
Gaseous waste	A16	R4 Stand Alone Mobile Extraction Unit (MEU)				

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Table S 3.2 Disposals to water					
Radioactive waste type	**Disposal outlet reference**	**Disposal outlet**	**Radionuclide or group of nuclides[3]**	**Annual limits[4]**	**Quarterly Notification level**
Aqueous waste	W1-W2 (in Total)	As specified below	Tritium	1TBq	0.5TBq
			Caesium-137	0.2 TBq	0.05 TBq
			"Other radionuclides"[5]	0.2 TBq	0.10 TBq
Aqueous waste	W2	System provided for discharging treated sewage effluent and storm water to the River Severn	Tritium, Caesium-137 and "other radionuclides"	1% of the relevant annual limit for all outlets	Not specified
Aqueous waste	W1	System provided for discharging radioactive waste from the Ebb Tide Tanks to the River Severn	No individual limits specified for these disposal outlets		

Table S 3.4 monitoring techniques	
Table and radionuclide	**Monitoring technique**
Table 3.1 - Beta-emitting radionuclides associated with particulate matter	For the purposes of demonstrating compliance with the conditions of this permit relating to "beta-emitting radionuclides associated with particulate matter", the operator shall measure the gross beta activity of all particulate samples collected for these purposes, after an appropriate period for decay of radon daughters, by using: (a) Best Available Techniques Including (b) any suitable counting system, which has been agreed in writing by the Agency.
"Other Radionuclides"	For the purposes of demonstrating compliance with the limitations and conditions of this permit relating to "other radionuclides' in aqueous waste, the Operator shall measure the gross activity, excluding tritium and caesium-137, of all samples collected for these purposes by: (a) Best Available Techniques Including (b) any suitable counting system, which has been agreed in writing by the Agency.

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3.2 Monitoring

3.2.1 The operator shall:

(a) take samples and conduct measurements, tests, surveys, analyses and calculations to determine compliance with the conditions of this permit;

(b) unless otherwise agreed in writing by the Environment Agency:

(i) define, document and carry out an environmental monitoring programme;

(ii) use the results of that programme to carry out an annual retrospective assessment of the dose to the representative person;

(iii) inform the Environment Agency in writing in advance of any modifications affecting the extent of that programme or that have a potential to change the results obtained.

(c) use the best available techniques when taking such samples, conducting such measurements, tests, surveys, analyses and calculations, and carrying out such an environmental monitoring programme and retrospective dose assessment, unless particular techniques are specified in schedule 3 of this permit or in writing by the Environment Agency;

(d) define and document the techniques being employed to determine the activity of radioactive waste disposals and inform the Environment Agency in writing in advance of any modifications to those techniques that have a potential to change the results obtained.

3.2.2 The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

3.2.6 The operator shall carry out:

(a) regular calibration, at an appropriate frequency, of measuring instruments and other systems and equipment provided for:

(i) carrying out any monitoring and measurements necessary to determine compliance with the conditions of this permit;

(ii) measuring and assessing exposure of members of the public and radioactive contamination of the environment.

(b) regular checking, at an appropriate frequency, that such measuring instruments and other systems and equipment are serviceable and correctly used.

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4.2 Reporting

4.2.1 The operator shall send all reports and notifications required by this permit to the Environment Agency using the contact details supplied in writing by the Environment Agency.

4.2.2 The operator shall supply such information in relation to:

(a) the disposals of radioactive waste; and

(b) the samples, tests, surveys, analysis and calculations, environmental monitoring and assessments undertaken under conditions 3.2.1 and 3.2.5 in relation to disposals of radioactive waste;

in such format and within such timescales as the Environment Agency may specify in writing.

Environment Agency

Gaseous Discharges

We receive and review discharge returns sent to us on a quarterly basis

Permit Number EPR/ZP3893SG/V005 - Effective Date: 1st May 2021

BERKELEY SITE - Table S 3.1 - Specified disposals to air (Authorised Outlets)

Month / Year: DECEMBER 2024

EPR Ref Numbers	Berkeley Site Building Numbers	Outlets	Beta Particulate Activity MBq	Tritium MBq	Carbon 14 MBq
A1	S1	SafeStore 1 (Reactor 1 Ventilation Stack)	N/M	202	10.6
A2	S2	Safestore 2 (Reactor 2 Ventilation Stack)	N/M	202	10.6
A7	B55	Active Waste Vaults Vent System	1.51E-03	20.68	13.84
A9	E23	Shielded Area Buildings Ventilation System	2.60E-03	N/M	N/M
A12	B53	Access Control Point (ACP) Wet Radiochemical Laboratory	N/R	N/M	N/M
A13	N/A	Mobile Extraction Units (MEUs)	4.24E-03	N/M	N/M
A14	B52	Solid and Wet Waste Ventilation System - Conditioning Facility	6.32E-04	2.54	0.00
A15	B64	MILWEP Encapsulation Plant (MFU)	1.48E-04	0.36	1.08
A16	B17A	R4 Stand Alone Mobile Filtration Unit (MFU)	8.21E-04	1.64	6.27
		MONTHLY TOTALS	9.95E-03	4.29E+02	4.24E+01

	Beta Particulate Activity	Tritium MBq	Carbon 14 MBq
Total in Last 12 Months	0.247	5705	1733
Annual Limit	20	1000000	5000
% of Annual Limit	1.24%	0.57%	34.65%

Decommissioning Work Status: (capable of affecting emissions). N/R = Not Run N/M = Not Measured

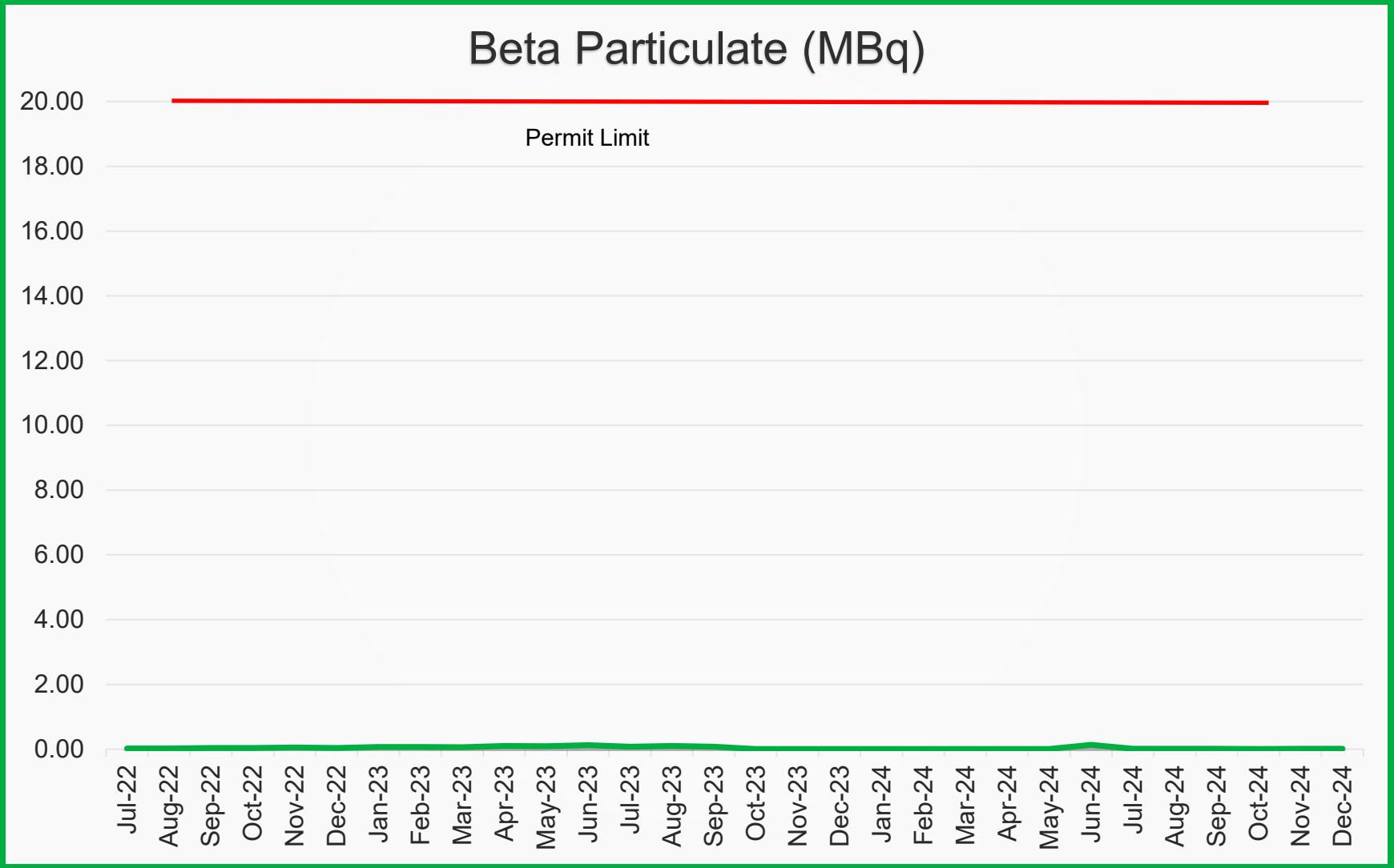
Events and non routine sampling: (including details of when alternatives to normal sampling procedure undertaken)

Please note: EPR Reference numbers: A3, A4, A5, A6, A8, A10 and A11 outlets have all been decommissioned and removed.
A7 / B55: vent shutdown from 23/12/24

Trending of Results

Gaseous Monthly Total Discharge				Beta	Tritium	C14			
				Post May 2021			Post May 2022 as MBq		
				20 MBq	1Tbq	5GBq	20.00	1000000.00	5000.00
				Cummulative Rolling 12 months Total			Percentage of Annual Limit		
				20MBq	1TBq	5GBq	% of the total discharge allowance		
Date	Beta (MBq)	H-3 (MBq)	C-14 (MBq)	Beta (MBq)	H-3 (MBq)	C-14 (MBq)	Beta (MBq)	H-3	C-14
Jul-22	0.02	571.00	44.40	0.024	571.00	44.40	0.12%	0.06%	0.89%
Aug-22	0.02	552.00	73.90	0.048	1123.00	118.30	0.24%	0.11%	2.37%
Sep-22	0.037	610.00	83.60	0.086	1733.00	201.90	0.43%	0.17%	4.04%
Oct-22	0.037	534.00	43.30	0.123	2267.00	245.20	0.61%	0.23%	4.90%
Nov-22	0.052	673.00	61.50	0.175	2940.00	306.70	0.87%	0.29%	6.13%
Dec-22	0.040	547.00	53.10	0.215	3487.00	359.80	1.07%	0.35%	7.20%
Jan-23	0.070	438.00	106.00	0.285	3925.00	465.80	1.42%	0.39%	9.32%
Feb-23	0.072	448.00	76.70	0.356	4373.00	542.50	1.78%	0.44%	10.85%
Mar-23	0.063	449.00	86.10	0.419	4822.00	628.60	2.09%	0.48%	12.57%
Apr-23	0.102	447.16	68.20	0.521	5269.16	696.80	2.60%	0.53%	13.94%
May-23	0.096	466.09	159.87	0.617	5735.25	856.67	3.08%	0.57%	17.13%
Jun-23	0.125	469.70	136.58	0.742	6204.95	993.25	3.71%	0.62%	19.90%
Jul-23	0.077	462.08	144.52	0.795	6096.03	1093.37	3.97%	0.61%	21.87%
Aug-23	0.100	455.10	123.54	0.870	5999.13	1143.01	4.35%	0.60%	22.86%
Sep-23	0.076	455.40	171.87	0.910	5844.53	1231.28	4.55%	0.58%	24.63%
Oct-23	0.009	457.04	125.36	0.882	5767.57	1313.34	4.41%	0.58%	26.27%
Nov-23	0.008	515.00	164.00	0.838	5609.57	1415.84	4.19%	0.56%	28.32%
Dec-23	0.006	505.00	158.00	0.804	5567.57	1520.74	4.02%	0.56%	30.41%
Jan-24	0.0088	451.00	135.00	0.742	5580.57	1549.74	3.71%	0.56%	30.99%
Feb-24	0.0075	422.00	78.70	0.678	5554.57	1551.74	3.39%	0.56%	31.03%
Mar-24	0.0096	474.00	154.00	0.626	5579.57	1619.64	3.13%	0.56%	32.39%
Apr-24	0.0096	471.00	173.00	0.533	5603.41	1724.44	2.67%	0.56%	34.49%
May-24	0.0082	483.00	165.00	0.445	5620.32	1729.57	2.23%	0.56%	34.59%
Jun-24	0.1340	463.00	170.00	0.455	5613.62	1762.99	2.27%	0.56%	35.26%
Jul-24	0.0134	471.00	165.00	0.391	5622.54	1783.47	1.96%	0.56%	35.67%
Aug-24	0.0106	467.00	149.00	0.301	5634.44	1808.93	1.51%	0.56%	36.18%
Sep-24	0.0135	537.00	241.00	0.239	5716.04	1878.06	1.19%	0.57%	37.56%
Oct-24	0.0096	491.00	83.00	0.239	5750.00	1835.70	1.20%	0.58%	36.71%
Nov-24	0.01240	485.00	136.00	0.243	5720.00	1807.70	1.22%	0.57%	36.15%
Dec-24	0.00995	429.00	42.40	0.247	5644.00	1692.10	1.24%	0.56%	33.84%

Trending of Results – Gaseous waste



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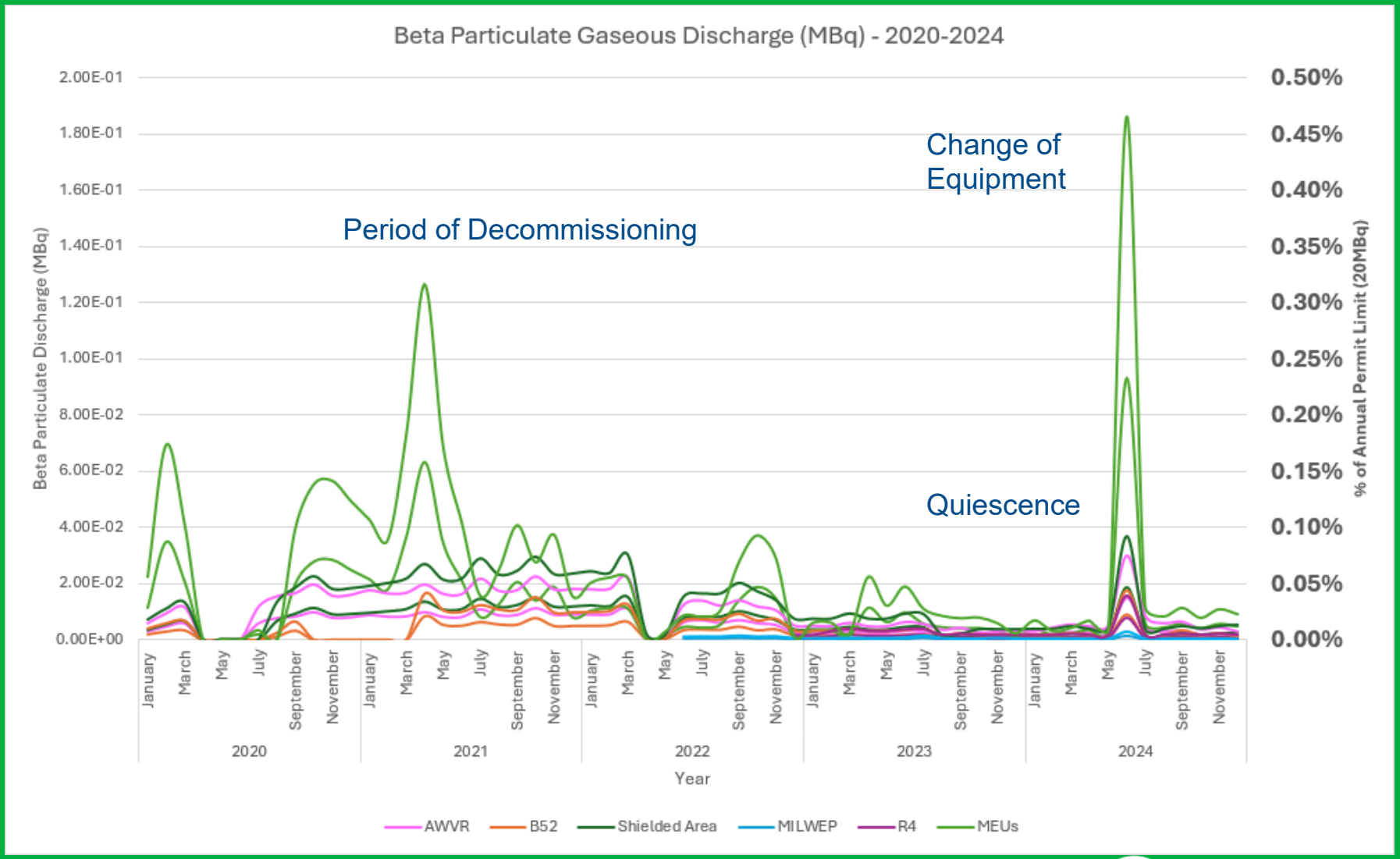

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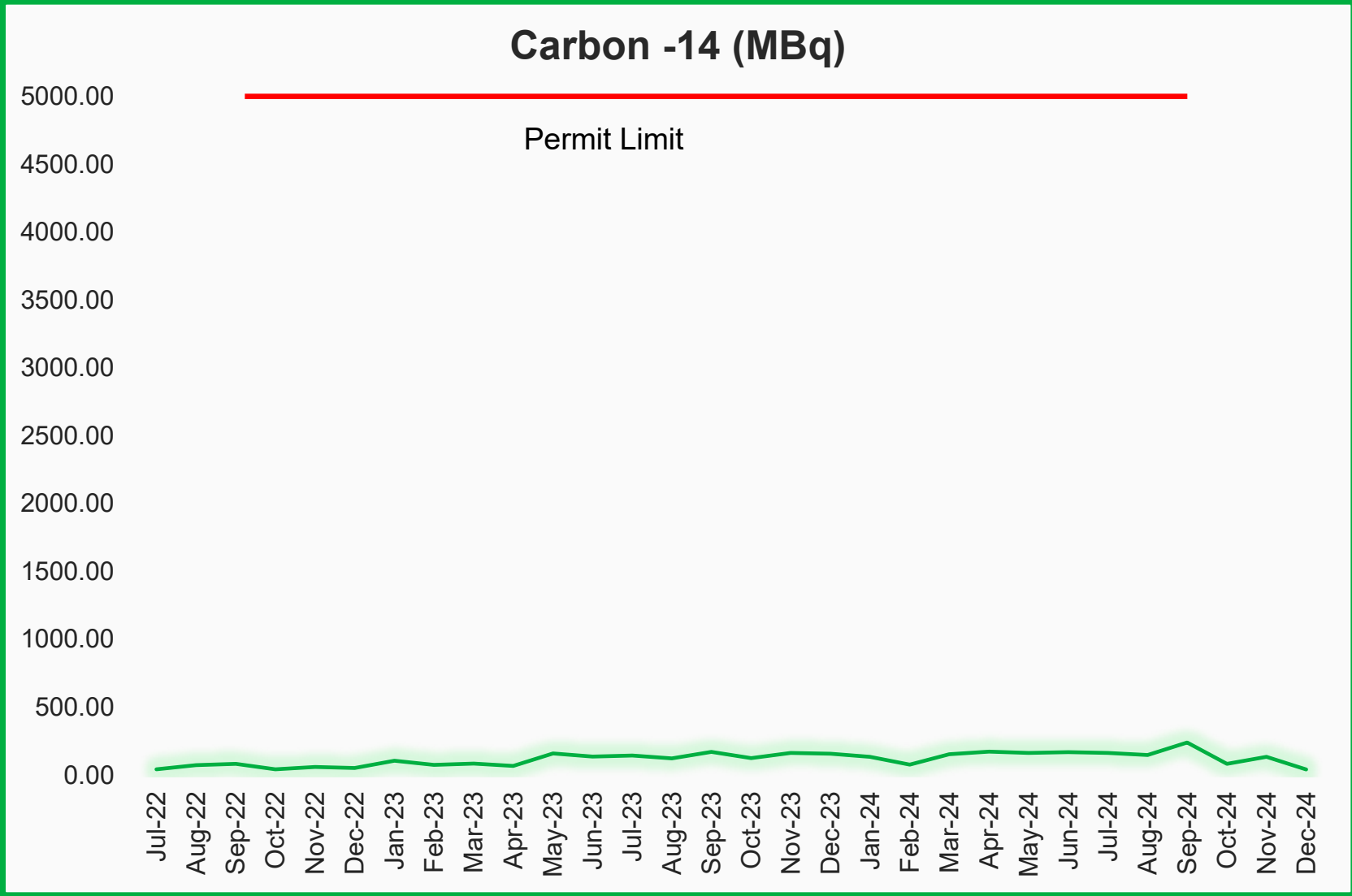

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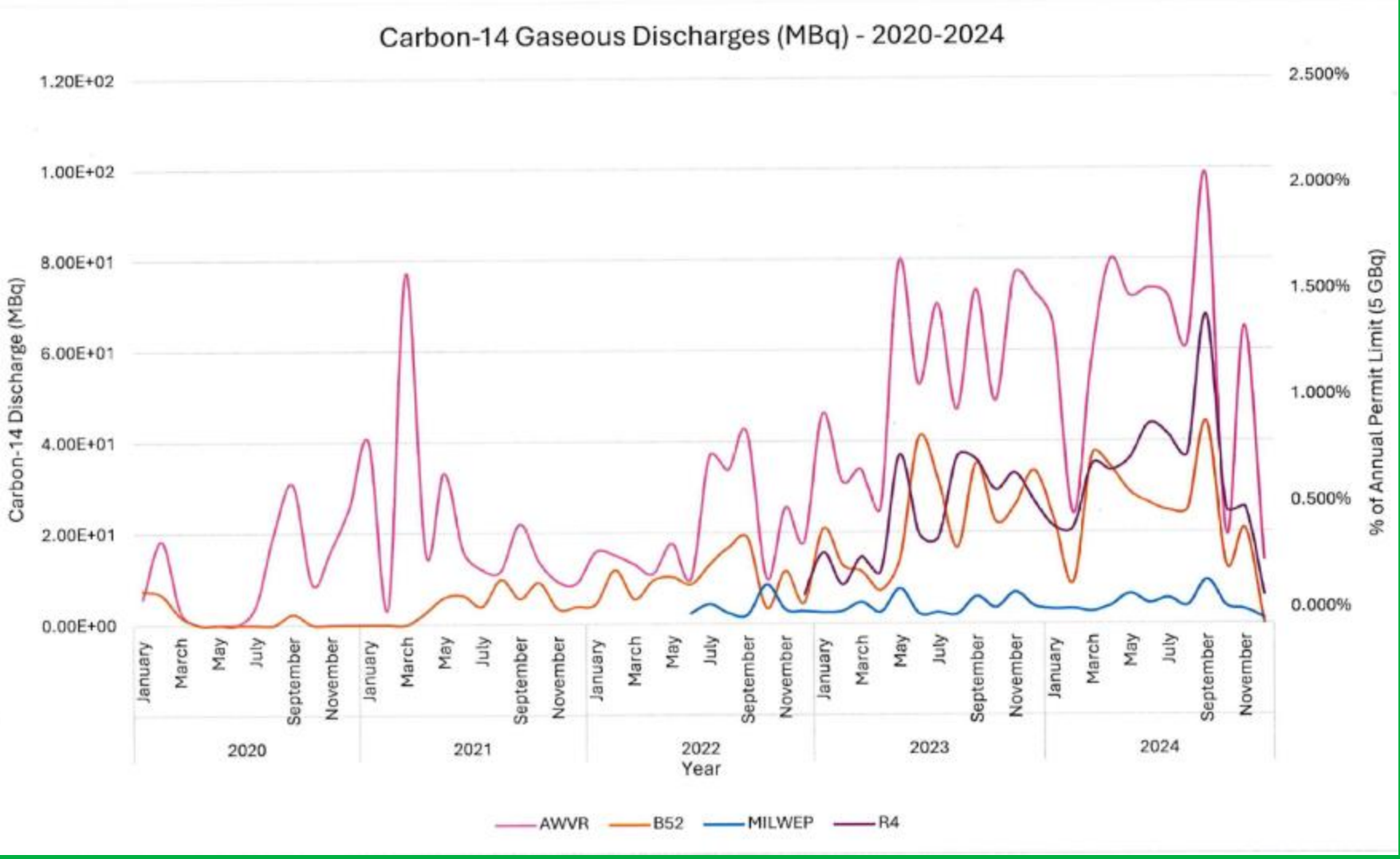

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Environmental Monitoring Programme

NRS carries out environmental monitoring around the sites to identify the levels of radioactivity in the environment. This includes sediments in the River Severn, sea food and other foods including those produced on local farms.

The permit requires that NRS review this monitoring and report any abnormal readings to us, directly. The results from the environmental monitoring programme must also be kept and sent to us every calendar quarter. We monitor these reports and then make these available on the public register. We issue RASCARS to the site and these are available on request.

We carry out our own independent environmental monitoring programme. The Food Standards Agency also carries out independent sampling of food around the sites Both programmes of monitoring are very long standing (more than 20 years) and show that the levels have been and continue to be very low. Levels of many radionuclides are now close to or below the limit of detection.

Every year we publish the Radioactivity in Food and the Environment report (RIFE), which includes a summary of discharges made from Bradwell under its permit during the previous year.

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