



**Environment
Agency**

**Environmental Permitting Regulations (England and Wales) Regulations
2016**

**Compilation of Environment Agency
Requirements, Approvals and Specifications**

made under

Permit Number EPR/ZP3493SQ

Issued to

Magnox Limited

for the

Receipt and Disposal of Radioactive Waste from

Bradwell Site

Bradwell-on-Sea, Southminster, Essex CM0 7HP

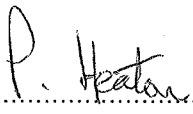
Issue 6, dated 06/03/2017

TABLE 1: CURRENT REQUIREMENTS

Permit condition	Requirement number	Effective Date
Condition 3.1.1	3.1.1/v002	14/03/2017
Condition 3.2.1(b)	3.2.1(b)/v002	14/03/2017
Condition 3.2.5(a)	3.2.5(a)/v005	14/03/2017
Condition 3.2.5(b)	3.2.5(b)/v005	14/03/2017
Condition 4.1.2	4.1.2/v005	14/03/2017
Condition 4.2.2	4.2.2/P1/v002*	14/03/2017
Condition 4.2.2	4.2.2/P2/v002**	14/03/2017

* part 1 (pollution inventory)

** part 2 (other specifications)

Authorised 

Dr P Heaton

Authorised to sign on behalf of the Environment Agency

Issue 6, dated 06/03/2017

Requirement number 3.1.1/v002

Permit condition

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.

To be read in conjunction with the text:

- A. in schedule 3 tables S3.1 – S3.2 of “all outlets to air/water/sewer, not otherwise described in this table, that are approved by the Environment Agency”
- B. in schedule 3 table S3.3 of “a specified holder of an environmental permit for the receipt and disposal of liquid waste/ILW, as agreed in writing by the Environment Agency”.

Environment Agency Approval

The Environment Agency approves the following outlets to air:

- Louvres, vents, fan assisted-vents, windows and doors associated with Radiation/Contamination Controlled Areas, laboratories and tanks not specifically listed above or in Schedule 3 of the permit and which collectively in total discharge less than 1% of the annual limits in the permit.

Requirement number 3.2.1 (b) v002

Permit condition

The operator shall:

(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.

Environment Agency Agreement

The Environment Agency agrees that

- The operator shall use BAT to define, document and carry out a marine and terrestrial environmental monitoring programme and ensure it is sufficient to comply with permit condition 3.2.1.(b)
- The operator shall carry out a retrospective assessment for the calendar year 2016, and every year thereafter, within 12 months of the completion of that year. In estimating effective doses, the values and relationships given in Annexes II and III to Council Directive 96/29/Euratom of 13 May 1996 shall be used unless the use of alternative data can be justified.
- The operator's BAT case used to define the programme shall be kept up to date and shall be provided in writing 28 days in advance of any proposed changes to the environmental monitoring programme.

Requirement number 3.2.5(a)/v005

Permit condition

If required by the Environment Agency, the operator shall

- (a) take such samples and conduct such measurements, tests, surveys, analyses and calculations, including environmental measurements and assessments, at such times and using such methods and equipment as the Environment Agency specifies.

Environment Agency Requirement

The Environment Agency requires the operator to:

Apply analytical techniques adequately validated and controlled in a manner consistent with Best Available Techniques (BAT), which is taken to include arrangements to minimise cross contamination.

Under this condition the Agency specifies:

1. Environmental Measurements;
2. Discharge Sampling.

1. Environmental measurements to be made

The Environment Agency requires the Operator to specify and carry out an appropriate terrestrial and marine environmental monitoring programme. The Operator shall take all reasonably practicable measures to obtain the specified samples, actively seeking appropriate permission to sample wherever relevant. Where circumstances beyond the control of the Operator prevent the undertaking of the programme as specified (such as lack of access to sampling locations or the lack of availability of samples), the Operator shall take all reasonably practicable steps to obtain appropriate alternatives.

2. Discharge Sampling

The Environment Agency requires the Operator to:

- a) Take samples of the type and at the frequency specified in Table 1 below, in the presence of a representative of the Environment Agency's current effluent check monitoring laboratory holding written authority from the Environment Agency. Two nominally identical aliquots, each of the minimum volume specified in the table, shall be prepared. The Operator shall analyse one aliquot for the radionuclides or groups of radionuclides specified in Table 2, using the same techniques as those employed by the Operator to determine the activity of relevant radioactive waste disposals.
- b) When the Operator becomes aware of any circumstances which have resulted, or are expected to result, in preventing the taking of any sample according to the requirements of paragraph a), they shall advise the Environment Agency and the Agency's approved contractor (see entry under EAR 3.2.5(b)/v005) verbally as soon as possible, and in any case in writing within 10 days and shall propose temporary administrative arrangements. These might include deferring the sample or taking an alternative sample appropriate to the relevant discharge route, and shall normally be implemented unless the Agency advises otherwise in writing.

- c) Prepare a volume-proportional annual bulk sample of effluent discharged from the Final Monitoring and Delay Tanks from the quarterly volume-proportional bulk samples taken by the operator as part of its quality assurance arrangements. The annual bulk sample is to be analysed, using the Best Available Techniques, for the radionuclides / groups of radionuclides specified in Table 2.

Table 1: Samples to be taken in the presence of a representative of the Agency's approved laboratory

Sample type	Frequency	Minimum aliquot volume	Radionuclides or groups of radionuclides
Spot sample of effluent from the Final Monitoring & Delay Tanks	Six monthly (twice per year)	250 ml	Tritium Caesium-137 Other radionuclides

Table 2: Radionuclides or Groups of Radionuclides for which the Bulk Sample is to be analysed

Radionuclides		
Tritium	Zirconium-95	Cerium-144
Calcium-45	Niobium-95	Praseodymium-144
Manganese-54	Ruthenium-106	Europium-154
Iron-55	Rhodium-106	Europium-155
Cobalt-58	Silver-110m	Plutonium-238
Iron-59	Antimony-124	Plutonium-239+240
Cobalt-60	Antimony-125	Plutonium-241
Zinc-65	Tellurium-125m	Americium-241
Strontium-90	Caesium-134	Curium-242
Yttrium-90	Caesium-137	Curium-243+244

Requirement number 3.2.5(b)/v005

Permit condition

If required by the Environment Agency, the operator shall

- (b) keep samples, provide samples, or dispatch samples for tests at a laboratory, as the Environment Agency specifies, and ensure that the samples or residues thereof are collected from the laboratory within three months of receiving written notification that testing and repackaging in accordance with the relevant legislation are complete.

Environment Agency Requirement

1. The Environment Agency requires the operator to keep an aliquot, of the specified minimum volume and for the specified period, from each sample of a type listed in the table below, and to provide any of those aliquots, on request, to an Environment Agency officer or to an employee of the Environment Agency's approved contractor, holding written authority from the Environment Agency, or to such other person as an Environment Agency officer specifies.

Table 3 – Sample retention

Sample type		Minimum volume	Retention period
Aqueous discharge samples	Volume-proportional samples or spot samples taken from aqueous liquid effluent from the Final Monitoring and Delay Tanks	500ml	6 months from the date of sampling
	Compliance sample taken as part of the Agency's Radioactive Waste Effluent Check Monitoring Programme (see paragraph 2 below) ^[3] :	500ml	24 months from the end of the bulking period
	Quarterly bulk sample of effluent from the Final Monitoring and Delay Tanks (stabilised by addition of recorded quantities of acid where necessary) taken and used by the Operator for quality assurance purposes		
Gaseous discharge samples	Beta-particulate filter paper samples	Whole filter paper	3 months from the date of sampling
Environmental samples	All non-perishable samples or residues	As available	24 months from the date of sampling

^[3] Collection to be witnessed by a representative of the Agency's approved contractor (subject to their availability).

2. The Environment Agency requires the operator to dispatch, within the specified period, aliquots of the specified minimum volume of each of the samples specified in the table below, to the Environment Agency's approved contractor:

LGC Ltd
 Queens Road
 Teddington
 Middlesex
 TW11 0LY

Table 4 – Specified samples to be dispatched to LGC

Sample		Minimum volume	Dispatch period
Aqueous discharge samples	<p>Compliance sample taken as part of the Agency's Radioactive Waste Effluent Check Monitoring Programme</p> <p>Quarterly bulk sample of effluent from the Final Monitoring and Delay Tanks (stabilised by addition of recorded quantities of acid where necessary) taken and used by the Operator for quality assurance purposes</p>	500ml	Within 28 days of the end of the quarter in which the sample is prepared

Requirement number 4.1.2/v005

Permit condition

The operator shall keep on site all records, plans and the management system required by this permit, unless otherwise agreed in writing by the Environment Agency.

Environment Agency agreement

The Environment Agency agrees that records, plans and the management system required by this permit may be held at:

Iron Mountain UK
3rd floor, Cottons Centre
Tooley Street
London
SE1 2TT

and

any other Iron Mountain UK storage facility

Requirement number 4.2.2/P1/v002

Permit condition

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 specification Part 1 : Pollution Inventory

The Environment Agency specifies that:

1. The operator shall supply information relating to disposals of radioactive waste, taking account of the guidance provided in Reporting Form PI(RAS), and in accordance with the following:

(a) the information shall be provided not later than 28 February each year for disposals made during the preceding calendar year;

(b) the information shall be provided by:

(i) using our web-based reporting system (accessible from <https://piedc.environment-agency.gov.uk/piedc/piedc>); or

(ii) completing form PI(RAS) (available from <https://www.gov.uk/government/publications/pollution-inventory-reporting-form>) and e-

mailing

it to: nrg.south@environment-agency.gov.uk

In either case, the information identified in 'Part 5' [if present in these forms] is not required.

(c) the information provided on release quantities shall be the operator's best estimate achievable with the time and resources available. The operator is not required to perform additional monitoring, beyond any demanded by the permit, in order to complete the Reporting Form.

Requirement number 4.2.2 Part 2/v002

Permit condition

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 Specification Part 2: other specifications

1. The operator shall report information relating to waste disposals as specified in table 5 below, at the frequencies and within the timescales specified in that table, and in accordance with the following:
 - (a) The guidance on assessing radioactive discharges in part 5 of 'Radiological Monitoring Technical Guidance Note 1: Standardised Reporting of Radioactive Discharges from Nuclear Sites'
(http://www.sepa.org.uk/media/101584/radiological_monitoring_technical_guidance_note_1_standardised_reporting_of_radioactive_discharges_from_nuclear_sites.pdf)
 - (b) For each reportable quantity marked with an asterisk in proformas 1 and 2, the operator shall highlight any reported value which exceeds the mean plus 3 standard deviations of the previous 12 reported values and, as far as reasonably practicable, provide an explanation for any such elevated value.

Table 5 –Waste Disposal Information

Information to be supplied	Frequency required	Date by which information is to be supplied
Monthly liquid effluent discharge return – as specified in Proforma 1	Every three months	30 days after the end of the preceding three month period whether or not waste was disposed of in that period
Monthly gaseous discharge return – as specified in Proforma 2	Every three months	30 days after the end of the preceding three month period whether or not waste was disposed of in that period
Results of Annual Extended Analysis of Liquid Effluent – as specified in Proforma 3	Annually	Six months after the end of each calendar year

NOTE:- Returns may be submitted using a format substantially similar to that shown in the relevant proforma.

2. The operator shall, within 4 months of the end of the calendar quarter in which the samples were taken, report analytical results for each sample specified in the table in paragraph 2 of requirement 3.2.5(b) from which an aliquot was dispatched to the Agency's contract laboratory.
3. The operator shall report the results of the environmental monitoring programme (see condition 3.2.1) on a quarterly basis; the reports to be provided within 3 months of the end of the quarter to which they refer and in accordance with the following:
 - (a) all positive results (ie those exceeding the detection limit) shall be reported with an uncertainty which is at the 95% confidence level (ie 1.96 standard deviations) and includes all analytical uncertainties in accordance with ISO 17025. Where results are less than, or equal to, the detection limit, the detection limit value shall be reported. (See paragraph 1 above for definition of detection limit.);
 - (b) reasons shall be identified for why any:
 - results are late;
 - sample has not been obtained;
 - analysis has not been undertaken;
 - relevant detection limit has not been achieved;
 - radiological assessment has used alternatives to the values and relationships given in Annexes II and III to the Council Directive 96/29/Euratom of 13 May 1996. The alternative data used shall be provided.
 - (c) where gamma-spectrometry has been carried out on sediment samples, any positive results for potassium-40 shall be reported;
 - (d) any result which exceeds the mean plus 3 standard deviations of the previous 12 results shall be highlighted and, as far as reasonably practicable, an explanation shall be provided for any such elevated value;
 - (e) any result which exceeds the mean plus 4 standard deviations of the previous 12 results shall be notified to the Environment Agency, without delay.
 - (f) The report for the last quarter of each calendar year shall include annual means and annual ranges for each type of measurement at each location.
4. The information required by paragraph 2 of this specification shall be sent to:

E-mail: radeff.Preston1.NW@environment-agency.gov.uk

All other information required by this specification shall be sent to:

E-mail: nrg.south@environment-agency.gov.uk

PROFORMA 1 - LIQUID EFFLUENT MONTHLY RETURN

BRADWELL SITE

MONTH:

LIQUID EFFLUENT MONTHLY RETURN

YEAR:

FINAL MONITORING AND DELAY TANK DISCHARGES ANY OTHER DISCRETE VOLUME DISCHARGES					TRITIUM		OTHER RADIO-NUCLIDES		CAESIUM-137	
DATE STARTED	TIME STARTED	TIME FINISHED	TANK	VOLUME m ³	MBq/m ³	GB q	MBq/m ³	GB q	MBq/m ³	GB q
DISCHARGES FROM OTHER AUTHORISED AND APPROVED SYSTEMS				VOLUME m ³	TRITIUM GBq	OTHER RADIO-NUCLIDES GBq	OTHERS GBq			
DETAILS OF DISCHARGE SYSTEM										
MONTHLY TOTALS										

BRADWELL MONTHLY LIQUID EFFLUENT DISCHARGE RETURN continued

COMMENTS (Including any use of sampling other than the proportional sampler for FMDT discharges)

	FMDT VOLUME M³	TRITIUM GBq	OTHER RADIO- NUCLIDES GBq	CAESIUM- 137 GBq
MONTHLY TOTAL				
TOTAL IN LAST 12 MONTHS				
ANNUAL LIMIT	N/A	7,000	700	700
% OF ANNUAL LIMIT	N/A			
TOTAL IN LAST THREE MONTHS				
QUARTERLY NOTIFICATION LEVEL	N/A	1,000	150	150
% OF QUARTERLY NOTIFICATION LEVEL	N/A			

SIGNED:

DATE:

APPROVED FOR ISSUE: DATE:

PROFORMA 2 - GASEOUS EFFLUENT MONTHLY RETURN

BRADWELL SITE

MONTH:

GASEOUS EFFLUENT MONTHLY RETURN

YEAR:

OUTLET	BETA EMITTING RADIONUCLIDES ASSOCIATED WITH PARTICULATE MATTER MBq	TRITIUM GBq	CARBON- 14 GBq
Reactor 1 and 2 Buildings			
Ponds Building			
Fuel Element Debris (FED) Dissolution Ventilation Plant			
Mobile Extraction Units (MEUs)			
Intermediate Level Waste (ILW) Drying Plant			
Fuel Element Debris (FED) Sorting Ventilation Plant			
Aqueous Discharge Abatement Plant (ADAP) Ventilation System			
Aqueous Discharge Abatement Plant (ADAP) Sentencing Tanks			
Health Physics and Chemistry Laboratory 1			
Health Physics and Chemistry Laboratory 2			
Low Level Waste Management Facility			
Health Physics Laboratory Fume Cupboard			
Active Waste Interim Storage Facility			
MONTHLY TOTALS			

NOTES:

BRADWELL MONTHLY GASEOUS EFFLUENT DISCHARGE RETURN continued

EVENTS and NON-ROUTINE SAMPLING:

(to include details of when alternatives to normal sampling procedure undertaken, and estimated or measured discharges of main radionuclides other than those in the tables (such as Iodine 131 during iodine filter tests)

MONTH YEAR	BETA EMITTERS ASSOCIATED WITH PARTICULATE MATTER MBq	TRITIUM TBq	CARBON-14 GBq
MONTHLY TOTAL			
TOTAL IN LAST 12 MONTHS			
ANNUAL LIMIT	600	6	900
% OF ANNUAL LIMIT			
TOTAL IN LAST THREE MONTHS			
QUARTERLY NOTIFICATION LEVEL	80	1.2	200
% of QUARTERLY NOTIFICATION LEVEL			
MAXIMUM WEEKLY TOTAL THIS MONTH	N/A		
WEEKLY ADVISORY LEVEL	N/A	0.6	40
% of WEEKLY ADVISORY LEVEL	N/A		

SIGNED:

DATE:

APPROVED FOR ISSUE: DATE:

PROFORMA 3 – ANNUAL LIQUID EFFLUENT DISCHARGE RETURN BASED ON RESULTS OF EXTENDED ANALYSIS OF BULKED EFFLUENT SAMPLES

BRADWELL SITE

YEAR:

Radionuclide	Discharge for the Year, GBq
H-3	
Ca-45	
Mn-54	
Fe-55	
Co-58	
Fe-59	
Co-60	
Zn-65	
Sr-90	
Y-90	
Zr-95	
Nb-95	
Ru-106	
Rh-106	
Ag-110m	
Sb-124	
Sb-125	
Te-125m	
Cs-134	
Cs-137	
Ce-144	
Pr-144	
Pm-147	
Eu-154	
Eu-155	
Pu-238	
Pu-239 + 240	
Pu-241	
Am-241	
Cm-242	
Cm-243 + 244	

PREPARED BY:

SIGNED:

DATE:

