



**Berkeley Site**

**EHSS&Q DEPARTMENT**

**REPORT ON:**

**ENVIRONMENTAL PERMITTING REGULATIONS (EPR) PERMIT VARIATION –  
SUPPORTING DOCUMENT**

Document Owner:  
Erica Rolfe

Erica Rolfe Date: 19-11-19  
Provider of Radioactive Substances Legislation Advice (PoRSLA)

QA Review:  
Dina D'Alessio

Dina D'Alessio Date: 20/11/19  
Quality Assurance Engineer

Approved By:  
Louis Delaney

Louis Delaney Date: 19/11/19  
Head of Radiological Protection & Environment

Authorised  
For Issue by:  
Emily Ciezarek

Emily Ciezarek Date: 20/11/19  
EHSS&Q Manager

Version	By	Changes since previous version	Date
Draft 1	E Rolfe	Initial Document	July 2018
Draft 2	E Rolfe	Initial Document amended with EA comments	July 2019
Issue 1	E Rolfe	Issue 1 amended with EA comments	Oct 2019

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## **EXECUTIVE SUMMARY**

As part of Magnox Ltd., Company Registration Number 2264251, Berkeley Site is permitted under the Environmental Permitting (England and Wales) Regulations 2016 (EPR) to dispose of radioactive gaseous, aqueous, solid and organic liquid waste from its premises. The EPR is regulated by the Environment Agency (EA).

Berkeley Site as an Environmental Permit (EPR/ZP3893SG Ref.1) for the disposals of solid, liquid and gaseous radioactive wastes with an accompanying Compilation of Environment Agency Requirements, Approvals and Specifications (CEARAS Ref.2) which details further requirements associated with radioactive waste discharges. In order to facilitate the future decommissioning programme (including further hazard removal), Berkeley Site request variations to the EPR Permit EPR/ZP3893SG (Dated 1<sup>st</sup> August 2019) to :-

- amend the current Schedule 3 of the EPR permit - disposals of radioactive waste and monitoring, to include 2 new approved outlets.
- amend the current Schedule 3 of the EPR permit – to increase the annual limit of tritium to air from 20 GBq to 2 TBq.

## 1. INTRODUCTION

### 1.1 BERKELEY SITE

Magnox Ltd became a subsidiary of the Nuclear Decommissioning Authority (NDA) on the 1st September 2019. Berkeley Site consists of two Magnox Nuclear Reactors which are now considered to be in a safe & compliant state (Safestores 1 and 2) and the remaining buildings were used to process active effluent and for the storage/processing of waste, Company Standard PD-026 – Management of Waste (Ref.3). Berkeley Site coordinates are 51.69°N, 2.5°W; and the Ordnance Survey Grid Reference is ST 660994.

The key decommissioning stages are:-

- **Care and Maintenance Preparations (C&MP):** This stage comprises the hazard reduction activities and preparations necessary to allow Berkeley Site to enter C&M; for example, Intermediate Level Waste (ILW) retrieval and processing.
- **C&M:** This is an extended period of inactivity, over several decades, where radioactive decay naturally reduces the radiological hazards on the Berkeley Site.
- **Final Site Clearance (FSC):** In this stage all remaining structures, including the Safestores (Reactors), are removed.

### 1.2 EPR PERMIT

The future decommissioning programme will generate radioactive and non-radioactive waste in gaseous, aqueous, solid and organic liquid form. The Environmental Permitting Regulations (EPR) Permit sets limits and conditions on the management and disposal of radioactive waste with which Berkeley Site complies. To best facilitate the future decommissioning programme, including further hazard removal, changes to some of the conditions in the current EPR Permit are requested. This report identifies the changes requested by the Site to the current EPR permit to support the application for the variation. There is no change to Berkeley Site Boundary, Schedule 7 – Site Plan, in this variation request to the EPR Permit.

## 2. REQUESTED CHANGES TO THE EPR PERMIT

Berkeley Site is requesting the following changes to the EPR Permit:

- Two new approved discharge outlets to air, Modular Extraction Unit (MFU) for the Modular Intermediate Level Waste Encapsulation Plant (MILWEP) facility and a standalone Modular/Mobile Extraction Unit (MFU) for the R4 Sludge Cans project in the Active Waste Vault building. Further information on these is presented in Section 2.1.
- An increase in the annual limit for the discharge of tritium to air. Further details are presented in Section 2.2.

### 2.1 REQUEST FOR TWO NEW APPROVED DISCHARGE OUTLETS TO AIR

#### MILWEP

Berkeley Site requests a variation to the EPR Permit for a new Approved Outlet for the Modular Intermediate Level Waste Encapsulation Plant (MILWEP) Project, and Modular/Mobile Extraction Unit (MFU) at Berkeley Site for gaseous radioactive discharges to the atmosphere during its operational lifetime.

## Technical Description

MILWEP is a new waste processing facility at Berkeley Site. The purpose of the MILWEP installation is to encapsulate solid radioactive waste inside a reinforced 6m<sup>3</sup> concrete box (CB). The CB's are delivered to the MILWEP installation pre-loaded with Intermediate Level Waste (ILW), and are then filled with grout at the MILWEP installation to encapsulate the ILW within the CB (referred to as flood grouting). The grout is a wet mix made from mixing cement powder with water and chemical additives. The output from the MILWEP encapsulation process are the CBs containing a solidified mix of ILW and grout, that are then stored within Berkeley Site existing Interim Storage Facility (ISF) building.

Information on the radioactive waste arisings from the operation of the MILWEP facility is described below. In summary, these comprise a discharge to air following the flood grouting of the CB, and the final solid waste package (the CB with encapsulated ILW). The discharge to air is captured through a dedicated ventilation system discharging through an outlet point to the side of the MILWEP facility.

## Operating Techniques

The CBs to be flood grouted are delivered to the MILWEP facility pre-loaded with the ILW and with a temporary lid in place. On delivery into the MILWEP facility, the CB is placed within one of three grouting stations. Ports on the temporary lid of the CB are connected to the grout delivery system, and also the dedicated ventilation system.

## Radioactive Waste Discharges

Radioactive waste discharges from MILWEP comprise of:

- **A discharge to air following the flood grouting of the CB.** The heat generated during the encapsulation process, following flood grouting of the CB, will cause some of the tritium that is present within the ILW to be driven off into a discharge to air from the CB. The generation of carbon-14 and beta particulates during this process is expected to be minimal, and will not exceed the levels permitted under the current EPR Permit. The level of tritium discharged depends on the quantity that is released from the ILW during the encapsulation process (termed the Release Fraction). For the purposes of this EPR Permit variation request, a conservative Release Fraction of 5% has been applied, giving a worst case annual aerial discharge for tritium of 1.93 Tbq. The MILWEP encapsulation process will account for most of the aerial discharge of tritium from Berkeley Site.
- **The final solid waste package.** This comprises the CB containing a solidified mix of grout and ILW, with a concrete lid cast in-situ. After the contents of the CB have cured, the final package is transferred to Berkeley Site's ISF.

## Monitoring Techniques for Radioactive Discharges

Stack monitoring will be installed in accordance with EG\_1\_2505\_1 (which draws on requirements from BS ISO 2889:2010 Ref.8), and will monitor for the presence of tritium, carbon-14 and beta-particulate. In addition to stack monitoring for the presence of tritium, carbon-14 and beta-particulate isokinetic sampling, the ventilation system will have associated alarms linked to the Building Monitoring System (BMS) including differential pressure (dP) across the HEPA filter. Dispersed Oil Particulate (DOP) injection, sample and return points are provided to test filter efficiency on the ductwork system.

A single stage safe change HEPA filter, comprising of a single duty only house (ES\_0\_1711\_2) containing one inset (EA\_0\_1737\_2, type 1 or 2 to be determined), complete with depression relief valve and filter will be fitted. The filter bank shall include a locally positioned differential pressure instrument. (WD\_REP\_0180\_18, Ref.5).

## Summary of Assessment and Optioneering Undertaken for MILWEP

The enclosed document WD-REP-0037-18 (Ref.4) summarises the assessment and optioneering undertaken to date for the MILWEP facility, to demonstrate that the current design has been optimised in line with the requirements of BAT/BPM (as set out in Company Standard S-391 Ref.6). Further details on assessments and optioneering undertaken, as summarised and cited in Ref.4, are presented in the following:

- **BNLS-REP-CMP-0094-17 – Berkeley Site Assessment of Aerial Discharges and Off-Site Public Doses for the worst-case year.** This report identified that the encapsulation process may result in the release of approximately 776 GBq of the tritium, and the Carbon-14 is trivial. The key sections of this document are Section 7 (Summary of Future Discharges) and Section 8.1 (Doses to the Local Public from Discharges), the increase in tritium discharges report that off-site public dose from tritium is negligible.
- **WD-REP-0255-16 – Assessments of the optimum siting for the Berkeley Encapsulation Plant.** Plot 1 is the preferred option East of the CRP (Building 54). Key sections are Page 15 Appendix C: Selection of Attributes, and Page 18 Appendix D: Assessment of Locations against Attributes.
- **M-EF-BKA-EAN-0012-16 – Variation in radiation doses from aerial discharge due to the location and discharge height of MILWEP at Berkeley Site.** Key sections are Page 3 Paragraph 6: Locations of MILWEP on Berkeley Site for Assessment of Public Dose. Page 8 Table 3: Assessment of Relative Inhalation Dose at Receptors from Locations. Page 6 Paragraph 8, Effects of MILWEP Stack Height.
- **BNLS-BAT-0128 – Options assessment for the abatement of tritium discharges.** See Section 9 – For unabated discharges, on the basis of lifetime dose to the most exposed person is less than 1 micro-Sv, a new abatement plant for Tritium is not justified. The MILWEP operational lifetime is expected to be 3-4 years.
- **1865\_RP\_HVAC\_0001 Issue B, (WD-REP-0180-18 Ref.5) – Ventilation Basis of Design.** The design life of the MILWEP ventilation system shall be 10 years, the expected plant operational lifetime is estimated at 5 years. The Process extract is a high integrity Standalone Mobile Filtration Unit (MFU) within the Process Plant area which comprises of an extract fan, HEPA filter, manual inlet/outlet dampers and local instrumentation. MFU is to maintain a minimum efflux velocity of 15m/s to meet best practice and minimise rain ingress. Ductwork is manufactured in high integrity stainless steel specification (EA\_0\_1723\_2) with bolted flanged connections for installation. A Dispersed Oil Particulate (DOP) injection, sample and return points are provided to test filter efficiency (EA\_0\_1707\_1) on the ductwork system (Ref.5).

#### **R4 SLUDGE CANS – STAND ALONE MODULAR EXTRACTION UNIT**

Berkeley Site requests a variation to the EPR Permit for a new Approved Outlet for the retrieval and processing of R4 Sludge Cans from Vault 3.

The R4 Sludge Cans Project aims to retrieve the 1,400 sludge cans from Vault 3 in the Active Waste Vaults Building (AWVB). The sludge contents will be separated from the cans which will be decontaminated to Low Level Waste (LLW). The potential for waste gases (including hydrogen) to be present in the sludge cans, as well as the likely generation of airborne particulate releases during the retrievals and processing stages means that a ventilation system is required for the project.

#### **Technical Description**

The sludge cans will be depressurised prior to their retrieval from the vault using an abrasive water jet cutting technique under the In-Vault Depressurisation (IVD) project. Water jet cutting is a cold cutting technique which would minimise the likelihood of ignition during depressurisation. In addition, in order to prevent detonations occurring inside the waste piles during waste handling activities, the project plans to use a cryogenic argon system to oxygen reduce the atmosphere in Vault 3.

#### **Operating Techniques**

Once depressurised, the sludge cans are removed from Vault 3 using the sludge can retrieval hoist for onward processing. The sludge can is raised through the shield door in the retrieval Area 100 posting port where it is lowered onto a bogie. The posting port includes a can wetting facility. The purpose of the

wetting module is to dampen sludge on the exterior of the sludge cans to minimise subsequent airborne contamination. In Area 200, the sludge is transferred to a Receipt Tank where it is homogenised and sampled prior to being pumped into a cuboidal Ductile Cast Iron Container (DCIC) for final conditioning. The empty sludge can is decontaminated and disposed of as LLW.

### **Radioactive Waste Aerial Discharges**

The total radioactive aerial discharges expected from the R4 Project are up to 9.9 GBq tritium and up to 0.6 GBq carbon-14. Levels of beta particulate are considered negligible and will not exceed the levels permitted under the current EPR Permit.

### **Monitoring Techniques for Radioactive Discharges**

Stack monitoring will be installed in accordance with EG\_1\_2505\_1 (which draws on requirements from BS ISO 2889:2010 Ref.8), and will monitor for the presence of tritium, carbon-14 and beta-particulate. In addition to stack monitoring for the presence of tritium, carbon-14 and beta particulate isokinetic sampling, the ventilation system will have associated alarms linked to the Building Monitoring System (BMS) including differential pressure (dP) across the HEPA filter. Dispersed Oil Particulate (DOP) injection, sample and return points are provided to test filter efficiency on the ductwork system.

### **Summary of Assessment and Optioneering undertaken for the R4 Project**

The enclosed document BNLS-BAT-MIMP-0136 Issue 2, F-224 (Ref.7) summarises the assessment and optioneering undertaken to date, to demonstrate that the current design has been optimised in line with the requirements of Best Available Techniques (BAT) as set out in Company Standard S-391 (Ref.6). Please see below other relevant documents summarised in BNLS-BAT-MIMP-0136 Issue 2:

- **21-REP-MIMP-18039 – R4 Sludge Can Ventilation Optioneering Report.** Option 5 consists of a new installation provided by one or more Modular Filtration Units (MFUs) connected directly to Area 200 through an extraction point in order to meet the ventilation and containment requirements of the processing area. The retrieval area (Area 100) will be extracted by the existing AWW ventilation system. The stand-alone MFU system requires the installation of a new discharge stack outside the AWWB.
- **21-SPEC-MIMP-18448 - R4 Sludge Can Project, Ventilation Technical Specification.** This has supported the conclusion that the system as described above is the BAT option.
- **BNLS-BAT-MIMP-0129 – Sludge Cans Project – Retrieval, Pre-Processing and Processing.** This ensures that the waste arisings, namely the number of ILW waste packages and secondary wastes are minimised and that the process applied demonstrates the use of BAT.

## **2.2 INCREASE IN TRITIUM ANNUAL LIMIT IN SCHEDULE 3 – TABLE S 3.1 SPECIFIED DISPOSALS TO AIR**

The annual limit for the discharge of tritium to air from Berkeley Site, under the current EPR Permit is 20 GBq.

A revised annual limit for the discharge of tritium to air of 2 TBq is requested. This increase is sought in order to undertake the decommissioning activities described for the MILWEP and R4 projects, along with the activities already permitted under EPR/ZP3893SG/V004. Collectively, these activities are necessary for the Berkeley Site to enter Care and Maintenance in a timely manner.

The 2 TBq figure is based on the worst case aerial discharges of tritium that may occur from the existing and planned (R4 and MILWEP) activities. The 2 TBq figure aligns with the value requested in the Article 37 Annexe 5 submission (Ref.9).

### Assessment of Potential Radiological Impact from the Increased Discharge of Tritium

The PC-CREAM 08 assessment tool has been used to predict the doses received by the most exposed individual (an infant) living in the vicinity of the Berkeley Site, using the discharge levels presented in this Environmental Permit variation request, and the methodology presented in the Article 37 Annexe 5 submission (Ref.9).

Table 1.

Calculated individual doses to infants living in the vicinity of Berkeley Site (100m) from the worst-case aerial discharge (calculated using PC-CREAM assessment tool)

Radionuclide	Annual discharge limit assessed (GBq)	Annual effective dose
Tritium (H-3)	2,000	$2.49 \times 10^{-2} \mu\text{Sv/y}$
Carbon-14	5	$1.20 \times 10^{-2} \mu\text{Sv/y}$
Beta particulate (Pu-241)	0.02	$2.36 \times 10^{-4} \mu\text{Sv/y}$
Total		$3.71 \times 10^{-2} \mu\text{Sv/y}$

Tier 1 ERICA dose assessments have been run for gaseous and aqueous discharges of radioactive waste from the site, a terrestrial assessment was carried out for the gaseous discharge limits and a marine assessment for the aqueous discharge limits in (M/EF/WIN/EAN/0009/19, Ref.10).

- **Terrestrial ecosystems** – to identify impacts to non-human biota in localised terrestrial receptors, from exposure to gaseous radioactive waste.
- **Marine ecosystems** – to identify impacts to non-human biota in localised marine receptors, from aqueous releases to the Severn estuary.

The assessments are based upon the new proposed gaseous annual limits presented in Table 1 in M/EF/WIN/EAN/0009/19 (Ref.10), and the existing aqueous limits in Table 2 in M/EF/WIN/EAN/0009/19 (Ref.10). The ERICA dose rate screening value of  $10 \mu\text{Gy.h}^{-1}$  has been used to provide an initial indication of whether populations of non-human organisms and their habitats could be adversely affected by the proposed gaseous and aqueous waste permit limits (Table 1 and Table 2 in M/EF/WIN/EAN/0009/19 (Ref.10). The assessment also considers whether more detailed assessment is required, this approach is discussed further in the methodology, (M/EF/WIN/EAN/0009/19, Paragraph 2 Ref.10). The gaseous results showed that at the ERICA dose screening level of  $10 \mu\text{Gy/hr}$ , no single radionuclide has a risk quotient greater than 1, and the sum of risk quotients is significantly below 1 ( $3.57\text{E-}04$ ) Table 6, Paragraph 4 (M/EF/WIN/EAN/0009/19, Ref.10). Therefore it is considered that the risk of significant impact to non-human biota local to the Berkeley Site, from the gaseous emissions, is negligible.

It should be noted that the studies into aqueous discharges gave similar risk returns. Whilst aqueous discharge is not the focus of this section some notes follow: PC CREAM & ERICA aqueous radionuclides were identified in Appendix A Table 9, (M/EF/WIN/EAN/0009/19 Ref. 10), the information was entered into the PC-CREAM DORIS module to model the dispersion of a common  $1\text{Bq/yr}$  release rate for each radionuclide. The DORIS module gave an output for two media concentration types – seabed sediment and unfiltered seawater. These two outputs were given with temporal variation between 1 and 10 years (specified in the DORIS parameters). The sum of all risk quotients is less than 1 ( $9.42\text{E-}01$ ) Table 7 ((M/EF/WIN/EAN/0009/19 Ref.10). It is considered therefore that the risk of significant impact from dose to non-human biota from the current aqueous limits is negligible. In all cases the highest media concentration values for each nuclide were selected for conservatism.



## 2.3 SAMPLING AND MAINTENANCE OF THE NEW APPROVED OUTLETS

The MILWEP Mobile Filtration Unit (MFU) and R4 Mobile Filtration Unit (MFU) stand-alone Ventilation Systems will be maintained via the Berkeley Site Radiological Environmental Maintenance Schedule BNLS-Sched-RAD/EPR or the BNLS-Management Mandatory Maintenance Schedule and controlled by passport cards on the passport system. A spares list requirement will be stated in the Technical Specification for each new outlet.

They will also be included in the BNLS-LSI-424 Environmental Compliance Management of Gaseous, Liquid and Solid Waste (Blue Label Scheme). This document describes procedures designed to ensure that defects that preclude normal operation of environmentally sensitive plant are highlighted so the appropriate and timely action may be taken. The following items are considered to be 'last line of defence' against unauthorised discharge for gaseous discharges, Fans, Filters, Samplers (including sampler nozzles) and are given priority as Blue Label Plant. The new approved outlets will have an Uninterruptible Power Supply (UPS) for the continuous sampling and will be alarmed and linked to our Building Management System (BMS) in the Security Gatehouse.

The Projects will be using a Regulated Air Pump (RAP) which is a compact, portable system containing an oil-free vacuum pump, motor and airflow regulator to measure beta particulate discharges to the air. The RAP is used across Berkeley Site for all Beta Particulate sampling. The bubblers used across Berkeley Site are multi-purpose gas sampling systems and are used for analysis of carbon-14 and tritium in air, these will be used on the MILWEP and R4 vent systems.

The MILWEP MFU and R4 MFU stand-alone ventilation system outlets will discharge air continuously via authorised stacks. The initial sampling frequency for beta particulate will be continuous and weekly for tritium and carbon-14 in line with existing stacks. All frequencies and techniques will remain under continuous review as per Magnox standard S-070 (ref. 11) as extended data is collected during commissioning and reviewed.

Magnox Ltd. is required to take samples and undertake radioactivity assessments to demonstrate compliance with the EPR Permit. The techniques implemented are documented in BNLS-MIS-0019 (Techniques used for Sampling and Assessment of Radioactive Waste Disposals). The application of BAT for gaseous and aqueous discharges at Berkeley Site is demonstrated in document BNLS-BAT-0140 (Application of Best Available Techniques (BAT) for Radioactive Waste Gaseous and Aqueous Discharges at Berkeley Site). These documents are updated, and reviewed on a regular basis.

The management of radioactive gaseous discharges is documented in BNLS-LSI-419 - Management of Gaseous Radioactive Waste. There will be Plant Operating Instructions for the MILWEP MFU and MFU 'stand-alone' ventilation systems as well as other relevant instructions. All these documents will be periodically reviewed and updated as required.

See Appendix A – Revised: Reporting Form including New Approved Outlets and Tritium Discharge Limit added to Proforma 1 – Monthly Gaseous Effluent Discharge Return. This is an example of the revised gaseous monthly reporting form including the Tritium annual increase and the extra two authorised outlets.

See Appendix B – Current: Proforma 1 - Monthly Gaseous Effluent Discharge Return, Permit Number EPR/ZP3893/V004 – Effective Date: 1<sup>st</sup> August 2019. This is an example of the current gaseous monthly reporting form.

## 2.4 ENVIRONMENT MONITORING PROGRAMME

Results from the report M/EF/WIN/EAN/0009/19 page 8, (Ref.10), and the PC-CREAM 08 assessment tool was used to predict the doses received by the most exposed individual (an infant) living in the vicinity of the Berkeley Site, using the discharge levels presented in this environmental permit variation request see Table 1 Page 8. Monthly gaseous discharges are reported to the EA monthly for tritium, carbon 14

and beta particulate and are below our discharge limits, they also reported annually for the Radioactivity in the Food and Environment (RIFE) report which is produced by the UK Environment Agencies. The radiological impact on the public and environment of discharges from Berkeley Site in the RIFE report 2017 4.1, Berkeley and Oldbury sites are considered together for the purpose of environmental monitoring because the effects from both sites contribute to the same total dose from all pathways and sources of radiation is assessed to have been less than 0.005 mSv per year. It can be seen that considering either of the dose assessments above, the exposure to the most critical member of the public as a result of the increase in tritium gaseous radioactive discharge annual limit from Berkeley Site is significantly below the dose limits and constraints, currently there is no change to the environmental monitoring programme (see below).

The radiological impact of gaseous discharges is considered, both in terms of doses derived from discharges (prospective) and doses derived from measurements made in the environment (retrospective). The EA agrees that the operator shall provide the EA with a report on the dose assessment required under condition 3.2.1 b (ii) within 12 months of the end of the calendar year. The last annual retrospective dose assessment in 2017 (adult) at Berkeley in 2018, was rounded up to <6 µSv/y.

Berkeley Site will continue to calculate the mean and standard deviation of previous 12 months results to comply with EA requirements and any results that exceeds the mean plus 4 standard deviations of the previous 12 results will be reported to the EA without delay. Any results that exceeds mean plus 3 or 4 standard deviations of the previous 12 months will be reported on our Q-Pulse event reporting system and investigated. The Environmental Monitoring Programme is regularly reviewed and any future amendments to the monitoring regimes or reporting parameters the EA will be notified. The sampling for the Environmental Monitoring Programme for Berkeley Site is carried out by Oldbury Power Station Laboratory.

Current Programme	Current Sampling/Measurements
Spot measurements of radiation dose rate for 0-1km ring	Quarterly spot measurements: SO 662 003 – number 57 ST 665 999 – number 58 ST 667 997 – number 59 ST 667 994 – number 60 ST 666 989 – number 61 ST 663 987 – number 62 ST 659 986 – number 63 ST 655 987 – number 64
Passive shades monitoring approximately 1km from site.	Monthly taki-shade measurements 6 locations around site: 1 NGR SO 667 009 approximately 2 km NNE 2 NGR SO 673 002 approximately 2 km ENE 3 NGR ST 674 984 approximately 2 km SE 4 NGR ST 665 983 approximately 1 km SSE 5 NGR ST 661 983 approximately 1 km S 6 NGR ST 654 991 approximately 0.5 km SW
Grass/herbage monitoring	Collected from Berkeley Nearest Site once per quarter - ST 664996 and Carbon-14 results are reported annually.

<b>Current Programme</b>	<b>Current Sampling/Measurements</b>
Marine programme: Spot gamma radiation dose rates measurements in 4 locations.	Quarterly beach/estuarine dose rate monitoring site locations: SO 652 015 Shore at near Lydney – Site A ST 641 983 Shore near Hayward Rock – Site M SO 666 018 Shore near Sharpness – Site O ST 653 992 Shore at Berkeley
Marine programme, sand and sediment sampling.	Quarterly sand and sediment sampling, site locations: ST 653 992 Berkeley SO 652 015 Shore near Lydney – Site A SO 666 018 Shore near Sharpness – Site O ST 641 983 Shore near Hayward Rock – Site M  Strontium results are reported annually for all sites
Marine programme, seaweed sampling	Quarterly seaweed sampling site locations: ST 653 992 Shore at Berkeley ST 641 983 Shore near Hayward Rock – Site M
Marine programme, fish samples are collected from local fishermen, when available.	Quarterly fish sampling are only reported when samples are available from local fishermen.
Marine programme strandline contamination monitoring	Contamination survey is carried out once every 6 months.

### **3. COMPLETED EA FORMS FOR THE APPLICATIONS FOR A VARIATION TO THE ENVIRONMENTAL PERMIT**

**See attached the completed permit application forms:**

1. For a Radioactive Substances Activity - Part RSR-A - About you and your premises.
2. Part RSR-C3 – Variation to a Bespoke Radioactive Substances Activity Permit (nuclear site, open sources and radioactive waste).
3. Radioactive Substances Activity – Part RSR-F- Charges and Declarations.

### **4. REFERENCES**

1. Magnox Limited, Berkeley Site Permit EPR/ZP3893SG
2. Magnox Limited, Berkeley Site – Compilation of Environment Agency Requirements, Approvals and Specifications EPR/ZP3893SG/V004.
3. Company Standard PD-026 – Management of Waste.
4. WD-REP-0037-18 – Options Assessment Review/Requirement Form for MILWEP.
5. 1865\_RP\_HVAC\_0001 Issue B, Magnox Ref: WD\_REP\_0180\_18 MILWEP Ventilation Basis of Design.
6. Company Standard S-391 – Options Assessment for Radioactive Substances Legislation BAT/BPM Compliance.
7. BNLS-BAT-MIMP-0136 - Options Assessment Review/Requirement Form for R4 Project.
8. BS ISO 2889:2010 – Sampling Airborne Radioactive Materials from the Stacks and Ducts of Nuclear Facilities.
9. BNLS-REP-MILWEP-0226-17 - Article 37 Annexe 5.
10. M/EF/WIN/EAN/0009/19 - ERICA Tier 1 dose assessment – to support a variation to Berkeley Site environmental permit (EPR/ZP3893SG).
11. Company Standard S-070 The Assessment of Radioactive Gaseous Discharges.

**APPENDIX A:**  
**REVISED REPORTING FORM INCLUDING NEW APPROVED OUTLETS AND TRITIUM DISCHARGE LIMIT.**

BNLS/F/HP/180

**PROFORMA 1 - MONTHLY GASEOUS EFFLUENT DISCHARGE RETURN**

Permit Number **EPR/ZP3893SG** - Effective Date:

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

Month:

Year:

EPR Ref Numbers	Site Building Numbers	Outlets	Beta Particulate GBq	Tritium GBq	Carbon 14 GBq
A1	S1	SafeStore 1 (Reactor 1 Ventilation Stack)	N/M		
A2	S2	Safestore 2 (Reactor 2 Ventilation Stack)	N/M		
A7	B55	Active Waste Vaults Vent System			
A9	E23	Shielded Area Buildings Ventilation System		N/M	N/M
A12	B53	Access Control Point (ACP) Wet Radiochemical Laboratory		N/M	N/M
A13	N/A	Mobile Extraction Units (MEUs)		N/M	N/M
A14	B52	Solid and Wet Waste Ventilation System - Conditioning Facility			
	B64	MILWEP Encapsulation Plant			
	B55	R4 Stand Alone Mobile Extraction Unit (MEU)			
	MONTHLY TOTALS				

	Beta Particulate GBq	Tritium GBq	Carbon 14 GBq
Total in Last 12 Months			
Annual Limit	2.00E-02	2.00E+03	5.00E+00
% of Annual Limit			

<b>Decommissioning Work Status:</b> (capable of affecting emissions). N/M - not measured N/R- Not Run Events and non routine sampling: (including details of when alternatives to normal sampling procedure undertaken)   
--

**Prepared by:**  
**Name:**

**Position:** Suitable Safety & Environment Engineer  
 Provider of Radioactive Substances Legislation Advice

**Signature:**

**Date:**

**Verified By:**  
**Name:**

**Position:** Head of Radiological Protection & Environment

**Signature:**

**Date:**

**APPENDIX B:**  
**CURRENT PROFORMA 1 – MONTHLY GASEOUS EFFLUENT DISCHARGE RETURN, PERMIT NUMBER**  
**EPR/ZP3893/V004 – EFFECTIVE DATE 1<sup>st</sup> AUGUST 2019.**

BNLS/F/HP/180

Authorised by Head of Radiological Protection & Environment

**PROFORMA 1 - MONTHLY GASEOUS EFFLUENT DISCHARGE RETURN**

**Permit Number EPR/ZP3893SG/**

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

**Month:**

**Year:**

EPR Ref Numbers	Site Building Numbers	Outlets	Beta Particulate MBq	Tritium MBq	Carbon 14 MBq
A1	S1	SafeStore 1 (Reactor 1 Ventilation Stack)	N/M		
A2	S2	Safestore 2 (Reactor 2 Ventilation Stack)	N/M		
A7	B55	Active Waste Vaults Vent System			
A9	E23	Shielded Area Buildings Ventilation System		N/M	N/M
A12	B53	Access Control Point (ACP) Wet Radiochemical Laboratory		N/M	N/M
A13	N/A	Mobile Extraction Units (MEUs)		N/M	N/M
A14	B52	Solid and Wet Waste Ventilation System - Conditioning Facility			
MONTHLY TOTALS					

	Beta Particulate MBq	Tritium MBq	Carbon 14 MBq
Total in Last 12 Months			
Annual Limit	2.00E+01	2.00E+04	5.00E+03
% of Annual Limit			

Decommissioning Work Status: (capable of affecting emissions)

N/R = Not Run      N/M = Not Measured

Prepared by:

Name:

Position:

Suitable Safety & Environment Engineer  
 Provider of Radioactive Substances Legislation Advice

Signature:

Date:

Verified By:

Name:

Position:

Head of Radiological Protection & Environment

Signature:

Date:

