

LOW LEVEL WASTE REPOSITORY  
NUCLEAR LICENSED SITE

## CONSEQUENCES REPORT

(Required under the Radiation (Emergency Preparedness & Public Information) Regulations 2019)

Approved by: Paul Pointon –  
Managing Director

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(Print Name)

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(Signature)

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(Date)



## Introduction

1. This document is for the Low Level Waste Repository (LLWR) nuclear licensed site as required under regulation 7(1) of The Radiation (Emergency Preparedness and Public Information) Regulations 2019 (Statutory Instrument 2019 No 703) – hereafter referred to as REPPiR.

## Purpose

2. The purpose of this report is to provide information required under regulation 7(1) of the legislation and as detailed in schedule 4 of the Approved Code of Practice and Guidance (ref 1).

## Context

3.1 This document has been produced to comply with requirements identified in the new REPPiR 2019 legislation which became law on 22<sup>nd</sup> May 2019. The output from LLWR, in the form of this report, is therefore made to meet these legal requirements but does not represent a change to the nature of operations on the LLWR nuclear licensed site. Indeed the risk to the public from the radioactive inventory at the site has progressively been decreasing since 1997 when the highest risk inventory started to be transferred to Sellafield. This was completed in 2007. Since then there has been a progressive further reduction in risk due to the successful diversion of low level waste to other routes e.g. metals recycling and incineration. 95% of all low level waste generated in the U.K is now directed to other routes and only 5 % comes to LLWR, instead of 100% as it used to be. Additionally, decommissioning of legacy facilities that had contained the highest risk inventory is now complete. With 60 years of safe operations behind it LLWR continues to remain a low risk facility.

3.2 In preparing Issue 2 of this report LLWR has followed national guidance provided by Government agencies:

- Approved Code of Practice and Guidance for REPPiR 2019 (ref 1),
- Public Health Protection in Radiation Emergencies guidance from Public Health England (ref 2),
- Public Health England consequence assessment methodology (ref 3)
- Public Health England Dose Release Ratio (DRR) data (ref 4).

LLWR's Hazard Evaluation Report (ref 5) has been written following the requirements of reference 1 and using the methodologies in references 2-4 . This report is written using the outcomes from LLWR's Hazard Evaluation Report (ref 5).

PART 1  
Factual Information

Location and Environment

Name and Address of the Site:	Name and Address of the Operator:
Low Level Waste Repository Site Drigg Holmrook CA19 1XH	Low Level Waste Repository Ltd Drigg Holmrook CA19 1XH

4. The Low Level Waste Repository is a Nuclear Licensed site located on the west Cumbrian coast, approximately 7 km South East of the Sellafield site. The Nuclear Licensed site is some 100 hectares in area and is built on the site of a disused munitions factory. The site's principal activity is to dispose of radioactive Low Level Waste (LLW).

5. Permitted radioactive liquid discharges are via a pipeline, which discharges to the Irish Sea.

6. The site has been operational for the disposal of LLW since 1959.

7. Figure 1 shows the geographic site location and figure 2 shows the site boundary.

8. The governing authority responsible for the implementation of the new REPPIR 2019 regulations is Cumbria County Council.

Potential sources of a radioactive material release

9. The components of the site's radioactive material inventory are from three main areas.

(i) Low Level Waste (LLW)

10. LLW disposed of into Trenches numbered 1 to 7. The trenches are now closed with an engineered interim cap.

11. LLW grouted into steel ISO containers disposed in an engineered vault (numbered 8). This vault also contains items directly grouted into the vault.

12. A second vault (numbered 9) currently used for the disposal of grouted LLW ISO containers and the interim storage of ungrouted LLW ISO containers.

13. The permitted discharges and waste disposals are managed in accordance with the Environmental Permitting Regulations 2010, and are governed by Permits issued by the Environment Agency.

(ii) Decommissioning material

14. One building contains drums of waste which have been created as other contaminated buildings have been decontaminated in readiness for demolition. The decommissioning work is now complete. Additionally, a small population of legacy drums is currently stored in this facility. All drums are awaiting onward transfer to other appropriate facilities, which may be off site.

(iii) Sealed sources

15. A small number of sealed sources are kept on the site which are managed in accordance with current legislation.

PART 2  
Recommendations

Assessment summary

16. No Detailed Emergency Planning Zones (DEPZ) are recommended.

17. LLWR, following the ACoP & Guidance (ref 1) for sites not listed in schedule 5 of the ACoP (ref 1), has taken advice from the regulator (Office for Nuclear Regulation) whereby ONR has advised LLWR to make the Local Authority aware that some limited off site consequences could result from severe events that might require some limited local response, but without (LLWR) formally recommending designation of an OPZ. Therefore no Outline Planning Zone is recommended based upon three considerations; (i) requirements identified in Schedule 5 of the Approved Code of Practice and Guidance, (ii) ONR advice and (iii) this assessment.

18. Sheltering, evacuation, administration of stable iodine and restrictions on the consumption of food and water are not considered to be required and are not recommended. Therefore no urgent protective actions are required.

PART 3  
Rationale

Hazard Evaluation and Consequence Assessment report

19. The first step in preparing this Consequences Report is for the Operator (LLWR) to assess the radiological hazards on the LLWR site and the consequences to members of the public if a 'radiation emergency' occurs. This is embodied in the Hazard Evaluation and Consequence Assessment report (ref 5). The basis for this is already in place by virtue of the current operational safety cases which define faults and predicted doses to the public consequent of them. From these, the LLWR hazard assessment (ref 5) has been written using PHE methodology (refs 2-4).



Based upon requirements identified in Schedule 5 of the Approved Code of Practice and Guidance, and ONR advice, this report which is based upon the Hazard Evaluation Report (ref 5), focuses on whether any urgent protective actions are required.

The assessment

20. The key steps for off-site consequence are:

- Identify a fault (accident scenario) that could cause a radiation emergency, regardless of frequency of occurrence. The worst case scenarios considered are earthquake and large aircraft impact.
- Determine whether any urgent protective actions are required

For Low Level Waste (LLW) inventory

21. The LLW containers at LLWR hold a large range of radiological inventories. Given the requirement in REPPIR 2019 that 'evaluating a low likelihood for a radiation emergency to occur should not be used as a reason for discounting the hazard from having the potential to cause a radiation emergency', it is considered that something approaching worst inventory should be used, called 'worst reasonable inventory'. 'Worst' in this context means the highest amount of radioactive material that is typically seen in the range of inventories in all of the LLW containers. Therefore in this assessment the 'worst reasonable inventory' of a container is assumed to be impacted by an earthquake, and separately, by a large aircraft. It is further pessimistically assumed that any containers affected are ungrouted, This means that the radioactive contents have not been encapsulated in concrete which would otherwise mitigate the effect of an aircraft fire.

Earthquake

22. This assumes that 25 ungrouted containers fall from the stacks over 3 metres. No credit is taken for the containment that would still be provided by the container even if it were damaged. A full uncontrolled release of the contents of these 25 containers is assumed. Another 75 are assumed to fall from below 3 metres which would not contribute significantly to dose.

Aircraft crash

23. As with earthquake, it is assumed that 100 ungrouted containers with the worst reasonable inventory are impacted by an aircraft which causes toppling of the containers and also affects them with a fire.

24. With the very low chances of an aircraft crash or an earthquake occurring, only a very limited off site consequence is determined with doses that do not exceed the lower Emergency Reference Level (ERL – see later). From this, and in conjunction with Schedule 5 of the ACoP (ref 1), no OPZs are recommended.



25. In all cases, sheltering, evacuation, administration of stable iodine and restrictions on the consumption of food and water are not considered to be required and are not recommended (see explanation later). Therefore no urgent protective actions are required.

Drummed decommissioning waste and sealed sources.

26. Unlike LLW, the data available for this area does not have a wide range of values. So the inventory is assessed on the common content. Most of the drums are not grouted apart from a small population that are. For the purpose of this assessment, all drums are be treated as if ungrouted and all drums will be assumed to be affected. The radioactive element giving rise to the worst case public dose is assumed to be in the inventory and the assessment is therefore based upon this.

Earthquake and Aircraft crash

27. The assessment considers the physical impact on the drums from an earthquake.

28. As before, the radioactive element giving rise to the worst case public dose is assumed to be in the common inventory, with an incident involving all drums assumed. The assessment considers both physical impact and fire as a means of release from the drums.

29. Similarly to the LLW assessment, with the very low chances of an aircraft crash or an earthquake occurring, only a very limited off site consequence is again determined with doses that do not exceed the lower Emergency Reference Level (ERL), and in conjunction with Schedule 5 of the ACoP (ref 1), no OPZs are recommended.

30. As with LLW, sheltering, evacuation, administration of stable iodine and restrictions on the consumption of food and water are not considered to be required and are not recommended (see explanation below). Therefore no urgent protective actions are required.

Explanation for the advice to the public

31. For both the LLW and drummed waste scenarios the stated response for the public is “sheltering, evacuation, administration of stable iodine and restrictions on the consumption of food and water are not considered to be required and are not recommended”

32. Public Health England has set a trigger called an ‘Emergency Reference Level’ (ERL). For sheltering the lower ERL is equal to 3mSv ‘averted dose’ which is the radiation dose that a member of the public can avoid being exposed to by implementing a protective action. The hazard assessment carried out (ref 5) shows that the doses to the public from the ‘worst reasonable inventory’ at LLWR do not exceed 3mSv which is the lower ERL for sheltering. Therefore no ‘averted dose’ measures are required for

evacuation or sheltering. This is similarly true for restrictions on the consumption of food and water and the administration of stable iodine. Therefore no urgent protective actions are required.

#### Overview

33. The PHE assessment processes, combined with the very low chances of an aircraft crash or an earthquake occurring, has shown only very limited off site consequences to be determined for a radiation emergency on the LLWR site with doses not exceeding the lower Emergency Reference Level (ERL), and in conjunction with ONR advice and Schedule 5 of the ACoP (ref 1), no OPZs are recommended.

34. Sheltering, evacuation, administration of stable iodine and restrictions on the consumption of food and water are not considered to be required and are not recommended. Therefore no urgent protective actions are required.

#### References

1. Approved Code of Practice and Guidance For The Radiation (Emergency Preparedness and Public Information) Regulations 2019. Office for Nuclear Regulation, HSE Books. ISBN 9780717667284.
2. Public Health Protection in Radiation Emergencies, PHE-CRCE-049, Public Health England. May 2019.
3. REPPIR 2019 consequence assessment methodology, PHE-CRCE-050, Public Health England. July 2019.
4. Public Health England, Dose Datafiles, REPPIR 2019, Version 1.0 (10/06/2019).
5. LLWR Hazard Evaluation Report, incorporating the Consequence Assessment MEHSC P(19)17.
6. National Radiation Protection Board, NRPB R-91 A model for short and medium range dispersion of radionuclides released to the atmosphere R H Clark September 1979.



Figure 1 Geographic site location



Figure 2 Site boundary

