Decision document: Sellafield Ltd and Sellafield site

Environmental permitting: radioactive substances activities

Date: September 2023

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Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

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Radioactive Substances Regulation (nuclear sites)

We have decided to grant the permit for Sellafield site operated by Sellafield Ltd. The decision is effective from 1 October 2023 in variation V013 of permit number KP3690SX.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of our decision-making process. It summarises the decision-making process to show how we have taken all relevant factors in to account in reaching our decision.

Unless the decision document specifies otherwise, we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and supporting Compilation of Environment Agency Requirements (CEAR) document. The introductory note summarises what the permit covers.

Confidential Information

A claim for commercial or industrial confidentiality has not been made.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our statement on public participation, "Environmental Permits: When and how we consult".

The application was publicised on the GOV.UK website and advertised in Cumberland News, West Cumberland Times & Star and Westmorland Gazette.

The application consultation was hosted on the Citizen Space website from 7 August to 3 September 2023.

We consulted the following organisations:

Department for Energy, Security and Net Zero

Committee on Medical Effects of Radioactivity in the Environment (COMARE)

Cumberland Council

Food Standards Agency

Ireland Environmental Protection Agency (EPA)

Isle of Man Government

Nuclear Decommissioning Authority (NDA)

Natural England

Natural Resources Wales (NRW)

Office for Nuclear Regulation (ONR)

Scottish Environmental Protection Agency (SEPA)

UK Health Security Agency (previously Public Health England)

West Cumbria Site Stakeholder Group (WCSSG) Environmental Health Working Group (EHWG)

Westmorland & Furness Council

The comments and our responses are summarised in Annex 1.

Variation for the disposal of radioactive waste

Introduction

Sellafield Ltd has applied to vary its existing environmental permit to carry out radioactive substances' activities on the Sellafield site. The application consisted of the relevant radioactive substances activities (RSA) environmental permit application forms (parts A, B5, C3 & F) and a submission of information to provide the required detailed technical information.

The operator has applied to make changes to the permit which include:

- the registration of the Magnox Swarf Storage Silo Retrievals Ventilation System stub stack which is being constructed to minimise and reduce facility gaseous discharges during operational activities by improving gaseous abatement with the use of additional High Efficiency Particulate Air (HEPA) filters.
- to register an Outfall X to discharge construction related aqueous waste arisings (non-sewage trade waste) to the River Calder via surface water drainage.
- the removal of the Gaseous Annual Site Limits for Krypton-85 & Antimony-125 following the completion of Magnox reprocessing in July 2022.
- a change to the site map and a reduction to the Radium-226 limit in response to Sellafield Ltd.'s application to extend the Calder Landfill Extension Segregated Area (CLESA) environmental safety case into the 'valley area'.

Justification (RSR-A, Q11)

The practices that are justified are production of nuclear fuel, generation of electricity by nuclear reactors, and recovery of usable products from spent nuclear fuel. The justified practice, for example generation of electricity, includes the decommissioning of relevant facilities and the associated waste management.

Transboundary contamination (previously Euratom Article 37) (RSR-C3, Q2c)

Following EU Exit, the UK is no longer bound by the requirements of Article 37 of the Euratom Treaty. Instead, DESNZ has issued a Direction to us (the Transboundary Radioactive Contamination (England) Direction 2020 – https://www.legislation.gov.uk/uksi/2016/1154/pdfs/uksiod_20161154_en_001.pdf), which requires applications for certain, new, radioactive substances activities to be accompanied by a far field dose assessment covering notifiable countries (Member States of the European Union and/or Norway). The same requirement for a transboundary dose assessment is placed on applicants seeking to increase discharge or disposal limits by variation for certain radioactive substances activity permits.

A Transboundary contamination submission is not required for this application.

Operator and Operator Competence (RSR-A, Q12)

We have assessed the applicant's competence against our guidance on the definition of legal operator for environmental permits and against our guidance on management arrangements for nuclear site operators.

We are satisfied that the applicant is the person who will have control over the operation of the facility after the grant of the permit.

We have not identified any reasons indicating that the operator is unable to operate in accordance with the permit.

Disposal of Radioactive Waste, Routes, Limits & Monitoring (RSR-C3, Q2c)

Registration of the Magnox Swarf Storage Silo (MSSS) Retrievals Ventilation System (RVS) stub stack

The MSSS facility is one of the most hazardous facilities on the Sellafield site, and the removal and storage of the highly radioactive waste inventory from the facility is essential in reducing both the radiological and environmental associated risks. Waste retrieval operations from compartment 10 (C10) commenced in April 2022 using the Silo Emptying Plant 2 (SEP2) machine. A further two SEP machines (SEP1 and SEP3) will be built and commissioned over the coming years to facilitate retrieval operations from all the MSSS compartments.

While the installed MSSS 2nd Extension Ventilation System was deemed fit for purpose for the retrieval of Miscellaneous Beta Gamma Waste (MBGW) from C10, for future sustained retrievals the 2nd extension abatement (wet scrubber and demister system) is not considered Best Available Technique (BAT) for particulate activity. To enable full retrievals from the MSSS facility a new RVS with stub stack, using HEPA filter abatement, has been constructed to minimise gaseous discharges.

The MSSS facility currently has two ventilation systems registered within Sellafield's RSA environmental permit. Disposal outlet reference A2 (Original building, 1st and 2nd extensions MSSS stack) and A12 (3rd extension MSSS stack). The inclusion of the MSSS RVS stub stack within the permit, with associated plant notification levels, will enable the commissioning of the stub stack to commence. Once the RVS stub stack becomes operational both the 2nd and 3rd extension discharge stacks A2 and A12 will be decommissioned and removed from Sellafield's RSA environmental permit via future permit variation. At this point the MSSS facility will have only the one statutory discharge outlet for the ventilation of the MSSS compartments during future retrieval operations.

Sellafield Ltd has applied to vary its existing RSA environmental permit to register the new MSSS RVS stub stack prior to it entering active service. We are satisfied with Sellafield Ltd.'s justification for the inclusion of the MSSS RVS stub stack as it will significantly reduce radioactive gaseous discharges to the environment from the MSSS facility. Accordingly, table S3.1C 'Specified disposals to air – Disposal Outlets', of the existing Sellafield RSA environmental permit, will now include the MSSS RVS stub stack as a new disposal outlet reference A19. There will be no change to the existing annual limits or quarterly notification levels, detailed within table S3.1A 'Specified disposals to air – Annual Site Limits', to which disposal outlet A19 will now apply. The permit already makes provision that upper site limits for some radionuclides (Strontium-90, Caesium-137, Plutonium-Alpha, Americium-241 & Curium-242 in total, Alpha-emitting radionuclides associated with particulate matter Beta-emitting radionuclides associated with particulate matter) will be in force until completion of the active commissioning of HEPA filtration in the MSSS stack, after which the lower site limits will come into force. This will represent a significant reduction in permitted and actual gaseous radioactive discharges from the Sellafield site.

In 2020, via permit variation EPR/KP3690SX/V011, we decided to replace annual plant limits with annual plant notification levels (APNL). The Environment Agency's 'Criteria for setting limits on the discharge of radioactive waste from nuclear sites' states that APNLs 'should be set on individual outlets as necessary to ensure that BAT is used to minimise discharges.' Within its application Sellafield Ltd. has outlined appropriate APNL values for the four radionuclides and radionuclide groups sampled for within MSSS i.e., Alpha, Beta, Caesium-137 and Strontium-90.

Discharge of radioactive waste from nuclear sites: setting limits - GOV.UK (www.gov.uk)

Sellafield Ltd.'s stated method used to calculate stack triggers within their guidance (SLSP 2.10.300.01) is to assume that a plant has been operating for a period greater than 12 months and that operational data is available. As new plant this has not been possible so Sellafield Ltd has used the estimated gaseous discharges from its RVS aerial flow sheet to determine both the 'worst case' and 'best estimate' annual gaseous discharges for each radionuclide via the RVS stub stack during full retrieval operations. The 'worst case' represents a ~99% decrease in the gaseous discharges via the RVS under full retrievals when compared to the 2nd extension APNLs within the existing Sellafield permit. As a result, Sellafield Ltd has proposed the 'worst case' discharge estimate for all three SEP machines as the appropriate approach for setting the initial RVS stub stack APNLs.

Overall, we are satisfied that the APNLs, proposed by Sellafield Ltd for the RVS stub stack, provide a high-level control of discharges for both the operator and regulator. Having reviewed the Environment Agency's 'Criteria for setting limits on the discharge of radioactive waste from nuclear sites' we are satisfied they also meet our limit setting guidance and so reflect the current approach to regulating radioactive waste disposals. As a result, table S3.1B 'Specified disposals to air – Annual Plant Notification Levels for individual Outlets / Groups of Outlets' has been updated to include the APNL proposed for the new disposal outlet reference A19. At the point that the Sellafield RSA environmental

permit is varied to remove disposal outlets A2 and A12 we expect Sellafield Ltd, based on actual discharge data, to undertake a formal review of the pertinence of the A19 APNL.

Register an Outfall X within the RSA environmental permit to discharge construction related aqueous waste arisings (non-sewage trade waste) to the River Calder via surface water drainage.

As part of Sellafield Ltd.'s decommissioning programme, new facilities are required for treatment and storage purposes on the Sellafield site. In 2023 the Environment Agency granted Sellafield Ltd. a bespoke Water Discharge Activity Permit (WDAP) to discharge non-radiological construction related liquid effluent arisings, via the Sellafield Site's surface water drainage system, to the River Calder at Outfall X [Permit number EPR/YB3996WN]. The effluent consists of non-sewage trade effluent, i.e., rainfall, and needs to meet strict discharge limits for elements like max daily volume, max rate of discharge, pH and suspended solids. The environmental permit does not permit the discharges of cement or gypsum into the River Calder.

In addition to the WDAP for Outfall X this discharge route also needs to be permitted under the Radioactive Substances Regulations and included as a variation to the existing Sellafield RSA environmental permit. This is because construction related liquid effluent arisings generated on the Sellafield site have the potential to include very low levels of radioactivity due to the impact from legacy facilities on the Sellafield site.

Consistent with WDAP EPR/YB3996WN we are satisfied that the liquid effluent discharged via Outfall X will consist of trade related rainfall dependent surface water runoff and some shallow intercepted groundwater, and any potential radioactivity present will be close to background levels. While we are content that it would be disproportionate for Outfall X to be reported against the existing site limits, Sellafield Ltd must demonstrate compliance with permit condition 2.3.2 and other permit conditions by ensuring BAT is applied within its management arrangements for discharges via Outfall X.

To minimise the activity of discharges of aqueous radioactive waste to the environment, and to ensure the effluent is characterised using appropriate analytical methods, thereby minimising its radiological effects on the environment and members of the public, Sellafield Ltd will require written approval from the Environmental Agency prior to the first disposals within the scope of WDAP EPR/YB3996WN being made via Outfall X. Accordingly, we have included a new pre-operational condition within the permit S1.3B.6.

In the future, Sellafield Ltd might wish to engineer new routes for other aqueous effluents via the Outfall X that are outside the scope of WDAP EPR/YB3996WN. Accordingly, to make sure that these plans are appropriate, we have updated table S3.2C 'Specified disposals to water – Disposal Outlets' and table S1.3B 'pre-operational measures for future development' (specifically reference S1.3B.5) to include Outfall X.

The Operator shall submit proposals for any new engineered routing of effluent via Outfall X, including a report which demonstrates how best available techniques (BAT) will be used

to minimise the activity of discharges of aqueous radioactive waste to the environment and to minimise its radiological effects on the environment and members of the public. These proposals will require approval in writing from the Environment Agency prior to such disposals being made.

Removal of the Gaseous Annual Site Limits for Krypton-85 & Antimony-125 following the completion of Magnox reprocessing in July 2022.

Krypton-85 (Kr-85) is a gas produced during the operation of a nuclear reactor. It is trapped within the spent fuel and then released during fuel shearing / decanning, which is the first stage in reprocessing, and subsequently during fuel dissolution. It is an inert gas with a half-life of almost 11 years. Antimony-125 (Sb-125) is a metal produced during reactor operations and becomes trapped in the spent fuel. Reprocessing and associated waste treatment operations result in most of the Sb-125 being directed into solid radioactive waste, but a small fraction is discharged into the air, particularly during Magnox fuel decanning operations. Sb-125 has a half-life of just under 3 years. Following discharge into the air, Sb-125 may concentrate in certain plants, which can then be eaten by animals and people.

In 2018, as part of the major review of the Sellafield RSA environmental permit, Sellafield Ltd. proposed to remove both the site limits for Kr-85 and Sb-125 following the end of Magnox reprocessing. Expected discharges of Kr-85 at that time were already significantly reduced due to THORP fuel shearing and dissolution ending, but it was expected that discharges would continue for the duration of Magnox fuel dissolution as part of reprocessing operations. After the end of reprocessing operations, there would be no source for continued Kr-85 discharges at a level that would meet the Environment Agency's limit setting criteria. Additionally, Sb-125 discharges were dominated by the Magnox fuel decanning operations associated with reprocessing. At the end of Magnox reprocessing, as fuel decanning operations will have ended, there would be no significant source for continued Sb-125 discharges at a level that would meet the Environment Agency's limit setting criteria.

In 2020, via permit variation EPR/KP3690SX/V011, we agreed in principle with the proposal to remove these limits at the end of Magnox reprocessing. However, we required Sellafield Ltd to provide further evidence that discharges had declined as expected before we removed these limits. We expected Sellafield Ltd to provide that information as part of a submission regarding CEAR requirement 4.2.2. part 2 paragraph 14.

In July 2022 the Environment Agency was notified by Sellafield Ltd. that its Magnox reprocessing plant had stopped reprocessing nuclear fuel and submitted a BAT justification [EM/2023/005] in May 2023 demonstrating the subsequent decline in discharges. Condition 4.2.2 of the Sellafield RSA environmental permit requires Sellafield to report its monthly radioactive gaseous releases to the Environment Agency. Upon review of this data, we are satisfied that discharges of Kr-85 and Sb-125 associated with Magnox reprocessing have ceased since its completion. Accordingly, Kr-85 and Sb-125 have been removed from table S3.1A 'Specified disposals to air – Annual Site Limits' and

Table S3.1B ‘Specified disposals to air – Annual Plant Notification Levels for individual Outlets / Groups of Outlets’ of the Sellafield RSA environmental permit.

The monitoring of Kr-85 and Sb-125 releases is currently undertaken via a dedicated Kr-85 sampler adjacent to the Sellafield site and via High Volume Air Samplers (HVAS) located around the site respectively. Sellafield Ltd has provided graphs of Kr-85 and Sb-125 discharge data from these samplers in support of their application. The discharge data between 2016 and March 2023 indicates that post Magnox reprocessing discharges of Kr-85 and Sb-125 have stabilised close to background levels or below LOD.

Having reviewed the Environment Agency’s ‘Criteria for setting limits on the discharge of radioactive waste from nuclear sites’ we are satisfied Sellafield may remove the requirement for environmental monitoring of Kr-85 and Sb-125 from its document [SLSP2.11.114] ‘Techniques defining the Sellafield Ltd Environmental Monitoring programme’, at its next reissue.

Change to the site map and a reduction to the Radium-226 limit in response to Sellafield Ltd.’s application to extend the Calder Landfill Extension Segregated Area (CLESA) safety case into the ‘valley area’.

The Calder Landfill Extension Segregated Area (CLESA) is an Environmental Permitting (England and Wales) Regulations 2016 (EPR) authorised Low Activity - Low Level Waste (LA-LLW) containment landfill for the disposal of non-hazardous radioactive waste generated at Sellafield. It is anticipated that the landfill will be full around 2030.

Once disposals to CLESA are complete there will be a ‘valley area’ between the CLESA disposals and the older disposals to the Calder landfill and its extension. The Environment Agency has previously agreed with Sellafield Ltd. that this ‘valley area’ would need to be filled to form an agreed restoration profile. Sellafield Ltd. has proposed to extend CLESA into the adjacent ‘valley area’, increasing CLESA’s volumetric capacity by around 23% and potentially extending the facility’s lifetime by around 5 to 6 years. There would be no increases to the radionuclide activity limits within the RSA Environmental Permit or any changes to the working methods, as outlined by Sellafield Ltd within its document ‘CLESA Valley Development – PCRSA Addendum: 60672670-ACM-RP-EN-004_C.’

The proposal to extend CLESA is not part of the scope of this application to vary the Sellafield Ltd.’s RSA environmental permit. Sellafield Ltd are already required to demonstrate compliance through the provision of a safety case for CLESA. The ‘CLESA Valley Development – PCRSA Addendum: 60672670-ACM-RP-EN-004_C.’ provided has been independently considered by the Environment Agency in response to existing regulatory requirements. To reflect the extended lifespan of the site, with the delivery of the valley infill capacity, condition S1.2.5 has been updated to reflect the current closure timings for the end of disposal operations at the CLESA site.

The proposed valley extension requires an update to the existing drawing of the Calder Tip / Calder Landfill Extension Main Area (CLEMA) / CLESA located within Schedule 7 – Site

Plan of the existing Sellafield RSA environment permit. No required changes to the existing site boundary have been proposed. In line with the Environment Agency Form Guidance, 'EP-RSR: How to apply for an environmental permit – Part RSR-A,' Sellafield Ltd. has proposed that detail of the CLESA / CLEMA is removed from Schedule 7 of the existing Sellafield RSA environmental permit. More detailed drawings of the Calder Tip / CLEMA/ CLESA will be included within Sellafield Ltd.'s internal management system document SLSP 2.11.100 'Techniques for determining the activity of waste disposals made under the Environmental Permit for Radioactive Substances (KP3690SX)'.

Sellafield's existing RSA environmental permit limits the activity of Ra-226 to 0.35 Bq/g in the top 3 metres of disposals in the top plane of the facility. Updated dose coefficients for Rn-222 gas have indicated this should be reduced to 0.16 Bq/g. This limit is not expected to constrain disposals, or introduce characterisation challenges, because Ra-226 in CLESA waste is typically naturally occurring and the associated exposures can be excluded from assessment. Having reviewed Sellafield Ltd.'s justification we are satisfied that the Ra-226 limit can be reduced. Accordingly, footnote 5 of Table S3.4 'Specified disposal by burial' has been amended.

Other changes

Table S1.2 Improvement and information requirements

Change to S1.2.8 – As detailed with RASCAR-SEL-22-048 the date has been changed to an annual submission starting on the 31 July 2023 from 6 monthly.

Removal of S1.2.10 – As detailed within RASCAR-SEL-21-028 this has been completed.

Removal of S1.2.11 – As detailed within RASCAR-SEL-23-026 this has been completed.

Removal of S1.2.12 – As detailed within RASCAR-SEL-22-016 this has been completed.

Change to S1.2.13 – As detailed within RASCAR-SEL-23-010 part 1 has been completed.

Change to S1.2.14 – As detailed within RASCAR-SEL-23-011 part 1 has been completed.

Addition of S1.2.15 – As detailed within RASCAR-SEL-22-051 we have included a new improvement condition requiring Sellafield Ltd to annually provide us with summary progress reports covering the programme of work for the HALES Old-Side Vent Duct (OSVD) to ensure all radioactive waste disposals are only by the permitted disposal routes starting on the 1 February 2024.

Table S3.1A Specified disposals to air – Annual Site Limits & Table S3.2A Specified disposals to water – Annual Site Limits

Removal of previous footnote 2 'Upper limit in force until the completion of Magnox reprocessing' against Tritium H-3, Carbon-14 and Iodine-129 from both table S3.1A and

S3.2A to reflect the lower limit is in force for these radionuclides due to the completion of Magnox reprocessing in July 2022.

Table S3.2 B Specified disposals to water – Annual Plant Notification levels for discharges

In 2020, via permit variation EPR/KP3690SX/V011, we agreed with Sellafield Ltd.'s proposals to change from plant limits to ANPLs. At the principle level, this aligns with the government's ambition as noted in the better regulation framework, 'to continue to bear down on the costs to business of regulation while maintaining important regulatory protections.' APNLs are generally based on historic discharge data, using accepted statistical methods for determining the values.

As we stated within the corresponding decision document, to permit variation EPR/KP3690SX/V011, in the future there will be changes to operations in existing facilities and new facilities will be built to allow POCO, HHRR and decommissioning at the Sellafield site. Sellafield Ltd. will need to consider whether these changes mean that ANPLs will need to change or whether new ANPLs will be required. We expect that Sellafield Ltd. will review the ANPLs annually and propose changes (up or down) where necessary. This may result in the permit needing changing on a regular basis. This is no different from the recent past, where the permit has been varied approximately every 18 months. To make sure that Sellafield Ltd. carried out this review, we decided to formalise this process through a revised version of CEAR requirement 4.2.2, part 2, paragraph 3.4:

'The operator shall submit interim and final permit review reports that shall review the existing permit conditions, limitations, and notification levels in the context of the site's waste management plans and its supporting strategies. The reports shall identify and justify situations, if any, where changes to the existing conditions, limitations and notification levels are appropriate; this should cover situations both where the headroom is restrictive or excessive. The reviews should be underpinned by comprehensive waste stream characterisation following major changes to source terms and/or effluent management at Sellafield (e.g., covering waste retrievals/post operational clean out/decommissioning transitions for major plants; diversion of major effluent streams; use of new major effluent treatment plants). The permit review reports shall also include review of the discharge data for all 'open fuel storage ponds' and 'other approved outlets', to understand and highlight the reasons for any significant changes in discharges and to summarise any required changes in 'other approved outlets.'

In response to CEAR requirement 4.2.2, part 2, paragraph 3.4, Sellafield Ltd. provided in September 2023 its annual review of the aqueous APNLs. Having applied the same methodology agreed within the 2020 permit variation Sellafield Ltd. have reviewed the existing sixty aqueous APNLs and have proposed to reduce fifty-three, six will remain the same and one (Factory Sewer – Beta) will increase from 7.0E+00 GBq to 7.2+00 GBq. Upon review of Sellafield Ltd.'s proposal, and to reflect our agreed position from the 2020 permit variation decision document, we have decided to carry out an Environment Agency initiated variation to update Table S3.2 B Specified disposals to water – Annual Plant

Notification levels for discharges. To ensure better regulation we have decided to include this Environment Agency initiated variation within this latest update to the Sellafield RSA environmental permit.

Schedule 6

A definition of the Calder Landfill Extension Segregated Area (CLESA) has been included.

Radiological Assessment (RSR-C3, 2c)

There have been no changes to the Sellafield site dose assessment made within the scope of this application to vary the Sellafield Ltd RSA environmental permit.

Growth Duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Decision

We conclude that that the operator can operate in accordance with the permit conditions to meet statutory requirements and the requirements of Government policy. We therefore grant the application, subject to the conditions of the permit.

Annex 1: Consultation and advertising responses

We received 64 responses from organisations and individuals. The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section.

Responses from organisations listed in the consultation section.

Response received from

Committee on Medical Effects of Radioactivity in the Environment (COMARE)

Brief summary of issues raised.

Registration of the MSSS Retrievals Ventilation System (RVS) stub stack which is being constructed to minimise and reduce facility gaseous discharges during operational activities by improving gaseous abatement with the use of additional High Efficiency Particulate Air (HEPA) filters.

We note that the decision to utilise the estimated gaseous discharges as per the RVS Flow sheet as the basis for PNLs was made following consultation with the Environment Agency given that there is a 99% headroom between the worst case predicted annual gaseous discharges from the RVs compared to the existing PNLs. This seems entirely reasonable. However,

1. We are not sure of the apparent objective to “minimise AND reduce” facility gaseous discharges. Once something has been minimised, how can it be further reduced?
2. The corresponding radiological implications of minimising gaseous discharges is an increase effluent discharges and/or in retained inventory – including increased solid waste from additional HEPA filters. So, it is not at all clear if there is any benefit.
3. The expected reduction in critical group dose from the implementation of RVS has been given, but there is no data on the increase in staff dose which must accompany fitting, retrieval and disposal of the HEPA filters. We assume that the disposal can be accommodated within solid waste limits.
4. It is not clear whether the introduction of the RVS speeds up or delays full sustained retrievals.
5. Is there evidence that the contents of the other compartments of the MSSS are identical (physically, chemically, and radiologically) to those presently being processed?

Implications for the change in the site wide discharge permits would be useful.

Registration of Outfall X to discharge construction related aqueous waste arisings (non-sewage trade waste) to the River Calder via surface water drainage.

1. We note from supporting document 7 that this has already been agreed in principle with the Environment Agency given that any activity present will be below typical limits of detection.
2. However, SL proposes to use best available techniques (BAT) to minimise the activity of discharges of aqueous radioactive waste. Does that means increasing something else, e.g., the gaseous discharges?
3. We assume that this discharge to the River Calder will be properly monitored.

Removal of the Gaseous Annual Site Limits for Krypton-85 & Antimony-125 following the completion of Magnox reprocessing in July 2022.

1. This seems entirely reasonable given the cessation of operations giving rise to the release. Even before the cessation, the contributions to doses were extremely small.

A reduction to the Radium-226 limit and update to the site plan due to Sellafield Ltd.'s application to extend the Calder Landfill Extension Segregated Area (CLESA) into an adjacent 'valley area'.

1. It would be useful to see specifics of the "Updated dose coefficients for Rn-222 gas (that) indicate this should be reduced to 0.16 Bq/g", including a reference to support the reduction of dose coefficients for Rn-222.
2. Is the dose from the Ra-226 dominated by Rn-222?
3. The need to change should be based on levels of dose. If the doses are low even with the changed DCs, is there a need to change the activity limit?
4. Does the change have any logistical implications for work at Sellafield?
5. Does the latest IPCC report have any further implications for this?
6. The use of percentages in Figure 10 (Section 3.5, page 24) is not clear. The infiltrate, evaporation and runoff make up the 100% of rainfall, but labelling the leachate at 58% makes this figure confusing.

Summary of actions taken or show how this has been covered.

In response to the comments raised concerning MSSS Retrievals Ventilation System (RVS) stub stack

The introduction of bringing the Magnox Swarf Storage Silo Retrievals Ventilation System stub stack into service will reduce gaseous discharges to the environment. Its design, and subsequent operation, will then minimise gaseous discharges during full retrievals. Its installation and subsequent operation during full retrievals will have the benefit of reducing dose to the public from gaseous emissions through ensuring the use of Best Available Techniques. We have previously captured our position within our RASCAR-SEL-13-027, which stated:

- The current MSSS compartment ventilation abatement system falls short of the accepted standard of abatement applied at the Sellafield site and elsewhere and requires upgrading as soon as reasonably practicable to meet the requirement to use Best Available Techniques.
- We expect a ventilation system that aligns with BAT to be installed, commissioned and to become operational as soon as practicable and prior to the start of retrievals (when there will be an increase in radioactivity in the gaseous effluent and increasing risk to the environment). Based on practice elsewhere, we expect that this will include single stage high efficiency particulate air filtration as a minimum requirement.

The system has been designed to be ALARP to operate and all HEPA filters used will need to be compliant for disposal via existing waste routes.

The system is due to be commissioned prior to full retrievals commencing. In the event of commissioning delays our position (from 2013) remains:

“We recognise that, despite all practical measures being undertaken, circumstances could arise where there will be over-riding safety and environmental reasons for a delay in implementing the above. In these circumstances we expect the operator to minimise the time at risk and to provide regular reports to the Environment Agency explaining the delay and measures being taken to address the non-compliance.”

We would consider the availability or otherwise of the new system as part of a future consultation on the ONR permissioning process for retrieval of other wastes and from other compartments, as these progress.

The inventories of the different Magnox Swarf Storage Silo compartments do range, and it is known that the current compartment conditions are less challenging, from a gaseous emission perspective, in comparison with other compartments from which future retrieval operations will be undertaken.

In response to the comments raised concerning the registration of Outfall X

In 2023 the Environment Agency granted Sellafield Ltd. a bespoke Water Discharge Activity Permit (WDAP) to discharge non-radiological construction related liquid effluent arisings, via the Sellafield Site’s surface water drainage system, to the River Calder at Outfall X [Permit number EPR/YB3996WN]. The effluent consists of non-sewage trade effluent, i.e., rainfall, and will need to meet strict discharge limits for elements like max daily volume, max rate of discharge, pH and suspended solids. Outfall X also needs to be permitted under the Radioactive Substances Activity regulations because construction related liquid effluent arisings generated on the Sellafield site have the potential to include very low levels of radioactivity due to the impact from legacy facilities on the Sellafield site. While it would be disproportionate for Outfall X to be reported against the existing site limits, Sellafield Ltd must demonstrate compliance with permit condition 2.3.2 by ensuring BAT is applied within its management arrangements for discharges via Outfall X. This would not be at the expense of increasing something else i.e., gaseous discharges.

In response to the comments raised concerning a reduction to the Radium-226 limit

1. Section 5.2.3 ‘Radon Gas’ of the PCRSA provides information on the dose coefficients as follows, “ICRP (2018) [Summary of ICRP Recommendation on Radon. ICRP ref 4836-9756-8598, January 26 2018] provides a summary of recommendations for assessing doses from Rn-222, including recent updates in the International Commission on Radiological Protection’s (ICRP’s) recommendations for Rn-222 dose coefficients. These dose coefficients are based on ICRP 137 (2017) and recommend that for buildings and underground mines a dose coefficient of 3 mSv per mJ.h.m-3 (approximately 10 mSv per working level month) be used. This corresponds to a dose coefficient of 6.7E-06 mSv per Bq h m-3, when expressed in terms of Rn-222 gas exposure (assuming an equilibrium factor of 0.4). This is an increase of a factor of ~2 compared with the dose coefficient used in the 2017 PCRSA. This will lead to increases in calculated doses from Rn-222 by a factor of ~2 for the same Ra-226 concentration in the waste, and a decrease by a factor of ~2 in the maximum acceptable Ra-226 concentration in shallow disposals.
2. The pathway (inhalation, ingestion or direct radiation) by which the radiation dose is received determines which radionuclides contribute most to the dose. The scenario on which the limit is based is one in which buildings used for residential purposes are constructed on landfill after it has been closed and is no longer regulated. The dose to residents of these houses would be dominated by inhalation of radioactivity and the main contribution to the dose would be from radon gas, resulting from the radioactive decay of Ra-226 and emanating from the upper strata of the landfill.
3. Sellafield Ltd. have chosen to include a reduction of the Ra-226 limit and as a result we are obliged to assess their variation to the permit.
4. Current and historical activities at the Sellafield site have not involved producing or handling radium rich materials. The majority of measured Ra-226 activity is naturally derived. Sellafield Ltd. has also proposed that the existing waste activity limit of 0.35 Bq/g for Ra-226 in the top 3 metres of waste should be reduced to 0.16 Bq. This will have limited operational impacts.
5. Sellafield Ltd. utilised the most up to date relevant outputs from the IPPC and other climate science sources in the production of the Post Closure Radiological Safety Assessment.
6. We note the point raised by COMARE. The leachate is the sum of the infiltrate and the runoff less the much smaller leakage flow (which is 0.03% of the annual rainfall.)

Representations from community and other organisations

Note that where the representation included matters that are outside the scope of the determination of this application, those matters have not been addressed below.

Response received from

Joint response on behalf of Lakes Against Nuclear Dump (LAND), Close Capenhurst Campaign & Nuclear Free Local Authorities.

The response was supported by 18 individual members of the public

Brief summary of issues raised.

The Nuclear Free Local Authorities have joined two campaign groups in Cumbria, Lakes against the Nuclear Dump and Close Capenhurst, to register their objections to any change in the rules relating to issuing and monitoring radioactive waste discharges at Sellafield.

The Environment Agency is consulting on a request by Sellafield for a Permit Variation comprising several parts – the registration of a new discharge stack and a new outflow into the River Calder, and a request for permission to expand a landfill site within the facility; this of course amounts to Sellafield seeking official sanction from the agency charged with protecting Britain's environment and the health of its people to continue to pollute Cumbria's skies, watercourses and soil with radioactive waste as it has done for nearly seven decades.

More worryingly, Sellafield is also seeking an exemption from monitoring some of its River and atmospheric discharges, seemingly for reasons of business expediency. The business wants pollution released via the 'new' Outfall X into the Calder to 'not be subject to any monitoring or discharge reporting against site limits', but when it comes to monitoring for Krypton-85 the business goes further, bewailing the requirements of the current regulatory regime: 'It should be noted that the sample collection and analysis of Kr85 from environmental concentrations at the met station on site is very complicated and time consuming, in fact it makes the dominant contribution to the analytical requirements for the environmental monitoring programme.'

Littered within the consultation document are references to a whole set of 'nuclear nasties' produced by operations at Sellafield, Antimony-125, Caesium-137, Plutonium-239, Strontium-90, and Tritium, now known universally as the Japanese Government's poison of choice for the Pacific Ocean ; as for the Krypton-85, the business, although funded annually through almost £3 billion of UK taxpayers' money, seems happy to forgo any requirement to protect the taxpayer by continuing to monitor for a substance described by the US Environment Pollution Centre as a gamma and beta emitter which is 'highly toxic and may cause cancers, thyroid disease, skin, liver, or kidney disorders'.

The campaign group Radiation Free Lakeland has for almost ten years been commendably taking soil and sand samples from the beaches of West Cumbria and sending them for analysis to a laboratory in the United States. Despite a sparsity of funds limiting this analysis, contamination by Americium-241 and Caesium-137 was found in one-third of the samples to be over the 'accepted limits'; this from beaches described as 'safe' and 'pristine'. On a visit to West Cumbria in 2014, the former US nuclear industry

regulator Arnie Gundersen said: “Some of the samples I took back then were as radioactive as Fukushima. The UK government has been covering up the severity of the radiation in the Irish Sea and on Cumbria’s beaches”.

The UK / Ireland Nuclear Free Local Authorities believe that there is no safe dose of radiation. We subscribe to the Linear-No Threshold Model, which states that the relationship between cancer risk and radiation dose is linear, so even at low doses there is still a small cancer risk. Many scientists and academics in this field also share this consensus, and the British Medical Journal has recently carried two articles of studies subscribing to this view. It therefore follows that we oppose any human activity which leads to the discharge of radioactive material into the sea, our waterways, atmosphere, onto beaches or into soil as this inevitably contaminates the environment, jeopardises the health of marine, animal, and bird life, and ultimately impacts on human health.

The objectors are also concerned that each element forming the Permit Variation should have been submitted separately, rather than together and charge that the information provided is inadequate – for example, lacking comparative historic data relating to discharges and the specifications for the HEPA filtration system incorporated into the stack – and is inaccessible – not being given in ‘lay-persons terms’.

The NFLAs were therefore supportive of a joint submission of opposition with our fellow campaigners LAND and Close Capenhurst.

The Chair of the NFLA Steering Committee, Councillor Lawrence O’Neill, fears the latest application by Sellafield is another example of regulation being stripped away from the nuclear industry: “We have previously seen the government enshrine within legislation an exemption for future nuclear fusion plants from being licenced as nuclear stations; the recent removal of the requirement that EDF Energy install an acoustic fish deterrent at Hinkley Point C, and so, by default, from any future Sizewell C; and a recent consultation on managing radioactive waste that talked up the prospect of permitting more incineration, dumping and discharges, and even mentioned the unwelcome possibility of reintroducing reprocessing and burning plutonium as fuel.

“The health of our people and planet should always trump considerations of cost and profit. Policies of ‘dilute and disperse’, whilst they may reduce the cost to the polluter, increase the health risk to our population and the environmental damage to our planet, and so we are opposed to them – instead we believe that radioactive substances should be stored on-site in a policy of ‘concentrate and contain’, where there is the possibility of ongoing monitoring and management and, if necessary, retrieval can take place.

“These opposing views explain the decision of the Japanese Government to choose to initiate the release of over 1.3 million tons of tritiated wastewater from Fukushima into the Pacific Ocean and the motivation behind the protests of tens of thousands of concerned citizens in many nations around the Pacific (and we note also in Bangor, North Wales). “This Sellafield application is that conflict in microcosm and we urge anyone opposed to these plans to register their objection by the closing date of 3 September.

Summary of actions taken or show how this has been covered.

The joint response submitted to us on behalf of Lakes Against Nuclear Dump (LAND), Close Capenhurst Campaign & Nuclear Free Local Authorities, and supported by 19 individual members of the public, has raised a number of questions which have also been raised by other individual members of the public. Answers to the questions raised within this response are addressed individually within the section below titled Representations from individual members of the public.

Representations from individual members of the public

We have grouped together responses that broadly raise the same issue. Each issue has been considered and addressed below.

Note that where the responses included matters that are outside the scope of the determination of this application, those matters have not been addressed below.

Brief summary of issues raised.

Concerns have been expressed that the Sellafield Ltd application to vary its RSA environmental permit covers a range of different issues. It is suggested that these should be considered within separate applications.

Summary of actions taken or show how this has been covered.

The Environment Agency has no basis for restricting the scope of an operator's application to vary their permit. Sellafield is large and complex site and so variation applications by the operator are also likely to be large and complex. We encourage interested parties to participate in the permitting process. We will publish all information that forms part of the application on our Citizen Space website. When determining a permit application, the Environment Agency will take all relevant issues into account, including all questions and comments, and publish our decision. Within our decision document we will summarise our assessment of the application and explain our reasons why we have granted the permit or not.

Brief summary of issues raised.

Concerns were expressed with radioactive / nuclear waste being released into the sea, river, landfill, or air.

Summary of actions taken or show how this has been covered.

Whether or not radioactive discharges to the environment are acceptable in principle is a matter for the government, not the Environment Agency.

We are satisfied that the impacts on the public and the environment are well below the limits set by government policy.

Brief summary of issues raised.

Concerns about the discharge of construction related aqueous waste arisings to the River Calder and that it will not be subject to any monitoring or discharge reporting.

Summary of actions taken or show how this has been covered.

In 2023 the Environment Agency granted Sellafield Ltd. a bespoke Water Discharge Activity Permit to discharge non-radiological construction related liquid effluent arisings, via the Sellafield Site's surface water drainage system, to the River Calder at Outfall X [Permit number EPR/YB3996WN]. The effluent consists of non-sewage trade effluent, i.e., rainfall, and will need to meet strict discharge limits for elements like max daily volume, max rate of discharge, pH, and suspended solids. Outfall X also needs to be permitted under the Radioactive Substances Activity regulations because construction related liquid effluent arisings generated on the Sellafield site have the potential to include very low levels of radioactivity due to the impact from legacy facilities on the Sellafield site.

Consistent with WDAP EPR/YB3996WN we are satisfied that the liquid effluent discharged via Outfall X will consist of trade related rainfall dependent surface water runoff and some shallow intercepted groundwater, and any potential radioactivity present will be close to background levels. While we are content that it would be disproportionate for Outfall X to be reported against the existing site limits, Sellafield Ltd must demonstrate compliance with permit condition 2.3.2 and other permit conditions by ensuring BAT is applied within its management arrangements for discharges via Outfall X.

To minimise the activity of discharges of aqueous radioactive waste to the environment, and to ensure the effluent is characterised using appropriate analytical methods, thereby minimising its radiological effects on the environment and members of the public, Sellafield Ltd will require written approval from the Environmental Agency prior to the first disposals within the scope of WDAP EPR/YB3996WN being made via Outfall X. Accordingly, we have included a new pre-operational condition within the permit S1.3B.6.

In the future, Sellafield Ltd might wish to engineer new routes for other aqueous effluents via the Outfall X that are outside the scope of WDAP EPR/YB3996WN. Accordingly, to make sure that these plans are appropriate, we have updated table S3.2C 'Specified

disposals to water – Disposal Outlets' and table S1.3B 'pre-operational measures for future development' (specifically reference S1.3B.5) to include Outfall X.

The Operator shall submit proposals for any new engineered routing of effluent via Outfall X, including a report which demonstrates how best available techniques (BAT) will be used to minimise the activity of discharges of aqueous radioactive waste to the environment and to minimise its radiological effects on the environment and members of the public. These proposals will require approval in writing from the Environment Agency prior to such disposals being made.

Brief summary of issues raised.

Concerns regarding the removal of the gaseous annual site limits and proposal to remove the monitoring of Krypton-85 and Antimony-125 following the completion of Magnox reprocessing in July 2022.

Summary of actions taken or show how this has been covered.

In July 2022 the Environment Agency was notified by Sellafield Ltd. that its Magnox plant had stopped reprocessing nuclear fuel. Subsequently a BAT justification was provided to us which demonstrated the subsequent decline in discharges. Having reviewed Sellafield Ltd.'s BAT justification in conjunction with the discharge data we obtain as per permit condition 4.2.2 we are satisfied that discharges of Kr-85 and Sb-125 associated with Magnox reprocessing have ceased since its completion.

Having reviewed the Environment Agency's 'Criteria for setting limits on the discharge of radioactive waste from nuclear sites' we are satisfied that due to discharges of Kr-85 and Sb-125 now close to limit of detection they can be removed from the permit. Subsequently, the requirement for environmental monitoring of Kr-85 and Sb-125 can also be removed from Sellafield Ltd.'s management system.

Brief summary of issues raised.

Concerns about the registration of the Magnox Swarf Storage Silo Retrievals Ventilation System stub stack and the setting of new plant notification levels.

Summary of actions taken or show how this has been covered.

Sellafield Ltd has applied to vary its existing Radioactive Substances Activity environmental permit to register the new Magnox Swarf Storage Silo Retrievals Ventilation System stub stack prior to it entering active service. We are satisfied with Sellafield Ltd.'s justification for the inclusion of the Magnox Swarf Storage Silo RVS stub stack as it will

significantly reduce radioactive gaseous discharges to the environment from the Magnox Swarf Storage Silo facility.

We are satisfied that the Annual Plant Notification Level's, proposed by Sellafield Ltd. for the Retrievals Ventilation System stub stack, provide a high-level control of discharges for both the operator and regulator. Having reviewed the Environment Agency's 'Criteria for setting limits on the discharge of radioactive waste from nuclear sites' we are satisfied they also meet with our limit setting guidance and so reflect the current approach to regulating radioactive waste disposals.

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