**Sellafield** **Pile Fuel Storage Pond (PFSP)**

**Agreement to commence the PFSP Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12**

Project Assessment Report ONR-SDFW-PAR-22-002

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**EXECUTIVE SUMMARY**

**Title**

Agreement to commence the Pile Fuel Storage Pond (PFSP) Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12 as detailed in Plant Modification Proposal (PMP) B\*Stream/B\*/0369 Issue 6.

**Permission Requested**

In accordance with its arrangements made under Licence Condition 22 (1), modification or experiment on existing plant, Sellafield Ltd., the licensee for the Sellafield site has requested the Office for Nuclear Regulation’s (ONR) agreement for commencement of the PFSP Diving Pilot to deploy divers into bays 11 and 12 of PFSP to remove the remaining fixed in pond items, clear debris and remove sludge. This activity will take place at the PFSP facility on the Sellafield nuclear licensed site.

The exact duration andnumber or dives of the pilot is not stipulated. Sellafield Ltd.’s approach is to undertake regular reviews of the diving pilot with respect to ensuring the risks are reduced as low as reasonably practicable (ALARP). There is a project governance process to measure the cleanliness of the bays and detail how the decision will be made to discontinue cleaning. Discontinuation will occur if the dose uptake, time or cost has become too significant and the benefit will not be realised further.

**Background**

The PFSP facility was originally built for the receipt and storage of fuel and isotopes from the Windscale Piles. On the southern side of the main pond are 12 pairs of decanning and associated adjoining withdrawal bays. These were previously used for decanning fuel and the export of the resultant fuel and removed cladding (known as swarf). Following the closure of the Windscale Piles and commissioning of the First-Generation Magnox Fuel Storage Pond, PFSP operations were scaled down, although the facility was still used as a storage facility for some materials. As a result, there is a historic radioactive inventory within PFSP including fuel, sludge, radioactive and contaminated solids, Intermediate Level Waste (ILW) and Low-Level Waste (LLW), pond water and contaminated concrete.

Approximately 75% of the radioactive inventory has been removed from PFSP to date, but there is still an inherent risk associated with the inventory remaining in an aging structure that was never intended for long term storage. Due to the age of the building structures and risks relating to ongoing discharges and degradation of the building and skip handling machine, PFSPremains registered as ‘significant’ in terms of ‘Risk and Detriment’ in accordance with Sellafield Ltd.’s Risk Based Management Framework, albeit lower down on the risk and detriment scale than other legacy pond and silo programmes (due to the inventory removed to date). While currently PFSP is within the bounds of a ‘tolerable’ risk, the facility ranks as the second most hazardous pond in the Nuclear Decommissioning Agency (NDA) nuclear portfolio and is the sixth most hazardous liability at Sellafield.

If no action is taken to remove the remaining inventory, PFSP may move into the unacceptable region, and without the infrastructure (due to aging/ degradation) in place to then remove the hazard at that time. In terms of the ONR Sellafield Strategy, PFSP does not fall within the group of facilities under significantly enhanced regulatory attention. It is therefore grouped with remainder of the Sellafield estate which is under enhanced regulatory attention.

Within PFSP the fundamental aim is to remove this material to enable future dewatering of the facility in line with the key focus of the Retrievals Value Stream, which in part is to accelerate hazard and risk reduction using innovative and fit-for-purpose solutions. The PFSP programme therefore contains several individual projects with an overall goal of removing radioactive and contaminated waste from the pond, and thereby achieving an interim state with minimal care and maintenance requirements demonstrating progress towards achieving the facility’s final end state.

Currently, there are two main tranches remaining in the PFSP programme in order to deliver it to a dewatered interim state: the Retrievals Tranche and the Interim State Tranche. By the end of the Retrievals Tranche, estimated timescale 2026, PFSP aims to have achieved a position whereby there is minimal mobile radioactive inventory remaining in the facility such that the radiological risk posed is minimal. Doing this creates the opportunity in the Interim State Tranche to trial and optimise the available approaches to achieving a dewatered interim state ahead of initiating the full-scale major project to deliver the remainder of PFSP to a dewatered state with much greater confidence in its deliverability.

In order to achieve this minimal risk position, Sellafield Ltd. need to retrieve as much sludge and debris from the facility as practicable and identify and recover visible fuel and fuel debris. This is required regardless of the dewatering approach selected and ultimately the recovery of any additional debris, sludge and fuel progresses overall hazard and risk reduction. The major challenge for achieving this is that there are many integral structures to the floor of PFSP such as troughs, sumps, rails and dwarf walls. These structures complicate recovery of sludge, debris and fuel as they cannot be easily accessed and require a retrieval capability that can adapt to this range of conditions.

Sellafield Ltd. has undertaken significant clearance of bays 11 and 12 of the PFSP using a range of techniques including remotely operated vehicles and operators using long reach tooling stood at the bay edge. The clearance of bays 11 & 12 has been carried out over more than 10 years in a number of stages. Although progress has been made, the deployment of existing techniques for clearing the bays are delivering continually diminishing returns when balanced with dose uptake and financial cost. In that context, the balance of risk moves towards trialling the use of divers for the remaining clearance work.

Due to the amount of work that has been done to clear materials from bays 11 and 12 and the isolated nature of the bays from the rest of the pond, this area presents the lowest risk area in which to pilot diving in the PFSP. Additionally, Sellafield Ltd. have demonstrated a robust optioneering process which concluded divers are the only currently available technique that could realistically achieve the required floor clearance. There are some bay clearance tasks that simply cannot be delivered by existing techniques but can be delivered by divers. The development of new remote techniques and equipment is not considered practicable. Even if the development of such techniques were achievable, it will significantly delay the clearance of the bays. This will have a significant impact on overall PFSP hazard reduction.

Sellafield Ltd. has reached a point where they claim that the benefits delivered by divers for final bay clearance outweigh the risk presented by diver deployment in PFSP bays 11 and 12 such that the residual risk is both tolerable and reduced ALARP. This is the first use of divers in Sellafield ponds and, if successful, may be a suitable method for future work in other bays in this pond and potentially other ponds.

The use of divers in PFSP bays 11 and 12 does not have any significant environmental aspects or risks to the public; the main hazards are related to nuclear and conventional safety. The key aspect is how to manage and minimise the dose uptake of the divers and support personnel by managing the pond water activity.

**Assessment and inspection work carried out by ONR in consideration of this request**

Following initial consideration of Sellafield Ltd.’s proposal, it was judged proportionate to obtain specialist inspector advice based on the potential faults that could arise from this proposal. Specialist advice was therefore sought as follows:

* Fault Studies – to confirm Sellafield Ltd.’s submission includes an adequate identification and assessment of faults and safety justifications;
* Radiation Protection – to assess the proposed arrangements for dose control during preparation works and diver operations, including dose comparison between the use of divers versus using conventional long handled tools. Additionally, contamination controls were assessed including emergency response to recover and decontaminate a diver. Consideration was also given to optioneering and pond surveys undertaken by Sellafield Ltd. to ensure that the risk of unknown high dose rate items is reduced to ALARP and that the use of divers is the most appropriate approach;
* Human Factors (HF) – to assess the arrangements for divers and support staff, to confirm that adequate HF arrangements have been considered and that tasks are achievable and safe, including the diver operations wash-down decontamination and undressing; and
* Conventional Health & Safety and Health & Safety Executive (HSE) dive specialists – to assess the licensee’s compliance with conventional Health & Safety legislation and with UK diving regulations. They also assessed whether the proposals reduce risks so far as is reasonably practicable and that adequate emergency response arrangements are in place to recover a diver and decontaminate.

ONR has also undertaken a readiness inspection of the PFSP to assess Sellafield Ltd.’s implementation of its LC 22 arrangements for its proposed activity to inform the permissioning decision.

In addition, I sought assurance of Sellafield Ltd.’s internal processes. Sellafield Ltd. confirmed that the project has been subject to independent internal governance through Independent Nuclear Safety Assessment and Management Safety Committees; and Hazardous Activity Readiness Review (HARR) by Sellafield Ltd.’s internal oversight function andNuclear Intelligence and Independent Oversight (NI&IO). All have concluded that they have no objection to the project commencing the proposed activity, which provides additional regulatory confidence.

To inform this permissioning decision I have consulted with ONR Civil Nuclear Security, ONR Safeguards and the Environment Agency. All parties have confirmed that they support ONR agreeing to Sellafield Ltd. commencing the PFSP Diving Pilot in bays 11 and 12.

**Matters arising from ONR's work**

The specialist assessments of Sellafield Ltd.’s proposed activity did not identify any nuclear safety shortfalls or raise any recommendations for Sellafield Ltd. to address. As a result, all ONR specialist inspectors have advised that they have no objection to Sellafield Ltd.’s proposal and recommend that ONR issues the Licence Instrument (LI).

ONR’s readiness inspection judged Sellafield Ltd.’s implementation of its LC 22 arrangements for the proposed activity as adequate with no significant shortfalls identified. The inspection did identify a number of actions, which Sellafield Ltd. has adequately addressed.

**Conclusions**

ONR has assessed the adequacy of Sellafield Ltd.’s proposal justifying commencement of diver deployment into bays 11 and 12 of PFSP to remove the remaining fixed in pond items, clear debris and remove sludge.

Based on the safety case evidence ONR has sampled during this assessment process, it is my opinion that for the proposed modification Sellafield Ltd. has provided adequate arguments and evidence to demonstrate that:

* Sellafield Ltd. has articulated a clear and strong case for diver deployment into PFSP;
* Sellafield Ltd. has done all that is reasonably practicable within the conduct of its undertaking, such that for the proposed activity it has reduced the risks to the public and workers so far as is reasonably practicable;
* Suitable and sufficient safety measures have been designed and implemented to provide adequate control of the hazards;
* It aligns with ONR’s expectations of relevant good practice, specifically the relevant aspects of ONR’s Technical Inspection Guide for LC 22 and Safety Assessment Principles (SAPs), which were used as benchmark for the ONR specialist assessments and readiness inspection; and
* It has been subject to an adequate level of independent internal challenge and governance in accordance with Sellafield Ltd.’s established arrangements.

Based upon the sample assessments performed, the specialist inspectors judged that Sellafield Ltd. had provided appropriate claims and arguments underpinned by adequate evidence demonstrating that the risks associated with the permission requested have been reduced to ALARP. All of the inspectors therefore recommend that ONR should grant a Licence Instrument (Agreement) to Sellafield Ltd. to commence the PFSP Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12 as detailed in Plant Modification Proposal (PMP) B\*Stream/B\*/0369 Issue 6.

**Recommendation**

I recommend that ONR issues Licence Instrument 543, Agreement to commence the PFSP Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12 as detailed in Plant Modification Proposal (PMP) B\*Stream/B\*/0369 Issue 6.

**LIST OF ABBREVIATIONS**

ALARP As Low As Reasonably Practicable

BISP Bay Interim State Project

CAE Claim, Arguments and Evidence

CDM The Construction (Design and Management) Regulations 2015

CH&S Conventional Health & Safety

DNA Dungeness A

DR Decision Record

EIM&T Examination, Inspection, Maintenance and Testing

FS Fault Studies

HAZOP Hazard and Operability study

HARR Hazardous Activity Readiness Review

HF Human Factors

HOW2 (Office for Nuclear Regulation) Business Management System

HPCP Hold-Point Control Plan

HP&S Health Physics and Surveillance

HSE Health & Safety Executive

IAEA International Atomic Energy Agency

ILW Intermediate Level radioactive Waste

INSA Independent Nuclear Safety Assurance

IRR17 Ionising Radiations Regulations 2017

LC Licence Condition

LI Licence Instrument

LLW Low Level radioactive Waste

LOLER The Lifting Operations and Lifting Equipment Regulations 1998

LP&S Legacy Ponds and Silos

μSv microsievert

mSv millisievert

MSC Management Safety Committee

NDA Nuclear Decommissioning Authority

NIO Nuclear Independent Oversight

ONR Office for Nuclear Regulation

PAR Project Assessment Report

PFSP Pile Fuel Storage Pond

PMP Plant Modification Proposal

PUWER The Provision and Use of Work Equipment Regulations 1998

RGP Relevant Good Practice

ROV Remote Operated Vehicles

RP Radiation Protection

RPA Radiation Protection Advisor

SAP Safety Assessment Principle(s)

SCIE Sellafield Compliance, Intelligence & Enforcement (ONR Sub-Division)

SCSR Safety Case Summary Report

SDFW Sellafield, Decommissioning, Fuel and Waste (ONR Division)

SQEP Suitably Qualified and Experienced Person(s)

S&RM Safety and Risk Management

SSC Structure, System and Component(s)

SZA Sizewell A

TIG Technical Inspection Guide (ONR)

UCC Underwater Construction Corporation

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1. PERMISSION REQUESTED
2. The licensee, Sellafield Limited (Sellafield Ltd.) has requested the Office for Nuclear Regulation’s (ONR) agreement under its Licence Condition (LC) 22(1) arrangements to commence the Pile Fuel Storage Pond (PFSP) Diving Pilot - Introduction of Nuclear Divers into Bays 11 and 12 [1]. This activity will take place at the PFSP facility on the Sellafield nuclear licensed site*.* The scope of the work comes under the licensee’s plant modification proposal (PMP) [2] and supporting documentation [3 – 28]. Sellafield Ltd. categorised the PMP at category B (radiological safety); this is on the basis that individuals being deployed underwater require alternative hazard management strategies with regards to protecting operators from prolonged exposure to high dose rate items as existing measures would be ineffective for a diver in the bay.
3. The PMP and supporting documentation has been subjected to and completed the licensee’s Independent Nuclear Safety Assessment (INSA) process [29] and presented at Management Safety Committees (MSC) [30, 31]. The safety case document tree [32] provides an illustration of the safety case structure.
4. This Project Assessment Report (PAR) records my judgement on the proposed activity as described in the Sellafield Ltd. PMP [2] and gives my recommendation to the ONR Sellafield Project Delivery Sub-Division Delivery Lead. It has been produced in accordance with ONR guidance [33]. The decision record (DR) [34] describes the engagement activities and the permissioning strategy for Sellafield Ltd. Hold-Point Control Plan (HPCP) 498.
5. BACKGROUND
6. The B\* PFSP was operational from the 1950s to 1970s and was originally built for the receipt and storage of fuel and isotopes from the Windscale Piles. On the southern side of the main pond are 12 pairs of decanning and associated adjoining withdrawal bays (1 -12). These were previously used for decanning fuel and the export of the resultant fuel and removed cladding (known as swarf). Following the closure of the Windscale Piles and commissioning of the First-Generation Magnox Fuel Storage Pond, PFSP operations were scaled down, although the facility was still used as a storage facility for some materials.
7. As a result, there is a historic radioactive inventory within PFSP including fuel, sludge, radioactive and contaminated solids, Intermediate Level Waste (ILW) and Low-Level Waste (LLW), pond water and contaminated concrete. This inventory presents an on-going radiological risk as PFSP does not meet modern containment standards due to the ageing structure and obsolescence. The PFSP programme contains several individual projects with an overall goal of removing radioactive and contaminated waste from the pond, and thereby achieving an interim state with minimal care and maintenance requirements that demonstrates progress towards achieving the facility’s final-end state.
8. Sellafield Ltd. has already undertaken significant clearance of bays 11 and 12 of PFSP using a range of techniques including remotely operated vehicles (ROVs) and operators using long reach tooling stood at the bay edge and have now reached a point where alternative methods are required to remove the remaining fixed items, clear debris and sludge from difficult areas of the floor to allow the project to proceed.
9. Sellafield Ltd. has identified an option of using divers in the pond to perform tasks currently carried out using either ROVs or operators using long reach tooling. Recognising the novel nature of this work, Sellafield Ltd. requested permission to trial the deployment of divers in bays 11 and 12 only.
10. As part of the submission, Sellafield Ltd. have provided a justification for selection of bays 11 and 12 and for the extent of diving operations within, supported by operational history and learning and a range of optioneering [3, 5, 22]
11. The aim of Sellafield Ltd.’s permissioning request is to remove remaining material from bays 11 and 12 and complete dismantling tasks to demonstrate that the use of underwater divers within ponds is a viable option enabling accelerated hazard and risk reduction, an approach which has been used successfully on other sites nationally and internationally.
12. Sellafield Ltd.’s claim that the benefits delivered by divers outweigh the risk presented by diver deployment in PFSP bays 11 and 12 given that there are many integral structures to the floor of PFSP such as troughs, sumps, rails, and dwarf walls, particularly within the bays. These structures complicate recovery of sludge, debris and fuel as they cannot be easily accessed using ROVs or using long reach tooling by operators stood at the bay edge. The clearance work now requires retrieval capability that can adapt to the range of conditions that exist within the PFSP. The use of specialised divers is considered ALARP in this instance.
13. This is the first use of divers in Sellafield ponds and, if successful, may be a suitable method for future work in other bays in this pond and potentially other ponds. Diving in nuclear ponds, while novel at Sellafield, is a widely accepted and mature technique for conducting this type of work worldwide and is a recommended technique within the International Atomic Energy Authority (IAEA) guide to pond decommissioning [35]. The technique has been successfully used in UK ponds by Magnox plc as part of the clean-up of Dungeness A (DNA), and more recently at Sizewell A (SZA).
14. The decommissioning challenges presented at Magnox ponds are not fundamentally different from the PFSP bays, i.e. clearance of furniture, clearance of residual debris, sludge and carrying out detailed surveys. There are some noticeable differences, namely the activity level of the water, the amount of inventory on the floor and the floors at SZA and DNA being flat. The successful deployment of divers at SZA and DNA provides supporting evidence to underpin the PFSP option selection process, and the operational experience has been used to develop Sellafield Ltd.’s safety case e.g. experience fed in at the HAZOP stage.
15. The development of the proposed diving scheme for PFSP has been supported by a specialist diving company, Underwater Construction Corporation UK Ltd. (UCC), who undertook the diving at DNA and SZA, and will be undertaking this phase of the diver deployment.
16. Recognising the novel nature of this work on the Sellafield site the PFSP Programme will trial the deployment of divers to complete an initial scope of work in bays 11 and 12 only, which are the most advanced areas of PFSP in terms of clean-up. This trial will undertake essential clean-up and dismantling tasks as part of the work to complete remediation of the bays. The trial will also provide learning to allow the deployment of divers throughout PFSP as well as other ponds on the Sellafield site in support of the future programme of work.
17. The licensee’s Safety Case Summary Report (SCSR) [3] presents the case for diving using the Claim, Arguments and Evidence (CAE) structure approach. Sellafield Ltd. provides a single claim which is supported by seven sub-claims. A useful summary of the CAE is provided in Figure 1 of the SCSR [3].
18. **Claim 1**: The benefits delivered by trialling divers for bay clearance outweigh the risk presented by diver deployment in PFSP such that the residual risk is both tolerable and ALARP.

**Sub-Claims:**

* 1. Sellafield Ltd. have demonstrated the strategic need for clearance of PFSP in the context of overall hazard reduction, and that bays 11 &12 is most appropriate trial area.
	2. Sellafield Ltd. have demonstrated that deploying divers is the best available option for achieving the required clearance of bays 11 & 12.
	3. Sellafield Ltd. have demonstrated that there is a requirement to deploy divers in the near term to achieve strategic outcomes.
	4. The hazards associated with the proposed diving operations are well understood.
	5. The radiological hazards from the proposed diving operations can be adequately managed such that the residual risk is tolerable.
	6. The conventional hazards from diving operations can be adequately managed such that the residual risk is tolerable.
	7. With appropriate review the radiological and conventional hazard management strategy are considered to be applicable for future diving operations in PFSP.
1. Sellafield Ltd. have sought to demonstrate that there are clear benefits of trialling the use of divers in PFSP. The potential benefits of using divers are identified as: reduced time to clear bays, ability to retrieve items that cannot be removed from pond side, cost savings and reduced cumulative dose compared to pond side operations. However, these are potential benefits and only the trials in bays 11 and 12 will demonstrate whether these benefits can be realised across PFSP. It is therefore concluded that the residual radiological risk from using divers to clear bays 11 and 12 is reduced ALARP.
2. It is noted that Sellafield Ltd. had previously submitted a request to ONR in 2021 for agreement to commence diver deployment which ONR started to assess. However, during the assessment period, two underwater dose rate surveys were carried out by Sellafield Ltd. using a remote operated vehicle that appeared to suggest the dose-rates were higher than expected.
3. The project was halted by Sellafield Ltd. to gain further information on the potential diver doses, and address some observations made by the Sellafield Ltd. Hazardous Activity Readiness Review (HARR) team. In addition, the Sellafield Ltd. Bay Interim State Project (BISP) project team rescoped the overall project to exclude the isolation and concrete remediation of bays 11 and 12 as part of this project. Sellafield Ltd. suggested that the number of dives will be limited so to determine the feasibility of diving in the pond and the effectiveness of such dives.
4. This led to Sellafield Ltd. undertaking further dose rate survey activities, which led to a review and revision of the associated safety case. This also provided an opportunity for Sellafield Ltd. to address a number of outstanding issues identified in the ONR 2021 assessments. This resulted in the latest safety case as detailed within [3].
5. ASSESSMENT AND INSPECTION WORK CARRIED OUT BY ONR IN CONSIDERATION OF THIS REQUEST
6. I have confirmed Sellafield Ltd.’s categorisation of the PMP as category B (radiological safety) is appropriate. The key nuclear and conventional safety matters predominantly concerned with the dive project is the management of the radiological risks and hazards to the worker (diver in this instance) for the duration of the task and are largely associated with exposure to sources (external dose) and potential for contamination, including contaminated wounds (internal dose).
7. There is significant reliance on procedural arrangements and the use of manual handling activities which are required to undertake the clearance of bays 11 and 12. This has led to the introduction of seven operating rules (six required operation instructions (rOIs) and one operating assumption (OA)). The adequacy of these have been considered within ONR’s assessments, in particular the human factors assessment has confirmed that the safety significant tasks can be achieved reliably.
8. There is no significant new engineering machinery associated with this proposal, other than that required for access and management of safe diver entry and exit from the pond.
9. Being cognisant of the above and in accordance with ONR’s regulatory permissioning strategy [34], ONR has carried out an assessment which has involved a series of early engagements with Sellafield Ltd. and identified the following ONR specialist inspectors to support the assessment of Sellafield Ltd.’s submission to inform the permissioning decision:
* Fault Studies (FS)
* Radiation Protection (RP)
* Human Factors (HF)
* Conventional Health & Safety (CH&S)
* HSE Dive specialists
1. The FS inspector undertook an assessment [36] at an early stage during the dive project evolution including witnessing the demonstration dive off-site [37]. It was concluded that there are no faults introduced with potential to give rise to significant offsite consequences. In addition, it was not considered necessary to undertake a detailed fault studies assessment to consider whether risks are reduced ALARP, as a judgement on whether risks are reduced ALARP can be formed based on other specialist input and application of relevant ONR guidance. In particular noting:
* The radiological risks associated with this work are considered as part of the ONR RP specialist inspector’s assessment;
* The HSE diving specialists are able to provide more detailed advice on management of risks in the context of underwater work;and
* ONR Human Factor specialist assessment is able to consider matters such as ergonomics, integration of controls and the command-and-control elements of the work relating to both nuclear and conventional safety risk.
1. In addition to the above and to support the permissioning decision, I judged that it was proportionate for ONR to undertake a readiness inspection [38] of the PFSP to assess Sellafield Ltd.’s implementation of its LC 22 arrangements for the proposed activity.
	1. ALARP justification
2. Approximately 75% of the radioactive inventory has been removed from PFSP to date, but there is still an inherent risk associated with the inventory remaining in an aging structure that was never intended for long term storage. Due to the age of the building structures and risks relating to ongoing discharges and degradation of the building and skip handling machine, PFSP remains registered as ‘significant’ in terms of ‘Risk and Detriment’ in accordance with Sellafield Ltd.’s Risk Based Management Framework, albeit lower down on the risk and detriment scale than other legacy pond and silo programmes (due to the inventory removed to date). While currently PFSP is within the bounds of a ‘tolerable’ risk, the facility ranks as the second most hazardous pond in the Nuclear Decommissioning Agency (NDA) nuclear portfolio and is the sixth most hazardous liability at Sellafield.
3. If no action is taken to remove the remaining inventory, PFSP may move into the unacceptable region, and without the infrastructure (due to aging/ degradation) in place to then remove the hazard at that time. In terms of the ONR Sellafield Strategy, PFSP does not fall within the group of facilities under significantly enhanced regulatory attention. It is therefore grouped with remainder of the Sellafield estate which is under enhanced regulatory attention.
4. Currently, there are two main tranches remaining in the PFSP programme in order to deliver it to a dewatered interim state: the Retrievals Tranche and the Interim State Tranche. By the end of the Retrievals Tranche, estimated timescale 2026, PFSP aims to have achieved a position whereby there is minimal mobile radioactive inventory remaining in the facility such that the radiological risk posed is minimal. Doing this creates the opportunity in the Interim State Tranche to trial and optimise the available approaches to achieving a dewatered interim state ahead of initiating the full-scale major project to deliver the remainder of PFSP to a dewatered state with much greater confidence in its deliverability.
5. In order to achieve this minimal risk position, PFSP need to retrieve as much sludge and debris from the facility as practicable to identify and recover visible fuel and fuel debris. This is required regardless of the dewatering approach selected and ultimately the recovery of any additional debris, sludge and fuel progresses overall hazard and risk reduction. The major challenge for achieving this is that there are many integral structures to the floor of PFSP such as troughs, sumps, rails and dwarf walls. These structures complicate recovery of sludge, debris and fuel as they cannot be easily accessed and require a retrieval capability that can adapt to this range of conditions.
6. Currently Sellafield Ltd. claims that all underwater retrieval operations for clearing sludge and irradiated solid materials have, to date, been undertaken using remotely operated methods including swimmer ROVs, in-pond excavators, sludge pumps and long handled tools operated from above the water surface.
7. The clearing of bays 11 and 12 has taken more than ten years using remote methods (including use of ROVs and long handled tools from above the bay). Sellafield Ltd. has now reached a point where alternative methods are required to remove the remaining fixed items, clear debris and sludge from difficult areas of the floor and thereby achieve an interim state with minimal care and maintenance requirements that shows progress towards achieving the facility’s final-end state. Sellafield Ltd.’s ALARP assessment ([5], [22] and section 3 of [3]) has considered alternative methods of bay clearance at PFSP which identified divers as the preferred option in delivering the outcomes Sellafield Ltd. seeks.
8. Sellafield Ltd. expects that the improved flexibility, dexterity and ability to multitask will allow the use of divers to accelerate final clearance of the bays from an estimated one year to three months of work for the diving project. This has a direct benefit to dose reduction; the diving project dose calculation is 90 mSv compared to 160 mSv that would be incurred from remote methods and bay-side operations [6]. Sellafield Ltd. acknowledges the dose rate is higher for the divers but the quicker completion of the works by diving allows the overall dose to be halved compared to remote methods. It can therefore be considered that diving project is ALARP in terms of dose reduction.
9. The use of divers in PFSP bays 11 and 12 does not have any significant environmental aspects or risks to the public; the main hazards are related to nuclear and conventional safety. The key aspect is how to manage and minimise the dose uptake of the divers and support personnel by managing the pond water activity.
10. Before diving commences the floor of the bays have been cleared on a best endeavours basis exhausting the application of the existing plant assets to a level of ‘clean enough’ as determined by the Legacy Ponds Head of Operations through the Management Safety Committee [12]. This will ensure acceptable radiological conditions as bounded by the dose management strategy [6], and the physical space for the divers to work in.
11. Sellafield Ltd. have a governance process for regular review of the diving pilot with respect to ensuring the risk is ALARP [21]. It includes arrangements for data collection and review upon which decisions will be made. The governance process sets out the methods used to measure the cleanliness of the bay and detail how the decision will be made to discontinue cleaning. Discontinuation will occur if the dose uptake, time or cost has become too significant and the benefit will not be realised further i.e. diminishing returns. The ALARP argument by Sellafield Ltd. is further explored within the specialist’s radiological assessment below.
12. Taking into account Sellafield Ltd.’s submission which articulates the incentives for undertaking the diving pilot (which will accelerate high hazard risk reduction), the justification for the choice of location, timing and scope of work (including optioneering) and the hazard management system employed, together with the ONR specialist inspectors assessment of the submission, I consider there is sufficient evidence demonstrating that the risks associated with the permission requested have been reduced so far as is reasonably practicable.
	1. Radiological Protection
13. An ONR radiological protection assessment has been undertaken of the licensee’s safety case claims [39], this covered the deployment of contract diver (UCC) into bays 11 and 12 of the PFSP to remove any remaining fixed items and clear debris such as sludge and any potential fuel elements that earlier work was not able to remove. Their assessment report does not cover any activities to further prepare bays 11 and 12 for physical isolation from the main PFSP, concrete remediation, concrete pour and final draining/dewatering. These are beyond the scope of this proposal.
14. The ONR radiological protection inspector is content that:
* Sellafield Ltd. has articulated a clear and strong case for diver deployment into PFSP;
* Sellafield Ltd. has conducted adequate and robust hazard identification and analysis for the deployment of divers into PFSP;
* Sellafield Ltd. has made an adequate whole-body dose assessment for the divers and support staff and has considered other means of further dose reduction within PFSP in demonstrating that doses have been reduced ALARP. The dose assessment considered whole body external, extremity and eye doses;
* Sellafield Ltd. is providing robust real time dosimetry to the divers during dive operations and has evidenced that it will be carefully monitoring and tracking doses as diving operations proceed, thus allowing prompt interventions to be made if accrued doses begin to exceed expected levels. All other support staff are provided with dosimetry applicable to the work area;
* Sellafield Ltd. is deploying adequate methods to protect divers and support staff during dive activities e.g., appropriate personal protective equipment, additional ventilated work areas, and decontamination activities; and
* Sellafield Ltd. have adequate emergency procedures from a radiological perspective in place to recover a diver from PFSP.
1. The ONR radiological protection inspector raised two recommendations during their assessment:
* That Sellafield Ltd. incorporate both the UCC and Sellafield Ltd. radiation risk assessments into the task-based risk assessment demonstrating cooperation between employers as required by regulation 16 of the Ionising Radiations Regulations 2017 (IRR17) [40], and to ensure clarity on any necessary actions to support demonstrating that doses have been reduced ALARP prior to diver deployment within bays 11 and 12 of PFSP taking place; and
* The Sellafield Ltd. draft report (Dose uptake assessment for Diver Operation in PFSP (Draft dated 24th June 2021)) collating the assessments of potential external whole body and extremity doses and internal doses to divers in planned operations and in fault scenarios, including doses resulting from sludge disturbance and contained wounds should be finalised and results appropriately recorded in the risk assessment referred to in recommendation 1. A copy of the final report should be provided to ONR.
1. Following the higher than anticipated dose rate measurement and subsequent pause of the project in 2021 (paragraphs 18 – 20) the safety case documentation was reviewed, revised and resubmitted to ONR in October 2022.
2. The ONR radiological protection inspector assessed the revisions made [41] and confirmed the conclusions reached in the previous assessment [39] were not challenged and the residual recommendations had been addressed; specifically:
* A IRR17 specific radiation risk assessment [26] has been produced by the PFSP Radiation Protection Advisor (RPA), which will support the details required in the task-based risk assessment; and
* The dose assessment originally produced by Sellafield Ltd, has now been revised and re-issued to reflect the additional dose rate information and impact on the divers and support staff. A signed off copy of the document [6] has been provided to ONR.
1. The radiological protection inspector has stated that they support the issuing of Licence Instrument 543 to Sellafield Ltd, to release Hold Point 498 on its Hold Point Control Plan, allowing Sellafield Ltd. to deploy divers into bays 11 and 12 of PFSP.
	1. Human Factors
2. There is a high reliance on people to maintain safety for the proposed diving activities. For this reason, a detailed HF assessment [42] was undertaken. The key topics considered by the ONR HF inspector, and their findings are summarised below.

**Licensee approach and integration of human factors**

1. The ONR HF inspector considered the level of HF assessor resource in support of the PFSP nuclear diving project to have been appropriately integrated. It was noted the project’s early integration of HF support, which is not always demonstrated across Sellafield Ltd.’s other Hold Point activities. The Sellafield Ltd. HF assessors have appropriately prioritised their work and have ensured that they have contributed to a multi-disciplinary approach, as required. There were minor shortfalls with the project’s provision of information to the incoming HF assessor in 2021, however this has not resulted in a safety gap for the diving activities.

**Human factors’ substantiation of safety important operator claims**

1. The ONR HF inspector’s assessment concludes that a systematic approach has been taken to identify human actions impacting safety, and that proportionate task-based HF analyses has been undertaken of those actions. This analysis has considered and addressed the reliability with which the identified tasks can be undertaken and has resulted in administrative controls being identified which will provide unambiguous information for those implementing them. Sellafield Ltd. has demonstrated that the substantiations meet relevant good practice (RGP) by providing adequate underpinning evidence, giving confidence that the safety significant tasks can be achieved reliably.
2. The ONR HF inspector required some additional regulatory confidence for the interfacing arrangements between the diving activities and wider PFSP operations in respect of reintroduction of radioactive material into bays 11 and 12. Following further review of Sellafield Ltd.’s arrangements I judged that the arrangements for controlling this hazard were adequate and agreed with the HF inspector that the matter could be closed [43].

**Training and competence assurance**

1. The ONR HF inspector considered that a satisfactory approach has been taken to identify the training requirements of UCC and Sellafield Ltd. personnel supporting the bay 11 and 12 diving activities. The training and competence assurance activities of the project have had HF suitably qualified and experienced persons (SQEP) oversight where appropriate and, in the opinion of the ONR HF inspector, comply with RGP. At the time of completion of the ONR HF assessment, there were some safety case briefings that were still being developed, but having reviewed the plan for development, delivery and assurance, it is considered adequate. However, the ONR HF inspector recommended that prior to issue of the LI, further evidence is sought to confirm the briefings have been delivered and included the expected content. This is recorded under regulatory issue RI-11123 [44], action 1, which has now been closed to the satisfaction of the ONR HF inspector.

**Instructions and procedures**

1. The ONR HF inspector was satisfied that an appropriate and collaborative approach has been taken to the development of instructions and procedures for the UCC dive team carrying out nuclear dive activities in PFSP bays 11 and 12, such that safe and effective diving-related tasks can be supported, including emergency (off-normal) scenarios.
2. The ONR HF inspector was content with the evidence that the Health Physics and Surveillance (HP&S) Monitoring Aid is being developed. As this is a key administrative control, the ONR HF inspector recommended that prior to issue of the LI, the project inspector ensures its satisfactory completion. This is recorded under regulatory issue RI-11123 [44], action 2, which has now been closed to the satisfaction of the ONR HF inspector.

**Command and control arrangements**

1. The ONR HF inspector is content with the command and control arrangements for UCC diving activities, both within the UCC dive team and between the UCC dive team and wider PFSP operations. HF SQEP consideration was given to command and control and has been considered by the HF SQEPs throughout the project lifecycle. Evidence has been provided by both UCC and Sellafield Ltd. demonstrating that the arrangements are adequately understood and can be reliably and repeatedly applied to safeguarding against, and recover from, higher than expected radiological exposure and potential radiological and conventional safety significant errors.

**Overall human factors judgement**

1. Whilst the ONR HF inspector rated this submission as Green, there have been shortfalls in respect of the licensee’s timeliness and quality of informal and formal submissions of the safety case, and also for some of its responses to regulatory intervention and requests for project documentation. These have been discussed this with the Project Delivery Lead who has raised this with the licensee, at an appropriate level.
2. Overall, the ONR HF inspector is of the opinion that Sellafield Ltd. has undertaken a significant and suitably targeted programme of HF work, to an adequate standard, to support the use of UCC nuclear divers in PFSP bays 11 and 12. RGP is met, and the licensee has responded constructively to ONR HF engagement. Two recommendations were raised under regulatory issue RI-11123 [44], which have subsequently been closed following provision of the requisite information from Sellafield Ltd.
3. Therefore, the ONR HF inspector supports ONR’s release of Hold Point 498, allowing divers to be deployed into PFSP bays 11 and 12.
	1. Conventional Health and Safety (CHS)
4. The Conventional Health & Safety (CHS) assessment [45] focused on compliance against the legal requirements of The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) [46] in relation to the stricken diver recovery lift as part of the emergency arrangements; specifically:
* LOLER, Regulation 4 - Strength and stability, in relation to the roof beam which is being used to anchor and lift the divers from the pond in an emergency;
* LOLER, Regulation 5 - Lifting equipment for lifting persons, in relation to all lifting equipment involved in the rescue lift;
* LOLER, Regulation 9 - Thorough examination and inspection, in relation to all lifting equipment involved in the recovery lift; and
* Related aspects from The Provision and Use of Work Equipment Regulations 1998 (PUWER) [47] and The Construction (Design and Management) Regulations 2015 (CDM) [48].
1. The assessment included a desktop review of documentation, a ‘virtual’ inspection of the work area using a ‘HoloLens’ camera and MS Teams meetings with key Sellafield Ltd. individuals.
2. Whilst the documentary submission and verbal advice from Sellafield Ltd. addressed most of ONR CH&S inspector’s queries in relation to LOLER compliance of the stricken diver recovery equipment, there remained several outstanding regulatory requirements requiring attention (see paragraphs 30 – 33 of [45]):
* Sellafield Ltd. should provide a copy of the PUWER inspection certificate for the roof beam once the inspection is complete (N.B. PUWER does not apply to structural items);
* Sellafield Ltd. and UCC should identify which harness will be used during any rescue scenario and confirm that it complies with Regulation 5 of LOLER in that it is suitable for this purpose;
* Sellafield Ltd. and UCC should provide evidence that the harness, spreader bar and block and tackle have been thoroughly examined in accordance with a written scheme, as required by LOLER Regulation 9; and
* Sellafield Ltd. and UCC should provide evidence that the persons undertaking the pre-use checks of the lifting equipment have received appropriate information, instruction and training to enable them to do this.
1. Following the provision of further information from Sellafield Ltd. and through discussions with Sellafield Ltd. / UCC, the ONR CH&S inspector confirmed [49] that the outstanding queries listed above (from [45]) have been adequately addressed. As such, the ONR CH&S inspector supports issuing of a Licence Instrument for commencement of the diving operations in bays 11 and 12 of PFSP.
	1. Conventional Health and Safety (CHS) Diving Specialists
2. HSE specialist diving inspectors (ED 6.2 – Diving Division) undertook an assessment of the suitability of the diving contractor UCC, diving project plan and emergency arrangements in accordance with the Diving at Work Regulations 1997 [50] and other relevant statutory provisions of the Health and Safety at Work etc. Act 1974 [51], e.g. PUWER [47] and CDM [48].
3. Their assessment of the health and safety arrangements and project planning for the use of divers to assist the cleaning of bays 11 and 12 within Sellafield Ltd.’s focused on the following areas:
* diving method statement
* divers’ qualifications, medicals and competence
* diving project plan and risk assessment
* diving emergency plan (including hyperbaric treatment)
* maintenance records for all ancillary equipment (such as cutting, lifting, generators etc)
* maintenance records for all diving equipment.
* breathing gas purity records.
1. Their assessment of the health and safety arrangements and project planning for the use of divers to assist the cleaning of bays 11 and 12 within Sellafield’s PFSP identified several technical queries that required Sellafield Ltd. and the dive contractor to address prior to the permissioning of dive operations [52]. All technical queries raised have since been addressed [53]. The dive specialists also undertook a desktop review of several key documents relating to the areas outlined above [54] concluding they were satisfied with the documentation provided [55].
2. In addition, as detailed in Section 3.7, the HSE dive specialists were part of the readiness inspection team that undertook a site inspection of the diving arrangements to verify that the procedures are as described within the documentation and that verbal assurances provided by Sellafield Ltd. and UCC are being applied.
3. A summary of the HSE dive specialists’ assessment [56] is provided below.
4. UCC are a notified contractor and member of the Association of Diving Contractors with considerable experience in nuclear diving in the UK and overseas and are familiar with the UK’s Diving at Work Regulations 1997 and relevant statutory provisions.
5. The project documentation, diving project plan, method statements, risks assessments and emergency arrangements appear to be suitable and sufficient. There is a process for reviewing and revising these documents as necessary. A suitable permit to work system and management of change procedure is in place to address any requirements for deviation from the agreed methodology or systems of work.
6. A review of the competencies of the diving team suggests that those taking part have the required qualifications, knowledge, skills and experience. With the exception of a few outstanding medical certificates of fitness to dive there are no concerns with the competencies of the diving team. There appears to be sufficient people with suitable competence to conduct the diving operation safely.
7. The diving plant appears suitable and sufficient. Uniquely to this project much of the plant is new and will be replaced due to contamination controls well before its required servicing date. In addition, due to the short duration of the pilot project, many items will not require servicing or recertification before the end of the project. Of the plant that will require serving there appears to be in place a suitable planned maintenance system.
8. The client for the project, Sellafield Ltd., have in place a competent diving technical authority to advise them on diving matters. The diving technical authority will be involved with monitoring and reviewing the project as it proceeds.
9. In general terms HSE are content that there are no significant reasons why the diving project should not proceed as planned, notwithstanding some simple actions which were captured under regulatory issue RI-11137. These actions were communicated to Sellafield Ltd. and UCC and have now been addressed [57]. From a perspective of the diving operations HSE are content for Sellafield Ltd. to be granted their licence by ONR for the pilot project.
	1. Demonstration Dive at Forth Engineering
10. The ONR assessment team attended a demonstration of the diving task in an inactive pool offsite at Forth Engineering [37]. The pool had been mocked up to show the dive platform, changerooms and dive control station. The demonstration covered:
* diver dressing on the platform
* diver entry to the pond
* pond monitoring activities
* size reduction activities using pneumatic cutting tools underwater
* retrieval of materials
* emergency recovery of the diver using sling and hoist
* diver exiting the pond
* diver undressing
1. Overall ONR was satisfied with the demonstration with some key points summarised below.
2. The communication between the dive supervisor and diver was clear, with the diver responding promptly to any commands made by the supervisor and adequate video and teledosimetry was within the dive control station.
3. The tasks demonstrated were shown to be well within the capability of the diver and similar to the pond clearance tasks already successfully completed by UCC divers in Magnox ponds.
4. The UCC dive team demonstrated a good level of competence and were aware that increased activity levels within PFSP will provide additional challenges over the Magnox dives.
5. Prompt emergency withdrawal of a simulated stricken diver was demonstrated. This used a manual winch with a reduction gearbox to facilitate easy / controlled withdrawal, which negates the requirement for electrical power.
6. The Sellafield Ltd. Safety & Risk Management (S&RM) lead observed the same dive, so ONR confirmed that nothing they had witnessed caused any concerns linked to the hazard identification (HAZOPs) or hazard analysis that have been completed.
	1. Readiness Inspection
7. In support of the permissioning decision, ONR with support from the HSE diving specialist inspectors undertook a readiness inspection of PFSP to assess Sellafield Ltd.’s implementation of its LC 22 arrangements for the proposed activity [57]. The purpose of this was to give ONR/HSE confidence that the elements identified in the project implementation plan [4] had been adequately closed out or were being suitably managed to ensure closure.
8. Based on the evidence sampled, ONR judged that Sellafield Ltd.’s implementation of its LC 22 arrangements as adequate as it was judged to align with relevant good practice, specifically the relevant aspects of ONR’s Technical Inspection Guide for LC 22 [58]. This judgement was based on Sellafield Ltd.’s demonstration that:
* All structures, systems and components (SSCs) important to nuclear safety are appropriately commissioned (or will be as part of the active commissioning during the first dive) and suitable Examination, Inspection, Maintenance, and Testing (EIM&T) is captured;
* Operating instructions were complete and reflected the requirements of the safety case;
* Sufficient people are suitably qualified and experienced, including completion of all relevant training, to operate and maintain SSCs important to nuclear safety that are introduced by this proposal; and
* There has been adequate testing of emergency arrangements including unresponsive diver recovery exercises.
1. Although there were several aspects requiring completion, Sellafield Ltd. demonstrated that that these were being adequately controlled and managed through the PMP [2] and the project implementation plan [4].
2. The additional evidence gathered during the inspection and also post inspection was considered to be sufficient to close out the issues identified by the HF inspector for follow-up relating to outstanding safety case briefings and adequacy of the HP&S Monitoring Aid as detailed in Section 3.3.
3. No significant shortfalls were identified during the inspection that would prevent permission being granted for the proposed activity.
	1. Internal Assurance and Governance
4. In accordance with its LC 22 arrangements, Sellafield Ltd.’s request to commence has been subject to INSA [29] and consideration and approval at the PFSP Management Safety Committee (MSC) [30,31].
5. The ONR project inspector observed the MSC on the 28 July 2022 [30] to gain confidence in its effectiveness and ensure it aligned with Sellafield Ltd.’s corporate arrangements (SLC 2.05.02: Sellafield Ltd.’s Company Charter for MSC’s). The meeting was well attended, well chaired and there was a good level of challenge throughout the meeting, which was promoted from a range of SQEP [59].
6. Sellafield Ltd.’s proposal has also been subject to independent inspection and oversight by the Sellafield Ltd.’s Internal Regulator in the form of a HARR by a specialist team from internal regulation [60]. The review identified a number of Category A findings (i.e. a significant finding that requires addressing prior to the Sellafield Ltd. internal regulator granting permission). However, the dutyholder (Head of Operations – Legacy Ponds) has confirmed that these have been closed, or will be closed as part of Sellafield Ltd.’s due process and the HARR is sufficiently complete for Sellafield Ltd. to commence diver deployment in PFSP bays 11 and 12 [61].
7. Based on the evidence sampled, I judge that Sellafield Ltd.’s proposal has been subject to an adequate level of independent internal challenge and governance, which provides additional regulatory confidence.
	1. Environment Agency
8. In line with the ONR Memorandum of Understanding with the Environment Agency [62] the responsible Environment Agency inspector has confirmed they have no objection to the issue of the LI giving ONR’s agreement to commence diver deployment into PFSP bays 11 and 12 to remove the remaining fixed in pond items, clear debris and remove sludge [63, 64].
	1. ONR Civil Nuclear Security and Safeguards
9. To inform this permissioning decision I have consulted with ONR Civil Nuclear Security [65] and ONR Safeguards [66]. Both parties have confirmed that they support ONR agreeing to Sellafield Ltd. commencing diver deployment into PFSP bays 11 and 12 to remove the remaining fixed in pond items, clear debris and remove sludge.
10. MATTERS ARISING FROM ONR’S WORK
11. The specialist assessments of Sellafield Ltd.’s proposed activity did not identify any nuclear safety shortfalls or raise any recommendations for Sellafield Ltd. to address. As a result, all ONR specialist inspectors have advised that they support Sellafield Ltd.’s proposal and recommend that ONR issues the Licence Instrument.
12. I have confirmed that regulatory technical queries that have been raised as part of previous assessments and inspections to have been closed [53] to the satisfaction of the specialist inspectors raising them.
13. ONR’s readiness inspection judged Sellafield Ltd.’s implementation of its LC 22 arrangements for the proposed activity as adequate with no significant shortfalls identified. The inspection did identify a number of actions, which Sellafield Ltd. have adequately addressed.
14. CONCLUSIONS
15. ONR has assessed the adequacy of Sellafield Ltd.’s proposal [1] justifying commencement of diver deployment into bays 11 and 12 of PFSP to remove the remaining fixed in pond items, size reduce and remove contaminated items and radioactive waste.
16. The key nuclear safety matters are predominantly concerned with managing radiological risks to the worker (diver) for the duration of the task (i.e. during size reduction and recovery of items from the pond area). The significant radiological hazards introduced as a result of using divers in this way are largely associated with exposure to sources (external dose) and potential for contamination, including contaminated wounds (internal dose) which is clearly reflected in the safety functions of the protective measures identified in the case. There is no significant new engineering machinery associated with the proposal, other than that required for access and management of safe diver entry to the pond and there are no faults with potential to give rise to significant offsite consequences.
17. The ONR assessment therefore focussed on:
* Radiological risks associated with this work as part of the ONR RP specialist inspector’s assessment [39, 41];
* ONR HF specialist assessment considering matters such as ergonomics, integration of controls and the command and control elements of the work relating to both nuclear and conventional safety risk [42];
* CH&S assessment of compliance against LOLER in relation to the stricken diver recovery lift [45, 49]; and
* Management of risks in the context of underwater work compliance with Diving at Work Regulations 1997 utilising HSE diving specialists [52, 54, 55, 56].
1. I am of the opinion that for the proposed activity, Sellafield Ltd. has provided an adequate level of evidence and assurance that:
* Sellafield Ltd. has articulated a clear and strong case for diver deployment into PFSP;
* Sellafield Ltd. has done all that is reasonably practicable within the conduct of its undertaking, such that for the proposed activity it has reduced the risks to the public and workers so far as is reasonably practicable;
* Suitable and sufficient safety measures have been designed and implemented to provide adequate control of the hazards;
* All ONR specialist inspectors (including ONR Civil Nuclear Security and safeguards) and the EA have advised that they have no objection to Sellafield Ltd.’s proposal and recommend that ONR issues the LI;
* It aligns with ONR’s expectations of relevant good practice, specifically the relevant aspects of ONR’s Technical Inspection Guide for LC 22 [58] and SAPs [67], which were used as benchmark for the ONR specialist assessments and readiness inspection;
* It has been subject to an adequate level of independent internal challenge and governance in accordance with Sellafield Ltd.’s established arrangements; and
* There are no outstanding shortfalls that would prevent its safe implementation.
1. Based on the evidence sampled, I judge that Sellafield Ltd. has reduced the risks to the public and workers ALARP and the people, process and plant for Sellafield Ltd.’s proposal are adequate. As a result, there are no outstanding issues to prevent ONR agreeing to Sellafield Ltd.’s request for the proposed activity.
2. RECOMMENDATIONS
3. I recommend that ONR issues Licence Instrument 543, Agreement to commence the PFSP Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12 as detailed in Plant Modification Proposal (PMP) B\*Stream/B\*/0369 Issue 6.
4. REFERENCES
5. Letter SL-2022-513-01: ‘Condition 22(1), Schedule 2 of the Nuclear Site Licence Number: 103 Sellafield Site – Application for Agreement to commence the PFSP Diving Pilot – Introduction of Nuclear Divers into Bays 11 and 12 as Detailed in PMP B\*Stream/B\*/0369’, 4 October 2022. CM9 Record: 2022/57773.
6. Plant Modification Proposal (PMP) B\*STREAM/B\*/0369 Issue 6: ‘PFSP Diving Pilot - Introduction of Nuclear Divers into Bays 11 and 12 and Implementation of Safety Case (RP/LPSERP-015/SAFE/00195), 4 October 2022. CM9 Record: 2022/57797.
7. PMP Appendix 2: RP/LPSERP-015/SAFE/00195/B: ‘Safety Case Summary Report for the Use of Divers in PFSP Bays 11 & 12’, September 2022. CM9 Record: 2022/57780.
8. PMP Appendix 3: PIP/LPSERP-015/PROJ/00008/A: ‘Implementation Plan for PFSP Diving Pilot in Bays 11 & 12 – Introduction of Nuclear Divers (B\*Stream/B\*/0369)’, 30 September 2022. CM9 Record: 2022/57794.
9. PMP Appendix 4: RP/LPSERP-015/SAFE/00204/C: ‘BAT & ALARP assessment for the reduction in pond water activity and dose to the PFSP diving project’, 2 September 2022. CM9 Record: 2022/57784.
10. PMP Appendix 5: STR/LPSERP-015/SAFE/00002/C: ‘Dose Management Strategy for Diver Operations in PFSP’, 20 July 2022. CM9 Record: 2022/57788.
11. PMP Appendix 6: SC/LPSERP-015/PROJ/00190 Revision B: ‘Engineering Schedule – Pile Fuel Storage Pond – Diving Pilot Project – Bays 11 & 12’, June 2022. CM9 Record: 2022/57801.
12. PMP Appendix 7: RP/LPSERP-015/MECH/00062\_C: ‘Diver Operations: Mechanical Substantiation Report’, 7 July 2022. CM9 Record: 2022/57785.
13. PMP Appendix 8: RP/LPSERP-015/SYST/00031 Issue B: ‘Substantiation Report for CE&l SRE Equipment Identified for Diving’, 8 January 2020. CM9 Record: 2022/57786.
14. PMP Appendix 9: RP/LPSERP-015/SAFE/00216 Issue 1: ‘Human Factors Assessment of Pile Fuel Storage Pond Diving Pilot in Bays 11 & 12’, November 2020. CM9 Record: 2022/57781.
15. PMP Appendix 10: RP/LPSERP-015/PROJ/00518/D: ‘Construction Command, Control & Supervision Strategy for Diving Operations’, 20 September 2022. CM9 Record: 2022/57792.
16. PMP Appendix 11: NFR/LPSERP-014/PROG/00011/A: ‘Bays 11 & 12 floor coarse clearance – ‘best endeavours’’, 7 October 2022. CM9 Record: 2022/68065.
17. PMP Appendix 12: RP/LPSERP-015/PROJ/00548/A: ‘Emergency Response Plan – Revision 5’, 11 November 2022. CM9 Record: 2022/68523.
18. PMP Appendix 13: PMP B\*Stream/B\*/0369 RPA Endorsement, 1 April 2021. CM9 Record: 2022/57803.
19. PMP Appendix 14: PMP B\*STREAM/B\*/0369 Environmental Endorsement, 21 June 2022. CM9 Record: 2022/57805.
20. PMP Appendix 15: PMP B\*Stream/B\*/0369 – Fire Safety Endorsement – FSDB No 7064, 23 March 2021. CM9 Record: 2022/57806.
21. PMP Appendix 16: Section 8A.2 Operational and Maintenance Documentation. CM9 Record: 2022/57807.
22. PMP Appendix 17: Security Endorsement, 26 May 2021. CM9 Record: 2022/57808.
23. PMP Appendix 18: NFR/LPSERP-015/SAFE/00066/Issue 1: ‘Human Factors Assessment of PFSP Diving 2022 including Deployment of Shielded Stands’, 1 August 2022. CM9 Record: 2022/57783.
24. NFR/LPSERP-015/SAFE/00060/Issue 1: ‘Human Factors Final Assessment of PFSP Diving Pilot in Bays 11 and 12’, 30 May 2022. CM9 Record: 2022/57782.
25. NFR/LPSERP-015/PROJ/00440/B: ‘PFSP Diving Pilot – Bay Cleanliness Governance’, June 2022. CM9 Record: 2022/57787.
26. NFR/LPSERP-015/PROG/00012A: ‘Diving Pilot Programme Justification’, 12 August 2022. CM9 Record: 2022/57791.
27. MS/LPSERP-015/PROJ/00053: ‘Diving Method Statement – Revision 3’, 26 October 2022. CM9 Record: 2022/64842.
28. RP/LPSERP-015/PROJ/00562: ‘Diving Project Plan – Revision 4’, 10 November 2022. CM9 Record 2022/68514.
29. RA/LPSERP-015/PROJ/00058: ‘Hazard Identification and Risk Assessment – Revision 4’ 18 November 2022. CM9 Record: 2022/68429.
30. NFR/LPSERP-015/SAFE/00062/B: ‘Radiological Risk Assessment. For Diving operations in PFSP’. CM9 Record: 2022/67684.
31. RP/LPSERP-015/SAFE/00239/A: ‘Operational Action Levels for Diver Operations in PFSP’, 20 May 2022. CM9 Record: 2022/34427.
32. B\*/CRS/009 Issue 1: ‘Compliance Record Sheet for PFSP Active Diving Ops’, October 2022. CM9 Record: 2022/67685.
33. B\*/0369: ‘Certificate of Independent Nuclear Safety Assessment – PFSP Diving Pilot – Introduction of Nuclear Divers B\* stream’, 23 August 2022. CM9 Record: 2022/57777.
34. Management Safety Committee (MSC) Legacy Ponds – Minutes of Meeting 28 July 2022 – MSC 027. CM9 Record: 2022/57774.
35. Management Safety Committee (MSC) Legacy Ponds – Minutes of Meeting 13 September 2022 – MSC 029. CM9 Record: 2022/57776.
36. PFSP Diving Pilot – Document Tree. CM9 Record: 2022/41235.
37. *ONR Guidance Document – The Purpose and Use of Permissioning – NS‑PER‑GD‑001 Issue 6*. October 2022. <http://www.onr.org.uk/operational/assessment/index.htm>
38. ONR-SDFW-DR-19-014 Revision 0: ‘Diver Deployment in PFSP (To support BISP and dewatering of bays)’, 8 July 2019. CM9 Record: 2019/184820.
39. International Atomic Energy Agency, Decommissioning of Pools in Nuclear Facilities, Nuclear Energy Series No. NW-T-2.6, IAEA, Vienna (2015). <https://www.iaea.org>
40. Sellafield - PFSP Bay 11/12 Divers - Confirmation of no requirement for Fault Studies assessment - [REDACTED] - 07 May 2021. CM9 Record: 2021/37535.
41. ONR-SDFW-CR-19-390 Revision 0: ‘Sellafield - legacy ponds project meetings, and demonstration of divers’, 23 August 2019. CM9 Record: 2019/245104.

1. [IR-52033](https://wired.crm11.dynamics.com/main.aspx?etc=10296&id=dd04d801-e55b-417d-9e51-868258919e7f&histKey=358590856&newWindow=true&pagetype=entityrecord" \t "_blank): ‘Readiness for diver deployment into PFSP Bays 11 and 12’, 29 November 2022.
2. ONR-SDFW-AR-21-001 Revision 0: ‘Radiological Protection Assessment of Sellafield Ltd. Safety Case for Diver Deployment in Pile Fuel Storage Pond’, 29 June 2021. CM9 Record: 2021/37265.
3. The Ionising Radiations Regulations 2017, SI 2017 No. 1075.
4. ONR-SDFW-AN-22-006 Issue 1: ‘Radiological Protection Assessment of Sellafield Ltd. Safety Case for Diver Deployment in Pile Fuel Storage Pond Following Reassessment of Diver Doses’, 25 October 2022. CM9: 2022/0062084.
5. ONR-SDFW-AR-22-012 Issue 0: ‘Human Factors Assessment of Hold Point 498 to commence the PFSP diving pilot, introducing nuclear divers into PFSP’s Bays 11 and 12’, November 2022. CM9 Record: 2022/68320.
6. Email – ‘Confirmation of close-out of HF query relating to reintroduction of radioactive material into Bays 11 and 12 - PFSP Diving Pilot - November 2022’. CM9 Record: 2022/70668.

1. [RI-11123](https://wired.crm11.dynamics.com/main.aspx?appid=58b7bb57-c806-ec11-b6e5-00224841dad4&pagetype=entityrecord&etn=can_regulatoryissue&id=99bbf4fd-5446-42c9-a863-18f99c33640b): ‘PFSP - HP498 - Provision of training, instructions and monitoring aid’.
2. ONR Assessment Note: ‘Conventional Health and Safety Assessment Note for Pile Fuel Storage Ponds (PFSP) – Bay Interim State Pilot (BISP) – deployment of nuclear divers into bays 11 and 12’, 1 July 2021. CM9 Record: 2021/51792.
3. The Lifting Operations and Lifting Equipment Regulations 1998, SI 1998 No. 2307.
4. The Provision and Use of Work Equipment Regulations 1998, SI 1998 No. 2308.
5. The Construction (Design and Management) Regulations 2015, SI 2015 No. 51.
6. ONR Assessment Note: ‘Conventional Health and Safety Assessment Note for Pile Fuel Storage Ponds (PFCS) – Bay Interim State Pilot (BISP) – deployment of nuclear divers into bays 11 and 12 – close out of final queries’, 7 October 2022. CM9 Record: 2022/58808.
7. The Diving at Work Regulations 1997, SI 1997 No. 2776.
8. Health and Safety at Work etc. Act 1974, 1974 Chapter 37.
9. HSE – ED Regulatory Inspector’s Contact Report – Sellafield Ltd / Underwater Construction Corporation UK Ltd – Case No. 4022595 – Service Order No: SVC4403386, Revision 2, 22 June 2021. CM9 Record: 2022/26901.
10. Technical Queries Register. CM9 Record: CM9 Record: 2022/71025, 2022/71023 and 2022/71024.
11. HSE – ED Regulatory Inspector’s Contact Report – Sellafield Ltd / Underwater Construction Corporation UK Ltd – Case No. 4022595 – Service Order No: SVC4403386, Revision 2, 16 November 2022. CM9 Record: 2022/67693.
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