



Office for
Nuclear Regulation

Chief Nuclear Inspector's annual report on Great Britain's nuclear industry

October 2024





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Foreword

I am pleased to present my annual Chief Nuclear Inspector's report covering the nuclear industry's performance in 2023/24. This year, the industry has maintained satisfactory performance levels, with good compliance indicating high standards of safety, security, and safeguards across Great Britain (GB).

We took a range of enforcement actions during the year to address immediate risks and ensure sustained compliance. Seven active investigations are ongoing, consistent with long-term trends, and there was a small increase in enforcement against nuclear transport dutyholders, with plans to share emerging lessons with the wider community.

The introduction of cyber security as one of my themes last year has already shown encouraging results, with fewer higher significance cyber security incidents reported. There is, however, a continuing need for further investment to protect against evolving cyber security threats. Significant progress was made in promoting industry-wide collaboration, enhancing senior-level engagement, and clarifying regulatory expectations. I am pleased that the nuclear industry has shown commitment to improving cyber security and regulatory compliance, with our targeted interventions and collaborative efforts driving progress.

Efforts across nuclear site health and safety activities focused on improving risk management for workers' health and safety, particularly in new build construction and decommissioning. Incident reporting trends in this area

increased, reflecting sector growth and changing risk profiles, particularly in construction and demolition. Our regulatory interventions have continued to target these areas effectively.

There have been many highlights, including collaboration with government, other regulators, and international counterparts on new nuclear-related activities, and steady improvements at sites under enhanced and significantly enhanced attention. Notable progress included:

- steady performance improvement, reduced number of open Regulatory Issues (RIs), and enhanced safety governance at the Atomic Weapons Establishment (AWE);
- significant infrastructure developments at major defence sites, including BAE Systems Marine Ltd, Devonport Royal Dockyard Ltd (DRDL), and Rolls-Royce Submarines Ltd (RRSL);
- focus on leadership and management for safety, proactive safety case assessments, and readiness for submarine docking permissions at DRDL;
- key permissions granted for high hazard and risk reduction activities, closure of long-standing Regulatory Issues (RIs), and progress on the Sellafield Security Enhancement Programme (SSEP) at Sellafield Ltd;
- continued collaboration on cyber security, balancing accountability with allowing space for improvements at EDF Nuclear Generation Ltd (NGL) Corporate; and
- approval of a Security Assessment Principles (SyAPs)-aligned security plan and confirmation of adequate security outcomes at Berkeley.

We have also observed specific good practices in the areas of Artificial Intelligence and robotics at Sellafield, as well as arrangements for managing counterfeit, fraudulent, and suspect items within the supply chain by Nuclear New Build Generation Company (NNB GenCo). This report expands upon these, and I am confident that the learning will benefit the industry as a whole.

Early in the year, the International Atomic Energy Agency (IAEA) Integrated Regulatory Review Service (IRRS)'s follow-up peer review mission to the UK evaluated our legal and regulatory infrastructure against global safety standards.

It concluded that the UK demonstrated strong commitment and professionalism in carrying out its mandate to ensure that nuclear and radiation safety is effectively implemented and that UK regulation meets global safety standards – a positive outcome secured by a significant piece of work requiring collaboration across both the UK government and national regulators.

While the overall performance of the industry remained adequate, this report also highlights areas needing further or sustained improvements, as well as those with shortfalls. Our regulatory efforts will focus on these areas, with expectations for short, medium and long-term progress. The industry must collectively address these areas, with continued efforts and strategic oversight required to both maintain expected standards and achieve the necessary improvements.

We will work with industry and other stakeholders to ensure that current legacy facilities have both adequate investment and appropriate plans to maintain the assets in a safe condition, and to allow timely decommissioning and dismantling. We will also focus on post operations, when nuclear plants should move seamlessly into cleanout, decommissioning and dismantling. Importantly, we will also ensure that new nuclear projects continue to give appropriate consideration to whole life cycle planning to prevent a repeat of the legacies that are being managed today.

I would like to express my thanks to ONR colleagues and stakeholders, particularly in embracing an increasingly enabling and collaborative approach. This has been crucial in driving progress and in upholding the strong track record of high standards across the GB nuclear industry. By working together we have embedded positive sustainable outcomes, and are continuing to protect society by securing safe nuclear operations.



Mark Foy
Chief Nuclear Inspector

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Chief Nuclear Inspector's review



Nuclear industry performance overview

- 1.01 The overall performance of the nuclear industry in 2023/24 remained satisfactory, with most of our inspections confirming good levels of compliance. This indicates that, on the whole, the industry continues to meet the high standards of safety, security, and safeguards we expect. In comparison to the previous year, performance remained steady, with a mixed picture in some areas representing some variations in performance. We worked with dutyholders to address this throughout the year.
- 1.02 While we saw a small increase in higher significance events that led to enforcement in some areas (such as operating reactors), there was also work and effort invested to influence improvements in a timely manner.
- 1.03 Following the introduction of the CNI cyber security theme, we are seeing an improving picture in this area. Notwithstanding the prosecution of Sellafield Ltd over cyber security matters, there were fewer incidents (including fewer higher significance incidents) in 2023/24, which could be a potential early indication of improvements.
- 1.04 Safeguards performance remained steady. Maintaining the number of suitably qualified and experienced (SQEP) people in the nuclear industry to provide the necessary resilience in this area remains an ongoing priority however, which we are monitoring.
- 1.05 Nuclear site health and safety reporting trends continued to increase in some persistent areas, which we have targeted through our regulatory interventions. This reflects the increased pace of sector growth and changing risk profiles towards the hazard and risk activities associated with construction and demolition.
- 1.06 Highlights during the period included:
- compliance and close out of two long-standing Level 1 Regulatory Issues (RIs)¹ at Sellafield Ltd, covering the building condition and storage of Special Nuclear Materials (SNMs);
 - progress on collaborative work with the Department for Energy Security and Net Zero (DESNZ) on the Advanced Modular Reactor (AMR) Research, Development and Demonstration, and Coated Particle Fuel programmes;
 - EDF NGL's Hunterston B station more than 50% defueled, with reactor 3 having completed defueling in September 2023 and reactor 4 underway, and Hinkley

1 A regulatory issue (RI) – Levels 1, 2, 3, 4 – is a matter identified by ONR that requires action by a dutyholder to return to compliance, or to demonstrate they are already compliant. The level of a regulatory issue denotes the extent of management attention that will be applied to its resolution. Level 1 issues are the highest category and are overseen by ONR's Regulatory Leadership Team led by the Chief Nuclear Inspector.

Point B station approaching 50% defueled;

- commencement of Step 1 of two new Generic Design Assessments (GDAs) on the Holtec International SMR-300 and GE Hitachi BWRX-300 designs, alongside the ongoing Rolls-Royce Small Modular Reactor (SMR) GDA, which has been steadily progressing through Step 2 during the period reported;²
- DRDL's progress towards routine regulatory attention now requires sustained improvements in safety outcomes. This followed the introduction of our new strategy for DRDL, focusing on the key foundational areas such as the licensee's leadership, organisational capability, decision making, learning and internal assurance. Case study 2 at Annex 3 provides more details;
- EDF NGL deciding to extend the current accounting lifetime for Heysham 1 and Hartlepool stations from 2024 to 2026. This was supported by a technical rationale, safety justifications and security arrangements underpinning the decision, providing us with confidence in both stations' future safe generation;
- the first ever full decommissioning of a UK reactor site under modern regulatory controls, completed in February 2024 at the Imperial

College Reactor Centre (ICRC).

In 2022 we delicensed the site in Ascot after the shutdown of the Consort research reactor in 2012.

In February 2024 we assessed ICRC as posing no danger to the public, and removed the site from all ONR regulatory controls;

- a tri-lateral agreement with the United States Nuclear Regulatory Commission (US NRC) and the Canadian Nuclear Safety Commission (CNSC), which will facilitate greater collaboration on reactor design assessment to accelerate timeframes and reduce overall regulatory burden;
- the IAEA's annual review confirming the UK met all safeguards obligations, with exemplary performance from ONR as the state regulatory authority; and
- our contribution to a US NRC-led international technical exchange focusing on broadening attendees' understanding of 'Unacceptable Radiological Consequence (URC) thresholds'. We clarified the UK's legislative and regulatory framework, confirmed the rationale for the UK's URC threshold and detailed the link between that threshold and the Design Basis Threat (DBT).

2 GDA Step 1 of the Rolls-Royce SMR design was completed in March 2023: <https://www.onr.org.uk/news/all-news/2023/04/rolls-royce-smr-design-progresses-to-next-step-of-generic-design-assessment/>

Industry progress against 2023/24 CNI themes

Strategic approach to nuclear site health and safety

1.07 Nuclear site health and safety (NSHS) remains a regulatory priority as we seek improvements in the management of risks to workers' health and safety across GB nuclear sites, particularly in new build construction and decommissioning.

1.08 Our inspectors progressed two ongoing investigations relating to the work-related deaths at Hinkley Point C in 2022³ and at the AWE Aldermaston site in 2023⁴. We also successfully completed an investigation that culminated in DRDL and Kaefer Limited pleading guilty to and receiving significant fines for serious breaches of health and safety law that led to a fall and serious injuries to a scaffolder on board a Royal Navy ship⁵.

1.09 We continued to see an increase in the number of Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) reports (combined data on dangerous occurrences and injuries) when compared with the 2022/23 reporting period and pre-COVID average.

1.10 Detailed analysis of NSHS reports and enquiries revealed 20% of reportable incidents to us during

2022/23 had the potential to have more serious consequences for individuals on site, and this proportion is sustained into 2023/24. Lifting operations, control of work at height, workplace transport, health hazards, and electrical safety remain persistent areas of attention that we have continued to target through planned interventions.

1.11 For improvements to be systemic and sustained, cross-industry leadership and strategic action is needed. Consequently, in 2023/24, we developed and commenced the implementation of a new NSHS regulatory strategy with four pillars:

1. NSHS capability;
2. Risk-informed and integrated regulation of NSHS;
3. Agile processes, guidance, and enforcement; and
4. Proactive industry engagement.

1.12 We have reinforced our capability and capacity in construction site health and safety, progressing the rollout of enhanced training programmes and experiential learning on NSHS for all of our inspectors. This will improve efficiency, effectiveness, and proportionality, and allow us to better utilise our current regulatory footprint.

³ <https://www.onr.org.uk/news/all-news/2022/11/statement-incident-at-hinkley-point-c/>

⁴ <https://www.onr.org.uk/news/all-news/2023/07/statement-fatality-at-atomic-weapons-establishment/>

⁵ <https://www.onr.org.uk/news/all-news/2024/03/devonport-royal-dockyard-limited-and-kaefer-limited-fined-after-scaffolder-ship-fall/>

- 1.13 The strategy's second and third pillars are driving regulatory risk profiling to target interventions and proactively review our guidance for early influencing of dutyholders' compliance arrangements. This ensures dutyholder arrangements are appropriately integrated and give due attention to NSHS risks.
- 1.14 For the fourth pillar, we have instigated and continued to build on our engagement to influence action from senior leaders across the industry, including the supply chain, towards tangible progress across our five NSHS themes:
1. Clear leadership, ownership and action on NSHS performance at Board level;
 2. Effective use of risk profiling, inclusive of worker safety and health risks, both immediate and long-term;
 3. Adoption of leading safety performance indicators allowing early identification of weaknesses in risk controls;
 4. Adequacy of dutyholder investigations and cross-industry learning; and
 5. Effective discharge of The Construction (Design and Management) Regulations 2015 (CDM 2015) roles and duties.
- 1.15 We welcomed the Safety Directors' Forum (SDF)'s recognition that risk profiling approaches across the sector can be biased towards nuclear safety and not always adequately capture NSHS risks, leading to areas with insufficient planning, resourcing, and leadership focus. We look forward to seeing industry and its supply chain actively collaborating in the development, sharing and implementation of risk profiling and performance benchmarking practices that drive improvement at health and safety management system levels. It is our expectation that nuclear site licensees and other dutyholders realise and sustain essential benefits across all health and safety hazards and risks at nuclear sites.
- 1.16 Given the sector's growth ambitions, we continue our emphasis on awareness and effectiveness in the discharge of responsibilities under CDM 2015. We will target intelligent customer capability, and the adequacy of planning, co-ordination, co-operation, and oversight between organisations discharging client, principal designer, and principal contractor roles from early in design and through the life of construction projects.
- 1.17 The NSHS themes and planned interventions in 2024/25 will inform the focus for the next CNI themed inspections, which will be on NSHS, including fire safety, following completion of the themed inspection on Climate Change in 2024/25.

Cyber security

1.18 Dutyholders have acknowledged the need to invest further to protect against the ever-evolving cyber security threat landscape, in line with commitments made under the [2022 Civil Nuclear Cyber Security Strategy](#).

1.19 Our priorities in this area focused on assessing the adequacy of:

- governance arrangements, including the leadership of cyber security and resulting culture across dutyholder organisations;
- risk management and cyber protection capabilities, particularly at the highest category sites and where interfaces exist between operational and information technology; and
- independent intelligence-led assurance activities, as part of a holistic approach to evidencing the adequacy of arrangements within approved security plans.

1.20 In support of each of these thematic priorities, we have carried out a series of targeted activities throughout the year, including:

- completion of a campaign of face-to-face, Board-level briefings on effective cyber security leadership and strategies followed by increased scrutiny of leadership and governance, delivered through a thematic programme of interventions across all dutyholders;
- delivery of a biennial cyber assessment framework (CAF)-aligned benchmarking exercise to

enhance regulatory intelligence and enable sector-wide analysis and trend identification, as well as a thematic programme of activity to ensure that comprehensive arrangements are in place to prevent a cyber-attack resulting in a radiological release; and

- clarifying expectations for dutyholders to conduct appropriate and proportionate assurance activities against their approved plans, alongside increased scrutiny of assurance activities delivered through assessments and inspections across our dutyholders.

1.21 In addition to these priorities, we remain committed to delivering against the other activities under the sector-wide strategy. We have made significant progress against the 'priority' and 'supporting' activities within this reporting period, including:

- promotion of industry-wide collaboration and sharing of information through the delivery of the first dutyholder regulatory portal targeted at dutyholders within the supply chain, and cross-sector exercising of responses and reporting during cyber-related incidents;
- ensuring appropriate engagement, accountability and responsibility at senior levels in the industry through targeted engagements with dutyholder executives at our industry conference and the industry's Cyber Security Oversight Group (CSOG); and

- greater clarity in our regulatory expectations through formal reviews of technical guidance and benchmarking of relevant good practice, as well as increased engagement with international partners, non-governmental organisations (NGOs) and government in respect to the threat landscape and our regulatory vires.

1.22 Both Sellafield Ltd and EDF NGL Corporate remain in significantly enhanced regulatory attention for cyber security. In addition, Springfields Fuels Ltd was moved into enhanced regulatory attention due to identified shortfalls in cyber security arrangements.

Industry progress against 2023/24 regulatory priorities

Promote improvement at sites in enhanced and significantly enhanced attention

1.23 We have continued to work with EDF NGL Corporate on cyber security throughout the year. We have provided advice on how gaps against regulatory expectations may be closed and have balanced holding EDF NGL accountable with allowing the dutyholder space to develop and embed suitable arrangements. We have also promoted and influenced implementation of required improvements through the issue of security directions.

1.24 AWE has shown steady improvement in performance during the reporting period. It has operated more effectively as an autonomous licensee, with the implementation of a suite of improved safety governance arrangements for the production of safety documentation, with minimal oversight. We have influenced an improved close out rate of RIs, which has reduced the number of long-standing open RIs.

1.25 We continue to work closely with AWE on understanding its culture and how we can influence positive change. Additionally, we have provided training to the AWE Executive team on licensee obligations, which will be rolled out across its broader senior leadership team in 2024.

1.26 At DRDL we have focused our attention on leadership and management for safety, and DRDL has responded positively in line with our expectations. We have also provided training to the Executive team on our regulatory framework and DRDL's obligations as a nuclear licensee. DRDL received this well, and it intends to roll out similar information to its wider management team throughout 2024.

1.27 In promoting improvements at Devonport, we have taken a proactive, flexible and enabling approach to safety case assessments, ensuring we are ready to permission submarine dockings

for maintenance operations and supporting DRDL and the Ministry of Defence (MoD) to achieve safe, timely progress with their planned programmes.

- 1.28 At Sellafield Ltd, we delivered permissions of paramount importance to the site's ongoing high hazard and risk reduction activities. This included the first export of zeolite skips within a Self-Shielded Box from the First-Generation Magnox Storage Pond (FGMSP), to the new Interim Storage Facility (ISF). The first box of waste from the legacy storage facility – Pile Fuel Cladding Silo (PFCS) – was retrieved and transferred to the Box Encapsulation Plant Product Store/ Direct Import Facility (BEPPS-DIF).
- 1.29 On the Sellafield site, we also influenced compliance and close out of two long-standing Level 1 Ris – improvements to the ventilation and electrical systems, as well as the building fabric within a facility containing SNMs, and the repacking of materials within existing stores into modern standards storage containment packages.
- 1.30 The Sellafield Security Enhancement Programme (SSEP) is largely complete. There have, however, been delays in achieving Full Operating Capability for the Main Site Command Facility, which is now expected in May 2027. The Site Security Architecture Upgrade (SSAU) – a project to upgrade electrical and communication infrastructure at Sellafield site to support the SSEP project – has been

the subject of a technical review and subsequent replanning exercise to complete its agreed specification. There are still some areas where there is a reliance on ageing equipment, but overall the Physical Protection System is significantly improved and we are satisfied that the required security outcomes can be achieved.

- 1.31 At Berkeley, we approved the Security Assessment Principles (SyAPs)-aligned security plan and conducted an intervention on the Civilian Guard Force (CGF). This confirmed the dutyholder had aligned their arrangements with the revised plan and continued to adequately support the required security outcomes for the site.

Addressing legacy risks – Sellafield ponds and silos, and Special Nuclear Material

- 1.32 Sellafield Ltd has continued to progress the remediation of the most hazardous legacy ponds and silos, although at a limited pace. It has achieved the capability to retrieve and commenced retrievals from all four legacy ponds and silos. However, the retrieval progress has been slowed by the difficulties mentioned in Section 2 of this report.
- 1.33 In addition to the achievements noted in paragraphs 1.28 and 1.29, Sellafield Ltd made progress in developing a strategy and delivering new capabilities to allow the medium-term storage and repacking of Dounreay Exotics into packages that can be treated.

This is the subject of the remaining Level 1 RI, which is explored further in a case study at Annex 3.

Regulating national infrastructure priorities

- 1.34 Major infrastructure investment is taking place across both the civil and defence sectors of the nuclear industry. Our regulatory teams are focused on ensuring the safe and secure delivery of these projects, in support of UK government's strategic ambitions around energy security and national defence requirements.
- 1.35 There are extensive developments either underway or in various stages of planning and delivery across the major defence sites, and BAE Systems Marine Ltd plans significant development of its Barrow site to support future generation submarine manufacturing capability.
- 1.36 Work continues at DRDL, with the upgrade and redevelopment of submarine docking facilities, to provide enhanced capability for in-service submarine maintenance and decommissioning.
- 1.37 Furthermore, Rolls-Royce Submarines Ltd (RRSL) plans to double the size of its Raynesway site to match future demand from the MoD and the AUKUS⁶ project.
- 1.38 In relation to the UK's strategic weapons programme, Project Mensa (the new warhead assembly facility at AWE) has commenced inactive commissioning, albeit against a delayed programme. Planning for significant investment in new and upgraded facilities to support the replacement warhead programme is well advanced, as are significant upgrades to the broader infrastructure.
- 1.39 We are working closely with licensees, MoD, and other regulators to ensure a joined up and consistent approach to regulation of these facilities, tailoring our approach to account for lessons learnt from previous defence projects.
- 1.40 We are working with DESNZ to inform policy regarding the deployment of civil nuclear new build. During this reporting period, we have provided advice and supported the development of the previous government's civil nuclear roadmap, and consultations on both alternative routes to market and siting policy.
- 1.41 We engaged extensively with Great British Nuclear (GBN) to provide regulatory advice and insights as it progressed its technology selection process and preparations for establishing development companies to take new projects forward to Financial Investment Decision (FID).

6 AUKUS is a trilateral defence partnership between Australia, the UK and the US which was announced in September 2021, designed to allow the 3 nations to co-operate closely on defence capabilities.

Lifetime extensions for existing reactors

- 1.42 In February 2023, EDF NGL requested our view of its feasibility study for a lifetime extension at Heysham 1 and Hartlepool nuclear power stations, which were initially set to operate until March 2024. Our technical specialists reviewed EDF NGL's documents justifying safe and secure operations for the period of extended operation, focusing on life-limiting components like the graphite core and boilers. We subsequently confirmed that our review did not identify any significant new issues associated with the extended period of reactor operations, providing us with confidence in the continued safety at the sites.
- 1.43 We have, and will continue to, engage with EDF NGL on its safety case approach to underpin life extension. This includes, but is not limited to, graphite and steels structural integrity, and external hazards. EDF NGL is also carrying out improvements related to plant stewardship.
- 1.44 We have been approached by EDF NGL to provide a view of work to establish the feasibility of a lifetime extension at Sizewell B, the UK's only pressurised water reactor (PWR). In this case, EDF NGL is proposing a life extension from 2035 to 2055.

We have been clear that EDF NGL must produce documentation to outline the work required to justify safe and secure operations during any period of life extension, similarly to advanced gas-cooled reactors (AGRs). We will consider this proposal and, as always, will require a robust safety case and security plan to support current and future operations.

AGR transition

- 1.45 Hunterston B (HNB), Hinkley Point B (HPB) and Dungeness B (DNB) are in a defuelling phase of operations. We have permissioned defuelling safety cases and security plans produced by EDF NGL, which justify safe and secure defuelling of the six reactors across the three stations.
- 1.46 EDF NGL is developing decommissioning plans for these stations in consultation with Magnox⁷. We are maintaining oversight of these plans and will confirm whether they fulfil the requirements of the site licence conditions. EDF NGL will also eventually produce similar plans for the additional AGR stations still currently in generation.

7 Magnox announced its brand name would change to Nuclear Restoration Services (NRS) during the reporting period. This change officially took place on 2 April 2024, therefore we have opted to refer to Magnox throughout this report since it was known by this name during the reporting the period: <https://www.gov.uk/government/news/major-nuclear-company-rebrands-as-nuclear-restoration-services>

CNI themed inspection on climate change

1.47 The CNI's themed inspection on climate change was commissioned in response to evidence from the scientific community that the UK climate may be changing at a faster rate than anticipated, and that the goal "to limit the temperature increase to 1.5°C above pre-industrial levels" made at the UN Climate Change Conference (COP21) in December 2015 is unlikely to be achieved.

Objectives

1.48 The aim of this themed inspection⁸ is to seek assurances that the nuclear industry:

- understands and has taken account of recent climate change projections in relevant safety cases and hazard definitions;
- can demonstrate activities are, and will remain, safe and secure in the future, subject to the reasonably foreseeable effects of climate change; and
- has effective arrangements to monitor and review climate change information to determine if additional measures are needed to ensure that activities remain protected in the future.

1.49 The output of the inspection will be a summary report that compares the preparedness of the UK nuclear

industry against our regulatory expectations in relation to climate change⁹.

1.50 The report will also highlight areas of industry good practice, identify broad areas where more work is required by the industry and the key findings from the inspections.

The plan

1.51 All licensees, except for three waste handling dutyholders (whose activities could be stopped if the consequences of climate change became onerous), are involved in this inspection, to provide a view across the whole of the nuclear industry. Sizewell C Ltd is also participating¹⁰.

1.52 To minimise the regulatory burden upon the industry, while maximising the value of the information collected, we have separated the themed inspection into two phases.

1.53 **Phase 1: Self-assessment questionnaire (Financial year 2023/24):**

Designed to establish the maturity of the participating licensees' arrangements and plans in relation to the potential effects of climate change. We received the responses to the questionnaire in October 2023 and used the intelligence gathered to inform the scope of Phase 2 and ensure it was appropriately targeted.

⁸ Read more about our CNI themed inspections: <https://www.onr.org.uk/publications/regulatory-reports/chief-nuclear-inspectors-themed-inspections/>

⁹ <https://www.onr.org.uk/climate-change/guidance.htm>

¹⁰ <https://www.onr.org.uk/our-work/what-we-regulate/new-reactors/licensing-of-new-reactors/sizewell-c/>

1.54 Phase 2: Site based interventions (Financial year 2024/25):

Five sites have been selected for site-based inspections based on the potential consequences of a site incident initiated by an external event, and/or by the anticipated period of operations. We also ensured a reasonable cross-section of the industry, including decommissioning and defence sites.

The aim of the site-based inspections is to provide greater insight into how the nuclear industry incorporates relevant good practice for climate change preparedness and to identify learning for both the industry, ONR and the international community.

1.55 The information collected during both stages will inform the summary report, which we aim to publish during the early part of 2025.

Progress and key findings to date

1.56 The themed inspection is on track. We are establishing dates for the site-based inspections, and defining the scope for each site by, for example, identifying which potential effects of climate change could create the most significant challenge to each site, and which safety measures might be adversely affected by the challenge.

1.57 The self-assessments provided a valuable insight to dutyholder arrangements and plans. Our specialist inspectors have considered these, generating the following high-level observations and findings:

- most licensee organisations already explicitly consider climate

change effects within their safety cases' external hazards definitions. About half of licensees still have to consider the full range of potential challenges caused by climate change, however, and many have not yet fully incorporated the UK Climate Projections 2018 (UKCPI8) into their safety cases. As a result, they are not currently meeting relevant good practice and, if not addressed, risk leaving facilities vulnerable to the future effects of climate change;

- consequently, licensees have made a strong commitment to update their safety case external hazards definitions in accordance with UKCPI8 within the next 18 months. We will test these commitments during the planned site-based inspections, seeking evidence and updates as appropriate; and
- it is clear from our recent engagements with the industry that the CNI themed inspection on climate change has already raised the profile of potential climate change effects and has helped to secure investment to ensure resilience to climate change.

1.58 In seeking opportunities to learn and share more broadly on climate change, we have engaged with the UK's environment agencies to share our plans for the themed inspection and to ensure consistency of expectations across the industry. We have sought to identify ways to work together to minimise our combined regulatory burden. For example, the Scottish Environment

Protection Agency (SEPA) will use the responses to our self-assessment questionnaire for the Scottish sites where the Control of Major Accident Hazards (COMAH) Regulations apply.

1.59 We also initiated and hosted an international workshop between national nuclear regulatory organisations from France, Belgium and the Netherlands to compare our regulatory approaches to climate change and to share relevant good practice. This confirmed our regulatory position and guidance in relation to climate change compares favourably with our international partners. It also resulted in a commitment to continue to work together in this rapidly-evolving area.

1.60 **Non-governmental organisations (NGO) engagement:** We completed three engagements with representatives from a range of NGOs. To provide the NGO community with assurance, we explained our

regulatory stance regarding climate change and how nuclear sites must remain safe and secure from hazards including rising sea levels and increasing temperatures at each stage of a nuclear site's life cycle. These workshops were well received and have provided a model to engage in a more open and transparent dialogue.

1.61 **EDF Climate Change Adaptation Meeting:** We actively participated in an EDF-led meeting, alongside other industry representatives, to discuss how the industry might best respond to the potential challenges of climate change. The willingness of dutyholders to openly share the factors that historically constrained their ability to update all hazard definitions was encouraging. We were also pleased that the engagement provided evidence the industry is willing to learn from experience and be better prepared for the future.

Other areas of industry and regulatory focus

Nuclear Skills

1.62 The demand for skills and resources in the nuclear sector is set to grow rapidly during the coming decades. Nationally, 80% of employers in the nuclear sector say they are experiencing talent shortages, indicating current demand outstrips supply for skills¹¹.

1.63 The skills challenge will increase as the anticipated growth in the industry

begins to become reality. Ensuring the supply of people and skills at the right time must be an area of sustained focus, at a regional and national level, now and into the future. Collaboration across the sector is essential, leveraging a coherent, collective effort by government, industry and the supply chain is the only way to successfully tackle the future people challenge.

¹¹ <https://nuclearskillsdeliverygroup.com/wp-content/uploads/2024/05/NSDG-National-Nuclear-Strategic-Plan-For-Skills.pdf>

1.64 During the last year we have supported the work of the Nuclear Skills Taskforce. Consisting of cross industry and government senior stakeholders, all working together for the first time, it was charged with improving the nuclear skills landscape by scoping the magnitude of the skills challenge, and proposing scalable options to close the UK's nuclear skills gap.

1.65 We were pleased to see a key milestone achieved during the year with the launch of the National Nuclear Strategic Plan for Skills (NNSPS), which identifies 13 areas for action across four overarching themes:

1. Collaborate across the sector;
2. Deepen the workforce pool;
3. Invest in the existing workforce; and
4. Lead and steward for the long-term.

1.66 Support of government and the industry in delivering the plan through the Nuclear Skills Delivery Group is now essential, to ensure the availability of skills that will enable the safe and secure delivery of the ambition for nuclear across the civil and defence sectors. It's important for us to support and focus on ensuring this is achieved.

1.67 An early indication of success is the National Communications Campaign (Destination Nuclear), which brings together government organisations across the nuclear and civil sectors, suppliers, and educational institutions to attract

new, and retain existing, talent across the entire nuclear sector, to help fill critical skills gaps. We contributed to the development of both the NNSPS and the Destination Nuclear campaign initiative, and all our vacancies will be part of this campaign on an ongoing basis.

Innovation

1.68 Our approach to innovation is centred around supporting the adoption of innovative solutions by the nuclear industry and its supply chain across all our regulatory purposes, where it is safe and secure to do so.

1.69 In addition to offering tailored support on engagement related to innovation, our innovation hub has established three pathways as a framework for our staff, dutyholders, and other stakeholders:

- Innovation Cafés: brief sessions for colleagues to discuss new ideas, products or processes in a safe environment;
- expert advice panels: discussions chaired by an inspector with input from specialist inspectors and, where appropriate, external subject matter experts to explore innovative solutions; and
- sandboxing, or Regulatory Laboratories: a safe environment in which we can consider new technologies and novel approaches or processes. Outside of our routine regulatory interactions, we explore with industry how their adoption should be facilitated.

1.70 To maximise the value of the innovation hub's work, we have developed a 2024-25 engagement plan, proactively communicating our open stance to innovation, informed by insights from our external stakeholder survey. We plan to perform an internal survey on innovation within the next financial year and we will further develop information on innovation on our website¹².

1.71 An example of innovation undertaken within the reporting period is provided in a case study in Annex 3. This case study describes how the sandbox, the first applied to nuclear regulation anywhere in the world, provided regulators and industry stakeholders with a safe space to consider how AI technologies could be adopted and regulated.

Safeguards

1.72 Safeguards Approach to Plutonium Management at the Sellafield site:

We have worked constructively with the IAEA, DESNZ, NDA and Sellafield Ltd to agree a future safeguards approach that delivers the UK's international safeguards policy outcomes while ensuring Sellafield Ltd progresses key projects that will ensure long-term safe storage of plutonium stocks at the site.

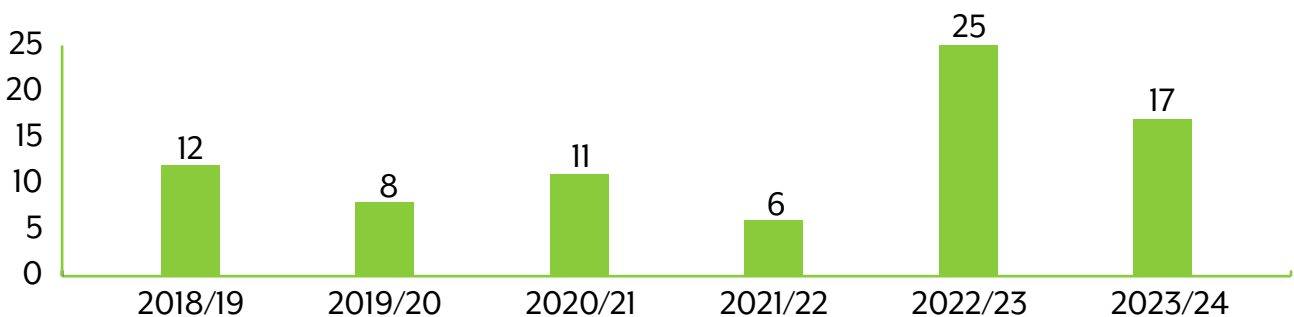
1.73 IAEA Annual Review of Safeguards Implementation in the UK:

We facilitated the IAEA annual review of UK safeguards implementation in November 2023. Following the review, the IAEA Deputy Director General for Safeguards confirmed the UK had met all its safeguards obligations and our role as the state regulatory authority for safeguards had been exemplary over the previous reporting period.

Enforcement

1.74 During the last year, we have exercised a range of enforcement actions¹³ to ensure dutyholders deal with immediate serious risks, to hold dutyholders to account and secure a return to sustained compliance. The trend of our formal enforcement action¹⁴ is in figure 1:

Figure 1: ONR Formal Enforcement Actions



¹² <https://www.onr.org.uk/our-expertise/innovation>

¹³ www.onr.org.uk/enforcement.htm and <https://news.onr.org.uk/enforcement-action>

¹⁴ Formal enforcement actions include all Prosecutions, Prohibition Notices, Improvement Notices, Enforcement Notices and Directions provided by legislation, regulations or licence conditions.

Table 1: Enforcement Action during 2023/24

Enforcement type	Description	Number of enforcements	
Legal Instrument	Decisions to prosecute	Conventional safety non-compliance	2
		Security, under the Nuclear Industries Security Regulations 2003 (NISR)	1
	Direction	Security, under the Nuclear Industries Security Regulations 2003 (NISR)	2
	Prohibition notice	Transport safety non-compliances	1
	Fire Safety Enforcement notice	Non-compliances with Regulatory Reform (Fire Safety) Order 2005	4
	Improvement notice	Conventional safety non-compliances	4
Inadequate arrangements for safe transport of radioactive material		3	
Enforcement Letters	Enforcement letter	Security	5
	Enforcement letter	Safety, for compliance with site licence conditions and conventional safety regulations	44
	Enforcement letter	Transport	7
	Enforcement letter	Safeguards	2

1.75 The number of enforcement decisions in year is similar to the long-term average. However, it is significantly lower than the peak that occurred during the 2022/23 reporting period.

1.76 During 2022/23, our inspectors followed up a number of incidents and in some instances identified shortfalls with the arrangements across multiple contractors and sites. As a result, we carried out multiple

enforcement actions for several single incidents. Our inspectors did not find similar problems during 2023/24. We will continue to monitor these trends and will use the intelligence to inform our site safety strategy and target our regulation.

1.77 Our **enforcement policy** expects inspectors to investigate the most significant incidents; we had seven active investigations at the end of the period. This number of investigations is consistent with our long-term trend for active investigations.

1.78 There was an increase in enforcement action taken against nuclear transport dutyholders during the reporting period. We plan to share lessons learned from such enforcement with the wider transport dutyholder community.

Overview of sites in enhanced and significantly enhanced regulatory attention

Defence sites: AWE Aldermaston and Devonport Royal Dockyard Ltd

1.79 Progress has been made across several key areas at AWE Aldermaston, including delivery of safety cases, decommissioning and addressing capability and capacity concerns. Demonstration of a sustained period of performance at this level should allow a move to routine attention for nuclear safety at the autumn 2024 review.

1.80 DRDL remains in enhanced regulatory attention for nuclear safety. We put a revised regulatory strategy in place in May 2023, supported by a Level 1 RI. The RI targeted improvements to DRDL's leadership, organisational capability, and decision-making, along with internal challenge and assurance functions. We have observed a positive response from DRDL, which has met our regulatory expectations so far.

EDF NGL Corporate

1.81 Although in enhanced regulatory attention overall, last year we raised the level for EDF NGL Corporate to

significantly enhanced for cyber security, alongside raising a Level 1 RI. Clear progress has been made by EDF NGL in response to both, which has allowed us to close one of the security directions this year.

1.82 However, EDF NGL has encountered difficulties in developing an organisational cyber security target operating model. This is required to implement improved governance arrangements because delivery of the broader cyber transformation remains a significant and challenging task. It is important the current attention level is maintained to ensure we can apply sufficient surveillance and regulatory resource to EDF NGL's schedule of cyber security improvements.

Magnox: Berkeley

1.83 During the year Berkeley submitted a revised security plan aligned with our Security Assessment Principles (SyAPs), which we approved in March 2024. It remains in enhanced attention for nuclear security, as it continues to address non-compliance issues on the site.

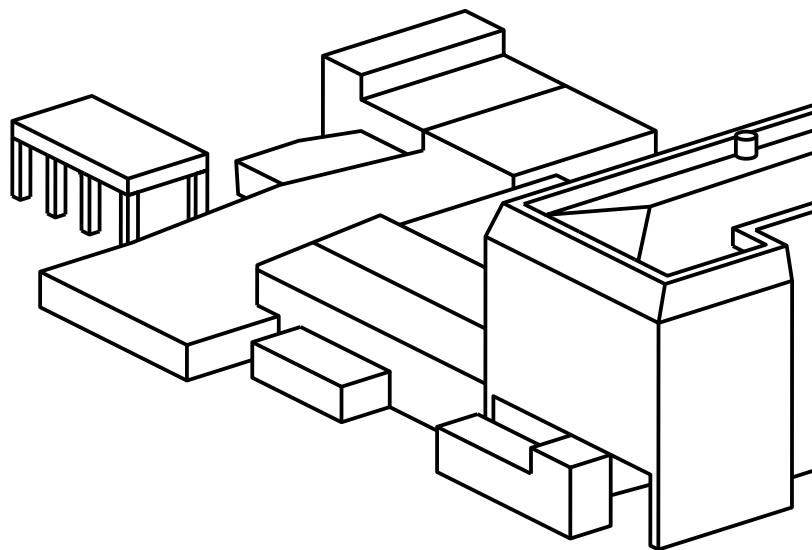
Sellafield Ltd

- 1.84 The Sellafield Ltd site remains a high regulatory priority. Due to the historical and ongoing high hazard nature of operations on the site, we expect Sellafield Ltd will remain in enhanced and significantly enhanced attention for many years to come.
- 1.85 While making good progress in some areas, Sellafield Ltd has made limited progress with waste and spent fuel retrievals from the legacy ponds and silos.
- 1.86 Sellafield Ltd has achieved important milestones this year, including the first export of zeolite material from FGMSP in a self-shielded box to the ISF. The first material from PFCS was also retrieved and transferred to the BEPPS-DIF, where it was placed into Vault 2. However, challenges remain in maintaining consistent operation across these facilities.
- 1.87 Sellafield Ltd remains in significantly enhanced attention for safety, in relation to the FGMSP, PFCS, and Magnox Swarf Storage Silo (MSSS), as well as SNMs, with the remainder of the site staying in enhanced attention.
- 1.88 During the reporting period, we took the decision to place the Analytical Services facility into significantly enhanced attention. This was due to delays in the Replacement Analytical Project (RAP) and significant uncertainty over the capability of the current ageing facility to service the site requirements prior to the availability of RAP.

- 1.89 Sellafield Ltd also remains in significantly enhanced attention for cyber security, and in enhanced attention for physical security. Sellafield Ltd is the largest and most complex nuclear facility in the UK and ensuring that security arrangements are appropriate is a priority for us. Although cyber security at Sellafield Ltd is currently not meeting certain high standards we require, there is no evidence that any vulnerabilities have been exploited as a result of the identified issues.

Springfields Fuels Limited

- 1.90 We conducted a thematic intervention on cyber security at Springfields Fuels Limited, and identified concerns with its cyber leadership and governance. Additionally, we will continue to influence Springfields to address the challenges of resourcing SQEP in key security positions.



Industry good practices

Innovation: use of robotics to reduce risk of exposure at Sellafield Ltd

1.91 In last year's report, we detailed an example of good practice of Sellafield Ltd using mobile robotics to reduce the risk for operators working at height and in hazardous environments. The use of a quadruped robot allowed safe relocation of bags of contaminated waste in a challenging environment. More generally, Sellafield Ltd continues to recognise the opportunity offered by innovation to reduce the risk to workers and to accelerate risk remediation, and continues to engage with us on the opportunities presented by robotics and autonomous systems (RAS). This spans across individual applications, such as AI-driven automatic sorting and segregation, use of a robotic arm in a glovebox, and use of quadruped robots; specific challenges, such as electrical control marking in prototyping; or as part of higher-level discussions, such as standardisation of robotics, good practice guides and overall approaches to drone application across the NDA group.

1.92 To support dutyholders in improving the pace of safe and secure deployment of robotics and autonomous systems in nuclear decommissioning, and to inform our regulatory approach, we have been engaging on domestic and

international regulatory forums on innovation in nuclear. We contribute to cross industry work in the UK (such as the National RAS (Robotics and Autonomous Systems) Regulations Standards and Ethics Committee Workshop), as well as on an international level (such as working with the Nuclear Energy Agency (NEA) Expert Group on the Application of Robotics and Remote Systems in the Nuclear Back-end (EGRRS)). All of this has served to facilitate the adoption of robotics and autonomous systems in key applications.

Effective arrangements for counterfeit, fraudulent and suspect items (CFSI) by NNB GenCo

1.93 In the last CNI Annual Report for 2023, we outlined the risks from CFSI and the publication of a dedicated CFSI alert note. The purpose of the alert note was to influence dutyholders to consider their CFSI risk mitigation arrangements, and to encourage continued vigilance with those involved in supply chain management, oversight, and assurance roles. During this reporting period, a key focus of our regulation has been on NNB GenCo's supply chain management arrangements, and those of its suppliers, to check that it is appropriately controlling CFSI risks.

1.94 In 2023/24, NNB GenCo's oversight and assurance arrangements

identified CFSI events within its supply chain. NNB GenCo has responded in a timely and appropriate manner in all instances, taking account of their potential significance. This has included undertaking investigations to understand the extent of condition, the potential impacts, any remedial actions, and learning that may influence future activities.

- 1.95 In relation to these events, NNB GenCo has demonstrated conservatism in its decision making around CFSI, which has resulted in the early deployment of its quarantine arrangements. Through this approach, NNB GenCo has demonstrated that its arrangements are effective in ensuring impacted components are adequately segregated in order to avoid inadvertent installation and commissioning, and therefore reduce the potential for latent defects. This is good practice.

- 1.96 During the reporting period, we inspected five of NNB GenCo's suppliers in the UK as part of our wider regulation of the supply chain and associated vendor inspection activity (see section 2.8 for more details). The inspection team interviewed managers with a role in the CFSI arrangements, checked documents and records, and inspected each supplier's workplace. The suppliers were selected to be representative of the range of UK based companies providing safety-related equipment to HPC. Each of the suppliers demonstrated knowledge of CFSI risks, and their impact on safety. However, NNB GenCo recognised there were some areas for improvement and has developed an action plan that will further enhance its overall CFSI arrangements.

Research¹⁵

- 1.97 The Energy Act 2013 enables us to conduct research¹⁶ in connection with our regulatory purposes and to publish the results where appropriate. The research we commission makes an important contribution to our understanding across a wide range of complex and often unique challenges.
- 1.98 Our research underpins our independent and objective

regulatory decision-making. It helps us make decisions based on timely and well-founded scientific and technical understanding of the safety, security and safeguards risks posed by nuclear operations.

- 1.99 The costs associated with our research portfolio are recoverable from our dutyholders. We engage proactively with industry, academia and other regulators in the interests

¹⁵ More information on our research can be found at <https://www.onr.org.uk/our-expertise/research>

¹⁶ Our research strategy, including research objectives, is published on our website at <https://www.onr.org.uk/documents/2019/onr-research-strategy.pdf>

of benchmarking, innovation and collaboration and to avoid duplication. We maximise the value of our research activities by partnering with other key national and international partners wherever possible.

1.100 During this reporting period, we have published nine research reports spanning various specialist areas to improve regulatory capabilities. Examples include research on the potential uses of artificial intelligence and machine learning on GB nuclear licensed sites, and approaches to substantiation. Despite its novelty, this research provides a benchmark for the potential approaches we would consider likely to satisfy UK regulatory requirements.

1.101 Other research examples, such as seal ring groove wall debris and potential impacts of climate change on the GB nuclear industry, are provided in Annex 3.

Effectiveness of commissioned research

1.102 Our approach to determining the effectiveness of the research we commission is now fully embedded and forms an integral part of our processes. We continue to review and update our processes to clarify what knowledge gaps exist, whether proposed research addresses those gaps, and to track any further research requirements.

1.103 To measure research effectiveness, we invite independent views from all relevant parties, including those who fund, specify, oversee and provide research. These views are analysed and used to produce an annual Research Effectiveness Self-Assessment, which identifies areas of success as well as any lessons learned. This includes assessing value for money.

1.104 Our 2023 self-assessment concluded that the research we commission is consistent with our Research Strategy. Overall, we deemed the research we commissioned over the 2022/23 financial year to have been effective in meeting our needs.



2

Overview of performance



Dutyholder performance

2.01 The following section outlines dutyholder performance by exception, covering areas where there is deviation from routine attention or significant developments during the reporting period.

Level
3

Routine attention applies to those sites, facilities, or organisations that we consider require no additional regulatory focus or effort over and above that which we would normally apply.

Level
2

Enhanced attention describes sites that, either by virtue of their safety and security performance or due to specific technical safety and security challenges, will be subject to a greater level of regulatory attention than would otherwise be the case.

Level
1

Significantly enhanced attention recognises additional factors, such as emergent or long-standing safety or security issues and/or the magnitude and nature of the risk associated with specific facilities. It may also reflect instances where we have substantially refocused our regulatory strategy to secure a specific outcome, such as accelerated hazard and risk reduction at Sellafield. We might in other circumstances assign such an attention level where the dutyholder has fundamental shortcomings in its safety or security performance or has failed to address long-standing and significant RIs.



Dutyholder performance by exception

Atomic Weapons Establishment (AWE)

Aldermaston

Regulatory attention levels

Safety	Enhanced
Civil Nuclear Security	N/A

2.02 During the past year, there have been several senior management changes at AWE, including a new Chief Executive Officer, Safety Director, Chief Operations Officer, Director of Liabilities and the appointment of a Chief Nuclear Officer. We have not identified any concerns with these changes, but continue to monitor the cumulative impact. We have closed some long-standing RIs and granted permission for high active waste decommissioning to recommence.

2.03 Following the work-related fatality on the Hub construction site in July 2023, we worked closely with Thames Valley Police in the early stages of their investigation. In January 2024, Thames Valley Police confirmed to us in writing their intention of handing over primacy for the investigation¹⁷. Hub construction work recommenced under our oversight in November 2023, following AWE's review of its arrangements. We have

increased our focus on construction activities on site to provide ongoing assurance that arrangements are suitable and to demonstrate a visible regulatory presence to workers.

2.04 There has been an increased number of low-level conventional safety events and related procedural non-compliances at Aldermaston. AWE has responded well to these events, and we will continue to oversee associated improvements.

2.05 The response to the extant Level 2 RI around capability and capacity is progressing and we anticipate this issue being appropriately addressed by AWE and becoming business as usual by the end of 2024.

2.06 Overall, Aldermaston is making improvements in line with our expectations. If the site demonstrates a further period of sustained improvements, we will consider a move to routine regulatory attention for nuclear safety performance.

17 Primacy over the investigation transferred from Thames Valley Police to ONR in May 2024 (outside of this reporting period), when material evidence was handed over and appropriate handover documentation officially completed. We continue to pursue lines of inquiry.

BAE Systems Marine Ltd (BAESML):

Devonshire Dock Complex (Barrow)

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	N/A

2.07 BAESML continues to progress the small number of RIs at the Barrow site and is generally compliant against nuclear site licence conditions. Our focus during the reporting period has been on addressing the NSHS performance on the licensed and authorised site, following formal enforcement action and two formal investigations following a number of events.

2.08 Working with the Defence Nuclear Safety Regulator (DNSR), we continue our regulatory oversight of BAESML's completion and commissioning of new facilities, using a flexible permissioning approach, to enable it to deliver its future submarine build programme.

Devonport Royal Dockyard Ltd (DRDL) EDF NGL

Regulatory attention levels

Safety	Enhanced
Civil Nuclear Security	N/A

2.09 DRDL remains in enhanced regulatory attention for nuclear safety. We implemented a revised regulatory strategy during 2023, supported by a Level 1 RI, which has targeted improvements to DRDL's leadership, organisational capability, and decision-making, along with internal challenge and assurance functions. DRDL's response has been positive, meeting our regulatory expectations, and it is preparing a comprehensive plan capturing

all activities necessary to address the Level 1 RI. We will then require DRDL to demonstrate improved safety outcomes that, after a period of sustained performance, would enable it to provide assurance it is ready to move to routine regulatory attention.

2.10 Through a series of regulatory interventions, we have gained confidence DRDL has demonstrated improved compliance with legislative safety requirements. We will continue

to adopt an enabling approach by influencing and forming a decision on DRDL's readiness to safely commence its planned dockings, as well as monitoring DRDL's delivery of agreed safety outcomes against the Level 1 RI and also focusing on DRDL's site-wide NSHS performance. This includes delivery of agreed improvements following our previous enforcement in this area, and ongoing compliance when submarine maintenance activities have commenced in the docks.

2.11 We have taken a proactive and flexible approach to safety case assessments and associated permissions for submarine dockings for maintenance operations. This ensures we are able to make timely decisions on the continued safety of these facilities and activities, while also ensuring our regulatory decisions are soundly based. This approach is enabling DRDL's readiness to progress with its planned programmes of submarine maintenance work on the licensed site.

EDF NGL

EDF NGL Corporate and Fleetwide

Regulatory attention levels

Safety	N/A
Civil Nuclear Security	Significantly Enhanced (Cyber Security)
Nuclear Safeguards	Routine

2.12 We have not previously undertaken a specific safety assessment of the performance of EDF NGL Corporate, but we will be undertaking a proportionate assessment in 2024/25 to inform the regulatory attention levels assigned from a safety (nuclear and NSHS) and security perspective.

2.13 We have maintained regulatory oversight of the changes taking place at NGL's corporate centre as it continues to transform its business. We are monitoring developments within Nuclear Services (originally Technical Services Organisation – a business unit in EDF Energy), as it

becomes a standalone organisation jointly owned by HPC, SZC Ltd and NGL.

2.14 Nuclear Services holds technical expertise seconded from NGL, HPC and SZC Ltd to allow shared resources, deliver licensee work activities and the building of future nuclear skills. As part of a continued focus on leadership, organisational culture and behaviours, a board observation is planned during 2024.

2.15 The EDF NGL corporate centre is leading on work to underpin safety cases in relation to climate change.

We have engaged on this topic during the reporting period and will continue to do so as part of our strategy for 2024/25. We have also engaged with the EDF NGL corporate centre on conventional safety, in response to events on EDF NGL stations. This remains a key area of focus during 2024/25.

2.16 As part of placing EDF NGL corporate into significantly enhanced regulatory attention for cyber security in 2023, we raised a Level 1 RI and two security directions to drive the required improvements to their arrangements. In response, EDF NGL has developed a cyber transformation programme and cyber security strategy, albeit the

former requires further detail and milestones to provide assurance of delivery.

2.17 EDF NGL is also in the process of designing an organisational target operating model for cyber security that will establish robust governance arrangements to ensure cyber security improvements are enduring. Successful implementation of the target operating model and cyber transformation programme will allow de-escalation of the regulatory attention and issue level. To that end, our organisational capability specialists will continue to work together to influence and assess as necessary, and to adequately support management of change.

Dungeness B

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.18 Dungeness B is no longer generating, meaning reduced levels of decay heat within the reactor. As a result, hazard and risk from reactor faults is low. During the reporting period we agreed to the implementation of the defuelling safety case and security plan for Dungeness B, and defuelling commenced in mid-2023.

2.19 Following the main cooling water valve injury event in 2022, we are pursuing a prosecution of EDF NGL and Trillium Flow Services for breaches of the Health and Safety at Work etc. Act 1974 Section 2¹⁸.

18 <https://onr.org.uk/news/all-news/2024/02/edf-and-trillium-to-be-prosecuted-after-injury-to-worker/>

Heysham 1 and Hartlepool

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.20 Positive results from graphite inspections at Heysham 1 and Hartlepool during the reporting period continue to increase confidence both stations can continue to generate into the future. As a result, following a rigorous review of the technical and commercial case for life extension, EDF NGL’s licensee board decided to move the forecast end of generation date for Heysham 1 and Hartlepool from March 2024 to March 2026. We are ensuring ongoing generation is underpinned by robust safety justifications and security arrangements.

On 23 December 2023, Heysham 1 declared a site incident following the failure of a main steam valve and associated unplanned trip of Reactor 1. EDF NGL’s initial investigation work identified concerns in relation to similar main steam valves on both Heysham 1

units. As a result, Heysham 1 Reactor 2 was shut down on 30 December 2023. Both reactors at Hartlepool were shut down between 6-9 January 2024. We issued an Improvement Notice to Heysham 1 in response to this event. We are satisfied that EDF NGL has taken appropriate measures to reduce the risk highlighted by the valve failure, allowing the units to return to service. Accordingly, the Improvement Notice has been closed.

2.21 We judged the Hartlepool site’s performance at a security response exercise in October 2023 as inadequate, due primarily to the areas of alarm assessment and command and control. The site reacted positively to address the shortfalls and held a successful re-demonstration exercise in February 2024, closing out the associated RI.

Heysham 2 and Torness

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.22 We continue to monitor the progress of keyway root cracking at Heysham 2 and Torness, with debris from associated seal ring groove wall cracking and the movement of fuel being the major considerations. At present inspection findings are at the upper end of fuel channel brick cracking expectations¹⁹, with plant improvements and safety case work to support the case for continued operation of the ageing graphite cores. We will monitor this activity closely; at present it is progressing as planned.

Following the planned shutdown of Reactor 2 at Torness, on 15 November 2023, in preparation for off-load depressurised refuelling and graphite inspections outage, four of the eight gas circulators (GC) failed, to run at reduced speed as designed.

2.23 This has prompted significant focus to understand the cause, and EDF NGL has implemented a programme of improvements to reduce the likelihood of reoccurrence. We will continue to oversee this activity as appropriate.

Hinkley Point B and Hunterston B

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.24 Hinkley Point B ceased generation as planned in August 2022, and Hunterston B in January 2022, with both reactors being defueled under

our oversight, which is progressing well; Hunterston B Reactor 3 is now completely defuelled.

2.25 We are also overseeing preparations

¹⁹ At the latest inspection of Torness Reactor 1, EDF's sampling of fuel channels showed 46 bricks with a single full height axial crack, which was at the upper end of expectations. However, these observations remain within the acceptable parameters of the safety case, with risks associated with any core cracking mechanism at tolerable levels. ONR continues to have confidence in the licensee's overall understanding of the graphite core ageing mechanisms. No bricks were observed with two or more full-height axial cracks. No full height axial cracking has been seen to date at Torness Reactor 2.

for the effective transfer of the site licence to the NDA (see Section 2.3) and development of the Hunterston B post-defuelling safety case, security plan and decommissioning plan.

2.26 As a result of the decrease in risk at these stations, we have taken the decision to allocate the equivalent of

one site inspector operating across both Hinkley Point B and Hunterston B, rather than maintaining one site inspector per site. We have also revised our regulatory strategy to reflect the differences between generating and defuelling stations, ensuring a proportionate approach.

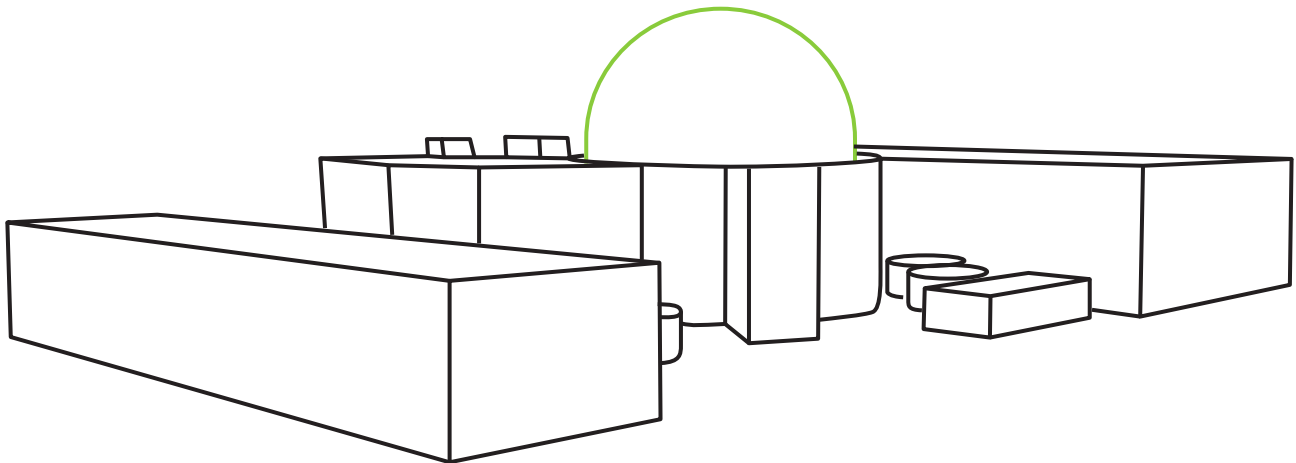
Sizewell B

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.27 EDF NGL plans to confirm the feasibility of a life extension at Sizewell B beyond its original design life of 40 years, moving from 2035 to at least 2055 (a 60-year operational life). It has initiated a programme of work to examine all significant safety, technical and commercial issues. We are engaging with EDF NGL on the feasibility of life extension, but a robust safety case and security plan will need to be in place to allow continued operation.

2.28 Cracking on the core barrel was discovered at a US nuclear power plant which has a similar design to Sizewell B. EDF NGL has considered this in relation to Sizewell B and will carry out additional inspections at the re-fuelling outage in November 2024; we will monitor the results.



Magnox Ltd

Magnox Corporate

Regulatory attention levels

Safety	N/A
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.29 Magnox Corporate now consists of 13 licensed sites, as Dounreay has transferred its license to Magnox. During the reporting period, we have been working with Magnox to enable the transfer of EDF AGR sites to Magnox once they have been defueled. The first two AGRs (Hunterston B and Hinkley Point B) are expected to transfer in 2026.

2.30 Major dismantling projects are in preparation across several sites. The principal hazard reduction activity on most sites remains the retrieval and packaging of intermediate level waste (ILW) into modern storage facilities, pending long-term disposal routes becoming available.

2.31 We have engaged with Magnox as it defines its longer term plans and decommissioning strategy, recognising uncertainties regarding future funding. We are working with Magnox to ensure robust risk profiling information is available across each of its sites so we can be assured funding is allocated appropriately. As part of these engagements we have ensured that there is appropriate focus on maintaining assets and progressing decommissioning, which will ensure

site safety and meet our regulatory expectations.

2.32 Magnox has started security preparations for receiving the EDF AGRs once they are declared fuel free. We are working with Magnox to achieve proportionate security outcomes at its sites, in line with regulatory expectations. All Magnox sites will have transitioned to SyAPs-aligned plans in 2024.

2.33 We will be monitoring Magnox's safeguards performance in terms of the transition and associated resource and training as part of the coming year's activities. Magnox is also addressing shortfalls identified in the ATOM accountancy system as part of ongoing RIs. Despite challenges in delivery of these RIs, we maintain a productive relationship with Magnox as they work towards addressing these shortfalls by the end of this year.

Berkeley

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Enhanced
Nuclear Safeguards	Routine

2.34 Although Berkeley remains at an enhanced attention level for civil nuclear security, it now has an approved SyAPs-aligned security plan and an action plan aimed at addressing identified security shortfalls is now being delivered by the dutyholder. Significant

improvements have already taken place at the site and a return to a routine level of attention is expected by quarter 3 of 2024. We will monitor progress on the site during 2024/25 to gain assurance that further improvements remain on schedule.

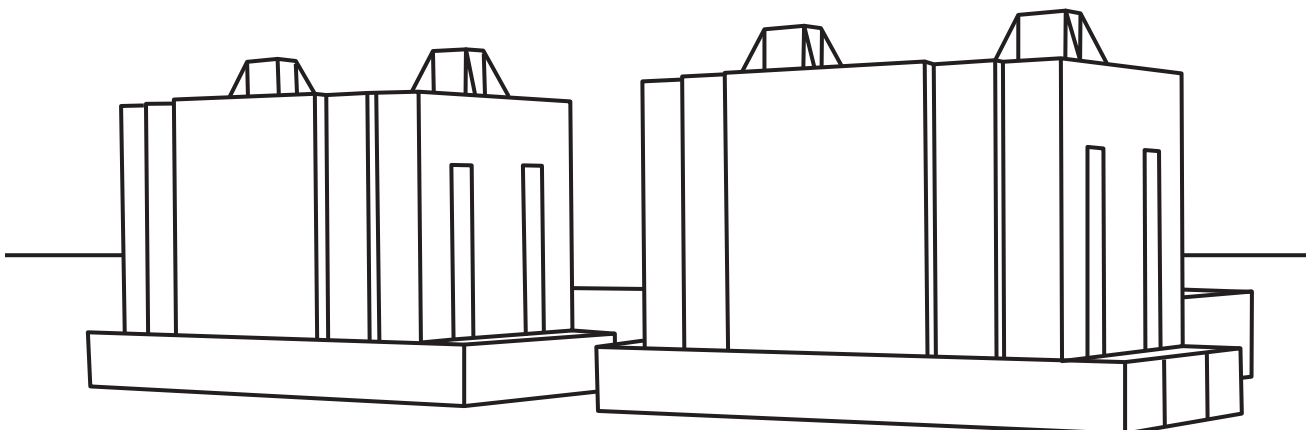
Trawsfynydd

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.35 Trawsfynydd is a low hazard site which is safely progressing through decommissioning. The agreed strategy for decommissioning the old Magnox reactor sites remains

a rolling programme beginning with Trawsfynydd, which is the lead site for early dismantling. The final decision on other sites will be taken on a site-by-site basis.



Dungeness A

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.36 At Dungeness A, our inspectors are regulating the preparatory work required for safe demolition of the boiler annexes, as well as regulating the application of CDM 2015, to ensure health and safety is fully considered in the design phase of the main demolition project.

2.37 We have recognised the NSHS/ construction risk profile of this project and have appointed a NSHS specialist inspector to oversee this work.

Dounreay

Regulatory attention levels

Safety	Enhanced
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.38 Dounreay has made progress with its decommissioning programmes. In 2021, the Nuclear Decommissioning Authority (NDA) announced plans to transfer management of the Dounreay site to Magnox Ltd. Having assessed the application and inspected Magnox Ltd's proposed arrangements, we revoked the nuclear site licence for Dounreay Site Restoration Limited (DSRL) on 1 April 2023 and issued a new nuclear site licence to Magnox Ltd for the Dounreay nuclear site.

2.39 In October 2023, Magnox Ltd Dounreay rebranded to Nuclear Restoration Services – Dounreay

Division. In January 2024, the NDA and MoD announced plans to transfer Vulcan Naval Reactor Test Establishment (NRTE) to Magnox for decommissioning and intend to create a single site in 2027. Combining the Vulcan site with the adjacent Dounreay site will be the focus of future regulatory activity, working with the MoD, NDA and NWS to ensure this is achieved successfully.

2.40 We have focused our regulation on Dounreay's plans to decommission the site and its ability to maintain its facilities, waste processing, and organisational capability to deliver its decommissioning activities safely

and securely. We have engaged with Dounreay as it developed its new lifetime plan and organisational structure to ensure appropriate focus on maintaining the assets and progressing remediation, which will ensure it keeps the site safe and meets our regulatory expectations.

2.41 Dounreay implemented the organisational structure on 1 April 2024, which will be a focus of our regulation for the next financial year. The revised lifetime plan identifies a longer period for the site to reach its interim end state, and as such, Dounreay will have to maintain its buildings and services for longer than previously intended. As some of these buildings and services are near the end of their design life, we will require several improvements to reach the site's revised end dates. This is an important area of focus for both the site and the regulators (ONR and SEPA).

2.42 Degrading assets highlight the importance of adequate planning for the whole life cycle of nuclear facilities, including asset management, timely clean-out, decommissioning and dismantling. We will be working to ensure that current legacy facilities have adequate investment and appropriate plans to maintain the assets in a safe condition and allow timely decommissioning and dismantling.

2.43 In May 2023, we issued an enforcement letter requiring improvements to how Dounreay stores sodium metal in the

Prototype Fast Reactor (PFR) complex. Dounreay's progress was unsatisfactory and in February 2024 we issued an improvement notice requiring this to be complied with by mid-2025. Dounreay has progressed implementing improvements to the current storage arrangements and has committed to building a new sodium store. We will continue to monitor its progress closely until the sodium storage arrangements are compliant with legislative requirements.

2.44 Through our inspections and interactions on site we have monitored Dounreay's arrangements for managing NSHS. We also influenced improvements to Dounreay's arrangements for complying with CDM 2015, enhancing the safety of Dounreay's enabling works, construction and ongoing decommissioning projects on the site.

2.45 In December 2023, Dounreay submitted its notification that it will become a COMAH lower tier site in 2024, when it transitions the site boilers to kerosene from heavy fuel oil. A focus of our regulation this year has been on ensuring Dounreay updates its health and safety management arrangements to align with the current status of the site and its progress through a changing hazard profile during decommissioning.

2.46 In March 2024, Dounreay discovered water had accumulated in the Prototype Fast Reactor (PFR) Surge Tank Pit and upon sampling

determined the water to have elevated levels of tritium. While the levels are elevated, they remain low and we do not consider they pose a risk to workers or the public. Dounreay is currently investigating the source of the tritium. We will monitor this via routine site engagements.

2.47 Based on the scale of the organisational changes, the improvement notice for sodium storage, the degraded asset conditions, and management of non-nuclear high hazard activities, we have moved Dounreay into enhanced regulatory attention from a safety perspective for the 2024/25 financial year.

2.48 Dounreay’s security performance is adequate and the security

directorate continues to be sufficiently staffed and supported at the executive level. It also performs adequately in terms of cyber security and information assurance.

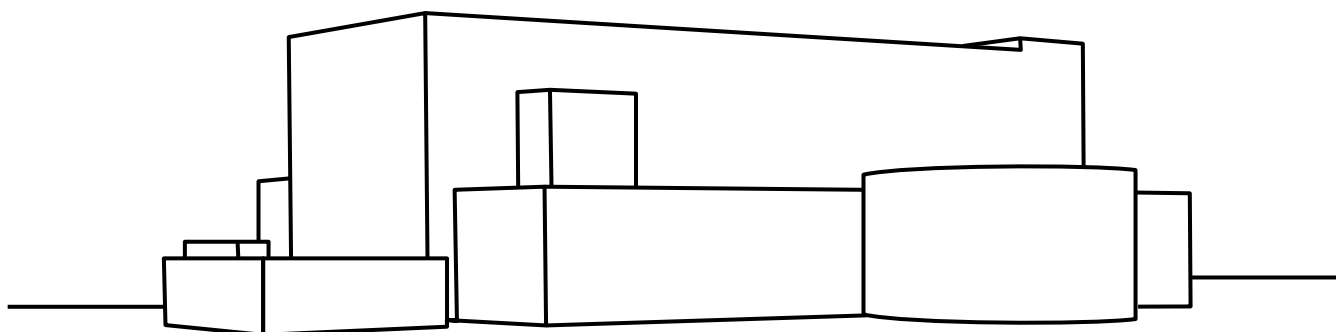
2.49 Dounreay’s safeguards performance has been satisfactory. We have been engaging with Dounreay about availability of a sufficient number of trained and experienced staff with appropriate succession planning in place. This area has notably improved during the reporting period. We have also sought assurance on the plans for upgrading to the nuclear material accountancy system, which has experienced delays. These upgrades are necessary to ensure appropriate resilience of the system.

Winfrith

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

2.50 Winfrith is preparing its first SyAPs-aligned security plan.



NNB Generation Company (HPC) Ltd (NNB GenCo (HPC))

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine

Hinkley Point C (HPC)

2.51 The HPC project has progressed significantly over the reporting period and is moving beyond the civil construction phase into significant installation. In parallel, attention is on commissioning and pre-operations, and our regulatory focus is targeted on site health and safety, and construction quality to deliver nuclear safety and preparedness for future operations.

2.52 Notwithstanding the ongoing investigations and enforcement action, noting the improvements made by NNB GenCo, we consider routine regulatory attention to be appropriate for the site. It is important to note that for HPC, routine regulatory attention is a significant level of engagement and oversight relative to more steady state nuclear sites, given the nature of the activity.

Nuclear site health and safety at HPC

2.53 There are around 12,000 workers on the HPC site. The industrial safety record of the site is largely consistent with other large-scale construction projects. We have ensured the licensee maximises learning and improvement from specific events, and we have seen an improvement in reporting culture and learning outcomes.

We served four enforcement notices and issued two enforcement letters in the reporting period. The notices were served on NNB GenCo, as principal contractor, on Bylor Joint Venture’s members (Bouygues Travaux Publics SAS and Laing

O’Rourke Construction Limited) and on REEL as a contractor working on the site. All the notices and enforcement letters were issued in relation to fire safety (under the Regulatory Reform (Fire Safety) Order 2005) and were in relation to breaches identified during routine inspections.

2.54 There are two formal investigations in progress relating to NSHS events, including into the work-related death that occurred in November 2022. We are unable to include further details here in order to not prejudice those inquiries.

2.55 Our focus following the more significant events has influenced the implementation of improvements in priority areas, including plant, vehicle, and person interfaces. We have also seen improvements in other areas because of our interventions, including lifting, control of contractors, working at height, fire, and occupational health (welding).

2.56 NNB GenCo as the principal contractor is adequately discharging its duties to coordinate and control all its contractors and thereby managing the significant NSHS risks present on such a large and complex site. The licensee has developed a healthy reporting culture ensuring that when events occur, they are investigated and measures are implemented to prevent recurrence.

Nuclear safety at HPC

2.57 Our focus has been on quality assurance and readiness for commissioning, particularly:

- oversight of construction, fabrication, manufacture, and delivery of components;
- permissioning delivery and release of components for the nuclear steam supply system (NSSS) making up the primary circuit;
- assessment of the safety case that will support commissioning activities; and
- learning from other European Pressurised (Water) Reactor (EPR) projects.

2.58 We have carried out supply chain inspections focused on the fabrication and manufacture of components important for nuclear safety that are novel and/or complex, and/or where there has been notable operational experience that we can take learning from.

2.59 NNB GenCo's controls are sufficient in identifying quality deficiencies prior to installation and ensuring components are delivered with adequate documentation.

2.60 We permissioned the release of the steam generators from the factory in France prior to shipment. We previously assessed NNB GenCo's programme of work in response to potential issues associated with records affecting HPC components important to safety, as reported in the previous CNI report (relating to operational experience from Japan Steel Works). Nothing was identified foreclosing shipment of the steam generators.

2.61 We permissioned the lifting of the dome onto the Unit 1 reactor building. To support our decision, we found the evidence provided by NNB GenCo supported its decision to lift the dome and overall that its decision-making process for release of this hold point was clear, rational and robust. Based on our permissioning activity, we judge that NNB GenCo is adequately controlling its readiness to commence specific activities.

2.62 We also completed an assessment of the latest version of HPC's safety case. Our assessment

highlighted areas of good practice but also identified areas requiring further development, particularly associated with the processes and arrangements for controlling commissioning activities, which need resolving ahead of the start of commissioning. NNB GenCo has accepted our findings and is planning improvements.

2.63 We engaged with both NNB GenCo and nuclear regulators in China, Finland, and France to discuss and understand operational experience from the other EPR projects, including the Taishan fuel and core operational

experience. We are satisfied with the progress NNB GenCo has made in considering the implications of the operational experience for HPC.

2.64 NNB GenCo has made good progress in understanding the cause of the fuel rod clad failures in Taishan, and has proposed modifications to the fuel assembly to address the learning that has emerged. We expect to receive the formal submission for the fuel modifications in 2024/25, enabling regulatory scrutiny ahead of the start of manufacture of the fuel assemblies.

Nuclear security at HPC

2.65 HPC has a robust protective security function. Generally, it remains compliant with the arrangements in the approved security plan and supporting documents. The security team strives for continuous improvement, is proactive in addressing issues, and is adept at identifying challenges and implementing mitigations.

2.66 We have identified cyber security and information assurance shortfalls

during the reporting period, principally related to the broader cyber security and information assurance central function within EDF NGL Corporate. EDF has developed a plan to address these shortfalls and we are monitoring progress, which we consider adequate. Development of the dutyholder's security arrangements for future project phases is progressing satisfactorily.

Nuclear safeguards at HPC

2.67 We have provided advice and guidance to NNB GenCo, to ensure adequate arrangements and systems are in place to meet nuclear safeguards regulatory requirements. Although HPC, at present, is not on the safeguards facilities list, there is a need to ensure adequate provision is in place for delivery of

its basic technical characteristics, accountancy and control plan and an adequate nuclear material accountancy system.

Nuclear Waste Services (NWS)

Low Level Waste Repository (LLWR)

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine

2.68 We are overseeing the evolution of NWS as it integrates LLWR, Radioactive Waste Management Ltd and the NDA's Integrated Waste Management Programme into a single organisation. We have no concerns with respect to the integration, but plan to monitor the implementation of organisational changes as they embed during the next year.

2.69 We are also engaging with NWS to ensure the NDA Integrated Waste Management Programme supports

minimisation of the accumulation of radioactive waste and its safe management on all licensed sites.

2.70 We welcome the work conducted by LLWR to collaborate with waste producers to fully utilise their disposal capacity effectively – of note is the use of infill spaces in Vault 8 for the disposal of low-level waste drums from Harwell. We also welcome LLWR's efforts to assist waste producers to ensure the prompt, efficient safe storage, and disposal of low-level waste.

Rolls-Royce Submarines Limited (RRSL), Derby

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	N/A

2.71 Re-development of the Neptune Test Reactor has continued to present RRSL with significant challenges, including the unplanned need to replace adjoining structures due to ageing issues.

2.72 RRSL's programme remains a significant challenge, which has attracted targeted regulatory attention to provide us with assurance its ongoing installation activities are to the expected quality

and safety standards. RRSL continues to be open and transparent with us about its challenges, which has enabled us to permission activities in a timely manner to support its programme.

2.73 While RRSL remains compliant with health and safety duties, regulatory intelligence led us to engage with RRSL regarding potential shortfalls in safety culture in respect of its older facilities. RRSL had already

recognised this matter internally and had implemented significant changes in recent years, which has resulted in notable improvements in both radiological safety and NSHS performance. RRSL's overall total

recordable injury rate is better than average; however, we will continue to monitor events on the licensed sites to remain assured RRSL has embedded these changes into its safety culture in the longer-term.

Sellafield Ltd

Regulatory attention levels

Safety	Significantly enhanced for FGMS, MSSS, PFCS, SNM Facilities and Analytical Services
	Enhanced for remainder of site
Civil Nuclear Security	Significantly Enhanced for cyber security
	Enhanced for physical security
	Routine for security for National Nuclear Laboratory (NNL) (tenant at Sellafield Ltd)
Nuclear Safeguards	Routine for all facilities

2.74 Sellafield Ltd remains a high regulatory priority due to the unique nature of the legacy and ageing facilities on the site. The most hazardous legacy ponds and silos and SNM areas will continue to receive significantly enhanced regulatory attention for nuclear safety reasons for many years to come. Progress with remediation of the highest hazard facilities has continued, but technical difficulties, supply chain issues and equipment reliability challenges have slowed this progress.

2.75 We have brought Analytical Services into significantly enhanced attention due to delays in the Replacement Analytical Project (RAP) and significant uncertainty with the capability of the current ageing facility to service the site

requirements prior to the availability of RAP. Sellafield Ltd has recognised the issues within Analytical Services and has raised the facility's priority to the highest level within the organisation. The licensee is developing a recovery plan, which we will review to gain assurance it is appropriate and we will subsequently monitor progress of its delivery.

2.76 During the past year, there have been several senior management changes at Sellafield Ltd, We have not identified any concerns with these changes but continue to monitor the cumulative impact.

2.77 We continue to hold monthly senior-level engagement meetings with the new Sellafield management team, during which performance and delivery have been focus areas.

We have been encouraged that the new management team recognises there are areas for improvement, and we welcome the commitments to improve delivery, for example, through the development and implementation of underpinned site-wide Key Decommissioning Milestones (KDMs). We will maintain close oversight of Sellafield Ltd's performance and delivery, consistent with enhanced or significantly enhanced regulatory attention.

2.78 There has been noteworthy progress during the reporting year including:

- achieving the capability to commence retrievals from all four of the legacy ponds and silos;
- starting zeolite removals from the FGMSP to the ISF;
- development and implementation of a suite of KDMs across the

site to aid timely remediation of a range of facilities. These are all underpinned by Key Performance Measures (KPM) and Key Performance Indicators (KPI), which we will regulate via Licence Condition (LC) 35²⁰ interventions;

- re-packaging and removal of SNM from legacy storage to a fit-for-purpose storage solution; and
- closure of two Level 1 RIs covering the building condition and storage of SNMs.

2.79 We have ensured safety cases in support of various facilities and activities adequately address the potential hazards. This has allowed the lifting of hold points for active commissioning of BEPPS-DIF, allowing the facility to receive the first box of retrieved waste from PFCS.

Legacy ponds and silos

2.80 Sellafield Ltd has made limited progress with waste and spent fuel retrievals from the legacy ponds and silos due to a combination of technical difficulties, supply chain issues and equipment reliability. That said, retrievals have been achieved across all four legacy ponds and silos (MSSS, PFCS, FGMSP, PFSP) within the reporting year. Good progress has been made in MSSS with the commissioning of a new heat management plant allowing the closure of a Level 2 RI. Exports

of legacy waste to BEPPS-DIF and ISF were also notable achievements within the year.

2.81 In the previous CNI report, we noted that we granted Sellafield Ltd permission to trial the use of divers in PFSP bays 11 and 12. Following successful completion of that trial and implementation of learning, Sellafield Ltd is now planning to undertake further use of divers in PFSP.

2.82 Sellafield Ltd has demonstrated

²⁰ LC 35 is a specific condition of every site licence that requires licensees to have arrangements and programmes for decommissioning. Each licensee is expected to develop a decommissioning strategy for the site and facility specific plans to implement the strategy.

nuclear safety compliance within the legacy ponds and silo facilities during this period. However, in June 2023, we issued an enforcement letter at the FGMSP facility relating to shortfalls against the Management of Health and Safety at Work Regulations 1999 (Regulation 5) and the resulting failure to meet KDM

FGMSP M14: export of first zeolite (or fuel bearing material) skip from the First-Generation Magnox Storage Pond to the Interim Storage Facility. Exports of zeolite skips have now commenced and we continue to engage on progress as part of our regular interactions at site.

Special nuclear material

2.83 Sellafield Ltd has made progress against Level 1 and 2 RIs associated with improvements to, and remediation of, some of its ageing SNM facilities. Sellafield Ltd has provided sufficient evidence with respect to completion of the First-Generation Finishing Line (FGFL) asset improvements (electrical and containment upgrade tasks) within the SNM (North) complex. We have therefore closed the associated Level 1 RI 4931.

2.84 Sellafield Ltd has also continued to make significant progress regarding the previously permissioned activities for inspection, retrieval and repackaging of acute-risk SNM packages. The reduction in risk, and evidence provided, has allowed us to also close the associated Level 1 RI.

2.85 One Level 1 RI remains outstanding for SNM, which relates to the safe and secure storage of ex-Dounreay

material transported to the Sellafield site under the Dounreay Exotics Consolidation Programme, which we continue to engage on. The ongoing construction of the Sellafield Product and Residue Store Retreatment Plant (SRP) is fundamental to the success of the future state programme. It also forms part of continued engagement and influence with Sellafield Ltd to ensure the timely implementation of capabilities required for the safe longer-term storage of SNM inventory consolidated from Dounreay to Sellafield.

2.86 Sellafield Ltd continues to meet all safeguards obligations to allow the IAEA to undertake its regular verification activities within the two plutonium storage facilities. These stores are in the list of selected facilities by the IAEA for regular inspection and surveillance activities.

Other facilities and site-wide matters at Sellafield Ltd

- **High level waste plants:** the Waste Vitrification Plant continues to progress, converting the site's highly active liquor (HAL) stocks into a

stable glass waste form. Although performance has been impacted by ongoing plant ageing and reliability issues in the first half of the year, a

strong second half performance has seen Sellafield Ltd achieve its vitrification targets for the year. HAL stocks at Sellafield Ltd are reducing in terms of both volume and heat load and plans are in place to transfer HAL from the older High Active Storage Tanks on site. While we are content with the progress, we will retain oversight of the HAL stock levels and vitrification performance.

- **Nuclear Site Health and Safety:** performance in this area has been variable during the reporting period and is a key driver for the enhanced attention level. Sellafield Ltd continues to develop and implement a fire life safety improvement plan, is developing an industrial safety improvement plan, and is working towards a better risk profiling of conventional safety issues across site to better prioritise resources. After an increasing trend of NSHS events early in the year, Sellafield Ltd saw a downturn after a number of safety “stand downs”. More recently, events have started to increase; while these are relatively minor, we have reinforced our expectations around NSHS and will continue to maintain a close oversight via enhanced regulatory attention to gain assurance this trend is being addressed.
- **Incidents, investigations, and enforcement:** notwithstanding legal obligations, we have continued to observe an open and positive reporting culture of security, nuclear safety, radiological safety and NSHS events at Sellafield Ltd, which we welcome and strongly encourage.

During the reporting period, investigations have not proceeded beyond preliminary enquiries, and we have issued seven enforcement letters. Sellafield Ltd has addressed, or is continuing to address, these matters.

- **Emergency preparedness and response:** Sellafield Ltd undertook separate nuclear safety and security demonstrations during 2023. The nuclear safety demonstration was rated amber and Sellafield Ltd received an enforcement letter and Level 3 RI, which it is currently addressing. However, we acknowledge the proactive way in which Sellafield Ltd has addressed the findings from the demonstration, and their approach of setting challenging exercise scenarios. The security demonstration was the first to use the new Main Site Command Facility (MSCF) as the primary response location. This followed the granting of a Licence Instrument and the approval of Sellafield Ltd’s LC II arrangements designating the MSCF as the primary response location.
- **Decommissioning and Post-Operational Clean Out (POCO):** inspections have taken place this year across the Sellafield site looking at decommissioning and POCO. We are satisfied with Sellafield Ltd’s planning, transition and progress of decommissioning and POCO. The production of KDMs and supporting indicators has also helped in this regard.
- **Dutyholder compliance in nuclear safety and NSHS at Sellafield Ltd:** we have undertaken planned compliance

inspections against LCs, as well as Ionising Radiations Regulations 2017 (IRR17) and other relevant legislation. We rated approximately 89% of inspections as green, with no formal action required. We rated the remaining 11% as amber (for which we sought improvement), and we rated no inspections red. While the

percentage of green rated inspections is lower than the previous year, this represents a more targeted approach to inspections rather than a direct decline in dutyholder compliance. In this regard, the percentage of amber rated inspections may continue to rise in the coming year.

Security and safeguards performance

2.87 Sellafield Ltd remains subject to significantly enhanced regulatory attention for cyber security and enhanced regulatory attention for protective security. These attention levels are due to complex security risks caused by the unique nature of the hazard at site, shortfalls in dutyholder cyber security arrangements and historic delays in the delivery of physical security programmes.

2.88 Based upon ONR's enforcement action, Sellafield Ltd has completed comprehensive assurance testing of their cyber security arrangements, analysed identified findings and is now in the process of delivering a comprehensive programme to address these shortfalls.

2.89 While there is no evidence that any cyber security shortfalls have been exploited, we announced on 28 March 2024 our intention to prosecute Sellafield Ltd for security non-compliances during a four-year period between 2019 and early 2023.

2.90 In respect of physical security, Sellafield Ltd is delivering an action plan to return to routine regulatory attention. We believe

completion of this action plan by the dutyholder remains achievable and is on schedule for completion by March 2025. However, this work is underpinned by resource constraints of key critical skills, which we will monitor to ensure suitable progress is made.

2.91 Furthermore, of equal importance is the imperative to balance the joint challenges of enforcing security and safety outcomes whilst enabling Sellafield Ltd's High Hazard and Risk Reduction (HHRR) operations.

2.92 In respect of physical security, Sellafield Ltd is delivering an action plan to return to routine regulatory attention. We believe completion of this action plan by the dutyholder remains achievable and is on schedule by the end of 2024/25. However, this work is underpinned by resource constraints of key critical skills, which we will monitor to ensure suitable progress is made.

2.93 Of importance for us is the Level 1 Security Regulator Evaluated Demonstration Exercise planned for November 2024, which is regarded as a critical milestone

for the dutyholder to demonstrate their interim physical security arrangements as we wait for the completion of the Main Sellafield Command Facility project. During the last 12 months all our inspections of Sellafield Ltd relating to physical security have been rated green.

2.94 Overall, safeguards performance at Sellafield Ltd has been satisfactory. Sellafield Ltd continues to submit the required accounting reports in a timely manner and our safeguards activities have provided regulatory confidence in the dutyholder's compliance with the UK's domestic safeguards regulations.

2.95 In the coming year we will be increasing our regulatory attention at the corporate level to seek assurance that appropriate arrangements for resilience of safeguards capability, leadership and governance are in place, as

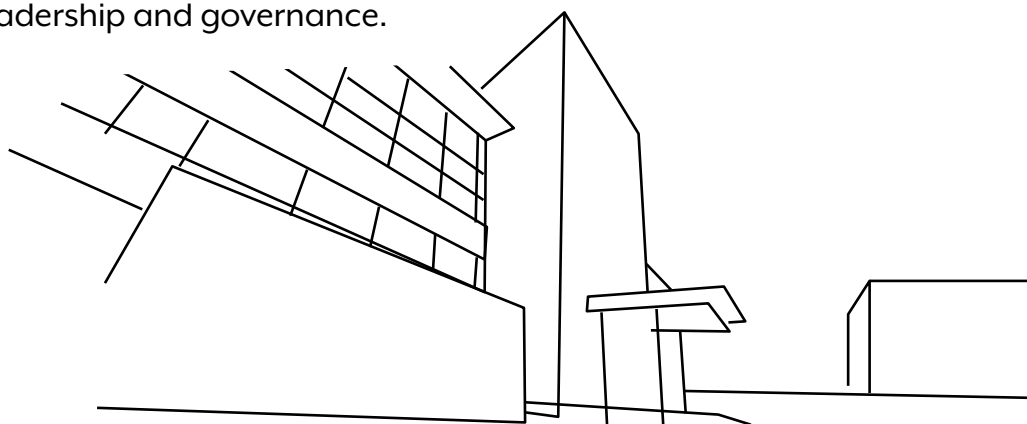
well as addressing ageing and obsolescence issues relating to nuclear material accountancy systems.

2.96 During the reporting period we successfully facilitated inspection activities on the parts of the Sellafield site that the IAEA had selected for the application of its safeguards measures under the [UK/IAEA agreement](#). During the IAEA's annual safeguards implementation review for the UK, the IAEA confirmed it was able to achieve all its objectives satisfactorily at the Sellafield site. We continue to facilitate discussion between the IAEA, Sellafield Ltd and the UK government on the development of new facilities on the Sellafield site that may be selected by the IAEA for the application of their safeguards measures under the UK/IAEA agreement.

Sellafield Ltd site tenants

2.97 NNL Ltd is a tenant on the Sellafield site. Its regulatory attention level for security has decreased from enhanced to routine as the dutyholder has made improvements in cyber security leadership and governance.

We have been reassured by the progress NNL has made and look forward to the dutyholder continuing to enhance its cyber security capability.



Springfields Fuels Limited

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Enhanced (cyber security)
	Routine (protective security)
Nuclear Safeguards	Routine

2.98 Springfields Fuels Ltd produces AGR and Pressurised Water Reactor (PWR) fuels. While the production of AGR fuel has reduced substantially with the eventual phasing out of the fleet, the dutyholder (EDF Energy) is seeking lifetime extensions for some of its AGRs, prolonging the expected lifetime of operations.

2.99 In parallel with maintaining the production of AGR fuel, Springfields Fuels Ltd is developing the production of other types of PWR fuel, while actively pursuing future opportunities for fuel manufacture and business diversification. We are engaging with the dutyholder to ensure it can accommodate new developments and changes without challenging the security and safety of existing operations.

2.100 The overall safety performance of the site remains adequate. We are maintaining close oversight of Springfields Fuel Ltd's response and improvements on site following regulatory enforcements in cyber security and safety.

2.101 Springfields Fuels Ltd has now moved to enhanced regulatory attention for security. This follows a thematic intervention on cyber

security where we identified notable concerns with cyber leadership and governance, as well as the absence of an independent assurance function across these areas. Additionally, we will continue to influence the dutyholder to address shortfalls in SQEP personnel in key security positions and ensure the site's security plan reflects the revised Physical Protection System Outcome, which involves Home Office police force engagement.

2.102 Springfields Fuels Ltd has demonstrated satisfactory performance against domestic safeguards regulations, with good progress against RIs and updating of safeguards documentation. Safeguards regulatory activities are co-ordinated across our statutory purposes to ensure efficient and effective regulation of the site. We have provided regulatory advice and attention to capability to enable the site safeguards team to manage future projects.

Urenco UK Ltd

Regulatory attention levels

Safety	Routine
Civil Nuclear Security	Routine
Nuclear Safeguards	Routine

Capenhurst works

2.103 Capenhurst is undergoing substantial changes in its operation, with a sustained increase in demand and the objective of undertaking important organisation and infrastructure changes to match production to market trend.

2.104 In parallel, work is ongoing to consolidate the NDA legacy material holding through the transfer of legacy cylinders from Springfields Fuels Ltd and the maintenance in a safe and secure storage on site of the existing backlog of legacy cylinders. Urenco is undertaking preparatory work with the aim to eventually process these legacy cylinders through the Tails Management Facility (TMF). The site has taken a conservative approach and responded adequately to regulatory enforcements seeking safety improvements during the reporting period. We will maintain regulatory oversight to ensure the development and changes on site do not challenge existing safe and secure operations.

2.105 The IAEA continues to apply safeguards measures at those parts of the Urenco Capenhurst site selected under the UK/IAEA safeguards agreement. We have successfully facilitated IAEA inspection activities at the site during the reporting period and the IAEA has confirmed all safeguards objectives at the site were satisfactorily met during the period.

2.106 Urenco has demonstrated that implementation of arrangements for nuclear material accountancy and control across all three business areas at the Capenhurst site adequately met our expectations and are broadly in line with the requirements of the Nuclear Safeguards Regulation 2019.

New nuclear reactors

Rolls-Royce SMR GDA

- 2.107 In April 2023, we started the 16-month Step 2 assessment of the Rolls-Royce SMR’s fundamental suitability for deployment in Great Britain. This followed the 12-month Step 1 in 2022, where we mobilised project teams, agreed the scope of the GDA, and identified our risk-informed assessment priorities for Step 2.
- 2.108 The Rolls-Royce SMR design is a 470 MW PWR, which uses mature and well-established technology deployed internationally. Innovation comes in the form of its modular approach to construction, which would see many components built in factory conditions and assembled on site.
- 2.109 We have taken an enabling and pragmatic approach to the assessment of the developing design. Rolls-Royce SMR, as the Requesting Party, has submitted technical reports to enable regulatory assessment to progress in line with the ongoing reactor design development.
- 2.110 Rolls-Royce SMR Ltd is on track to successfully complete Step 2 to the agreed schedule²¹. We will publish

our conclusions on the fundamental adequacy of the design and supporting safety, security and safeguards documentation on our website²². We anticipate moving seamlessly into Step 3, where we will examine the detailed evidence supporting the claims made in the Step 2 submissions.

- 2.111 During Step 2, Rolls-Royce SMR Ltd identified potential export markets for its technology (Poland, Czech Republic, Finland, Sweden and the Netherlands) and regulators from other countries have routinely observed our GDA meetings with the Requesting Party. This is intended to increase their appreciation of the design and allow them to gain confidence in the rigour and relevance of GDA to the benefit of potential future deployment in their countries.

BWRX-300 and SMR-300 GDAs

- 2.112 We started two new GDAs during the reporting period:
- the Holtec SMR-300, in October 2023²³; and
 - the GE-Hitachi BWRX-300, in January 2024.

21 The Rolls-Royce Small Modular Reactor design completed GDA Step 2 on 30 July 2024: <https://www.onr.org.uk/news/all-news/2024/07/rolls-royce-small-modular-reactor-design-completes-second-step-of-regulatory-assessment/>

22 Rolls-Royce SMR information: <https://www.onr.org.uk/generic-design-assessment/assessment-of-reactors/rolls-royce-smr/>

23 Holtec International’s Small Modular Reactor completed the first step of design assessment on 1 August 2024: <https://www.onr.org.uk/news/all-news/2024/08/holtec-international-s-small-modular-reactor-completes-first-step-of-design-assessment/>

2.113 These GDAs are the first ever ‘two-step only GDAs’, for which the output will be:

- a statement of the outcome of our assessment of the fundamental suitability of the design; and
- an indication of our confidence in the potential for the design to be built and operated in GB to acceptable standards of safety and security.

2.114 Both GDAs are seeking to progress to Step 2 during 2024.

Sizewell C (SZC) Ltd

2.115 We have continued to engage and work with SZC Ltd following our assessment of the nuclear site licence (NSL) application in 2022, when we made the decision not to grant a NSL due to two outstanding matters we have previously reported. We commenced formal reassessment of the application in September 2023 (concluding in April 2024), targeting the two outstanding matters; changes in SZC Ltd, which may have had an impact on the previous licensing judgement; and new information relevant to the application.

2.116 SZC Ltd has resolved the two outstanding matters, following its purchase of the freehold of the land announced in late March 2024, and the earlier change to the shareholders’ agreement to put control of key policies relating

to safety and security with the licence applicant, SZC Ltd. The reassessment did not identify any other issues which would prevent a NSL from being issued²⁴.

2.117 In terms of security, SZC Ltd’s performance during this reporting period has been satisfactory. We continue to engage with SZC Ltd on the development of security arrangements to ensure they remain proportionate to the risk profile of the project. There were some initial concerns relating to the limited capacity of the security function, but the situation has improved significantly during the last year. This includes a number of staff joining from the HPC project, who bring valuable learning and experience.

2.118 We identified some shortfalls relating to cyber security and information assurance governance as part of the thematic cyber security intervention programme. These shortfalls reflect the relatively early development of the cyber security and information assurance function and have been acknowledged by senior managers and directors. We are satisfied with SZC Ltd’s response to our findings and its commitment to develop a security improvement plan. We will continue to provide regulatory advice as the project develops and monitor the implementation of security improvements.

24 The NSL was granted in May 2024: <https://www.onr.org.uk/news/all-news/2024/05/onr-grants-nuclear-site-licence-for-sizewell-c/>

Advanced Nuclear Technologies (ANTs)

- 2.119 We have continued to develop our capability and to ensure our readiness to regulate SMRs and AMRs in GB.
- 2.120 We are engaging internationally to support and promote regulatory collaboration to facilitate the safe and secure deployment of SMRs and AMRs. We have supported the regulatory track of the IAEA's Nuclear Harmonisation and Standardisation Initiative, and we are the vice chair of the IAEA's SMR Regulators' Forum.
- 2.121 We have further strengthened direct links with overseas regulators, including CNSC and the US NRC. In March 2023, our organisations signed and published a Memorandum of Cooperation, an important milestone paving the way for us to work together on joint regulatory reviews of SMR and AMR technologies. We see great opportunities for international collaboration to potentially reduce assessment timescales for new designs and improve the efficiency and effectiveness of regulation without compromising our high standards of safety and security. We are actively working with CNSC and US NRC to explore opportunities for collaboration on the assessment of both the BWRX-300 and SMR-300 designs which have recently entered GDA.
- 2.122 We have provided support to DESNZ on development of policy for new nuclear projects, contributed to the '[Civil Nuclear Roadmap to 2050](#)', published in January 2024, and provided advice to DESNZ as it launched consultations on alternative routes to market for new nuclear projects, and for siting of new nuclear power stations. We will continue to provide advice and support to DESNZ as it takes forward the outcomes of these consultations.
- 2.123 We have worked with the Environment Agency (EA) and DESNZ to develop a new framework for early regulatory engagement on new nuclear projects. This framework, launched in March 2024, facilitates access to regulators outside of more formal processes, so organisations can benefit from advice and guidance at an early stage of project development, including the importance of considering whole life cycle planning from the outset of any nuclear project. Early engagement is available to any party proposing to deploy reactor technology in GB, including reactor technology vendors, developers or aspirant licence/permit holders.
- 2.124 We are providing regulatory support to Phase B of the DESNZ AMR Research, Development and Demonstration (RD&D) programme, which aims to demonstrate high-temperature gas-cooled reactor (HTGR) technology by the 2030s, as well as the Coated

Particle Fuel (CPF) programme, which aims to continue developing CPF technology required for AMRs and SMRs. With the EA, we are providing regulatory advice and guidance to two reactor vendors

and one fuel vendor as they develop their designs ahead of entering formal regulatory assessment in potential future project phases.

Other cross-cutting nuclear regulation activities

AGR transfer and transition

2.125 EDF NGL is making good progress with the defuelling of stations that have ceased generation and preparations for the re-licensing of these sites to Magnox Ltd is underway.

2.126 Defuelling of HNB and HPB is being carried out in line with the expected programmes. One reactor at HNB is defuelled and EDF NGL is making progress on the second. HPB is currently defuelling its first of two reactors.

2.127 DNB began defuelling but has experienced some delays. The station is seeking to improve operational performance to achieve the planned defuelling rates.

2.128 There have been no nuclear safety events of concern at these defuelling sites and our engagement strategy continues to be risk-informed and proportionate, seeking safety improvements where necessary.

2.129 Once the stations are declared fuel free, the nuclear sites will be transferred from EDF NGL to Magnox, a subsidiary of the NDA, who will decommission the sites²⁵. EDF and Magnox are developing a joint transition and transfer plan for HNB and HPB, with similar work for the remaining stations to follow when appropriate. We are engaging with both stakeholders to ensure these plans and associated work scopes do not adversely affect safety and that adequate arrangements and resources will be in place to allow us to issue the site licences.

2.130 EDF NGL is controlling changes to its organisational structure and capability at both the stations and corporate centre, in accordance with its LC 36 (management of change) arrangements. We maintain oversight of these plans and, where necessary, will assess and permission changes to confirm EDF NGL maintain adequate resources to ensure safe operations.

²⁵ Once stations cease generation, EDF is responsible for defueling the reactors. Once defuelled, the sites will be licensed to Magnox. This process is called transition and transfer. Transition covers the preparation for the move from defuelling operations to decommissioning, which involves changes to management systems and organisational structure and will mainly be carried out by EDF under existing arrangements. Transfer covers the licensing of the stations to Magnox. To do this, Magnox needs to demonstrate that it has a capable organisation, both corporately and on the sites in question. The transfer is planned to take place 9 months after the sites have been declared fuel free.

2.131 Magnox is preparing its site licence applications for Hunterston B and Hinkley Point B, which will be assessed by our technical experts to confirm it meets the criteria under the Nuclear Installations Act 1965, before we grant a nuclear site licence.

2.132 Operations on the site will then transition from defuelling to decommissioning post-‘Fuel Free Verification’.

Delicensing sites

2.133 We advised DESNZ on the development of the legislative framework for nuclear sites in the final stages of decommissioning and clean-up. Proposals to amend the Nuclear Installations Act 1965 have been included in the Energy Bill.²⁶

2.134 The proposed amendments bring the UK in line with international agreements on ending nuclear third-party liability and will allow us to delicense nuclear sites earlier than at present. The amendment contains applicable conditions in addition to the extant ‘no danger’ criterion defining when nuclear licences can be revoked or varied.

2.135 Work is nearing completion on reviewing and revising our existing relevant policy and guidance to incorporate the amendments and provide clarity on the changes to nuclear site licensees.

Geological Disposal Facility (GDF)

2.136 We continued to support plans for a nuclear site licence for any future GDF by providing technical advice on how it could be included in updates to existing legislation. This has included support and advice on changes to primary legislation, including the Nuclear Installations Act 1965 via the Energy Act 2023, to remove any ambiguity on whether a GDF would be subject to the nuclear licensing regime.

2.137 We continue to provide advice to NWS, the prospective GDF dutyholder, to ensure it understands its responsibilities as a prospective nuclear site licence holder and its ability to discharge these when required. This includes support to the pre-application advice and scrutiny process and ongoing regulatory engagements for a prospective site licence, details of which are published annually in the autumn in a [joint report](#) with EA.

2.138 While we do not have a role in the decision on siting of the GDF, we are supporting the process to ensure the public understands and is confident in how we would regulate such a facility. We continue to scrutinise GDF programme timescales to ensure they are viable.

²⁶ The Bill was given Royal Assent on 26 October 2023, meaning that it is now an Act of Parliament; the Energy Act 2023: <https://commonslibrary.parliament.uk/research-briefings/cbp-9853/>

Radioactive materials transport

2.139 Our approvals programme assesses the adequacy of packages used to transport radioactive materials against international safety regulations. The programme covers packages used by the nuclear industry and a range of other sectors including medical, construction, manufacturing, and research.

2.140 Our transport inspection programme gives us the necessary confidence that dutyholders are compliant with required safety and security standards. Our transport inspection and package approval programmes continue to enable the safe transport of nuclear fuel, radioactive waste and radioactive material. Where dutyholders have failed to meet specified requirements, we have taken proportionate enforcement action to secure compliance.

Influencing improvements

2.141 Responding to regulatory intelligence gained from our transport inspection programme, we have worked with industry groups to improve standards of compliance with IRR17. The Radioactive Materials Transport Users Committee (RAMTUC) has issued new guidance advising dutyholders on how to assess transport accident doses to ensure they comply with transport legislation. We recognise RAMTUC's guidance as relevant good practice, and it is available for use by transport dutyholders.

2.142 We handled more than 100 incidents related to the transport of radioactive materials during the reporting period, ranging from minor documentation errors to road traffic accidents. There were no radiation emergencies. We have been working closely with the Civil Aviation Authority (CAA) to address a number of minor, but repeated, incidents involving packages arriving by air. Our inspectors judged that none of these incidents met the criteria for investigation.

Transport package approvals in the nuclear and non-nuclear sector

2.143 In support of a broad range of domestic and international transport activities throughout the reporting period, we have routinely:

- approved a wide variety of package designs;
- validated international Competent Authority approvals; and
- approved modifications to existing designs.

2.144 These approvals have enabled the safe transport of:

- irradiated fuel from UK nuclear power plants to Sellafield;
- nuclear fuel cycle materials, such as enriched uranium oxide powders, nuclear fuel, and uranium hexafluoride; and
- radioactive material used in the medical sector for patient treatment, and in applications such as radiography and sterilisation.

Collaboration with other bodies

2.145 We are the UK's representative to the IAEA Transport Safety Standard Committee and have been heavily involved in the update of the international regulations for transport of Class 7 material.

2.146 By working closely with other regulators and other government departments, we have improved regulatory consistency for transport of Class 7 dangerous goods. During 2023/24 we have continued to engage with police forces, resulting in an increased number of agency agreements, with the aim of securing these with all GB police forces. Agency agreements permit the relevant police forces to take roadside enforcement action on our behalf against vehicles carrying Class 7 goods.

2.147 We participated in three unannounced roadside stop campaigns in conjunction with the Driver and Vehicle Standards Agency (DVSA), the police's national radiological and nuclear (RN) team and regional police forces.

2.148 To drive improved compliance, we have continued to work with industry groups and professional bodies to increase dutyholders' awareness of transport legislation and associated ONR guidance across the nuclear and non-nuclear sectors. During the reporting period, this has included:

- attending national and international meetings with stakeholder groups and professional bodies;
- issuing a 'transport guidance leaflet' in conjunction with the Society for Radiological Protection (SRP)'s non-nuclear industry committee;
- presenting at an SRP 'transport learning from experience' event in relation to our most common findings from transport compliance inspections and dutyholders' experiences of our transport inspections;
- issuing an ONR explanatory leaflet 'When a transport inspector calls'; and
- publishing an article on the transport of Class 7 dangerous goods in a sector-specific publication.

Nuclear site health and safety

2.149 During the reporting period we continued our investigations into the work-related deaths at HPC in 2022 and AWE Aldermaston in 2023. Avon and Somerset Police passed the primacy for the investigation

at HPC to ONR in November 2023²⁷. We do not include further details on these ongoing investigations in order to avoid prejudicing the inquiries.

2.150 We also completed our investigation into the events leading to a

27 In the case of AWE Aldermaston, primacy over the investigation transferred from Thames Valley Police to ONR in May 2024 (outside of this reporting period), when material evidence was handed over and appropriate handover documentation officially completed. We continue to pursue lines of inquiry.

scaffolder employed by Kaefer Limited at DRDL falling through an unprotected hole on a Royal Navy warship and sustaining serious injuries. Our investigation uncovered multiple failures by DRDL and Kaefer Limited, including failure to learn from an earlier incident in the same location. We prosecuted both organisations; each pleaded guilty and were fined a total of £896,660 at Plymouth Magistrates Court in March 2023.

2.151 In 2023/24, we continued to see an increase in the number of RIDDOR reports (combining data on dangerous occurrences and injuries) when compared with 2022/23 and pre-pandemic levels. While the small dataset of RIDDOR incidents reportable to ONR, when compared with HSE, does not allow for statistical trending per type, year on year, it is important to note the overall increase is statistically significant. Further information is available in Annex 2.

2.152 Analysis of the 2022/23 sector reports and our inquiries shows approximately 20% of incidents had potential for more serious consequences to individuals on site, and this proportion was sustained into 2023/24. Injury reports with potential for more serious consequences to individuals were due to equipment striking or trapping the injured person, often involving lifting equipment. Falls from height and workplace transport accidents were also

dominant across the events with more serious consequences. Dangerous occurrences involved lifting activities, health hazards (asbestos, chemicals, or ionising radiation) and high voltage electric equipment.

2.153 Injury reports and estimated workforce numbers at sites in 2023/24 show the GB nuclear industry injury rate is numerically slightly below the UK overall average, although the difference is not statistically significant. This is due to the considerably smaller nuclear industry dataset, and the calculation assumptions made. It suggests that performance of the industry is comparable with the national average and does not offer a nuclear industry ‘performance delta’, echoing findings from the ‘Discovering Safety’ project published in the 2021 CNI report²⁸.

2.154 Following integration of NSHS incident data, including the management of RIDDOR incidents into our information management systems in 2022, we progressed the next stage of planned enhancements to the RIDDOR notification process. This culminated in the launch of our online platform, known as the ‘dutyholder portal’, for dutyholders to submit NSHS incident notifications to us directly. We preceded the launch with significant stakeholder engagement and consultation, which, in turn, informed the development and issue of enhanced guidance to

28 <https://www.onr.org.uk/media/01cjwcr0/cni-annual-report-2021.pdf>, page 106

increase awareness of reporting requirements. We retain effective cooperation and dialogue with HSE to ensure capture of any reports received in error via former routes.

- 2.155 It is important to emphasise that RIDDOR reports are lagging indicators offering insights on past events, while missing insights from wider lagging indicators such as near misses, which did not result in injuries or fatalities but had the potential to do so. We expect dutyholders to record, investigate and learn from these wider data, and to identify and address root causes to prevent future occurrences. As we investigated RIDDOR incidents and undertook proactive interventions informed by lagging data, we identified and took enforcement action, including issuing Improvement Notices in areas such as dropped loads during lifting operations, and electrical safety. In both areas, dutyholders complied with the notices by strengthening their safe system of work arrangements relating to the operations.
- 2.156 Crucially, for improvements to be sustained, selection and implementation of leading indicators of health and safety performance, informed by sites' risk profiles, are vital steps towards driving systemic and targeted preventative action.
- 2.157 We have led engagement with industry leaders via the SDF and the Nuclear Industry Association (NIA). We welcomed SDF's recognition that

risk profiling approaches across the sector can be biased towards nuclear safety and does not always adequately capture NSHS risks, leading to insufficient planning, resourcing, and leadership focus in some areas. We also welcomed recognition of the importance of selecting and monitoring performance indicators to drive sector-wide information sharing and learning.

- 2.158 We look forward to seeing collaboration and progress in industry's risk profiling, performance benchmarking and adoption of innovation, to address shortfalls in the planning, co-ordination, co-operation and monitoring of performance at safety management systems levels. This is essential so prioritisation of resources ensures systemic and sustained improvements across all dominant hazards and risks. We will continue to engage with the SDF and cross-industry to ensure good practices are achieved, shared and widely adopted.
- 2.159 Increased awareness and capability across the nuclear industry, including licensees, on effective discharge of responsibilities under CDM 2015 is of paramount importance. In the year ahead, we will conduct targeted interventions to sample organisational arrangements and intelligent customer capability of organisations discharging client, principal designer, and principal contractor roles.

2.160 With multiple GDA projects ongoing, designers' awareness of CDM 2015 duties remains vital. This is to ensure future installations, including new reactors, are designed, constructed, operated, and decommissioned in compliance with the principles of prevention, consistently throughout their life cycle, and this is inclusive of construction, use and maintenance.

Fire safety

2.161 During 2023/24 we continued our programme of risk-informed, intelligence-led fire safety inspections across licensed sites to seek confidence of the industry's management of fire risks. Given the evolution of the risk profiles across the nuclear industry, we placed focus on dutyholders' control of fire risks in construction and decommissioning activities, including compliance with CDM 2015 duties. We also targeted the maintenance arrangements and status of fire safety systems, including the management of ageing and obsolescence across GB licensed sites.

2.162 Overall, we concluded that GB licensed sites are broadly compliant with the Regulatory Reform (Fire Safety) Order 2005 and the Fire (Scotland) Act 2005. However, we took enforcement action on shortfalls in the provision and maintenance of fire safety measures derived from fire safety strategies and risk assessments at several licensed sites. This emphasises the importance of

proactive management of ageing and obsolescence of fire safety measures, including fire detection and alarm systems.

2.163 We also took formal enforcement action where we identified significant compliance shortfalls. These included enforcement notices on the principal contractor and subcontractors following significant failures in duties to plan, co-operate and co-ordinate between responsible persons to provide adequate fire safety provisions at the HPC site.

2.164 During 2023/24, we continued to co-ordinate the UK's involvement in the European Nuclear Safety Regulators Group (ENSREG) Topical Peer Review (TPR) 2 exercise, which covers fire protection in nuclear installations. TPRs are an instrument of the European Union (EU)'s revised Nuclear Safety Directive for member states to undertake national assessments every six years on a specific nuclear safety topic selected by ENSREG, followed by a peer review by other member states. Following departure from the EU, the UK is now an observer at ENSREG and decided to voluntarily take part in TPR 2.

2.165 The first phase of TPR 2 concluded in October 2023 with the publication of National Assessment Reports (NAR). The UK NAR²⁹ included input from GB licensees spanning nuclear reactor sites in construction, operation, and decommissioning, as well as spent

29 https://www.ensreg.eu/country-specific-reports/other-countries-tpr2/United_Kingdom

fuel and waste storage facilities, enrichment plants and reprocessing plants.

2.166 The NAR includes a description from each participant licensee of how they assess fire safety and implement fire protection, followed by our regulatory assessment, which references both UK and international standards. Our assessment concluded that the UK installations included in TPR 2 have appropriate fire safety analysis and fire protection arrangements commensurate with their radiological risks from fire and the potential for fire to impact nuclear safety systems, taking into consideration the stage each installation had reached within its life cycle.

2.167 Nevertheless, we identified potential areas for improvement, namely implementing methodologies for systematic analysis of hazard combinations, and enhancing the links between management of fire loading for life protection and nuclear safety in facilities undergoing decommissioning. Insights from life fire safety regulation emphasised the importance of proactively addressing fire detection and alarm system obsolescence and fire damper maintainability.

2.168 We have taken action requiring the licensees to implement improvements and have continued to contribute to the TPR 2 peer review phase by assessing reports from other participant countries.

The peer review workshops will take place in September 2024, and this phase is expected to culminate with the ENSREG Topical Peer Review Board's EU and National Action Plans, which will be produced in 2024/25.

Control of Major Accident Hazards (COMAH)

2.169 We enforce the COMAH Regulations 2015 across three Upper Tier COMAH sites and 11 Lower Tier sites, working in partnership with the EA and SEPA.

2.170 We have continued to deliver our programme of COMAH interventions according to the sites' risk profiles and regulatory intelligence, focusing on sites where shortfalls had been identified or where changes in operations should attract additional planning, resource, and managerial controls from dutyholders.

2.171 We continue to assess and engage with sites on COMAH notifications associated with changes in their undertakings. For example, Regulation 6 notifications from reduced inventories linked to defuelling and decommissioning operations ongoing across the EDF NGL fleet and new entries into Lower Tier COMAH status, such as is the case for Dounreay.

2.172 We have seen improvements in the quality and maturity of safety report submissions received in 2023/24, and we have confirmed compliance with COMAH 2015 regulations, where sampled. Dutyholders responded adequately where we raised actions and RIs following inspections.

We continue to engage with site and local authority emergency planning teams in relation to COMAH off-site emergency plans.

2.173 Finally, we continue to manage information and administrative requirements under COMAH Regulation 6 (notification) and Regulation 17 (provision of

information to the public). We are seeking regular updates to entries within the COMAH public information database relating to nuclear licensed sites, including information relating to recent notifications, such as changes to dangerous substance inventories.

Emergency Preparedness and Response (EP&R)

2.174 This reporting period has seen continued engagement with government and local authorities to address national guidance concerning emergency preparedness and response arrangements raised in last year's report. A plan to update the National Nuclear Emergency Planning and Response Guidance (NNEPRG) has been agreed with DESNZ and other parties, with the first element of this work to begin in 2024/25. Work to revise and update the remaining sections of the guidance material will continue in 2024/25. Following publication of the revised NNEPRG, we will work with government to establish a national level exercise that provides a suitable test of the UK's preparedness for a national nuclear emergency.

2.175 This period also included an IAEA IRRS follow-up mission in early 2024 to address matters identified during the detailed 2019 IRRS mission to the UK. The follow-up mission allowed closure of two suggestions raised during the 2019 mission related to the development and delivery of our emergency response arrangements

and the exchange of pre-defined technical data between dutyholders and ONR.

2.176 During the reporting period, DESNZ undertook a mandated five-year post implementation review (PIR) of the Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPiR 19). DESNZ has engaged with stakeholders to ascertain the effectiveness of the regulations. Initial feedback from the responses is that the regulations support the government policy intent to ensure commensurate and proportionate emergency preparedness and response for the full range of nuclear and radiological emergencies. The review has identified areas where changes would be beneficial, however, such as the requirements around determination of detailed emergency planning zones and the provisions for setting outline planning zones. We will be working with partners to ensure that the associated Approved Code of Practice (ACOP) and guidance is updated.

2.177 Work with the respective local authorities responsible for maintaining REPPiR emergency plans has continued throughout the period. This has included three Level 2 exercises to test the relevant local authority off-site emergency arrangements. These have identified challenges in addressing some of the unique aspects of a nuclear emergency event.

2.178 We continue to provide oversight of work by dutyholders and local authorities who have responsibilities in relation to the setting of detailed emergency planning zones. One of our key objectives is to ensure that these continue to meet national and international expectations. We continue to work with government and all stakeholders to ensure a consistent and proportionate approach is maintained.

2.179 Throughout the period, we have continued to provide specialist information and advice to government related to the situation affecting nuclear facilities in Ukraine as a consequence of military action. We have maintained contact with IAEA and other agencies to analyse and assess reports related to these facilities. This has enabled us to provide advice regarding the impact of the conflict on the safety of nuclear facilities in Ukraine.

2.180 During the last year, we have experienced a rise in land use planning consultations, with challenges made by developers to decisions regarding developments within certain emergency planning zones. Generally, these have been non-contentious. However, the outcome of one formal planning inquiry has been the subject of a statutory appeal and the process is likely to continue throughout 2024. We also continue to support DESNZ in the development of a revised national policy statement (NPS) covering the siting of new locations for future nuclear power stations, due to be published in 2025.

2.181 Looking ahead, 2024/25 has a full programme with seven Level 2 (local authority led) emergency exercises forecast, two of which will involve national and devolved governments. This offers the opportunity to test our wider emergency response arrangements, with an associated programme of internal training and exercising to support our delivery.

2.182 We continue to work with government and other agencies to improve the awareness and utility of associated projects, including Joint Agency Modelling (JAM) and the Radiological Response Emergency Management System (RREMS).

Vendor (supplier) inspections

2.183 We undertake an annual vendor inspection programme that considers the adequacy of licensee and vendor supply chain

management arrangements. The programme targets areas of risk and influences improvement across the GB nuclear industry. It includes

suppliers who provide safety-related products or services, or support multiple licensees in the civil nuclear operations, decommissioning and new build sectors. We conducted 14 vendor inspections during the period, 10 of which were rated green (No Formal Action) and four were rated amber (Seek Improvement).

- 2.184 The shortfalls associated with amber-rated inspections related to arrangements for supply chain management, record management and CFSI risk mitigation. The records management shortfalls were associated with ineffective completion of manufactured product certification and inspection and test plans.
- 2.185 The deficiencies were indicative of process control and cultural weaknesses and will be the subject of regulatory focus during future intervention activity to ensure our activities remain risk informed and targeted. Where identified, we took action to ensure prompt and proportionate improvement.
- 2.186 The green-rated inspections included examples of good practice, such as effective arrangements to mitigate the risks of CFSI, promulgation of learning, reinforcement of good practice in record management, and enhancements in nuclear safety culture.
- 2.187 Regulatory intelligence and operating experience from national and international activity

continues to inform our approach. The international nuclear sector continues to detect CFSI events. While many incidents relate to the nuclear sector outside GB, in some cases they involve suppliers providing products and services in the GB nuclear supply chain. This reinforces the importance of maintaining a regulatory, and therefore industry, focus on the risks. We will therefore continue to influence licensees and dutyholders to establish effective risk mitigation arrangements and maintain its vigilance. This area will continue to be a focus of our supply chain regulatory activity.

- 2.188 To ensure cross-sector learning, we have provided feedback on the key outcomes of our inspections through routine licensee engagements. We also shared the information collectively with the industry through the SDF Supply Chain Quality Working Group, and key suppliers via the NIA Quality Working Group.
- 2.189 We also co-operate and share experience with other national nuclear regulators through the Committee on Nuclear Regulatory Activities (CNRA), Working Group on Supply Chain Regulation (WGSUP). Membership of this international regulatory group enables us to collaborate with other national nuclear regulators and consider areas of emerging risk related to international nuclear industry supply chains.

Overview of performance summary

While the overall performance of the industry remained adequate, this report highlights where further or sustained improvements are necessary, as well as those areas where there have been shortfalls, where further effort and strategic oversight across the industry will remain a priority.

Operating Facilities

- We have made full use of our existing regulatory tools and processes to adopt an enabling stance towards EDF's ambitions to extend the life of the fleet of AGRs and the long-term operational feasibility of Sizewell B. We have provided robust challenge to EDF's plans where safety could be adversely affected, resulting in improvements to safety submissions. We have been working closely across regulatory purposes to explore innovative solutions to regulate reactor stations post fuel-free verification.
- We engaged extensively with EDF regarding the challenges posed by climate change. This has resulted in several plant enhancements across the fleet and more robust safety justifications, and we continue to support EDF and provide regulatory advice to influence improvements in EDF's arrangements, from organisational capability to demonstration of compliance with LCs.
- We have used a range of influencing tools, including formal enforcement action, to require EDF improve its cyber security arrangements. This has resulted in EDF developing a cyber transformation programme that includes implementing stronger technical controls on their network holding sensitive nuclear information; the rollout of greater protection to station demilitarised zones through more secure architecture; and enhanced governance and assurance processes to ensure the improvements are enduring.
- At AWE we continued with our enabling regulatory approach, to understand its culture, how we can influence positive change and providing training to the executive team on licensee obligations. AWE responded positively by showing steady improvement during the reporting period and operating more effectively as an autonomous licensee. At Devonport, our focus on seeking improvements in leadership and management for safety, and our provision of training on regulatory framework and licensee obligations resulted in a positive response from the DRDL executive team that met our expectations. At Barrow, we increased focus on NSHS. BAE Systems revised its strategic approach to managing health and safety and has put in place programmes of work to improve safety performance.

New Reactors

- At HPC, we have focused our attention on current risks and hazards and on the development of an adequate safety case to ensure nuclear safety in the future. We have continued to engage on key technical areas of risk and the associated implications on development of the safety case, as well as monitoring civil construction activities and the safe transition into mechanical equipment installation and commissioning arrangements.
- We took formal enforcement action to influence significant improvements in fire safety arrangements at the HPC site. Where appropriate, we have used a flexible permissioning approach to ensure suitable regulatory control, allowing the licensee to progress construction activities while reducing regulatory burden. Overall, we are content that the licensee has implemented a healthy reporting culture and responds proactively when shortfalls are identified.
- Our proportionate and targeted regulatory assessment enabled SZC to acquire a nuclear site licence in May 2024. We continue to work closely with the site to maintain targeted and proportionate oversight as it moves into construction activity in the coming months.
- Use of the GDA process has facilitated design development, whilst ensuring safety, security and safeguards considerations are taken into account early in the project, enabling it to move into UK construction if that decision is taken by the vendor.
- To ensure that we consider the impact of our regulation, and to incorporate learning for the future, we have been undertaking an assessment of changes to reactor designs resulting from our GDA process and other interventions resulting from our oversight activities. We have already implemented significant learning into the GDA process, shortening our assessment timescales and helping applicants in understanding the requirements. We will share more on our findings in due course.

Sellafield, Decommissioning, Fuel and Waste (SDFW)

- Sellafield is the largest and most complex nuclear facility in the UK, and therefore ensuring that security and safety arrangements are appropriate continues to be a priority for us.
- Across the SDFW sites, we have increased our focus on NSHS. Specifically, we have required both Sellafield Ltd and Magnox to revise their approaches to managing NSHS and to put in place robust programmes of work to improve performance.
- Although cyber security at Sellafield Ltd is currently not meeting the high standards we require, there is no evidence that any identified vulnerabilities or shortfalls have been exploited. Accordingly, we have used a range of influencing tools and formal enforcement that required Sellafield Ltd to improve its cyber security arrangements. This has resulted in Sellafield Ltd developing a cyber security improvement plan that

we are closely monitoring and will ensure that the improvements in this area are sustained. Our commitment to holding Sellafield Ltd to account regarding cyber security shortfalls was demonstrated by our announcement in March 2024 of our intention to prosecute it for alleged cyber security non-compliances.

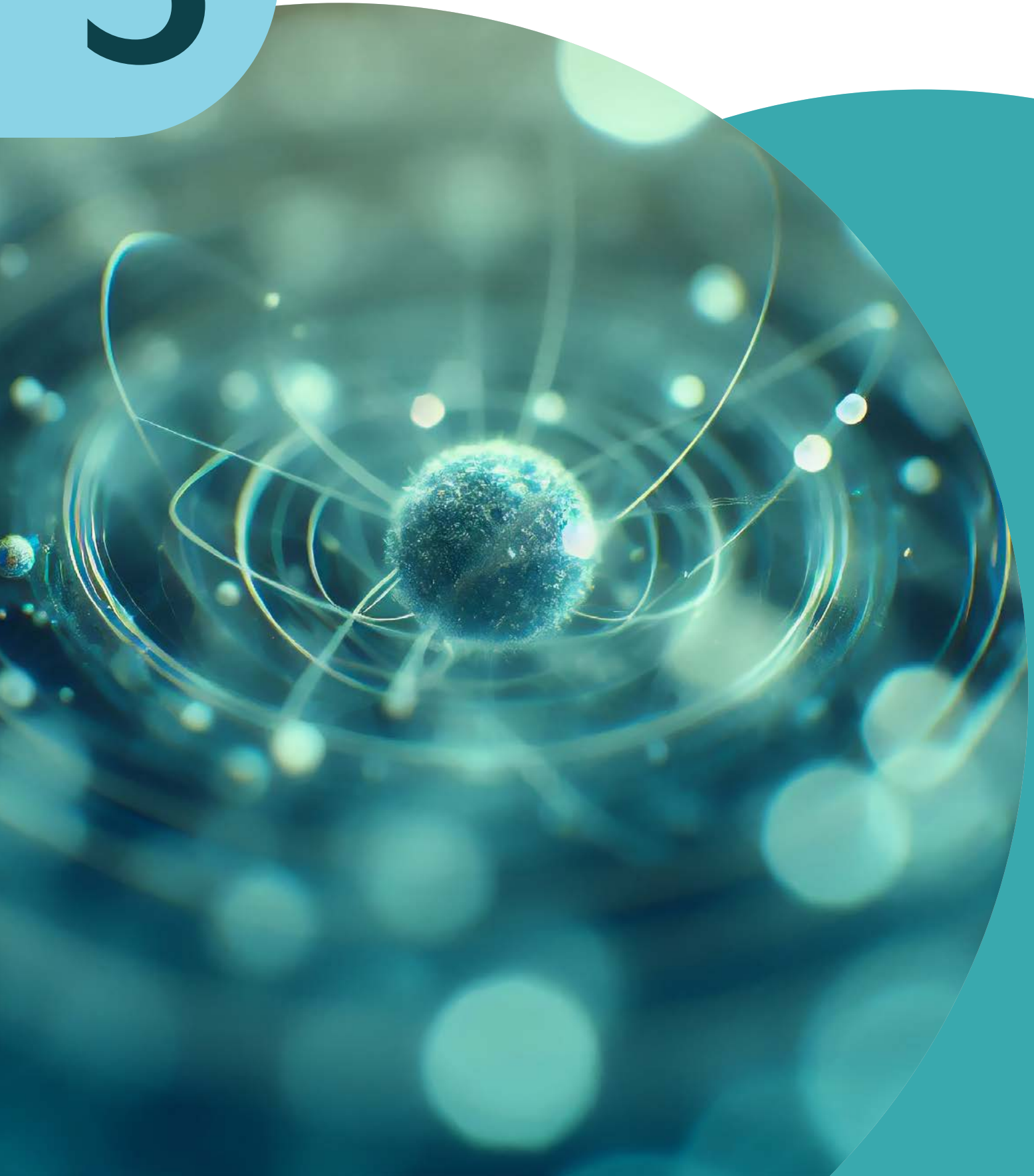
- We have delivered significant permissions of paramount importance to Sellafield Ltd and its ongoing high hazard and risk reduction activities. Our work has also seen the closure of two RIs within the SNM area of the site. However, while we have observed good progress in some areas, Sellafield Ltd has made limited progress overall with waste and spent fuel retrievals from the legacy ponds and silos. Enabling accelerated progress while maintaining consistent safe and secure operations across the site will remain a focus for us.
- We took the decision to place Sellafield Ltd's Analytical Services facility into significantly enhanced attention. We have refocused our regulatory strategy for this area and required the development of an improvement plan to ensure Sellafield Ltd has an appropriate analytical capability to support the site's current and future operations.
- We have continued to ensure the readiness of Magnox to receive the AGR fleet from EDF via a phased programme, following end of generation and fuel-free verification. Our AGR Transition Strategic Oversight programme has been developed to ensure we continue to give consistent and proportionate regulatory oversight of the defueling, decommissioning and licensing workstreams.
- We have been working with Magnox to find efficiencies in their site-wide approach to regulatory compliance, which has already resulted in a more focussed and efficient set of license condition 35 decommissioning milestones, a streamlined approach to emergency arrangements under license condition 11, and a proportionate approach for Magnox to maintain the security measures necessary to achieve required outcomes.
- At Dounreay, our robust enforcement action has resulted in the site repacking its degraded sodium drums and implementing an enhanced inspection and monitoring regime. The site has also repaired the buildings where the drums are currently being stored to prevent rainwater ingress, as a new dedicated sodium storage and disposal facility is developed to address the requirements of the improvement notice.
- We have provided input to the GDF community partnerships, attending stakeholder events on request to provide reassurance to the public on the way a GDF will be regulated for safety and security. We have also required LLWR to review its waste acceptance procedure, which has prompted them to hold beneficial discussions with waste consignors to understand and resolve issues. There has been increased evidence of degrading assets across SDFW

sites, predominantly those within the NDA estate. We will continue to be proactive in ensuring current legacy facilities across the NDA estate have adequate investment to maintain the assets in a safe condition and allow timely decommissioning and dismantling. We will also ensure that learning from past experience of decommissioning, spent fuel and radioactive waste within the UK and internationally are all appropriately considered within new nuclear projects to prevent a repeat of the legacies that are being managed today.

- We have also co-operated and shared experience with other national and international nuclear regulators by chairing the 10th term of the IAEA Waste Safety Standards Committee (WSSC) from January 2021 to January 2024. As Chair of this group we have been able to collaborate with other national nuclear regulators and consider areas of emerging risk related to decommissioning, safe management of radioactive waste and spent fuel. Focus areas have included deep geological disposal facilities, and the importance of good planning, with adequate funding for the whole life cycle of nuclear facilities including decommissioning, clean up and release from regulatory control.

3

CNI themes for 2024/25



- 3.01 The key areas where we expect to see improvements are reflected in the CNI themes for 2024/25. The CNI themes are a combination of internal (to the industry) and external (global) factors that the industry must tackle collectively to sustain the standards we expect, and secure improvements where necessary. We will be focusing our regulatory efforts in these areas and expect to see improvements not only in-year, but into the medium and long term.
- 3.02 For 2024/25, we will remain focussed on NSHS and cyber security. Efforts in these areas are having a positive impact and influencing improvements. However, continued attention is necessary to ensure progress is maintained and longer-term benefits are sustained.
- Strategic approach to nuclear site health and safety**
- 3.03 Sustained attention on NSHS remains essential to drive tangible improvements that protect the health and safety of workers, while the sector's ambitions for new build and decommissioning grow.
- 3.04 We expect sustained focus by leaders, including at Board level, on sites' NSHS performance trends, seeking improvements in risk profiling practices so that health and safety management systems appropriately reduce worker health and safety risks, both in terms of immediate and long-term effects.
- 3.05 We also expect sustained adoption and monitoring of leading indicators of safety performance, for early identification of weaknesses in risk control, and implementation of appropriate preventative action. We will continue to investigate incidents and maintain our focus on the adequacy of dutyholders' own investigations and learning so that root causes of events are routinely identified and tackled systemically.
- 3.06 We also expect greater awareness and effectiveness amongst the industry in the discharge of responsibilities under CDM 2015. We will sample intelligent customer capability, and the adequacy of planning, co-ordination, co-operation and monitoring across the client, designer, and principal contractor roles, from early in design and through the life of construction projects. These interventions and the themes identified above will inform the focus of our next CNI Themed Inspections, which will target NSHS, including fire safety, following attention on climate change in 2024/25.
- 3.07 In 2024/25, we will continue to progress the implementation of the NSHS regulatory vision and strategy launched this year. We will complete our programme for reinforcing our capability and capacity in construction site health and safety, while we progress the roll out of enhanced training programmes and experiential learning on NSHS for all our inspectors.
- 3.08 The strategy's second and third pillars will continue to use regulatory risk profiling to target

interventions and proactive reviews of our guidance. This is to ensure early influencing of dutyholders' compliance arrangements, with timely enforcement action where we see compliance shortfalls.

3.09 In line with the strategy's fourth pillar, we will continue to foster engagement and strategic action from senior leaders across the industry.

Cyber security

3.10 We will continue to promote and encourage our dutyholders to undertake independent and intelligence-led assurance activities to ensure a holistic approach to evidencing the adequacy of arrangements within approved security plans.

3.11 We will maintain our enhanced focus on cyber security throughout the year ahead, to deliver cross-cutting, thematic activities aligned with the

sector-wide cyber security strategy and our own regulatory priorities.

3.12 We will complete our in-depth assessment of risk management and cyber protection capabilities, particularly at sites where the potential consequence is greatest and where interfaces exist between operational and information technology. Furthermore, we will identify how the learning from this work may be applied across a broader range of systems, such as those delivering physical protection outcomes.

3.13 We will complete our thematic interventions targeting leadership and governance across our dutyholders to ensure cyber security remains a strategic and board-level priority. We will use the intelligence gathered to identify broader evidence of positive cultural indicators or warning flags requiring further action.

Regulatory priorities for 2024/25

3.14 As well as securing increased industry effort on the CNI themes (section 3.2), we will be focusing on the following top regulatory priorities that reflect ongoing high-profile programmes in specific regulatory areas, to ensure we can continue to influence proportionate improvement across the nuclear estate.

Risk informed and targeted engagements (RITE)

3.15 In September 2024 we published a new regulatory policy which sets

out a risk-informed approach that we expect our regulatory staff to adopt. This should be evident in our behaviours, culture and decision-making, such that regulation across all our purposes is efficient and yields effective outcomes for safe and secure nuclear operations. In publishing this policy, we are mindful to the dynamic external environment: the industry is growing, competition for resource is increasing, more opportunities are emerging, potentially resulting in a recruitment and retention

challenge at a time when regulatory demand is likely to increase. This means we need to make better use of the regulatory resource we have available.

- 3.16 Central to the approach set out in the policy is a refreshed overarching philosophy on how risk informs our priorities across safety, security, safeguards and radioactive materials transport, complementing our long-established view of risk tolerability described in our Framework for Risk-Informed Regulatory Decision-Making (RIRDM). This policy emphasises the importance of intelligence-led regulation and clear alignment between our regulatory strategies, supporting plans and the individual engagements that our regulatory staff undertake with dutyholders.
- 3.17 As we continue to implement this philosophy into our regulatory arrangements, capability and culture over the next twelve months, we intend to engage extensively with industry to enable us to measure and monitor impact.

Enabling major infrastructure project delivery

- 3.18 We will continue to maintain targeted and proportionate oversight of HPC as the project transitions from civil construction to mechanical equipment installation and commissioning. Similarly, for SZC, we will implement our post site licence regulatory strategy focusing on shorter term construction related risks, as well as longer term nuclear safety considerations.
- Building and maintaining regulatory capacity and capability.**
- 3.19 Maintaining a resilient regulatory capability and capacity, including the niche skills necessary to deliver our mission, remains a key priority. In response to an ageing demographic and an increasingly competitive skills market, we have continued to grow and diversify our talent pipeline. We have strengthened our approach to workforce planning and deployment, rolling out a new digital technology to improve our agility to respond to changing demand arising from new civil and defence nuclear projects.
- 3.20 In January, we launched our new cohort approach to inspector development with emphasis on coaching and mentoring as well as experiential learning. This new programme is designed to enable our new recruits to understand, practice and master the regulatory craft, building confidence and underpinning knowledge, as well as reinforcing proportionality and consistency principles.
- 3.21 Organisational Learning (OL) and Knowledge Management (KM) are key enablers for the organisation to build and maintain resilient capability. Although work has previously been undertaken to enhance ONR's OL and KM capability, ONR recognises the need to keep pace with industry trends and technical advancements.

Over the next 12 months we will review our current OL and KM arrangements against best practice and identify future improvements, including making best use of emerging information technology.

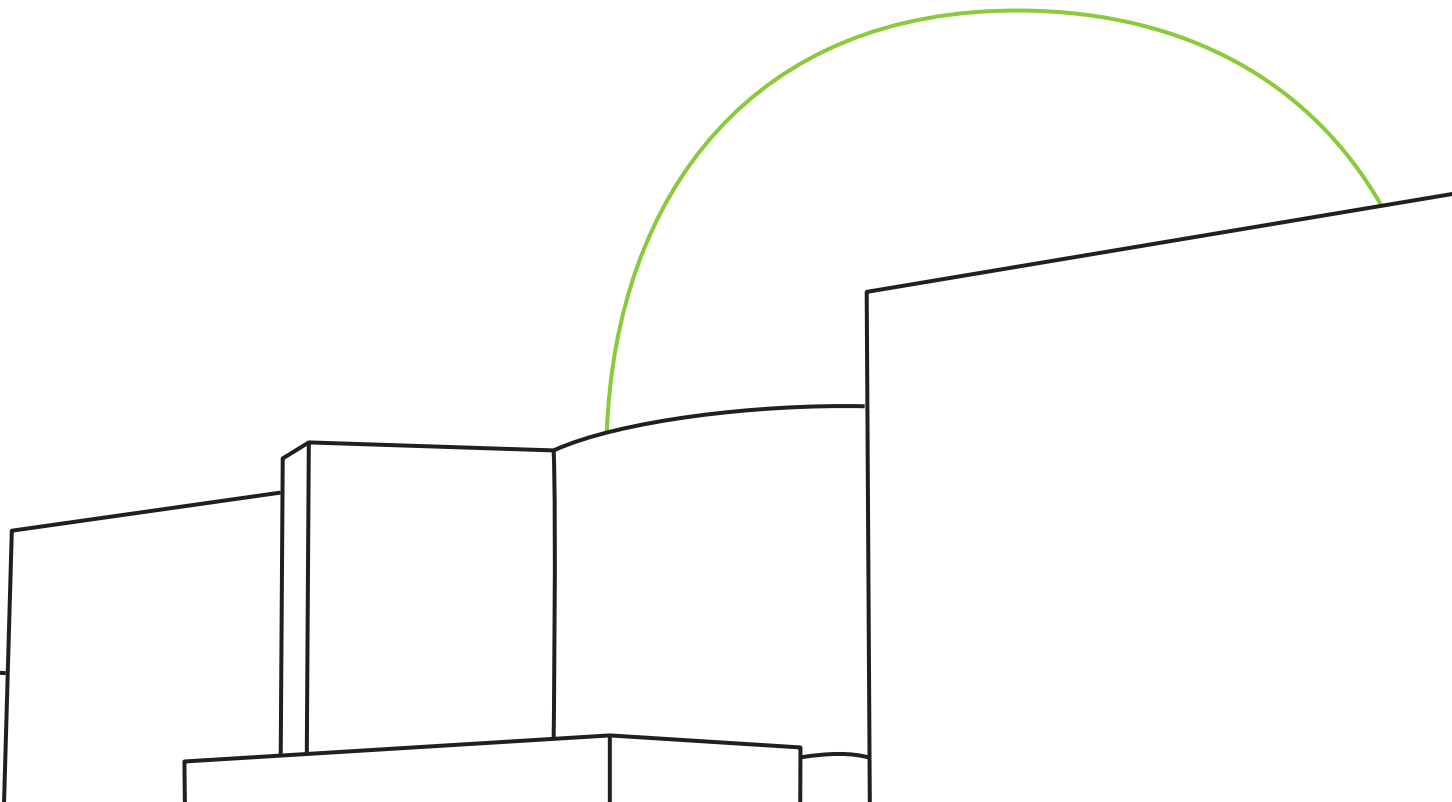
Address legacy risks – ponds and silos, SNMs

3.22 Sellafeld Ltd's delivery and effectiveness of the strategy will remain a priority for us. We will monitor progress through internal oversight, governance, and regulatory interface meetings with Sellafeld Ltd to identify and address any risks and challenges to the effectiveness of the strategy.

Appropriate consideration by industry of whole life cycle planning

3.23 As we prepare for our strategy beyond 2025 we will be engaging further with industry and other stakeholders to ensure that current legacy facilities have adequate investment and appropriate plans to maintain the assets in a safe condition and to allow timely decommissioning and dismantling. We will also focus on post operations, when nuclear plants should move seamlessly into cleanout, decommissioning and dismantling.

3.24 We will also ensure that new nuclear projects continue to give appropriate consideration to whole life cycle planning to prevent a repeat of the legacies that are being managed today.





Annex 1

Regulatory attention levels

Full regulatory attention levels for all sites and approved carriers, to supplement main section (Section 2)

Regulatory attention levels

4.01 The regulatory attention levels we are applying to licensed nuclear sites during 2024/25 is summarised in Tables 3, 4 and 5. The attention level assigned for each site is based on our assessment of its overall performance during the past 12 months, considering a broad range of safety and security considerations, and/or the operational issues each site is addressing.

4.02 It also reflects an overall judgement across our nuclear safety, NSHS, civil nuclear security, and transport purposes. Attention levels may differ

between safety and security for the same licensed site and may be allocated to specific parts of larger sites.

4.03 We have now implemented safeguards attention levels to safeguards dutyholders. This year, we are publishing our baseline safeguards attention levels that we have evaluated based on our operational experience of nuclear material accountancy, control and safeguards in the UK.

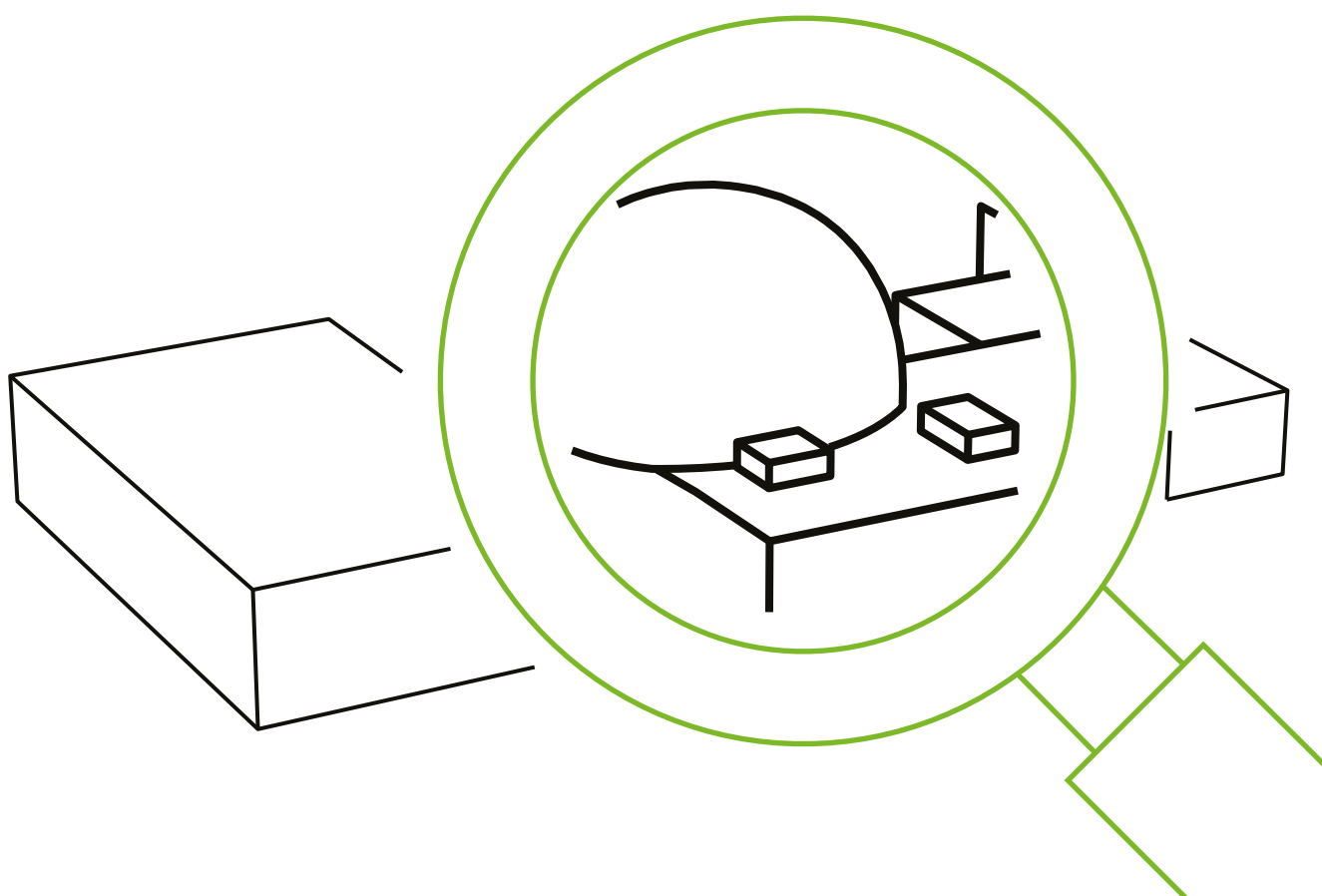


Table 2: Regulatory attention levels for safety for licensed sites from 31 March 2024

Regulatory attention	Licensed site	Change in attention since 2023/24
Significantly enhanced	Sellafield (Sellafield Ltd): Legacy Ponds and Silos	No change
	Sellafield (Sellafield Ltd): SNMs	No change
	Sellafield (Sellafield Ltd): Analytical Services	Raised to Significantly Enhanced
Enhanced	Atomic Weapons Establishment (AWE Plc), Aldermaston	No change
	Devonport (Devonport Royal Dockyard Ltd)	No change
	Dounreay (Magnox Ltd)	Raised to Enhanced
	Sellafield (Sellafield Ltd), remainder of site	No change
Routine	Atomic Weapons Establishment (AWE Plc), Burghfield	No change
	Barrow (BAE Systems Marine Ltd)	No change
	Berkeley (Magnox Ltd)	No change
	Bradwell (Magnox Ltd)	No change
	Capenhurst (Urenco UK Ltd)	No change
	Chapelcross (Magnox Ltd)	No change
	Derby (Rolls-Royce Submarines Ltd), 2 sites	No change
	Dungeness A (Magnox Ltd)	No change
	Dungeness B (EDF Energy Nuclear Generation Ltd)	No change
	GE Healthcare Amersham (GE Healthcare Ltd)	No change
	Hartlepool (EDF Energy Nuclear Generation Ltd)	No change
	Harwell (Magnox Ltd)	No change
	Heysham 1 (EDF Energy Nuclear Generation Ltd)	No change
	Heysham 2 (EDF Energy Nuclear Generation Ltd)	No change
	Hinkley Point A (Magnox Ltd)	No change
	Hinkley Point B (EDF Energy Nuclear Generation Ltd)	No change
	Hinkley Point C (NNB Generation Company (HPC) Ltd)	No change
Hunterston A (Magnox Ltd)	No change	

Regulatory attention	Licensed site	Change in attention since 2023/24
Routine (continued)	Hunterston B (EDF Energy Nuclear Generation Ltd)	No change
	Low Level Waste Repository (LLWR)	No change
	Metals Recycling Facility (Cyclife UK Ltd), Lillyhall	No change
	Oldbury (Magnox Ltd)	No change
	Rosyth (Rosyth Royal Dockyard Ltd)	No change
	Sizewell A (Magnox Ltd)	No change
	Sizewell B (EDF Energy Nuclear Generation Ltd)	No change
	Springfields (Springfields Fuels Ltd)	No change
	Torness (EDF Energy Nuclear Generation Ltd)	No change
	Tradebe Inutec (Inutec Ltd)	No change
	Trawsfynydd (Magnox Ltd)	No change
	Winfrith (Magnox Ltd)	No change
	Wylfa (Magnox Ltd)	No change
	Torness (EDF Energy Nuclear Generation Ltd)	No change
	Tradebe Inutec (Inutec Ltd)	No change
	Trawsfynydd (Magnox Ltd)	No change
	Winfrith (Magnox Ltd)	No change
	Wylfa (Magnox Ltd)	No change

Table 3: Regulatory attention levels for civil nuclear security performance from 31 March 2024

Regulatory attention	Licensed site/premises/new build	Change in attention level since 2023/24
Significantly enhanced	Sellafield (Sellafield Ltd): cyber security	No change
Enhanced	Berkeley (Magnox Ltd)	No change
	EDF Energy Nuclear Generation Ltd (Corporate)	No change
	Sellafield (Sellafield Limited): protective security	No change
	Springfields (Springfields Fuels Ltd)	Raised to enhanced attention due to identified shortfalls requiring further attention.
Routine	Bradwell (Magnox Ltd)	No change
	Cavendish Nuclear	No change
	Capenhurst (Urenco UK Ltd)	No change
	Centronic	No change
	Chapelcross (Magnox Ltd)	No change
	Dounreay (Magnox Ltd)	No change
	Dungeness A (Magnox Ltd)	No change
	Dungeness B (EDF Energy Nuclear Generation Ltd)	No change
	Harwell (Magnox Ltd)	No change
	The Grove Centre (GE Healthcare)	No change
	Hartlepool (EDF Energy Nuclear Generation Ltd)	No change
	Heysham 1 (EDF Energy Nuclear Generation Ltd)	No change
	Heysham 2 (EDF Energy Nuclear Generation Ltd)	No change
	Hinkley Point A (Magnox Ltd)	No change
	Hinkley Point B (EDF Energy Nuclear Generation Ltd)	No change
	Hinkley Point C (NNB Generation Company (HPC) Ltd)	No change
	Hunterston A (Magnox Ltd)	No change
	Hunterston B (EDF Energy Nuclear Generation Ltd)	No change

Regulatory attention	Licensed site/premises/new build	Change in attention level since 2023/24
Routine (continued)	Tradebe Inutec (Inutec Ltd)	No change
	Low Level Waste Repository (LLWR)	No change
	Magnox Ltd Corporate	No change
	Metals Recycling Facility, Lillyhall (Cyclife UK Ltd)	No change
	National Nuclear Laboratory (Preston)	No change
	National Nuclear Laboratory (Sellafield Central Labs)	Returned to routine after addressing specific challenges
	National Nuclear Laboratory (Windscale)	No change
	Oldbury (Magnox Ltd)	No change
	Sizewell A (Magnox Ltd)	No change
	Sizewell C (NNB Generation Company (SZC) Ltd)	No change
	Sizewell B (EDF Energy Nuclear Generation Ltd)	No change
	Torness (EDF Energy Nuclear Generation Ltd)	No change
	Trawsfynydd (Magnox Ltd)	No change
	Winfrith (Magnox Ltd)	No change
	Wylfa (Magnox Ltd)	No change
Wylfa (Magnox Ltd)	No change	

Table 4: Regulatory attention levels for civil nuclear security performance of approved carriers from 31 March 2024

Regulatory attention	Approved carrier	Change in attention level since 2023/24
Routine	CTS Logistics (GB)	No change
	David Watts Transport Ltd	No change
	Dounreay (Magnox Ltd)	No change
	EDF Energy Nuclear Generation Ltd	No change
	Express Transport SA (Spain)	No change
	Nuclear Transport Solutions (NTS) [includes: Direct Rail Services (DRS); International Nuclear Services (INS); and Pacific Nuclear Transport Services (PNTL)]	No change
	ORANO NCS GmbH (Germany)	
	[formerly Daher NT GmbH]	No change
	Sellafield Ltd	No change
	Société De Transports Spéciaux Industriels (STSI) (France	No change
	Springfields Fuels Ltd	No change
	TN International (France	No change
	Transrad (Belgium)	No change
	WH Bowker Ltd	No change

Table 5: Regulatory attention levels for nuclear safeguards for dutyholders under NSR 2019 from 31 March 2024

Regulatory attention	Safeguards dutyholders and qualifying nuclear facilities	Baseline attention in March 2024
Significantly enhanced	None	None
Enhanced	None	None
Routine	Sellafield (Sellafield Ltd), Corporate functions	Routine
	Sellafield (Sellafield Ltd), Infrastructure	Routine
	Sellafield (Sellafield Ltd), Remediation	Routine
	Sellafield (Sellafield Ltd), Retrievals	Routine
	Sellafield (Sellafield Ltd), Spent Fuels Management (SFM)	Routine
	Sellafield (Sellafield Ltd), SNM	Routine
	Springfield Fuels Ltd	Routine
	EDF Corporate and sites	Routine
	Magnox Ltd Corporate	Routine
	Dounreay (Magnox Ltd)	Routine
	Magnox Ltd other sites	Routine
	Urenco Capenhurst	Routine
	Qualifying nuclear facilities with limited operations (QNFLO) dutyholders have smaller quantities of qualifying nuclear material (QNM) and conduct limited types of activities. ONR regulates these proportionately to the reduced safeguards risks present. There are currently 148 QNFLO dutyholders but this number fluctuates throughout the year as the ongoing need for QNM at these sites changes.	

Annex 2

Events report and regulatory intelligence report 2023/24

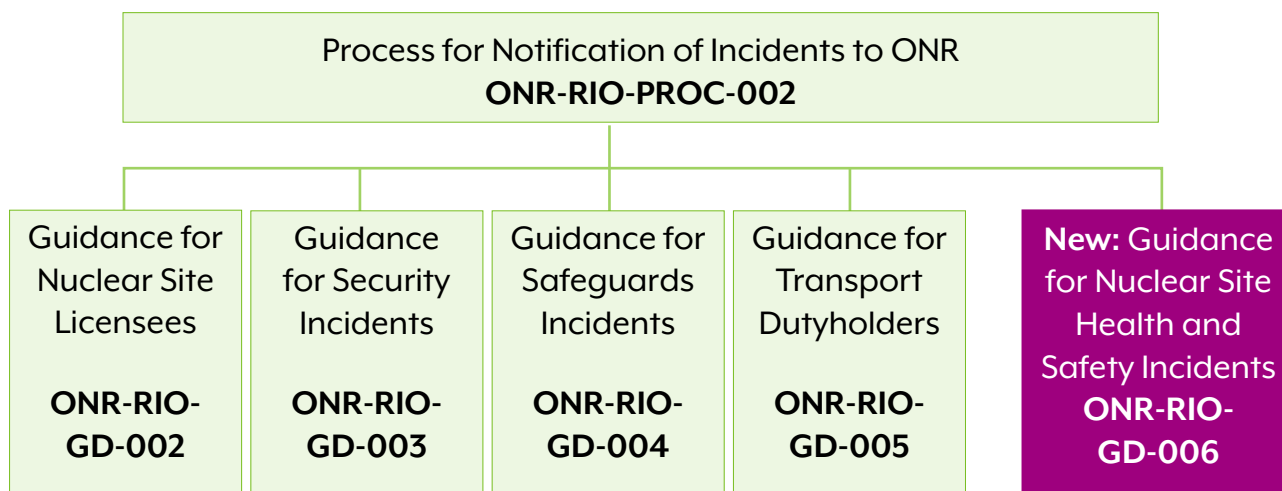
Introduction

- 5.01 This events and regulatory intelligence report provides an overview of the incidents dutyholders have reported to us during the period of 1 April 2023 to 31 March 2024.
- 5.02 It provides analysis of incidents across our purposes and an overview of our regulatory responses. It covers our use of the intelligence from these incidents as operating experience (OPEX) for us to target our regulation. It concludes with a summary of the most significant incidents.
- 5.03 Our incident notification guidance is available on our website³⁰.

Incident reporting framework

- 5.04 In line with international expectations, UK legislation requires dutyholders to formally report safety, security, and safeguards incidents to ONR.
- 5.05 Figure 2 shows the structure of our incident reporting process and guidance.

Figure 2: overview of our incident reporting guidance



- 5.06 During 2023/24, we implemented new guidance for NSHS incidents to cover Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013. In future, we intend to broaden the scope of this guidance to include our other NSHS incident notification requirements.

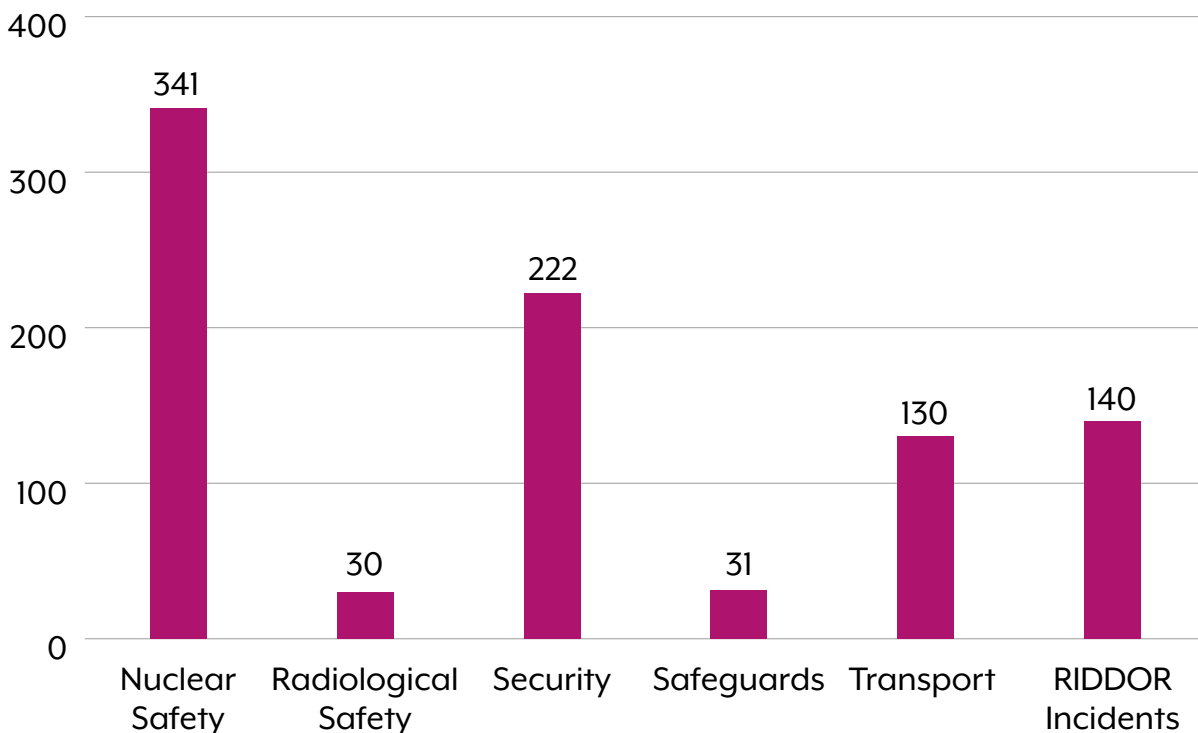
30 <https://www.onr.org.uk/notify-onr.htm>

Incident reporting trends in 2023/24 across ONR purposes

5.07 Figure 3 is an overview of incidents dutyholders reported to us against each regulatory purpose during the period of 1 April 2023 to 31 March 2024. For consistency, we have separated radiological and RIDDOR incidents to present our five purposes across six topic areas:

- nuclear safety;
- radiological safety;
- security;
- safeguards;
- transport safety; and
- RIDDOR incidents.

Figure 3: incident reports during 2023/24



5.08 Legislation sets the general severity threshold for dutyholders to report incidents to us. The actual threshold varies between topic area and involves a degree of judgement. Our approach has been to promote consistent reporting thresholds. We have observed a net reduction in incident reports of 10% since last year.

The changes in this period are:

- 39% reduction in security incident reports;
- 9% reduction in nuclear safety incident reports;
- 20% increase in radiological safety incident reports;

- 29% increase in safeguards incident reports;
- 51% increase in transport incident reports; and
- 27% increase in RIDDOR reports.

5.09 The other changes are mostly the lowest significance incident categories. Historically, our analysis shows reporting thresholds dominate reports in these categories. Therefore the changes are not necessarily indicative of actual performance. We give further analysis of these trends in the relevant sections of this intelligence report.

5.10 In previous years, up to 90% of security incidents reported to us were for minor breaches of dutyholders' own security arrangements and so work has been ongoing to allow for more proportionate reporting thresholds to be implemented. This has had the effect of improving their categorisation of incidents, allowing us to focus on the more significant security incidents requiring regulatory attention and resolution.

5.11 RIDDOR incidents are an exception to this trend: legislation prescribes the threshold. Our analysis shows the types and severity of RIDDOR incidents are consistent. This means the trend is more indicative of underlying performance.

Trends of Significance of Incidents

5.12 We have used four variables to consistently trend higher significance incidents:

- The incidents' International Nuclear and Radiological Event Scale (INES) rating;
- Our expected timescales for incident notification;
- Our inspectors' judgements on incident significance; and
- The dutyholders' judgement of incident significance³¹.

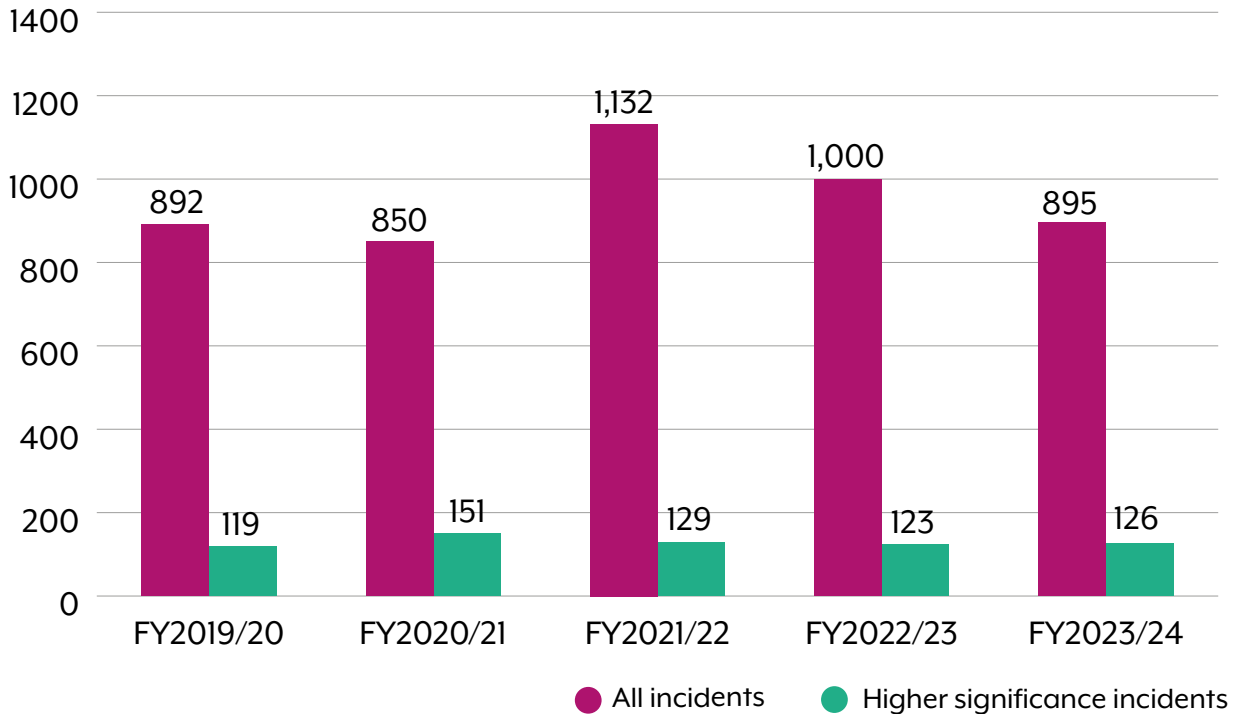
5.13 During this reporting period, there were 126 higher significance incidents across all our purposes.

5.14 Figure 4 presents the five-yearly trend of total incidents and higher significance incidents reported to us.

31 ONR-PROC-RIO-003: Processing Incident Notifications

Total number of Incident Reports to ONR

Figure 4: five-year trend of all incidents and significant incidents



5.15 Our analysis shows dutyholders report incidents with higher significance more consistently. Changing reporting practices does not have such a large influence on these trends. This means this dataset is a more reliable indicator of underlying performance.

5.16 Overall, these data show the numbers of significant incidents were consistent with previous years. There is no significant variation between dutyholders. However, there are notable decreases in transport and security significant incidents:

- 38% fewer significant security incidents; and
- 28% fewer significant transport incidents.

Incident reporting practices

5.17 To ensure reporting practices remain appropriate and have not adversely impacted the trends, we analysed non-reportable incidents. This analysis found:

- dutyholders are consistently reporting the most significant incidents;
- some dutyholders are over-reporting incident significance and others are under-reporting; and
- dutyholders do not have consistent thresholds for reporting nuclear safety incidents.

5.18 In response, we have given targeted regulatory advice to dutyholders to address these findings. We will

continue to engage with individual dutyholders and industry groups to enable consistent incident reporting practices.

Regulatory response to incidents

5.19 Our inspectors decide a proportionate regulatory response for all incidents reports. Table 6 shows our final follow up of all incidents reported between 1 April 2023 and 31 March 2024.

Table 6: Regulatory response to incidents

ONR Regulatory Response	Number of Incidents	Proportion
Investigation or Preliminary Enquiries	26	3%
Routine follow up	340	38%
No further action	529 ³²	59%

5.20 All incidents we investigated were reported as nuclear safety or site safety incidents. We have not concluded our investigations for five of these incidents. For the majority of these, we carried out informal enforcement and/or decided to take no further action. Some resulted in formal enforcement³³, the notable outcomes being that we:

- decided to prosecute an incident at DRDL; and
- issued Improvement Notices for separate incidents at Heysham 1 and Dounreay.

5.21 In addition to regulatory follow up, we report the most significant incidents to DESNZ on a quarterly basis. We publish the details of these incidents on our website³⁴. During this period, we reported three incidents to DESNZ. Table 9 is an updated summary of the incidents and our responses.

Topic area analysis – nuclear safety incidents

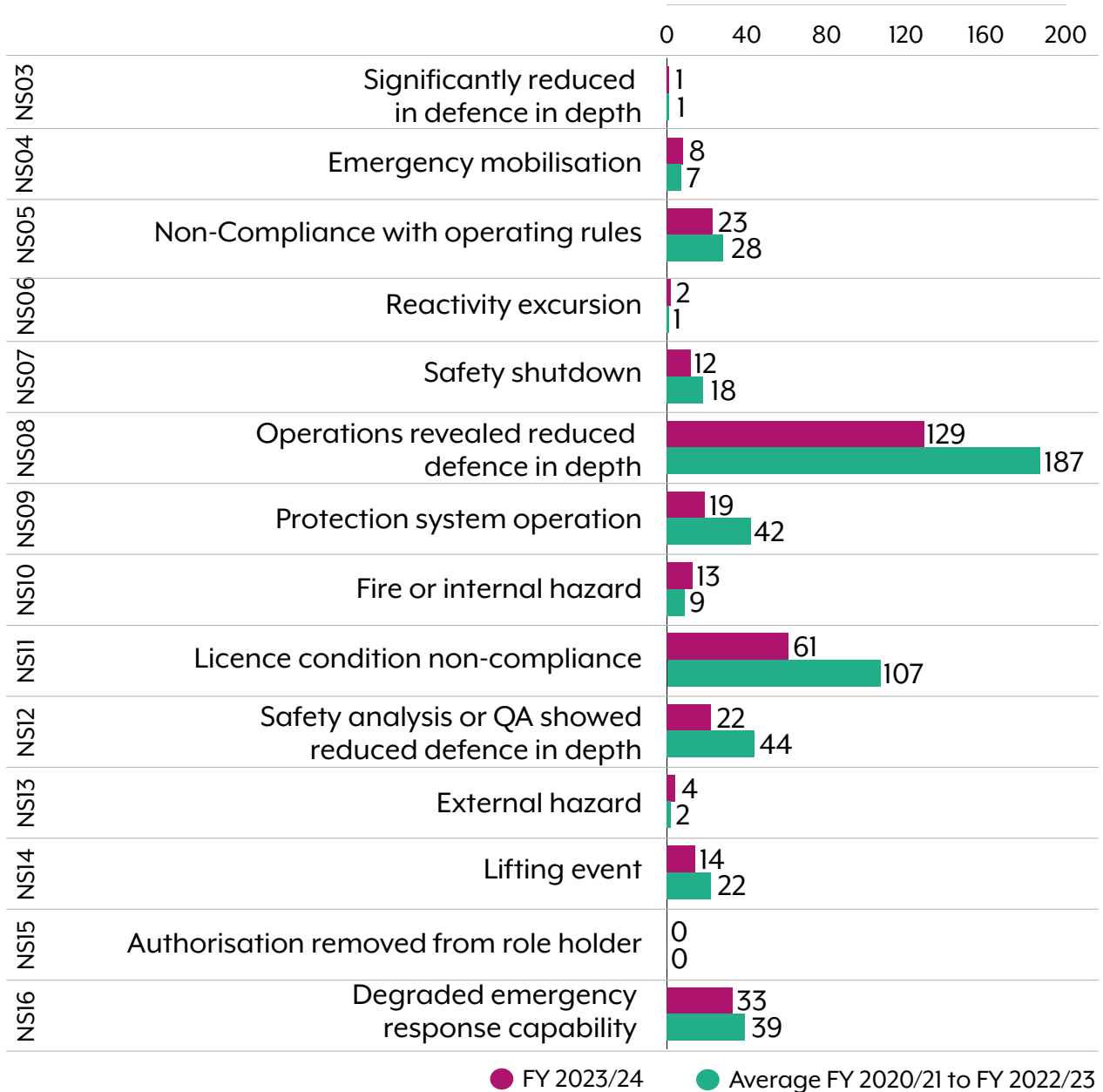
5.22 Dutyholders report incidents to us under the reporting categories defined in our Incidents Notification guidance³⁵. Figure 5 shows all incidents with a nuclear safety category reported to us during 2023/24.

³² Excludes seven incidents that do not have a governance code

³³ Excludes enforcement action for incidents

³⁴ <https://www.onr.org.uk/quarterly-stat/index.htm>

³⁵ Full category definitions are provided in our incident notification guidance (Appendix A), which can be found at <https://www.onr.org.uk/operational/inspection/onr-rio-proc-002.docx>

Figure 5: Breakdown of incidents related to nuclear safety – 2023/24

5.23 Figure 5 shows that the lower-level incident categories with the greatest reductions are:

- safety shutdowns (NS07);
- operations revealing reduced defence in depth (NS08);
- protection system operation (NS09);
- LC non-compliance (NS11); and
- degraded emergency response capability (NS12).

5.24 There is a notable reduction in the numbers of operating rules non-compliances (NS05) and safety shutdowns (NS07). These are the only notable changes in the higher significance categories.

5.25 There is also a significant reduction in the numbers of reports of incidents identifying a reduced defence in depth (NS08). We will investigate this

further to better understand what has led to this reduction.

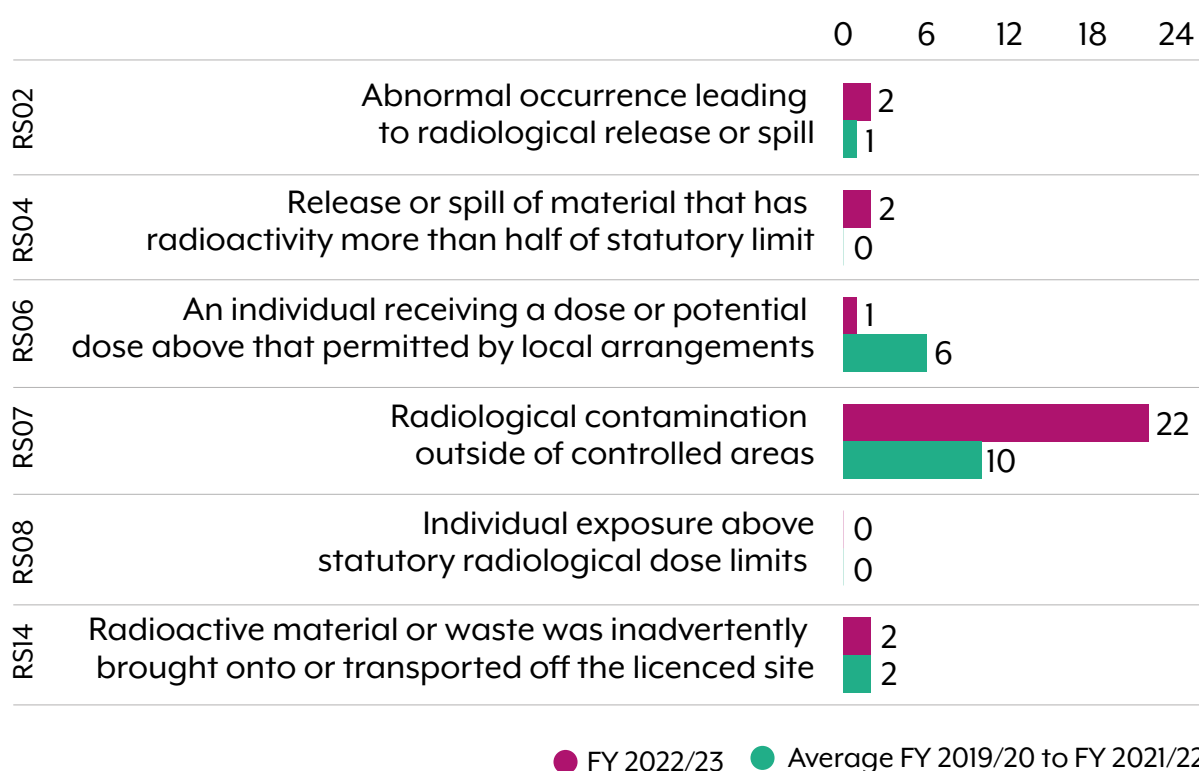
5.26 This is the first full year with fewer operating nuclear reactors and end of reprocessing at Sellafield. This would usually lead to fewer operational incidents (NS05, NS06 and NS07), which may partially account for the reduction being consistent for the lower and higher

significance incidents. We continue to work with dutyholders to ensure incident reporting is consistent and proportionate.

Topic Area Analysis – radiological safety incidents

5.27 Figure 6 shows all incidents with a radiological safety category reported to us during 2023/24.

Figure 6: Breakdown of incidents related to radiological safety – 2023/24



5.28 The increase in RS02 and RS04 categories is localised to Capenhurst. Our inspectors are investigating this and using the intelligence to inform our regulation of this site. Further comment is included in Section 2.1 (Urenco entry).

5.29 Our inspectors have been actively influencing dutyholders to report lower-level contamination level incidents. This part of our consistent

reporting strategy has resulted in lowering the reporting threshold. This partially accounts for the increase in RS07 incidents. We intend to analyse the incidents to identify any intelligence to inform our inspections. We will continue to encourage dutyholders to report the lower-level radiological incidents and this may involve revising our reporting criteria.

5.30 Our inspectors consider the increase

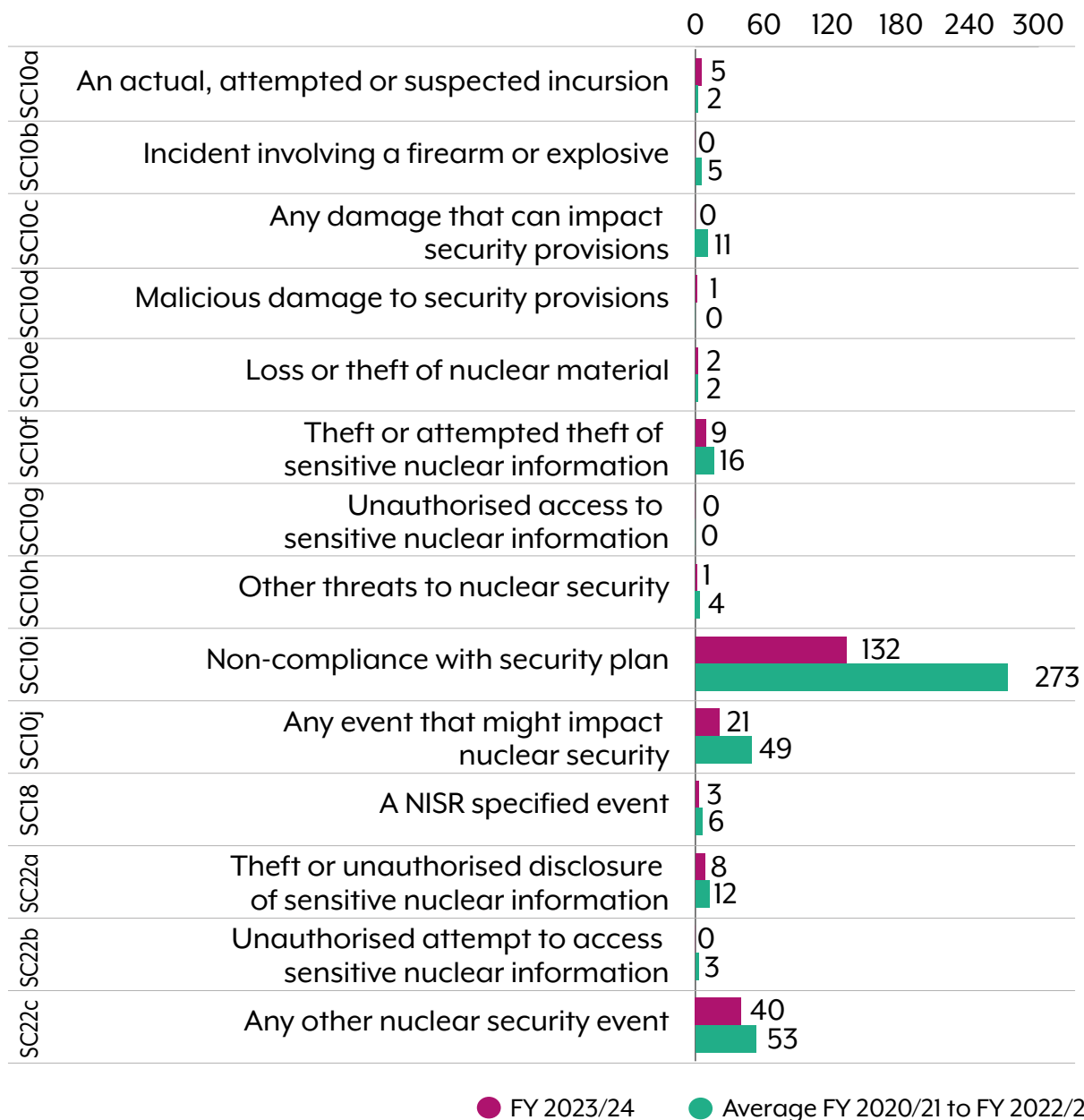
in radiological incidents represents improved dutyholder reporting. This part of our consistent reporting strategy has resulted in lowering the reporting threshold. As a result, inspectors have judged similar numbers of incidents occurred in previous years but were not reported.

This means the increase does not indicate an adverse trend of radiological safety performance.

Topic Area Analysis – security

5.31 Figure 7 provides a breakdown of security incidents by category as reported to us during 2023/24.

Figure 7: Breakdown of incidents related to security – 2023/24



5.32 The security categories in Figure 7 reflect those specified under the Nuclear Industries Security Regulation (NISR) 2003 within Regulations 10, 18 and 22. The threshold for reporting ‘events and matters’ is defined in NISR 2003. This threshold is not consistent with safety incidents under RIDDOR and/or Licence Condition 7. It means most security reports are administrative and/or procedural non-compliances. Consequently, these are not security breaches nor are a reduction in security defence in depth for nuclear material. We use multiple factors to assess incident significance and our inspectors follow up based on this assessment (see figure 4 and table 6).

5.33 Consistent with the overall trend, the number of security incident reports in most categories has reduced. The category with the largest reduction is minor non-compliances with the security plan (SC10i), primarily through dutyholders utilising permissioning under NISR Regulation 7 and not having to report specified minor events and matters to us.

5.34 The only category with an increase is ‘suspected incursions onto sites’ (SC10a). Our analysis of these incidents has found:

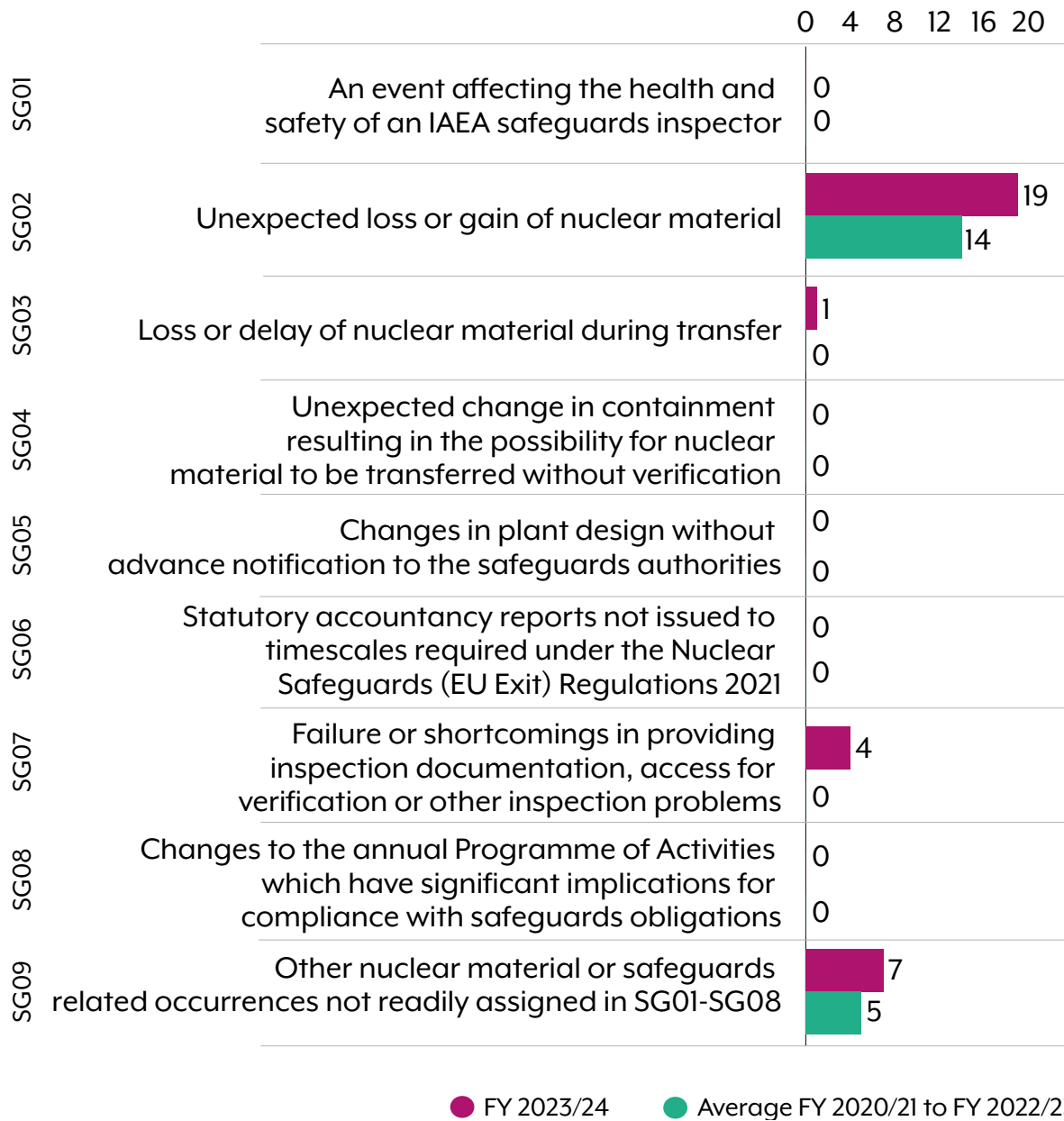
- no incidents involved actual incursion onto the site or threat to the security of nuclear material;
- the nuclear licensed sites incidents were rapid detection, and police apprehension, of members of the public that had inadvertently trespassed; and
- two incidents were conservative reports of drone operation near to a rail fuel transport.

5.35 Our inspectors reviewed these security incidents and judged that none met the criteria for a major incident or formal investigation. This is a reduction from previous periods. The existence of fewer significant incidents is a potential indication of improving performance. Our inspectors will use this intelligence to inform regulatory strategies.

Topic area analysis – safeguards

5.36 Figure 8 provides a breakdown of safeguards incidents by category as reported to us during 2023/24.

Figure 8: Breakdown of incidents related to safeguards – 2023/24



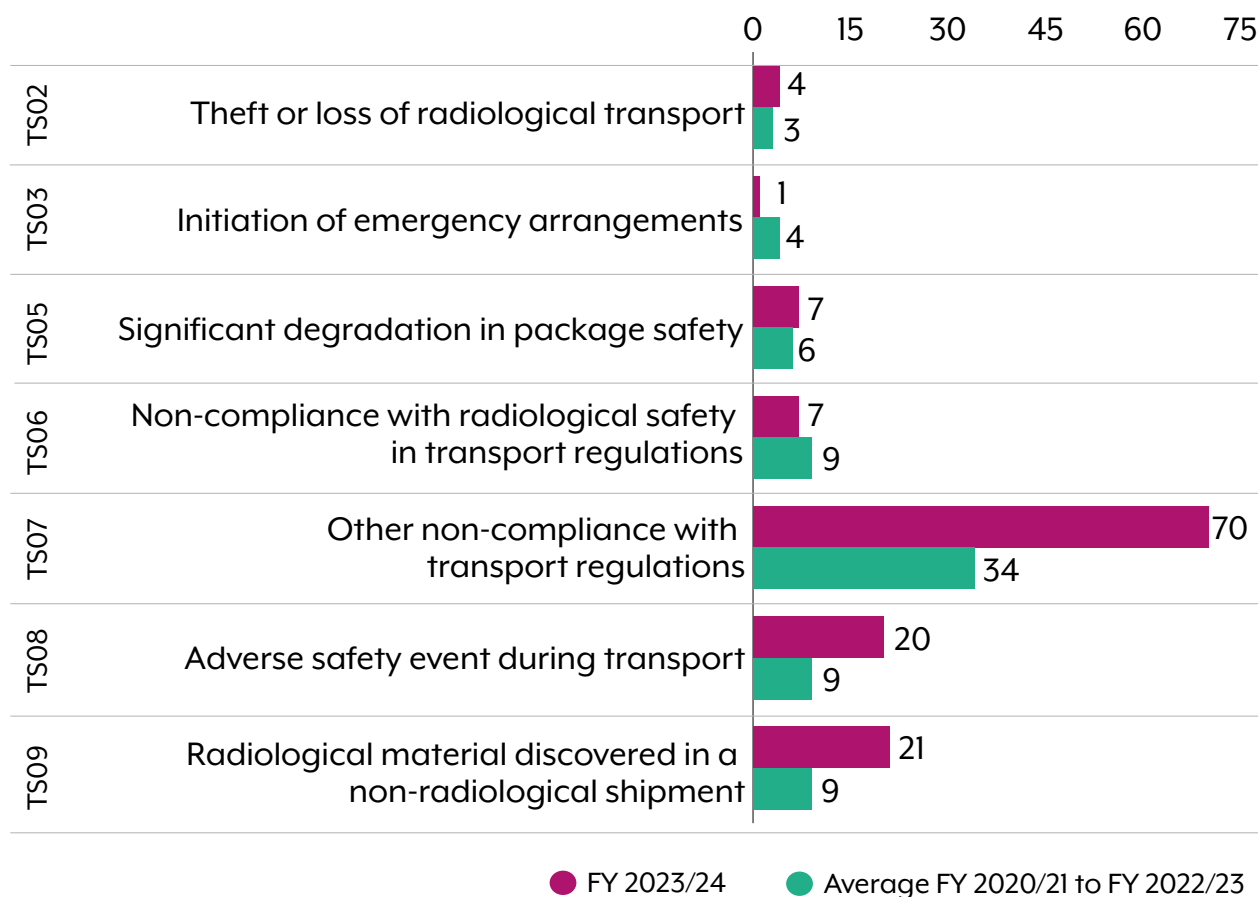
5.37 We assess the significance of reported safeguards incidents based on the implications for compliance with UK domestic safeguards regulations and UK international safeguards obligations. Our inspectors judged none of these incidents impacted on the UK’s compliance.

5.38 Our regulatory influence has led to dutyholders’ improved reporting practices. This part of our consistent reporting strategy has resulted in lowering the reporting threshold. This has provided us with valuable intelligence. Our inspectors have used this to proportionately target inspection and assessment strategies and plans.

Topic area analysis – transport safety incidents

5.39 Figure 9 provides a breakdown of transport safety incidents by category as reported to us during 2023/24.

Figure 9: Breakdown of incidents related to transport safety – 2023/24



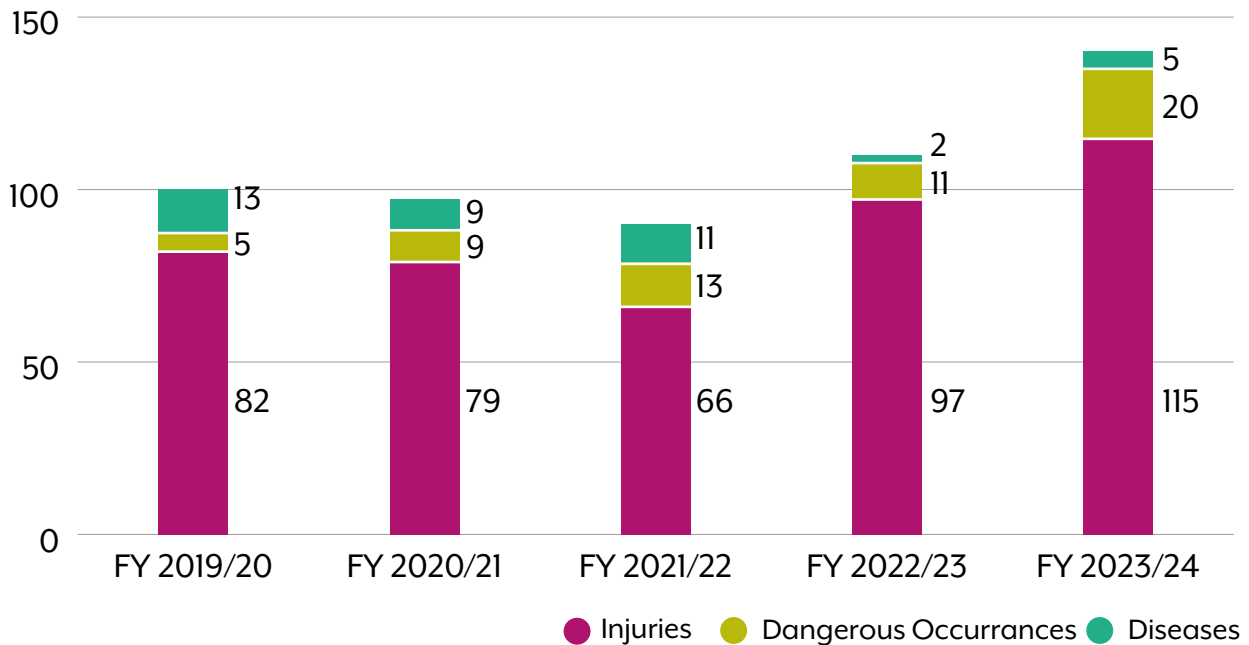
5.40 No transport incidents involved a radiological release or exposure. **There has been no notable change in numbers of reports of incidents with higher significance categories.**

The large increase in the lower significance incidents is partially due to our inspectors encouraging dutyholders to report lower-level incidents.

5.41 **We are using the intelligence from these lower significance incidents to inform and target our transport inspections.**

Topic area analysis – nuclear site health and safety incidents

5.42 Dutyholders report specified injuries to workers, diseases, and dangerous occurrences on GB nuclear sites to us under RIDDOR 2013. Table 8 provides information on the number of RIDDOR-reportable injuries that occurred between 1 April 2023 and 31 March 2024. The data include all RIDDOR injuries reported by contractors, tenants, and licensees across nuclear sites.

Figure 10: Trend of Site Safety Incidents – 2023/24

5.43 There was a 19% increase in 2023/24 RIDDOR injury reports compared to 2022/23. Our analysis shows the increase in the GB nuclear sites' total number of reports of injuries is statistically significant compared with the previous seven years. The primary cause is greater numbers of sites reporting small numbers of injuries. Our analysis has found:

- industry workforce size is consistent;
- there are no notable changes in the ratio of severe and less severe injuries; and

- there is an increased proportion of ONR preliminary inquiries or investigations.

5.44 Our analysis indicates the increase is indicative of the nuclear industry's site safety performance. However, there is insufficient data for conclusions on specific topics or dutyholders. We have used this intelligence to inform our regulatory strategy for NSHS and for regulation of these areas. More details are provided in Sections 1 and 2, with commentary provided for each dutyholder.

Table 7: Reportable Injuries 1 April 2023 – 31 March 2024

Site	Total Injuries Reported FY23/24	Total Injuries Reported FY22/23
Sellafield	21	20
HPC	22	26
Barrow	20	5
Devonport	11	13
Aldermaston	9	4
Springfields	8	1
Faslane	4	2
Dounreay	3	2
Dungeness B	2	2
Hunterston B	2	1
Hinkley Point A	2	0
Sizewell B	1	2
Hartlepool	1	0
LLWR	0	1
Capenhurst	1	0
Harwell	1	2
Lillyhall	1	1
Rosyth	1	0
Hunterston A	1	1
Oldbury	1	0
Rolls Royce Derby	1	3
Berkeley	1	0
Vulcan	1	0
Heysham 2	0	4
Heysham 1	0	1
Hinkley Point B	0	2
Burghfield	0	1
Torness	0	2
Dungeness A	0	1
Total	115	97

5.45 We do not consider the increase in the number of reportable events in the reporting period to be significant, but that it is indicative of a healthy reporting culture, with increased confidence that dutyholders are correctly categorising events.

5.46 One of these reportable injuries was a work-related death at AWE Aldermaston in July 2023. In the previous financial year, there was a work-related death at HPC in November 2022. Our response is described in Section 2 of this report.

5.47 Throughout the reporting year we maintained an increased focus on NSHS performance on the Barrow licensed site. BAE Systems recognised an increase in reportable events during the reporting period related to safe control of work, including work undertaken by contractors on site and it revised its strategic approach to health and safety performance. Improvement programmes with senior leadership oversight are now in place and we will continue to monitor progress and seek evidence of improved safety performance.

5.48 In this period there were five RIDDOR reports for occupational illnesses. This is an increase from the previous period. We are collecting intelligence to inform our regulatory oversight.

5.49 Dutyholders notified us of 19 RIDDOR dangerous occurrences that occurred between 1 April 2023 to 31 March 2024, which are outlined in Table 3.

Table 8: Numbers of dangerous occurrences from each site during 2023/24

Site	Total Dangerous Occurrences Reported FY 23/24	Total Dangerous Occurrences Reported FY 22/23
Sellafield	5	2
Rolls Royce Derby	2	1
Heysham 2	2	0
HPC	1	0
Springfields	1	2
Hunterston A	1	0
Heysham 1	1	1
Hinkley Point B	1	0
Torness	1	0
Trawsfynydd	1	0
Devonport	0	1
Aldermaston	0	1
Faslane	0	1
Dungeness B	0	1
Vulcan	0	1
Total	19	11

Our analysis shows the increase was 82% during this period, statistically significant compared with the ten-year average. The increase of RIDDOR dangerous occurrence reports is consistent with illnesses and injuries. Our response is detailed in Section 2, with commentary provided for each dutyholder.

Incidents ONR reported to DESNZ

Heysham 1, INF-3582 and INF-3614, 23/12/2023

At Heysham 1 Power Station in Lancashire on 23 December 2023 at 4.16am, a valve controlling the flow of superheated steam from one quadrant of Reactor 1 failed, resulting in a steam leak. The lower spindle (weighing approximately 25 kg) was ejected from the bottom of the failed valve and impacted and penetrated steel flooring underneath the valve. It then ricocheted before coming to rest several metres beneath on a concrete floor. The incident generated debris as the lower part of the valve disintegrated, landing 20-30 metres away. The resulting steam flow, along with the water forming as it condensed, led to further damage in and around the area.

The dutyholder was returning the reactor to service and operators were in the process of opening the valve to allow main steam to supply the turbine.

The dutyholder tripped the reactor and established post-trip cooling. The Central Control Room declared a site incident at 4.21am. No staff were present in the vicinity of the failed valve and all station personnel were accounted for by 4.39am.

There was no harm to workers, the public, or the environment as a result of the incident.

The nuclear safety significance of the event was minor. The steam leak was well within the range of faults the plant is designed to deal with. There were other valves to isolate the steam flow and the

plant damage around the failure was not nuclear safety significant.

The NSHS significance of the event was moderate. The area around the valves is frequently occupied by staff, so this event had the potential to cause serious or fatal injuries to workers.

Dutyholder response

The dutyholder implemented its emergency arrangements for a site incident. Notifications were made to a number of organisations including ONR. Emergency services also attended the site in support but were not deployed onto the plant. Station emergency teams were deployed to the scene to assess damage. The site incident was stood down at 12.30pm the same day and an event recovery organisation established.

This led to the decision to shut down Heysham 1 Reactor 2 in December 2023 and Hartlepool Reactors 1 and 2 in January 2024. This resulted in EDF entering a four-reactor forced outage for three months.

EDF has completed its internal investigation. It implemented a programme of work to replace the affected components on the steam valves at all four reactors at Heysham 1 and Hartlepool. It also conducted inspections on some similar valves present in the feedwater system. It produced safety cases to demonstrate these reactors were safe to return to service.

ONR actions

We monitored the licensee's response to the incident, noting the promptness and effectiveness of the site's emergency response, the support from Heysham 2 and EDF's central support centre in Barnwood.

We are content with EDF's safety-based decision-making following the event, which sought to understand the mechanism of failure and the safety implications for the other reactors with this type of valve. We are also content with the timeliness and openness of the communication from EDF.

We undertook preliminary enquiries into the event. The information collected

resulted in an improvement notice being served on EDF on 23 January 2024, relating to the maintenance of systems and the duty of EDF to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all its employees.

Our inspectors undertook interventions in support of the return-to-service of the reactors, including assessment of the safety cases and oversight of the remedial work and improvement notice requirements. We were satisfied the Improvement Notice had been complied with. Both Heysham 1 units (and both units at Hartlepool) have subsequently been returned to service.

Hartlepool, INF-3716, 05/02/2024

In January 2024 EDF took the decision to shut down all four reactors at the Heysham 1 and Hartlepool power stations. This was due to a steam valve failure at Heysham 1 during operation that challenged the continued safe operation of these valves, which are used at both stations. The decision was taken to shut down all the reactors to investigate the fault.

This failure of the Heysham 1 steam valve was the subject of a separate ONR investigation that resulted in an improvement notice being issued to Heysham 1 (which has now been complied with) but is referenced here for context as the reason for the Hartlepool reactors being shut down.

When the Hartlepool reactors were shut down, the flow rate of (demineralised) water used for post-trip cooling of the

reactors was observed to be far higher rate than was assumed by the safety case. This was later confirmed as being due to leakages within the system and other genuine system usages that hadn't been considered within the safety case.

The situation presented a potential safety challenge as there is an expectation that the site will be able to maintain adequate water supplies to cool down both reactors when they shut down. This is achieved by ensuring defined water stocks are maintained in the five reserve feed tanks, which are continuously monitored. In justifying the required water stocks, the safety case assumed that there would be minimal losses from the water system to ensure that the water in the reserve feed tanks is sufficient to cool down both reactors on shutdown. This assumption was

demonstrated to be incorrect when the reactors were shut down in January 2024 with water usage being significantly higher than that assumed in the safety case.

As all water supplies, and all safety systems, were available at the time of shutdown, there was no actual safety consequence due to this event. The potential however, was that if water supplies to the station had been interrupted while shutting down the reactors, this would have challenged the ability to provide adequate post-trip cooling to the reactor fuel.

Dutyholder response

EDF entered their internal investigation process to ascertain why the level of water usage was so high and what actions were required to ensure future usage was sustainable for post-trip cooling of both reactors. In their investigation, EDF identified several process shortfalls, and that daily water usage had steadily risen over several years without any intervention being taken to ascertain why.

A systematic review of the system has now been carried out, with several defects rectified, which has brought water usage down significantly. In addition, system isolations have been identified that can be made when the reactors are shut down to minimise non-essential water usage, thus maximising water available for post trip cooling. The investigation noted that claims made in the safety case regarding water usage had not been adequately validated and were subsequently shown to be incorrect. EDF have also implemented

process changes to enhance daily water usage monitoring, with clear criteria on how to respond to rising usage.

EDF have made several commitments to update the safety case to ensure it accurately reflects validated water usage during all phases of system operation and to ensure system losses are appropriately rectified. While these commitments are being progressed, EDF have installed additional temporary water production capabilities on site which provides confidence in continued operation.

ONR actions

ONR inspectors have continued to engage with and monitor EDF's response since the identification of the issue, through to the return to service of the reactors.

Prior to return to service of each reactor, we reviewed EDF's interim justification for continued operation and scrutinised the commitments that were made and the actions identified in their internal investigation. ONR will ensure that EDF delivers against the commitments and post investigation actions, ensuring they are completed in a timely manner.

ONR conducted preliminary enquiries and concluded that EDF had failed to adhere to the requirements of site licence conditions, and we issued an enforcement letter. This enforcement letter requires EDF to provide ONR with a detailed plan of how they will address all commitments and investigation actions. EDF must provide this response in writing by 30 June 2024, although ONR has monitored EDFs progress in implementing improvements since

the return to service of the reactors. A level 3 regulatory issue has been raised by ONR to maintain formal oversight of the actions required in the enforcement letter.

Adherence to licence conditions and safety case assumptions is routinely

confirmed by ONR through regular compliance inspections at all licenced sites. The information from the event at Hartlepool was promptly shared with all EDF stations and has not been identified as an issue at any other operating station.

Torness, INF-3471, 15/11/2023

A planned shutdown of Reactor 2 at Torness for Off Load Refuelling and Graphite Inspection programme commenced at 11pm on 15 November 2023. Post-shutdown, three Gas Circulator Variable Frequency Converter units (VFCs) and one Variable Speed Drive (VSD) failed, preventing the associated Gas Circulators from continuing to run at reduced speed as designed.

Adequate post trip cooling of the reactor was maintained by the remaining four Gas Circulators (GC) running.

Failure of the three VFCs and the VSD unit does not challenge the applicable safety case or operational limits but represents an unexpected reduction in defence in depth at the site.

Dutyholder response

EDF's decision making process was established to review the findings, consider available options and recommend a way forward. The outcome was to proceed with the planned reactor gas pressure blowdown to 0.5 bar, once a further GC was repaired and became available.

EDF established an event recovery team at Torness to focus on understanding

the cause of the failures and to initiate a repair strategy.

Torness had already planned a programme of examination, inspection, maintenance and testing for the Reactor 2 outage, following similar VFC failures, which occurred in January 2023. This programme will now be extended to include the findings and associated rectification work from these failures.

Prior to Reactor 2 returning to service, a full review will be undertaken by EDF's Operational Safety Review Committee.

OPEX has been shared with Heysham 2, which has the same equipment.

ONR actions

The ONR site inspector followed up this incident to ensure Reactor 2 was in a safe state and that EDF's processes had been implemented appropriately to establish the cause of the failures.

Torness is working through a comprehensive examination, inspection, maintenance and testing programme of work to establish the cause and prevent recurrence on the VFCs/VSD failures.

ONR continues to engage with Torness on progress and will monitor the remediation work undertaken prior to

any restart of Reactor 2, to ensure similar VFCs/VSD failures are prevented.

Our inspectors are confident EDF has taken the appropriate actions to

prevent recurrence. However, we will continue to sample the adequacy of the remaining GC improvements at Torness and Heysham.

Capenhurst Site, INF-3697, 05/02/2024

On 5 February 2024 at the Tails Management Facility (TMF) on the Capenhurst Site in Cheshire, a metal box containing uranium powder weighing over ten tonnes was dropped from a forklift truck.

When the box was dropped, it struck other equipment within the facility and was damaged, resulting in some of the uranium powder being released into the facility.

A total of 3.3 Kg of uranium powder was released into the facility. This is a relatively small amount of material by mass. However, the amount of radioactivity released is above the statutory reporting criteria.

Following the release of uranium powder, monitors designed to detect the presence of radioactivity in air sounded. The incident occurred inside the facility, adjacent to a metal door which opens to the outside of the facility. During the incident the door became obstructed by the metal box/forklift truck, and was unable to be closed.

Two workers were involved in the incident in the facility. They were uninjured and were monitored, and found to be “clear” of any external radioactive contamination. The workers are currently being monitored to determine if they have received any internal radiation dose.

The event was not a hazard to the public.

Dutyholder response

Following the incident, the dutyholder deployed their on-site emergency response teams and immediately stopped operations in the TMF. All staff on shift successfully mustered. The incident was reported to ONR on the same day.

Recovery operations were undertaken, including cleaning up the facility to remove the spilled uranium powder and closing the roller shutter door. The dropped box has been sealed and moved to a secure location on the site. The dutyholder is undertaking enhanced monitoring of the box, to detect any signs of further leakage of the uranium powder. They are currently considering the safest way to transfer the contents to a new box.

The dutyholder has implemented changes to the way they handle boxes of uranium powder at the facility, including new operating instructions. The facility remained off-line for approximately one week, whilst these changes were implemented, but is now operating again. The dutyholder is also currently undertaking their own investigation into the incident.

ONR actions

ONR's site inspector visited the facility the day after the incident and spoke with members of the Urenco Chemical Plant's Senior Leadership Team to gain a fuller understanding of the event.

ONR will monitor the dutyholder's response to the incident, to gain assurances on their recovery operations, and the actions being taken to prevent a reoccurrence. We have also undertaken initial investigations into the circumstances surrounding the event.

At this stage, we are satisfied that the dutyholder has taken appropriate

measures to prevent a reoccurrence.

Although we are satisfied that the uranium powder has been cleaned up and no longer presents a risk to workers or the public, this incident is the third similar event reported to us in less than a year; where a loss of control of radioactive material has occurred at this facility.

We believe the incident could have been significantly worse, and should have been preventable. Therefore, we have decided to launch a formal investigation into this incident.

Dounreay, INF-3782, 29/02/2024

When plant operators lifted a personnel access hatch to the Prototype Fast Reactor (PFR) Surge Tank Pit, to inspect for water ingress and the condition of the surge tanks, a significant accumulation of water in the pit was observed. Samples of water taken from within the pit determined elevated levels of tritium (15-18 Bq/ml).

The levels detected, are nearly double that permitted by the world health organisation for drinking water (set at 10 Bq/ml). No other specific radionuclides have been detected.

Dutyholder response

A site level investigation has been convened, and additional borehole sampling has been undertaken to confirm the extent of the elevated levels.

The water in the pit was scheduled to be pumped out through the normal authorised route for radioactive

aqueous discharges. A substantial amount of the water from the pit has since been discharged via the normal authorised route for radioactive aqueous discharges.

ONR actions

ONR's site inspectors followed the event up during their visit to site in March 2024 (19-21 March). During the inspector's visit, site personnel confirmed that monitoring of the surrounding boreholes had confirmed that there were no elevated levels of tritium in the surrounding ground water.

ONR is satisfied that the offsite discharge of the water from the pits was within the authorised limits set by SEPA.

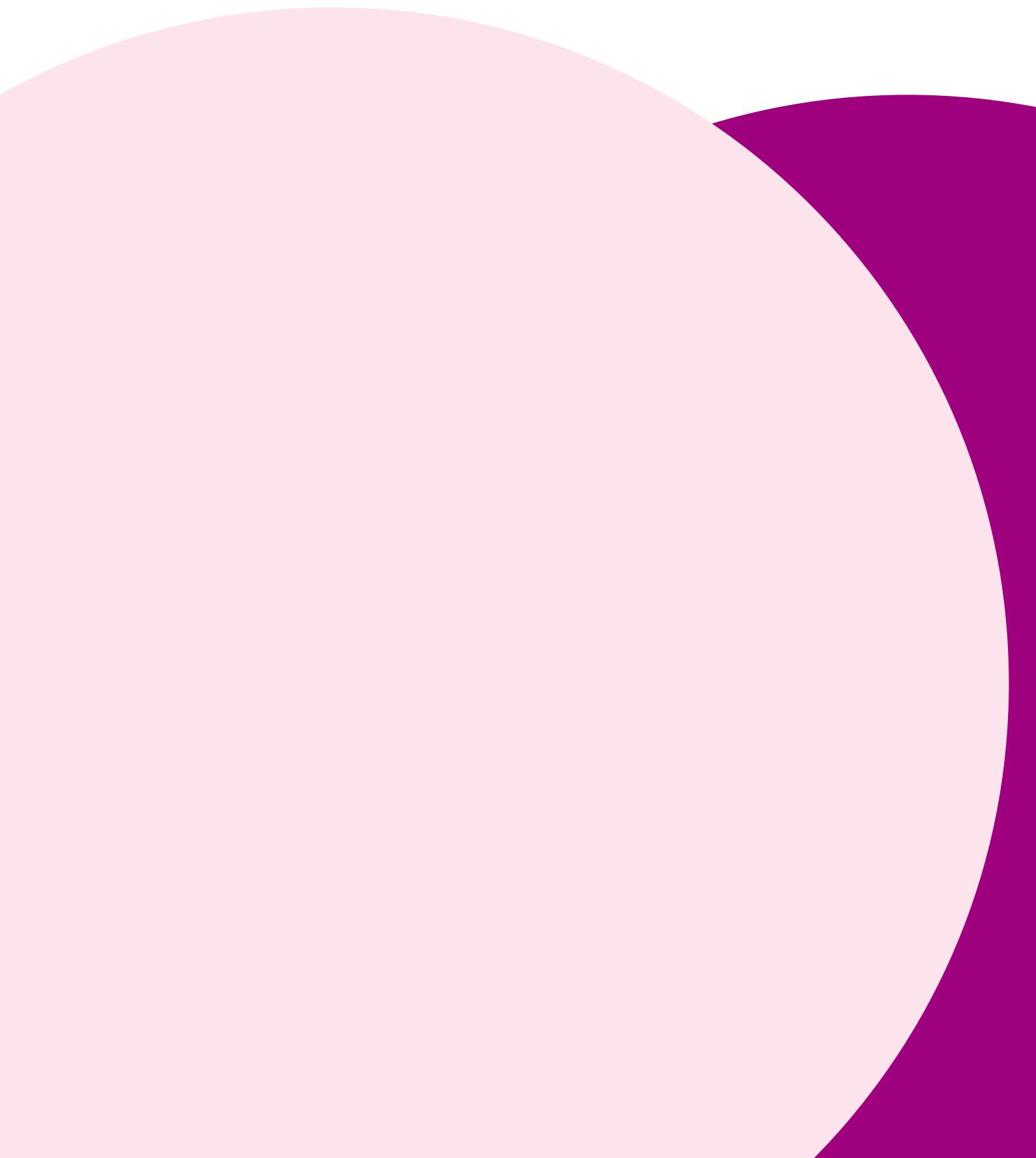
Dounreay's site investigation team has not been able to definitively identify the source of the water or tritium in the pits, however, they consider the most likely source being historical operations

which contaminated the pits with tritium which was mobilised by the presence of water from either rain or ground water. ONR considers the dutyholders analysis of these matters to be reasonable. Damage to some of the tank supports have also been identified and Dounreay have developed a recovery plan and

are progressing this. ONR inspectors are monitoring the dutyholders progress via routine site interactions. ONR does not consider the levels of tritium detected present a substantive challenge to the site in managing potential exposure to site personnel, and that it does not present a concern to persons off the site.

Annex 3

Case studies



CASE STUDY 1:

Reviewing ONR's regulatory influence on the EPR design in the UK

Introduction

ONR is required by the Regulators' Code to carry out its activities in a way that supports those we regulate to comply and grow when it is safe to do so. To ensure that we continue to consider the impact of our regulation, and to incorporate learning for the future, we conducted a review of the design evolution of the European Pressurised Water Reactor (EPR) at Hinkley Point C (HPC). This work specifically examined the role that ONR's regulatory requirements have played in the modification of HPC from the reference design (the design proposed for Flamanville in France) that was submitted to the Generic Design Assessment (GDA) process in 2007.

Background: UK EPR Generic Design Assessment

During GDA, we assess reactor designs and provide early advice to the designers about any potential safety or security issues we identify. This allows the companies who have submitted the design to address the issues before committing to construction. We apply our safety assessment principles that are based upon International Atomic Energy Agency (IAEA) guidelines.

In 2007, the UK EPR became the first reactor to be submitted to a full GDA. Since that time, we have incorporated learning and enhanced the process through continuous improvement.

The UK EPR design evolved throughout the GDA process and the detailed design was not complete when it entered or finished GDA. This is not unusual, and the design continued to evolve as our assessment progressed, as a result of a range of factors including learning from other EPR projects and the Fukushima accident.

At the end of 2012, the UK EPR completed GDA and was awarded a Design Acceptance Confirmation, a formal document meaning that the design is suitable for construction in the UK. At that stage, in 2012, EDF committed to make changes to the design as a result of our regulation, identifying the need to improve certain safety features.

Also in 2012, a nuclear site licence was granted to build two UK EPR reactor units at Hinkley Point C in Somerset, which are now under construction and are expected to become operational around the end of the decade.

What we reviewed

In early 2024 NNB GenCo (EDF) released public communications that referenced some 7,000 design changes in order to meet 'British regulations', including 35% more steel and 25% more concrete. Although NNB GenCo has not attributed these figures to ONR's regulation, recent media reports have increasingly cited ONR as the sole driver for the changes.

In order to understand the basis of these figures, we revisited our UK EPR GDA step 4 reports and other supporting records. We looked at the key design change commitments that were made by the GDA requesting party (EDF/Areva) in order to meet our regulatory expectations for safe operation of the technology. At the same time we engaged with NNB GenCo to understand its source data.

For each modification we applied a standard set of questions, including: what the technical change was?; why it was important to nuclear safety?; and what impact it may have had? We also asked why the UK approach was, or was not, different to international regulators. With the benefit of hindsight, we considered whether the outcome was proportionate and whether the modification was needed to meet the UK legal requirement of reducing risk as low as reasonably practicable.

Findings

Our analysis found that the GDA process resulted in the requesting party proposing 82 changes to the original reactor design. We accept that these will inevitably have led to further downstream modifications. We have not been able to identify evidence to support the figures quoted for additional concrete and steel. Some material increases are due to site-specific requirements, such as raft foundations required due to the geology, and some arose from building modifications as a result of GDA. However we estimate that the increase in concrete and steel due to our regulation is less than 5%.

With input from NNB GenCo, we identified a group of the most significant GDA-related modifications for study. These were:

- Enhanced structural integrity testing and inspection for high integrity components, where failures would have a significant impact on nuclear safety.
- Adjustments to the requesting party's nuclear safety categorisation and classification process to bring it in line with international good practice. Applying this updated process led to a number of systems and components having higher nuclear safety significance than the design initially submitted.
- Modifications to the Control and Instrumentation (C&I) architecture, as described below, required to meet independence and diversity principles.
- Enhancements to the Heating, Ventilation, and Air Conditioning (HVAC) systems to reduce the likelihood that HVAC system failure would have a detrimental effect on multiple nuclear safety systems at the same time.
- A change in the type of pipe insulation used to eliminate the risk of fibres clogging pumps and preventing the correct operation of safety systems.

The full findings of the review are detailed on the ONR website

<https://www.onr.org.uk/designimpactpr/>

Example: Control & Instrumentation architecture

From the above list of significant GDA-related modifications, the Control and Instrumentation changes are explored in more detail here by way of example in order to demonstrate how our work was carried out, and the conclusions reached.

The C&I systems of a nuclear power plant allow the operators to monitor and control the plant from the control room. They also perform automatic safety functions if the plant conditions go beyond normal limits. These include the automatic reactor trip (scram) which rapidly shuts down the reactor.

If something goes wrong with the plant, these C&I safety functions are a barrier that stops the chain of events before there are significant consequences for the plant, environment, staff or public. These functions are essential to the safety of the power station. Designers, operators, and regulators need to be very confident that these systems will work correctly if they are needed.

C&I architecture, independence and diversity

A nuclear power plant has a number of C&I systems that work together to provide all of the functionality that is needed. The arrangement of these systems, and how they communicate with each other, is known as the C&I architecture.

When consequences are high, the C&I architecture is designed so that there is more than one system delivering the safety function. That way, should one system fail, another can still stop the fault sequence.

Internationally-recognised good practice requires independence and diversity between the C&I systems delivering the safety function. Independence means designing the systems so that a fault in one system won't affect the other system. Diversity means ensuring that two systems do not have common features that could mean they are both affected by the same fault at the same time – known as a common cause failure. ONR's assessment of the UK EPR C&I architecture during GDA found that the design did not satisfy these principles.

In the original design the two main C&I systems were both software-based, using technology originally developed by the same company. The complexity of software is so high that it is difficult to prevent errors or 'bugs' occurring. Because the systems had shared origins, this increased the risk that they might both contain the same errors, and so be vulnerable to a common cause failure.

Truly diverse systems would use different development methods and technology. ONR advised that it would be challenging to justify that the original design was adequate to ensure the required levels of safety, and that using a different technology such as a hardwired back-up system had the potential to significantly reduce the risk of common cause failure. Hardwired systems are not computer-based, and therefore do not use software. They are a fundamentally diverse technology to software-based systems.

At the end of the GDA process, the designer had recognised the underlying issue and had improved the architecture, evolving the design to include a new hardwired non-computer based backup system.

Regulatory consistency

There was consistency across nuclear regulators on this issue. ONR (UK), STUK (Finland), and ASN (France) published a joint regulatory position statement in 2009, which explained that all three had identified the same issue of C&I independence and diversity, and had asked the designer to make improvements.

Modifications were then implemented in all three countries. The UK and Olkiluoto 3 (OL3) design in Finland both feature a diverse hardwired backup system. At the point of GDA, the OL3 design had already included this, which was an indicator that the effort of implementing this was reasonably practicable and not disproportionate. The modification to the EPR at Flamanville 3 (FA3) in France was different, involving duplication of some safety functions between the two existing systems. However, FA3 was at a more advanced stage of the design process meaning that the design modification of a hardwired back up system may not have been as practicable.

Safety benefit

The addition of a diverse backup system was a significant safety improvement to the C&I architecture – fundamentally eliminating the potential for common cause failure and meaning that protection systems would reliably function when required, hence providing greater protection for workers and the public.

Impact on the HPC project

The overall C&I architecture has remained largely unchanged since the end of GDA in 2012, providing NNB GenCo with the opportunity to plan for, schedule and cost its implementation. The new C&I system did present a significant additional challenge in relation to design, development, testing and approval. It also meant that additional space and extra cooling was required in the building, all of which presented cost implications for the project.

UK law allows for the benefit of a safety improvement to be balanced against the time, cost and trouble of implementing it, and provides the dutyholder with the opportunity to make a case where an improvement is deemed disproportionate. EDF and AREVA have not claimed that the installation of the hardwired protection system was disproportionate, or proposed a lower cost/different solution.

In the time since GDA, another significant benefit of the hardwired backup system has been realised – resilience to a cyber-attack. Should the computer-based systems be compromised by a cyber-attack, the hardwired system would be unaffected and still available to perform the safety function. This alone would be a compelling case for the system, given the elevated and quickly-evolving cyber threat levels today.

Without the reliability provided by the hardwired system, considerably greater effort would need to be applied to cyber protection of the software systems than has been required to date. In our opinion this is likely to represent a substantial through-life cost benefit with greater assurance.

Outcome

The C&I example illustrates the benefits of ONR undertaking the review. Developing our understanding in this area has been particularly helpful, because our regulatory approach to diversity and non-computerised safety systems continues to be a high profile topic in current GDAs.

Across the wider review, we found that all of the modifications made as a result of ONR's regulatory engagement in GDA were for proportionate, necessary improvements to nuclear safety and our approach was broadly consistent

with other international regulators. The review has provided the ONR with an opportunity to reflect on decisions made during GDA and the impact they have had over the past 12 years. Whilst our conclusions are based on information we currently have available, we recognise there may be other perspectives.

Recently, we have been proactive in seeking to work much closer with international regulators on the assessment of new reactor technologies, to realise the benefits that this will bring in aligned assessments and regulatory conclusions.

Summary

As the nuclear safety regulator, the protection of society is our priority and is always the fundamental consideration underpinning our decisions.

We have carried out a thorough review of the modifications made to the EPR design to meet regulatory expectations for safe operation in the UK.

Our analysis shows that 82 high-level design changes were agreed with ONR when the UK EPR reactor was approved in 2012, leading to meaningful improvements to nuclear safety. This meant that EDF was in a position to understand indicative costs and likely schedule impact.

However, we accept that these high-level changes led to further downstream modifications.

EDF and AREVA did not provide any arguments of disproportionality in relation to any of the modifications.

We have not been able to identify evidence to support the figures quoted for 35% more steel and 25% more concrete. We estimate that the increase in concrete and steel due to our regulation is less than 5%.

Our review concluded that all the GDA design changes led to improvements to nuclear safety. We judge that these were required to satisfy our nuclear safety assessment principles, which are derived from international standards and good practice.

We exercise a proportionate approach to our regulation and will continue to enable the UK's energy ambitions while ensuring the fundamental standards of nuclear safety and security.

CASE STUDY 2

Regulating artificial intelligence (AI)

Challenge

Artificial intelligence (AI) is starting to enter the nuclear sector with substantial investment. Our horizon scanning activities have identified AI as a key trend, with significant potential benefits for nuclear safety and security but also some risks. At present, there is limited established relevant good practice allowing the benefits of AI to be realised, while ensuring the risks are appropriately managed. The purpose of this work was to explore AI applications, develop skills, and to provide clarity on our approach to regulating AI.

Approach

Alongside the EA, we developed initial approaches to the regulation of innovation in the nuclear sector, centred around encouraging and supporting the adoption of innovative solutions where it is safe and secure to do so. As noted in last year's report, we have trialled this in three forms: expert panels, the provision of advice, and regulatory sandboxing.

We convened an expert panel on the regulation of AI and an opportunity emerged from this work to sandbox the regulation of two applications of AI in the nuclear sector – AI to ensure appropriate and targeted plant maintenance, and real-time use of AI to facilitate the safe operability of robots in constrained spaces.

Working with the EA, we jointly developed a proposal and were successful in securing Regulators' Pioneer Fund (RPF) support to explore the sandboxing of potential methods to aid AI deployment in the interest of safety, security and environmental protection. The Control and Instrumentation Nuclear Industry Forum (CINIF) also provided additional funds for a contractor to support the project, by producing a mock safety, security and environment case, as well as facilitating the sandboxing process.

Outcome

The successful sandboxing of two specific applications of AI in the nuclear industry provided key findings [described in a joint report](#). This included consideration of the phased deployment of AI to build confidence, which will inform the development of our regulatory approach to AI, and areas of further focus such as understanding the complexity of the human/system interaction.

We have shared the sandboxing learning more broadly with, for example, the Nuclear Institute's AI4 Nuclear initiative, the UK Health and Safety Regulators Network – Innovation subgroup, the Alan Turing Institute's AI Standards Forum for UK Regulators, and international nuclear regulators.

In addition to informing the regulatory approach to AI, we see the expert panels and sandboxing as a key factor in improving and disseminating AI knowledge within our own organisation.

We are continuing to seek further AI sandboxing opportunities alongside the Environment Agency.

CASE STUDY 3

Risk-informed regulatory strategy at DRDL

Challenge

DRDL has been in enhanced regulatory attention since 2014. DRDL's plans to support a move to routine regulatory attention, overseen by us, delivered some improvements, but DRDL did not sustain these improvements. Accordingly, we increased levels of enforcement at site. During several years, our sub-division strategy had been to increase the regulatory footprint at site, however this did not achieve sustained improved outcomes in nuclear and site health and safety performance.

During 2022, we reviewed our propulsion sub-division strategy from a risk perspective. DRDL's programme of work is a key contributor to the risk profile at site and our review determined that our regulatory footprint was too extensive in several areas, while simultaneously being insufficiently targeted on some key aspects. Additionally, the DRDL and ONR propulsion sub-division strategies were no longer adequately targeting improvements that would support DRDL's move to routine regulatory attention. A key contributing factor was that both DRDL and ONR had become overly reliant on us identifying safety performance shortfalls, rather than DRDL having understanding and ownership of its own risks and their management. This effectively reduced DRDL's ability to demonstrate autonomy through its own leadership and internal challenge.

Mindful of DRDL's imminent increasing programme pressures, we saw a further risk that DRDL's challenging programme of work may take priority over nuclear safety and NSHS improvements.

Approach

Consequently, we changed our sub-division strategy. We stopped asking DRDL for a detailed plan to support a move to routine attention and instead focused on the key foundational areas of DRDL's leadership, organisational capability, decision making, learning, internal assurance and challenge. These are enabling criteria in GD13 – ONR Guidance on the assignment of dutyholder attention levels, and when adequately demonstrated in dutyholder arrangements and their implementation,

have the potential to achieve a desired outcome for both the regulator and the dutyholder, i.e. safe delivery of the dutyholder's programme.

Our strategy included raising a RI to monitor DRDL's progress on safe delivery of the programme during a period of 12 months. The key focus of the RI was on how DRDL demonstrated improved leadership, decision making, organisational capability, learning, internal assurance and challenge in support of adequate governance and assurance for safe delivery of the DRDL programme. We judged DRDL's progress through regular interventions with the leadership teams and the internal assurance function and reduced the number of other ONR inspections. Simultaneously, we increased our focus on inadequate safety performance including for LC7 compliance, control of work and working at height.

Outcome

Our change of strategy gave DRDL the opportunity to demonstrate autonomy, ownership and understanding of its risks, how they are managed, and how that management is assured, which are key factors in longer term sustainability of safety performance. This has also resulted in DRDL improving nuclear safety and NSHS performance outcomes.

DRDL's response to our change of strategy was positive and ultimately we now have increased confidence in DRDL's safe delivery of its programme. During the next reporting period, we will continue to seek evidence of sustainability of DRDL's improved safety performance. Should this remain on the current trajectory for a sustained period, it will provide evidence to support a recommendation for DRDL to move to a routine level of regulatory attention.

CASE STUDY 4

A risk-informed approach to transport regulation

Challenge

The UK has more than 600 transport dutyholders. The majority are not part of the nuclear power industry and are generically referred to as the 'non-nuclear sector'. These dutyholders include large multi-national radiopharmaceutical companies, industrial radiography providers and specialist carrier organisations.

A number of these dutyholders are also dutyholders for our safeguards and security purposes. The wide range of dutyholders, both geographically and in their business, means it is not possible to regulate them in the same way as nuclear licensed site dutyholders. Consideration of our limited resource and funding for non-nuclear compliance inspection and the financial impact on smaller dutyholders of multiple regulatory interactions is also a factor in the need to target dutyholders based on risk.

Approach

To address this, our Transport Competent Authority (TCA) has been developing a range of risk-informed approaches to identify and target dutyholders requiring inspection. These include:

- gathering and consolidation of transport dutyholder information to populate our Well-Informed Regulatory Decisions (WIReD) database. The capability provided by WIReD enables the TCA to record, analyse and utilise data more efficiently, allowing, for example, inspections to be grouped by location to reduce time spent travelling. WIReD also enables a risk-informed approach by allowing inspectors to view incident data, previous inspections, RIs and other operational experience to inform regulatory attention levels for each dutyholder. This is an ongoing programme of work due to the large number of such dutyholders;
- regular interfaces with our safeguards and security purposes have allowed us to carry out joint inspections which, where possible, address multiple inspection

aspects in a single engagement. This significantly lowers the burden on smaller dutyholders by reducing the number of engagements with us. Transport and safeguards inspectors also carry out spot checks on behalf of each other's purposes, allowing for additional basic checks without requiring both purposes to be at the inspection;

- following on from the arrangements developed during the COVID-19 pandemic, we have continued, where appropriate, with the use of virtual inspections for low risk and document-heavy inspections;
- we currently operate on behalf of three other regulators via powers agreed in Agency Agreement documents. We have also developed interfaces with other agencies (such as police forces and the DVSA) and regulatory bodies (such as the environment agencies) for sharing of best practice and knowledge transfer. Additionally, we have carried out roadside stops with national police Chemical, Biological, Radiological and Nuclear teams to dynamically assess compliance at the roadside;

Outcome

We completed 65 compliance inspections in 2023/24, and we participated in three days of roadside stops with DVSA and Northamptonshire Police. Of the 65 inspections, there were nine occasions where we were able to carry out multiple inspections (two to three) in one block of travel, which demonstrates the benefit of planning by location; saving overhead expenditure, travel time and resource effort.

We have developed a comprehensive WIReD dashboard to monitor progress/delivery to plan. It allows us to extract data for further analysis and assists with risk informed planning.

We have also developed and published a guidance document, 'What to expect when an ONR inspector calls', providing dutyholders with information ahead of any compliance inspections. The purpose of this document is to provide an overview of our inspection process, particularly for dutyholders who may not be familiar with us, and to allow the dutyholder to prepare properly for a planned inspection.

There remains a significant percentage of dutyholder entries in our WIReD system where data available is not fully populated. It is our intention to build a full transport dutyholder information portal for future planning, which is planned to begin during 2024/25.

Our risk-informed approach and cross-purpose working is already delivering benefits, for example joint inspections and virtual inspections (where the risk is low) are lowering the financial impact on smaller dutyholders.

By leveraging our data and targeting dutyholders, we are making better use of our limited resource and funding for non-nuclear compliance inspection. Focusing on those areas of greatest risk has a direct impact on safety and security outcomes, as well the associated efficiencies for both ONR and dutyholders.

CASE STUDY 5

Improvements realised in the management and processing of SNMs at Sellafield Ltd

Challenge

The SNM area of Sellafield site has faced significant high hazard risk reduction challenges during the last few years. These have included:

- delivering solutions to the package integrity risks associated with legacy packages stored within SNM North;
- improving the acute asset risks associated with the SNM North facilities;
- dealing with the legacy of the strategic decision to consolidate Dounreay Exotic packages on the Sellafield site; and
- supporting the Remediation Value Stream with dealing with acute package corrosion issues in Mixed Oxide (MOx) Demonstration Facility (MDF) Lab L.

These challenges led us to introduce three Level 1 RIs and resulted in movement into Significantly Enhanced Regulatory Attention a number of years ago to ensure Sellafield Ltd addressed these significant risks.

Approach

The focus of the 3 RIs has enabled the SNM Value Stream to make significant progress in addressing them through developing strategies and delivering new capabilities to deal with the clearly defined acute issues.

A key pillar in enabling delivery of improvements has been the development of an improved and enabling set of regulatory engagements. Fundamental to this has been:

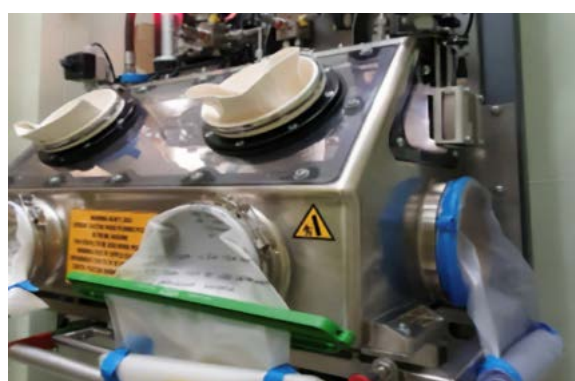
- open and honest early engagement on strategic issues to ensure there is a clear understanding that Sellafield Ltd demonstrates the level of risk has been reduced as low as reasonably practicable (ALARP) (including optioneering and risk appetite);
- enabling regulation through our project inspectors providing early advice and

guidance to allow Sellafield Ltd to consider feedback while delivering new capability; and

- a shared situational awareness on how Sellafield Ltd is trying to address these challenges so we understand the context of delivery and we can subsequently provide risk-informed judgements.

Outcome

- Significant investment by Sellafield Ltd in terms of resourcing and sanction;
- new capabilities developed to allow the repackaging of SNM within Finishing Line 4 and the introduction of retrievals within an inert atmosphere from the oldest store on site along with repacking of these materials for medium term storage. These new capabilities enabled the closure of one of the Level 1 RIs;
- delivery of a stabilised and improved asset envelope within SNM North including the construction of a new barrier to reduce fire risks, providing a modern robust barrier for a legacy finishing line undergoing decommissioning, replacing the legacy Electrical Distribution System in the facility. This work enabled the closure of a further Level 1 RI;
- developing a strategy and delivering new capabilities to allow the medium-term storage and repacking of the Dounreay Exotics into packages that can be treated through the future Sellafield Repackaging Plant (SRP). An updated store safety case is going through the permissioning stage, which will enable SL to begin to implement this strategy. This work has been identified as an action within the final Level 1 issue, which Sellafield Ltd is working towards delivering in 2024/25. Closure of the Level 1 RI is anticipated in 2027 upon completion of SRP; and
- utilising learning from the experience of resolving these challenges to drive the delivery of a bespoke solution to retrieve Lab L packages and transfer them for storage within the Dounreay Exotic Storage Facility (DESF).



CASE STUDY 6

Improving nuclear safety outcomes using internal regulatory capability at Heysham 1

Challenge

On 23 December 2023, the Heysham 1 (HYA) nuclear power station declared a site incident following the failure of a main steam valve on Reactor 1. The incident led to identification of safety concerns associated with the valves on Hartlepool (HAR) as well. As a result, both reactors on HYA and both reactors on HAR were shut down for three months. This constituted a reportable incident (more details in Annex 2).

HAR faced an additional challenge when the station suffered a brief loss of offsite reverse osmosis (RO) supplies in November 2023, at the same time having a concurrent defect on their water treatment plant. This meant the station was unable to maintain its demineralised water supplies and reserve feedwater tank (RFT) levels at the time dropped rapidly. The station quickly re-established RO supplies and replenished RFT levels.

The station made a case for continued operation through the safety case anomalies process at the time, on the basis that when the units were shut down, demineralised water usage would reduce to a level that would not challenge the claimed operator response times within the extant safety case. However, when the station shut down the HAR reactors due to the steam valve issue at HYA, demineralised water usage and losses increased and were outside the assumed losses within the safety case. This challenged the ability to meet the station's 24-hour and 72-hour extended loss of grid mission times.

Approach

Our Operating Reactors team developed and implemented a strategy of influencing EDF's INA to include ONR as a factor within its own concurrence strategy for eventual return to service (RTS) of any reactor at HYA & HAR. This meant we did not need to impose our own hold-point on RTS and provided INA with additional support and ability to influence EDF to complete the necessary remediation and provide robust safety justifications.

For the water stocks issue, our team made use of derived powers under EDF's LC 22 (Modification or Experiment on Existing Plant) arrangements to request the supporting justification for continued operation (JCO) for review and consideration.

Our assessment team engaged with INA assessors to ensure our early engagement, as JCOs were in production, did not undermine but enhanced their effectiveness.

Our site inspectors engaged with INA Station Evaluators to help ensure EDF adequately accounted for any residual nuclear and industrial safety risk posed by currently unmodified feedwater valves of a similar design. EDF plans to modify such valves as an ongoing programme of work.

Outcome

As a result of our effective engagement with INA, we optimised the required RTS hold points and prioritised our efforts in areas of greatest risk or uncertainty. Ultimately, our site inspectors communicated our position of no objection to INA Station Evaluators, enabling completion of their concurrence process.

In relation to the HAR water stocks challenge, our parallel working with the INA assessment team contributed to us reaching the position where we could provide timely communication to the licensee that we were content for them to implement their water stocks JCO

All return to service hold points were complied with efficiently and effectively, enabling the timely and safe return to service of the reactors at HYA and HAR.

CASE STUDY 7

Research – Climate change and potential impacts for GB nuclear industry

Challenge

Climate change may impact the magnitude and frequency of some natural hazards relevant to nuclear safety. However, there is uncertainty in how climate will evolve and how rapidly changes may occur.

Climate models, which aid our understanding of possible future climate scenarios, are also associated with uncertainties that need to be appreciated to inform risk management strategies. This is compounded by climate science being a dynamic area of research: the science is rapidly evolving with emerging theories, and new observations and information.

We tasked our Expert Panel on Natural Hazards, Meteorological and Coastal Flooding Hazards with providing us with literature reviews of relevant climate change topics.

Research Activities

The UK has experienced extreme weather events during the past few decades:

- high temperatures and heatwaves (July 2022);
- severe rainfall (Boscastle floods, August 2004); and
- low temperatures and snowfall (winter 2009/10).

We tasked our expert panel with providing us with a literature review on extreme weather events in the UK to address whether:

- the magnitude and frequency of extreme events is changing; and
- attribution of weather events to climate change has been made.

The expert panel carried out a comprehensive literature review of peer-reviewed papers published in reputable academic journals. They collated the key findings

from these papers into a technical report. We published the report on our website³⁶. To address our questions, the report:

- defined extreme weather;
- reviewed methods of assessing extreme weather events;
- reviewed the record of pre-historical weather events;
- reviewed the record of historical weather events;
- reviewed instrumental records of extreme weather events;
- discussed methodological and technical issues for understanding extreme weather events; and
- provided conclusions.

The paper found anthropogenically-forced climate change can be detected at small temporal scales based on the spatial patterns of weather events. However, it was also found that unforced climate variability over the UK region has been high in the past and probably higher than previous research has suggested. This is most likely the case for flooding, where the palaeoclimate and palaeoflood record shows recent floods may not be extremely large when considered in their long-term context. Extrapolation from only instrumental data sets may not capture the actual risk from future extreme events.

This demonstrates the importance of long-term studies of extreme weather and climate events, if we are to better understand the context within which recent extremes have occurred.

The report identified three emerging topics where additional research would be beneficial to inform our regulatory position:

tipping points – a tipping point in the climate system is a threshold that, if exceeded, leads to significant changes in the climate system;

model uncertainty – uncertainties in climate modelling are large and this means the usefulness of outputs needs careful consideration; and

compound events – the safety significance of compound events has had little study, and there is a need to understand the applicability of existing methods of analysis and exploring auto-correlations across multiple timescales.

We tasked our expert panel with providing us with a comprehensive literature review on these topics and with developing a report for each. These reports are currently in review and will be published on our website.³⁷

³⁶ ONR Research Project RRR-055: <https://www.onr.org.uk/media/orpnjasz/onr-rrr-055.pdf>

³⁷ <https://www.onr.org.uk/our-expertise/expert-panels/onr-expert-panel-on-natural-hazards/>

The preliminary findings are:

- tipping points – various tipping points have been identified in earth systems, some of which may have already been reached and others that may occur soon. Risk assessments should consider evidence for potential tipping points;
- model uncertainty – climate models have been remarkably successful in providing credible large-scale climate projections for many years. However, climate model uncertainties need to be better understood so future projections are made more robust, and better-informed risk management decisions are made considering these uncertainties; and
- compound events – temporally compounding events and the impact on infrastructure performance of prolonged sequences of storms is an important consideration, which may not be captured by a design basis event. Our understanding of the reliability of infrastructure, its time-dependent deterioration, and the impact of changing loads is currently limited. The adequacy of the design basis event approach needs to be considered as research into these topics develops.

Outcome

We have clarified our expectations in the latest revision of the External Hazards Technical Assessment Guide (TAG) (NS-TAST-GD-013, Issue 9)³⁸. This includes explicitly clarifying that we expect design basis events to be reviewed on a periodic basis for relevant hazards (such as those affected by climate change), and a revised design basis event to be defined, where necessary.

Using the expert panel insights and revised guidance, we are working with industry to ensure it meets our expectations on climate change and associated safety substantiations.

The External Hazards TAG has been structured so the more detailed hazard annexes and supporting expert panel papers can be updated on a regular basis, if required, and we will continue to monitor the adequacy of our regulatory guidance.

³⁸ <https://www.onr.org.uk/publications/regulatory-guidance/regulatory-assessment-and-permissioning/technical-assessment-guides-tags/nuclear-safety-tags/ns-tast-gd-013-external-hazards/>

CASE STUDY 8

Research – Seal Ring Groove Wall Debris

Challenge

Production of low carbon electricity through operation of the Advanced Gas-cooled Reactors at Heysham 2 and Torness formed a critical part of the UK's strategy for achieving net zero and ensuring energy security.

These reactors are operating beyond their intended design life and are encountering ageing mechanisms which include fuel brick cracking leading to seal ring groove wall debris which can affect the movement of fuel in and out of the reactors. EDF states the cracking mechanism is understood and predictable, and hence operation is safe.

EDF routinely inspects its reactors' graphite cores to confirm the assumptions within its models. There is uncertainty in the degradation and inspections can reveal unexpected behaviour. The challenge is understanding whether any unexpected observations undermine the general understanding and hence safe operation.

The presence of cracking outside the region of highest assumed stress (Figure 11) challenged EDF's understanding of graphite ageing and EDF's ability to predict the condition of the reactors. EDF's ability to predict the ageing of the reactors is of paramount importance to our confidence in allowing reactors to return to service.

EDF argued this cracking was caused by a unique condition of fuel position and stress profile. It was therefore necessary for us to form a view on the adequacy of EDF's position and whether to agree return to service.

Research activity

Graphite experts from the University of Manchester (UoM) are internationally recognised. They have provided independent expert advice to us on subjects including graphite material behaviour, graphite weight loss and analysis techniques since 2003.

The UoM team has developed a suite of analysis models which can quickly and effectively simulate the stresses within the graphite bricks in the reactor. This allows

the UoM to respond efficiently to our requests for independent and informed views on a host of graphite behaviour aspects and their potential causes and extent.

We commissioned the UoM to investigate the observed cracking and provide an independent view. This included running finite element models (Figure 12) to evaluate and test potential causes and infer the extent of cracking.

Safety Intelligence Gained

The UoM work provided the following insights:

- The analysis models revealed how fuel position could amplify the temperature (Figure 12) and hence stresses within the given brick;
- There are natural fluctuations in neutron dose due to the position of individual fuel elements which affect the axial distribution of stress in a graphite fuel brick; and
- The models also showed how the stresses in the brick (Figure 13) are affected by fuel position. The models indicated a small region of elevated stress in the vicinity of the partial crack observation which then reduces above the observation.

Outcome

The work provided a rapid and independent response, which supported EDF's claim that the observation was supported by their current understanding.

The technical support from UoM's experts was invaluable and enabled our specialist inspectors to understand the unique conditions in the reactor. This allowed us to adopt a proportionate position with respect to the unexpected observation and hence gain confidence that safe operation was justified.

Figure 11: Partial Height Axial Crack Observed at Heysham 2 R7 (Source: EDF)

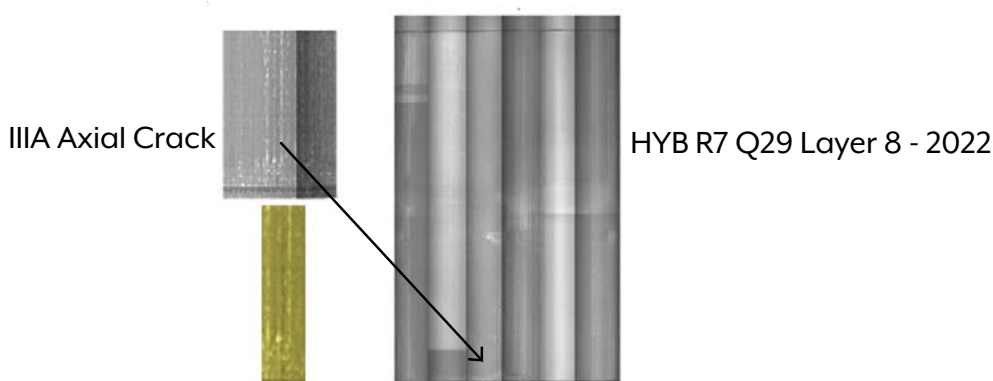


Figure 12: Illustration of how the increase in temperature (dark region at the bore) is localised when fuel becomes eccentric

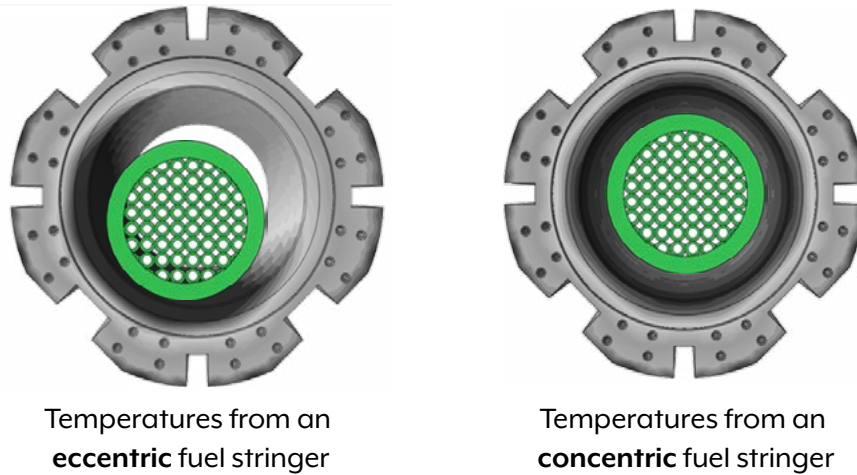


Figure 13: Variation in stress with axial distance from the bottom of the brick (solid line) plotted over FE model of a moderator brick. Stress in excess of material strength (dotted line) indicated potential for crack growth (source University of Manchester)

