Office for Nuclear Regulation

Ref	Project Title	Project Aims / Description	Specialism		ONR Comments - APRIL-JUNE 2021	ONR Comments - JANUARY-MARCH 2021	ONR Comments - OCTOBER-DECEMBER 2020	ONR Comments - JULY-SEPTEMBER 2020
ONR-RRR-004	Optimising Development Techniques using Project Statistics (Combination) CINIF	This work involves the use of statistical analysis to identify techniques which have been found to be most effective in avoiding, discovering and removing faults in safety-critical software. The outcomes will be used to strengthen the definitions of relevant good practice and reasonable practicability in this area.	**EC+I**	Current Status:	Project is on hold (not currently funded). ONR continues to be in contact with the singleton contractor that has limited resources.	Project on hold (not currently funded). ONR continues to be in contact with the singleton contractor, who has limited resources / time available.	Project on hold. ONR continues to be in contact with the singleton contractor who has provided some preliminary catch up material after being unavailable for some time, which may allow the project to recommence during 2021	Project on hold due to unavailability of singleton contractor. Although this is not causing ONR any immediate issues, the lack of progress is delaying the potential identification of long term improvements to RGP.
				Look Ahead :	The hope remains that there may be some progress in 2021 to complete work outstanding from the previous contract.	The hope remains that there may be some progress in 2021 to complete work outstanding from previous contract.		ONR continues to be in contact with the singleton contractor who remains currently unavailable to work
ONR-RRR-007	Goal-based Assessment of COTS Products for Safety-related Systems (COGS) CINIF	Development of a goal-based assessment framework for commercial off-the-shelf (COTS) products, allowing greater flexibility in making a safety justification while ensuring that all safety relevant attributes of the product are demonstrated. Recent work is focusing on deployment strategies for licensees, and the extension of the framework to programmable logic controllers.	**EC+I**	Current Status:	This project remains on track. Work is progressing as planned.	On track	On track	On track
				Look Ahead :	Next meeting scheduled on 14 September 2021	Next meeting scheduled for 12 May 2021	Next meeting scheduled for 14 January 2021	Next meeting scheduled for 14 January 2021
ONR-RRR-008	Deploying Claims Arguments and Evidence (Declare) CINIF	Builds on previous work developing the key concepts of claims, arguments and evidence (CAE) to balance the benefits of increased clarity, rigour and precision with flexibility and sensitivity to constraints including costs and resources. Supports regulation of the hazards arising from the UK's existing operational nuclear sites, waste storage and decommissioning facilities. The safety case approach is used to justify and evaluate modifications on existing plant.	**EC+I**	Current Status:	This project remains on track. Work is progressing as planned.	On track	On track	On track
				Look Ahead :	Next meeting scheduled on 14 September 2021	Next meeting scheduled for 12 May 2021	Next meeting scheduled for 14 January 2021	Next meeting scheduled for 14 January 2021
ONR-RRR-011	MISTS2	Aim is to develop practical guidance (based on experimental evidence) to determine the extent of the hazardous areas associated with flammable mists and the likely consequences of ignition (severity of ensuing fire and/or explosions)	**Fault Analysis - Internal Hazards**	Current Status:	During the Stakeholder meeting on July 15th 2021, the Gas Turbine Research Centre and HSE provided a progress update across the 3 project work packages (WPs). The experimental work across all 3 WPs is complete with high quality outputs which have identified flammability sensitivities in relation to diesel mists in small and large scale tests and the acute sensitivity to elongated slot release geometries. HSE has produced draft reports to document the findings. I asked HSE about the overall project reporting format and timeline for final, public facing reports. The HSE project lead responded that the WP report drafts are complete, and his plan was to match the approach followed in MISTS1. There will be scientific reports on each WP and an overall report that summarises the practical outcomes and learning. The HSE project lead agreed that the latter will be shared with the stakeholder group for comment ahead of publication. Information on the indicative publication timescales was deferred to the outcome of an internal HSE work prioritisation discussion on week commencing 19th July. The HSE Computational Fluid Dynamic (CFD) specialist noted that there had been significant interest in MISTS1 results, and that we should expect interest and challenges to MISTS2 findings, as they seem to hint towards the need for hazardous area classification for mists from very low pressures. I commented that it was important to document the test bounds and assumptions so that future practical guidelines do not overlook key factors such as the fact that the ignition source used was strong (and hopefully uncommon in most diesel handling environments).			
				Look Ahead :	I suggested that it would be beneficial for the group to reconvene to discuss how the project learning will be taken forward in, for example, EI's standard reviews, and consider/ rank key factors/ knowledge gaps that merit further investigation. The HSE project lead agreed and indicated that he intended to organise a meeting in September and this will coincide with provision of final reports for ONR (and other stakeholder comment). Receipt of final reports in September. Overall the project objectives have been fully achieved.			
ONR-RRR-017	Membership and Attendance of CAMP/CSARP.	This project maintains ONR/UK access to the USNRC reactor physics, thermal hydraulics and severe accident codes such as RELAP, TRACE, and MELCOR. It allows ONR to continue to be a member of and attend the meetings of the USNRC organised Code Applications and Maintenance Programme (CAMP) and Cooperative Severe Accident Research Programme (CSARP)	**Fault Analysis - Fault Studies DSA**	Current Status:	**CSARP** The UK member organisations (code users) including the MoD have maintained access to the relevant updates, no major issues reported. Work is ongoing to ensure the related Non Disclosure Agreements (NDAs) are actively processed, updated and maintained as appropriate. This year's subscription via US-NRC invoice has now been processed. Both the European MELCOR User Group (EMUG) 2021 and CSARP 2021 were arranged virtually in April and June with limited scope and focus. These provided an opportunity to hear about and influence the latest code developments and challenges experienced by the code users and how these are being viewed by other international regulators. The USNRC is increasingly looking to have a better understanding of the Fukushima learning and fuel performance in Spent Fuel Pond (SFP) post Loss of Coolant Accident (LOCA) and fire.	No activity has taken place during this quarter. Progress will be reported next quarter following a meeting in April.	Work is progressing well within the member organisations; no major issues reported. Work is ongoing to ensure the related NDAs (non-disclosure agreements) are actively updated and maintained. There are additional requests for membership, which are being processed as appropriate. This represents increased nuclear activity in the UK. CSARP 2020 was arranged virtually in Sept. with limited scope and focus (2020/278443).	Work is progressing well within the member organisations, no major issues reported. There are additional requests for membership, which are being processed as appropriate. This represents increased nuclear activity in the UK. Members requesting for access to the code whilst working from home has been resolved with the USNRC agreement. CSARP 2020 was arranged virtually in Sept. with limited scope and focus.
				Look Ahead :	**CSARP** - US-NRC has announced plans for a series of Non-Light Water Reactor (LWR) Public Schedule Virtual Workshops which are developed by Oak Ridge National Laboratory and SNL, and financed by NRR and US-NRC to share the latest developments relating to these reactors. This has been cased within ONR. Arrangements for April and June 2022 will be subject to prevailing travel advise, but currently US-NRC has proposed in person events.	The EMUG 2021 (European MELCOR User Group), is currently planned for 16 April 2021	The EMUG 2021 (European MELCOR User Group), is currently planned for Q2. Future arrangements will be subject to prevailing travel advice.	The EMUG 2021, is currently planned for Q1. Future arrangements will be subject to prevailing travel advice.

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ONR-RRR-021	Research into Board Performance, Corporate Governance relevant Good Practice and Impact on Nuclear Safety	We will undertake research into the area of corporate governance in order to provide clear underpinning evidence in support of ONR's interventions. The aim of the research would therefore be to answer the following overarching research questions 1. Does good corporate governance result in good health and safety performance? And if so, 2.What are the key elements of corporate governance that contribute to good health and safety performance?	**Human & Org Capability**	Current Status:	The Thomas Ashton Institute has been identified as the preferred organisation to undertake the research. The research project is currently going through ONR internal process for the letting of a single tender contract **Progress since last update -** Research programme has been revised to start in September 2021 which should allow completion by March 2022.			
				Look Ahead :	Further discussions with Thomas Ashton Institute have taken place. Documentation has been prepared and is now with the PL for review.			
ONR-RRR-024	Development of Technical Baseline for Packaging of Radioactive Waste and Spent Fuel and for long-term Interim Storage	Long-term interim storage of radioactive waste and spent fuel, pending disposal to a geological disposal facility, present a challenge to the nuclear industry. The aim of this research topic is to monitor Academic papers/research into behaviour of packaged radioactive waste or fuel and its use in the nuclear industry, commercial waste packaging products being introduced within the nuclear industry and the Involvement of licensees in research or commercial products.	**NLR**	Current Status:	**Scope moved into RRR-113 for FY 21/22**	ONR continues to support relevant industry group meetings on a regular basis; it is ONR's opinion that these meetings are effective in sharing good practice and therefore provide ONR with suitable information to support this research need. However, due to COVID-19, very few interactions have taken place, although research activities have continued in the background.	ONR continues to support relevant industry group meetings on a regular basis; it is ONR's opinion that these meetings are effective in sharing good practice and therefore provide ONR with suitable information to support this research need. However, due to COVID-19, very few interactions have taken place, although research activities have continued in the background.	ONR continues to support relevant industry group meetings on a regular basis; it is ONR's opinion that these meetings are effective in sharing good practice and therefore provide ONR with suitable information to support this research need. However, due to COVID-19, very few interactions have taken place, although research activities have continued in the background.
				Look Ahead :	Project closed	Currently, most meetings are on hold due to COVID-19 restrictions.	Currently, most meetings are on hold due to COVID-19 restrictions.	Currently, most meetings are on hold pending relaxation of COVID-19 restrictions. Currently considering impact of draft NDA Strategy 4 on future interactions.
ONR-RRR-025	Safety Implications of the Design, Construction and Operation of a Geological Disposal Facility	This work involves research into methods for construction and operation of a geological disposal facility and includes safety implications of access shaft/tunnel construction, phased construction and emplacement of waste packages, handling of large waste packages in confined spaces underground and also knowledge capture and transfer from other countries (e.g. France, Finland) and industries (e.g. mining). The outputs are to support future regulatory decisions regarding design, construction and operation of a GDF.	**NLR**	Current Status:	ONR has adequate engagement with Radioactive Waste Management (RWM) on its current research activities to build confidence in RWM's Research & Development (R&D) strategy and technical delivery. As the Geological Disposal Facility (GDF) programme moves into the site characterisation phase, RWM will develop its generic concepts into site-specific designs; this will enable identification of relevant topics with potential for targeted regulatory research projects. Until such time, ONR considers its current level of engagement to be proportionate and fit-for-purpose. **Progress since last update:** There have been no specific interactions with RWM on R&D in this reporting period.	ONR has adequate engagement with RWM on its current research activities to build confidence in RWM's R&D strategy and technical delivery. As the GDF programme moves into the site characterisation phase, RWM will develop its generic concepts into site-specific designs; this will enable identification of relevant topics with potential for targeted regulatory research projects. Until such time, ONR considers its current level of engagement to be proportionate and fit-for-purpose. Progress since last update: There have been no specific interactions with RWM on R&D in this reporting period.	ONR has adequate engagement with RWM on its current research activities to build confidence in RWM's R&D strategy and technical delivery. As the GDF programme moves into the site characterisation phase, RWM will develop its generic concepts into site-specific designs; this will enable identification of relevant topics with potential for targeted regulatory research projects. Until such time, ONR considers its current level of engagement to be proportionate and fit-for-purpose. **Progress since last update:** Routine update meeting held with RWM on its R&D Strategy in December 2020. RWM briefed regulators on its updated Science & Technology Plan and international collaborations at Underground Research Laboratories. ONR has continued confidence RWM is managing its R&D to ensure research needs associated with safe operations at a GDF are identified and addressed to facilitate delivery of its GDF programme.	ONR has adequate engagement with RWM on its current research activities to build confidence in RWM's R&D strategy and technical delivery. As the GDF programme moves into the site characterisation phase, RWM will develop its generic concepts into site-specific designs; this will enable identification of relevant topics with potential for targeted regulatory research projects. Until such time, ONR considers its current level of engagement to be proportionate and fit-for-purpose. **Progress since last update:** No engagement with RWM in this period on R&D. RWM formally launched its Research Support Office with a virtual conference in mid-September.
				look Ahead :	Meeting planned covering Safeguards which will likely discuss relevant aspects of RWM's R&D strategy and portfolio. Context: The Regulatory Research Register project ONR-RRR-025 will continue to monitor the implementation of the Geological Disposal Technical Programme and RWM's research portfolio to ensure that it delivers the required research outputs to underpin and support the implementation of geological disposal. RRR-025 will also identify topics where ONR may require additional research to underpin future regulatory decisions as uncertainty associated with the disposal concept reduces and detailed designs are developed.	Meeting planned in Q1 2021/22 covering Safeguards which will likely discuss relevant aspects of RWM's R&D strategy and portfolio. Context: The Regulatory Research Register project ONR-RRR-025 will continue to monitor the implementation of the Geological Disposal Technical Programme and RWM's research portfolio to ensure that it delivers the required research outputs to underpin and support the implementation of geological disposal. RRR-025 will also identify topics where ONR may require additional research to underpin future regulatory decisions as uncertainty associated with the disposal concept reduces and detailed designs are developed.	ONR is aware of preliminary work to consider feasibility of borehole disposal for the UK inventory of higher activity waste. Should this study result in a decision to explore this option in further detail, ONR may need to consider research to assist development of regulatory understanding of the concept. Context: The Regulatory Research Register project ONR-RRR-025 will continue to monitor the implementation of the Geological Disposal Technical Programme and RWM's research portfolio to ensure that it delivers the required research outputs to underpin and support the implementation of geological disposal. RRR-025 will also identify topics where ONR may require additional research to underpin future regulatory decisions as uncertainty associated with the disposal concept reduces and detailed designs are developed.	Meeting planned for October 8 on the alternative concept of deep borehole disposal of radioactive waste. Context: The Regulatory Research Register project ONR-RRR-025 will continue to monitor the implementation of the Geological Disposal Technical Programme and RWM's research portfolio to ensure that it delivers the required research outputs to underpin and support the implementation of geological disposal. RRR-025 will also identify topics where ONR may require additional research to underpin future regulatory decisions as uncertainty associated with the disposal concept reduces and detailed designs are developed.
ONR-RRR-027	NDT (Non Destructive Testing) Research in the area of Structural Integrity	This research project covers membership of the "Research Centre for Non Destructive Evaluation" and attendance for ONR specialist inspectors at events and meetings organised by the organisation. The aim of this project is for ONR to gather information on up to date Non Destructive Evaluation techniques to inform current and future regulatory decisions in this specific technical area which can form a significant aspect of nuclear safety cases. The forum is also an opportunity for ONR to set regulatory expectations to industry and academia in this area.	**Structural Integrity**	Current Status:	The RCNDE (Research Centre for Non Destructive Evaluation) has maintained its virtual working arrangements in view of COVID-19 restrictions. The academic activities are progressing although there has been an inevitable reduction in laboratory activity due to COVID-19. ONR has participated in the RCNDE board meeting, technology transfer events and meetings to develop the 5yr strategy. The RCNDE was unsuccessful in its Engineering and Physical Sciences Research Council (EPSRC) bid for a new research base but this is judged to not impact the effectiveness of RCNDE in the foreseeable future. ONR is reviewing RCNDE activities to see what could relate to advanced nuclear technologies.	The RCNDE (Research Centre for Non Destructive Evaluation) has maintained its virtual working arrangements in view of COVID-19 restrictions. ONR attended several sessions in Q4 2020 (Technology transfer events, board meetings). ONR participated in the industrial members meeting in March to develop the next phase of the strategy (undertaken every 5yrs). ONR has supported a bid by RCNDE for EPSRC (Engineering and Physical Sciences Research Council) funding to extend its research base. If successful ONR will sit on the steering group. The review of time of flight diffraction performance has been postponed as there is no longer an urgent need.	While COVID-19 restricts meetings the RCNDE (Research Centre for Non Destructive Evaluation) has established an effective substitute with WEBEX; this does not hinder the dissemination of results. ONR attended several sessions in Q4 2020. ONR has supported a bid by RCNDE for EPSRC (Engineering and Physical Sciences Research Council) funding to extend its research base. If successful ONR will sit on the steering group. Review of US NRC work programmes is underway on modelling and human reliability. Ultrasonic inspection of rough defects review continues in the context of recent submissions	As a result of COVID-19. alternative arrangements for these meetings have been made using WebEx. The focus has been on reviewing NDT developments associated with the ultrasonic inspection of rough defects to support the UKHPR1000 GDA activities. Progress since last update: Participation in WEBEX RCNDE meetings.
				Look Ahead :	ONR attendance at the US EPRI workshop on high temperature NDE is being considered. RCNDE Quarterly board and progress meetings.	RCNDE Technology transfer event and board meeting in May. Future review of time of flight diffraction performance. Results of the RCNDE bid to the EPSRC for widening its research is expected. It is expected that the pace of the research output from the RCNDE will pick up as universities return to the laboratories.	The result of RCNDE's bid to EPSRC will be announced. Progress of RCNDE research activities will be presented. Ongoing review of rough defect responses. Review of time of flight diffraction performance to be assessed.	
ONR-RRR-028	Fracture Mechanics – Defect Assessment Procedures	The code "R6" is a fracture mechanics approach used by EdF. This project is to allow ONR to maintain a presence at the R6 panel. Attending these meetings allows ONR to both influence and benefit from the development of the code. ONR's attendance at the R6 panel helps ensure that EDF Energy's research is appropriate to support R6's continued use as part of safety case justifications .	**Structural Integrity**	Current Status:	Activities observed show that the development of the R6 Defect Assessment code is being managed adequately. **Progress since last update -** I observed the R6 Panel meeting on the 20th May 2021	Activities observed show that the development of the R6 Defect Assessment code is being managed adequately. **Progress since last update:** No activity has taken place this quarter. **Context:** Attendance as an observer at R6 panel meetings twice a year to review ongoing developments in the R6 methodology related to flaw characterisation and advanced finite element evaluation of cracks and crack growth. ONR seeks to ensure that new methodologies in these areas remain conservative.	Activities observed show that the development of the R6 Defect Assessment code is being managed adequately. A R6 panel meeting was held on the 5th November . At the meeting the new R6 panel chair introduced themselves. It was stated that the way the R6 / R5 panel is supported is changing, but that this should not have a detrimental impact on the maintenance of the R6 code.	Activities observed show that the development of the R6 Defect Assessment code is being managed adequately. **Progress since last update:** There has been no activity on this research task within this reporting period. The chairman of the R6 Panel has changed due to the resignation of person currently holding that role. A new Chair has been appointed and will lead the next R6 Panel meeting.
				Look Ahead :	No activity is planned in the next quarter. Attendance as an observer at R6 panel meetings twice a year to review ongoing developments in the R6 methodology related to flaw characterisation and advanced finite element evaluation of cracks and crack growth. ONR seeks to ensure that new methodologies in these areas remain conservative.	The next R6 panel is due to take place on the 20th May 2021.	The next R6 panel is due to take place within November.	The next R6 panel is due to take place within November 2020.

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ONR-RRR-029	Assessment of High Temperature Degradation of Structures	High temperature material degradation is an active mechanism and industry understanding and management of this issue is not considered to be fully mature and continues to evolve. EDF Energy has updated the R5 methodologies and has included a number of different routes through the assessment procedure. ONR needs to be assured that these new procedures retain sufficient conservatisms and that the licensee is adequately addressing high temperature degradation. ONR's attendance at the R5 panel helps ensure that EDF Energy's research is appropriate to support R5's continued use as part of safety case justifications .	**Structural Integrity**	Current Status:	The last EDF-NGL panel meeting, as attended by ONR, was undertaken on the 19th May 2021 (2021/40796) with a scheduled future programme of panel meetings (the next being in November 2021). Meetings to date have demonstrated steady progress to updates to the R5 procedures with Revision 3 of the procedures being endorsed by the panel this year. Work also continues on individual technical subjects supporting ongoing development of the procedures (with external review and support) and its application not only to current Advanced Gas Reactor (AGR) fleet but for future Advanced Modular Reactor (AMR) designs. Consequently I consider that adequate progress is being made.	No panel meeting has taken place since last update. However, work is ongoing with panel members currently actioned to review updates to R5 Vol 2/3 appendices for their endorsement for use. Consequently, adequate progress is being made.	Panel meeting observed on 4 November 2020 Adequate progress noted in key areas.	No panel meeting taken place since May, however confidence in progress gained via routine email comms and receipt of 2020-2024 R5 program document.
				Look Ahead :	EDF's recent R5 programme document provides the strategy until 2023. It should be noted that risks to the longevity of the R5 development programme is posed by the reliance on a small number of personnel within the R5 panel member organisations. This has been recognised by the panel and succession planning is currently under development, for which ONR will maintain regulatory oversight on.	Next panel meeting to be confirmed with May 2021 likely.	Next panel meeting planned for Apr or May 2021	
ONR-RRR-030	Environmentally Assisted Cracking (EAC) of Light Water Reactor Structural Components – Corrosion	EAC is a major research topic for both nuclear industry and regulators around the world with established and extensive programmes of research in this area, including the International Co-operative Group on Environmentally Assisted Cracking (ICG-EAC) in Light Water Reactrors (LWRs). This group meets on an annual basis and the meetings are attended by regulators, manufacturers, utilities, academic researchers, and funding agencies from the international nuclear community. Attending these meetings allows ONR to both influence and benefit from the work of the group.	**Structural Integrity**	Current Status:	All interactions virtual due to the pandemic. Good engagements regarding forward planning and technical steering.	A virtual meeting is now planned to allow exchange of information and engagements.	The project technical committee is assessing the feasibility of a virtual meeting to ensure that the most up to date material is shared with the group and appropriate operational experience is disseminated in a timely manner.	Due to Covid 19 pandemic the annual meeting has been cancelled, however a virtual meeting and sharing of data was planned. The information has been instrumental in developing a position statement for targeted ageing and degradation mechanisms.
				Look Ahead :	Realistic plans for future interactions are currently under development with earliest possible meeting date in mid 2022.	Further interactions within the group are planned for 2022.	Planning for next year's meeting is on-going and preparations for technical exchanges are progressing well. The project remains an invaluable source of information for inspectors.	Planning for next years meeting is on-going and preparations for technical exchanges are progressing well. The project remains an invaluable source of information for inspectors.
ONR-RRR-031	IBID Membership/Irradiation Embrittlement Project	Information from the Information Base on Irradiation Damage (IBID) is central to the understanding of through-life degradation of the UK-Evolutionary Pressurised Reactor (EPR) The Generic Design Assessment (GDA) process for this plant discovered that EPR Reactor Pressure Vessel (RPV) geometry will mean that the test results expected from this plant will be out-with the expectations from world data.	**Structural Integrity**	Current Status:	Membership in place until March 2022			
				Look Ahead :	Progressing as planned			
ONR-RRR-032	The Brick Cracking network	ONR consider it is necessary to commission independent research to provide confirmation of assumptions underpinning safety case claims and to support independent decision making regarding Advanced Gas-cooled Reactor (AGR) graphite. ONR has commissioned a group of industrial and academic organisations to provide independent research in this area. The group is referred to as the Brick Cracking Network (BCN). The group interacts with other ONR regulatory research areas, namely the Graphite Technical Advisory Committee (GTAC) and research activities specific to the University of Manchester. Without this research, ONR would be wholly reliant on the licensee's research and unable to derive independent judgements in this highly specialised area.	**Structural Integrity**	Current Status:	Progress and spend in line with prediction Current spend rate and progress against specified deliverables is within normal expectations A progress meeting was held on the 23rd June during which progress against key tasks was presented. BCN have been adapting their work programme to support the emergent issues at Heysham B (HYB) and Torness (TOR) Reports on weight loss at Dungeness B (DNB) and Flexural Strength of various sites were provided during this period. The Y2Q1 progress report was also sent The programme of work provides a basis for expert advice on aspects of the licensee's graphite core safety case. Of particular importance is the support given by HSL in providing an independent prediction of the onset and rate of cracking within the AGR cores. This work has been particularly important to ONR's consideration of the restart of reactors at HNB/HPB following graphite core inspections.	Progress and spend in line with prediction. Current spend rate and progress against specified deliverables is within normal expectations. Progress since last update: A progress meeting was held on the 23rd March during which progress against key tasks was presented. Reports on Notch Strengthening and a cracking prediction for HPB were provided during this period. **Context:** The programme of work provides a basis for expert advice on aspects of the licensee's graphite core safety case. Of particular importance is the support given by HSL in providing an independent prediction of the onset and rate of cracking within the AGR cores. This work has been particularly important to ONR's consideration of the restart of reactors at HNB / HPB following graphite core inspections. Looking forward, HSL's advice regarding changes to the licensee's cracking progression models will be an important as KWRC at both HRA/HYA and HYB/TOR is anticipated in the next few years. The work being conducted by Birmingham University on fracture of graphite is also increasing in importance as the material property assumptions are challenged and new debris formations are postulated. The work being conducted by Birmingham University on the fracture of graphite will assist in advising ONR as to whether the removal of conservatism by EDF is appropriate.	Progress and spend in line with prediction Current spend rate and progress against specified deliverables is within normal expectations. **Progress since last update:** A progress meeting was held on the 22nd December 2020 during which progress against key tasks was presented. The research priorities were presented for year 2 and the general scope of the tasks to be completed was agreed. This will be converted into a year 2 plan in January 2021. **Context:** The programme of work provides a basis for expert advice on aspects of the licensee's graphite core safety case. Of particular importance is the support given by HSL in providing an independent prediction of the onset and rate of cracking within the AGR cores. This work has been particularly important to ONR's consideration of the restart of reactors at HNB / HPB following graphite core inspections. Looking forward, HSL's advice regarding changes to the licensee's cracking progression models will be an important as KWRC (KeyWay Root Cracking) at both HRA/HYA and HYB/TOR is anticipated in the next few years. The work being conducted by Birmingham University on fracture of graphite is also increasing in importance as the material property assumptions are challenged and new debris formations are postulated. The work being conducted by Birmingham University on the fracture of graphite will assist in advising ONR as to whether the removal of conservatism by EDF is appropriate.	Progress and spend in line with prediction. Current spend rate and progress against specified deliverables is within normal expectations. **Progress since last update:** A progress meeting was held on the 8th September 2020 during which progress against key tasks was presented. In addition a series of technical meetings have been held to discuss the more detailed points. Within the last reporting period EdF have announced that the predicted date at which the onset of keyway root cracking (KWRC) is reached at HYA / HRA is earlier than anticipated. We have engaged with the BCN to determine how we can change the planned work to provide the relevant advice to ONR assessors in a timely manner. Within the last reporting period I have obtain permission to accelerate the spend rate on the BCN project to bring certain tasks earlier. HSE who manage the BCN contract are re-confirming what could be accelerated and will propose a revised spend rate and plan. It is still expected that the acceleration will amount to and additional £60k over 6 months. **Context:** The programme of work provides a basis for expert advice on aspects of the licensee's graphite core safety case. Of particular importance is the support given by HSL in providing an independent prediction of the onset and rate of cracking within the AGR cores. This work has been particularly important to ONR's consideration of the restart of reactors at HNB / HPB following graphite core inspections. Looking forward, HSL's advice regarding changes to the licensee's cracking progression models will be an important as KWRC at both HRA/HYA and HYB/TOR is anticipated in the next few years. The work being conducted by Birmingham University on fracture of graphite is also increasing in importance as the material property assumptions are challenged and new debris formations are postulated. The work being conducted by Birmingham University on the fracture of graphite will assist in advising ONR as to whether the removal of conservatism by EDF is appropriate.
				Look Ahead :	Looking forward, HSL's advice regarding changes to the licensee's cracking progression models will be an important as Keyway Root Cracking (KWRC) at both HRA/HYA and HYB/TOR is anticipated in the next few years. The work being conducted by Birmingham University on fracture of graphite is also increasing in importance as the material property assumptions are challenged and new debris formations are postulated. The work being conducted by Birmingham University on the fracture of graphite will assist in advising ONR as to whether the removal of conservatism by EDF is appropriate.			See above
ONR-RRR-033	Graphite Technical Advisory Committee (GTAC)	ONR considers it is necessary to commission the generation and activities of the Graphite Technical Advisory Committee (GTAC). GTAC provides expert opinion to ONR on the assumptions underpinning safety case claims and on emergent graphite issues to support ONR's independent decision making.	**Structural Integrity**	Current Status:	Progress and spend in line with prediction. **Progress since last update -** The 79th GTAC meeting was held on the 17th June 2021. Due to the complexity and number of the safety cases currently under consideration within the graphite area there are a number of new and active questions. Progress against the questions raised has been good the current spend is in line with forecast.	Progress and spend in line with prediction. **Progress since last update:** The 78th GTAC meeting was held on the 2nd March 2021. Due to the complexity and number of the safety cases currently under consideration within the graphite area there are a number of new and active questions. Progress against the questions raised has been good and the current spend is in line with forecast. Questions 65 and 69 were closed out this quarter with the information directly supporting ongoing assessments.	Progress and spend in line with prediction. The 77th GTAC meeting was held on the 10th December 2020. Due to the complexity and number of the safety cases currently under consideration within the graphite area there are a number of new and active questions. Progress against the questions raised has been good, and the current spend is in line with forecast. Two new members were welcomed to the GTAC and have already been deployed on the relevant sub-groups.	Progress and spend in line with prediction. **Progress since last update:** The 76th GTAC meeting was held on the 24th September. Due to the complexity and number of the safety cases currently under consideration within the graphite area there are a number of new and active questions. Progress against the questions raised has been good the current spend is in line with forecast. Two new members have been proposed at the 76th meeting and will hopefully be available shortly to join the relevant sub-groups.
				Look Ahead :	The next GTAC meeting will be held within the next quarter.	The next GTAC meeting will be held within the next quarter.	The next GTAC meeting will be held within the next quarter.	The next GTAC meeting will be held within the next quarter.

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ONR-RRR-038	Emphasis Tool CINIF	EMPHASIS assessment is the preferred approach to justifying the production excellence of smart devices in the UK. The process is maturing but there remain issues to be addressed. Maintenance of EMPHASIS and improving the documentation supports ONR's core purpose of regulating the hazards arising from the UK's existing operational nuclear sites, waste storage and decommissioning facilities.	**EC+I**	Current Status:	The general maintenance / support to Emphasis users is working as expected. Concerns: none at the moment.	The general maintenance / support to Emphasis users is working as expected; Emphasis discovery phase is about to be completed (target: end of April 2021). - Concerns: none at the moment. Next steps of Emphasis development to be discussed and agreed by CINIF members on completion of this task.	The general maintenance / support to Emphasis users is working as expected; Emphasis discovery phase has recently restarted (kick off meeting in November 2020; first technical meeting in December 2020).	the general maintenance project is proceeding as expected. Emphasis re-development currently paused (see below) Concerns: at the moment the lack of progress in Emphasis re-development is not critical but could become so in the near future (e.g. HPC) unless prompt actions are taken. This issue was discussed at the Emphasis workshop in Cheltenham in February and at the CINIF project meeting in March.
				Look Ahead :	Next steps of Emphasis development to be discussed and agreed by CINIF members on completion of this task.		Discovery phase on track to be completed by the end of this FY; next steps of Emphasis development to be discussed and agreed by CINIF members on completion of this task.	CINIF has recently agreed to finance this project and a kick off meeting is expected in Q3 / Q4 2020.
ONR-RRR-039	FPGA Guidance CINIF	The use of Field Programmable Gate Arrays presents some novel aspects that sets them apart from more familiar programmable devices. The verification of these components is therefore an area that requires investigation in order to establish relevant good practice for the justification of their use in nuclear safety applications. The objective of this research project is to explore the availability and suitability of static and dynamic analysis techniques and tools for the verification of FPGAs across the whole integrity range.	**EC+I**	Current Status:	Project meeting took place April 2021. EDF confirmed that CINIF funding for this project has been agreed for this financial year. Comments on the draft Safety Case Framework report discussed, further discussion required at the next meeting. Further discussion took place regarding Field Programmable Gate Array (FPGA) bitstream verification, actions remain to further investigate this topic with chip manufacturers.	ONR comments provided on draft report "Developing a Claims–Arguments–Evidence Framework for FPGAs in Nuclear Safety Systems". Updated version to be discussed at the next project meeting.	TSC engaged. Contents of draft report "Developing a Claims–Arguments–Evidence Framework for FPGAs in Nuclear Safety Systems" discussed at meeting with Licensees and the TSC in December 2020. Draft report submitted to the working group for comment end of December 2020	Specification for agreed research topic "the development of safety cases for FPGAs in nuclear safety systems" drafted and discussed with Licensees. Final comments to be provided by mid- October prior to commission of a TSC contract by EDF NGL to undertake the work.
				Look Ahead :	Project meeting scheduled for July 2021 to further discuss comments on the safety case framework report.	Project meeting to discuss the latest version of report "Developing a Claims–Arguments–Evidence Framework for FPGAs in Nuclear Safety Systems" scheduled for April 2021. Further development of the framework expected in the coming months.	Working group to provide detailed comments on draft report to TSC by end of January 2021; report to be published end of February 2021.	Contract for agreed research topic to be placed, work to commence.
ONR-RRR-046	Security of Computer-Based Systems Important to Safety CINIF	This work supports ONR's core purpose of regulating the hazards arising from the UK's existing operational nuclear sites, waste storage and decommissioning facilities. Particular focus is on commercial off the shelf (COTS) equipment such as programmable logic controllers (PLCs), SCADA systems and smart instruments. The research will consider vulnerabilities, forensics, intrusion prevention (such as anti-virus and whitelisting), intrusion detection and use of tools across different platforms. The design principles developed advance relevant good practice which is used as a benchmark in evaluating modifications on existing plant.	**EC+I**	Current Status:	Project is on track - (although there have been delays due to COVID and access to the University Lab, this problem continues). The three projects that started in September 2020 were completed at the end of April 2021 with the Students writing up their reports. These reports will not be available until they have gone through due process at the university and is therefore likely to be in the autumn. The Lab at Glasgow University is continuing to be developed with further test beds and training facilities.	Project is on track - (although there have been delays due to COVID and access to the University Lab, this problem continues). We still await the reports from the four student projects 'completed' during the summer. I will follow up on this.	Project is on track - (although there have been delays due to COVID and access to the University Lab, this problem continues). The four student projects 'completed' during the summer are as follows; 1.Identifying potential cyber incidents in ICS (Industrial Control Systems) 2.Network discovery for ICS 3.Cyber security of 5G and wireless technologies for ICS 4.Utilising threat modelling to support ICS digital forensics The reports for these are yet to be issued but should be done in the coming weeks. As mentioned above, due to very restricted access to the lab, these projects have been 'desk top' research and hence not as comprehensive as they would have been if lab access had been available.	Project is on track - (when considering the impact of COVID-19 on University attendance). The reports have now been received and these were; •Assessing the Scalability Benefits of Portable ICS Testbeds for Training •A Functional Evaluation Framework for Digital Forensic Tools in Industrial Control Systems •SCADA Data Acquisition and Analysis Toolkit The research has continued on from the previous work in the following four topic areas; 1. A visualisation tool for the analysis of PCAP files 2. Utilising threat modelling to support the acquisition of valid digital forensic data from ICS 3. Identifying potential cyber incidents in ICS where software detection mechanisms have failed 4. Suitability of incorporating 5G Cellular Technologies into ICS networks from a security perspective Reports are currently being completed on these tasks and will be available towards the end of the year.
				Look Ahead :	Since the last students completed their work in April, due to the impact of COVID the next students will not be in place until September so there is/will be no research happening between April and September. However, in this interim period we are having meetings with other CINIF members to discuss the past research project and what projects might be appropriate going forward.	The next project meeting is scheduled for 29 April, which will again be virtual, where the results and output of the current projects will be presented and future research directions can be discussed further.	The three new projects that started in September 2020 are as follows; 1.Network discovery and Visualisation 2.PLC Forensics and Anomaly Detection 3.Utilising Variable Speed Drives (VSDs) for cross-network layer attacks. The lab is being developed further to include two projects a) Water Treatment plant that will simulate a number of functions. And b) a hoist system that will be a generic system used in a large number of applications, including the nuclear but many other systems in CNI. Glasgow University advised that the Masters students wouldn't be starting back on their course until Jan-21 rather than Sep/Oct-21 due to COVID-19. This means that follow on activities will also be later, therefore their exams are likely to be in Aug-21 (rather than May-21) and their project work completed in Sep-21 rather than Jun-21. This means the project reports for these will probably not be available until Jan/Feb-22.	During the progress meeting with CINIF, (25 august 2020) the task sheet for the upcoming phase of research between September 2020 and April 2021 with the undergraduate and MSc masters students was provisionally agreed with project industry sponsors. The specific objectives and expectations of each project will be discussed and agreed in an upcoming meeting between project members and CINIF. The four projects that are being taken forward includes a continuation on from the project work packages from the previous session and includes: 1. Digital Forensics and Data Acquisition 2. Network Discovery 3. ICS Cyber Incident Trigger Points 4. The Security of 5G and Wireless Technologies Deployed in ICS The next meeting is scheduled for November
ONR-RRR-048	Human Reliability Data for Modern Control Room Environments	Traditional Human Reliability Analysis (HRA) methods can fail to accurately model the effects that software navigation has on reliability. This is internationally recognised and it is important that ONR maintains its understanding in this area given that all new reactor designs coming into the UK feature some level of risk important HCI (Human Computer Interaction). This work is needed to support GDA and new build.	**Human & Org Capability**	Current Status:	Resource shortages within the team are holding up internal review. TSC author is also working on high priority remedial work on GDA.	Still undergoing review. Divisional priorities have impacted the availability of team review. No major concerns identified with the report based on initial reviews.	The final draft version of this report was completed by the TSC (Technical Support Contractor) in November 2020. It was issued to ONR in January 2021 and is currently undergoing review.	Having seen the content and the planned updates, I am not concerned about deliverable quality. Progress since last update: Report now completed to informal draft status and is currently being updated to formal draft submission for comment / review. Due EO month (October)
				Look Ahead :	May consider further contract extension so as to avoid further conflicts with GDA programme.	Contract extended to Aug 21 to enable review activities to be completed	ONR will commence its review E/O Jan with the aim of a finalised version of the report in March 2021	
ONR-RRR-053	Research to provide support to ONR in the area of Nuclear Graphite Structural Integrity (Contract ONR313)	This work will allow ONR to make proportionate and informed judgements relevant to the operability of the Advanced Gas-cooled Reactors (AGRs). Thus we will be able to make a constructive challenge to the licensee's safety case, based on a detailed understanding, supported by our own analyses. The NGRG (Nuclear Graphite Research Group, University of Manchester) has broad and deep knowledge of graphite moderated reactors (in particular AGRs) and irradiated graphite core and graphite property behaviour. Importantly, this proposal secures the independence of four academics for ONR and prevents them from working on work directly funded by EDF.	**Structural Integrity**	Current Status:	Progress and spend in line with expectations **Progress since last update -** University of Manchester (UoM) has actively supported several GTAC questions on weight loss over this period. A new PostDoctoral Research Associate (PDRA) has been appointed and is making progress getting up to speed with the ONR 313 work area. Thankfully the PDRA completed their PHD in Graphite Whole Core Modelling so will have a shorter learning period. The UoM has continued to support ONR through the development of new dimensional change models to support the BCN forecasts of brick cracking. An adhoc task is also ongoing to support ONR's response to emergent issues at Heysham B (HYB) R7.	Progress and spend in line with expectations **Progress since last update:** UoM has actively supported several GTAC questions on weight loss over this period. The new PDRA has left the UoM to take up a position in industry. A recruitment process has begun with interviews scheduled to take place at the end of April 2021. It is expected that the spend rate will reduce until the replacement is in post. A progress report has been produced documenting the work within the period Oct – Dec 2020. **Context:** The work assists ONR to understand more fully the uncertainty and appropriateness of the Licensee's assumptions in their safety case. In particular aspects dealing with brick cracking and the resultant increase in core distortion which arises from brick cracking. Advisors from Manchester university are involved in GTAC questions on whole core modelling and graphite material property models. They have also been invited at my request to an EDF level 4 technical meeting on EDF's new real time core damage seismic model.	Progress and spend in line with expectations. We met the new PDRA (Postdoctoral Research Associate) and he is getting up to speed with the background to the task. It is expected that he will start delivering work by the end of Q1 2021. A discussion has been held with UoM to convey the research priorities and how these affect the work that is planned for 2021. Context: The work assists ONR understand more fully the uncertainty and appropriateness of the Licensee's assumptions in their safety case, in particular aspects dealing with brick cracking and the resultant increase in core distortion which arises from brick cracking. Advisors from the University of Manchester are involved in GTAC questions on whole core modelling and graphite material property models. They have also been invited at my request to an EDF level 4 technical meeting on EDF's new real time core damage seismic model.	Progress and spend in line with expectations. **Progress since last update:** The University of Manchester (UoM) have appointed (subject to contracts) a new PDRA to replace the PDRF who resigned. UoM have stated that the new replacement has good Finite Element knowledge but will require support in subject areas of nuclear and graphite material. The UoM has been engaging with the BCN to confirm and plan the interactions between the BCN and ONR313 contracts. This will lead to a discussion about the work plan next year. The ONR 313 has now been formally extended from October 2021 to August 2022. **Context:** The work assists ONR understand more fully the uncertainty and appropriateness of the Licensees assumptions in their safety case. In particular aspects dealing with brick cracking and the resultant increase in core distortion which arises from brick cracking. Advisors from Manchester university are involved in GTAC questions on whole core modelling and graphite material property models. They have also been invited at my request to an EDF level 4 technical meeting on EDF's new real time core damage seismic model.
				Look Ahead :	A progress meeting is planned with UoM within the next quarter.	ONR will participate in the interviews for the replacement PDRA and a progress meeting is planned with UoM within the next quarter.	A progress meeting is planned with UoM within the next quarter.	A progress meeting is planned with UoM within the next quarter.
ONR-RRR-055	Investigation of Weather data trends and effect on Extreme Value Analysis	It is possible that the UK is experiencing more frequent severe weather, possibly as a result of climate change. For nuclear facilities the External Hazard design basis criterion is based upon an event which is conservatively calculated. This work aims to establish to what extent the UK is experiencing more frequent extremes and establish the potential effect of the change in weather pattern on the evaluation of design basis weather parameters at various exceedance frequencies.	**Civils + External Hazards**	Current Status:	Report has been drafted and iterated with ONR. Final version with ONR for review and acceptance.	The literature review is complete and the report has progressed through ONR's review process. The report is back with the Expert Panel (EP) to address ONR's review comments.	Project report updated to include peer review comments has taken longer than expected. Report is due for ONR review and approval prior to publication to the ONR website.	Project report updated to include peer review comments. Report going through final ONR review and approval prior to publication to the ONR website.
				Look Ahead :	Report to be reviewed and accepted by end July. Will then be published to the ONR website.	The EP has committed to addressing ONR's comments by end April 2021. The report will then go for approval and publication to the ONR website.	ONR is looking to publish the report by end of the FY.	

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ONR-RRR-063	Proven in Use	Proven-in-use (PiU) arguments to build confidence in the reliability of a Programmable Electronic System (PES) component are discussed by many standards. However, guidance on which sources of data might be relevant, how one might increase confidence in a source of data, and any weighting that should be applied to high quality or particularly relevant sources of data is lacking. The outcomes of this work will strengthen the definition of relevant good practice and reasonable practicability in this area.	**EC+I**	Current Status:	Potential candidate device identified for extended trial of the framework.	Potential candidate device identified for extended trial of the framework. Delay in commencement of assessment due to licensee resource availability.	Current Status: Project meeting held 9 November 2020 to discuss consolidated feedback on PiU (Proven in Use) framework and agree next steps.	Remote workshop held over three sessions on 18 August, 25 August and 25 September, to review PiU framework and agree amendments.
				Look Ahead :	Delay in commencement of assessment due to licensee resource availability.	Project meeting to be arranged for May to discuss next steps and work scope for 2021.	Investigation into candidate devices for further trials ongoing, with a view to undertaking trials on Q1 2021	Project meeting to be arranged for November to discuss next steps. Aim for further case studies to be carried out Q1 2021
ONR-RRR-064	Wireless Communication	The output from this research project will improve the definition of relevant good practice as applied to the use of wireless technology in nuclear safety applications, and thus support ONR assessment of reasonable practicability. It will also help ONR inspectors to assess safety case claims and arguments as applied to the use of wireless technology.	**EC+I**	Current Status:	Wireless testing underway at NDA facility.	Wireless testing underway at NDA facility.	Test facility has been secured which will allow extended testing to be carried out.	SL identified opportunity to carry out wireless testing at NDA facility and is progressing development of detailed specification. However resource constraints mean progress remains slow. No per missioning is dependent on this project, as the testing is related to a case study and is not a 'live' project. The output will ultimately determine if CINIF believes it is feasible to implement wireless technology in safety applications. ONR maintains regulatory oversight of CINIF activities to de-risk potential regulatory decisions in future but there is no per missioning associated with CINIF activities.
				Look Ahead :	Meeting to discuss project next steps delayed due to resource availability	Meeting to discuss project next steps to be held w/c 26 April.	Detailed test specification to be finalised with a view to completing tests in Q2 2021.	Test documentation to be circulated to stakeholders for comment and dates for testing to be confirmed.
ONR-RRR-071	PRISME 3	PRISME 3 is an experimental research programme designed to investigate fire behaviour in mechanically ventilated conditions representative of nuclear operational facilities. The PRISME 3 programme follows on from the findings from the previous two PRISME experimental campaigns. The focus of PRISME 3 is on multi-compartment fires in under-ventilated conditions with ventilation systems and real fire sources. PRSIME 3 AWG (Analytical Working Group) is an international programme and ONR involvement will enable us to both influence and benefit from the work.	**Fault Analysis - Internal Hazards**	Current Status:	• A 4 day PRISME 3 meeting was held on the 7-10 June 2021 to discuss project progress, completion and next steps. • All of the PRISME 3 tests have been completed. • Any of the test and analysis reports which have been issued are available on the PRISME website. The EFCS D3-D4 analysis report and CFP Diva (corridor) test and analysis reports have not yet been issued. The EFCS D3-D4 analysis report will be available 2nd quarter of 2021. • CFP – DIVA (Corridor) specification was delayed to early 2021. 3 fire tests were completed April – June 2021. Test reports will be available in October 2021 and analysis report end of 2021. • The PRISME 3 Project is due to be completed by the end of 2021, although the programme has worked hard to deal with the impact of COVID and all the experimental work is now complete. **Analytical Working Group** • In April 2021 ONR held a UK AWG webinar which was well attended by Licensees, other industry stakeholders and academics.	**Experimental** •In general the PRISME 3 team have continued to work well despite the delays induced by COVID, and have adapted the test schedule accordingly. The experimental programme is in the final stages and work will start on the final project report. •The campaign on Smoke, Stratification and Spread (S3) was completed in 2019 and all reports issued. For the Electrical Cabinet Fire Spread (ECFS) campaign, 4 tests have been completed, each in SATURNE and DIVA, and the analysis reports for the DIVA tests will be circulated in 2021. For the Cable Fire Propagation (CFP) campaign, 2 tests were completed in SATURNE and 3 tests completed in DIVA. The analysis reports for the tests should be issued by the end of the year for SATURNE and in early 2021 for DIVA. The remaining 3 tests for CFP-DIVA had been postponed. •IRSN need to produce the final summary report and an application report that may require the Project to be extended into 2022. The Management Board could decide on the Project extension when the required period becomes clearer. •Proposals to define the next phase of PRISME (PRISME 4) has also been provided to ONR for review.	**Experimental** •In general the PRISME 3 team have worked well to account for the delays induced by COVID, and have adapted the test schedule accordingly. A full update was provided in the PRISME 3 meeting held in December 2020. •All the electrical cabinet fire tests have been completed with the analysis reports being drafted for the later tests. •Several cable fire tests had to be postponed due to the COVID restrictions and rescheduled for late 2020, with the remaining tests moved in to early 2021. •Project is still on track for completion in 2022. •Discussions have been held to determine interest and define a project to follow-on from PRISME 3. Participants have been requested to provide feedback to IRSN by mid-February 2021 on the topics for a follow-on project and their ranking, with the intent to develop a specific proposal during late 2021 for finalisation in 2021. Analytical Working Group •Step 2 of the benchmark modelling has been completed. ONR have submitted their results. Analysis of the comparison of method between each international partner is underway and due to be submitted mid 2021. •Benchmark 3 data inputs have been agreed based on the spreadsheet issued by ONR.	**Experimental** - Due to Coronavirus the programme's planned experimental activities had been delayed; however IRSN, have worked to recover the programme, and experiments continue. -Test reports received from fire detection tests and benchmark exercises. - June PRISME meetings successfully held. **Analytical Working Group** - ONR has provided their contribution to Bench mark exercise 2 and is working on preparation for BM3. - Engagement with the UK industry continues and feedback being used to inform UK approaches. - Meeting held on 5th October to discuss final sp**ecifications on next modelling activity (Benchmark exercise 3)**
				Look Ahead :	Finalisation of the experimental programme, reporting of key findings and presenting finding following the bench mark exercises. There will be an impact on the delivery of the main report, although summary reports for each campaign have been delivered. As a result, it was agreed to nominally extend the PRISME 3 project for a period of six months. This extension would be related to the closure of the project and therefore, no impact to costs to the UK is expected. • Work is underway to assess the areas that PRSIME 4 could investigate, and questionnaires have been issued. This has already been shared with UK licensees for input.	Finalisation of the experimental programme, reporting of key findings and presenting finding following the bench mark exercises. •The scheduled next main board meeting is to be held in June 2021. Analytical Working Group •ONR's contribution to the AWG is on schedule with the main aspects and sensitives being investigated. A national working group to be hosted by ONR and ATKINS is scheduled on the 22nd April 2021.	Forward Look: •Next PRISME 3 meeting TBA •Review of topics for PRISME 4	Next PRISME meeting will be held on WB 7th December 2020 over video conference.
ONR-RRR-072	NEA Fire Database project	The main purpose of the FIRE project is to encourage multilateral co-operation in the collection and analysis of data relating to fire events. The objectives of the NEA Fire Project are to collect fire event experience, collect and analyse fire events over the long term, generate qualitative insights into the root causes of fire events, establish a mechanism for efficient operation feedback on fire event experience and record characteristics of fire events in order to facilitate fire risk analysis. Involvement in this international work will enable ONR to both influence and benefit from the work.	**Fault Analysis - Internal Hazards**	Current Status:	The issue with Microsoft Access that was preventing use of the database has now been resolved. **Progress since last update -** A number of events are now ready for submission onto the database and two years are now complete. I attended a virtual meeting in April where we discussed project management and work planned for remainder of the current phase.	I am continuing to enter fire data onto the database. Currently addressing compatability issues through OECD NEA and our IT provider.	The project is progressing well. Another 8 UK events have been uploaded to the database in December 2020 and January 2021. The database has now been distributed to both Magnox and Sellafield Ltd in addition to the licensees who already have a copy. There have been some issues with the move to new IT and the version of Office. We now have a test version of the next version of the database and Cancom are testing it now.	Despite the coronavirus epidemic, the project is progressing well. I am still entering events onto the database and making sure licensees are given the opportunity to access the database if they are interested.
				Look Ahead :	I am planning to prepare a question set to gauge interest in small modular reactors and advanced nuclear technologies and applicability of the database. We have a questionnaire from Spain on fire regulation and I will continue to code and enter events onto the database.	I will continue to enter events onto the database. The next FIRE project meeting is due to take place in April and will be remote. I need to make contact with Magnox again to discuss their participation.	I will continue to code past events with EDF NGL. I am planning to start coding Magnox decommissioning events as soon as possible. The next FIRE project meeting is planned for April/May this year and will be carried out remotely.	I am continuing to work with EDF NGL to code and enter events onto the database. This is taking slightly longer than usual due to the pandemic. I have had discussions with Magnox and I am trying to encourage them to support me in including decommissioning events which will become more useful in future.
ONR-RRR-074	FABIG – access to fire and explosion knowledge and good practices 2020-2023	The Fire and Blast Information Group (FABIG) is a membership group dedicated to the dissemination of technical knowledge and good practice in the prevention, control and mitigation of fire and explosion hazards, and the protection of people and plant from the consequences of these hazards. The group was established in 1992 in the wake of the Pipe Alpha disaster and is highly regarded as an authoritative source of technical knowledge amongst the high hazard industries. Involvement in this group will enable ONR to both influence and benefit from the work.	**Fault Analysis - Internal Hazards**	Current Status:	Webinars continued to be well attended by ONR internal hazards inspectors during this period and remain highly topical. The frequency of webinars has increased and they all had been topical to ONR: -'Publicly Available Data and Interpretation From Large Liquid Hydrogen Releases' - Wednesday 5th May 2021. - 'Gas Turbine Enclosures: Determining Ventilation Safety Criteria Using Hydrogen Explosion Modelling' - Wednesday 19th May 2021. - 'Preliminary Analysis of Gas Release and Dispersion Behaviour Relevant to the Use of Hydrogen in the Natural Gas Distribution Network' - Wednesday 23rd June 2021. - 'A comprehensive test programme for Blast Resistant Modular Buildings (BRMs) - Phase 2' - Wednesday 9th June 2021. - Near-Field Blast Loading: Challenges, Unknowns and Opportunities' - Wednesday 7th July 2021.	Webinars continued to be well attended by ONR internal hazards inspectors during this period and remain highly topical. They included: The work of LASTFIRE - Ensuring a smooth transition to PFAS free firefighting foams through research and testing by Niall Ramsden, LASTFIRE (Wednesday 27th January 2021) A comprehensive test programme for Blast Resistant Modular buildings (BRMs) by : Ali Sari, Omega-Risk (10th February) Risk Management of Electrochemical Energy Storage Systems (Wednesday 17th March 2021) Hydrogen and ammonia Vapor Cloud Explosions by Darren Malik, Baker Risk (Wednesday 31st March 2021)	Webinars continued to be attended by ONR inspectors during this period and remain highly topical. They included: - INTRODUCTION TO STRUCTURAL FIRE ENGINEERING 28 October 2020. - SIMPLIFIED TOOL FOR EXPLOSION LOAD DECISION SUPPORT - LINDA FLOTTUM, AKER SOLUTIONS & JENS JOHANSSON GARSTAD, DNV GL, 09 December 2020	A research effectiveness review has been undertaken with the views of the project officer and professional lead so far received. The ONR consensus is that the webinars remain highly topical and a key CPD tool for ONR internal hazards inspectors, chemical engineering and other specialisms. The virtual lunchtime seminars and new website allow more frequent events with the following planned for the remainder of the year:
				Look Ahead :	Future planned webinars continue to be topical to NIHSS and ONR: TITLE: The "Design-Case Fire" Approach to Evaluating and Solving Fire Protection Needs Date: 21st July 2021		Further webinars and technical newsletter have been announced: - 'The benefits of blind benchmarking of probabilistic Explosion Risk Analysis (ERA) studies' to be held on Wednesday 13th January 2021 -The work of LASTFIRE - Ensuring a smooth transition to PFAS free firefighting foams through research and testing on 27th January 2021 Both are highly relevant to ONR internal hazards and fire safety inspectors and attendance has been encouraged.	INTRODUCTION TO STRUCTURAL FIRE ENGINEERING - BASSAM BURGAN, SCI, 28 October 2020. LUNCHTIME WEBINAR | RECENT ENHANCEMENTS IN PREDICTING SUBSEA DISPERSION OF GAS FROM BLOWOUTS AND PIPELINE FAILURE - JAN ERIK OLSEN, SINTEF 11 November 2020 LUNCHTIME WEBINAR | RISPEX - SIMPLIFIED TOOL FOR EXPLOSION LOAD DECISION SUPPORT - LINDA FLOTTUM, AKER SOLUTIONS & JENS JOHANSSON GARSTAD, DNV GL, 09 December 2020

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ONR-RRR-079	Develop Storm Hazard Curve Methodology	Consideration of combinations of weather hazards is important in the analysis of external hazards that can affect nuclear sites. Hazards currently tend to be considered in isolation, even when those hazards are highly correlated . The risks due to combined hazards may be more onerous than hazards occurring individually, particularly if the individual hazards are highly correlated. The outcomes will be used to strengthen the definitions of relevant good practice and reasonable practicability in this area.	**Civils + External Hazards**	Current Status:	Project continuing. Student progressing towards end of second year of PhD. ONR and LU presented at the Extreme Value Analysis conference end June 2021.	Milestone deliverable submitted. Lancaster University has progressed the project and begun addressing ONR's feedback	Lancaster University presented the research project to members of CEEH (ONR Civil engineering & External Hazards) on 17 December 2020, which was well received and feedback provided. Next steps have been identified and agreed. Project is progressing.	Progress meeting with Lancaster University on 3 September to discuss progress (see ONR-TD-CR-20-107). PhD student has provided ONR with 10 month progress report, which supports their transition to the PhD proper. Progress in line with expectations.
				Look Ahead :	24 month review, for which the Student will need to produce a plan for my PhD thesis, this will be discussed to ensure it meets ONR's needs.	Project ongoing - circa one-two years remaining of PhD. Meeting arranged for April 2021 with Lancaster University to discuss progress and possible publication of research.	Next milestone is due circa September 2021. Regular contact will be maintained during this time.	
ONR-RRR-083	Low Temp / High Temp Performance of seals during fault recovery, possibly relevant to other fixtures and fittings attributed to transport packages	The regulation for the transport of radioactive material requires that a package containing active content shall remain leak tight in severe conditions including an accident, a 30 minute fire, or temperatures as low as -40 °C. In order to prevent the activity (solid, liquid or gas) from being released the packages usually use elastomeric seals. The outcomes of this work will be used to strengthen the definitions of relevant good practice and reasonable practicability in this area.	**Mechanical Engineering**	Current Status:	Project Completed.	First draft report delivered. Contents are satisfactory and reflect original scope.	Project on-going and on track. Frequent KITs and contact with Jacobs. Satisfied with progress to date.	Project underway. Successful kick-off meeting to define scope of work. No current issues or concerns identified. Project running on track. **Progress since last update:** Literature review being conducted. Progress meeting due in coming weeks to define structure and contents of final report, aligning to ONR expectations.
				Look Ahead :	Final report to be published on ONR's external website.	Warrant extended to account for delays due to COVID-19 and to allow time to review external stakeholder input and publish updated (final) report.	Draft copy of report due mid-Feb. for comment from ONR. Currently no identified project-blockers preventing progress.	Project update meeting due Friday 30th October 2020.
ONR-RRR-090	Treatment of Rainfall in Off-site Deterministic Radiological Consequence Analysis	This work aims to improve practice in nuclear safety by improving guidance on the treatment of rainfall for off-site consequences in Design Basis Analysis . The potentially increased deposition that would result from rainfall washing out the plume in the vicinity of the representative individual on whom the analysis is based is not explicitly included. Rainfall is a reasonably foreseeable occurrence at UK nuclear sites, and there is a potential cliff-edge effect associated with increased dose received by the representative individual through higher ground shine and ingestion doses for long-term exposures.	**RP Criticality EP+R**	Current Status:	Contract now raised.	Contract has just started after delays due to COVID.	Covid-19 rebaselining of Research projects: RRR-090 due to start Jan-2021	Covid-19 rebaselining of Research projects: RRR-090 due to start Jan-2021
				Look Ahead :	Work to be completed by August 2021			
ONR-RRR-094	Methods to determine High Efficiency Particulate Air (HEPA) filter ageing and cumulative effects of Dispersed Oil Particulate (DOP) testing on filter performance. Phase 1 - 3	The objective of this research project is to ensure ONR has continuing access to independent scientific and technical expertise in the area of High Efficiency Particulate Air filter (HEPA) filter ageing and degradation and its impact on nuclear safety. The project will examine ageing mechanisms and how these affect filter performance and material condition, e.g. strength, in both normal operations and design basis fault conditions where significant demand may be placed upon HEPA filters.	**Mechanical Engineering**	Current Status:	Technical research completed, final stage of phase 1 – 3 is editorial changes to report and stakeholder engagement at industry forum. Phase 4 budget confirmed and work order specification in development.	Regulator comments on draft final report being compiled - target end April 21. Final report completion pending FY 21-22 budget sanction. **Progress since last update:** - Editorial review of draft final report in progress. - Technical Supprt Contract (TSC) engagement to explain status of draft report and likely timescales for next phase.	Draft Final report received from TSC. Regulator review meeting completed (13-01-21). Final report completion pending FY 21-22 budget sanction. **Progress since last update:** - TSC delivered draft final report. - Regulator review meeting of draft report completed(13-01-21). Scope and content considered adequate pending editorial revision. - Research proposal submitted for subsequent phase and additional budget to complete industry (NNVF - National Nuclear Vent Forum) engagement.	Project delivery of scope progressing. Output of Phase 1-3 expected by end of calendar year. Content delivered to date is adequate in quality and technical coverage. Progress since last update: Fraser Nash consultancy delivered the draft literature review for phase 1 – 3 in line with the delivery schedule on the (07/08/20) and presented to ONR and the Environment Agency (24/08/20). The project is expected to deliver the original scope (Phase 1-3) however an overspend has been predicted by FNC. The overspend is considered reasonable (stakeholder engagement was underestimated). An informal inquiry request regarding application for additional funds submitted
				Look Ahead :	Phase 1 – 3 draft report delivered, with editorial comments prepared for final update and a significant stakeholder engagement planned for September 2021. Additional scope of work for editorial review and stakeholder engagement budget confirmed and tender in final stage for direct award.L69 L69		1) Industry engagement (NNVF) pending FY21-22 budget sanction. 2) Future research scope (previously phase 4 and 5 of RRR-094) developed based on phase 1-3 output. 3) Revised scope and budget submitted to ONR Research for approval.	
ONR-RRR-095	Adept, CINIF	Agile development process for smart devices (ADEPT) applies an approach that follows the Agile Manifesto and the 12 principles of the Agile framework. Agile development process involves incremental and iterative propagation of features. Each iteration is made up of a number of phases, progressing from the requirements definition, through design, implementation and testing with a set of questionnaires that intend to be consistent with the IEC61508's software development lifecycle that demonstrates the V-model.	**EC+I**	Current Status:	Project is on track. No concerns for delivery of work. **Progress since last update** - Workshop meeting held 23/6/21 on phase 3 proposal.	Project is on track, no concerns about the delivery of this work.	Project is on track and no concerns about the delivery of this work	Project is on track, no concerns about the progress of this work.
				Look Ahead :	A further meeting is being arranged and proposal for phase 3 to be submitted.	A further meeting is being arranged in coming weeks to close-out the phase 2 report actions.	A further meeting is to be arranged to complete the remaining phase 2 work.	A further meeting is to be arranged within the next few weeks to discuss ONR and EDF NGL's comments.
ONR-RRR-096	The efficacy of peer checking – Research to better understand its effectiveness	The aim of this research is to investigate recently identified uncertainties in the benefits of peer checking. Research carried out in the medical sector questions the material benefits of peer checking with respect to reducing human error. There is also anecdotal evidence that a UK organisation has dropped the use of peer checking as it found that aggregated responsibility (split between two people) offered lower reliability than when responsibility was vested in a single person. The outcomes of this work will strengthen the definition of relevant good practice and reasonable practicability in this area.	**Human & Org Capability**	Current Status:	Progress is on target with no current technical issues identified. **Progress since last update -** The kick off meeting for this project was held 15th July 2021. Communication has so far been effective. Materials were shared well in advance and the supplier had taken into account the feedback ONR provided during the procurement phase, which was evident in their kick off presentation. The supplier has been proactive in establishing and communicating their research design ahead of the kick off meeting. The team composition has altered slightly, however I am satisfied that this has enhanced the skills match, which again, is positive. Sufficient ONR resource is in place to manage this contract.	Work was put onto Contract April 2021. New ONR lead assigned to this project	Covid-19 rebaselining of Research projects: RRR-096 delayed but due to start March 2021	Covid-19 rebaselining of Research projects: RRR-096 due to start Nov-2020
				Look Ahead :	3 x monthly project KITs. Report issued to ONR for comment scheduled 8th October. Project currently estimated to complete 29th October 2021.	Prelim meetings planned May 21.		

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ONR-RRR-098	THEMIS (THAI Experiments on Mitigation measures, and source term issues to support analysis and further Improvement of Severe accident management measures)	THEMIS is the follow on project to the THAI experiment conducted in 3 phases from 2009 – 2019. ONR participated in THAI 2 and 3. THEMIS will consist of a series of large scale experiments and analytical activities. The investigations, undertaken by OECD/NEA, aim for severe accident management improvement, validation of safety analysis codes and direct transfer of knowledge to reactor cases, e.g. by means of integral tests under typical severe accident conditions The scope of THEMIS focuses on those safety issues identified as the most significant, based upon the opinion of 49 experts from 22 countries representing 28 organisations, including ONR.	**Chemistry + Chemical Engineering**	Current Status:	Currently updating financial justification	Covid-19 rebaselining of Research projects: RRR-098 delayed but due to start in the next financial year.	Covid-19 rebaselining of Research projects: RRR-098 delayed but due to start March 2021	Covid-19 rebaselining of Research projects: RRR-098 due to start Nov-2020
				Look Ahead :				
ONR-RRR-100	Research into the sensitivity of load time functions to aircraft impact threat definitions	This research is to investigate the consequence / sensitivity of aspects of the threat definition to the load time function and by extension the qualification of civil engineering structures. Five areas have been identified for investigation.	**Civils + External Hazards**	Current Status:	Project work order specification took longer to develop than anticipated. The project has been tendered and the responses evaluated. Currently progressing the financial justification for the winning bid.			
				Look Ahead :	Will need to revise programme at kick-off meeting to account for project starting later than planned (original date 12 July for kick-off meeting). May be opportunity to expedite some of the analysis work to meet original deadline.			
ONR-RRR-102	Ageing and degradation document	Following on from research conducted in ageing and degradation, the aim of this proposal is to produce the outline of new guidance documentation, such that it could then be used by specialist inspectors to author a Technical Assessment Guide (TAG).	**Mechanical Engineering**	Current Status:	Project is on track. No concerns for delivery of work.	Project due to start Jun-21. The aims and objectives of this project have been discussed with the B1 community. All specialisms have agreed to provide additional resource to ensure correct level of guidance is produced. Research tender currently with Professional Lead for acceptance.	Project start date delayed due to availability of resource. Technical specification has been amended to include findings from beyond design life substantiation research (RRR-061).	Project start date delayed due to availability of resource. Technical specification produced. Undergoing internal due process prior to direct award to Wood. Marginal delay due to COVID.
				Look Ahead :	Agreed kick-off meeting for September 2021 due to availability of staff		Internal review scheduled to take place 26/01/21, prior to direct award to Wood.	
ONR-RRR-103	Digital Twinning and the application of VR technology in alpha gloveboxes	The aim of this research project is to investigate the possibilities for the application of Virtual Reality (VR) and digital twinning specifically with relation to alpha gloveboxes. The project would then support the development of relevant good practice (RGP) into the regulation of innovation.	**Mechanical Engineering**	Current Status:	Progress is on target with no current technical issues identified. **Progress since last update -** The aim of this research project is to investigate the possibilities for the application of VR and digital twinning specifically with relation to alpha gloveboxes. The project would then support the development of RGP into the regulation of innovation.			
				Look Ahead :	ONR is maintaining a watching brief on developments in this area.			
ONR-RRR-104	ZINC	Expected output of this research would be a study incorporating data from plants that have commenced dosing during operation, data from plants that have commenced dosing during commissioning/hot functional testing, and recognising and incorporating recommendations arising from any previous relevant studies that can be identified.	**Chemistry + Chemical Engineering**	Current Status:	Work has not commenced, and a revised work specification has been produced, but is currently on hold awaiting the outcome of the duty holder's work in response to the escalation of the issue re letter sent on 19th April 2021. **Progress since last update -** None. Situation is on hold, pending duty holder response which may result in the withdrawal of this research requirement.			
				Look Ahead :	This work had been specified and had been tendered previously, but neither of the two tender responses provided sufficient confidence that any new information or insight into the zinc injection issue would be achieved by the work. Therefore, the specification was revised and prepared for issue, but at the same time, the issue on SZB was escalated and the sit has responded positively to the escalation, such that there is a commitment to undertake the work ONR's research was seeking to achieve and thus the research project may no longer be necessary and thus this work is currently on hold until SZB response has been received. If that response is satisfactory, then this research project may be withdrawn. If it is unsatisfactory, the work specification may be revised further in light of the SZB response to focus on any shortfalls identified in the SZB work. So, at this moment the specification is "parked" awaiting SZB's own output.			
ONR-RRR-106	Studsvik Cladding Integrity Project IV (SCIP IV)	This project is to maintain involvement with the Studsvik Cladding Integrity Project SCIP IV. The output of this research will provide valuable reference material to aid regulatory judgements in the fuel and core sub-specialism, specifically relating to hydrogen embrittlement of clad, PCI (Pellet Clad Interaction) and fragmentation of high burnup fuel	**Fault Analysis**	Current Status:	The project is progressing to plan. Progress meetings are held every six months as per the schedule.	The SCIP IV Meetings are scheduled every 6 months. Since there has not been another meeting since the last Regulatory Research update and no other activities performed in support by ONR. As previously stated: SCIP IV is mainly at the sample-characterisation stage, with very few test results generated to date.	ONR are now members of SCIP IV. We attended the December 2020 meeting, our first meeting as a "member". SCIP IV is mainly at the sample-characterisation stage, with very few test results generated to date.	ONR are now members of SCIP IV. We have attended one meeting to date. This was as "observers", as at the time we had not yet joined SCIP. We are now full member of SCIP IV
				Look Ahead :	The next meeting is scheduled for December 2021.	The next meeting is due to be held week starting 14 June 2021.	The next meeting is expected to be held in Jun/Jul 2021.	The Next Meeting is expected to be held in December 2020.
ONR-RRR-107	External Research Effectiveness Review	Expected output is a report from the third party body providing a review and critique of ONR's research effectiveness self-assessment and the effectiveness evaluation process. This is intended to provide recommendations to improve ONR's research effectiveness evaluation process, and how that information is processed to generate learning points to improve the undertaking of ONR research.	**Chemistry + Chemical Engineering**	Current Status:	Specification of the work has been agreed and been sent out to the two research institutes as they are considered to be suitably independent of the normal contractual framework to provide a truly independent view on the evaluation process and the overall view of ONR research effectiveness.			
				Look Ahead :	Tender responses are due sometime end of July/beginning of August.			

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ONR-RRR-108	Environmental fatigue methodologies	The contractor will supply a report that weighs up the experimental evidence and operational experience and provides advice on the use of the different ASME and AFCEN methodologies so that ONR can set informed and unbiased expectations for the assessment of PWR plant potentially affected by environmentally affected fatigue.	**Structural Integrity**	Current Status:	ONR liaising with VTT and the ONR Tier 1 contractors to initiate work			
				Look Ahead :	Expectation to complete work within six months of placing a contract			
ONR-RRR-109	Development and Validation of a Safety Culture Model for Assessing Safety Culture Within the UK Nuclear Industry	Deliverables are a model of safety culture which builds on the Harmonised Safety Culture model comprising of several dimensions, each supported by several attributes that have been validated as measures of their respective dimension - and a validated survey instrument structured on the model's dimensions and attributes.	**Human & Org Capability**	Current Status:	Work in this areas is progressing as planned. The contract is currently out to tender and questions from prospective bidders have been answered.			
				Look Ahead :	Tenders are due to be received by 20 July 2021. Further communication with industry is planned via the Safety Directors' Forum culture sub-group.			
ONR-RRR-110	Development of Guidance on the Use of Electronic Procedures	The benefits of this work would be to better understand the human factors issues associated with the design and introduction of electronic procedures and bring together available guidance and learning in a guidance note for use by Inspectors.	**Human & Org Capability**	Current Status:	Work due to begin in October 2021			
				Look Ahead :				
ONR-RRR-111	Human Performance During Severe Accidents	The key benefit of this work would be a better understanding of individual and team performance under high stress/extreme environmental situations, and thus a basis for combating the deleterious effects and ensuring that licensees are effectively training, and appropriately testing, human performance in accident scenarios	**Human & Org Capability**	Current Status:	Delays expected as project is currently being re-scoped with a new lead.			
				Look Ahead :	Should begin in October			
ONR-RRR-112	PSA Best Estimate C&I Software Modelling and Reliability	The output of this work will clarify our regulatory expectations, and ensure we understand the implications of the expanded consideration of software and modelling of SMART components in Probablistic Siesmic Analysis (PSA) to inform our regulatory decisions. It is expected to lead to potential improvements to our Safety Assessment Principles (SAPs) and Technical Assessment Guides (TAGs).	**Fault Analysis - PSA**	Current Status:	Progressing as planned.			
				Look Ahead :	Currently awaiting costed response from contractor.			
ONR-RRR-113	Development of technical baseline for packaging of radioactive waste and spent fuel and for long-term interim storage	Long-term interim storage of radioactive waste and spent fuel, pending disposal to a geological disposal facility, present a challenge to the nuclear industry. The aim of this research topic is to monitor Academic papers/research into behaviour of packaged radioactive waste or fuel and its use in the nuclear industry, commercial waste packaging products being introduced within the nuclear industry and the Involvement of licensees in research or commercial products.	**NLR**	Current Status:	ONR continues to support relevant industry group meetings on a regular basis and this project replaces RRR-024. It is ONR's opinion that these meetings are effective in sharing good practice and therefore provide ONR with suitable information to support this research need. However, due to COVID-19, very few interactions have taken place, although research activities have continued in the background. **Progress since last update -** Representation by ONR at meetings of the Nuclear Waste and Decommissioning Research Forum and the NDA's IPT for Problematic Waste.			
				Look Ahead :	Attendance at further NWDRF meetings.			
ONR-RRR-114	Research in Relevant Good Practice for Radiation Shielding Assessment within the UK Nuclear Industry.	To provide ONR with an up-to-date view of Relevant Good Practice (RGP) within the UK nuclear industry. This will allow ONR to identify any gaps in its knowledge and to update Safety Assessment Principles (SAPs), Technical Assessment Guides (TAGs) and process accordingly. To gain an independent view of current RGP across the industry in both licensee and supply chain organisations. This will help ONR to understand methods that are currently being employed and aid ONR during assessment and inspection. To provide ONR with an insight of future developments in radiation shielding assessments. This is particularly important given modern shielding assessment methods (e.g. codes) and field of application (e.g. Advanced Nuclear Technologies). Timing of this research in 2021/2022 will allow the TAGs to be updated in the next cycle.	**RP Criticality EP+R**	Current Status:	The work has not been put out to tender yet. The project is delayed to see if the The Shielding Forum's (TSF)'s proposal will deliver the same outcomes as this research project, potentially negating the need for ONR to undertake the work.			
				Look Ahead :	It would be preferable for the TSF (which consists of licensee organisations) to own and undertake this work at their own expense provided that it delivers the necessary information in time for the next update of TAG-002 in July 2023.			
ONR-RRR-117	Effects, capabilities and limitations of the explosives, explosive devices and weapons systems set out in the UK Design Basis Threat (UK DBT) on SSC's relevant to the Civil Nuclear Industry.	This project will culminate in a 'body of knowledge' data set to facilitate 'awareness' level internal training and development for CNSS inspectors on the UK DBT threat's effects, capabilities and limitations. This training will predominately be targeted at SINS inspectors whose work is significantly influenced by the UK DBT. The output of this project will serve as a fundamental tool in ensuring that newly appointed SINS inspectors are adequately equipped to form regulatory judgements confidently and effectively using sound, scientific and technical information, to support balanced decisions and avoid over-conservatism and over-optimism.	**SINS**	Current Status:	Project due to start in September 2021			
				Look Ahead :	Next step is to develop work specification.			

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ONR-RRR-118	RRR 094 Part 2 - Testing and development of High Efficiency Particulate in Air (HEPA) Filters to inform relevant good practice.	The objective of this research project is to ensure ONR has continuing access to independent scientific and technical expertise in the area of HEPA filter ageing and degradation and its impact on nuclear safety. The project will examine ageing mechanisms and how these affect filter performance and material condition, e.g. strength, in both normal operations and design basis fault conditions where significant demand may be placed upon HEPA filters.	**Mechanical Engineering**	Current Status:	Project due to start in November 2021			
				Look Ahead :				
ONR-RRR-119	Enhanced Decision Making	The key benefit of this work would be an improvement in the tools and training used to support decision making, with a commensurate improvement in the efficacy of decisions made. In particular, benefits are likely to be seen in the improvement in decision making in high-stress situations, or where personnel face novel or rarely encountered events.	**Human & Org Capability**	Current Status:	Project due to start in Q4 (~January 2022)			
				Look Ahead :	Next step is to develop work specification.			
ONR-RRR-121	Research into the potential uses of Artificial Intelligence and Machine Learning on UK nuclear licensed sites, and approaches to their substantiation	This research aims to further progress the (pending) outcomes of previous research into the use and verification of systems containing artificial intelligence (AI) and machine learning (ML) technologies in a wide range of industrial applications. Due to the unique properties of AI and ML systems there is currently no established regulatory route to their deployment in the UK nuclear sector.	**EC+I**	Current Status:	Project due to start in October 2021			
				Look Ahead :				
ONR-RRR-123	CABRI	The CABRI International Programme (CIP) is a joint international programme being carried out at Cadarache (on behalf of the OECD/NEA), looking at Reactivity Insertion Accidents (RIA) for Light Water Reactor (LWR) fuel. The work is looking at the ability of high burn-up fuel to withstand sharp power peaks due to rapid reactivity insertion into the core (such as could occur if a control rod were suddenly to be ejected from the core).	**Fault Analysis - Fault Studies DSA**	Current Status:	Steering committee meeting has taken place. Extended umbrella agreement until March 2026. Hodoscope detectors were calibrated and new sensibility coefficients determined. The 10-year regulatory safety review of the pressurized water loop (PWL) was completed in 2019 and the PWL was ready for the start-up campaign in February 2020. Preparations for the CIP1-2B, CIP3-1R and CIP3-3 tests were carried out, noting some delays due to the COVID-19 pandemic. CIP1-2B and CIP3-1R originally scheduled for 2020 have been delayed by restrictions from the pandemic and new security constraints from French authorities. Preparations of CIP test rods continued for CIP3-3, CIPX, CIPY and CIPZ. Post-test examinations will start for CIP1-2B and continue for CIP-Q. Recent Delays in testing: Two CIP tests were planned in the first part of this year: -CIP1-2B (with a UO2/M5 at 72 GWd/t) -CIP3-1R (with a UO2/Zirlo at 65 GWd/t) The process for carrying out the first test was initiated when some days before it, in the frame of a periodic regulatory control test, the CABRI reactor operator (CEA) detected an internal leakage in the vessel of CABRI core-pool (between the main pool and the hodoscope channel). The CEA informed immediately the French Safety Authority (ASN) and had to decide to withdraw the carrying out of the test. The origin of this leak was identified by the CEA as a local corrosion. The CEA is currently investigating the way to fix it. The CEA is making its best effort to start again CIP1-2B experimental process before the end of the year. It has also to present its safety strategy to the Safety Authority, the ASN, in order to get authorization to restart the reactor. As soon as everything is back to normal the experimental IRSN team will resume the process.			
				Look Ahead :	Attendance to next SC meeting for update on progress (TBC)			