



Progress in implementing the lessons learnt from the Fukushima accident

Summary

In October 2012 the Office for Nuclear Regulation (ONR) published a comprehensive report (Ref. 1) on the progress of all stakeholders in implementing the recommendations made by the Chief Nuclear Inspector in his final report following the Fukushima accident (Ref. 2) and the outcomes from the European Stress Tests (Refs 3 and 4). Progress updates were published in October 2013, and October 2014. This final report in the series summarises the progress made since.

The general recommendations in the Chief Nuclear Inspector's Final Report (Ref. 2) were principally aimed at the UK's response to civil nuclear emergencies, support for global safety standards and review and update of ONR's Safety Assessment Principles. There has been good progress in all of these areas and whilst we recognise that further work in these areas will continue, we consider it to be an integral part of normal business and that the open recommendations from 2014 can be closed.

For the recommendations and stress test outcomes relevant to the nuclear licensees, there has also been good progress with more than 80% now closed. Overall, ONR is content that the most significant of the Chief Nuclear Inspector's recommendations and stress test outcomes directed towards licensees have been satisfactorily addressed. ONR will continue to regulate progress on the remaining open matters and on any related work programmes that have resulted from consideration of recommendations and stress test outcomes, as part of normal regulatory business.

Progress Report

The following sections provide more evidence of the progress made by ONR, Government, licensees and other stakeholders involved in addressing the Chief Nuclear Inspector's recommendations and European stress test outcomes. A quantitative indication of the current status is also included.

General recommendations

The general recommendations in the Chief Nuclear Inspector's Final Report (Ref. 2) were principally aimed at the UK's response to civil nuclear emergencies, looking at international (IR1)¹ and national issues (IR2, IR3, IR 7, FR6 and FR7). Also included in this section were: support for global safety standards (FR9); the adequacy of planning controls for developments near nuclear licensed sites (FR5); review and update of ONR's safety assessment principles (IR5) and openness and transparency (IR4 and FR8).

These recommendations fell largely to the Government and ONR itself. Recommendations IR1, IR4, IR6, FR9 and FR12 were closed by October 2012. Recommendations FR5 and IR2 were closed in 2013 and in 2014, we reported that FR8 (creation of ONR) and FR10 (expanded nuclear safety research oversight) had been closed. Since then, the publication of ONR's revised SAPs in late 2014 has fulfilled recommendation IR5. The remaining recommendations (IR3, IR7, FR6 and FR7) are all concerned with emergency response and significant progress has been made with tangible improvements already in place. These improvements include better access to detailed plant information to support ONR's emergency response and strengthening of ONR's emergency planning and response function. At a national level, there is better understanding of the techniques for estimation of accident source terms and the ability to provide information on the nature and magnitude of any releases has been reinforced. Overall ONR considers that the recommendations (IR3, IR7, FR6 and FR7) can be closed and additional work in this area will continue as part of normal business.

All of the general recommendations are now closed.

¹ Interim Recommendation (IR); Final Recommendation (FR).

Site licensee-facing recommendations and stress test outcomes

In the implementation report (Ref. 1) ONR described how it intended to regulate the work of licensees in implementing further measures by embedding the work within the operational regulatory programmes. This has been achieved and ONR's operational programmes have ownership of the work in their areas of responsibility.

Nuclear power plants

EDF Nuclear Generation Ltd

EDF Nuclear Generation Ltd (NGL) submitted its summary report at the end of March 2014 to justify the close out of the Chief Nuclear Inspector's recommendations and stress test outcomes. ONR has now assessed all of the claims made by EDF and considers that EDF's responses to the recommendations and stress test findings demonstrate appropriate progress and commitment to implementing lessons from the Fukushima accident.

ONR notes that whilst EDF responded to and closed out each individual recommendation from a 'bottom-up' point of view it has also built an enhanced holistic response capability based on a 'top-down' approach comprising people, procedures, training and equipment to restore key nuclear safety functions regardless of the initiating event.

EDF has provided sufficient evidence for closure of all the recommendations and stress test findings. Nevertheless, ONR has raised a number of issues to ensure that any further work that has come to light during the course of this review is adequately captured and addressed. The completion of the work to address these issues will be monitored via normal regulatory interactions and oversight of the committed work plan that EDF is producing.

NNB Generation Company Ltd

NNB Generation Company Ltd (NNB Genco) has made progress with incorporation of Fukushima-related resilience enhancements into Hinkley Point C and ONR is satisfied that the scope and focus of the work, which includes resolution of the Generic Design Assessment (GDA) findings, is adequate. An area of ongoing discussions with NNB Genco is provision of additional systems to reduce the risk of containment overpressure during prolonged total loss of power supply.

ENSREG National Action Plan

ONR provided an update to the European Nuclear Safety Regulators Group (ENSREG) on the implementation of the UK's response to

events at Fukushima in December 2014 (Ref.6). A further update of the national action plan is to be produced, on a timescale to be agreed with ENSREG, based on the information summarised here. It is expected that this will enable close out of the remainder of ONR's post-Fukushima reporting for nuclear power plants.

Non-power generating nuclear facilities

Sellafield

Sellafield Ltd acknowledged that it had made slower than expected progress in relation to addressing all of the recommendations and considerations raised following the events at Fukushima, due to the complexity of the potential for interactions between facilities. However, remedial work has accelerated over recent months.

ONR's assessment of this recent work identified that Sellafield Ltd had completed a significant amount of work since January 2015, such that a number of recommendations could be closed in the near future. The enhanced resilience work has also been substantial in relation to strengthening a number of facilities on site against the effects of loss of off-site power as well as improvements in the equipment available to respond to a 'beyond design basis' event. Additional enhancements in response capability have been realised since January 2015, demonstrating Sellafield Ltd's ability and commitment to address the most significant recommendations in a more timely manner. Sellafield Ltd has also written to ONR providing a number of commitments to address the areas of greatest impact on hazard and risk reduction over the remainder of the year, which will enable further recommendations to be closed and considered under normal regulatory business by ONR.

Decommissioning, Fuel and Waste (DFW)

We reported in 2014 that ONR was satisfied that Magnox Ltd had met the intent of the Chief Nuclear Inspector's recommendations and stress test outcomes at its reactor sites and, subject to the continuation of work described under normal business, it needed to do no additional work in response to the events at Fukushima.

The remaining sites regulated by the Decommissioning, Fuel and Waste programme in ONR were referred to as "restoration and commercial sites" in the implementation report (Ref. 1). The vast majority (more than 90%) of the recommendations and stress test outcomes for these sites have now been closed out satisfactorily. There are some remaining actions associated with Urenco UK and the Magnox Ltd site at Harwell (a former Research Site Restoration Ltd site), but ONR is satisfied that the ongoing work to close these actions will be completed.

Defence

In the defence sector, all licensees have continued to make progress with closure of findings and recommendations relating to lessons from Fukushima.

At the Atomic Weapons Establishment (Aldermaston and Burghfield) only two of the actions put in place to address the stress test outcomes and recommendations remain open.

At Rolls-Royce Marine Power Operations Ltd (Derby) (RRMPOL) the licensee has a programme of work related to Fukushima recommendations. Much of this work is tied into the upcoming update of site safety cases (including the Periodic Review of Safety). ONR expects that by the middle of 2016 RRMPOL will be in a position to close out the remaining recommendations in a proportionate and timely manner, with much of the work completed during 2015.

In 2014 we reported that BAE Systems Marine Ltd (Barrow-in-Furness) considered that all recommendations and stress test actions had been completed. Since that time ONR has satisfied itself that all but one of the recommendations can be considered closed and that the open issue is being addressed within the on-going Periodic Review of Safety process.

Devonport Royal Dockyard (Plymouth) (DRDL), has continued to progress work on closing out the Fukushima recommendations, many of which have been incorporated into the site Periodic Review of Safety forward action plan with appropriate prioritisation. ONR expects that by mid-2016, DRDL will be in a position to close out the majority of the remaining recommendations with much of the work completed during 2015 and early 2016.

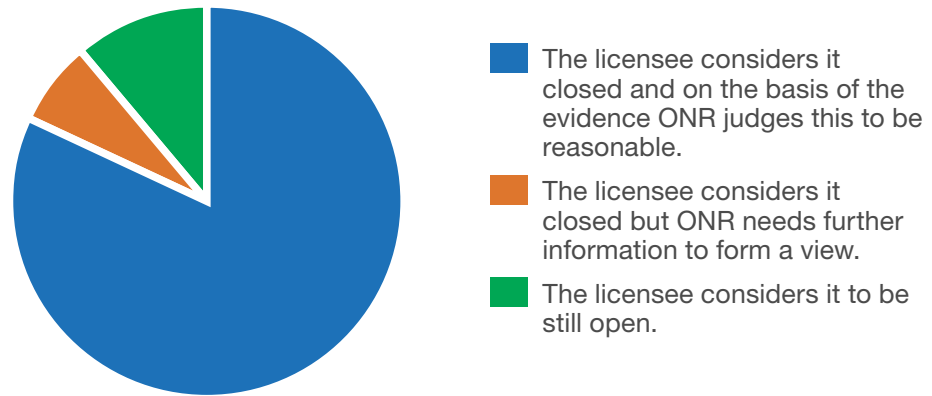
At Rosyth Royal Dockyard all of the recommendations and stress test outcomes have been closed out.

Quantitative Indicators

There were a significant number of recommendations and stress test findings placed on the nuclear industry, as well as the industry's own considerations developed during the stress tests. Although the implementation report (Ref. 1) contained the outcomes of ONR's extensive assessment of these for all licensees, they were, and remain, too numerous to feature individually. Instead, we summarised the overall position and presented it in a simple pie charts, one that would provide visibility of the overall progress being made in closing out the recommendations and stress test outcomes (findings and considerations).

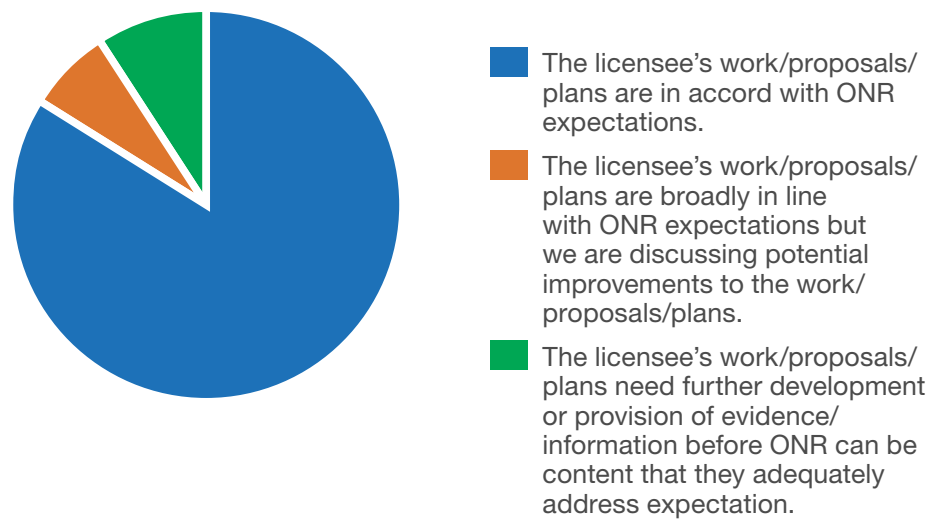
ONR's assessment of the licensees' current positions has been grouped into the same broad categories as in our earlier reports and are shown in figures 1 and 2 on page 7.

Figure 1 Is the recommendation or stress test outcome considered closed?



Compared with 2014, there has been a significant increase (from 65% to 82%) in the items that have been satisfactorily closed.

Figure 2 Is there a reasonable match with ONR's expectations?



The number of instances where there is a full accord between ONR expectations and the licensees' work has increased from 75% to 84% and the percentage where further development of evidence is needed has fallen to 9%.

International Atomic Energy Agency

In 2014 we reported that the International Atomic Energy Agency (IAEA)'s independent review had endorsed ONR's response to the Fukushima accident. Recently IAEA published a comprehensive report on Fukushima (Ref. 5). ONR will review the IAEA report to see if we can identify any further measures that we or the nuclear licensees need to consider.

Conclusions

The summary information provided here gives an overview of the progress made by ONR, Government, licensees and other stakeholders in addressing the recommendations and stress test outcomes since the publication of the implementation report in October 2012.

Overall, ONR's opinion is that the most significant of the Chief Nuclear Inspector's recommendations and stress test outcomes for licensees have been satisfactorily addressed. ONR will continue to regulate progress on the remaining open matters and on any related work programmes that have resulted from consideration of recommendations and stress test outcomes as part of normal regulatory business.

References

- 1 ONR Report: Japanese Earthquake and Tsunami: Implementing the lessons for the UK's nuclear industry, October 2012
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- 6 ONR progress report "UK ONR ENSREG Related 'National Action Plan' December 2014
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