



Progress in implementing the lessons learnt from the Fukushima accident

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 Inspector (Ref. 2) and the outcomes from the European Stress Tests (Refs 3 and 4). A progress update was included in the Chief Inspector's report published in October 2013, and here we summarise further progress made up to April 2014.

General recommendations

The general recommendations in the Chief Inspector's Final Report (Ref. 2) were principally aimed at the UK's response to civil nuclear emergencies, looking at international (IR1) and national issues (IR2, IR3, 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); and openness and transparency (IR4 and FR8).

These recommendations largely fell 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. For the remaining general recommendations, work has continued, and a further two recommendations, FR8 (creation of ONR) and FR10 (expanded nuclear safety research oversight) have been closed since that time. Overall, 60% of the general recommendations are now closed, and significant progress has been made in those that remain open.

Site licensee-facing recommendations and stress test outcomes

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

There were a significant number of recommendations and stress test findings placed on the nuclear industry, as well the industry's own considerations which 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 graphical form, one that would allow us to see the overall progress being made in closing out the recommendations and stress test outcomes (findings and considerations).

ONR's views on the licensees' 2014 responses have been grouped into the same broad categories, defined to represent situations or outcomes. As an example, for the question: "Is the recommendation, stress test finding or consideration considered closed by the licensee?", ONR has grouped its judgements on the licensee's response as follows:

- The licensee considers it closed and on the basis of the evidence ONR judges this to be reasonable.
- The licensee considers it closed but ONR needs further information to form a view.
- The licensee considers it to be still open.

These categories give a broad, quantitative idea of the progress made, which is shown in figure 1 below.

Figure 1: Is the item considered closed?

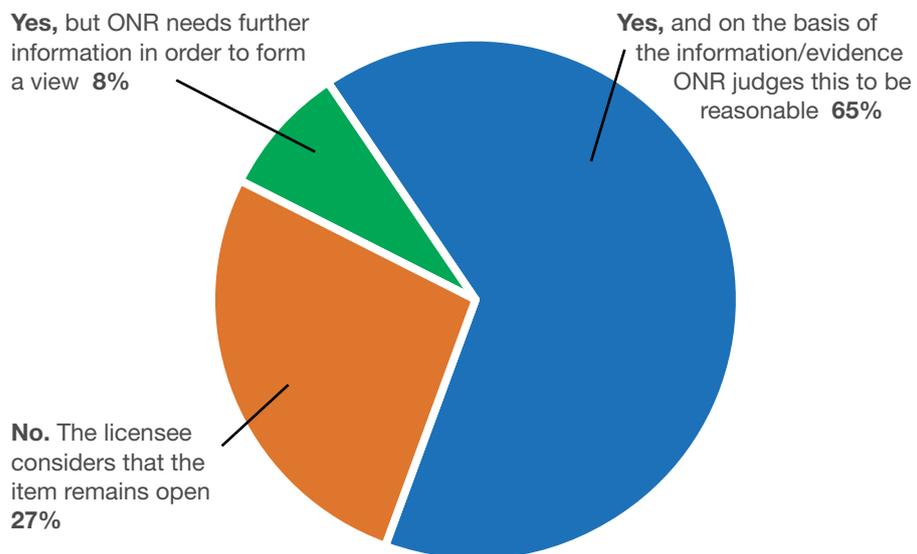


Figure 1 indicates that, compared with last year, there has been a significant increase (from 41% to 65%) in the items that have been satisfactorily closed. For 8% of the issues, the licensee believes them to be closed but ONR either needs more information or has yet to assess the situation. The number of items agreed as remaining open has fallen to less than 30% compared with more than 50% this time last year.

In terms of the technical work done, or the proposals made, ONR has grouped its judgements as follows:

- The licensee’s work/proposals/plans are in accord with ONR expectations.
- The licensee’s work/proposals/plans are broadly in line with ONR expectations but we are discussing potential improvements to the work/proposals/plans.
- The licensee’s work/proposals/plans need further development or provision of evidence/information before ONR can be content that they adequately address expectations.

These categories, shown in figure 2 below, give a qualitative insight not only for those recommendations or findings that are considered closed, but also on the plans and proposals that are still being worked on.

Figure 2: Is there a reasonable match with ONR Champion’s expectations?

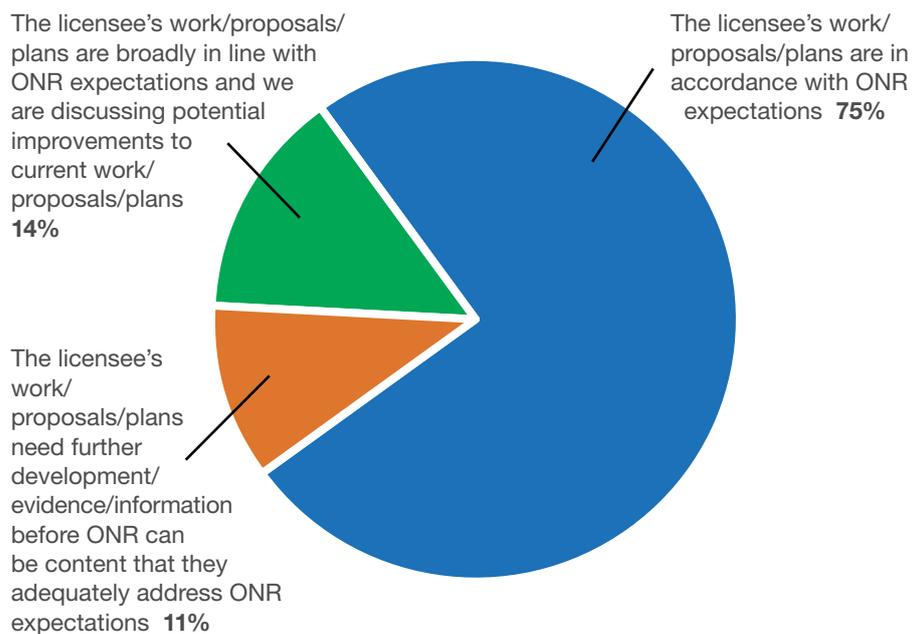


Figure 2 shows that the number of instances where further development of evidence is needed before ONR can be content that expectations will be adequately addressed has fallen to only 11%.

The results in the figures above provide a high-level picture of the overall position on the nuclear site licensees’ progress in implementing the lessons from Fukushima. The percentages in the figures are relatively crude and tell only part of the story since they do not necessarily reflect progress in areas where significant work has been done but closeout has not yet been achieved.

Additionally, the figures do not distinguish between items that have different levels of importance in terms of safety. It is also

worth recognising that the reporting of progress by licensees and subsequent assessment of that progress by ONR is not always aligned to the timing of ONR's annual report, or this summary, and so the figures above, although an accurate reflection of ONR's views, may not represent more recent progress.

Nuclear power plants

Magnox

Magnox Ltd submitted their summary report, which aimed to justify the close-out of the Chief Inspector's recommendations and stress test outcomes, at the beginning of January 2014. The summary report detailed a short programme of work to complete a small number of outstanding items in order to fully address the recommendations and stress test outcomes, and Magnox Ltd will shortly re-issue the summary report to reflect the completion of the outstanding items.

The summary report details the enhancements to plant resilience across many areas including flood resilience across the fleet, review and updating of various emergency procedures, procurement of back-up equipment such as generators, pumps, debris removal equipment and increased stocks of essential supplies, and a revised probabilistic safety assessment for the single remaining operating reactor at Wylfa.

Additional work is still required as part of 'normal business', and this will carry on and be monitored by ONR as part of its ongoing interventions with Magnox Ltd. Such additional work includes continuing training for staff on use of emergency procedures and emergency backup equipment, demonstration of newly procured equipment and revised procedures as part of the ongoing emergency exercise programme.

ONR is mindful of the continuously reducing hazard across many Magnox Ltd sites and the limited operating life of the single operating reactor at Wylfa, and was encouraged by the professional and proactive approach taken by Magnox Ltd in response to the recommendations and stress test outcomes. Quick and practical improvements were made to the plant where appropriate in order to realise the maximum safety benefit possible given the position in the plant life-cycle. A proportionate approach was taken which gave ONR confidence in relation to conclusions where Magnox Ltd justified a position of not carrying out further work against some recommendations and stress test outcomes.

Overall, ONR is satisfied that Magnox Ltd has met the intent of the Chief Inspector's recommendations and stress test outcomes and, subject to the continuation of work described under normal business, it needs to do no additional work in response to the events at Fukushima.

EDF Nuclear Generation Ltd

EDF NGL submitted its summary report at the end of March 2014, which aims to justify the close-out of the Chief Inspector's recommendations and stress test outcomes. ONR is in the process of assessing the claims, arguments and evidence contained within the report and all of the supporting documentation before reaching a decision on the adequacy of the submission. Whilst the due process of assessment needs to take place before ONR declares its position, regular interactions with EDF NGL have given ONR a clear and up-to-date picture of the progress achieved throughout the project.

EDF NGL was quick to respond to events at Fukushima and the reports published by ONR (Refs 2 and 3), and embarked on an extremely wide ranging review of the fleet resilience to events similar to those seen at Fukushima. A combination of desktop reviews and practical improvements on the plant were implemented, whilst further plant improvements took place where necessary as the result of desktop reviews.

The breadth of the response to Fukushima covered technical areas such as civil and seismic engineering, external hazards, electrical engineering, control and instrumentation, fault studies, chemistry, human factors, probabilistic safety analysis, emergency arrangements and radiological protection. Given this breadth, EDF NGL highlighted a programme of work that will carry on as part of normal business in addition to the work completed to date.

Work involving further modifications to plant and/or completion of existing work streams is scheduled to be completed by the end of 2014. Some additional work will carry on beyond this, such as ongoing training programmes related to emergency response and the use of the large range of newly procured back-up equipment. Work to accommodate Fukushima-type scenarios into the emergency exercise programmes will also continue, as will improvement activities that require work to be undertaken under plant outage conditions.

Information from the events at Fukushima is still emerging from the wider nuclear industry and EDF NGL has committed to implementing any learning that comes to light as and when the information becomes available. EDF NGL is involved in cross-licensee working groups that will enable the sharing and technical exchange of information that is essential in ensuring that relevant learning is captured and implemented.

Overall, ONR considers that EDF is on course to meet the intent of the Chief Inspector's recommendations and outcomes from the stress tests, subject to continuation of relevant work into normal business.

NNB Generation Company Ltd (NNB Genco)

NNB Genco has made progress with incorporation of Fukushima-related resilience enhancements into Hinkley Point C. Overall, ONR is satisfied that the scope and focus of the work, which includes resolution of the Generic Design Assessment (GDA) findings, are adequate and that NNB is making good progress in developing appropriate resolution plans.

Non-power generating nuclear facilities

Sellafield

Sellafield Ltd (SL) remains confident that it will have completed or identified the work required to complete all the 138 ONR Chief Inspector Fukushima report recommendations (Ref. 2), the ONR stress test findings (Ref. 4) and SL response report considerations that are applicable to the Sellafield site by the end of 2014. As of March 2014, ONR considered 76 of the items to be closed.

The majority of the outstanding work falls into two areas: firstly, the implementation of the identified improvements to a number of key plants to allow the Sellafield site to remain resilient to a prolonged Station Blackout (SBO) event; and secondly, the completion of more than 30 Severe Accident Management strategies (SAMs) covering a wide spectrum of major accident scenarios on the site affecting the main operational plants and their support systems.

ONR considers that SL is on course to complete the programme of work planned for the end of 2014 and will have made sufficient progress on all of the 138 Fukushima report recommendations, stress test findings and considerations. ONR will continue to monitor the progress made by SL in delivering the next phase of the SL improvement programme within the planned ONR Sellafield Programme Intervention projects.

Decommissioning, Fuel and Waste (DFW)

Sites referred to as “restoration and commercial sites” in the implementation report (Ref. 1) are regulated by ONR’s DFW programme. In general, the majority of the recommendations and stress test outcomes for these sites have now been closed out satisfactorily. There are some remaining actions, mainly associated with emergency preparedness and periodic review of facility safety cases at Springfields and Urenco UK Capenhurst, but ONR is satisfied that the ongoing work to close these actions will be completed. There are ongoing minor issues at Harwell but ONR is content that these will be managed as part of continuing routine regulatory interaction.

Defence

In the Defence sector, all licensees have continued to make progress with closure of findings and recommendations relating to lessons from Fukushima. At AWE (Aldermaston and Burghfield), clear progress has been made and AWE considers all but two of the actions put in place to address the stress test outcomes and recommendations to be closed.

At Rolls-Royce Marine Power Operations Ltd (Derby), the closure of three findings and recommendations has recently been agreed. Much of the remaining work will require some further analysis which will be undertaken as part of the upcoming periodic reviews of safety and new construction.

BAE Systems Marine Ltd (Barrow-in-Furness) considers that all recommendations and stress test actions have been completed. Evidence of progress is clear in the recent improvements made to the structural integrity of the Wet Dock Quay facility where submarine commissioning takes place, and further improvements are planned which will mitigate the consequences of quay collapse in a seismic or dock dewatering event.

At Devonport Royal Dockyard (Plymouth), several physical modifications have been completed or are currently programmed, including dock subway penetration closures for flood prevention, redundant lift shaft removals, dock roadway remediation and submarine refit complex central promontory structure removal.

In most of the above cases, whilst the licensees have reported good progress, ONR has yet to look in detail at what has been delivered and to form a view on whether the stress test outcomes and recommendations can be considered closed or whether further work will be necessary. ONR's assessment is expected to be completed before the next planned update of progress.

IAEA

In October 2013, the International Atomic Energy Agency (IAEA) International Regulatory Review Service (IRRS) undertook an independent review of ONR's response to the Fukushima accident and concluded that: "ONR has exercised considerable efforts in order to collect information on the circumstances of the Fukushima Dai-ichi accident, to draw conclusions on the lessons learned and to initiate steps in order to enhance nuclear safety in the UK. The IRRS Team recognises that these efforts have led to valuable results and are expected to reach their goal."

Conclusions

The summary information provided here gives an overview of the progress being 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.

The statistics for closure of recommendations and stress test findings show significant improvement over those reported in October 2012, but they tell only part of the story since they do not fully reflect progress in areas where close-out has not yet been achieved.

Generally, licensees and ONR remain confident that the most significant of the Chief Inspector's recommendations and stress test outcomes in relation to licensees will have been satisfactorily addressed by the end of 2014. ONR intends to publish a further progress update in 2015 to reflect the situation at the end of 2014.

References

- 1 ONR Report: Japanese Earthquake and Tsunami: Implementing the lessons for the UK's nuclear industry, October 2012, www.hse.gov.uk/nuclear/fukushima/implementation-report-oct-2012.pdf
- 2 ONR Report: Japanese Earthquake and Tsunami: Implications for the UK nuclear industry. HM Chief Inspector of Nuclear Installations' Final Report, September 2011, www.hse.gov.uk/nuclear/fukushima/final-report.pdf
- 3 ONR Report: European Council "Stress Tests" for UK Nuclear Power Plants, National Final Report, December 2011, www.hse.gov.uk/nuclear/fukushima/stress-tests-301211.pdf
- 4 ONR Report: "Stress Tests" for UK Non-Power Generating Nuclear Facilities, Final Report, May 2012, www.hse.gov.uk/nuclear/fukushima/ngpf-report.pdf



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Published October 2014

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