

GE Healthcare Ltd (GEHC)

Fukushima report recommendations and stress test findings: Final report on Licensee's position.

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June 2012

Introduction:

This document has been produced to meet the ONR request for an update on Licensee responses (including any specific actions planned) to three key review activities resulting from events at Fukushima in March 2011:-

1. The Interim and Final Recommendations (IRs and FRs) from the final report by the ONR Chief Inspector (September 2011)
2. The Licensee considerations against the ENSREG Stress Tests (December 2011)
3. The ONR Stress Test findings (STFs) (May 2012)

GEHC has previously provided a number of required responses and progress reports against those reviews within a timetable and programme set out for all Licensees who are not nuclear power plants (Non-NPP). Those were:

- A response to the Chief Inspector's Interim Report (June 2011)
- A progress report on responses to the Stress Tests (November 2011)
- A final report on outcomes from consideration of those Stress Tests (January 2012)
- A progress report on responses to the Chief Inspector's Final Report (April 2012).

This document is a fifth and final part of that programme. It builds on those four previous responses and has also been informed by the subsequent generic guidance provided by ONR during April and May 2012 which outlined ONR expectations.

The document has been collated by the Nuclear Assurance Safety Director with input from the relevant site leadership teams. There has been a degree of benchmarking via the industry's Safety Directors' Forum (SDF) and via informal discussions with certain other non-NPP Licensees closest in nature to GEHC operations. It is issued under the authority of the Licensee Board and will be presented to the Nuclear Safety Committee at the next practicable opportunity, for comment and advice.

Analyses of lessons learned from the events at Fukushima have specifically focussed only on potential off-site radiological impact and not on (e.g.) business risk or compliance risk.

Overview of GE Healthcare Licensed sites:

This and previous responses have been performed within the context of the following key generic features relating to GEHC operations:

- None of GEHC sites trigger the requirement for an off-site emergency plan under REPPiR.
- There are no nuclear reactors (power, research or other) at the sites.
- There is no handling of reactor fuel (either spent or new).
- There are no cooling ponds.
- There is no requirement for heat sink capability.
- There are no materials requiring criticality control.
- There are no processes in routine or accident conditions involving temperature or pressure excursions sufficient to drive materials off-site.
- There is laboratory scale use of Hydrogen for certain localised production processes but scenarios for the creation or accumulation of Hydrogen or other combustible gas is not relevant for GEHC operations
- There are no processes involving control of reactivity.
- Systems for the control of off-site safety or environmental impact are passive.
- Availability of those systems is not time-critical.

There are currently two GEHC nuclear licensed sites in the UK:

- The Grove Centre at Amersham (Site Licence 32A)
- The Maynard Centre at Cardiff (Site Licence 38B)

In April 2012, GEHC formally exited from what was a third Licensed site - Building 443.26 at Harwell (Site Licence 33A)).

Detailed descriptions of each site have been provided in the previous submissions to ONR listed in the Introduction above and are not repeated here. However in summary the sites are included within a grouping of Licensees described by ONR as “lowest hazard”, by virtue of the nature of the operations carried out. In addition the sites are in non-coastal locations with no credible risk of tidal flooding and where there is also relatively low risk of flooding, other extreme weather or notable seismic events.

As justified in previous submissions to ONR, GEHC remains confident of its position in respect of currency of knowledge of plant condition, processes, hazards and the validity of its safety cases at the UK sites.

Summary Position:

Appendix 1 shows the GEHC status against each recommendation or finding from the three key source documents listed in the Introduction (i.e. from the final report by the ONR Chief Inspector, the Licensee considerations against the ENSREG Stress Tests and the ONR Stress Test report).

The summarised position against the 23 recommendations identified as relevant to GEHC is as follows:

- No specific actions have been identified for progression by GEHC sites as a result of the lessons learned from events at Fukushima.
- A number of recommendations for the nuclear industry as a whole are to be dealt with by GEHC via the continuing engagement with the wider nuclear sector through existing forums-notably the Safety Directors' forum. In particular, although GEHC emergency response capability remains entirely fit for purpose, GEHC will maintain appropriate engagement with stakeholders across the nuclear sector in the various forums which will be focussing on emergency response *resilience* in the light of the events in Japan. ONR have stated that they will review GE Healthcare's progress in this matter through normal regulatory processes.
- For certain other recommendations against the nuclear industry as a whole GEHC is unlikely to engage either because the issue has limited relevance or because the contribution GEHC could make to its resolution is much smaller than that from "mainstream" nuclear licensed sites.
- As documented in previous submissions, GEHC reviews post-Fukushima have confirmed that the historical and effective focus on accident management arrangements based on fire as the potential motive force remains appropriate. Fire management arrangements will continue to be scrutinised under normal business processes.
- Those reviews have also confirmed that the GEHC active programme of decommissioning remains the most appropriate and effective priority for reducing the hazards on site. Decommissioning progress and prioritisation will continue to be scrutinised under normal business processes.

Appendix 1

GEHC considered the 113 recommendations arising from the source documents. Sixteen (16) are discounted either as clearly not applicable to operations at GEHC sites or because they are assigned to Government, Regulator or other non-Licensee body (see section 4 below). Another 74 (of 75) arising from the ONR Stress Test Final report are assigned specifically against Licensees other than GEHC and are not discussed further. The remaining 23 recommendations are addressed in sections 1, 2 and 3 below

1. Response to Recommendations in the ONR Fukushima Interim and Final reports

IR 4 *“Both the UK nuclear industry and ONR should consider ways of enhancing the drive to ensure more open, transparent and trusted communications, and relationships, with the public and other stakeholders”*

STATUS: No specific action being taken: However GEHC will engage in relevant industry forums where appropriate under routine business.

IR8 *“The UK nuclear industry should review the dependency of nuclear safety on off-site infrastructure in extreme conditions, and consider whether enhancements are necessary to sites’ self sufficiency given for the reliability of the grid under such extreme circumstances.”*

STATUS: No specific action being taken. Previous assessments noted that , specifically in respect of nuclear safety (as opposed to business continuity or other considerations), the sites would remain in a state of passive safety for a relatively prolonged period (days rather than hours) without reliance on off-site infrastructure or significant intervention by personnel. This is primarily based on the low hazard nature of the operations and the simple control and monitoring systems associated with them. For that reason enhancements to sites’ self-sufficiency are not considered necessary.

IR9 *“Once further relevant information becomes available, the UK nuclear industry should review what lessons can be learnt from the comparison of the events at the Fukushima-1 (Fukushima Dai-ichi) and Fukushima-2 (Fukushima Dai-ni) sites.*

STATUS; No specific action being taken: However GEHC will engage in relevant industry forums where appropriate under routine business.

IR10 *“The UK nuclear industry should initiate a review of flooding studies, including from tsunamis, in light of the Japanese experience, to confirm the design basis and margins for flooding at UK nuclear sites, and whether there is a need to improve further site-specific flood risk assessments as part of the periodic safety review programme, and for any new reactors. This should include sea-level protection.”*

STATUS: No specific action being taken: Impact of flooding was confirmed as insignificant in previous assessments. However GEHC will engage in relevant industry forums where appropriate under routine business.

IR13 *“The UK nuclear industry should review the plant and site layouts of existing plants and any proposed new designs to ensure that safety systems and their essential supplies and controls have adequate robustness against severe flooding and other extreme external events.: This recommendation is related to Recommendation IR-25 and should be considered along with the provisions put in place under that recommendation. It should include, for example, the operator’s capability to undertake repairs and the availability of spare parts and components.*

STATUS: No specific action being taken. Previous assessments noted that a) in the event of significant water ingress to facilities, the nature of operations is such that containment integrity remains adequate to protect the public and environment from significant release of materials and b) the nature of the safety systems at the sites are such that their unavailability (from whatever cause) is not time-critical in respect of off-site impact. Further, the nature of GEHC operations is such that the control of process parameters (e.g. temperature or pressure) are not critical to off-site safety. The sites would remain in a state of passive safety for a relatively prolonged period (days rather than hours) without reliance on off-site infrastructure or significant intervention by personnel. It is also noted that GEHC is in a period of decommissioning and reduction of its nuclear footprint and has no proposals for new plant construction or re-siting.

IR15 *“Once detailed information becomes available on the performance of concrete, other structures and equipment, the UK nuclear industry should consider any implications for improved understanding of the relevant design and analyses. The industry focus on this recommendation should be on future studies regarding the continuing validation of methodologies for analysing the seismic performance of structures, systems and components important to safety. This should include concrete structures and those fabricated from other materials”*

STATUS: No specific action being taken. Local seismicity around the sites is well understood (and is low) as is the extent of damage to the buildings which could be expected from that (relatively minor). None of the buildings are designed specifically against more extensive seismic activity, being typically of standard industrial construction. Seismic collapse is routinely considered within the potential accident scenarios examined under REPPiR. The consequences fall below the requirement for off-site emergency planning and are less than those related to fire scenarios. The nature of the site safety systems are such that their loss through seismic activity (or other routes) is not time-critical in respect of off-site impact. Shielding degradation following seismic damage to these facilities is not considered to be significant in respect of off-site impact. The few specific enclosures of relevance are well known, and relatively simple localised contingencies are available.

IR16 *“When considering the recommendations in this report the UK nuclear industry should consider them in the light of all extreme hazards, particularly for plant layout and design of safety-related plant.”*

STATUS: CLOSED: The assessments carried out to date by GEHC, particularly against Stress Tests have considered generic failures of systems, power, other supplies and non-availability of personnel regardless of initiating event. This approach was driven by the absence of specific credible scenarios, other than fire related, which could lead to a significant off-site impact.

IR17 *The UK nuclear industry should undertake further work with the National Grid to establish the robustness and potential unavailability of off-site electrical supplies under severe hazard conditions.*

And

IR18 *The UK nuclear industry should review any need for the provision of additional, diverse means of providing robust sufficiently long-term independent electrical supplies on sites, reflecting the loss of availability of off-site electrical supplies under severe conditions. This should be considered along with Recommendation IR-8 within the wider context of “on-site resilience”.*

STATUS: No specific action being taken. As noted previously (IR8) the nature of the safety systems at the sites are such that their unavailability through loss of power (or other cause) is not time-critical in respect of off-site impact. Further, the nature of GEHC operations is such that the control of process parameters (e.g. temperature or pressure) are not critical to off-site safety. Both the Grove Centre and Maynard centre sites would remain in a state of passive safety without reliance on off-

site infrastructure (grid supply) in the immediate or medium term. It is also noted that the parent company GE is a commercial supplier of electrical power generating units. However GEHC will take due account of any initiatives or developments emerging from the “mainstream” nuclear sector.

IR22 *The UK nuclear industry should review the provision on site of emergency control, instrumentation and communications in light of the circumstances of the Fukushima accident including long timescales, widespread on and off-site disruption, and the environment on site associated with a severe accident. In particular, the review should consider that the Fukushima-1 site was equipped with a seismically robust building housing the site emergency response centre which had: adequate provisions to ensure its habitability in the event of a radiological release; and communication facilities with on-site plant control rooms and external agencies, such as TEPCO headquarters in Tokyo”*

And

IR23 *The UK nuclear industry, in conjunction with other organisations as necessary, should review the robustness of necessary off-site communications for severe accidents involving widespread disruption. In addition to impacting communications, it is possible that external events could also affect off-site centres used to support at site in an emergency. Alternative locations should be available and they should be capable of being commissioned in an appropriate timescale.*

And

IR24 *The UK nuclear industry should review existing severe accident contingency arrangements and training, giving particular consideration to the physical, organisational, behavioural, emotional and cultural aspects for workers having to take actions on site, especially over long periods. This should take account of the impact of using contractors for some aspects on site, such as maintenance, and their possible response.*

And

IR25 *The UK nuclear industry should review, and if necessary extend, analysis of accident sequences for long-term severe accidents. This should identify appropriate repair and recovery strategies to the point at which a stable state is achieved, identifying any enhanced requirements for central stocks of equipment and logistical support.*

STATUS: No specific action being taken. The systematic consideration of accident scenarios via safety cases, periodic safety reviews, emergency planning exercises and the assessments required under REPPIR has consistently shown that the credible mechanism for potential off-site impact is limited to fire scenarios. Fire management (i.e. avoidance, detection and suppression) is considered to be highly effective. It is and will remain a focus in terms of accident management. No specific scenarios have been identified where there is a loss of emergency response capability or prolonged duration emergency concurrent with an accident with severe off-site consequences. Nevertheless GEHC is aware that the nuclear industry is considering the lessons learned from events in Fukushima specifically in relation to emergency response resilience. GEHC will remain fully engaged with the various forums on this issue to ensure that any appropriate improvements can be identified and implemented where practicable.

IR 26 *“Response to the various recommendations in the interim report should be made available within one month of it being published.”*

STATUS:CLOSED via responses provided in June 2011

FR1 *“All nuclear site licensees should give appropriate and consistent priority to completing Periodic Safety Reviews (PSR) to the required standards and timescales, and to implementing identified reasonably practicable plant improvements.”*

STATUS::CLOSED:The submission for the 10 year Periodic Review of Safety for GEHC is due for completion by the end of this year (2012). Forward action plans relating to reasonably practicable

plant improvements will be one routine output from that process and will be monitored via normal business process.

FR2 *“The UK nuclear industry should ensure that structures, systems and components needed for managing and controlling actions in response to an accident, including plant control rooms, on-site emergency control centres and off-site emergency centres, are adequately protected against hazards that could affect several simultaneously.”*

STATUS: No specific action being taken. No specific scenarios have been identified where there is a loss of facilities which render the emergency response capability inadequate. Nevertheless GEHC is aware that the nuclear industry is considering the lessons learned from events in Fukushima specifically in relation to emergency response resilience. GEHC will remain fully engaged with the various forums on this issue to ensure that any appropriate improvements can be identified and implemented where practicable.

FR3 *“Structures, systems and components needed for managing and controlling actions in response to an accident, including plant control rooms, on-site emergency control centres and off-site emergency centres, should be capable of operating adequately in the conditions, and for the duration, for which they could be needed, including possible severe accident conditions.”*

STATUS: No specific action being taken. No specific scenarios have been identified where there is a loss of facilities which render the emergency response capability inadequate. Additionally no scenarios where operation of full emergency response capability is required for extended durations. Nevertheless GEHC is aware that the nuclear industry is considering the lessons learned from events in Fukushima specifically in relation to emergency response resilience. GEHC will remain fully engaged with the various forums on this issue to ensure that any appropriate improvements can be identified and implemented where practicable.

FR4 *“The nuclear industry should ensure that adequate Level 2 Probabilistic Safety Analyses (PSA) are provided for all nuclear facilities that could have accidents with significant off-site consequences and use the results to inform further consideration of severe accident management measures. The PSAs should consider a full range of external events including “beyond design basis” events and extended mission times.”*

STATUS:: No specific action being taken. Level 2 Probabilistic Safety Assessments are appropriate for accidents with significant off-site consequences. Given the nature of GEHC operations and the results of systematic consideration of accident scenarios via safety cases, periodic safety reviews, emergency planning exercises and the assessments required under REPIR it is considered unnecessary to carry out L2PSA.

FR6 *“The nuclear industry with others should review available techniques for estimating radioactive source terms and undertake research to test the practicability of providing real-time information on the basic characteristics of radioactive releases to the environment to the responsible off-site authorities, taking account of the range of conditions that may exist on and off the site. “*

STATUS:: Given the relative size, nature and scope of GEHC Licensed operations relative to other Licensees, no engagement is planned on this topic

FR9 *“The UK Government, nuclear industry and ONR should support international efforts to improve the process of review and implementation of IAEA and other relevant nuclear safety standards and initiatives in the light of the Fukushima-1 (Fukushima Dai-ichi) accident Relevant to international standard setting”*

STATUS:: Given the size, nature and scope of GEHC Licensed operations relative to other Licensees, no engagement is planned on this topic

FR11 *“The UK nuclear industry should continue to promote sustained high levels of safety culture amongst all its employees, making use of the National Skills Academy for Nuclear and other schemes that promote “nuclear professionalism”.*

STATUS:: No specific action being taken. GEHC normal business processes require (and monitor) high standards of safety culture, attitude and integrity. This remains a demonstrably integral part of the GEHC safety management process. Given the size, nature and scope of GEHC Licensed operations relative to other Licensees, no engagement specifically with the National Skills Academy is planned .

FR12: *“ Reports on the progress that has been made in responding to the recommendations in this report should be made available to ONR by June 2012. These should include the status of the plans, together with details of improvements that have been implemented by that time.”*

STATUS:: CLOSED via production of this status report

2. Licensee Considerations against the ENSREG Stress tests

No specific actions were identified as a result of the GEHC assessments against the Stress Tests .

However, specifically in relation to emergency response capability and resilience,GEHC is aware that the nuclear industry is considering the lessons learned from events in Fukushima. GEHC will as noted in part 1 above, remain fully engaged with the various forums on this issue to ensure that any appropriate improvements can be identified and implemented where practicable.

ONR have stated that they will review GE Healthcare’s progress in this matter through normal regulatory processes and will ensure that any reasonably practicable improvements are identified and implemented.

3. Response to ONR Stress Test Findings (STF)

STF 94: *“Reports on the progress made in addressing the conclusions of the licensees*

Considerations and the ONR findings should be made available to ONR on the same

timescale as that for HM Chief Inspector’s recommendations (June 2012). These

should include the status of plans and details of improvements that have been

implemented.”

STATUS:CLOSED via production of this report

No other findings were assigned against or relevant to GE Healthcare Ltd

4. Recommendations not considered further.

IR1 Relevant to international regulation etc-response not required from GEHC

IR2 Relevant to National Emergency Planning -response not required from GEHC

IR 3 Relevant to National Emergency Planning –response not required from GEHC

IR 5 Relevant to Regulator- response not required from GEHC

IR 6 Relevant to Regulator- response not required from GEHC

IR 7 Relevant to Regulator- response not required from GEHC

IR11 Relates to multiple reactor sites. Not Applicable to GEHC

IR12 Relates to spent fuel. Not Applicable to GEHC sites

IR14 Relates to fuel ponds . Not Applicable to GEHC sites

IR19 Relates to cooling water supplies. Not applicable to GEHC sites

IR20 Relates to cooling water supplies. Not applicable to GEHC sites

IR21 Relates to significant flow or accumulation of combustible gases. Not applicable to GEHC sites

FR5 Relevant to Government -Response not required from GEHC

FR7 Relevant to National Emergency Planning body –response not required from GEHC

FR8 Relevant to Regulator -response not required from GEHC

FR10 Relevant to Regulator -response not required from GEHC.