



briefing

Date: 12th December 2011

No.93

Subject: Nuclear emergency planning – the ONR Fukushima nuclear safety report, the UK Government’s nuclear emergency planning review and the NFLA Secretariat survey of local authorities and nuclear emergency planning

1. Introduction

The Nuclear Free Local Authorities (NFLA) have drafted previous Policy Briefings outlining some concerns over UK nuclear emergency planning, particularly in relation to the transportation of nuclear materials (see Policy Briefings 74 (1) and 75 (2), 2010). NFLA National Forums have also held nuclear emergency planning seminars in Manchester, Oxford and Glasgow in the past 12 months. With the recent incident in Fukushima, and recommendations made in the interim (3) and final reports (4) of the Office for Nuclear Regulation’s (ONR) analysis of this incident and its potential impact on the UK nuclear industry; the NFLA Secretariat has conducted a survey on nuclear emergency planning knowledge and readiness with local authorities in England, Scotland and Wales. This briefing considers the ONR report in reference to nuclear emergency planning, the UK Government’s review of nuclear emergency planning and the findings of the NFLA survey.

2. The Fukushima disaster and the final ONR report

NFLA Policy Briefing 83, of the 1st June 2011, which can be found on the NFLA website (5), gave a thorough overview of the Fukushima disaster and its wider implications. It also provided an overview of the interim ONR report of the disaster, which was co-ordinated by the UK Chief Nuclear Inspector, Mike Weightman.

Some 9 months after the incident it is still clear that many issues remain to be resolved in making the highly damaged reactors and the site facility at Fukushima ‘safe’. Still more problems remain over the radioactive clean-up of the wider area and determining whether the 20 kilometre (and in some areas larger) exclusion zone can ever be re-inhabited. The economic, social and environmental costs of the disaster remain huge to the Government and people of Japan.

In mid September 2011, the ONR’s ‘final’ report on the Fukushima disaster was published. Again its ‘headline’ was that it was the tsunami that was the main cause of the damage to the nuclear facility and that the UK nuclear industry was largely ‘safe’ and unaffected by the causes and consequences of the Fukushima incident. A number of significant recommendations were though included in the report, and considerable focus was placed on the area of nuclear emergency planning. The main recommendations from the final report, in comparison with the interim report, are attached as Appendix 1 of this briefing.

THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES

Before considering the specific issues in the report around nuclear emergency planning, it is relevant to outline some of the wider concerns of the NFLA to the ONR's reports, which it was able to reiterate at the ONR NGO dialogue meeting in London on the 17th November.

4. NFLA submission to the ONR Fukushima nuclear safety report

Following the publication of the interim ONR report on Fukushima, the NFLA developed a detailed series of submissions for consideration prior to the publication of the final report. These included (all can be found on the NFLA website, see the references for web-links):

- A 17 page overview which included concerns over the narrowness of the ONR interim report, the incongruence between the conclusions and recommendations of the interim report, the lack of independent consultants on the Technical Advice Panel and the concern that some submissions to the report had been taken off the ONR website. More specific points were also made around nuclear engineering issues, the safety of the 'EPR' new nuclear reactor design, marine and airborne pollution issues, concerns over the lack of any detail on defence nuclear programmes and wider nuclear emergency planning issues (6).
- A 31 page appendix on specific marine pollution issues arising from the Fukushima incident, which had been provided to the NFLA by independent consultant, Tim Deere-Jones (7).
- An additional 3 page addendum of the relationship between marine pollution issues at Fukushima and the current ONR / Environment Agency's Generic Design Assessment of proposed new nuclear reactor designs (8).

The NFLA were disappointed that quite a number of the points in its own submission do not appear to have been specifically considered in the ONR's final report. At the ONR NGO dialogue meeting on the 17th November, the Chief Nuclear Inspector said he would endeavour to publish a document to explain how the ONR considered each submission to it, and the NFLA awaits sight of this document.

5. NFLA comments on nuclear emergency planning and its survey of Local Authorities

In its submission on nuclear emergency planning issues to the ONR Fukushima Committee, the NFLA made the following points (9):

- It raised the issue of potential weaknesses to the probabilistic risk model. In Fukushima there appeared a severe under-estimation of the potential risk of an earthquake and tsunami at the magnitude that actually happened, which meant the crucial coastal wall was too low to prevent the tsunami passing over it and devastating the nuclear facility.
- A concern that the nuclear emergency planning review announced by the Government following the ONR interim review would not bring in independent critical voices into the review, due to the wider concerns over national security and the sensitivity of the review.
- The size of the evacuation zone for a major nuclear accident and all the logistical, technical and scientific issues that arise from a large area having to be evacuated for a long, possibly permanent, amount of time. This considered the difference between the ONR's recommended evacuation distances compared to the 20kms (and up to 32kms) of the Fukushima incident and the recommendations of the American and French nuclear regulators that it should be up to 50 miles.
- The interim ONR report stated that there was: "potential for flooding to occur in the near vicinity of nuclear sites", but went on to say that the actual flooding risk is unknown "because the detailed specific likelihood and consequences of flooding have not been assessed" by the regulators. The NFLA felt this was incongruent with the interim report's conclusion: "Flooding risks are unlikely to prevent construction of new nuclear power stations at potential development sites in the UK over the next few years".
- The NFLA noted that emergency evacuation plans were affected by serious damage to the transport infrastructure in eastern Japan. Some UK reactors would face serious problems in emergency evacuation due to the lack of evacuation routes – Mersea Island near Bradwell and main routes off Anglesey with Wylfa are obvious examples. The Fukushima incident clearly shows the need for evacuation plans to be fully revisited, particularly in the light of expanded sites through a nuclear new build programme.

- The need for robust mutual aid and central government support agreements is required to ensure a framework is in place for the huge demands that such a prolonged incident would place on the emergency services and the public authorities. Under the Civil Contingencies Act, local authorities would be expected to take the lead in all recovery work, but the substantial cuts to local government services, including the merging of a number of emergency planning units, would make this an immensely difficult, if not impossible, task. The NFLA noted that the financial implications of Fukushima are staggering. The independent Japan Centre for Economic Research has calculated that the clean-up of Fukushima will cost \$250bn (£150bn) over the next 10 years. The figure includes \$54 billion to buy up all land within 20kms of the plant, \$8 billion to deal with compensation claims and between \$9bn and \$188bn to scrap the reactors (depending on how many reactors beside Fukushima 1 remain closed). The Centre suggested \$71 billion could come from freezing research and development projects linked to the nuclear fuel cycle and \$150 billion from TEPCO's and the Government's reserve funds (10). Such a figure is higher than the UK's current public spending deficit.
- There is also a clear need to consider the scientific and technical assistance that would be required to the emergency services and the public authorities dealing with such an incident. An emergency planning review needs to outline how such expertise is to be organised and ensure public safety lies at the centre of an emergency response.
- Taking a broader view, the NFLA felt that the ONR needed to develop a more robust policy on siting, evacuation, and emergency planning issues. The Boundary Hall planning inquiry, on issues relating to development within emergency planning zones at the Atomic Weapons Establishment Aldermaston, has exposed weaknesses in the approach adopted to date and has also highlighted the lack of understanding of these issues by non-specialist decision makers at both the local and national levels. A clear statement of ONR policy is needed which will address the potential loopholes created by the Boundary Hall decision and present ONR policy in a single accessible document.

In addition to these specific points, the NFLA also noted that it would seek to conduct a survey of Local Authority emergency planning units on knowledge, expertise, training requirements and readiness for dealing with nuclear incidents. As this would take longer than the ONR's timetable would allow for, the NFLA said it would send the survey in at a later date to the ONR and to the UK Government's Department of Energy and Climate Change (DECC) for consideration in the nuclear emergency planning review (that was announced by DECC following the publication of the ONR's interim report).

6. UK Government's nuclear emergency planning review and the NEPLG

Following the publication of the ONR's Fukushima interim report and its recommendations on nuclear emergency planning (see Appendix 1), the UK Government announced two major actions would be developed as part of a national review of nuclear emergency planning arrangements.

In a written statement to the UK Parliament, Energy Minister Charles Hendry announced: "The UK Government will carry out a review of the Japanese response to the Fukushima emergency. The review will build on the UK's existing robust and well-exercised plans for civil contingencies (including nuclear emergencies), and will be strongly informed by relevant findings presented by Dr Weightman to the IAEA following the recent international fact-finding mission to Japan. Also in line with the Weightman report the review will include a strong focus on ensuring that the UK's evacuation plans for a wide range of civil contingencies, including nuclear emergencies, are robust, practical and appropriate to the UK context."

The Minister also specifically added: "The Nuclear Emergency Planning Liaison Group (NEPLG) will review the capacity and capability of the UK's nuclear emergency response arrangements to effectively manage a prolonged nuclear emergency, caused by a UK or overseas incident." (11)

The reviews would be conducted by DECC staff and the NEPLG, which is administered through, and chaired by, DECC. The initial nuclear emergency planning review has fed into the ONR's final report and the completed review is expected to report by the end of the year.

Key parts of the review include (12):

- NEPLG will review the capacity and capability of the UK's nuclear emergency response arrangements to effectively manage a prolonged nuclear emergency, caused by a UK or overseas incident.
- The review will consider environmental and radiation monitoring arrangements for both the acute phase and longer term recovery phase.
- The review will consider what happened in Japan in terms of decisions taken to protect the public and compare the UK approach to the one used in Japan.
- The review will also consider the response required for faults considered to be reasonably foreseeable and will additionally consider the response required for 'beyond design basis' accidents.
- The recommendations will also be used to update NEPLG's published guidance on dealing with nuclear emergencies, national and international.
- The review will consider the role of scientific advice in decision-making during nuclear emergencies.

The NFLA welcomed the announcement of the review and sees its own survey of Local Authority Emergency Planning Units as a positive way to complement this review by discussing nuclear emergency planning issues with both the Councils that possess fixed civil or military nuclear sites, and those that do not. The NFLA has also welcomed the significant populating of much more useful information on the NEPLG web-pages on the DECC website (13), which has made it a more user-friendly resource and a repository for appropriate nuclear emergency planning public information.

7. The NFLA nuclear emergency planning survey

The NFLA Secretary issued in late July 2011 a survey to all Local Authority Emergency Planning Units which had published email addresses on their internet sites and, as a catch-all, it was emailed to all Local Resilience Forums in England, Scotland and Wales.

The survey included a lengthy preamble from the NFLA Secretary which provided background on the nuclear emergency planning recommendations from the ONR interim report and the NFLA's long-held interest in local authority nuclear emergency planning arrangements. The intention of the survey was to get a clearer understanding of local authority involvement, and any relevant issues or concerns with, the UK's nuclear emergency planning arrangements. It also wishes to seek improvements in such arrangements if any perceived gaps are identified.

A summary of the findings from this survey is attached in Appendix 2. Notable 'headlines' and interpretations from the NFLA survey include:

- As perceived in previous NFLA briefings and meetings, the survey showed that knowledge, training and experience of Local Authority Emergency Planning Units with fixed nuclear sites in their area is substantial, but for other Local Authorities is more patchy and limited, which may be of concern for a wide-area type of incident like the Fukushima disaster.
- Local Authority Emergency Planning Officers in areas with fixed nuclear sites had formally inputted to the ONR reviews through the NEPLG's Local Authority Sub-group. Again, Councils without such sites largely have not got involved in the review.
- There was wide knowledge, testing and / or awareness raising of REPPIR (Radiation (Emergency Planning and Public Information) Regulations) plans and the Ministry of Defence LAESI (Local Authority Emergency Service Information) Guidelines for nuclear weapons convoys. With the latter, the NFLA is pleased that the MOD has organised 'Exercise Senator' for Scottish local authorities and has been more pro-active at providing awareness seminars, following the 2010 NFLA report in this area. It still should be noted that not all Local Authorities have been invited to such events, despite most welcoming the chance to be involved in them.

- There was not a clear response on the NAIR and RIMNET radiation warning systems. Most respondents were aware of them, but some did not appear to be sure how they are tested.
- CBRN (Chemical Biological Radiological and Nuclear, colloquially referred to as 'dirty bombs') planning and exercises has clearly expanded and deepened across the country, and has brought more awareness of nuclear issues to the big-city metropolitan councils as a result, which is to be welcomed.
- There was only patchy knowledge of the NEPLG from Local Authorities who do not possess fixed nuclear sites in their area. Some individual comments mentioned that the NFLA survey had encouraged them to research the NEPLG's role. There was a similar patchy response on who represents local government on the NEPLG from such officers. Local Authority Units with fixed nuclear sites were strongly engaged in the work of the NEPLG.
- There were some interesting points made over the potential size of the Detailed Emergency Planning Zones around UK nuclear sites. Most felt that, though smaller than the Fukushima evacuation zone, or to those used in the United States of France, there was scope in the REPPIR regulations and on appropriate scientific and technical advice for the zone to be quickly and flexibly extended. CBRN planning had assisted Local Authorities in thinking more flexibly around the size of evacuation zones.
- Most respondents noted that the final recommendations of the ONR's report, and the outcome of the national nuclear emergency planning review, would play a part in the review of County Community Risk Registers and mutual aid agreements. CBRN planning had again assisted more detailed consideration of such matters in the last couple of years.
- A healthy and useful response was provided over leading the recovery phase of an incident, particularly, as in the case of Fukushima, with a prolonged and large-scale disaster. Under the UK Civil Contingencies Act 2004, local authorities are expected to take the lead with short-term, medium-term and long-term recovery planning through multi-agency groups. This is still a relatively new legal duty on Councils, though dealing with recovery issues has always been one of the main areas of the local authority in an emergency. Since the introduction of the Civil Contingencies Act, considerable work has been undertaken to develop a detailed recovery plan strategy for a multi-agency emergency response, though most Council-specific recovery plans remain quite generic by nature. Fixed nuclear site Councils commented that their recovery plans contain specific information on the issues surrounding a nuclear-related emergency, whilst other Councils stated that they would adapt their recovery plans accordingly.
- In the NFLA's view, experience of widespread flooding and the reviews of the multi-agency response to them like the Pitt Review (14), has shown that recovery planning is a difficult, complex and expensive part of the emergency planning process. The NFLA would strongly encourage the UK Government and the NEPLG to consider in detail the issues around prolonged recovery planning for nuclear emergencies. The UK Government should also consider at the national, local and wide area contexts such matters and provide specific recommendations and actions to Local Authorities on the unique issues of a wide area nuclear emergency compared to other types of incidents. A real consideration of how Councils would deal with recovery planning in the current financial crisis on local government finance needs also to be considered – the NFLA continues to make the point that all the organisations that would be involved in a multi-agency response are seeing significant reductions in budgets and staffing, with many emergency planning services being merged between local authorities. An acknowledgement from the UK Government that a nuclear emergency would essentially dictate a huge national response, with an equivalent national recovery plan, should be considered.
- The majority of respondents felt national and regional training events for nuclear incidents would be of particular benefit. It was acknowledged again that quite extensive training does take place for Councils with fixed nuclear sites, but those without felt that awareness seminars and specific training for staff that may have a particular role in such an emergency incident should be encouraged. With local training budgets now cut to the bone, this is an area the NFLA would recommend where central funding should be considered.
- There was largely consensus on what should and should not be published in reference to public information on nuclear emergencies. It was felt that publishing as much information as possible that was not subject to sensitive security implications should remain the general

rule. According to most respondents, under REPIR, those households who live in Detailed Emergency Planning Zones receive extensive information, and those outside them more generic booklets. The NFLA has been informed by many local nuclear concerned groups of a general level of frustration with the type of public information that is made available. A number of survey respondents acknowledged the difficulty in organising effective public information campaigns, whilst at the same time not trying to develop a sense of public alarm. Again, the cuts to local authority budgets may create issues for the effective 'warning and informing' of the public and the business communities. The NFLA recommends that the NEPLG and the UK Government consider both the funding of such campaigns and encourages it to interface directly with local nuclear concerned groups over the type of information they would encourage and the issues around what information to make public and what to remain restricted.

- Following on from this question, the NFLA asked if CBRN plans should consider developing a public information strategy informing the public on what to do in the event of a 'dirty bomb' going off in a town or city centre. Currently, large amounts of resources have been purchased and are regularly exercised. Exercises have shown a large surface area is needed for an emergency response to such an incident and major staffing would also be required, and there are a plethora of other difficult issues for emergency responders. There was quite divergent views on this question, with particular concerns around the cost of such a campaign (and who would pay for it) and the potential again for creating public alarm rather than reassurance. Most respondents felt that there was a need for national government to consider and review public information for emergencies in its totality and not just for this incident in isolation. The NFLA would endorse this view.
- Finally, all respondents noted that they saw the fairly recent development of Scientific and Technical Advisory Cells (STAC) – a multi-agency pool of staff with specific expertise for chemical, radiological and other scientific incidents – as welcome and fulfilling the local needs for a response to a nuclear emergency. The NFLA welcomes this consensus and the development of the STAC. A subsequent follow-up question to the survey should have asked if the trimming of budgets was having any effect in this area, which was an omission on the NFLA Secretary's part. Are there enough well trained staff in this area around the country?

8. Conclusions and recommendations

- The ONR Fukushima reports, the UK Government's nuclear emergency planning review and the NFLA's nuclear emergency planning survey all highlight that the issue of nuclear emergency planning is one of the most pressing areas of policy review following the Fukushima disaster, in reference to the UK context.
- The need for a review of nuclear emergency plans post Fukushima was obvious, and the NFLA hopes, when it is completed by the UK Government and the NEPLG, that it will be thorough, all actions appropriately funded and a consideration is made for improving awareness and appropriate training not just in areas – with fixed nuclear sites, but on a national basis in a suitably appropriate fashion.
- The NFLA will send this Policy Briefing to all respondents to its survey, all Local Resilience Forums and all Local Authority Emergency Planning Units with public email addresses.
- The NFLA will send this Policy Briefing to the UK Government, the NEPLG and Governments and appropriate emergency planning bodies in England, Scotland and Wales (and to the Northern Ireland and the Republic of Ireland Governments for information).
- The NFLA will send this Policy Briefing to the Chief Nuclear Inspector for further consideration following the post Fukushima learning process.
- The NFLA will seek to develop a further nuclear emergency planning seminar in February 2012 to discuss this briefing and the wider policy context in this area. It is hoped to invite members of the NEPLG, DECC and the ONR's Office for Civil Nuclear Security to this seminar.
- The NFLA will seek to table this report at the DECC NGO dialogue meeting to allow more detailed discussion of nuclear emergency planning in this useful forum. This may allow for direct engagement between the emergency planning community and statutory bodies and local / national nuclear concerned groups. It may also allow for possible future discussion,

in complete confidence, around the security and emergency planning procedures for fixed civil and military nuclear sites; along with the transportation of nuclear materials by road, rail, sea and air.

- The NFLA will send this Policy Briefing to all its member authorities encouraging its elected representatives to engage with their Local Authority Emergency Planning Officers on its content.

9. References

- (1) NFLA Policy Briefing 74, 'Safety and emergency planning of nuclear weapons transportation convoys', 15th June 2010 – [http://www.nuclearpolicy.info/docs/briefings/A189_\(NB74\)_Nuclear_weapons_transportation.pdf](http://www.nuclearpolicy.info/docs/briefings/A189_(NB74)_Nuclear_weapons_transportation.pdf)
- (2) NFLA Policy Briefing 75, 'Radioactive waste shipments through the Irish Sea', 16th June 2010 - [http://www.nuclearpolicy.info/docs/briefings/A190_\(NB75\)_Radioactive_waste_shipments/pdf](http://www.nuclearpolicy.info/docs/briefings/A190_(NB75)_Radioactive_waste_shipments/pdf)
- (3) Office for Nuclear Regulation, 'Fukushima – Interim Lessons Learned', 18th May 2011 - <http://www.hse.gov.uk/nuclear/fukushima/interim-report.htm>
- (4) Office for Nuclear Regulation, 'HM Chief Nuclear Inspector's Fukushima Final Report', 11th October 2011 – <http://www.hse.gov.uk/nuclear/fukushima/final-report.htm>
- (5) NFLA Policy Briefing 83, 'Fukushima nuclear incident and the ONR nuclear safety review, 1st June 2011 – [http://www.nuclearpolicy.info/docs/briefings/A197_\(NB83\)_Fukushima_and_Weightman_Review.pdf](http://www.nuclearpolicy.info/docs/briefings/A197_(NB83)_Fukushima_and_Weightman_Review.pdf)
- (6) NFLA main submission to the ONR Fukushima final report, 2nd September 2011 - http://www.nuclearpolicy.info/docs/consultations/NFLA_Weightman_final_submission.pdf
- (7) NFLA appendix to its submission to the ONR Fukushima final report, 2nd September 2011 - http://www.nuclearpolicy.info/docs/consultations/NFLA_Weightman_submission_annex.pdf
- (8) NFLA addendum on Fukushima and GDA to the ONR final report, 15th September 2011 – http://www.nuclearpolicy.info/docs/consultations/NFLA_Weightman_final_review_comments_addendum.pdf
- (9) Op cit Reference (6).
- (10) NHK World, 1st June 2011 – http://www3.nhk.or.jp/daily/english31_24.html
- (11) DECC media release, Response to Weightman Interim Nuclear Safety Report and Charles Hendry's comments to Parliament, 21st June 2011. http://www.decc.gov.uk/en/content/cms/news/pn11_051/pn11_051.aspx
- (12) UK Energy Minister Chris Huhne's official response to the ONR Fukushima Interim Report, 17th June 2011 – <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/nuclear/2011-letter-huhne-to-weightman-japan-nuclear.pdf>
- (13) The Nuclear Emergency Planning Liaison Group's home page can be found at: http://www.dec.gov.uk/en/content/meeting_energy/nuclear/safety_and_sec/emergency_plan/neplg/neplg.aspx
- (14) Sir Michael Pitt's Report on the Summer 2007 floods - <http://collections.europaarchive.org/tna/20100509080731/archive.cabinetoffice.gov.uk/pittreview/thepittreview.html>

ONR Fukushima final report conclusions and recommendations

(Taken from <http://www.hse.gov.uk/nuclear/fukushima/final-report.htm>)

Additional conclusions made in the final report:

1. Consideration of the accident at Fukushima-1 against the ONR Safety Assessment Principles for design basis fault analysis and internal and external hazards has shown that the UK approach to identifying the design basis for nuclear facilities is sound for such initiating events.
2. The Fukushima accident reinforces the need for the Government, the Nuclear Decommissioning Authority and the Sellafield licensee to continue to pursue the Legacy Ponds and Silos remediation and retrievals programme with utmost vigour and importance.
3. The mandatory requirement for UK nuclear site licensees to perform periodic safety reviews of their safety cases and submit them to the ONR to permit continued operation provides a robust means of ensuring that operational facilities are adequately improved in lines with advances of technology and standards, or otherwise shut down or decommissioned.
4. The circumstances of the Fukushima accident have heightened the importance of Level 2 Probabilistic Safety Analysis for all nuclear facilities that could have accidents with significant off-site consequences.
5. The additional information we have received since the Interim Report, and our more detailed report, has added further substantiation to, and reinforced, our initial conclusions and recommendations.
6. The nuclear industry and others have responded constructively and responsibly to the recommendations and conclusions made in our Interim Report and instigated, where necessary, significant programmes of work. This shows a commitment to the principle of continuous improvement and the maintenance of a strong safety culture.

The conclusions made in the interim report and reiterated in the final report:

1. In considering the direct causes of the Fukushima accident we see no reason for curtailing the operation of nuclear power plants or other nuclear facilities in the UK. Once further work is completed and proposed improvements will be considered and implemented on a case by case basis, in line with our normal regulatory approach.
2. In response to the Fukushima accident, the UK nuclear power industry has reacted responsibly and appropriately displaying leadership for safety and a strong safety culture in its response to date.
3. The Government's intention to take forward proposals to create the Office for Nuclear Regulation, with the posts and responsibilities of the Chief Inspector in statute, should enhance confidence in the UK's nuclear regulatory regime to more effectively face the challenges of the future.
4. To date, the consideration of the known circumstances of the Fukushima accident has not revealed any gaps in the scope or depth of the Safety Assessment principles for nuclear facilities in the UK.
5. Our consideration of the events in Japan, and the possible lessons for the UK; has not revealed any significant weaknesses in the UK nuclear licensing regime.
6. Flooding risks are unlikely to prevent construction of new nuclear power stations at potential development sites in the UK over the next few years. For sites with a flooding risk, detailed

consideration may require changes to plant layout and the provision of particular protection against flooding.

7. There is no need to change the present siting strategies for new nuclear power stations in the UK.
8. There is no need to depart from a multi-plant site concept given the design measures in new reactors being considered for deployment in the UK and adequate demonstration in design and operational safety cases.
9. The UK's gas-cooled reactors have lower power densities and larger thermal capacities than water-cooled reactors which with natural cooling capabilities give longer timescales for remedial action. Additionally, they have a lesser need for venting on loss of cooling and do not produce concentrations of hydrogen from fuel cladding overheating.
10. There is no evidence to suggest that the presence of MOX fuel in Reactor Unit 3 significantly contributed to the health impact of the accident on or off the site.
11. With more information there is likely to be considerable scope for lessons to be learnt about human behaviour in severe accident conditions that will be useful in enhancing contingency arrangements and training in the UK for such events.

Additional recommendations made in the final report:

General –

1. The UK Government, nuclear industry and the ONR should support international efforts to improve the process of review and implementation of IAEA and other relevant safety standards and initiatives in the light of the Fukushima-1 accident.
2. The nuclear industry with other 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 or off the site.
3. The Government should review the adequacy of arrangements for environmental dose measurements and for predicting dispersion and public doses and environmental impacts, and to ensure that adequate up to date information is available to support decisions on emergency countermeasures.
4. The relevant Government departments in England, Wales and Scotland should examine the adequacy of the existing system of planning controls for commercial and residential developments off the nuclear licensed site.
5. The Government should consider ensuring that the legislation for the new statutory body requires ONR to be open and transparent about its decision-making, so that it may be clearly demonstrate to stakeholders its effective independence from bodies or organisations concerned with the promotion or utilisation of nuclear energy.

Relevant to the Regulator –

6. ONR should expand its oversight of nuclear-safety related research to provide a strategic oversight of its availability in the UK as well as the availability of national expertise, in particular that needed to take forward lessons from Fukushima. Part of this will be to ensure that ONR has access to sufficient relevant expertise to fulfil its duties in relation to a major incident anywhere in the world.
7. 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 control centres, are adequately protected against hazards that could affect several simultaneously.

8. 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.

Relevant to the Nuclear Industry -

9. 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.
10. 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.

Way Forward –

11. 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.

The main interim recommendations made in the interim report and reiterated in the final report:

General -

1. The Government should approach IAEA, in cooperation with others, to ensure that improved arrangements are in place for the dissemination of timely authoritative information relevant to a nuclear incident anywhere in the world.
2. The Government should consider carrying out a review of the Japanese response to the emergency to identify any lessons for UK public contingency planning for widespread emergencies, taking account of any cultural, social and organisational differences.
3. The Nuclear Emergency Planning Liaison Group should instigate a review of the UK’s national nuclear emergency arrangements in light of the experience of dealing with the prolonged Japanese event.
4. Both the UK nuclear industry and ONR should consider ways of enhancing the drive to more open, transparent and trusted communications, and relationships with the public and other stakeholders.

Relevant to the Regulator –

5. Once further detailed information is available and studies are completed, ONR should undertake a formal review of the Safety Assessment Principles to determine whether any additional guidance is necessary in the light of the Fukushima accident, particularly for “cliff-edge” effects.
6. ONR should consider to what extent long-term severe accidents can and should be covered by the programme of emergency exercises overseen by the regulator.
7. ONR should review the arrangements for regulatory response to potential severe accidents in the UK to see whether more should be done to prepare for such very remote events.

Relevant to the Nuclear Industry –

8. 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 extreme circumstances.

9. Once further relevant information becomes available, the UK nuclear industry should review the lessons learnt from the comparison of the events at Fukushima-1 (Fukushima Dai-chi) and Fukushima -2 (Fukushima Dai-ni) sites.
10. 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 site-specific flood-risk assessments as part of their periodic safety review programme, and for any new reactors. This should include sea-level protection.
11. The UK nuclear industry should ensure that safety cases for new sites for multiple reactors adequately demonstrate the capability for dealing with multiple serious concurrent events induced by extreme off-site hazards.
12. The UK nuclear industry should ensure the adequacy of any new spent fuel strategies compared with the expectations in the Safety Assessment Principles of passive safety and good engineering practice.
13. 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.
14. The UK nuclear industry should ensure that the design of new spent fuel ponds close to reactors minimises the need for bottom penetrations and lines that are prone to siphoning faults. Any that are necessary should be as robust to faults as are the pools themselves.
15. 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.
16. 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.
17. 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.
18. The UK nuclear industry review any need for the provision of additional, diverse means of providing of robust sufficiently long-term independent electrical supplies on sites, reflecting the loss of availability of off-site electrical supplies under severe conditions.
19. The UK nuclear industry should review the need for, and if required, the ability to provide longer term coolant supplies to nuclear sites in the UK in the event of a severe off-site disruption, considering whether further on-site supplies or greater off-site capability is needed. This relates to both carbon dioxide and fresh water supplies, and for existing and proposed new plants.
20. The UK nuclear industry should review the site contingency plans for pond water make up under severe accident conditions to see whether they can and should be enhanced given the experience at Fukushima.
21. The UK nuclear industry should review the ventilation and venting routes for nuclear facilities where significant concentrations of combustible gases may be flowing or accumulating to determine whether more should be done to protect them.
22. The UK nuclear industry should review the on-site provision 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.

23. The UK nuclear industry, in conjunction with other organisations as necessary, should review the robustness of necessary off-site communications for severe accident involving widespread disruption.
24. 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 into account of the impact of using contractors for some aspects on-site such as maintenance and their possible response.
25. 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.
26. A response to the various recommendations should be made available within one month of it being published. These should include appropriate plans for addressing the recommendations. Any responses provided will be compiled on the ONR website.

Results of NFLA survey of Local Authority Emergency Planning Units around nuclear emergency planning

The NFLA survey was emailed to all local authority Emergency Planning Units in England, Scotland and Wales who had public email addresses on their Council websites. As a catch-all, the survey was also sent to county Local Resilience Forums, which co-ordinate and oversees the multi-agency emergency planning response at a county level.

Responses were received by 29 Councils as follows:

- Scotland – 10 Councils responded.
- Wales – 2 Councils responded.
- Northern England – 7 Councils responded.
- English Midlands – 4 Councils responded.
- Southern England – 6 Councils responded.

Of the 29 Councils that responded, 2 of them said they were satisfied with the nuclear emergency planning arrangements in their area and did not see it as necessary to fully respond to the questionnaire.

It was stipulated in responding to the questionnaire that anonymity would be given to responses, given the sensitivity of the subject area. The responses below therefore are a collation of the responses and specific comments provided, which have not in any way been taken out of context by the NFLA Secretary.

Q1. Do you have a fixed civil nuclear reactor or a military nuclear facility in your area, or within 30 miles of your boundary?

Of those that responded in detail to the survey, 16 had fixed nuclear sites in their area, or within 30 miles of their area, and 11 did not.

Q2. Are you aware of the following nuclear emergency planning arrangements, and do you have plans for them? Have they been tested in the last 12 months?

- a) REPPIR - ***over 80% had REPPIR plans and of them 80% had tested them in the last 12 months, with others having it timetabled for before the end of the financial year.***
- b) LAESI guidelines on nuclear weapons convoys – ***of those that replied all expect 2 Councils did not have LAESI guidelines available (as they were not near a convoy route). Most Scottish Councils mentioned recent involvement in Exercise Senator a 'table-top' convoy exercise. Most were aware of the LAESI guidelines. One Council had asked to attend an exercise but were told it was not relevant to their area (even though their Council is on the convoy map).***
- b) CBRN plans – ***apart from some Councils located in more remote, rural areas most had CBRN plans. Large city councils and county councils had formally tested their plans, either in a live scenario or by a 'tabletop' run-through exercise.***
- c) RIMNET and NAIR tests – ***there was a patchy response to this question. Most were aware of it, but unsure whether regular tests occurred of the systems.***
- d) Fixed nuclear site evacuation plans – ***for those Councils who had fixed nuclear sites in their area they had taken part in regular live and tabletop exercises. For those who did not there was more limited involvement, unless they were a neighbouring authority.***

d) Other nuclear emergency plans – **a number of Councils had offsite plans for civil or defence nuclear facilities.**

Q3. Are you aware of the Nuclear Emergency Planning Liaison Group (NEPLG) and what it does?

Amongst all Councils with fixed nuclear sites in their area there was strong awareness of the NEPLG and what it does. Amongst Councils without fixed sites 60% were aware of it and 40% were not. A number of Emergency Planning Officers commented that the questionnaire had prompted them to research the group through the internet.

Q4. Do you know who represents local government on the NEPLG and are you aware of the guidance they provide to local government and fire authorities on nuclear emergency planning?

A similar response was received as to question 3. Those with fixed sites had been involved in the Local Authority Sub-group of the NEPLG and fed in issues and concerns to it. 40% of Councils without fixed sites (who responded to the survey) were unaware of who represents local government on the NEPLG.

Q5. Were you aware of the recommendations on nuclear emergency planning from the ONR (HSE) interim review on the Fukushima incident?

Of respondents, 9 Councils were only slightly, or not aware at all, of the ONR's interim recommendations until prompted by the questionnaire. The other respondents were aware of the report.

Q6. Is your authority, or the Local Resilience Forum, planning to make any submissions to the final Weightman nuclear safety report or to the UK Government's review of nuclear emergency planning?

Respondents with fixed nuclear sites commented that they had fed their responses through to the Local Authority Sub-group of the NEPLG. Only 1 other Council had made a formal individual response to the ONR review beyond this.

Q7. The Fukushima disaster led to the evacuation of an area of 20 kilometres (12 miles) and up to 32 kilometres (19.2 miles) to cover some outlying towns that the Japanese authorities were particularly concerned about. The French and US nuclear regulators suggested the evacuation zone should have been even larger – as much as 50 miles. This is considerably higher than current evacuation zones for UK civil nuclear reactors and is likely to take in Councils that do not have fixed nuclear sites in their area. Do you think UK nuclear evacuation zone plans should be increased to the Fukushima evacuation zone size (or larger) than the present smaller zones in current plans? Please explain why.

There was a general consensus amongst most respondents that the size of the zone would depend on the most up-to-date technical and scientific advice and that there should be flexibility in the plan for swift extendibility of the zone as required. The scale of the incident would determine the need for such an extension. It was noted that offsite REPPIR plans had clear guidance on the need to be able to extend the zones.

One interesting comment made was that "...the zones should be reviewed to reflect any updated assessment of the reasonable worst case scenario. However, the rationale behind UK zones is different to that in the US (based upon public perception and not actual risk) and French zones (difference in containment at sites)."

Q8. It is highly possible that the host local authority / LRF for all UK civil nuclear reactors and military nuclear sites could be overwhelmed with the emergency response to a Fukushima type disaster. Mutual aid with neighbouring authorities across the region is essential. Will you be adjusting your Community Risk Registers and / or altering your present emergency plans to

take account of this type of incident? And, if you are an Emergency Planning Unit / LRF in an outlying area, do you require additional training of key personnel for such an eventuality?

All respondents said they were reviewing plans and their Community Risk Registers in reference to lessons learned from any significant incident that takes place. Councils with fixed nuclear sites particularly noted that they were awaiting the recommendations that would come out of the UK Government's national emergency planning review before making any major plan amendments. A number of respondents felt targeted additional training of key personnel would also be considered following the national review.

The large majority of respondents noted that they had established mutual aid agreements that would come into place in the event of a wide-area emergency.

- Q9. The Weightman interim nuclear safety report has noted the need for a review of UK emergency planning to deal with a prolonged incident like Fukushima, which may take as much as a year to become fully under control. Have you put in place reviews to consider how your local authority / LRF would deal with the recovery phase to such a prolonged incident if it had occurred in the UK? Please explain further.

The large majority of respondents noted that they had generic recovery plans which are used in prolonged incidents. Since the introduction of the Civil Contingencies Act, most respondents also noted that a consideration of the recovery implications of a prolonged incident was a key part of many tabletop major incident exercises.

A useful comment that was made noted: "Our recovery plans do not have pre-anticipated time period for the recovery process. One of the initial deliverables in our recovery plan is to scope out the extent and duration of the required recovery process so that it can be supported appropriately by the responding organisations."

Councils with fixed nuclear sites noted that their generic recovery plans had specific consideration of the issues relating to a major nuclear emergency.

Respondents who noted their heavy involvement in CBRN planning had extrapolated lessons learned from live or tabletop incidents into their generic recovery plans.

A small minority of respondents noted that they were developing more detailed recovery plans and welcomed the survey for pointing out the need to more fully consider prolonged incidents of this nature.

- Q10. NFLA seminars and reports, and the Scottish Parliament's report on nuclear weapons convoys, have suggested that there is a lack of specific knowledge and training on nuclear emergency planning matters in Councils that do not have specific civil or military nuclear sites in their area. Do you think, following the Fukushima incident, there is a need for national nuclear emergency planning training for **all** local authorities/LRFs in the UK? Please feel free to add any comments to substantiate your answer.

There was a notable divergence in responses to this question. Respondents with fixed nuclear sites noted that they had extensive training programmes for nuclear emergency plans at local authority and multi-agency level.

Amongst those without fixed nuclear sites the response was more patchy. Some had received some training, and CBRN planning had much enhanced knowledge of nuclear emergency planning issues. The majority noted they would welcome involvement in nuclear emergency planning training events / awareness seminars and would like to see them enhanced. It was stressed that such training should be targeted to key and relevant personnel. It was noted by more than one respondent that such training was necessary only if local risk registers identified nuclear issues in their areas as a 'high' or a 'very high' risk'.

It was also noted that it would be beneficial to offer national events at the Emergency Planning College and devise local / regional events where fixed site emergency planners could train and provide awareness to emergency planners without local fixed nuclear sites.

- Q11. How do you think Local and Fire Authority Emergency Planning Unit's / LRFs can remain open and transparent to the public on nuclear emergency planning matters whilst not infringing issues of local and national security?

There was a consensus that the current arrangements around publishing what was publicly available information and not publishing what had been determined (at the multi-agency or the national level) as restricted and sensitive information largely worked well.

It was noted by respondents with fixed nuclear sites that the public living in detailed emergency planning zones (DEPZ's) receive detailed information as part of the REPPIR regulations, and public information booklets for the wider area are also disseminated and amended on a three-yearly basis.

- Q12. At NFLA seminars mention has been made about the large amount of equipment and open space that would be required in establishing decontamination facilities for cleaning the civilian population in the event of radiation exposure from a nuclear accident or a malicious CBRN attack. Other countries, like Sweden, have been considering the development of a public information campaign to educate the public on what to do in the event of a radiation exposure in terms of removing clothing and thoroughly cleaning the body. Do you think such a public information programme is feasible and more effective than a large-scale emergency decontamination operation? Please explain your comments.

There was no real consensus of views in this area. The majority of respondents felt it was important to ensure both public information campaigns and current large-scale planning arrangements should both be pursued. There was concern about the costs and utility related to such a public information campaign being organised at the local level, and even at the national level. There was also concern that such a campaign could raise unnecessary panic amongst the public, when the risks of such an attack remained low. It was felt that there was a need for national government to consider and review public information for emergencies in its totality and not just for this incident in isolation.

- Q13. All UK civil / military nuclear facilities are near the sea or a river. Following the Fukushima incident, have you reviewed your local / LRF flood plans in reference to the flooding of a civil nuclear reactor or military nuclear facility and its effects on the marine environment?

All respondents with fixed nuclear sites in their areas replied that the nuclear site operators had reviewed flood plans and these had been discussed at the multi-agency level. Respondents with no fixed nuclear sites in their area said this question was not relevant to them.

- Q14. Do you, as a local authority / and wider as a LRF have sufficient technical and scientific expertise for radiation emergencies available to you at short notice? How are you bringing scientific and technical expertise into emergency planning decision-making in the event of a major radiation emergency?

All respondents positively replied that the development of multi-agency Scientific and Technical Advisory Cells (STACs) for environmental and radiation emergency plans had given them access to sufficient expertise. Mutual aid agreements, particularly in relation to CBRN planning, were also in place if the pool of expertise needed to be expanded at short notice.