Learning From Experience At Fukushima:

A UK Regulatory Perspective on Emergency Preparedness

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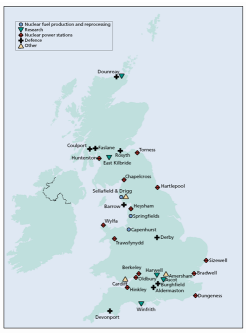
1. Introduction

The UK has developed plans for dealing with nuclear emergencies. To improve our plans we need to learn from experience. The accident at the Fukushima Dai-ichi nuclear power station in Japan following the earthquake and tsunami of 11 March 2011 was unprecedented. The events have highlighted valuable lessons for emergency preparedness.

2. Objectives

- To outline the UK's approach to planning for nuclear emergencies.
- To share the lessons learned from Fukushima and what this means for nuclear emergency plans and recovery.

3. Regulatory framework for nuclear emergency planning



Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR) are enforced by Health and Safety Executive (HSE).

Applies to all nuclear sites holding nuclear materials above specified quantities.

REPPIR requires:

- Nuclear operators to prepare an on-site emergency plan for reasonably foreseeable radiation emergencies.
- Local authorities to produce an off-site emergency plan for reasonably foreseeable radiation emergencies and outline plans for larger, less likely events.

Distribution of nuclear licensed sites in the UK
Supplied with the kind permission of the Environment Agency, Food Standards Agency, SEPA and Northern Ireland Environment Agency.

4. What is a radiation emergency?

A radiation emergency is any event likely to result in a member of the public being exposed to radiation in excess of doses set out in REPPIR. For example, an effective dose of 5 milli-Sievert in the first year.

5. What do we mean by a reasonably foreseeable radiation emergency?

…one which is less than likely, but realistically possible.

6. How we develop off-site nuclear emergency plans

REPPIR requires the HIRE to be reviewed at least every 3 years

Step 1: Nuclear operator carries out a Hazard Identification and Risk Evaluation (HIRE) identifying all accidents that could result in a *radiation emergency*. Submits a *Report of Assessment* to Office for Nuclear Regulation (ONR).

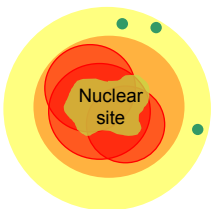
Step 2: ONR uses the Report of Assessment to determine the Emergency Planning Zone within which the Local Authority must plan in detail. This is the Detailed Emergency Planning Zone (DEPZ).

Step 3: Local Authority takes into account local demographics and infrastructure which may extend the DEPZ.

Step 4: The Local Authority prepares and implements a detailed Off-Site Emergency Plan for the DEPZ. This plan should be extendable to deal with larger, less likely events.

Step 5: Off-Site Emergency Plan is tested at least every 3 years.

7. How the Detailed Emergency Planning Zone is developed



Step 1: Operator identifies radiation emergencies and 5mSv dose consequence contours.

Step 2: ONR determines the DEPZ which bounds all reasonably foreseeable radiation emergencies.

Step 3: Local Authority considers other factors in the local area which may increase the DEPZ.

Other factors, for example vulnerable group, road junction.

8. The role of the Nuclear Emergency Planning Liaison Group (NEPLG)

NEPLG brings together local and national government, operators, the environment agencies and other organisations with interests in off-site emergencies at civil and defence sites. The group ensures consistent development of off-site nuclear emergency plans and has produced guidance[1] taking into account national and international best practice.

[1] NEPLG Consolidated Guidance, November 2011.

9. What about recovery planning?

REPPIR guidance[2] says emergency plans should include what needs to be done to support long term recovery. Helping communities recover is a significant challenge for local authorities, so in 2010 NEPLG published the UK Nuclear Recovery Plan Template[3]. The template provides a starting point for nuclear recovery planning which can be adapted to local needs, a structure to organise what needs to be done and a vehicle for consistent improvement of recovery plans. Lessons learned from exercising off-site recovery plans are included in updates of the template.

Key elements of an effective recovery strategy

- Protect people and environment
- Get the community back to normal asap
- Provide reassurance and build confidence
- Engage communities and seek their input
- Establish clear objectives for remediation and when to stop
- Manage contaminated wastes
- Include everyone affected by the event
- Provide clear governance
- Consider wider impact on the region
- Manage compensation arrangements

[2] A Guide to REPPIR 2001. HSE publication.
[3] Chapter 18 UK Nuclear Recovery Plan Template, NEPLG Consolidated Guidance.

10. Learning from Fukushima

Lessons for UK nuclear emergency planning

In its review of the UK's nuclear emergency arrangements following the Fukushima accident, NEPLG identified four main areas for improvement.

Radiation monitoring: We need more detailed information about the UK's monitoring capacity. NEPLG also recognised the strengths of existing capability.
Central Government response arrangements: We need a common response framework for all types of event at nuclear sites (civil, defence and overseas nuclear emergencies) including the provision of scientific and technical advice.
Emergency services capacity and capabilities: We need more opportunities to test emergency service capacity and capability in the event of a prolonged radiation emergency. We also need a consistent radiation protection and intervention framework for all emergency services throughout the UK.
Extending emergency plans for severe accidents: We need to review Hazard Identification Risk Evaluation methods to address larger, less likely events and coincident events – for example, multiple plant failures. Off-site nuclear emergency plans need to dovetail more effectively with wider emergency arrangements, for example for flooding. We need to test our nuclear emergency plans against these scenarios.

Lessons for recovery

Helping communities recover is an on-going challenge for the Japanese authorities. Our understanding of how this is progressing remains sketchy. Our observations and those of a mission to Japan[4] led by the International Atomic Energy Agency are outlined below:

- Strengthen co-ordination and liaison between central, regional and local government.
- Balance the benefits of dose reduction with the negative impact of on-going remediation.
- Establish realistic and credible clearance levels linked to radiation exposure.
- Optimise dose reduction and minimise waste in areas where people live and work.
- Recognise that decontamination is one of a range of options within a recovery strategy.
- Recognise that factors other than dose reduction may influence a recovery strategy.
- Build the needs of stakeholders into a recovery strategy.
- Plan how to manage, share and release data and information to the public.

Outstanding questions for recovery

What arrangements does Japan have to co-ordinate recovery?
How did these arrangements assist the recovery process - including the management of wastes?
How were nuclear recovery efforts affected by the impact of the earthquake and tsunami?
Are contingencies for recovery in the case of multiple events likely to be feasible and cost-effective?
What plans can we reasonably put in place for these circumstances?

[4] Final report of the International Mission on Remediation of Large Contaminated Areas Off-site the Fukushima Dai-ichi NPP. 7-15 October 2011, Japan. NE/NEFW/2011.

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