Public Health England

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Emergency Response Group
Centre for Radiation, Chemicals and Environmental Hazards

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PHE CRCE response to Suffolk County Council on the Sizewell B Power Station Consequence Report

Regulation 7 of the Radiation (Emergency Preparedness and Public Information) Regulations 2019, known as REPPIR19, requires site operators to provide the Local Authority in which their site is based with a Consequence Report which sets out any minimum geographical extent from the premises, that should be covered by the Local Authority's off-site emergency plan for the site.

Local Authorities may request advice from Public Health England, Centre for Radiation, Chemical and Environmental Hazards (PHE CRCE) in support of their interpretation of this Consequence Report as an input into the process of determination of the Detailed Emergency Planning Zone and other arrangements included in the Off-site Emergency Plan.

Suffolk County Council requested that PHE CRCE provide advice on the Consequence Report as described under the Standard Service in the document 'Guidance for Local Authorities on PHE CRCE Support for REPPIR19 Consequence Reports'.

To provide this advice, PHE CRCE requested, and were provided with, the original version of the Consequence Assessment used by EDF Energy Nuclear Generation (the site operator for Sizewell B power station) to develop the original version of the Consequence Report (Revision 000), and were provided with the revised version of the Consequence Report (Revision 002). PHE also held a meeting with EDF on the 18th of December 2019 to clarify several areas of the Consequence Assessment.

This document contains PHE CRCE's response to Suffolk County Council.

PHE comments on Sizewell B Power Station's Consequences Report

On Behalf of Suffolk County Council

REPPIR 2019 – Schedule 4 Checklist
The following information is required to be included in a REPPIR consequence report

Reg 7, Sch 4, 1 a	The name and address of the operator	✔
Reg 7, Sch 4, 1 b	The postal address of the premises where the radioactive substance will be processed, manufactured, used or stored, or where the facilities for processing, manufacture, use or storage exist	✔
Reg 7, Sch 4, 1 c	The date on which it is anticipated that the work with ionising radiation will commence or, if it has already commenced, a statement to that effect.	✔
Reg 7, Sch 4, 2 a	The proposed minimum geographical extent to which urgent protective action may need to be taken	✔
Reg 7, Sch 4, 2 b	The minimum distances to which urgent protective action may need to be taken, marking against each distance the timescale for implementation of the relevant action.	✔
Reg 7, Sch 4, 3 a	The recommended urgent protective action to be taken, together with timescales for the implementation of that action	✔
Reg 7, Sch 4, 3 b	Details of the environmental pathways at risk, to support the determination of food and water restrictions	✔
Reg 7, Sch 4, 4	The rationale supporting each recommendation made in the consequences report.	✔
Reg 7, Sch 4, 5 a	The rationale for the minimum distances for which urgent protective action may need to be taken	✔
Reg 7, Sch 4, 5 b	The rationale for no off-site planning, if agreed between the operator and local authority	n/a
Reg 7, Sch 4, ACOP 670	The appropriate distance for outline planning	✔

Note that CR = Consequence Report, and CA = Consequence Assessment.

All distances discussed below relate to distance from the point of release, unless otherwise specified.

PHE-CRCE did not replicate the calculations contained in the CA and based its assessment on the pre-calculated data as provided by EDF in the CA and CR.

1. Application of the ERLs

Following discussion with EDF on the 18th of December 2019 and subsequent revision of the Consequence Report by EDF, PHE are confident that the application of the Emergency Reference Levels in deriving the recommended distances is correct.

2. Urgent protective action distances

It is recognised that the Gaussian Plume approach is associated with a degree of uncertainty, and therefore such values should be treated as ball park figures. Alternative Gaussian approaches are likely to estimate larger or smaller distances of the order of a few hundred metres.

2.1 Sheltering

Assuming suitably conservative weather conditions, the maximum distance for sheltering given in the (revised) CR is 500 m, based on the lower ERL. The distance derived is deemed to be appropriate.

2.2 Stable Iodine Prophylaxis

Assuming suitably conservative weather conditions, a maximum distance for the administration of stable iodine of 1350 m was derived (based on the protective action being 100% effective). The distance derived is deemed to be appropriate.

2.3 Sheltering and Stable Iodine Prophylaxis

Where practical the minimum technical distance for the implementation of sheltering and stable iodine prophylaxis should be the same. EDF Energy's recommendation for the minimum technical distance for implementation of urgent protective actions in the event of an Off-Site Nuclear Emergency is 1350 m based on suitably conservative weather conditions.

2.4 Evacuation

A maximum estimated distance of 250 m was estimated for evacuation on the basis of the lower ERL and suitably conservative met conditions. The closest permanent habitation is 740 m. The shortest distance from the reactor building to the site fence is just under 100 m (Section 1.2 of the CA).

In the CR, evacuation is not recommended as an urgent protective action. It is agreed that there is no justification to evacuate members of the public who reside in the vicinity of the site, however there is justification for making arrangements (within the detailed emergency plans) to evacuate members of the public who are part of an itinerant population (e.g. walkers) within 250 m, along with other itinerant populations within the protective action area that cannot take shelter.

2.5 Meteorological Assumptions

Following discussion with EDF on the 18th of December 2019 it was agreed that a range of meteorological conditions would be considered. The meteorological conditions representative of the 95th percentile (i.e. "suitably conservative") of urgent protective action distances would be determined by way of an assessment of site specific historic met data. This is deemed to be a satisfactory approach and is described in Section 1.7 (Rationale) of the revised CR.

2.6 Other Considerations

Where appropriate distances to the lower ERL for different protective actions are based on infants, as the most vulnerable group.

3. Outline Planning Zone distances

Outline planning zone distances have been set as per Regulation 9 (1)(a) and schedule 5 of REPPIR 2019. For operating nuclear power plants (such as Sizewell B) the distance is 30 km.

4. Urgent protective action timescales

It is recommended in the CR that sheltering and administration of stable iodine are implemented in parallel which seems sensible.

It is recognised that PITs will be pre-distributed to each residence within the automatic protective action zone. This is of significant importance given the dominance of iodine in the assessment of dose and thereby any delay in taking the PITs is likely to be detrimental to public health.

EDF highlight that stable iodine can be administered up to 5-8 hours following exposure as averting iodine inhalation dose of ~ 50% is still possible. It should also be noted that the optimal period of administration of stable iodine is less than 24 hours prior to, and up to 2 hours after, the expected onset of exposure. Commencing treatment later than 24 hours following exposure may do more harm than good.

5. Application of Reference Levels

There is no reference to the application of the national Reference Level (RL) of residual effective dose in either the CR or CA. And no estimates of individual annual effective residual dose (mSv y^{-1}) are presented in either the CR or CA. A reference level is the level of dose above which it is judged inappropriate to plan to allow exposures to occur. RLs are tools for supporting the practical implementation of the optimisation principle by maintaining doses as low as reasonably achievable and are applicable to all areas/planning zones affected by contamination following the radiation emergency. For the early and intermediate phases (constituting an emergency exposure situation) it is appropriate in planning to select a national RL of below 100 mSv for a short period (that is, short duration, low impact release) or up to a year (longer duration, high impact release). Although, not required to be reported in the CR, reference levels should help inform the off-site emergency plan (as detailed under paragraph 309b in Regulation 11 of the ACoP).

For the assessment of the (averted) dose over 2 days for the application of the ERLs, consideration of a single bounding source term (derived by selecting the contribution from the fault with the maximum radioactivity for each radionuclide) was acceptable (because of the dominance of a single radionuclide). However, when assessing the residual dose over the first year it is possible that multiple radionuclides will contribute significantly to dose. This is relevant to the planning of actions for not exceeding the Reference Level. However, the situation faced in the event of a release would drive specific action plans necessary to keep doses below the agreed Reference Level.

6. Other

Dose to the foetus and to breast-fed infants has been considered and it has been determined that the protective measures required for these do not exceed those required by the most vulnerable group (infants).