

**HEALTH & SAFETY EXECUTIVE
NUCLEAR DIRECTORATE
ASSESSMENT REPORT**

New Reactor Build

EDF/AREVA EPR Step 2 ALARP Assessment

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1. Introduction

This report deals with assessment of the ALARP approach detailed in the Submission (Ref1) provided by EDF/AREVA for the EPR and concludes that the requirements of GDA Step 2 have been met in this respect.

2. ND Assessment

2.1 Requesting Party's Case

EDF/AREVA's case is outlined in chapter C of the submission (Ref 1) in which they describe a 20 year process of progressive safety improvement evolving from the N4 and Konvoi designs, claiming significant reduction in risk in comparison to these baseline plants. They also describe their efforts in relation to accidents and normal operation dealing with workers and the public in the latter case.

EDF/AREVA does quote low numerical risk estimates but their argument is not based solely on this element. They describe real safety improvements for operational dose such as materials selection, equipment design to minimise radiation levels and reduce the exposure time by designing for reduced maintenance. For accident risk, EDF/AREVA describe their consideration of a number of design options, for example to reduce the impact of containment bypass events associated with Steam Generator Tube Rupture events, and severe accidents where the intent is to both reduce likelihood and mitigate consequences, the latter by inclusion of the core catcher.

2.2 Standards and Criteria

In respect of ALARP, Step 2 of the GDA guidance (Ref 2) requires the Requesting Party (RP), in section 2.2, to provide "A description of the process being adopted by the applicant to demonstrate compliance with the UK legal duty to reduce risks to workers and the public SFAIRP". The GDA guide goes on to say that HSE will undertake "an assessment directed at reviewing the design concepts and claims" and specifically in point 2.2 "the approach to ALARP".

Hence whether or not ALARP has been demonstrated is not being assessed in Step 2; rather we are looking at high level claims on how ALARP will be shown to be met by the RP. Based on ND's ALARP guide (Ref 3) the following assessment points were identified for Step 2:

1. An awareness of the HSW act, particularly sections 2 and 3 and confirmation that the RP recognises the duty to comply with the law.
2. Understanding of the concept of ALARP – i.e. a balance between risk averted and the sacrifice, in terms of money, time, trouble, etc., to avert the risk.
3. Understanding that gross disproportion between risk averted and the cost of averting the risk is the test of reasonable practicability.
4. Low numerical risk figures are not the sole support for the risk being claimed ALARP.
5. Options for improvement have been considered; the designs are all evolutionary, so they have clearly built on lessons from the past and from earlier variants. Hence we would expect to see: - a rationale for the safety improvements they have adopted and the proposed improvements (i.e. options) that were rejected during the design process. This would include outline information on how the various options were identified, analysed and sentenced. (For Step 2 existence of the approach is sufficient).

6. That there is a claim that the standards used represent Relevant Good Practice (we will test that justification in Step 3 or 4).
7. There is a clear conclusion that there are no further “reasonably practicable” improvements that could be implemented – this could use a T/AST/005 section 6.21 argument (see below).

2.3 ND Assessment

The table below contains a judgement on how well EDF/AREVA addresses the demonstration of ALARP against each of the Step 2 criteria listed in the previous section.

Assessment point	Comment
1	App C does not specifically mention the HSW act, but it does recognise the need to demonstrate risks are ALARP.
2	Section 1 of App C recognises the need to compare the cost of improvement measures with the benefits (risk reduction) and to implement them unless the cost of such measures is disproportionately large.
3	There is no explicit mention of the term “gross disproportion” but use of the term “disproportionately large” (see 2 above) is close enough.
4	Numerical results are cited (e.g. section 1 and 4 of App C) in the argument but EDF/AREVA does not rely on this alone. There is lots of discussion of practical measures implemented in the design (over those in the baseline plants) and consideration of risk reduction measures.
5	Section 3 in particular discusses a number of design measures considered to mitigate severe accidents
6	The standards used are identified elsewhere in the submission. The merits of the justification of codes and standards will be the subject of ND’s individual assessment topic reports.
7	Section 1 and section 8 of App C claims the EPR design is ALARP. In section 6.2 EDF/AREVA make a commitment to carry out further work, supported by their level 2/3 PSA, “confirming that the plant design does not require significant further improvement under ALARP principles”.

Overall the submission indicates that EDF/AREVA has a reasonable grasp of the ALARP concept and has presented sufficient material for a detailed assessment to begin in Step 3.

Points for ND to follow up include:

- More clarity on gross disproportion in practice
- Review of conclusions of revised PSA studies and its use for ALARP
- Justification of codes and standards will be ongoing, led by the individual topic assessors.

3. Conclusions

EDF/AREVA has provided an adequate description of the approach to ALARP for Step 2. Some detailed points for further consideration have arisen during this high level review and these will be followed up during Step 3 and beyond. We do expect further points to arise as the assessment intensifies in Step 3.

4. Recommendations

HSE should accept that EDF/AREVA has provided sufficient information on the approach to ALARP for Step 2 of GDA.

5. References

1. EDF/AREVA. Safety, Security and Environmental Report. EPR0001. September 2007.
2. HSE Nuclear Power Station Generic Design Assessment – Guidance to Requesting Parties, Version 2, 16 July 2007
3. T/AST/005 Demonstration of ALARP
http://www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/index.htm