ANNEX D

ALARP FACTORS

1 The MoD is committed to the application of civil nuclear safety standards with regard to activity on nuclear licensed sites, and to the same standards so far as is reasonably practicable for other sites where nuclear-related activity takes place. In both cases, the ALARP principle applies. However, what is acceptable in ALARP terms for civil practice may not be achievable for some MoD activities. This is because of the particular constraints imposed on the design of the hazard that arises from its incorporation into weapons of war and the fact that the NII is precluded from seeking to influence this design. In some cases, military requirements prevent the levels of designed safety that would be expected in a civil design, and the overall level of risk that might be accepted at the ALARP point is higher than that for civil practice (lower levels may also be achievable). That is not to say that the relevant standards are different, just that constraints on the design may lead to an ALARP end point that is different from NII expectations based on its experience of civil different practice.

2 There are a number of aspects of NII regulation and ALARP judgement that are peculiar to the MoD domain:

- The body of NII experience or understanding of 'relevant good practice' in MoD activity is not as extensive as that applicable to the civil domain.
- The NII is precluded from influencing NRP and weapons design, and in some instances may not have access to relevant information.
- Application of design base accident SAPs would inevitably lead to queries and challenges relating to design, which would be contrary to the HSE/MoD Agreement.
- Particular defence needs may have to be taken into account.

3 Table 1 highlights a number of areas in the NRP where military requirements preclude the levels of engineered and operational safety that would be expected in a civil plant (it is not appropriate to do this for nuclear weapons). It is intended to be an aid to reaching proportionate judgements. These areas may be such as to indicate a slightly lesser level of achieved safety than for a civil plant and therefore lead to attempts to seek compensatory increases in the levels of safety provided by support facilities, thereby leading to civil standards of overall achieved safety. Features of the submarine may also lead to constraints on shore facilities, for example the space available in supporting infrastructure such as the Reactor Access House. However, as noted in para 2.3 of the main text, this is contrary to NII policy for MoD regulation. The reason for adopting this policy is to avoid expenditure on support facilities that could be better spent on reducing hazards at source, ie weapon/NRP design, if MoD

was persuaded that this was justified (by DNSR – the NII is precluded from seeking to do this).

4 The overall approach to be adopted will therefore be to seek formal assurance from DNSR that safety of NRP/weapon as designed is ALARP against the threats to safety arising from activities carried out on the licensed site. **It is entirely right that this will be a robust process and the NII will not simply accept these assurances without a degree of challenge**. Support and associated facilities will be regulated by the NII as for any other civil nuclear activity. In seeking this confirmation, the NII will also seek confirmation that risks arising from the NRP/weapons are tolerable against HSE's tolerability of risk framework, and that responsible design authorities have processes for establishing levels of risk arising from their design that meet the internal authorisation requirements relating to safety cases.

5 A number of matters are de facto Government policy and as such are excluded from ALARP considerations:

- Present siting of MoD licensed sites
- The need to sustain a nuclear weapons capability
- The use of nuclear plant to power submarines
- Proximity of explosives to some nuclear activities

6 **Reaching ALARP judgements**. ALARP judgements on activities that are subject to direct NII regulation cannot be made without taking into account hazards associated with those activities that are outside the scope of NII regulation. As an example of this, slightly unrealistic but to make a point, insistence by the NII that a submarine needed additional independent cooling systems with associated hull penetrations may increase safety in a LOP(R) but could reduce the safety of the ship's company in war-fighting situations where hull penetrations are a source of potentially life-threatening battle-damage.

7 It follows that ALARP judgments are only likely to be properly reached in full dialogue with DNSR, who regulate those hazards inaccessible to NII regulation. Expectations for the conduct of this dialogue are covered by the DNSR/NII Letter of Understanding.

8 **Particular defence needs**. There has been considerable NII uncertainty over the past few years over the way in which due account should be taken of the particular needs of defence in relation to the NII regulation of licensed nuclear sites. This is presently under review but some broad principles are set down here:

- The MoD/HSE Agreement was established as a basis for the way in which HSE monitored MoD's 'observance of health and safety legislation in respect of members of the military, naval and airforces of the Crown, MoD civilian employees, and others affected by MoD activities...'

- The Agreement commits HSE to ensuring, in judging the adequacy of MoD's performance, that **'the requirements of defence** as well as cost must be considered' and that HSE monitors MoD's observance 'having due regard to **defence imperatives**' (this is the exact wording in the Agreement).

- The whole focus of this Agreement is on MoD's health and safety duties as an employer and creator of risk, and the need for HSE to take account of the peculiarly different circumstances surrounding some of the activities of an employer whose daily business can involve danger (live firing exercises, bomb disposal, simulated air combat etc)

- Advice from the HSE Defence, Fire and Police Unit (telecon Britten/McDowell 15 June 2006) is that no particular meaning is attached to the word 'defence imperative', ie it is no different in principle from other imperatives such as Fire Service imperatives (where higher levels of risk to fire-fighters are accepted in the dose levels permitted for fighting fires in nuclear facilities when they carry out their statutory duty to fire-fight). The wording was **not** particularly intended to apply to situations such as the contract refueling of submarines in licensed nuclear facilities. The subject does not feature at all in the nuclear annex to the General Agreement.

- In overall terms, the advice was that defence needs should be taken into account as would be the case with the more strategic needs of any other stakeholder (for example in electricity supply, or vaccine for a potential flu pandemic), but that resolution of conflicts between NII expectations for safety and MoD interests should be part of the normal ALARP process.

9 **ALARP in the defence context**. The NII/DNSR workshop of 7/8 June 2006 addressed this issue and identified some common points that can be used to guide thinking in this area:

- consideration of defence needs <u>is</u> part of the normal ALARP process and it is not appropriate to identify as a separate matter a 'defence imperative' process.

- the usual regulator/duty-holder processes should be followed, with emphasis on effective dialogue to identify any potential problems early.

- the duty-holder **has** to be involved.

- the NII's role is solely to identify and represent the nature and significance of any unacceptably heightened risk that may accrue if the MoD insists on a particular course of action.

- in extremis, the NII may withhold a permission if it believes these risks are intolerable and ALARP is grossly unbalanced.

- if the MoD continues with the proposed action, they will effectively have taken responsibility for safety, a decision that would be expected to be taken only at the highest level in connection with real defence-of-the-realm considerations (although the decision-making process is a matter for MoD and not the NII).

- since the NII is not competent to judge the significance of defence interests, DNSR's assistance will be essential to the ALARP discussion.

- In general it is preferable for the MoD to represent its concern over defence needs during ALARP/permissioning considerations, rather than for the NII to try to anticipate the possibility that it may arise and condition its thinking accordingly. Such concerns would be expected to be set down formally in writing.

Table 1

NRP ALARP CONSTRAINTS

Military requirement	Design constraints	Implications
1 Capability to operate at significant under water depth and retain hull integrity against challenges (eg depth excursions, shock, collision).	Space limitations arising from small diameter of pressure hull. Limitations in number of pressure hull penetrations.	1.1 Limited redundancy, diversity and segregation of safety systems. EDR.2 1.2 Compact reactor plant layout with limited opportunity for significant in-service maintenance and inspection. EMT.6 1.3 Limited space for passive (and active) engineered safeguards. EKP3, EDR.2 1.4 Limited scope for minimising potential for interactions between safety-related plant and systems and failed structures against internal and external hazards. ELO.4
2 Submarine to be capable of high speed and manoeuvrability.	Highly reactive core, small reactors.	2.1 Limited ability to monitor core conditions during operation. ERC.4
3 Submarine should be capable of continuing to operate as far as is practicable when threatened or damaged.	High reliance on operator intervention. High degree of cross-connection of systems. Need to be able to operate in abnormal and degraded plant conditions.	3.1 30 minute risk may not be applicable para 344. 3.2 Limitations on diversity, redundancy and segregation. EDR.2 3.3 Fault analysis will need to cover other than 'planned' operating modes para 504.
4 The need for self-sufficiency and high underwater endurance.	High inventory of fissile material, low shut-down margin.	
5 Handling of munitions.	Proximity of explosives and other high-hazard materials	5.1 Limited ability to provide protection against fire and explosion hazards. EMA 13-17
6 Minimum numbers of personnel.	Limited space for crew numbers. Extensive remotely operated systems.	6.1 High 'shift' workload. EHF.5 6.2 Limited space for optimising man-machine interfaces. EHF 6 and 7. 6.3 High training demands on qualified staff (P94) EHF.8
7 Operating systems (planes,	Extensive use of high pressure air and hydraulic systems (fire	7.1 As for 5.1.

rudder, masts etc).	hazards).	
8 Domestic and life support systems.	Extensive space requirements. High fire hazard compartment.	8.1 As for 1.3. 8.2 As for 5.1.