HSE Criteria for Delicensing Nuclear Sites

Response to the Consultative Document

Quintessa

www.quintessa.org

June 2004

1 Introduction

This document sets out Quintessa Limited's response to HSE's consultative document on proposed criteria for delicensing parts of, or entire sites licensed under the Nuclear Installations Act 1965 (HSE, 2004).

Quintessa is an Anglo-Japanese scientific and mathematical consultancy company specialising in strategic and safety issues relating to the management of radioactive waste and radioactively contaminated sites. Over the past five years, Quintessa has worked for thirty organisations concerned with the regulation and management of nuclear sites and radioactive materials in sixteen countries. Several staff at Quintessa have over twenty years experience in the field.

Quintessa's motivation in responding to the present consultation exercise is to aid the development of a well-founded, robust and coherent basis for delicensing in the UK. As such, we are entirely supportive of HSE's objective in clarifying interpretation of the 'no danger' requirement incorporated in the Nuclear Installations Act 1965. This is clearly a matter on which opinions be are likely to divided and where it is therefore important to be as clear as possible in establishing regulatory objectives and criteria. Our response is therefore intended to reflect on some of the fundamental issues that we believe to be critical in achieving a coherent approach.

Our comments relate to HSE's proposed definition of 'no danger' as well as the wider context within which that requirement is interpreted. Brief consideration is also given to wider institutional framework within which delicensing arrangements are implemented. These are presented in Section 2. The main points arising from this commentary are then summarised in Section 3.

2 Interpretation of the 'No Danger' principle

2.1 Context

The conditions for releasing a nuclear site licensee from responsibilities under the Nuclear Installations Act 1965 include the requirement that there is 'no danger' and that there has 'ceased to be any danger' from ionising radiations from anything on the site or that part of the site under consideration for delicensing.

We support HSE's contention that 'no danger' cannot reasonably be interpreted as requiring the licensee to demonstrate that a site is 'completely safe'. Even though such an objective might outwardly appear to be desirable, it is not a realistically achievable

goal and does not reflect the fact that 'zero risk' for any undertaking, whether or not it involves ionising radiations, is effectively impossible to demonstrate. As a general rule, the point will be reached where it is necessary to consider whether further meaningful risk reduction can be achieved without disproportionate effort or cost (or perhaps even through the introduction of other – potentially worse – risks and detriments).

Balancing such decisions (typically characterised as "how safe is safe enough?") is necessarily a societal process. In some circumstances it may be sufficient for regulatory authorities, appointed to act in the best interests of society, to establish a 'commodity' basis for regulation, in which clear technical criteria are established and compliance evaluated. On other occasions, the nature of the risk may be such that it is not sufficient for operators and regulators alone to act solely on the basis of a technocratic interpretation of society's best interests and a measure of involvement from other stakeholders may be appropriate.

At the same time, it is also important to bear in mind that the legitimate perspectives, values and interests represented by different groups and communities mean that environmental decision-making will tend to be a site of conflict. No single indicator, or combination of indicators (e.g. such as might be derived from a multi-attribute analysis of alternative solutions) will necessarily be capable of characterising a single 'optimum' solution. Environmental problems will often in practice have more than one plausible answer, and many may have no answer at all (Funtowicz et al., 1999). Ultimately, quantitative analysis alone cannot provide a substitute for the wider political process surrounding decisions on complex issues.

We therefore support the conclusions of the SAFEGROUNDS project (CIRIA, 2002; Collier, 2002) that a measure of consultation should be a fundamental component of planning and decision making for the restoration and safe management of residual contamination on nuclear sites. We also believe that it is important to give such matters due recognition in regulatory proposals on criteria for delicensing. This is not evident from the current proposals, in which it is suggested that a process by which HSE will '*inform local stakeholders*' of its decisions (paragraph 9) will be sufficient to meet policy requirements for openness and involvement. It is Quintessa's view that such limited engagement of community representatives in the process surrounding decision making on delicensing will not always be appropriate.

Consideration of the wider social context in which the 'no danger' principle is interpreted – in order to establish the basis on which criteria area to be defined – raises related questions concerning the situation at the time the original Act of Parliament was drafted. For example, the controversial nature of this issue and its potential importance in determining costs to the public purse associated with delicensing efforts

at major sites may not have been recognised 40 years ago as clearly as they are today. This suggests that attention might usefully be given to the background against which the language of the Act was developed in order to provide an appropriate framing for its application to present-day decision making. Quintessa believes that the robustness of a regulatory interpretation in 2004 of words used some 40 years earlier might be improved if some reflection were given to questions such as:

- What evidence exists for how the term 'no danger' was interpreted in the original parliamentary debate (and surrounding discussion) on the Act itself? For example, what sources of exposure to the public and workforce from ionising radiations were recognised as being relevant at that time? To what extent were low levels of residual contamination considered a relevant factor in delicensing decisions?

- How different was the wider social and cultural understanding of 'no danger' at the time the Act was passed? For example, what other aspects of technological risk were at that time expected to pose 'no danger' to society?

2.2 Regulatory Framework

The recent Government consultation on nuclear decommissioning policy (Department of Trade and Industry et al., 2003) included a discussion on the anticipated end points of decommissioning.

"*The government proposes to recognise that restoration to unrestricted use may not always be the BPEO for the site of a decommissioned facility, that the policy needs to be flexible enough to allow for a range of possible end points reflecting the intended future use of the site, and that achievement of any given end point will be a progressive process which, in most instances, will span a number of decades.*"

It can be inferred that, from a policy perspective, the intention is therefore to encourage decommissioning and site restoration in all circumstances, with the caveat that restoration to 'unrestricted use' may require grossly disproportionate expense and effort. The implication of such a policy is that the safety of a decommissioned site can be ensured by controlling its end use, thereby limiting the potential exposure pathways from the site. Quintessa recognises that such an approach consistent with aspects of the regulatory approach for non-radioactive contaminated land. Clearly, however, an important consideration that is particularly relevant to delicensing decisions is the appropriate balance between alternative strategies: a highly restrictive interpretation of 'no danger' (with the consequence that a greater number of sites will require ongoing controls and restrictions on use), or a less restrictive (but nevertheless prudent) criterion that does not *necessarily* require ongoing controls and restrictions.

The practical implications of such a policy remain to be worked out – in particular, it is appropriate that due recognition is given to international guidance (such as that from ICRP (1999)) in dealing with residual contamination from past practices. Some of these matters are addressed in Section 2.3 below. Beyond this, however, it is perhaps also relevant to consider whether the current regulatory mechanisms (in particular, the implications of requiring continuing maintenance of a nuclear site licence) are actually appropriate to such situations.

There is no indication in the current consultative document that alternative regulatory mechanisms might be considered as an appropriate means for implementing the 'no danger' principle. This is perhaps understandable since such changes might require changes to primary legislation, which could be considered beyond the remit of HSE. Nevertheless, Quintessa believes it is appropriate (perhaps in the light of information arising from analysis of the wider context in which the original legislation was written), for a more fundamental review of the way in which such sites are subject to regulatory control. Such a review would also help to ensure consistency in approaches to long-term control over residual contamination and radioactive waste disposal.

Given the fundamental importance of delicensing decisions to overall site restoration effort (particularly on major sites), it seems reasonable to expect that wider reflection should be given to the implications of requiring maintenance of a nuclear site licence as the appropriate regulatory mechanism for control over those sites where all nuclear activities (other than management of residual activity) have effectively ceased. Alternative approaches might include either: (a) the adoption by HSE of a narrower set of licensing conditions appropriate to the nature of the hazard; or (b) transferring responsibility for regulatory control over such sites to the Environment Agencies (who are already the lead regulator for radioactive waste disposal on, or from, licensed and non-licensed sites). Such issues could have an important bearing on the definition and practical implementation of delicensing criteria, and the overall logic and coherence of the regulatory framework in which such criteria are applied.

2.3 Quantitative Criteria

The critical paragraph in the consultative document in relation to the definition and interpretation of quantitative criteria is paragraph 7. Here HSE indicates that it has drawn on the principles established in previous guidance on *Tolerability of Risk* (HSE, 1988) on more recent guidance in *Reducing Risks, Protecting People* (HSE, 2001). Both these documents provide a framework for decision-making expressed in terms of risk 'tolerability', which recognises the principle that risks situated above the threshold for broad general acceptability may nevertheless be tolerated provided that society can be satisfied that there is an associated benefit (e.g. in terms of employment, convenience

or lower costs to the public purse), that they are kept under review and that they are maintained at a level that is as low as reasonably practicable (ALARP).

The broader implications of adopting such a framework for long-term environmental risks – in particular, the implication that risks can be periodically reviewed to ensure that they still meet ALARP criteria – remain to be fully tested. However, a potentially interesting exploration is the current re-authorisation process for the Drigg disposal facility. The Environment Agencies' guidance on requirements for authorisation (Environment Agency et al., 1997) do not explicitly adopt the 'risk tolerability' framework; however, they do specify an individual risk criterion of 10^{-6} per year as a design target that effectively provides a lower constraint on optimisation (equivalent to the limit of the 'broadly acceptable' region in HSE's guidance). Some of the projected risks associated with Drigg are expected to lie above this level and the Environment Agency will therefore need to be satisfied that Best Practicable Means have been applied to ensure that risks to future populations are as low as reasonably achievable.

It is also interesting and important to consider the specific words used in HSE's proposal, which indicates that the 10^{-6} per year criterion will be used as "*the minimum requirement*" for what is regarded as 'no danger' for the purposes of the relevant Sections of the Nuclear Installations Act. The language adopted here is obscure and lacks the clarity of that employed in the reference reports. In general usage, a 'minimum requirement' is typically considered to be a basic standard, which needs to be satisfied before any additional constraints (or optimisation requirements) are applied. If this (reasonable) interpretation is adopted, however, it would imply HSE anticipates that further optimisation of clean up on nuclear sites will be required beyond 10^{-6} per year in order to reduce risks to levels that are ALARP (which would be inconsistent with the quantitative criteria used elsewhere). In this light, even the subsequent text, which requires a licensee to demonstrate that "*all reasonable practicable actions*" have been taken to reduce risks below one in a million per year, is ambiguous.

The difficulties in interpretation of HSE's intentions are exacerbated because, while reference is made to existing reports that adopt the Tolerability of Risk framework, no indication is actually provided of the proposed 'ALARP' region for delicensing decisions. Does it lie above or below the proposed 10^{-6} criterion? From Quintessa's perspective, we understand that an individual risk of 10^{-6} per year can reasonably be interpreted as consistent with 'broadly acceptable' risks (as in existing HSE guidance), and therefore perhaps relevant to the description of 'no danger'. However, we would also anticipate that ALARP-type arguments can be used to enable higher risks to be tolerated, provided that an appropriate case was made and, if necessary, debated through public consultation.

If an upper limit to the ALARP region (at, say, 10^{-5} or even 10^{-4} per year) were also applied, this would be fully consistent with the principle of constrained optimisation used in radiological protection. In this light, it is relevant to note that ICRP is in the process of significantly revising its overall guidance on dose criteria. Among other improvements, it is anticipated that the new guidance (expected in 2005) will include further discussion of the application (and potential inappropriate use) of very low dose targets as well as the implications of constrained optimisation.

It may be that Quintessa's interpretation is the same as what is intended by HSE in the consultation document (or perhaps not). If not, and the 10^{-6} per year value is actually intended to be viewed as an upper limit on tolerability, then we would question whether this would be consistent with radiological protection objectives used elsewhere (including by the authorising agencies for radioactive waste disposal (Environment Agency et al., 1997)).

In any case, we suggest that specific consideration should be given by HSE to improving the existing language in order to make intentions absolutely clear.

3 Summary

Quintessa welcomes the consultative document, and is entirely supportive of HSE's objective in clarifying interpretation of the 'no danger' requirement incorporated in the Nuclear Installations Act 1965. This is clearly a matter on which opinions are likely to be divided and where it is therefore important to be as clear as possible in establishing regulatory objectives and criteria.

Overall, however, we have some difficulties with the way in which the proposed criteria have been specified. In particular, we believe that attention could usefully be given to the following factors in improving the clarity of, and basis for, the guidance:

- HSE should improve the language with which the proposed delicensing criteria are defined, in order to remove ambiguity and to make its intentions absolutely clear. Specifically, it should be made plain where the proposed 10^{-6} criterion lies with respect to the ALARP region. Furthermore:
  - If it is intended that the ALARP region should lie above the criterion, then (for consistency with the Tolerability of Risk framework) consideration should also be given to providing an appropriate upper-bound constraint on tolerable risk.
  - If the ALARP region is to be understood as lying below the 10^{-6} criterion, then serious consideration should be given to the implications of such an approach for related areas of regulation (not least the radiological protection objectives for solid radioactive waste disposal).

- More explicit recognition should be given to appropriate consultative processes as a fundamental component of the ALARP discussions surrounding decision making for site delicensing.

- The robustness of a regulatory interpretation in 2004 of specific words used in legislation some 40 years earlier might be improved if a deeper analysis were made of the wider context in which the 'no danger' requirement was originally defined.

- It is perhaps relevant to review whether the current regulatory mechanisms associated with maintenance of a nuclear site licence are actually appropriate once nuclear activities on the site have ceased and whether alternative approaches might be more effective and/or efficient.

References

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