Response to Comments Received during the Consultation on Proposed HPA Advice on the Application of ICRP's 2007 Recommendations to the UK

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ABSTRACT

The Health Protection Agency (HPA) advises UK bodies with responsibility for protection against radiation on the applicability to the UK of recommendations issued by the International Commission on Radiological Protection (ICRP). After a consultation process lasing several years, ICRP has issued new recommendations for a system of radiological protection (ICRP 2007). These recommendations replace the previous recommendations issued in 1991 (ICRP 1991).

Following a period of public consultation, HPA has developed its advice on the application of the new ICRP Recommendations to the UK. During the consultation, HPA posed twenty-five specific questions. Views on any other relevant aspects were also welcomed. The comments received were used to assist HPA in the development of its advice.

This document summarises the main comments received during the consultation period and HPA's response to them. The revised advice is published in a separate document.

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1 INTRODUCTION

A function of the Health Protection Agency (HPA) is the provision of information and advice on radiation protection of the community (or any part of the community) from risks connected with radiation. This function is inherited from one of the HPA's predecessor organisations (the National Radiological Protection Board (NRPB)). NRPB specifically advised UK bodies with responsibility for protection against radiation on the applicability to the UK of recommendations issued by the International Commission on Radiological Protection (ICRP, 2007). The HPA is continuing with this function and, following a public consultation in 2008, has developed advice on the applicability to the UK of the 2007 Recommendations of ICRP (HPA, 2009a). The present document summarises the comments received during the consultation and HPA's response to them.

Most of the responses received during the consultation related to the twenty-five specific questions which appeared in the consultation document. Where possible, responses which were not associated with a specific question have been dealt with alongside the responses to the question to which they most closely relate. Responses which do not closely relate to any of the questions have been dealt with in a separate section.

Section 2 considers the comments received in response to the specific questions in the consultation document. Section 3 considers the responses which were not linked to the consultation questions.

2 RESPONSE TO CONSULTATION QUESTIONS

2.1 Question 1: Protection of the eye

Question 1: Pending the outcome of the ICRP review, do you believe that further advice should be given concerning protection of the eye? If so, what would you recommend?

There were 14 responses to this question.

The respondents to this question fell roughly evenly into two groups. The first group considered that such further advice would be helpful. The second group were of the opinion that further advice before the outcome of the ICRP review would be inappropriate, and could even be counter-productive.

HPA has amended Section 3.1 of the advice document to note that:

> *The HPA has conducted a review of the effects of radiation on the eye, concluding that the lens of the eye is more sensitive than is assumed in the ICRP recommendations*,

and ends by stating that:

The HPA will comment on recommendations made by the ICRP on protection of the eye.

Other minor editorial changes have also been made.

2.2 Question 2: Cancer

Question 2: Do you think that the ICRP approach provides a reasonable means of estimating the risk of cancer following chronic or low dose radiation exposure? If not, what alternative would you suggest?

There were 14 responses to this question.

Almost all the respondents to this question were in agreement that the ICRP approach is reasonable. Consequently, no major changes have been made to Section 3.2 of the advice document, except that a passage has been added at the end of the section noting recent findings which provide more evidence in favour of a DDREF for all cancers other than leukaemia of less than 2 rather than greater than 2, and also indicating that HPA will continue to monitor developments.

Other minor editorial changes have also been made.

2.3 Question 3: Heritable effects

Question 3: Do you think that the ICRP approach to estimating the risk of heritable disease is reasonable? If not, what approach would you suggest?

There were 13 responses to this question.

Almost all the respondents to this question were in agreement that the ICRP approach is reasonable. Even those few respondents which did not give unqualified support for this position tended to dissent only in that they considered that this issue should be kept under review as new data emerge and expertise develops. Consequently, only minor editorial changes have been made to Section 3.3 of the advice document.

2.4 Question 4: Nominal risk coefficients

Question 4: Do you agree that a simple set of averaged risk coefficients is appropriate for radiological protection purposes? If not, how would you suggest implementing a radiological protection policy based on different risk coefficients for different groups of the population (other than for the distinction between working and general populations)?

There were 17 responses to this question.

Almost all the respondents to this question agreed that a simple set of averaged risk coefficients is appropriate for radiological protection purposes. The general

opinion was that introducing an alternative arrangement could add complication without assisting radiological protection or practically improving regulation, and that the use of specific risk coefficients would imply a level of precision which is not justified.

It is worth noting that a small number of respondents, whilst not objecting to the above approach, also suggested that HPA provide further advice concerning circumstances where averaged dose coefficients would not be appropriate.

One respondent stated that he did not see how applying a simple set of averaged risk coefficients could be justified in many of the practical situations that arise; however, this was very much a minority opinion.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 3.4 of the advice document.

2.5 Question 5: Non-cancer diseases

Question 5: Do you think that the information on non-cancer diseases is sufficiently robust to allow these diseases to be included in estimates of radiation detriment at low doses? If so, how would you suggest that these risks be calculated?

There were 13 responses to this question.

Most of the respondents were of the opinion that the information on non-cancer diseases is not sufficiently robust to allow these diseases to be included in estimates of radiation detriment at low doses; however, a small number qualified this by emphasising that the situation should be kept under review, and the principles of ALARA used for protective purposes.

One response differed significantly from the others. This was:

> *As there is indication of risk of non-cancer diseases they should be included. The risk should be calculated in the same way as for cancer.*

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 3.6 of the advice document.

2.6 Question 6: Dose calculation for protection purposes

Question 6: Do you agree with the HPA endorsement of the ICRP methodology of dose calculation for protection purposes, including:

a) the use of defined values of radiation and tissue weighting factors

b) the sex-averaging of equivalent doses in the calculation of effective dose to a reference person?

If not, what alternatives would you suggest?

There were 14 responses to this question.

Almost all the respondents agreed with the HPA endorsement of the ICRP methodology of dose calculation for protection purposes. A few qualified their support by noting that there were specific instances where sex-averaging could cause problems; examples given were medical exposure and when considering compensation claims.

In view of the responses received, a passage has been added to Section 4.3 of the advice document which states:

> *It is noted that, particularly for medical applications, there may be a need for calculations that have the convenience of the approaches adopted by the ICRP but avoid some of the simplifications. The HPA is aware that the ICRP intends to provide further advice on the applicability of effective dose in different circumstances and will consider alternatives. The HPA is considering the specific needs of assessments applied to medical procedures and will provide advice that is informed by international developments.*

Other minor editorial changes have also been made.

2.7 Question 7: Uncertainties in assessed doses

Question 7: Do you agree with HPA advice that:

a) there should be no requirement for the routine assessment of uncertainties in assessed doses, but that:

b) an understanding of source of uncertainty and their magnitude could inform judgements on the optimisation of protection?

There were 15 responses to this question.

The respondents were generally in agreement with both a) and b), above.

A few respondents considered that the advice required clarification and a direct link between uncertainties and optimisation of protection was questioned.

Accordingly, small revisions have been made to the final paragraph of Section 4.3 of the advice document.

2.8 Question 8: Doses from external exposures

Question 8: Do you agree with HPA advice on operational quantities for the measurement of external exposures, that:

a) H(10), Hp(10), H'(0.07,Ω) and Hp(0.07) remain appropriate quantities for area and personal monitoring of effective dose, and measurement of dose to the skin and extremities (hands and feet), but that:*

b) contrary to ICRP advice, H'(3,Ω) and Hp(3) should be retained for measurement of doses to the lens of the eye, rather than relying on conservative estimates made using H'(0.07,Ω) and Hp(0.07)

If not, what alternatives would you suggest?

There were 13 responses to this question.

The respondents were generally in agreement with both a) and b), above, particularly those concerned with medical exposure.

There were some respondents who disagreed with b), and considered that the ICRP advice should be followed, even though this could lead to an overestimate; however, these were in the minority.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 4.4 of the advice document.

2.9 Question 9: Doses from internal exposures

Question 9: Do you agree with HPA advice on the interpretation of bioassay data in the assessment of occupational doses from intakes of radionuclides, that:

a) in most cases only reference model parameter values and the dose coefficients published by ICRP will be used, although changes may be made relating to the exposure conditions, specifically to material-specific biokinetic parameter values (eg. inhaled particles size, solubility), but:

b) while changes to individual-specific biokinetic parameter values are not formally allowed by ICRP in the calculation of effective dose, HPA considers that in rare cases of dose assessments based on extensive data, where doses justify a detailed analysis, a UK Approved Dosimetry Service may agree approaches with the regulatory authority and advisory bodies such as the HPA?

If not, what alternatives would you suggest?

There were 9 responses to this question.

The respondents were generally in agreement with the HPA advice.

One respondent was wary of requiring the Approved Dosimetry Service to seek the advice of regulators or advisory bodies at the time of assessment, on the grounds that it could be a time-consuming process, and suggested that "*the advice be that pre-advice can be obtained*".

In view of the supportive nature of the responses, only minor editorial changes have been made to Section 4.5 of the advice document.

2.10 Question 10: Doses from radiation exposures

Question 10: Do you agree that there should be no requirement to recalculate previously recorded doses once new dose coefficients are available and have received legislative endorsement?

There were 13 responses to this question.

The respondents were generally in agreement that there should be no requirement to recalculate previously recorded doses once new dose coefficients are available and have received legislative endorsement. No respondents dissented from this view; however, a number included provisos; for example:-

> *But this should not be taken to mean that it is never appropriate to make such revised assessments.*
>
> *However note should be made that recalculation may be required in relation to compensation schemes etc.*
>
> *However, we believe that it would be prudent to examine the assessments underpinning discharge authorisations to ensure that there is no need to amend the authorisations.*

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 4.5 of the advice document.

2.11 Question 11: Collective dose

Question 11: Do you agree with the HPA proposal that collective dose still has a role in radiation protection for both workers and the public? If not, how do you propose to take account of societal risks in the process of optimisation?

There were 16 responses to this question.

All of the respondents to this question agreed that collective dose still has a role to play.

Many respondents qualified their agreement by emphasising that collective dose was useful only if used appropriately, and was open to misuse. Concern was expressed at the possibility of very small doses being multiplied by very large populations and time scales.

There was also a view that, although restricting doses to the individual is a very important element in radiation protection, this should not be at the expense of significantly increasing collective dose, e.g. by dose sharing.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 4.6 of the advice document.

2.12 Question 12: Types of exposure situation

Question 12: Do you agree that the three exposure situations (planned, emergency and existing) can replace the previous categorisation into practices and interventions? If not, how would you categorise exposure situations?

There were 13 responses to this question.

The respondents to this question all agreed that the three exposure situations could replace the previous categorisation into practices and interventions. In view of this, only minor editorial changes have been made to Section 5.2 of the advice document.

2.13 Question 13: Monetary cost of unit collective dose

Question 13: Do you think that the monetary cost of unit collective dose is relevant to the optimisation process? Should HPA give guidance on this cost?

There were 20 responses to this question.

Almost all of the respondents were of the opinion that the monetary cost of unit collective dose is relevant to the optimisation process, although a number considered it necessary to emphasise that such a cost should not be applied simplistically, and should be used only in combination with other factors when considering optimisation.

One respondent cautioned that the introduction of a monetary cost for unit collective dose could have serious implications in the medical sector, at least if it were the same as for the nuclear sector, concluding that it was not possible to produce a "yes" or "no" answer to this question without further information being available.

The respondents were generally in favour of HPA giving guidance on the cost. One exception was a respondent who considered that HPA should advise only on factors which may be relevant to the determination of the cost, and that "*different values may be appropriate in different situations*".

In view of the responses, a passage has been added to Section 5.4.2 of the advice document which states:-

> *However, the HPA recognises that there appears to be support in the UK for the use of a monetary value for unit collective dose. Therefore the HPA will consider initiating a programme of work on this topic.*

Other minor editorial changes have also been made.

2.14 Question 14: Dose limitation

Question 14: Do you agree that

(i) HPA should recommend no change to the dose limits in the UK;

(ii) Exposures from past controlled releases should be included in comparisons with dose limits?

There were 15 responses to this question.

Most of the respondents agreed with both (i) and (ii), above, although one responding organisation did not agree that exposures from past controlled releases should be included in any comparison with dose limits.

A number of respondents wanted additional guidance on dose limits for pregnant women and women of reproductive age.

In view of the comments received, the 4th paragraph of Section 5.4.3 of the advice document has been amended so as to read as follows.

> *The HPA continues to recommend the use of an occupational dose limit of 20 mSv in a single year with no allowance for higher annual doses based on averaging over several years. Furthermore, the HPA supports the ICRP policy that the methods of protection at work for women who are pregnant should provide a level of protection for the embryo/fetus broadly similar to that provided for members of the public and specifically that after declaration of pregnancy the dose to the fetus should not exceed about 1 mSv. However, the HPA supports the ICRP view that for the purposes of controlling occupational exposure there is no other reason to distinguish between the sexes.*

Other minor editorial changes have also been made.

2.15 Question 15: Scope of medical exposure (1)

Question 15: Do you agree that HPA should recommend no change to the definition of medical exposure as currently understood in the UK? If the description in Chapter 7 of the 2007 Recommendations is applied instead, exposures such as those carried out for guiding or planning purposes, which are not strictly diagnostic, interventional or therapeutic, may not be covered and your views on this are welcomed.

There were 13 responses to this question.

The respondents were generally in agreement that HPA should recommend no change to the definition of medical exposure as currently understood in the UK.

In a joint response to questions 15 and 16, one respondent commented:

> *Further consideration may be required for other types of exposure such as health screening of asymptotic patients which are not covered by health screening programmes. Further consideration of planning and verification exposures is perhaps warranted.*

Another emphasised that

> *All exposures need to be assessed and captured whether it is planning or for medical exposure, i.e. therapeutic, diagnostic or interventional.*

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 5.6.1 of the advice document.

2.16 Question 16: Scope of medical exposure (2)

Question 16: Do you consider that the range of exposures currently considered as medical exposures as understood in the UK should be maintained (or expanded), or decreased as in the 2007 Recommendations? In addition, your views on what might constitute 'exceptional circumstances' with regard to exposures for individual health assessment, population screening, occupational health surveillance or medico-legal purposes as stated in the 2007 Recommendations are invited.

There were 11 responses to this question.

There was general agreement among the respondents that the range of exposures currently considered as medical exposures as understood in the UK should not be decreased. A significant minority went even further in suggesting that it was at least possible that the range should be expanded.

As mentioned in connection with question 15: in a joint response to questions 15 and 16, one respondent commented:

> *Further consideration may be required for other types of exposure such as health screening of asymptotic patients which are not covered by health screening programmes. Further consideration of planning and verification exposures is perhaps warranted.*

Another pointed out that

> *The use of medical exposures is increasing with the introduction of new diagnostic techniques particularly for health assessment. This is an area where the range of exposures should be maintained.*

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 5.6.1 of the advice document.

2.17 Question 17: Principles of protection in medical exposure

Question 17: Do you consider that HPA should recommend that the concept of an annual restriction for normal healthy volunteers who may participate in more than one research study should be adopted in the UK? Views on what that annual restriction may be would be welcomed.

There were 14 responses to this question.

Most of the respondents were of the opinion that HPA should recommend that the concept of an annual restriction for normal healthy volunteers who may participate in more than one research study should be adopted in the UK.

With regard to what this restriction might be, the following comments were received.

> *… this level should be of the order of 5mSv, unless there are exceptional circumstances or unusual justification for higher doses.*
>
> *… suggest standard limits should be applied, e.g. 20mSv.*
>
> *I would propose a restriction of 20 mSv over 5 years.*
>
> *Occupational dose limit could be applied.*
>
> *… the mechanism might be to require average dose be restricted over, say, 5 years.*
>
> *… perhaps the same as for a worker.*
>
> *Ideally it should not exceed the limit for a member of the general public but may, with informed consent, of course, extend to the limit for a non-classified person. I believe that it would be difficult to justify exceeding that, especially since, as they are volunteers, they will have no employer entitled or able to classify them.*

A significant minority of respondents expressed the opinion that it would be difficult to regulate and police a restriction of this nature, and a few questioned whether such a restriction for healthy volunteers was really necessary at all.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 5.6.2 of the advice document.

2.18 Question 18: Public exposure (1)

Question 18: HPA is recommending a maximum dose constraint for members of the public of 0.15 mSv y^{-1} for a new nuclear power station. Should this value for a constraint be extended to all new sources?

There were 31 responses to this question.

Of all the consultation questions, Question 18 (especially the second part) provoked by far the biggest response, with particularly strong opinions being expressed by respondents from the medical sector.

The first part of the question consists of a statement that HPA is recommending a maximum dose constraint for members of the public of 0.15 mSv y^{-1} for a new nuclear power station. Although this was not itself a question, a significant number of respondents commented upon it. Some respondents were supportive of this recommendation (and at least one suggested that the value should be even lower than 0.15 mSv y^{-1}), but the majority who commented on it were opposed, with many expressing the view that insufficient justification had been put forward for what they considered to be an arbitrary reduction in an already small value. The following examples are excerpts from responses.

> *The HPA has not explained on what basis this recommendation is made or the justification for moving away from the 0.3mSv.y-1. Setting a dose constraint should be risk based, not source based and agreed with the regulator.*
>
> *Not only would this proposal prove to be unhelpful in protecting the public, it would have the opposite effect. It would significantly raise the cost of building a new nuclear power station …There are still some individuals and organizations who are strongly opposed to the creation of a new generation of nuclear power stations and, if the cost of building them is driven up, such groups might be able to show that they would be uneconomic. It would be extremely unfortunate if the HPA were to be drawn into this particular argument.*

There was also some concern that, even if the lower value were intended to apply only to new power stations, it may also become applied in contexts for which it was not originally intended. For example:

> *I fear the application of a lower dose constraint for new nuclear power stations will become a recognised constraint for all other planned exposures even if the constraint is explicitly specified for nuclear power. This will be pushed by pressure groups, the media, and I believe the regulators.*

Responses to the second part of the question ("Should this value for a constraint be extended to all new sources?") were overwhelmingly negative, with particular concern expressed about the effect this could have on the medical sector. A significant number of specific examples were provided to highlight the problems which could be caused by such an extension. An idea of the nature of these is given by the following sample. It should be noted that what follows is only a small proportion of the responses, and many other examples giving similar opinions could have been quoted.

> *… I am now really nervous for the future of Nuclear Medicine in particular, that if your advice is implemented across the board by the EA, the additional cost to the Health Service of having a maximum 0.15 mSv per year dose constraint would not benefit patients, or members of the public, who are mostly "patients-in-waiting".*
>
> *I would like to express my concern regarding the impact of any reduction from the existing 0.3 mSv per year on the medical sector in general and the dental sector in particular … If a reduced dose constraint is applied this will have the effect of requiring many … surgeries … to be retro-fitted with additional protection when an X-ray unit is replaced. … I do not consider that these small dose savings would be cost effective and it is likely that once practices are aware of the implications of any new constraint, less equipment will be replaced. This will have a negative impact on radiation dose to the patient as new equipment tends to give lower patient doses.*
>
> *… The areas where this could increase the shielding requirements are … Radiotherapy design – linac bunkers, HDR suites and other treatment*

rooms. … PET/CT … CT … General radiology … Dental radiology … Nuclear Medicine … Radioactive waste.

… Any lowering of the dose constraint itself for new (or indeed existing) medical facilities … implies that prohibitively expensive new facilities that potentially will provide therapeutic procedures for health problems in the local population are not going to get built. So are we going to have a regulatory control which dictates that the local population should be protected from a hypothetical risk, rather than benefit from improved healthcare facilities?

… A dose constraint of 0.15 mSv y-1 is not appropriate in terms of cost/benefit for other sectors of the industry. For the Medical Sector it would mean the introduction of holding tanks, additional shielding and increasing behavioural restrictions.

… The real concern, however is the effect such measures would have on patient care - perhaps at the cost of lives. Nuclear Medicine would be particularly hard hit with patients being required to be admitted following routine scans whereas they can now be treated as outpatients. New emerging uses of nuclear medicine perhaps could even be prevented. Within other areas, the need to provide further protection when upgrading facilities will lead to significantly prolonged programmes of works during which essential clinical facilities are not available for patient care.

In view of the responses, the wording of the second paragraph of Section 6.1.1 of the advice document has been amended so as to make clear that HPA specifically advises the UK Government to select a value for the constraint for members of the public for new nuclear power stations and waste disposal facilities that is less than 0.15 mSv per year. This reflects the recommendation that lower dose constraints can be set where readily achievable and that at the design stages of new plant it is more straightforward to take measures to reduce exposures of the public than for existing plant. The amended advice document does not advise that this lower value be extended to all new sources. This is a reflection of the fact that respondents voiced very strong opposition to the value being extended in this way.

Other minor editorial changes have also been made.

2.19 Question 19: Public exposure (2)

Question 19: Do you agree that for comparison of options and for discharge authorisations collective doses truncated at 500 y should be estimated for the populations of the UK, Europe and the world? Views are welcomed on the extent to which collective doses should be considered in this context, what the truncation period should be and which population groups should be considered.

There were 16 responses to this question.

Most of the respondents were supportive of HPA's position, with a number suggesting that use of a collective dose period of more than 500 years would be

of limited value. Although some respondents appeared to consider the specific period of 500 years to be somewhat arbitrary, this was mentioned in only a few responses.

A few respondents addressed the use of annual doses in the nanosievert range, with most of those who commented on this supporting the view that such doses could be ignored. However, one respondent emphasised that, given a sufficiently large exposed population, even such a small dose could be associated with a statistical death.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to the relevant paragraphs of the advice document.

2.20 Question 20: Reference levels (1)

Question 20: What are your views on ICRP's proposed use of overall reference levels in emergency planning and response?

There were 14 responses to this question.

Most of the respondents were supportive of the HPA and ICRP positions.

A few respondents advised caution, commenting that the use of reference levels for emergencies could be hindered by the unpredictability of the consequences of accidents and (especially) malicious attacks.

One respondent was of the opinion that the use of overall reference levels in emergency planning and response needed "*a step change in legislation*".

In view of the generally supportive nature of the responses, only minor editorial changes have been made to the relevant paragraphs of Section 6.2.4 of the advice document.

2.21 Question 21: Reference levels (2)

Question 21: Do you think it would be helpful to specify reference levels for overall emergency response? If so, do you think these should be set in the range 20 – 100 mSv?

There were 13 responses to this question.

Respondents were largely supportive of the specification of reference levels for overall emergency response, but with a number of provisos.

Concern was expressed that such reference levels might come to be treated more like "absolute limits" than was originally intended.

A number of respondents expressed the view that some emergencies could require a level of greater than 100 mSv.

In view of the responses, the relevant paragraph of Section 6.2.4 of the advice document has been clarified by the insertion of the following sentence.

This reference level (100 mSv) would only apply in circumstances where plans could reasonably be in place to protect people to below this level.

Other minor editorial changes have also been made.

2.22 Question 22: Reference levels (3)

Question 22: Do you think that it would be helpful to specify reference levels for the management of the rehabilitation phase following an emergency? If so, do you think these should be set in the range 1-20mSv?

There were 12 responses to this question.

Almost all of the respondents thought it would be helpful to specify reference levels for the management of the rehabilitation phase following an emergency. Of those respondents, none objected to the suggested range of 1-20 mSv.

The small number of respondents who expressed concern about the specification of reference levels for the management of the rehabilitation phase following an emergency, did so because they were not convinced that this would be of significant benefit beyond that provided by the principles of optimisation, justification and ALARP.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to Section 6.2.5 of the advice document.

2.23 Question 23: Withdrawal of protective actions

Question 23: Do you agree that it would be helpful if HPA developed further guidance on the withdrawal of protective actions?

There were 13 responses to this question.

All the respondents who provided an answer to this question agreed that it would be helpful if HPA developed further guidance on the withdrawal of protective actions. In view of this, the only significant change which has been made to Section 6.2.9 of the advice document is that the final sentence has been changed from

HPA proposes that it should develop further guidance on the withdrawal of protective actions.

to

The HPA will develop further guidance on the withdrawal of protective actions.

Other minor editorial changes have also been made.

2.24 Question 24: Radioactively contaminated land (1)

Question 24: Do you agree that current HPA advice on radioactively contaminated land is consistent with the 2007 Recommendations and that there is no need for HPA to issue further general advice on this topic?

If not, what further advice do you consider necessary?

There were 13 responses to this question.

There was general agreement that there was no need for HPA to issue further general advice on this topic.

A few respondents made suggestions as to what further advice could be issued, with one in particular saying that they would like further advice in respect of the social and economic context in which HPA are offering such advice, and a clearer statement and understanding of the factors, costs and benefits underlying it. However, the view that no further advice is currently required was very much in the majority.

In view of the generally supportive nature of the responses, only minor editorial changes have been made to the relevant paragraphs of Section 6.3.3 of the advice document.

2.25 Question 25: Radioactively contaminated land (2)

Question 25: Do you agree that additional guidance from HPA is needed in relation to radiological protection principles for land contaminated with 'hot particles' and, if so, what should be included in such guidance?

There were 11 responses to this question.

All of the respondents to this question agreed that additional guidance from HPA is needed (or at least would be helpful) in relation to radiological principles for land contaminated with 'hot particles'.

Suggestions as to what should be included in such guidance included

> *Further advice from the HPA on the situation of heterogeneous contamination would be of benefit. This advice should consider issues and environments wider than just 'hot particles' on land. The guidance should cover issues such as what are acceptable combinations of the probability of encountering such heterogeneous contamination and dose received both for individuals and for larger populations.*
>
> *HPA should consider advice based on the processes applied to "hot particles" at Dounreay.*
>
> *The guidance should include the considerations that you state e.g. the potential for deterministic effects, worst case scenario, distribution of particles and probability of exposure.*

In view of the responses, a sentence has been added to the end of Section 6.3.3 of the advice document which states:

> *The HPA will issue further guidance on the radiological implications of heterogenous contamination.*

Also, the penultimate sentence of Section 6.3.3 has been amended so that it now reads:

> *The HPA considers it important to note in this context that, in its view, the ICRP recommended bands of reference levels (Table 5.2) strictly apply only in cases where doses are reasonably certain to occur and are thus not strictly applicable to situations of heterogeneous contamination.*

(Previously, this sentence had ended with the words: "*to such exposure situations*".)

3 OTHER RESPONSES

A number of comments were received which did not specifically relate to any of the consultation questions. Some of these are dealt with below. It is not appropriate to deal individually with each such comment received, as some cover similar subject matter, and others are of a type which does not require a response in the present document (for example, comments which give general support for the HPA's position); however, the omission of a comment from this section does not mean that it has not been read and considered.

Some of the comments which are reproduced below have been slightly amended so as to preserve anonymity.

The following comment relates to Section 4 of the advice document.

> *Section 4 concerns Dosimetry. The curves in Figure 1 are not clearly labelled but the text allows the reader to determine which is which. The new Recommendations give a reduced weighting factor for protons and charged pions and a revised continuous function of neutron energy as the weighting factor for neutrons. The HPA considers that "further increases in complexity in the calculation of equivalent and effective dose are undesirable and inconsistent with their intended use" and [this organisation] welcomes this.*

The figure has been amended to make this clearer.

The following comment relates to Section 5 of the advice document.

> *The first paragraph of Section 5.4.1 contains a sentence which seems to have gone awry. The third sentence, when discussing protective strategies for reducing exposures it says "the expected benefits achieved by the strategy should be expected to outweigh the detriment from the averted radiation exposure and the individual and societal harms inevitably associated with the strategy itself". Averted radiation*

exposure is not a detriment. It is presumably the principal benefit of the strategy.

The first paragraph of Section 5.4.1 of the advice document has been substantially re-worded.

The following comments relate to Section 6 of the advice document.

Section 6.1.2 Occupational exposure

The final paragraph of this section is self-inconsistent. It begins, "The HPA does not recommend any specific dose constraints…." but finishes, "The HPA recommends that the UK Government should consider setting dose constraints……" The Government should only consider setting dose constraints in the light of HPA recommendations ie in what appears to be a contradiction of the first sentence. Failing this, the constraints would be set after receiving advice from many different sources. Each source would argue from its own particular standpoint, resulting in such a wide range of different opinions as to be almost useless. This paragraph therefore needs to be carefully reconsidered before it is formally submitted.

It is not considered appropriate for HPA to recommend specific dose constraints for occupational exposure as this is a matter for the appropriate Government Department or Agency. However, we do advise Government to consider setting specific dose constraints for occupational exposure for new nuclear plant, as also recommended for public exposure, and do not consider this to be inconsistent.

Comment on 6.1 If contaminated land being redeveloped can be treated as planned, then it can be treated as such at all times rather than an existing exposure situation, nothing about the land has actually changed. In fact it sounds as if the original people responsible for the contamination can just leave it and say it is existing but if someone wants to improve the situation by using the land positively, they will then have to clean up.

Comment on 6.2.2 There should be a recognition that the situation not only evolves from emergency to existing but also, if the area is not to stagnate, to planned when the area is to be used for some future purpose.

It is recognised that there are grey areas between the different exposure situations but as the same basic approach is used in radiological protection for all situations then detailed guidance on which exposure situation applies is not required.

The first italicised HPA view in Section 6.3.1 endorses an ICRP caveat that land contaminated as a result of activities on a site or by residues of radioactive discharges are only Existing Exposure situations if "such activities and discharges were not conducted within ICRP's framework or equivalent" and goes on to state that residues from authorised discharges "should be considered as part of the overall system for planned exposure

situations, except in exceptional circumstances". We have two comments on this:

Firstly it is not clear what this implies for inadvertent radioactive contamination on a nuclear licensed site. As the contamination has not left the site, the question of authorisation does not arise. It would help to clarify whether unintended consequences of a 'practice' (such as residues from leaks and spills during operation of a nuclear site) are "activities conducted within ICRP's framework or equivalent" or not. The introductory paragraph to Section 6.3.1 is not explicit whether it is referring to residual contamination on a licensed nuclear site or a former (de-licensed) site, or off-site contamination resulting from the past operation of a nuclear site. It is perhaps a bad example to choose to illustrate 'existing exposure' from man-made radionuclides. Section 6.1 has previously stated that "the radiological implications of land contaminated with radioactive material will normally be treated as an existing exposure situation". Perhaps land contaminated with radioactive material on an existing nuclear licensed site is not within HPA's meaning of 'normally' in this context.

Secondly, the statement that residues from authorised discharges "should be considered as part of the overall system for planned exposure situations, except in exceptional circumstances" seems to run counter to my understanding that the Part 2A regulatory regime (which addresses 'interventions' in respect of what is now called 'Existing Exposure' situations) is the applicable regime that acts as a 'safety net', should there be a concern (justified or otherwise) that residues from authorised discharges are giving rise to 'unacceptable' exposures (e.g. greater than predicted when the authorisation was granted) - perhaps through changes in land use or human habits.

In relation to the first point, Section 6.1 of HPA 2009a states that 'land contaminated with radioactive material on a nuclear licensed site or other site where access by members of the public is already controlled is also treated as a planned exposure situation'. Regarding the second point it is understood that the Part 2A regulatory regime, whilst primarily intended to address existing exposure situations, could also be used in relation to contamination from planned exposure situations where there is, as noted above, concern regarding 'unacceptable' exposures (ie the 'exceptional circumstances noted above). Therefore, no additional changes were made to the HPA response.

The HPA view at the end of Section 6.3.1 about what 'normal' means is a bit hard to follow. I think it is risky to use the phrase "new status quo acceptable to all stakeholders involved" - some stakeholders may never accept the "new status quo". Also, I think "status quo" is actually short for "status quo ante" - meaning "how things were before", so a "new status quo" may be an oxymoron!

And similarly:

> *Comment on 6.3.1 In the context of the desire of the exposed population to reduce exposures to 'normal', the assumed meaning of 'normal' should be clearly stated. I do not think it is acceptable to assume it means something different post accident to what it meant pre-accident. The HPA position does not describe a desire to return to 'normal' but a willingness to accept the dose even though it is not 'normal'.*

HPA acknowledges these comments but considers them too specific to be included in the overall response to the ICRP recommendations. They will be considered, however, when HPA reviews its advice on existing exposure situations following publication of the ICRP guidance on 'Application of the Commission's Recommendations to the protection of individuals living in long term contaminated areas after a nuclear accident or radiation emergency'.

The following comment was received about the document in general, and particularly about the implications for the building of new nuclear power stations.

> *[We] request that the HPA accept and implement all the recommendations of ICRP 2007, including applying them to existing situations like operative nuclear sites, decommissioning and waste sites.*
>
> *In view of the so-called host communities' 40 years of cumulative exposure to radiation from Hinkley, Oldbury and Berkeley nuclear sites, we also request that these ICRP 2007 recommendations rule out new build on any of these Somerset sites.*

The following comment concerns the linear non-threshold dose-response model.

> *I wish to comment on your "recommendation that the linear no threshold model remains the basis for setting radiological protection standards and criteria, because it represents the scientific consensus".*
>
> *No threshold is all very well, but the presumption that the linear model remains valid is no less than outrageous. The so-called scientific consensus is a contrived apparatus, based upon vested interests and Nelsonian blindness. The implications of the German KiKK report make it altogether untenable, while the various hypotheses emanating from Green Audit and the European Committee for Radiation Risk provide more than enough material for research into more appropriate models.*
>
> *At this particular moment, when the world is contemplating a surge in new nuclear power stations, you have a unique opportunity and responsibility to find a more suitable model, and the planet will be greatly in your debt if you do. Yet the window of opportunity is about to close. I sympathise with your problem - that the current nuclear industry would certainly be shaken to its roots by a more appropriate model; but this is balanced by the equal certainty that nuclear power is not necessary - there are other ways of providing electricity - and only the precautionary principle can advise you on how to behave.*

The following summarises comments received during consultation on objectives for disposal of solid radioactive wastes (HPA, 2009b, Jones et al, 2009), which were felt to be more relevant to the HPA response to the 2007 ICRP Recommendations.

> *'Your consultation document depends crucially on advisory recommendations promulgated by the International Commission on Radiological Protection which are scientifically invalid insofar as they are extended to some of the exposures associated with waste.' This respondent later states: 'The ICRP's response to heterogeneity is to employ assumptions. Most are individually questionable and when taken together, as they must be, they are simply not acceptable as a system of radiation protection. The upshot is that "dose" is an effectively meaningless term yet the industry's regulators have no other terms with which to assess and quantify risks. Reassurances about "trivial doses" are revealed as empty.'*

HPA considers that the ICRP Recommendations are based on a considerable body of peer reviewed scientific evidence which has been collated and reviewed by experts from throughout the world. Therefore, HPA has confidence that the radiation risk factors used by ICRP provide a sound basis for a radiological protection system, which is applied internationally and in the UK. HPA also considers that the work of the Committee on Medical Aspects of Radiation in the Environment (COMARE) on clusters of childhood leukaemia in the UK provide evidence that the risks of radiation have not been substantially underestimated. Therefore, no additional changes were made to the response document in light of these additional comments.

4 REFERENCES

HPA (2009a). Application of the 2007 Recommendations of the ICRP to the UK. Advice from the Health Protection Agency.HPA RCE-12.

HPA (2009b). Radiological protection objectives for the land-based disposal of solid radioactive wastes. Advice from the Health Protection Agency. HPA RCE-8.

ICRP (1991). 1990 Recommendations of the International Commission on Radiological Protection. ICRP Publication 60. *Ann ICRP,* **21** (1-3)

ICRP (2007), The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. *Ann ICRP,* **37** (2-4)

Jones KA, Mobbs SF and Anderson T (2009). Response to Comments Received during the Consultation on Proposed HPA Advice on Radiological Protection Objectives for the Landbased based Disposal of Solid Radioactive Waste. HPA-RPD-052