

Report of Task Group on the implications of the implementation of the ICRP
recommendations for a revised dose limit to the lens of the eye

This content has been downloaded from IOPscience. Please scroll down to see the full text.

2013 J. Radiol. Prot. 33 855

(<http://iopscience.iop.org/0952-4746/33/4/855>)

View [the table of contents for this issue](#), or go to the [journal homepage](#) for more

Download details:

IP Address: 2.39.8.142

This content was downloaded on 27/02/2015 at 11:23

Please note that [terms and conditions apply](#).

MEMORANDUM

Report of Task Group on the implications of the implementation of the ICRP recommendations for a revised dose limit to the lens of the eye

J Broughton¹, M C Cantone², M Ginjaume³ and B Shah¹

¹ Society for Radiological Protection (SRP), UK

² Asociación Italiana de Radioprotección (AIRP), Italy

³ Sociedad Española de Protección Radiológica (SEPR), Spain

Received 28 August 2013, accepted for publication 30 August 2013

Published 22 October 2013

Online at stacks.iop.org/JRP/33/855

Summary

This report was commissioned by the IRPA President to provide an assessment of the impact on members of IRPA Associate Societies of the introduction of ICRP recommendations for a reduced dose limit for the lens of the eye.

The report summarises current practice and considers possible changes that may be required.

Recommendations for further collaboration, clarification and changes to working practices are suggested.

Approved by the IRPA Executive Council in July 2013

1. Introduction

In April 2011, the International Commission on Radiological Protection revised its eye dose threshold for cataract induction, specifying 0.5 Gy, compared with the previous threshold doses for visual-impairing cataracts of 5 Gy for acute exposures and >8 Gy for highly fractionated exposures. Further, ICRP recommended a reduction in the dose limit for occupational exposure in planned exposure situations (in terms of equivalent dose) for the lens of the eye from 150 to 20 mSv in a year, averaged over defined periods of 5 years, with no dose in a single year to exceed 50 mSv. This statement generated both interest and some concern from the radiological protection community regarding its practical implementation.

The primary purpose of IRPA is to provide a medium whereby those engaged in radiation protection activities in all countries may communicate more readily with each other and through this process advance radiation protection in many parts of the world. IRPA also has a Vision 'to be recognised as the international voice of the radiation protection profession'. In accordance with these considerations, at a meeting of the Presidents of the European Associate Societies of IRPA (Venice, October 2012) at which there was some discussion regarding the new dose limit, the IRPA President, Renate Czarwinski, commissioned John Broughton, the SRP President,

to form and lead a Task Group to survey the views of the Associate Societies worldwide and consider the implications of the implementation of the ICRP statement.

The Task Group was established and a questionnaire was devised to canvass the international views of the effects of implementing the recommendations. The questionnaire was divided into three topic areas and Topic Experts were chosen from volunteers nominated by Associate Societies to assist with the collation of the responses.

Of the forty-eight Associate Societies, just twelve returned completed questionnaires, although these included most of the larger organisations, and represented input from Europe, North and South America as well as Asia.

The report was collated by the Topic Experts and Task Group from the returned questionnaires, and was then subject to further amendments following comments from contributors.

The IRPA Executive Council is invited to note the findings and recommendations of the report and take action as appropriate.

2. Terms of reference and Task Group involvement

The Terms of Reference for the study were developed for, and agreed by, the IRPA Executive Council. These are shown in the appendix along with details of IRPA members involved in the Task Group or as topic experts.

3. Questionnaire

The Task Group developed the questionnaire, in accordance with the requirements of the Terms of Reference, to ascertain the implications of a revision to the eye dose limit for workers internationally. The questionnaire, which was not limited to any specific area of radiation practice, was developed to address three principal topics, namely the implications for dosimetry, methods of protection, and an overview of the wider implications of the change to the limit. The questions are listed below along with the collated responses, together with any additional comments from the Associate Societies (ASs).

Additional comments were also invited: the ASs were informed that there would be some flexibility to include any additional matters that arose during the study, and that these would be addressed within the requisite timescales (if possible) or identified for possible separate consideration should they require significant additional time or effort. In reality, in view of the limited timescale, only a limited number of additional items were identified, although several matters are recommended for further consideration.

4. Distribution

The questionnaire was circulated to all ASs within IRPA who were invited to respond if they felt that they had the necessary expertise to contribute towards an assessment of the implications of the revision to the eye dose limit. Responses were received from the following twelve ASs (covering sixteen countries)—Argentina, Belgium, France, Hungary, Italy, Japan, Nordic Societies, Spain, Romania, Slovakia, UK and USA—with the majority of ASs responding to all questions.

5. Responses and reports from topic experts

The majority of ASs focused on the impacts to the medical community, with some also supplying information regarding the nuclear power industry. One AS discussed the issues associated with veterinary uses of x-rays.

The topic experts (TEs) scrutinised the responses and reported on the key points raised in response to each question, together with appropriate conclusions and recommendations. This information is presented below.

6. Task Group input

The Task Group have edited the topic reports to clarify wording, enhance points from the contributors which they considered to be important and provide a consistent report format.

6.1. Topic 1: implications for dosimetry

This topic concerns the implications for dosimetry for the lens of the eye.

The section consisted of four questions.

Q1. Since there is already a requirement to monitor doses to the eye, what is/are the current best method(s) used for the assessment of $H_p(3)$? For field exposures which are not highly localised, the measurement of $H_p(0.07)$ and $H_p(10)$ with a passive whole body dosimeter worn on the torso region is generally regarded as sufficient to assess the $H_p(3)$ dose and confirm compliance with the eye dose limit.

In practice, although no-one is routinely monitoring the eye lens dose specifically, for exposures in a non-uniform field which would result in an individual receiving a significantly higher dose to the lens of the eye than to the whole body, a method has been identified which has been used in pilot studies in many countries. This involves wearing a dosimeter near the eyes, i.e. near to the eyebrow ridge, the centre of the forehead, or on the side of the head, with the dosimeter calibrated in terms of $H_p(3)$. In some of these studies, $H_p(0.07)$ was used as an estimate of $H_p(3)$.

In some countries, particularly for medical workers who use a lead apron to protect most of the body but who could be exposed to high eye lens doses, the most frequent method to assess the eye lens dose is to use two whole body dosimeters, with one placed under the apron and another above it (generally on the left shoulder or on the neck). The so-called 'double-dosimetry' method is recommended by ICRP publication 85 (2001) and ICRP 117 (2010) and is mandatory in some countries where workers could be at risk. The eye dose can then be extrapolated from the unprotected dosimeter, using correction factors.

However, one AS states that variations in the measured dose when using this technique can be substantial, being very sensitive to positional changes, and that the technique should not be used to determine eye dose as it could underestimate the dose in some situations.

Some countries introduce monitoring if 3/10 of the dose limit is likely to be exceeded, so monitoring of eye lens dose could be introduced for doses potentially above 6 mSv. In some Northern European countries, it has been assumed that if the annual whole body gamma dose is less than 50 mSv, then the dose to the lens is below the current dose limit for the lens of the eye.

One AS has presented a proposal to identify the workers at risk and to define a monitoring method related to that risk:

- (1) Classification of type of practices which should lead to the identification of workers at risk: measurements with dosimeters worn above the apron could be used to confirm this classification, but not as a substitute for specific eye lens dosimetry.
- (2) If high eye lens doses are then expected, based on the above dose estimates, then a specific 'pilot' eye dose measurement should be performed. This could be done either by passive or active dosimetry. If a high risk is confirmed, the first step is provision of adequate (or more adequate) protection, combined with repeat dosimetry to verify the adequacy of the protection.

- (3) If the assumed risk is confirmed, a permanent monitoring system with a passive dosimeter close to the lens of the eye within the protection equipment (lead glasses/goggles) should be considered.

Q2. What systems under consideration/development are you aware of or likely to use in future for improved measurement of $H_p(3)$? Provide cost implications if possible. On the basis of current data, no major changes in dosimetry practice are expected from the nuclear sector or from most practices that involve uniform radiation fields and very low dose exposures. A high percentage of workers receive an annual dose below 1 mSv.

The main concerns and changes are foreseen for some medical practices, although one AS did report the potential to exceed 20 mSv in certain situations in nuclear industry glove-box work. Several ASs have recommended additional training relating to radiation protection and the correct use of methods of protection.

Three different approaches have been suggested by ASs for monitoring workers who are likely to receive high doses to the eye lenses:

- (1) Specific $H_p(3)$ dosimeter worn close to the eye.
- (2) $H_p(10)$ and/or $H_p(0.07)$ whole body dosimeter worn at the collar or shoulder above the lead protections and corrected to assess $H_p(3)$.
- (3) Electronic devices that provide prompt information on dose.

No information has been provided about the cost implications of the different approaches. However, supplementary costs are foreseen if additional monitoring is needed.

Several concerns have been expressed by the ASs:

- (1) It is problematic to increase the number of required dosimeters, especially in the medical sector where there is a high rate of loss or misuse of dosimeters. One possible solution which has been suggested is to use the unprotected $H_p(10)$ measurement for the assessment of $H_p(3)$ and $H_p(10)/10$ for the assessment of effective dose if a lead apron is worn.
- (2) It is necessary, when lead glasses are used, to correctly assess the dose reduction to eyes, but this is not usually undertaken.
- (3) There are no international standards for dosimeter calibration in units of $H_p(3)$.

Among recent developments, the 'Eye-DTM' dosimeter distributed by Rad Pro (Germany) is mentioned by three ASs. This dosimeter was developed within the ORAMED EU FP7 project (see www.oramed-fp7.eu/ for more information) specifically to monitor the eye lens doses, but it has been found not to be completely satisfactory from an ergonomic viewpoint. Likewise, a modified dosimeter for $H_p(3)$ measurement has been identified by one AS and another has investigated the most appropriate dosimeter to be used. As regards electronic dosimeters, current developments are not specifically targeted towards eye lens dose measurements. If only gamma radiation is involved, the use of an extremity dosimeter that is calibrated on a slab or cylindrical phantom for $H_p(0.07)$ could produce a conservative estimate for eye lens.

Q3. Are these measurement methods dependent (or likely to be dependent) on the level of the dose being measured or on any other conditions? There is general agreement that eye lens dosimetry will only be needed for specific types of work, such as interventional radiology or interventional cardiology. However, a few ASs claimed that, in other fields, there was insufficient published evidence to support this policy and that further investigation was required.

When specific eye lens dosimetry is needed, the most critical parameters for accuracy of dose assessment are the positioning of the dosimeter, the angular and energy radiation field distribution, and the effectiveness of any means of protection used (e.g. lead glasses).

The selected measurement method can influence the classification of workers and the monitoring requirements. Some recent studies, which form part of the ELDO project financed by the EU DoReMi network, highlight the high dependency on the location of the whole body dosimeter and the limited correlation that this has with the eye lens dose.

Q4. Are there any implications for dose recording, including possible considerations for itinerant workers ('outside workers'—i.e. people who work at more than one location)? There is general agreement that dose recording for the eyes should be considered in the same way that it is done for whole body doses. Itinerant workers should report eye lens doses from their different employers.

The fulfilment of this requirement may be dependent on national regulations and ease of identification of workers. In some countries the dose data belongs to private companies or nuclear power plants, whereas in others, it is the worker who is supposed to provide this information. In Europe, the Heads of the European Radiological protection Competent Authorities (HERCA) has recently undertaken a project dealing with dosimetric follow-up of itinerant workers (see www.herca.org/WG1.asp).

One AS has proposed postponing the dose recording of eye lens dose for itinerant workers until there is further experience for full time workers.

6.2. Topic 2: implications for methods of protection

This topic concerns the implications for methods (including protective equipment) which may be utilised to reduce dose to the eye.

The section consisted of two questions.

According to most ASs, it is clear that the medical sector, and in particular high dose fluoroscopy areas of cardiology surgery and interventional radiology, seems to provide the potential for worker doses to reach levels that may exceed the recommended limits.

Q5. What procedures and equipment are used at present for reduction of the dose to the eye? In the medical sector, which is the area on which most ASs have concentrated, the majority have indicated that eye dose is reduced by protective shielding equipment such as pull-down shields, leaded glasses with side shields, fluoroscopy table shields, disposable patient shields and portable shields of various configurations. The use of such protection is mandatory in some countries for high dose fluoroscopy areas associated with interventional radiology and cardiology.

Generally, established protective methods are used to reduce eye dose. These include extensive training for personnel to select, place and utilise shielding correctly. Training is also used to help personnel understand where high radiation areas exist and the proper techniques to reduce patient dose and thus the scatter dose to medical personnel nearby. Other methods indicate leaving the fluoroscopy suite when cine acquisition is initiated.

Generally, with one exception relating to glove-box work in the reprocessing field, the nuclear industry does not foresee a problem. Some organisations require the mandatory wearing of either safety or personal prescription glasses in radiation areas. Although others do not utilise these glasses at present, they will consider similar measures in future where high beta doses are involved.

Q6. What procedures and equipment might be used in future for reduction of the dose to the eye? Provide cost implications if possible. Most ASs have indicated that a real reduction

of the dose to the eye can be obtained with extensive training of medical staff to ensure the appropriate use of protection equipments introduced in question 5 above, and awareness of their effectiveness. Mandatory use of leaded glasses for all personnel involved in the interventional procedures, not just those most exposed, is suggested, and attention is also drawn to the need for protective glasses with more comfortable characteristics.

One Society indicated the use of dedicated electronic eye dosimeters to give immediate feedback; this could be quite expensive.

Another suggestion is the need to use and place dosimetry in a consistent manner (e.g. differences with left or right side) and to develop an accurate method to determine eye dose using current dosimetry by developing effective and accurate eye dose algorithms. This is unlikely to increase the cost of dosimetry.

Cost implications are likely to be variable, but insufficient evidence has been provided to understand the extent of the requirement and its variability.

6.3. Topic 3: wider implications of implementing the revised limit

This topic aims to identify any direct or indirect impacts on current practice which would result from the application of the revised dose limit.

The section consisted of five questions.

Q7. Are there any short-term implications before the satisfactory implementation of revised dosimetry and methods of protection (as in those topics described above)? All ASs have indicated that there will be short-term implications. Several ASs believe that there is insufficient data (from either measurements or calculations) to allow full understanding of the current situation. Responses from ASs have also suggested that guidelines for achieving the new standards (to include requirements on management, means of protection, dose estimations and monitoring systems) should be established. There has also been a suggestion that there is an urgent need to develop appropriate commercially based dosimetry systems.

Some ASs have also cited better education and training on the risks associated with radiation and the need for protection of the eye lens.

Q8. Are there any potential longer-term issues, which may have an impact on activities on a more permanent basis? The majority of the ASs have indicated that there will be some long-term effects. One AS believes that there will not be any longer-term impact if all the protection methods are implemented. Other comments received have included the need to assess the radiation dose and the associated risk further, the management of more extensive data on doses, the establishment of a system to estimate doses more precisely and the role of radiation protection specialists. Many ASs have also commented that it is necessary to consider the implications for medical staff such as interventional radiology or cardiology practitioners—for whom doses could be higher than for other groups—and some believe that the number of the practitioners should be increased if doses for them have the potential to exceed the limit.

Q9. Are there any implications for employment of people who have an existing cataract or pre-cataract condition and, if so, what criteria might be used? All ASs are concerned with the impacts on employment. They commented that employment could vary depending on the domestic situation in the various countries, that the freedom to choose occupation should be protected, and that there should not only be international standards but also countermeasures introduced nationally. Several ASs have commented that radiation-induced and age-induced cataracts cannot be distinguished and that discrimination methods could not be easily established or applied. Some ASs have said that the cost could be high if employers

adopt medical examination of the eyes for all workers, and hence it is important to investigate the relationship between radiation-induced cataracts and doses in detail to determine the causality.

One AS has suggested that undertaking tasks where the worker would be exposed to a relatively high radiation dose, such as looking at fluoroscopic screens, should be avoided based on the ALARA principle.

Q10. Are there any circumstances in which you foresee that the introduction of new limits might lead to more claims for compensation? Several (but not all) ASs are concerned with the potential for an increase in claims seeking compensation for damages. ASs believe that the increase in lawsuits due to the reduced dose limits would be unavoidable where there is already a culture of many lawsuits in other fields. It was commented that the types of occupations with higher doses could be IR and IC practitioners. There was a suggestion that the costs of healthcare could generally increase resulting from the number of compensation claims. This may be mitigated if the doses to high-risk workers, such as IR and IC practitioners, could be reduced by more extensive education and training. It was also suggested that perhaps compensation should be limited to visually disabling cataracts (posterior subcapsular cataract). There may be additional implications for claims following accidental situations.

A small number of ASs believe that the revised eye dose limit will not increase the number of compensation claims as they believe it would be difficult to prove exposure above the dose limit if periodic monitoring could not be performed, and if the effects of doses accumulated in the past could not be properly evaluated.

Q11. Are there any additional matters regarding the change of dose limit that you wish to bring to the attention of the Task Group?

Comments received have included:

- Many ASs have mentioned that the doses could be high in diagnostic radiology.
- Diagnostic precision should be considered.
- Medical exposures are not subject to the new dose limits; however, attention has been drawn, by one AS, to exposures of the lenses of children, considering the potential for greater sensitivity of their lenses compared to those of adults, and their longer life expectancy which, together, put them at higher risk for developing visually impairing cataracts.
- ICRP or ICRU should establish conversion factors for $H_p(3)$ —from existing dosimetry measurements—and find a different unit name for equivalent dose.
- The high costs of the measurements need further consideration.
- There is a substantial cost implication for a relatively low risk; there is a need to consider social and economic factors in setting the new limits further.
- The managerial decisions to be taken, including confusion in deciding the need for classification as exposed/not occupationally exposed workers.
- The increased probability of accidentally exceeding the new dose limits.
- The ICRP statement has been rushed and has led to confusion regarding stochastic/deterministic effects.
- The apparent alignment of fatal and non-fatal effects.
- The implications for dose limits during emergency situations are unclear.

7. Conclusions

7.1. Specific

The following specific conclusions have been drawn.

Fields of impact. There is a very broad consensus that the principal impact of the new dose limit will be in the medical sector—primarily in interventional radiology and cardiology. There were some concerns that some impact could also be felt in diagnostic radiology, and with veterinary x-rays.

There was relatively little concern over the impact on the nuclear sector. Some situations of high beta fields could exist (e.g. after significant accidents), but it was considered that adequate control could be exercised through relatively simple use of protective glasses.

Eye lens dosimetry.

- (1) The revised dose limit to the lens of the eye will not impose changes for most monitored workers, who are exposed to uniform fields or very low doses. However, it will be a concern for some types of work, mainly those related to interventional radiology and cardiology procedures, where workers could be exposed to doses close to or in excess of the revised limit and where it will be particularly important to know that the dosimeter will record a dose indicative of that being received by the lens of the eye.
- (2) The relationship between dose and cataract formation is not well understood and the causality should be clarified.
- (3) It is evident that, in general, specific eye dosimetry is not performed on a regular basis, even in these instances. There are several approaches suggested to monitor eye lens for workers, but they all have some practical difficulties and there is a need for international recommendations to ensure harmonisation of radiological protection criteria.
- (4) In particular, it would be beneficial to develop specific dosimetry for $H_p(3)$ for use in various working conditions.
- (5) For more general situations, it would seem appropriate to agree a standardised system of dose recording (such as the double-dosimetry system, or a single badge with use of an appropriate empirical formula) to record both $H_p(10)$ and $H_p(3)$.
- (6) Arrangements should be confirmed or put into effect for assessing and recording the total eye lens dose of itinerant workers.

Protection of workers.

- (1) Established radiation protection techniques and shielding devices, as listed in the main body of the report, have been available to all ASs for some time to reduce the doses to the lens of the eye, but may be being used somewhat sporadically. Training of workers to use these techniques and devices effectively and consistently is a significant hurdle due to the limited time and availability of staff to properly execute effective training. Funding radiation protection training as a priority, especially in areas where eye dose could exceed established limits, is of significant importance. The cost of the increased funding would be the major cost implication.
- (2) The application of methods of protection varies considerably from one location to another, even in the same country. Because of the lack of explicit guidelines relating to the use of methods of protection, facilities may independently purchase protective equipment or opt to apply differing procedures. While decisions on which techniques and equipment to be used must rest at the local level, it would be useful if guidelines could be issued.

- (3) The use of mandatory eye protection should be considered for all exposed workers.

Wider implications.

- (1) In terms of the wider impacts, the application of the new dose limits for the lens of eye could affect current methods of working, and cause many problems for the majority of the AS members. These problems could include employment issues, including high costs for possible additional medical examinations for the lens of the eye, possible increases in compensation lawsuits, how to answer queries about previously unrecorded doses well below the existing dose limit (but possibly above the new one), etc.
- (2) A number of ASs noted significant concern and confusion among radiation practitioners about the rationale for the change in the dose limit. The nature of these concerns included:
 - Why fatal and non-fatal effects are being considered in similar fashion. The evidence to support this change is not linked to harm, but to potential changes in the eye that are not necessary a significant detriment.
 - A view that the literature is not consistent and the results are tenuous. This type of change has huge cost implications and the risk to the eyes may be considered to be small.
 - The work of the key international organisations on this topic (ICRP, IAEA) seemed to be hurried, with an inadequate period for consultation.

It was felt that the case for the revised dose limit should be made more visible to the practitioners.

Potential cost implications. In the time available for this survey it has not been possible to quantify the additional costs imposed by the new dose limit. However, most ASs had some concerns over the implied costs included:

- Additional training.
- Additional dosimetry.
- Additional shielding.
- Possible need to formally classify more workers.
- Possible need for extra staff if current specialists staff reach the dose limit.
- Enhanced medical eye examinations for workers.

7.2. General

The responses received to the questionnaire indicate various methods of approach and express different points of view, reflecting the nuances of the particular ASs or specific groups responding.

When reviewing the responses, for instance, there was considerable disparity in the following three aspects:

- (1) The cost implication for the procedures and equipment aimed at reducing the dose to the eye.
- (2) The various implications related to the employment of people who have an existing cataract or presenting pre-cataract conditions.
- (3) The current perception of future compensation claims related to the new eye limit.

Because the choices and decisions will rest largely with each of the various countries, it would be useful to have further interchange aimed at achieving a better understanding of the various aspects considered in this report.

8. Recommendations

A series of recommendations have originated from the responses received. These have been grouped under a number of headings.

Understanding and guidance.

- (1) The fundamental relationship between radiation exposure of the lens of eye and cataract formation requires further study and clarification and support should be given to investigation into this.
- (2) The recommendation to use the same numerical dose limit for a non-fatal deterministic effect to the eye as for fatal stochastic effects requires further explanation, as it has led to some confusion. It would be helpful for the relevant international organisations to more visibly explain the case for the revised dose limit so that it is more easily understandable to the practitioners.
- (3) Further guidelines are required to correctly identify workers who could be exposed to eye lens doses close to the dose limit.
- (4) The IRPA Executive Council should promote a further study leading to an international protocol, regarding recommendations for monitoring dose to the lens of the eye. (The procedures presented in Q1 above could possibly provide a template.)
- (5) The appropriate guidance, to be provided by regulators, must be sought in a timely manner to assist implementation of any changes introduced. This should include requirements on management, means of protection, dose estimations and monitoring systems.

Practical aspects.

- (1) There is a need for a new system for detecting, investigation and reporting of cataract data (levels of opacities and cataract formation) or perhaps, as an alternative, a need for a clear comparison of existing systems.
- (2) There is a need for further investigations regarding the validity and limitation of the use of a whole body dosimeter worn at the collar, above the lead apron protection, to assess $H_p(3)$. The results of the ELDO project could provide very valuable information.
- (3) There is a need for further investigation of the effectiveness of the protection methods that are commonly used such as lead glasses and screens and dissemination of the results to users via training sessions.
- (4) It is important to ensure that any new dosimeters and protective equipment for the lens of the eye are comfortable to use and do not significantly interfere with effectiveness of the medical procedures. This will encourage their effective uptake by practitioners.
- (5) There is a need for studies that provide information about the effectiveness of eye lens protection methods for different tasks and situations.
- (6) Certain designs of lead glasses provide insufficient shielding for scattered radiation. These glasses should be redesigned.
- (7) Optimisation of radiation exposure for workers who could be exposed to levels, approaching dose limits should be considered.
- (8) The radiation protection for the public and procedures for emergency situations should also be considered.

Social, economic and management considerations.

- (1) The economic and social considerations should be taken fully into account when introducing the limits into the relevant regulations of each country.
- (2) It would be useful to have better details of the costs, showing the existing costs for the current method of protection and an evaluation of the additional costs incurred in reducing eye exposure, in comparison to the total cost of each procedure and/or overall costs of any required installation.
- (3) The new dose limit results in even greater emphasis on the training of key groups of workers who are likely to be the most highly exposed. There is the need to address training on the use of protective equipment to make the best protection achievable whilst also increasing awareness about protection effectiveness. The importance of the correct wearing of relevant dosimeters must also be emphasised.
- (4) Since cataract and, even more so, pre-cataract conditions are relatively common among the population, there is a need within a range of work-roles and other situations to propose or more clearly define procedures relating to the employment of people with existing or pre-cataract conditions. Two situations are relevant: (1) the risk of discriminating against people seeking employment, on the basis of a common condition; and (2) the risk of inducing additional deterioration of visual acuity for exposed workers.

Acknowledgments

Grateful thanks are given to all who contributed to the generation of this report and the information which it contains. The Chairman would also like to thank, personally, his colleagues on the Task Group who made the exercise such a pleasurable one.

Appendix. Terms of reference and membership**IRPA Task Group on the implications of the implementation of the ICRP recommendations for a revised eye dose limit***Terms of reference*

Objective. A report will be produced on the principal issues faced by practitioners regarding the implementation of the new eye dose limit. The report will aim to make recommendations on the appropriate course of action for IRPA to engage in the ongoing international discussions on the implementation issues. The report will be presented to the IRPA Executive Council for consideration and endorsement.

Process. The task will be led by a Task Group composed of members of the UK, Italian and Spanish Societies assisted by three topic experts and a project manager.

Chairman: John Broughton, President, SRP

Members: Marie-Claire Cantone, Vice President AIRP, (Vice-Chair), Mercè Ginjaume, SEPR, Binika Shah (SRP)

All Associate Societies (ASs) will be asked to provide views and comment urgently on implementation issues. The request for views will be supported by a Questionnaire to aid structuring of the responses. The Task Group will be responsible for the assessment, collation and compilation of this information into a draft report which will be issued for urgent comment to ASs, following which the Task Group will submit a Final Report to the IRPA Executive Council.

Table A.1. Timescales. The Terms of Reference will be implemented as follows.

| Start date (to commence earlier if conditions allow) | Action | Responsible Individual(s) | Completion deadline |
|--|--|--|---------------------|
| | Issue draft terms of reference to IRPA Executive Council | SRP President | 14/12/12 |
| 15/12/12 | Finalise Task Group membership | SRP President and AIRP Vice President | 21/12/12 |
| 15/12/12 | Approve/amend terms of reference Provide SRP President with email contact details for all Associated Societies | IRPA Executive Council | 28/12/12 |
| 15/12/12 | Notify standardised style/format required for IRPA Final Report to SRP President | IRPA Executive Council | 1/2/13 |
| 22/12/12 | Compile questionnaire | Task Group | 25/1/13 |
| 29/12/12 | Seek nominations for topic leaders from associated societies Issue terms of reference to ASs (in order to allow initial consideration and data acquisition to commence) | SRP President/AIRP Vice President | 11/1/13 |
| 12/1/13 | Respond with suggestions for appropriate topic leaders (providing brief details of suitability and contact details) | Associated Society Presidents/Secretaries | 25/1/13 |
| 26/1/13 | Select topic leaders and notify ASs and IRPA website Issue questionnaire and seek responses from ASs and IRPA members regarding both the questionnaire and any other implications of the revised eye dose limit | Task Group | 1/2/13 |
| 26/1/13 | Continue to acquire data and prepare response Submit findings to Task Group, Topic Leaders and Project Manager | Associated Society Presidents/Secretaries and IRPA members | 8/3/13 |
| 9/3/13 (but probably considerably earlier) | Compile topic reports | Topic leaders | 22/3/13 |
| 23/3/13 | Compile draft report and circulate to contributing ASs for comment/final endorsement (and to other ASs for information) | Project Manager and Task Group | 5/4/13 |
| 6/4/13 | Receive endorsement/comments from ASs | Associated Society Presidents/Secretaries | 19/4/13 |
| 20/4/13 | Incorporate any final changes | Project Manager and Task Group | 3/5/13 |
| 4/5/13 | Submit report to IRPA President and Executive Council (with copies to all ASs) | SRP President | 17/5/13 |

There is significant current interest in this topic at both national and international levels, and the Task Group must proceed with urgency in order to provide IRPA with timely advice. The objective is to issue the Final Report no later than mid-May 2013 in order to support effective engagement by IRPA in international considerations of the practical implementation of the revised dose limit. It is recognised that this timescale is challenging for this type of consultation and ASs are asked to cooperate in making their expertise available to meet the challenge.

A proposed timeline of activities is given in table A.1.

Matters to be addressed. There are three principal topics to be addressed, namely the implications for dosimetry and methods of protection, together with an overview of the wider implications of the change to the limit.

Implications will be identified within the different areas of practice, including the principal areas of medical practice and wider industry.

Topic 1: implications for dosimetry

This topic concerns the implications for dosimetry for the lens of the eye.

- (i) Since there is already a requirement to monitor doses to the eye, what is/are the current best method(s) for the assessment of $H_p(3)$?
- (ii) What systems are under development for improved measurement of $H_p(3)$?
- (iii) Are these methods dependent on the level of the dose being measured or other conditions?
- (iv) Are there any implications for dose recording, including possible considerations for itinerant workers ('outside workers')?

Topic 2: implications for methods of protection

This topic concerns the implications for methods (including protective equipment) which may be utilised to reduce dose to the eye.

- (v) What procedures and equipment are used (or could be used in future) for reduction of the dose to the eye?

Topic 3: wider implications of implementing the revised limit

This topic aims to identify any direct or indirect impacts on current practice which would result from the application of the revised dose limit.

- (vi) Are there any short-term implications pending the satisfactory implementation of revised dosimetry and methods of protection (as in topics 1 and 2 above)?
- (vii) Are there any potential long-term issues which may impact ongoing activities on a more permanent basis?

Additional matters

There will be some flexibility to include any additional matters that arise during the study, if these can be accommodated within the requisite timescales, or to identify them for possible separate consideration should they require significant additional time or effort.

Detailed project management

Each of the topics listed above will be addressed by an Associate Society volunteer/nominee who is an acknowledged expert in the particular field being considered, who will collate the replies of contributing ASs and coordinate a response for the Task Group report. These experts will be selected by the SRP President and the AIRP Vice President from the lists of experts nominated by their Societies.

The Task will be coordinated and project managed under the direction of the SRP President by a member of the Society who has similar involvement in a previous internal review of this subject.

The Society for Radiological Protection will undertake the compilation of the report, overseen by the Task Group. The report will address each of the listed questions and will make recommendations for action by the IRPA Executive Council as described in the above Objective.

John Broughton, SRP President

Date: 25 December 2012 (Updated April 2013 for this report to reflect a change in the Task Group structure.)

IRPA members involved in the assessment of the responses and collation of the report

Following the initial request to undertake the study, the appointed Chairman of the Task Group invited Marie-Claire Cantone to join the Group and, by mutual agreement, they invited the Spanish Society (SEPR) and another Society to nominate members. Mercè Ginjaume was nominated by the SEPR. Following the subsequent unavoidable withdrawal of the nominee from the other Society, Binika Shah, who had originally undertaken to project manage the task, effectively became an integral member of the Group.

Suitable volunteers were also requested from the Associated Societies to act as Topic Experts to help to collate the report from the returned questionnaires. Originally it was intended to choose just one for each topic but later it was decided to increase this to two, primarily to encourage involvement by more countries. Again there were some difficulties with withdrawals and failed communications. Those who finally contributed were: topic 1—José Miguel Fernández-Soto, Spain with input from Mercè Ginjaume; topic 2—Steven King, USA, assisted by Denisa Nikodemová, Slovakia; and topic 3—Keiichi Akahane, Japan, assisted by Sumi Yokoyama, Japan with an additional contribution from Bela Csakany, Hungary

In addition some of the original volunteers for the roles of Topic Experts were also given a sight of the draft report and invited to comment.