Department of Energy
Washington, DC 20585

October 21, 2011

U.S. Nuclear Regulatory Commission
ATTN: Dr. Donald Cool, Rulemakings
and Adjudications Staff
Washington, DC 20555–0001

Dear Dr. Cool:

On August 30, 2011, the Nuclear Regulatory Commission (NRC) published a request for public comment in the Federal Register (Docket ID NRC-2009-0279). NRC requests comments on adopting the April 21, 2011, International Commission on Radiological Protection (ICRP) recommendations on lowering lens of the eye dose limits. NRC submitted a set of 10 questions addressing areas for which they seek public comment.

The Department of Energy's (DOE) Office of Health and Safety, within the Office of Health, Safety and Security, is responsible for establishing the Department's policy and requirements for the radiological protection of its workers. The Office of Health and Safety, with input from radiation protection contacts across the DOE complex, developed the enclosed set of responses to NRC's questions regarding lowering the lens of the eye dose limits.

Sincerely,

Patricia R. Worthington, PhD
Director
Office of Health and Safety
Office of Health, Safety and Security

Enclosure

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Department of Energy's Office of Health and Safety Comments on the Nuclear Regulatory Commission August 30, 2011, Request for Public Comment on Adopting the "New International Commission on Radiological Protection; Recommendations on the Annual Dose Limit to the Lens of the Eye"
Docket ID: NRC-2009-0279

1. **To what extent has dose to the lens of the eye been an issue in the implementation of your radiation protection program, and would a change in the limits cause operational and administrative impacts? What other types of impacts would you foresee?**

   Within the Department of Energy (DOE) complex, it is extremely rare for an individual to receive a lens of the eye dose greater than the proposed 2 rem annual average dose. Internal exposures are the most likely scenario within DOE that would result in exposures of this magnitude. Accordingly, it is unlikely application of the International Commission on Radiological Protection (ICRP) eye dose recommendation will have a significant overall impact on DOE operations, although there may be more specific operations and activities for which eye dose will need to be monitored and tracked.

2. **What types of specific administrative and monitoring methods would be available in your use of radiation or radioactive materials to reduce exposures to the lens of the eye, and what would be the costs and operational impacts of implementing such methods?**

   As noted above, the primary impact for DOE will be to identify situations where eye dose will require explicit monitoring. For most uniform photon and neutron exposures, control of the equivalent dose to the whole body dose will control the eye dose. For beta particles below about 1.5 MeV control of equivalent dose to the skin will control eye dose. For beta particles above about 1.5 MeV, and certain nonuniform exposures, specific monitoring of eye dose will be required.

   Sites may choose to require protective shielding for the eyes for certain exposure scenarios. This would add a small increase in the cost of performing radiological work.

3. **What might be the anticipated impacts of a rule change on recordkeeping and reporting?**

   DOE lowering the eye dose limit will result in increased records of eye dose. DOE does not anticipate an increase in reports to individuals. Additionally, having the option of going over 2 rem in a single year but keeping the 5-year average under 2 rem per year will require tracking doses over a 5 year period. This will be much more cumbersome than the current annual tracking of doses.

4. **Are there technological implementation issues, such as limits of detection as compared to currently used radiation monitoring methods, or availability of dosimetry, that would make adoption of the ICRP recommendations difficult or impractical in certain circumstances? If possible, please provide a typical example of such a circumstance.**

As noted previously, for DOE, the primary impact will be increased monitoring. Assuming a monitoring threshold of 200 mrem/yr, for most DOE sites, monitoring of eye dose (under the ICRP's recommended limits) should not be any more challenging than monitoring under the current system.

However, some DOE sites may need to revise their monitoring methodology. Some DOE sites assign the same dose to the lens of the eye that is assigned to the skin or to the whole body because their personal dosimeter does not measure dose at a depth 0.3 cm. This may be too limiting and the dosimetry configuration will need to be revised.

For other DOE sites where beta is the dominant source of exposure, the lens of the eye dose could be a problem to administratively control if the program is relying on timely results from a passive dosimeter. DOE may need to evaluate use of electronic dosimetry devices, which can also measure beta exposure, and have them calibrated to 300 mg/cm^2.

5. **How does the recommended limit to the lens of the eye influence your views on possible changes to the limits on TEDE, given that these two quantities are expected to be essentially the same for many exposure situations?**

   A lens of the eye dose limit of 2 rem/year would require adoption of the same value for the whole body limit. This applies to most exposure situations, which involve external exposures, and where the whole body and the lens of the eye doses are the same.

6. **What alternatives to adoption of the new limits would you suggest in achieving the desired outcome of limiting exposure of the lens of the eye over the working lifetime of an employee?**

   ICRP's recommended dose limit for the eye is based on 10 rems over 5 years with no single year to exceed 5 rem. This approach goes part of the way towards a lifetime limit. A lifetime limit of 50 rems (consistent with the ICRP statement on tissue reactions) would be more restrictive than the ICRP's recommended limit. Another way to gain some level of control of eye dose is codification of a 2 rem/yr administrative level on eye dose. Alternatively, dose constraints on sources known or expected to result in eye doses greater than two rems could be instituted.

7. **What should be the relationship between the U.S. regulatory requirements and those adopted internationally? What impacts, either positive or negative, would result from an alignment of NRC regulatory requirements and guidance with international standards?**

   To the degree necessary, there should be consistency between U.S. requirements and guidance and those in other countries. Consistency of dosimetry systems is desirable to ensure that a dose means the same thing everywhere in the world and supports the continuing efforts to reduce unnecessary exposure to radiation. There are efforts underway to achieve

this goal. For example, in 2007, DOE adopted more recent international occupational radiation protection standards to better evaluate internal exposures within the DOE complex.

Alternatively, there may be some need to allow for larger dose limits for countries with developing radiation protection programs than for countries with mature radiation protection programs where doses are a small fraction of the dose limit.

8. **Should licensees be required to monitor and report LDE for foreign workers and report the values upon request? Are there other impacts (*e.g.*, operational, administrative, costs, etc.) that should be anticipated if the U.S. regulatory structure were to be different from that being used in other countries?**

Revision of requirements for monitoring and reporting lens of the eye dose for foreign workers and for U.S. citizens, who may at some point later in the year work in a foreign country, will be needed. While the U.S. regulatory structure for occupational radiation protection already requires monitoring and reporting lens of the eye dose, the threshold for these requirements will likely be too high to be of value and will need to be lowered.

The U.S. regulatory structure for occupational radiation protection is already different than that being currently used in other countries. Adopting this ICRP recommendation and the associated whole body dose limit will help in bringing the differing structures closer together.

9. **Are there any other NRC regulations and regulatory guidance that might need to be reviewed and revised as a result of ICRP recommendations in reducing the allowable dose to the lens of the eye?**

There are additional difficulties with monitoring lens of the eye dose in nonuniform fields. Accordingly, additional guidance will need to be developed and disseminated.

10. **How are licensees monitoring to demonstrate compliance with the existing dose limits for the lens of the eye?**

Within DOE, there are several monitoring methods for the lens of the eye dose evaluation:

Many DOE sites use dosimeters, which assesses the lens of the eye dose at a tissue depth of 0.3 mg/cm2.

If the dose at 0.3 cm in tissue does not exceed the dose at 1 cm, for uniform exposures, a measurement taken in the torso region is sufficient. Otherwise, for nonuniform exposures that would result in an individual receiving a significantly higher dose to the lens of the eye than to the whole body, such as access to or near reactor beams, X-ray machines, sources of beta radiation, and shield penetrations, the dose should be measured near the eye, such as with a dosimeter worn on the side of the head or forehead.

If the dose limit to the skin is more restrictive than that for the lens of the eye, then the dose to the skin may be used to assess lens of the eye dose.

Sufficient protective eyewear may also be used and the whole body dose used to assess lens of the eye dose.

DOE Guide 441.1-1C, *Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection*, section 6.4.1.1, provides guidance on lens of the eye monitoring.