Withdrawn

NRC Regulatory Issue Summary 2003-04, “Use of the Effective Dose Equivalent in Place of the Deep Dose Equivalent in Dose Assessments,” dated February 13, 2003, has been withdrawn.

ADAMS Accession Number: ML030370122

See *Federal Register* notice dated October 25, 2016

81 FR 73448

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555-0001

February 13, 2003

NRC REGULATORY ISSUE SUMMARY 2003-04
USE OF THE EFFECTIVE DOSE EQUIVALENT IN PLACE OF THE DEEP DOSE EQUIVALENT IN DOSE ASSESSMENTS

ADDRESSEES

All U.S. Nuclear Regulatory Commission (NRC) licensees.

INTENT

NRC is issuing this Regulatory Issue Summary (RIS) to provide guidance on situations in which it is permissible to use the effective dose equivalent, in place of the deep dose equivalent (DDE), in showing compliance with regulatory requirements.

BACKGROUND

The dose limits in 10 CFR Part 20 for occupationally exposed workers, as well as for members of the public, are specified in terms of the quantity total effective dose equivalent (TEDE). Other Part 20 requirements, such as the criteria for license termination, are also specified in terms of the TEDE, as are requirements specified in other parts of NRC's regulations.

The TEDE is defined in Part 20 as the sum of the DDE resulting from exposure to external radiation and the committed effective dose equivalent (CEDE) resulting from internal contamination. However, Footnote 2, in the "Organ Dose Weighting Factors" table in 10 CFR 20.1003, does permit approval of the use of organ and tissue weighting factors for external exposures on a case-by-case basis, until specific guidance is issued. This RIS provides this guidance. NRC, reading Part 20 as a whole, concludes that the footnote provides the staff with the discretion to permit the use of effective dose equivalent for external exposures in place of the DDE, in the definition of TEDE. In accordance with the discretion thus provided by the footnote, TEDE may be redefined as the sum of the effective dose equivalent for external exposure and the CEDE for internal exposure. When this redefinition of TEDE is used, 10 CFR 20.1201(c) does not apply, because the DDE is no longer used in the definition of TEDE.

ML030370122

This RIS describes the exposure situations in which NRC would regard the use of the effective dose equivalent, in place of the DDE, as appropriate and acceptable. This RIS does not affect the definition and use of the CEDE.

SUMMARY OF ISSUES

Use of Effective Dose equivalent

Licensees are encouraged to use the effective dose equivalent in place of the DDE in all situations that do not involve direct monitoring of external exposures using personnel dosimetry. Such situations include, but are not limited to: (1) calculating offsite doses resulting from effluents; (2) calculating doses from contaminated soils and buildings; (3) assessing the effects of as low as reasonably achievable (ALARA) measures, such as installation of shielding or system decontaminations; (4) assessing the environmental impacts of proposed licensing actions; (5) making calculations in connection with license termination and release of sites; (6) assessing doses resulting from localized skin contaminations; and (7) all other situations in which the doses are calculated rather than measured with personnel dosimetry. No prior NRC approval is required when using the effective dose equivalent from external exposure in place of the DDE, in such situations. The tissue weighting factors to be used in these effective dose calculations must be those listed in 10 CFR 20.1003. Use of other weighting factors requires case-by-case approval from NRC.

There are several reasons for adopting this position: (1) the effective dose equivalent is the primary radiation protection quantity, linked directly to the risks resulting from radiation exposure, whereas the DDE is a surrogate operational quantity intended to be used, in monitoring situations, as an approximation to the effective dose equivalent, which cannot be measured directly; (2) when doses are to be calculated, or otherwise estimated, in ways that do not involve personnel dosimetry, the effective dose equivalent is usually just as easily calculated as is the DDE and, in many situations, it may be easier to estimate; (3) many of the tabulations of dose conversion factors currently used in dose assessments are in terms of the effective dose equivalent, not DDE; (4) most software used in dose assessments refer to tabulations of effective dose equivalent conversion factors, not DDE factors; (5) in situations involving dose calculations, the effective dose equivalent is a well-defined dosimetric quantity, whereas the DDE is not.

When recording or reporting doses in situations in which the effective dose equivalent from external fields is assessed in place of the DDE, the value of the effective dose equivalent is entered in place of the DDE in recording or reporting forms, such as NRC's Form 4 or 5.

Use of Deep Dose equivalent

The above guidance does not apply to situations in which individual doses from external radiation fields are to be measured using personnel dosimetry. In such situations, because the effective dose equivalent cannot be measured directly, NRC still requires the use of the DDE, as defined in Part 20, as an estimator of the effective dose equivalent. It has been shown that, for most practical situations involving personnel monitoring, the DDE provides a reasonable, conservative, and often the best, estimate for the effective dose equivalent. It is also a quantity that is well-suited to measurement using dosimeters.

Need for NRC Approval when Estimating Effective Dose Equivalent by Measurements

In personnel monitoring situations for which this use of the DDE measured at the location of highest exposure may not be desirable, NRC will grant approval for other methods of dose monitoring, on a case-by-case basis, if the proposed methods can be shown to be technically adequate for the intended use.

One such situation is monitoring of personnel working under conditions where a substantial part of the body is shielded as, for example, when wearing protective aprons in medical radiology. Another involves radiation fields that are very non-uniform, or that irradiate only small parts of the body, such as the upper extremities, but not the torso. Empirical and semi-empirical methods are available, in such cases, that involve the use of one or more dosimeters, together with an appropriate formula, to provide a better estimate of the effective dose equivalent than is possible using the DDE as described above. However, because these methods are often specific to certain limited exposure situations, and can be easily misapplied, NRC requires that licensees obtain approval before using them. NRC will grant such approvals on a case-by-case basis if the licensee is able to demonstrate that the proposed method will provide reasonable dose estimates under the exposure conditions for which it will be used. NRC may also provide generic approval for a specific method through issuance of a generic communication or other means of providing guidance to licensees. One such general approval has already been granted, and applies only to medical personnel wearing protective aprons during radiology procedures (see RIS 2002-006). In addition, Entergy has recently been granted approval to 2002-06 use an Electric Power Research Institute (EPRI) two-badge method for estimating effective dose equivalent at their sites.

BACKFIT DISCUSSION

This RIS does not require any action nor written response nor require any modification to plant structures, systems, components, nor designs of facilities; therefore, the staff did not perform a backfit analysis.

FEDERAL REGISTER NOTICE

A notice of opportunity for public comment was not published in the *Federal Register* because this RIS is information and pertains to a staff position that does not represent a departure from informational current regulatory requirements and practices.

PAPERWORK REDUCTION ACT STATEMENT

This RIS does not request any information collection.

If you have any questions about this RIS, please contact the persons listed below or the appropriate Office of Nuclear Reactor Regulation project manager.

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Attachment: List of Recently Issued NRC Regulatory Issue Summaries

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OFC	IMNS		NMSS		NRR		IMNS	
NAME	SSherbini		EKRAUSS		WBeckner		DCool	
DATE	01/30/2003		01/31/03		02/13/03		02/05/03	

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LIST OF RECENTLY ISSUED
NRC REGULATORY ISSUE SUMMARIES

Regulatory Issue Summary No.	Subject	Date of Issuance	Issued to
2003-03	Release of Draft Review Standard (RS) 002, "Processing Applications For Early Site Permits," For Interim Use	02/06/2003	All holders of operating licenses for nuclear power reactors, all entities that have notified the U.S. Nuclear regulatory Commission (NRC) of their intent to submit early site permit (ESP) applications, and all prospective vendors of nuclear power plants in the United States.
2003-02	Importance of Giving NRC Advance Notice of Intent to Pursue License Renewal	02/03/2003	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
2003-01	Examination of Dissimilar Metal Welds, Supplement 10 to Appendix VIII of Section XI of the ASME Code	01/21/2003	All holders of operating licenses for nuclear power reactors.
2002-23	Availability of Guide for Diagnostic Nuclear Medicine	11/27/2002	All medical licensees.
2002-22	Use of EPRI/NEI Joint Task Force Report, "Guideline on Licensing Digital Upgrades: EPRI TR-102348, Revision 1, NEI 01-01: a Revision of EPRI TR-102348 to Reflect Changes to the 10 Cfr 50.59 Rule"	11/25/2002	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Note: NRC generic communications may be received in electronic format shortly after they are issued by subscribing to the NRC listserver as follows:

To subscribe send an e-mail to <listproc@nrc.gov >, no subject, and the following command in the message portion:

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OL = Operating License
CP = Construction Permit