UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, DC 20555 - 0001

ACNWR-0228

September 30, 2005

The Honorable Nils J. Diaz
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: COMMENTS ON USNRC STAFF RECOMMENDATION OF THE USE OF COLLECTIVE DOSE

Dear Chairman Diaz:

On July 20, 2005, staff from the Office of Nuclear Regulatory Research briefed the Committee regarding proposals on effective and realistic uses of the concept of collective dose in radiation dose analysis.

The staff reported they are considering four options (one with three variations) regarding the uses of collective dose. These options as reported are as follows.

Option 1-Truncate individual doses at some nominal value.

- Truncate individual doses at some nominal value from the collective dose calculation.
- Truncate individual doses at some distance from a facility or at some future time.

Option 2-Health Physics Society position on collective dose

- For populations in which *almost* all individuals are estimated to receive a lifetime dose of less than 10 rem above background, collective dose is a highly speculative and an uncertain measure of risk and should not be used for the purpose of estimating population health risks [Radiation Risk in Perspective (position statement of the Health Physics Society),1996, revised in 2004].
- Estimation of health risk associated with radiation doses that are of similar magnitude as those received from natural sources should be strictly qualitative and encompass a range of hypothetical health outcomes, including the possibility of no adverse health effects at such low levels.

Option 3-Individual dose emphasis

- Emphasizes protection of individuals in the critical group of an exposed population and assumes that if the average individual in the critical group is protected, the entire population is protected.
- Consistent with the 10 CFR Part 20 Subpart E, “Radiological Criteria for License Termination Rule,” which explicitly states that the average individual of the critical group must be below a 25 mrem per year dose constraint and ALARA.

- No collective dose is calculated in this option.

Option 4-Significance determination of a collective dose calculation

- Use a Commission-approved criterion to judge the significance of a collective dose calculation.

Option 4a: 1 mrem per year and 100 person-rem per year

- International bodies argue that it is not cost-beneficial to do a formal cost-benefit analysis process when individual and collective doses are less than 1 mrem per year and 100 person-rem per year, respectively, and the practice can be exempted from regulatory oversight (IAEA 1996, ICRP 1992, EC 1999).

Option 4b: Background collective radiation dose comparison

- Compare the collective dose from a regulated activity to the collective dose from background radiation to the same population.

- This approach is comparable to the approach in NUREG-1515, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants."

Option 4c: Safety goal evaluation

- Expand the use of the reactor safety goal/quantitative health objective value for latent cancer fatalities of "0.1% of the sum of cancer fatality risks resulting from all other causes" to other applications that use collective dose.

- The staff would compare collective dose calculations to this safety goal value, either in units of person-rem or in latent cancer fatality risk, and make a determination of "not a significant additional risk."

Observations and Recommendations

The Committee believes that collective dose has little value in an *absolute* sense. Irrespective of whether very low doses can be reliably measured or estimated, the product of an individual dose and a population magnitude does not yield a number that has any real meaning. When estimates of risk are desired, the Committee recommends use of individual risk within the context of the critical group or the reasonably maximally exposed individual (RMEI) scenario.

However, the Committee does believe that collective dose is useful for comparing different management options (e.g., steps taken under ALARA to reduce radiation doses to workers).

The Committee believes that there is no basis for truncating dose at some nominal value when calculating collective dose.

Given the inherent limitations of collective dose and the serious potential for misuse (e.g., using collective dose as a measure of risk), the Committee does not recommend adoption of any of the options considered above.

Sincerely,

/RA/

Michael T. Ryan
Chairman

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