DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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May 21, 2010

The Honorable Kristina M. Johnson
Under Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Mr. Glenn S. Podonsky
Chief Health, Safety and Security Officer
Office of Health, Safety and Security
U.S. Department of Energy
HS-1, Germantown Building
1000 Independence Avenue, SW
Washington, DC 20585-1290

Dear Under Secretary Johnson and Mr. Podonsky:

For the past several months, the Defense Nuclear Facilities Safety Board (Board) has been evaluating the new information resulting from the Department of Energy's (DOE) revised safety strategy for the Waste Treatment and Immobilization Plant (WTP) at the Hanford Site. At this time, the WTP project is finalizing decisions concerning the need for safety-related controls based on "severity-level" calculations that evaluate the dose consequences to the public as predicted for certain accidents. The revised safety strategy changes assumptions regarding the transport of a radioactive plume following an accident at the plant. In the judgment of the Board, before revision, the transport analysis at WTP was based on supportable, conservative applications of dispersion models and deposition velocities used in the dose consequence analysis. The revised WTP transport analysis relies upon the default transport value (deposition velocity = 1.0 cm/sec) adopted for use in DOE's atmospheric dispersion model. This default value deviates significantly from previous values used at Hanford. Prompt identification of an adequately conservative value is necessary to support the ongoing design effort at WTP. In the longer term, an appropriately conservative default value needs to be validated for all DOE sites.

For the radioactive material potentially released from WTP, the WTP project calculated that changing the deposition velocity to 1.0 cm/sec would reduce the predicted dose consequences to the public by about a factor of five and could be a determining factor in the need for safety-related controls. DOE justified using the higher value on the grounds that it is the default value recommended in DOE's guidance document for use of the DOE MELCOR Accident Consequences Code System (MACCS2). DOE's Chief of Nuclear Safety (CNS) evaluated this change and also found it to be acceptable, as documented in a CNS Technical Paper entitled, *Dry-Deposition Velocity Assumptions Used in Consequence Modeling at the Hanford Waste Treatment Plant.* However, on February 1, 2010, based upon concerns raised by the Board, DOE's Office of Environmental Management issued a

memorandum requesting guidance on whether the dose consequence analyses using this value are predictable and reasonably conservative, as required when following DOE Standard 3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*.

The Board questions the technical justification for using 1.0 cm/sec based on the Board's evaluation of the literature and what it judges to be conservative values for particle size, wind speed, and surface roughness at the Hanford Site. In addition, data from an accidental release of radioactive material that occurred in the Hanford tank farms in 1985 showed that deposition velocity in that accident was about 0.15 cm/sec. The Board's staff has reviewed published data and believes that a value between 0 cm/sec and 0.3 cm/sec could be technically justified.

Therefore, in order to support the dose consequence analysis for WTP and the need for the WTP design effort to proceed in a timely manner, it is the Board's position that until a technically defensible basis is otherwise developed, WTP should use an interim deposition velocity between 0 cm/sec (the conservative value previously used in the WTP safety analysis) and 0.3 cm/sec.

As made evident by this example, the deposition velocity specified in the DOE guidance for the MACCS2 atmospheric dispersion model is not appropriately conservative for all DOE sites.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests that DOE provide a report within 120 days of receipt of this letter setting forth a technically defensible basis for (a) the final deposition velocity to be used in accident calculations for WTP and (b) complex-wide use of a default value (or values) to be specified in DOE's *MACCS2 Computer Code Application Guidance for Documented Safety Analysis*.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

c: The Honorable Inés R. Triay
Ms. Shirley J. Olinger
Mr. Richard H. Lagdon, Jr.
Dr. Don F. Nichols
Mr. Andrew Wallo III