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

ACNWR-0250

November 8, 2006

The Honorable Dale E. Klein
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: DOE LOW DOSE RADIATION RESEARCH WORKSHOP (VI)

Dear Chairman Klein:

During August 1-2, 2006, the Chairman of the Advisory Committee on Nuclear Waste (Committee) and Committee staff attended the U.S. Department of Energy (DOE) Low Dose Radiation Research Workshop (VI), in Washington, DC. Subsequent to the meeting, a report was given to the ACNW on the content of the meeting. This letter summarizes observations developed from the meeting and discussions with the Committee.

The stated purpose of DOE's research program is to fund basic research to determine the responses induced by experimental radiation doses in addition to background of ~10 cGy (10 rad) and below. The program goal is somewhat paradoxical because little biological response is observed below 10 cGy and, therefore, most of the reported research analyzed the biological effects of doses > 10 cGy. The research may augment the scientific underpinning for future radiation protection standards if results can establish any clear biological effects or lack of effects at lower doses.

Currently approximately 60 percent of the projects are funded through universities and 30 percent through DOE national laboratories. Projects are focused on studies of the phenomenology of effects of low doses of radiation to biological subsystems. These studies focus on DNA damage and repair, endogenous vs. radiation-induced oxidative damage, adaptive responses, bystander effects, genomic instability, and genetic susceptibility. The research is conducted at all levels of biological organization from molecular to organism, though most work is being done at the molecular, cellular, and culture levels. Detailed information is available on the project Website (http://lowdose.tricity.wsu.edu/) regarding the projects funded, abstracts of past research, and publications to date based on this research.

Observations:

1. This body of DOE research is developing interesting information on the mechanisms for radiation injury, repair, and responses to radiation mainly at the molecular and cellular level. However, much of the work is evaluating effects at doses several times to orders of magnitude above levels at which exposures to the public and to most workers are regulated. Extrapolation to lower doses and reconciliation with epidemiology studies have not been possible because of the lack of sensitivity and statistical power in the studies at doses of 10 cGy. Accordingly, results to date are not directly useful in policy making or in revising current or developing new radiation protection standards.

2. There are related and cooperative studies being conducted in the European Union (EU). These studies are funded from EU sources. A new project on non-targeted (bystander) effects of ionizing radiation has been initiated (http://www.note-ip.org). Additional work is being performed under the European research project RISC-RAD, which is examining the radiosensitivity of individuals and susceptibility to cancer induced by ionizing radiation. More information about RISC-RAD is available at www.riscrad.org.

Recommendations:

1. The Committee believes that the DOE Low Dose Radiation Research Program is providing important information regarding the phenomenology of radiation injury, particularly at the molecular and cellular levels. Although information to date is not directly useful in policy making or standard setting, the Committee believes that the program should continue because it may be helpful in assessing fundamental radiation biology of low dose exposures and eventually in policy making.

2. Committee members and NRC staff should remain informed of continuing developments in this work. In support of this recommendation, the Committee plans the following activities:

   a. A half-day working group session within the next 18-24 months, to obtain additional information on the progress of these studies. The focus of the working group will be to explore the state of knowledge of radiation biology with emphasis on implications for radiation risk models and radiation protection practice.

   b. Examining the report of the French Academy of Sciences on risks from low dose radiation exposure during presentations to the ACNW scheduled for later this year.

Sincerely,

/RA/

Michael T. Ryan
Chairman