



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

November 17, 1976

Honorable Marcus A. Rowden
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REPORT ON THE FINAL GENERIC ENVIRONMENTAL STATEMENT ON THE USE
OF RECYCLE PLUTONIUM IN MIXED OXIDE FUEL IN LIGHT WATER COOLED
REACTORS - HEALTH, SAFETY AND ENVIRONMENT

Dear Mr. Rowden:

In response to the letter of January 13, 1976, from Chairman Anders, the Advisory Committee on Reactor Safeguards completed, at its 199th meeting, November 11-13, 1976, a partial review of the Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors - Health, Safety and Environment (NUREG-0002). This subject was also considered at meetings of the Environmental Subcommittee with the NRC Staff in Washington, D.C., on April 21, June 11, and November 5 and 6, 1976.

In the course of its review, the Committee has noted several areas which appear to be in need of greater discussion and evaluation. These are enumerated below.

Nature and Evaluation of Environmental Releases of Plutonium and Other Transuranics

The major difference in the use of mixed oxide fuel in commercial nuclear power plants will be the greater quantities of plutonium and other transuranic nuclides which must be handled at various steps in the fuel cycle. NUREG-0002 states that airborne releases of these nuclides will be a primary factor in determining the associated impact on the environment and the neighboring populations, but fails to include quantitative estimates of such releases. The Committee recommends that such information be provided.

For airborne releases from mixed oxide fuel fabrication plants, assumptions made by the NRC Staff lead them to an estimated maximum annual dose rate to the bone of an individual living at the site boundary of 0.171 rem. Because this dose rate is large in comparison to the "As Low As Reasonably Achievable" (ALARA) regulatory requirements for commercial nuclear power stations (and potentially for other facilities within the fuel cycle), the Committee anticipates that future licensing specifications may require substantially improved effluent control systems for

mixed oxide fuel fabrication plants. The Committee also notes, however, that this dose rate estimate would have been much lower if most of the airborne plutonium releases for such plants had been assumed to have been in an insoluble state. The Committee believes that it would be helpful if the existing report could be supplemented by sensitivity studies to indicate how assumptions on the chemical form of this nuclide affect dose rate estimates. To the extent possible, the Committee suggests that data used in reaching conclusions regarding the impact of plutonium recycle be based on realistic assumptions.

The ALARA Criterion and Assumed State of Nuclear Technology

In line with the attention being directed by the NRC Staff to the ALARA criterion, the Committee expected that the projection of conditions from 1975 through 2000 would include reasonable assumptions on changes in manufacturing and operating practices and on improvements in the state of the art of process control, radiation control, and environmental control which might evolve during this period. It is not clear, however, that such changes and improvements have been projected uniformly for each step within the fuel cycle. For example, specific improvements have been projected with respect to occupational exposure control in nuclear power plants and with respect to effluent control systems for fuel fabrication and fuel reprocessing plants. By contrast, the assumption with regard to the control of wastes and effluents from "uranium operations" (which estimates show will be the major contributor to population dose regardless of which fuel cycle option is selected) is that current procedures will continue.

The Committee believes that the usefulness of the report would be enhanced by the addition of a descriptive section expressing the views of the NRC Staff on what might be considered state of the art (in the sense of applicable good commercial practices) by 5 to 10 year increments during the time span from 1975 through 2000. Included in such projections should be semi-quantitative sensitivity analyses of how each of these changes might affect the associated environmental impacts and population dose estimates.

Applicability of the Person-rem Concept

Person-rem calculations are used throughout the NUREG-0002 document as a means for estimating the "health effects" on the population of the different fuel recycle options. The estimates of population effects are based on an assumed linear relationship between dose and resulting radiobiological

November 17, 1976

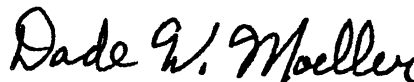
consequences. The Committee believes it should be recognized that there is not universal agreement that "health effects" bear a linear relationship to dose. The Committee recommends that an acknowledgment of this issue be included in NUREG-0002.

Consideration of All Dose Pathways

Most estimates in NUREG-0002 cover only the dose commitment to individuals which results from exposure to the immediate radionuclide release from a given nuclear facility. Consideration of other pathways to man may be important, particularly for releases involving long-lived radionuclides. Since these other pathways may be important on a long-term basis, the Committee recommends that they be carefully assessed in terms of their potential implications in evaluations of the relative impact of the several fuel cycle options.

The Committee will continue to follow progress in the NRC Staff's evaluations of the health impact of the several fuel cycle options and will provide additional comments as appropriate.

Sincerely yours,



Dade W. Moeller
Chairman

REFERENCE:

NUREG-0002, Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors - Health, Safety and Environment.