UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 7, 2004

MEMORANDUM TO: Alexander Murray, Senior Chemical Process Engineer
Mixed Oxide Facility Licensing Section
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

FROM: Jack R. Strosnider, Director
Office of Nuclear Material Safety
and Safeguards

SUBJECT: RESPONSE TO MEMORANDUM OF MAY 13, 2004, "STATUS OF DIFFERING PROFESSIONAL VIEW CONCERNING MODELING CHEMICAL CONSEQUENCE EFFECTS FOR DETERMINING SAFETY REQUIREMENTS AT THE PROPOSED MIXED OXIDE (MOX) FUEL FABRICATION FACILITY, DOCKET NUMBER: 070-03098 (NMSS-DPV-2002-03)"

This is in response to your May 13, 2004, memorandum to the Director, Office of Nuclear Material Safety and Safeguards (NMSS), concerning actions related to your Differing Professional View (DPV) on modeling chemical consequence effects at the proposed Mixed oxide (MOX) Fuel Fabrication Facility (MFFF), filed on December 19, 2002. In your memorandum, you expressed concerns over the adequacy of the Division of Fuel Cycle Safety and Safeguards (FCSS) actions taken, as set forth in a January 12, 2004, FCSS memorandum, in response to the Director's Decision for this DPV.

In your DPV, you requested that: (1) the staff decision accepting the use of less conservative code and parameters be overturned; (2) NMSS establish a position on the use of codes, estimation techniques, and parameters that is consistent, peer-reviewed, conservative, provides adequate assurances of safety, and is defensible [this could be a Branch Technical Position (from the Fuel Cycle Facilities Branch) or a separate guidance document (say, a NUREG document)]; and (3) NMSS address the fundamental problem of reconciliation of significantly different results from computer codes, models, and approaches listed in its guidance.

On October 3, 2003, following receipt of the report and recommendations of an ad hoc review panel, the Director, NMSS, issued both a Director's Decision on that DPV and a memorandum to the Director, FCSS, requesting that FCSS take specified followup actions. In a memorandum to the Director, NMSS, dated January 12, 2004, the Director, FCSS, detailed the actions taken by FCSS in response to the NMSS directive.

In its report to the Director, NMSS, dated September 30, 2003, the DPV Review Panel found that ARCON 96 code documentation indicates the code is a suitable tool for analyzing potential chemical consequences for a MOX fabrication facility. Consequently, the panel recommended not granting your request to overturn the FCSS decision accepting the ARCON 96 code for

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modeling dispersion of hazardous material releases at the MOX facility. The Director, NMSS, agreed with the Panel's recommendation, and denied your request. However, the Panel also recommended "...that FCSS ensure that the MOX license application docketed information include the applicant's technical rationale demonstrating the reasonableness of the use of ARCON 96 results for MOX safety related decision-making and the Safety Evaluation documents the NRC staff's consideration of the applicant's code results and supporting rationale." The Director, NMSS, also agreed with that recommendation and, in an action memorandum, dated October 3, 2003, requested that FCSS "...ensure that sufficient information is docketed to demonstrate the reasonableness of the MOX site specific application of the code results for safety related decision-making."

The Director, FCSS, in his January 12, 2004, response, confirmed that sufficient information was docketed to support the use of ARCON 96, based on a review of information docketed in the applicant's Construction Authorization Report, an August 31, 2001, response to a Request for Additional Information (RAI), and the staff's independent assessment of the use of ARCON96 for safety related decision-making. The Director, FCSS, also confirmed that the information provided by the applicant was reviewed by the staff, and that the results of these evaluations provided a sufficient basis for a safety-related decision.

Your May 13, 2004, memorandum to me, stated that the information cited in the January 12, 2004, FCSS memorandum had already been reviewed by the DPV Panel and found not to address the safety issues, and that the DPV Panel had concluded that additional information should be provided on the docket, such as software qualification and validation, and tailoring of the code to the specific site, including diffusion coefficient modifications, data output, interpolations, and uncertainties.

I have reviewed the DPV Review Panel's report to the Director, NMSS, dated September 30, 2003, and find that the report does not indicate that the Panel had reviewed all of the information in the docket, or concluded that the docketed information did not address safety issues. In addition, the report does not conclude that additional information should be provided on the docket. Instead, the Panel, after finding that the ARCON 96 code is a suitable tool for analyzing potential chemical consequences for a MOX fabrication facility, recommended that FCSS ensure that the docketed information, which would include not only the MOX license application, but also any additional information submitted, "...include the applicant's technical rationale demonstrating the reasonableness of the use of ARCON 96 results for MOX safety related decision-making...", and that the "...Safety Evaluation documents the NRC staff's consideration of the applicant's code results and supporting rationale." Additional information would only need to be provided on the docket if FCSS' review had found that the information that was docketed was not sufficient. That was not the case.

The Panel report further recognized that "The reasonableness of the MOX applicant's specific application of the ARCON 96 code and its results for safety related decision-making may involve consideration of the applicable and more important code modifications, assumptions, parameter values, algorithm option selection, diffusion coefficient adjustments, data input, data output, interpolations, and uncertainties." The data required to run the ARCON 96 code include the release height, building area, effluent vertical velocity, stack flow, stack radius, direction to source from receptor, distance from receptor to source, intake height, grade elevation difference, minimum wind speed, averaging sector width constant, lower measurement height, upper measurement height, and hourly meteorological observations over a one-year period that includes upper and lower wind speeds, upper and lower wind direction, and atmospheric

stability class. The applicant provided this data, including actual site measurements and technical references that served as the basis for the parameter values, on the docket in an August 31, 2001, response to an FCSS RAI. The staff reviewed the information and found the values for the parameters acceptable. The staff further determined that the data values provided are within the acceptable ranges for use with the ARCON 96 code. Therefore, the analysis and results for the ARCON 96 code are acceptable.

Your May 13, 2004, memorandum to me also expressed a concern that "The DPV Panel's recommendations on guidance do not appear to have been followed, particularly for software quality assurance and code validation/verification for safety determinations."

The October 3, 2003, NMSS Director's action memorandum, which is the document that directed FCSS to take certain specified actions, called for FCSS to:

> (a) issue guidance to ensure that its managers and staff involved with development, endorsement, use or acceptance review of automated scientific codes are familiar with relevant sections of Volume 2 of the NRC's Management Directives and NUREG/BR-0167, Software Quality Assurance Program and Guidelines;
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> (b) identify this for consideration in the next NMSS/Office of Nuclear Regulatory Research (RES) "user need" interface meeting; and
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> (c) issue guidance so that reviewers have sufficient understanding of automated scientific codes to determine which code is appropriate (i.e., reasonable) for the intended use (e.g., providing site specific condition input for consideration in safety related decisionmaking).

The Director, FCSS, in his January 12, 2004, response to the NMSS Director's action memorandum, stated that:

> (a) based on its evaluation of available review guidance, FCSS had concluded that sufficient guidance on consequence assessment is provided to the staff, and that FCSS believes the guidance documents are acceptable for use in the MOX review. FCSS stated that its evaluation of the applicability of Volume 2 of the NRC's Management Directives and NUREG/BR-0167, "Software Quality Assurance Program and Guidelines," found that neither offer guidance that was useful to the staff's review of the MOX application.
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> (b) a user-need memorandum to RES had been issued, requesting assistance in various tasks regarding the establishment of a collaborative process for development and application of automated scientific codes; and
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> (c) it had determined, based on its evaluation, that reviewer education and experience, as well as the reviewer qualification program, coupled with existing regulatory guidance available to the staff for evaluating the acceptability of codes used to support the licensing of fuel cycle facilities, provides a sound foundation for selection and use of codes.

Upon review of the NMSS Director's tasking to FCSS, and the FCSS Director's January 12, 2004, response, I conclude that FCSS satisfactorily responded to the NMSS Director's action items concerning guidance on automated scientific codes.

Although FCSS concluded that neither Volume 2 of the NRC's Management Directives nor NUREG/BR-0167, "Software Quality Assurance Program and Guidelines," offer guidance that was useful to the staff's review of the MOX application, I requested that FCSS describe to me what quality assurance had been applied to the ARCON 96 code development and use. The response I received was that the ARCON 96 code was developed and tested by Pacific Northwest National Laboratories for the U.S. Nuclear Regulatory Commission. Benchmark, validation and verification of ARCON 96 is documented in NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes." The Radiation Safety Information Computational Center (RSICC) at the Oak Ridge National Laboratory is responsible for stewardship of ARCON 96, which involves, among other software quality assurance activities, testing, documentation, organizing, promulgation and troubleshooting, including minor debugging tasks. The code is catalogued by RSICC as code package CCC-664.

In conclusion, upon review of your DPV, the ad hoc Review Panel Report and recommendations, the NMSS Director's Decision and action memorandum to FCSS, the FCSS Director's response to the action memorandum, your May 13, 2004, memorandum to me (with your attached January 22, 2004, memorandum to the Director, FCSS), and the additional information provided to me concerning software quality assurance applied to the ARCON 96 code development and use, I find that FCSS has adequately responded to all action items in the October 3, 2003, NMSS Director's action memorandum. Therefore, no further action is required on those items.

Upon review of the NMSS Director's tasking to FCSS, and the FCSS Director's January 12, 2004, response, I conclude that FCSS satisfactorily responded to the NMSS Director's action items concerning guidance on automated scientific codes.

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