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U.S. Nuclear Regulatory Commission
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Subject: Completion of Intermediate Milestone—Summary of Biosphere Characteristics Activities Accomplished in Fiscal Year 2005 (IM 06002.01.372.520)

Dear Dr. Leslie:

This letter transmits information documenting completion of the Intermediate Milestone Summary of Biosphere Characteristics Activities Accomplished in Fiscal Year 2005 (IM 06002.01.372.520) and addresses your request of October 13, 2005, to resubmit this document with the predecisional headers and footers removed. No other changes have been made. A number of diverse technical support activities were conducted by the Center for Nuclear Waste Regulatory Analyses (CNWRA) in fiscal year 2005 to support the Biosphere Characteristics Integrated Subissue. Because these technical support activities did not include the development of specific milestone reports, this letter serves as an end of year summary report documenting accomplishments on assigned tasks in fiscal year 2005.

CNWRA supported resolution of the remaining Total System Performance Assessment and Integration Key Technical Issue Agreements related to the Biosphere Characteristics Integrated Subissue. This work involved reviewing the U.S. Nuclear Regulatory Commission (NRC) response to agreement TSPA1.3.37 regarding the U.S. Department of Energy (DOE) approach for sampling biosphere dose conversion factors. The original agreement response was drafted by NRC staff, and the CNWRA contribution was to review and comment on that draft response. Additional effort included review of U.S. Department of Energy responses to agreements related to DOE features, events, and processes associated with biosphere characteristics. In particular, CNWRA reviews addressed biosphere related comments included in the DOE response letter for agreements TSPA1.2.01, TSPA1.2.02, TSPA1.2.03, and TSPA1.2.04.

CNWRA support for precicensing actions and activities was limited because no formal interactions with the DOE on issues related to biosphere characteristics were conducted during the fiscal year. CNWRA supported NRC interactions with the Advisory Committee on Nuclear Waste by participating in a visit of committee members to the CNWRA facilities in San Antonio, Texas. During this visit, CNWRA biosphere characteristics integrated subissue staff responded to questions related to biosphere dose calculations and dosimetry methods applied in the Total-system Performance Assessment Code. In a separate activity, CNWRA reviewed and commented to the NRC program element manager on draft



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proceedings of the Advisory Committee on Nuclear Waste Meeting of the Working Group on Biosphere Dose Assessments for the Proposed Yucca Mountain High-level Waste Repository. NRC and CNWRA staffs had made presentations at that meeting, which was held in fiscal year 2004. The review of the draft proceedings was conducted to ensure the presented material was correctly summarized in the document.

CNWRA supported the development of license application review teams, plans, and strategies. Part of this effort required review of the Yucca Mountain Review Plan to assess its continued applicability to the evolving high-level waste program, specifically with regard to biosphere characteristics reviews. This effort concluded that the biosphere characteristics section of the Yucca Mountain Review Plan continues to provide useful license application review guidance. CNWRA staff also participated in a biosphere characteristics team review of features, events, and processes identified by DOE. Staff began assembling lists of documents and information relevant to the license application review activities and participated in numerous activities focused specifically on license application review planning.

To understand DOE models, CNWRA staff reviewed the DOE biosphere model (ERMYN) and began familiarization activities and checks for consistency with available documentation. No major inconsistencies between the model and documentation were identified; however, the recent revision of a number of supporting documents will necessitate further reviews during the next fiscal year. Part of this effort involved a visit to the DOE licensing support office to develop a more complete understanding of the DOE implementation of biosphere calculations in its Total System Performance Assessment model. CNWRA staff will continue to monitor changes in the DOE biosphere modeling approach including implementation of revised dosimetry methodologies, in particular.

CNWRA supported the development of the TPA code by participating in a number of related activities.

- Staff compiled a new data file of inhalation and ingestion dose coefficients for five age groups and 74 radionuclides. Dose coefficients were selected from information published by the International Commission on Radiological Protection in a database attached to Publication 72. This work was delayed due to difficulties obtaining the database which was temporarily out of print. However, following receipt of the data, staff expeditiously compiled the new data file. Staff reviewed International Commission on Radiological Protection summaries of biokinetic information to select absorption classes relevant to Yucca Mountain exposure scenarios for key radionuclides included in TPA code calculations. All other dose coefficients were selected based on the international commission's default recommendations on chemical

form-based absorption types. Inhalation dose coefficients were based on an activity median aerodynamic diameter representative of expected exposure conditions. Prior to extracting data from the International Commission on Radiological Protection database, staff tested (i.e., verified) the database software in accordance with CNWRA quality assurance procedures. The software and data are copyright protected, and staff drafted a letter to the International Commission on Radiological Protection requesting permission to use the queried data in the TPA code (currently awaiting the response).

- Staff investigated alternative sources of dose coefficients in Federal Guidance Report No. 13 (not copyright protected) as a potential backup source of information while awaiting the response to the request for permission to use the International Commission on Radiological Protection dose coefficient data. Staff reviewed information on the methodology used in the Federal Guidance Report to calculate risk-based coefficients. CNWRA staff also obtained a supplemental data disk containing coefficients based on effective dose that could be incorporated into a data file used in the TPA code effective dose calculations. Investigations continue, however, preliminary results suggest the Federal Guidance Report could be used as a backup source for dose coefficients in the TPA code.
- Staff completed a concurrence review of all biosphere characteristics related input parameters and data files for the TPA code. A subsequent task to justify the biosphere parameters and data was completed at the end of the fiscal year. The parameter justification effort was completed on a delayed schedule because of the large amount of information to be documented and other competing priorities.
- Two software change reports were drafted to address code changes required for implementation of age-dependent dose calculations based on revised dose coefficients. The two reports were submitted to the code developer for implementation and testing under a separate task.
- Staff supported the TPA version 5.0.1 code validation effort by developing calculation verification spreadsheets, preparing initial code validation plans, and coordinating the validation team. Execution of the validation tests was conducted under a separate task.

Planning and executing work for fiscal year 2005 was challenging due to uncertainties in the schedule for receipt of the DOE license application and subsequent evolution of the program activities for changing circumstances. CNWRA staff ensured work conducted for the Biosphere Characteristics Integrated Subissue was completed so as to avoid delays to the schedules of other related high-level waste program activities such as TPA code development and validation. In general, work was completed consistent with target dates. However, in some cases, progress was delayed due to assignment of limited staff resources to other tasks.

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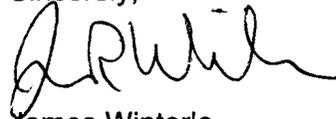
For example, parameter justification was delayed so staff could focus on updating and validating the TPA code.

End of fiscal year expenditures are estimated to be approximately 80 percent of the budgeted amount. Active recruitment throughout the year resulted in the hiring of an additional dose/risk analyst, who will help meet the demands of future activities.

While executing planned work has been challenging, CNWRA has demonstrated flexibility in adapting to changes in the program and, as documented in this letter report, has provided a variety of high quality and efficient technical support services for the NRC this fiscal year.

Additional details on the activities discussed in this letter can be provided at your request. Please contact me at 210-522-5249 or Mr. Patrick LaPlante, the principal investigator, at 301-881-0289 if there are questions regarding the information discussed in this letter.

Sincerely,



James Winterle
Manager, Performance Assessment

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