

# CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

## TRIP REPORT

**SUBJECT:** Staff Exchange of Dr. Vijay Jain between Center for Nuclear Waste Regulatory Analyses (CNWRA) and the U. S. Nuclear Regulatory Commission (NRC)  
Charge Number 20.06002.01.081; AI Number 06002.081.315

**DATE/PLACE:** July 7-18, 2003, Rockville, MD

**AUTHOR:** V. Jain

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**PERSONS PRESENT:** V. Jain, CNWRA and NRC staff

### **BACKGROUND AND PURPOSE OF TRIP:**

I participated in a staff exchange between the CNWRA and NRC from July 7–18, 2003 at the NRC Headquarters in Rockville, Maryland. The purpose of this staff exchange was to (i) examine the impact of high burnup spent nuclear fuels on the performance of the proposed geologic repository at Yucca Mountain; (ii) provide insights on current CLST topics, (iii) assist in the management activities during the absence of NRC CLST PEM, and (iv) participate in meetings and tasks that will facilitate communications between NRC and CNWRA.

During the staff exchange, I worked with the NRC staff in the Division of Waste Management, Office of Research, and Spent Fuel Project Office.

### **SUMMARY OF PERTINENT POINTS:**

One of the major objectives of this staff exchange was to evaluate disposal issues associated with the high burnup spent nuclear fuel after confinement barriers such as waste package is breached and the fuel is subjected to groundwater interactions. Spent nuclear fuel exceeding 45 GWd/MTU is classified as high burnup spent nuclear fuel. Based on 1998 projections, high burnup spent nuclear fuel will constitute more than 81 percent of the total inventory of the spent nuclear fuel generated between 1998 and 2015. Assuming 63000 MTU capacity for commercial spent nuclear fuel at the Yucca Mountain repository, 35 percent of the spent nuclear fuel will be classified as high burnup fuel. High burnup spent nuclear fuel undergoes significant microstructural changes such as a decrease in the fuel grain size and a loss of defined grain structure, high density of small pores, and loss of fission gas Xe from the fuel matrix. These changes can impact radionuclide release rate. Tae Ahn of Division of Management, Harold Scott of the Office of Research, Chris Brown of Spent Fuel Project Office, and Kim Gruss of Risk Task Group provided insights into current programs at the NRC on the evaluation of high burnup fuels for interim storage and transportation. The discussions provided information on current regulatory bases, staff guidance under development, and ongoing research on high burnup fuels. Staff provided a number of relevant documents for review. Information collected will be incorporated in a FY2004 intermediate milestone.

During my stay at NRC, I participated in several meetings. These included King Stablien's weekly staff meetings which provided an opportunity to interact with his staff. In addition, I

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participated in two meetings on Naval Fuels. The first meeting included a discussion with staff from the Office of Research on human reliability considerations in estimating probability of criticality for Navy fuels. In the second meeting, we worked on finalizing the letter to the Navy requesting additional information. In this meeting, I provided insights into waste package manufacturing processes. In addition, I had discussions with Denis Galvin on postclosure criticality strategy. I will continue to work with Denis as he further refines current criticality strategy. These meetings reinforced collegial interactions between NRC and CNWRA staff.

Tae Ahn provided excellent support. Discussions on corrosion models based on his recent trip to England and Japan were informative. Insights gained in these discussions will help in the resolution of several CLST KTI agreements. In addition, we discussed new information on high burnup fuels collected at the Argonne National Laboratory conference. In consultation with Tammy Bloomer, I reviewed and assisted in the development FY2004 CLST Operations Plan guidance.

I discussed draft response on PRE 7.04 agreement with Al Scontos, Tae Ahn, Greg Hatchett and Tim Kobetez, and requested additional references from DOE to complete our review. Also, attended a preclosure meeting led by Tim Kobetez where plans for preclosure work were discussed.

**CONCLUSIONS:**

The two week time period was adequate to meet my objectives during this staff exchange. Staff exchange reinforced collegial interactions between NRC and CNWRA staff and fostered a mutual understanding of and appreciation for the NRC regulatory role. This staff exchange facilitated my interactions beyond Division of Waste Management. The NRC staff from the Office of Research and Spent Fuel Project Office staff provided insights and information on the current NRC programs on high burnup fuels. This information will be useful in the assessment of disposal issues for the high burnup spent nuclear fuels at the proposed Yucca Mountain repository. Participation in internal NRC meetings was an excellent opportunity to better understand the NRC regulatory role. The professional relationships developed during this exchange will enhance coordination of future CNWRA activities within Division of Waste Management and other NRC organizations.

**PROBLEMS ENCOUNTERED:**

None.


**PENDING ACTIONS:**

Include intermediate milestones in the FY 2004 Ops Plan on the evaluation of the high burnup fuel at the proposed Yucca Mountain Repository and evaluation of localized corrosion methodology currently used in TPA code.

**RECOMMENDATIONS:**

Staff exchange provided an excellent venue for interacting with NRC staff beyond the Division of Waste Management. I strongly recommend that CNWRA staff should take advantage of this opportunities in the future.

**SIGNATURES:**

  
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Vijay Jain  
Corrosion Science & Process Engineering, Element

7/22/03  
Date

**CONCURRENCE:**

  
\_\_\_\_\_  
Budhi Sagar  
Technical Director

7/23/03  
Date

VJ:BS:jg