

RES
NR

From: Fuat (Frank) Odar - RES
To: Ballsj@ornl.gov; Dapowewr@sandia.gov; INternet:ballsj@ornl.gov;
INternet:dapower@sandia.gov; INternet:morrisrn@ornl.gov; Internet:pti@inel.gov; Morrisrn@ornl.gov
Date: Mon, May 13, 2002 11:39 AM
Subject: Pre-PIRT Meeting , May 28-29

To all:

Attached is the outline of presentation by Stu Rubin from NRC for this Pre-PIRT meeting. Stu is going to have approximately 4 slides providing a framework for discussions. There are already 22 issues outlined. When we go further in details of these issues and as new issues and/or phenomena are added, it would not surprise me to see about 200 different issues. It looks like we will have a very challenging meeting.

I would like the recipients of this memo (not recipients on cc) to take a hard look at these four major categories of issues. I am seeking contributions or further tutorials on these issues with handouts so that all participants will be brought up to a certain level. I would like each recipient to send me by E-Mail identifying the area or issues that he/she would like to make a presentation and give me the time that they will be available for telephone conversation with me (301-415-6500) and/or Brent Boyack (505-667-2023) from Los Alamos to finalize the NRC /DOE presentations session. After this session we would start discussions. Brent Boyack is preparing a letter to each of you describing the PIRT process, further details of the purpose of the meeting as well as the success metric for the meeting.

Frank Odar

CC: Amy Cabbage; Axn; Charles Ader; DEC1; fxe; INET:bboyack; Jer1; Jhf; N.P.
Kadambi; Raji Tripathi; Ralph Caruso; Rth; sdr1; Undine Shoop; Yuri Orechwa

T/67

Illustrative Potential Phenomena (Factors) Affecting HTGR Fuel Performance
(Coated Particle Failures and/or Fission Product Release)

Fuel Design Factors

- Kernel sphericity (out-of-roundness)
- Buffer layer thickness and density (void volume)
- Inner and outer pyrolytic carbon layer thickness and density
- Silicon carbon layer thickness and strength
- Anisotropy of inner and outer pyrolytic carbon layers
- Unconfined heavy metal outside SiC layer (FP release)
- Anisotropy of matrix material
- Particle packing fraction in fuel elements

Fuel Manufacturing Factors

- Initial particle defect fraction due to manufacture
- Microstructure of layers and bonding between layers
- Layer coating process variable specifications (e.g., temperature, coating rate, pressure)
- Fuel element (pebble, compact) manufacturing process specifications (e.g., annealing temperature)
- Unconfined heavy metal in the matrix material (FP release)

Fuel Operating (Irradiation) Conditions

- Irradiation temperature
- Burn up
- Fast fluence
- Power/temperature gradients
- Transients

Fuel Accident Conditions

- Maximum temperature during heat up
- Time at maximum temperature
- Reactivity pulse (energy deposition and rate)
- Chemical attack