

**From:** Amy Cabbage *NRR*  
**To:** *NRR* Akstulewicz, Frank; Chatterton, Margaret; LaVie, Steve; McKenna, Eileen; Palla, Robert; Rubin, Mark; Shoop, Undine *-NRR*  
**Date:** Wed, Aug 22, 2001 5:20 PM  
**Subject:** Fwd: Re: DOE training agenda

*-NRR refer*  
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Agenda for the DOE training (September 10 -14) is attached.

I will be out of the office until September 5. Please contact Don Carlson in RES (415-8507) if you have any questions or problems. Don will be sending everyone some more information in the next day or so. Please let Don know if you will be missing any portion of the training so he can arrange a substitute.

**CC:** Carlson, Donald; Jackson, Diane

*FF/25*

**From:** Donald Carlson *RES*  
**To:** Cabbage, Amy *NRA*  
**Date:** Wed, Aug 22, 2001 2:08 PM  
**Subject:** Re: DOE training agenda

Attached.

>>> Amy Cabbage 08/22/01 01:00PM >>>  
Can you e-mail it to me??

*NRA*

Thanks!

**Draft 7/27/01**  
**MHTGR Technology Course**  
**for NRC/DOE (Brayton Cycle Only)**  
**September 10-14, 2001**

**Monday, September 10**

- |      |   |   |
|------|---|---|
| 0830 | Introduction  | Syd                                       |
|      | <ul style="list-style-type: none"> <li>• Introduction of course &amp; participants</li> <li>• Course objectives &amp; Agenda overview</li> </ul>  |   |
| 0900 | History, Background   | Syd, Arkal, & Pete Williams (30 min each) |
|      | <ul style="list-style-type: none"> <li>• Elaboration of MHTGR Safety Features (IAEA Consultancy)</li> <li>• Begin a real-time MHTGR DBA+ (ATWS, LOFC, Depressurization)</li> <li>• UK &amp; other early gas reactors</li> <li>• MHTGR evolution</li> <li>• What's going on now with MHTGR development</li> <li>• Some war stories (FSV wobble, water ingress,...)</li> <li>•</li> </ul> |   |
| 1030 | Design Overviews (Top-Level Requirements, Flow Sheets with Brayton Cycles)  |   |
|      | <ul style="list-style-type: none"> <li>• PBMR</li> <li>• GT-MHR</li> </ul>  | Syd or Prof. Frickie (SA)<br>Arkal        |
| 1200 | Lunch   |   |
| 1300 | Core Designs & T/H (General + Both concepts)  | Syd                                       |
| 1400 | Core Physics (General + Both concepts)  | John-Paul Renier                          |
| 1530 | Helium Purification   | Arkal                                     |
| 1600 | Reactor Cavity Cooling Systems (RCCS)   | Syd                                       |
| 1630 | Adjourn   |   |

**Tuesday, September 11**

- |      |  |                |
|------|--|----------------|
| 0830 | Turbomachinery/Power Conversion (General + Both Designs)   | Scott Penfield |
|      | <ul style="list-style-type: none"> <li>• PBMR Power Conversion Unit Overview</li> <li>• GT-MHR Power Conversion System Overview</li> <li>• Key PC Tradeoff Considerations</li> <li>• Major Power Conversion Components <ul style="list-style-type: none"> <li>- Turbines and compressors</li> <li>- Generator</li> <li>- Electromagnetic/auxiliary bearing systems</li> <li>- Recuperator</li> <li>- Precooler and intercooler</li> <li>- Control and bypass valves</li> <li>- Ducts and Supports</li> </ul> </li> </ul> |                |

		Power Conversion
1030	Structural, Seismic, High-Temperature Materials – General	Russ Vollman
1130	Vessels	Scott
1200	Lunch	
1300	Graphite	Tim Burchell
1430	Fuel Handling, Spent Fuel Storage, and Proliferation Considerations	
	• Prism	Russ & Arkal (1 hr)
	• Pebble	Hans Chi (1 hr)
1630	Maintenance	Scott
1700	Adjourn	

### Wednesday, September 12

#### Fuel & Fission Product Day!

0830	Topic 1	Don McEachern
1030	Topic 2	Bob Morris
1130	Lunch	
1230	Topic 3	Bob Wichner
1430	Topic 4	Heinz Nabeilik
1600	Panel Discussion	All
1700	Adjourn	

### Thursday, September 13

0830	Graphite Oxidation	Bob Wichner
1000	I&C Technologies for MHTGRs	Richard Wood
1100	Operations & Operating Transients (General & Prism)	Jim Zgliczynski
1130	Lunch	
1230	Confinement Issues	Bob Wichner
1300	Safety Characteristics; Accident Analysis & Codes	Syd, Jim, & Larry Parme
1630	Adjourn	

### Friday, September 14

0830	PRA for MHTGRs	Larry
0900	Licensing – U.S. Historical Background	Pete
	• MHTGR	
	• FSV	
	• Advanced reactor policy	
0930	Safety & Licensing Issues	Larry & Syd
	• How others did/are doing it	
	• IAEA guidelines	
	• Passive systems - special considerations	
	• Approaches – accident selection, DBA, ...	
	• License by test	

- Public interactions
- 1130 Lunch
- 1230 Safety & Licensing Issues (Continued)
- 1400 Panel discussion on Safety & Licensing
- 1500 Course wrapup, feedback, followups,...
- 1600 Adjourn

Larry, Syd & Pete  
Syd

DRAFT 6/14/01

MHTGR Technology Course – Fuel & Fission Product session (Wednesday)

How about the following: (Proposed by Bob Wichner – rpw):

1 General behavior of FP groups in GCRs. (rpw 30 min)

Differences from LWRs

Introduction of the oxygen potential concept

Which are oxides, which are metals

2 FP species in fuel (rpw 45 min)

Differences between UCO and UO<sub>2</sub>

Fuel chemistry, linked

Burnup limitations

3 Fuel manufacturing (Don 45 min)

Both UO<sub>2</sub> and UCO

kernel and coatings

4 Interaction of FPs with SiC (rpw 30 min)

Mainly work of Homan, Lindemer

Photos of interactions

5 Fuel Quality control (Don 45 min)

Standard methods

Improved methods?

6 FP release from US fuel (Bob Morris 1 hr)

Annealing tests

Out of pile tests

Release models (COPAR ?)

7 FP release from German fuel (Heinz 2 hr)

Annealing tests

Out of pile tests

Release models

German Behavior models

8 US Fuel behavior prediction and models (Don 1 hr)

SURVEY code

Goodin models used by GA

What went wrong with the NPR fuel?