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FOR THE DEPARTMENT OF ENERGY

Deep Burn Team



Deep Burn: Development of Transuranic Fuel for High-Temperature Helium-Cooled Reactors

Monthly Highlights

October 2010



TRISO-Coated Particle with Mixed Pu, Th Oxide
Kernel after High Pu Burnup

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Deep Burn: Development of Transuranic Fuel for High-Temperature Helium-Cooled Reactors

Monthly Highlights for October 2010

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1. Project Management and Planning

Program reporting (*ORNL*)

The DB Program monthly highlights report for September 2010, ORNL/TM-2010/252, was distributed to program participants by email on October 26.

Archiving program records (*ORNL*)

The monthly report for September was posted on October 26 to the Deep Burn website, http://www.ms.ornl.gov/deep_burn/index.shtml. Program participants are reminded to send reports, milestone documents and other pertinent documents to the webmaster, Shirley Shugart shugartsa@ornl.gov, for uploading to the website.

2. Core and Fuel Analysis

Tasks and subtasks in these three areas have not been fully defined yet, and contracts are not in place. These three chapter headings are from FY 2010, and may be revised when FY 2011 work plans are finalized.

During the month of October, in addition to the preparation of the Annual Report and some wrapping up and presentation of previous work, there have been considerable planning activities and the start of exploratory work on the Deep Burn LWR concept.

3. Spent Fuel Management

See Chapter 2.

4. Fuel Cycle Integration of the HTR

See Chapter 2.

5. TRU HTR Fuel Qualification

Modeling (*ORNL*)

Developed draft program plan for Deep Burn modeling efforts including contingencies based on funding. Assessed PASTA code documentation and evaluated potential contribution from thermomechanical modeling effort.

6. HTR Spent Fuel Recycle

6.1 TRU Kernel Development (*ORNL*)

A procedure to remove cerium and other potential contaminants from acidic plutonium solutions was identified with the assistance of researchers from the Savannah River Site.

Drafts of two research safety summaries and two procedures for the Radiochemical Engineering Development Center (REDC) were submitted for review. The documentation covers the preparation of TRU solutions, use of the internal gelation system, and the novel wash procedure for the TRU gel spheres.

Preparations to connect the new glove boxes to the ventilation system and to modify the glove port are underway.

6.2 Coating Development (ORNL)

A purchase order was issued for procurement of standard glove boxes. The design of coating glove box is nearing completion, and a detailed facility design for a new coating laboratory is ongoing. Coating furnace components are in fabrication.

6.3 Characterization Development and Support

No Activity this month.

6.4 ZrC Properties and Handbook

Mechanical properties of zone-refined ZrC (ORNL)

This task was completed in FY10. The final results are summarized in the Quarterly report.

Pd/ZrC interaction (UNLV)

Contract ended 30Sept10.

Ag/ZrC interaction (UW-M)

The [ZrC/Ag gas] constant source diffusion couple (DC) between a ZrC_{0.95} disk and an encapsulating Zr-Ag solid solution was sent to PNNL and is there waiting for SIMS analysis. Another [ZrC_{0.89}/Ag gas] constant source diffusion couple was constructed for WDS measurement since the previous sample for SIMS was not acceptable. This is expected to be the final [ZrC_{0.89}/Ag gas] DC.

Irradiation effects in ZrC (UW-M)

ZrC_{0.84} and ZrC_{1.05} samples were irradiated at ~1350°C, and the irradiated microstructures of the specimens were examined. No irradiation-induced voids were identified while a high density of dislocations was observed. The irradiation response is strongly dependent on the stoichiometry.

7. HTR Fuel Recycle

There is presently no funded work in this category for FY 2011.

Appendix I – Project Participants

Deep Burn Task	Name	Organization
Project Management	Lance Snead	ORNL
	Ana Hulsey	ORNL
	Bill Wiffen	ORNL
	Tara Voit	ORNL
	Angie Blankenship	ORNL
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Thermo-chemical Modeling	Ted Besmann	ORNL
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	John Wills	LANL
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	Gary Bell	ORNL
TRU Kernel Development	Rodney Hunt	ORNL
	Valmor de Almeida	ORNL
	Jack Collins	Subcontract
Coating Development	Jim Miller	ORNL
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	Brian Jolly	ORNL
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*Denotes observer to program