



Idaho National Laboratory

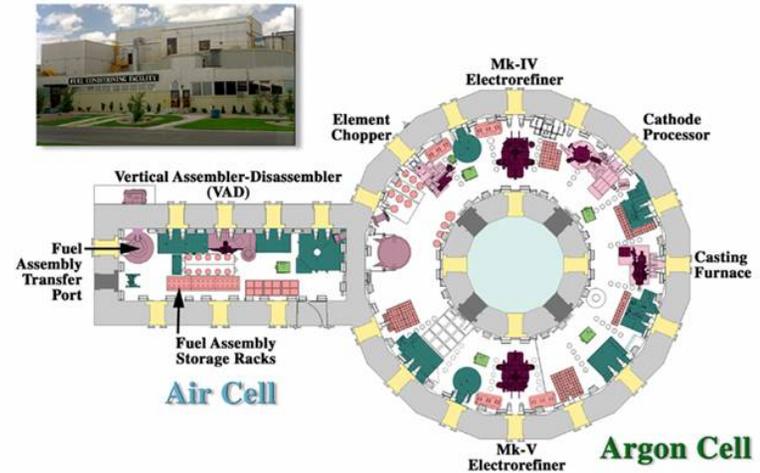
Treatment of Sodium-Bonded Spent Nuclear Fuel

Mike Goff
Director, Fuel Cycle Programs
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Status of Pyrochemical Processing at Idaho National Laboratory

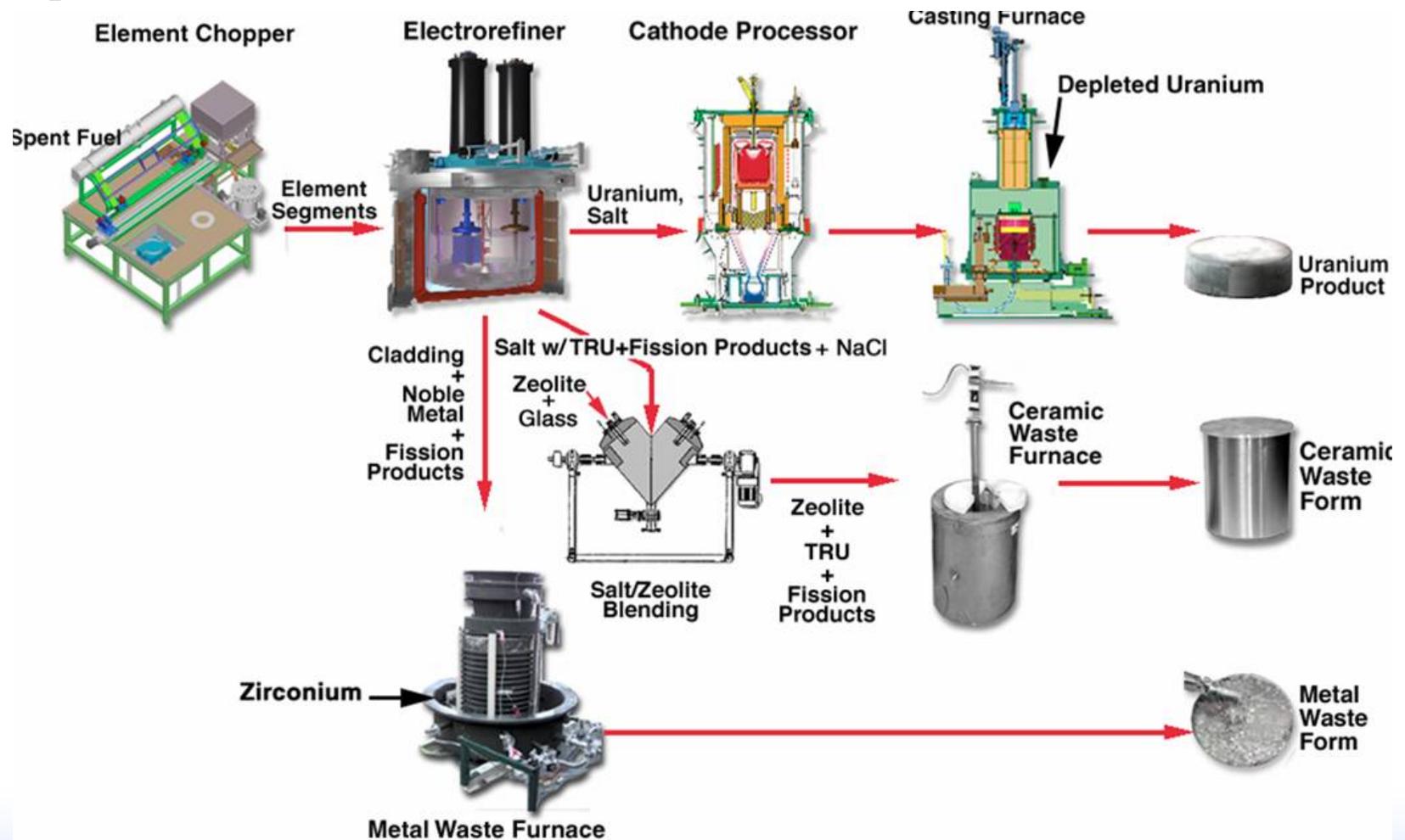
- Pyrochemical processing is being used for treatment of EBR-II fuel.
- Work is part of the Advanced Fuel Cycle Initiative (AFCI).
- More than 3 MTHM of fuel have been treated.
 - Treatment of driver fuel has been a focus.
- Emphasis is on demonstration of the pyrochemical fuel cycle for recycle of fast reactor fuels.
- Work includes development, qualification, and production of high-level waste.

Fuel Conditioning Facility for Spent Nuclear Fuel Treatment



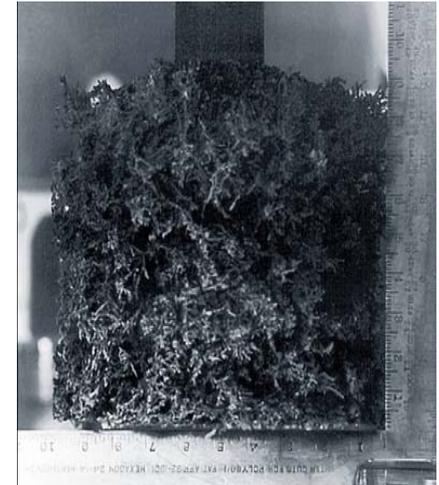
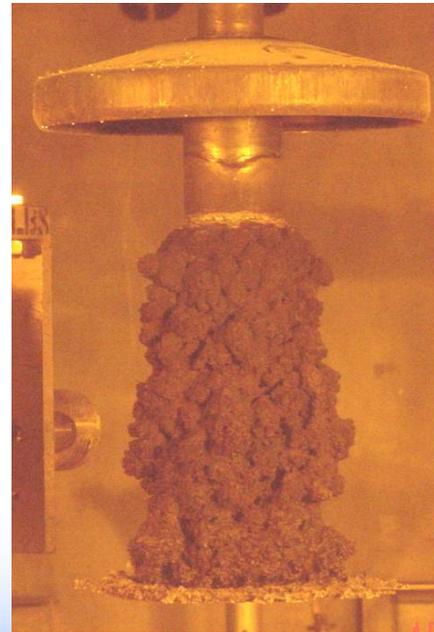
Hot Fuel Examination Facility

Spent Fuel Treatment Flowsheet



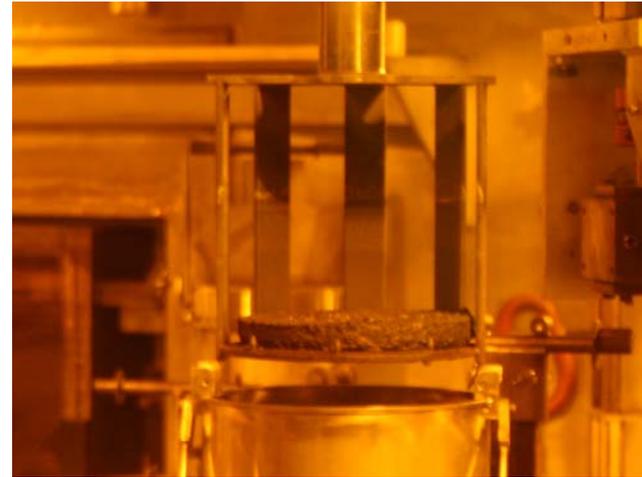
Recent Achievements in Electrorefiner Operations

- **Greater than 99% percent dissolution of actinides routinely obtained.**
- **Process batch sizes for driver fuel have increased by 50%.**
- **Uranium current efficiency of 80% obtained.**
- **Recovery of fuel matrix material (zirconium) has been demonstrated.**



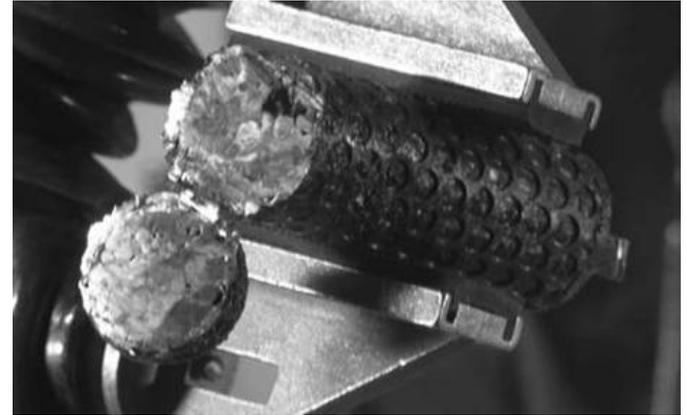
Group Actinide Recovery

- **Group transuranic recovery tests have been successfully performed at the laboratory and engineering-scales.**
- **At the engineering scale, recoveries of more than 1 kg of transuranics have been obtained.**
- **Purity requirements for fast reactor fuel have been demonstrated at both scales.**



Lab-Scale Oxide Reduction Tests

- Lab-scale reduction tests with spent LWR fuel element (Belgium Reactor 3) have been performed.
- Electrorefining of the reduced metal was recently completed.
- Reduction tests of fast reactor MOX are planned for FY07.

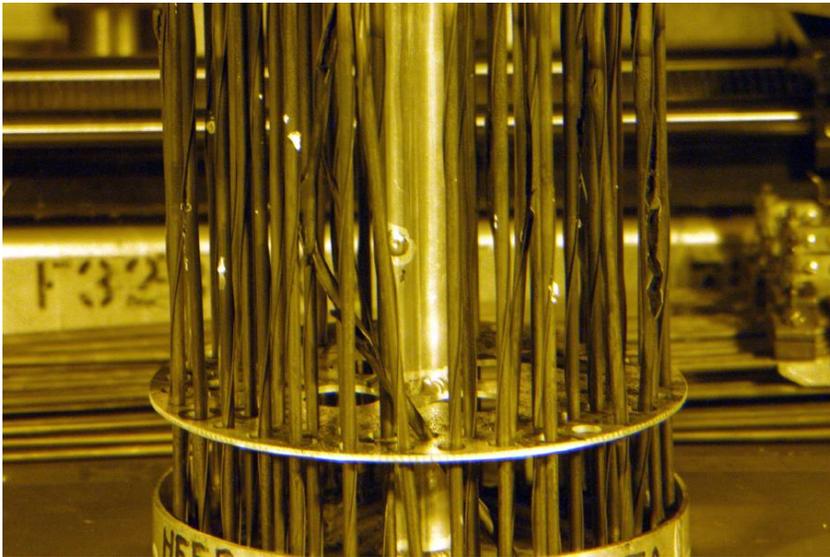


High-Level Wastes from Pyrochemical Processing

- Process tests for both the ceramic and metal waste are progressing.
- Testing with production-scale equipment is ongoing.



Continued Treatment Operations



- Revised cost estimates and schedules were developed for treatment of EBR-II sodium-bonded fuel that incorporate fuel cycle research.
- Proposal focuses on increasing treatment rate and expanding fuel cycle work.
- Treatment of driver fuel would continue to be a focus since additional fuel failures are being detected with increased dry storage times.

Other Sodium-Bonded Fuel

- **Funding has been obtained to perform a feasibility study and cost estimate for treating sodium debris beds from Sandia National Laboratory.**
- **Funding has been obtained to initiate work for the receipt for treatment of the sodium-bonded fuel from the Fast Flux Test Facility.**

Summary

- **EBR-II spent fuel treatment operations are continuing with a focus on fuel cycle demonstrations.**
- **Significant advancements in the technology are still being implemented.**
- **Scaling of waste form production is ongoing.**
- **Additional work supporting treatment of other sodium-bonded spent fuel is ongoing.**