

WORKING GROUP 1

PROLIFERATION RESISTANT REACTORS AND FUEL TECHNOLOGY

John Taylor

Electric Power Research Institute

April 24, 1998

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- **An International Issue**
 - **Short Term in US: Not a significant issue**
 - **Long Term in US and internationally: A major barrier to commercial fuel reprocessing/recycling**
 - **Short term internationally: Separated commercial plutonium stockpiles an IAEA concern**
- **Knowledge Gaps**
 - **A @clean slate framework@ evaluation is needed to identify the critical gaps and to define the potential technical responses over the entire system in the recycling mode:**
 - **reactor and fuel design**
 - **fuel cycle alternatives**
 - **reprocessing technology**
 - **MPC&A technology**
 - **Design for HLW management**

- **Potential R&D Opportunities**

- **Re-visit INFCE results in light of 20 more years of experience; e.g. CIVEX**
- **Ultra-long lived fuel---high conversion reactors without reprocessing**
- **Utilization of thorium cycle in LWR systems**
- **Pu burners--non-fertile Pu alloy fuel**
- **Accelerator-driven Pu burners**
- **Pyro-metallurgical and dry chemical reprocessing**
- **Recycling without reprocessing**
- **Basic materials science--emphasis on irradiation behavior**
- **International monitored retrievable storage**

- **Relevance Review Criteria**
 - **Potential contribution to nuclear power, short or long term**
 - **Potential for Proliferation resistant fuel/fuel cycle**
 - **Encourage research to better utilize nuclear fuel, giving high priority to nonproliferation**
 - **Retain technical capabilities in the US**
 - **Maintain/regain US technical leadership**

- **Collaborative R&D beneficial**
 - **With industry to obtain design, licensing know-how**
 - **With international but with greater leverage than equal cost sharing**
 - **With NIST (Russia)**
 - **With Office of Materials Disposition**

- **Process Issues**

- **Extra credit should be given for student involvement**
- **Consideration should be given to the merit of collaborative proposals beyond the technical enhancement from the collaboration**
- **The program should have a balance of single PIs and teams/collaborations; suggest about 100 single PI grants @ \$100,000 each to encourage participation and about 10 team/collaborative projects in the range \$1 to 2 million each to close identified knowledge gaps.**
- **Major equipment purchases should not be allowed; utilization of needed equipment should be sought in collaborative arrangements**
- **Cost sharing should be encouraged; the credit should be determined on the basis of the value added to the collaboration.**
- **The allocation to the individual areas (working groups) should be based solely on peer reviews, not on predetermined allocation of funding to each area. In particular, cross cutting proposals should be encouraged.**

- **Process Issues (Continued)**

- **No time frames should be established in the RFA, but the proposer should be asked to define the time frame of fruition and time phases of the effort, with milestones, on approximately an annual basis.**
- **Innovative approaches should be taken to attract top students from a broad scope of technical disciplines through the NERI program. Suggestions are: scholarships in departments outside nuclear engineering for research in cross-cutting technologies with nuclear engineering/science; summer retreats of NERI student participants to report and compare progress and critique the overall program**
- **DOE should try to attract researchers outside of those normally involved in nuclear engineering and related subjects. Cannot do it well directly but can attract researchers by asking in the RFA/RFP for collaborative efforts encompassing other technologies: e.g., advanced digital I&C controls for nuclear plants, materials science R&D of potential value in nuclear plant applications; advanced 3-D simulations to develop streamlined nuclear plant construction processes.**
- **The peer reviews should be performed by independent review panels of the highest possible qualifications. There is merit in combining the two step process into one peer review panel. There is also merit in soliciting pre-proposals for review to minimize proposal effort.**