U.S. Department of Energy
Office of Environmental Management
Environmental Management Advisory Board (EMAB)
Regional Meeting, August 23-24, 2006
Richland Washington

Public Comment

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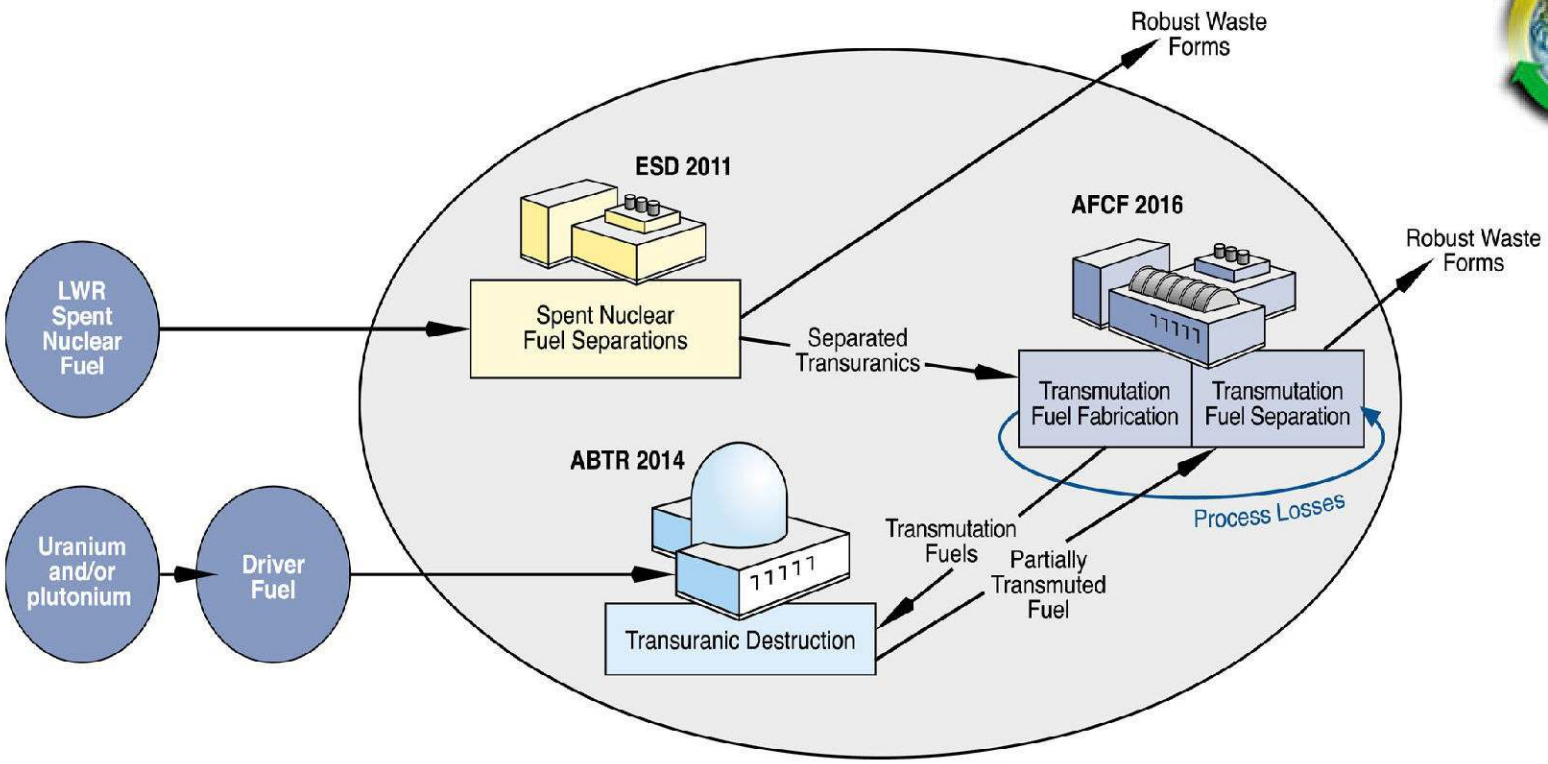
PERSONAL COMMENTARY

Advanced Burner Test Reactor
Report to Congress, May 06

- Sodium-Cooled Fast Spectrum Reactor
- ~250 MWth
- Test Capabilities ‘functionally equivalent” to FFTF
- Without U.S. fast neutron capability
  - Advanced Fuel Cycle testing difficulties
- International facilities considered:
  - France (Phenix – due to shut down in a few years)
  - Japan (JOYO – very difficult to test advanced fuels in Japan)
  - Russia (BN-600 or BOR-60 – expensive/difficult infrastructure)

GNEP Technology Demonstration Facilities
Report to Congress, May 2006



Advanced Burner Test Reactor
Essentially Identical to FFTF

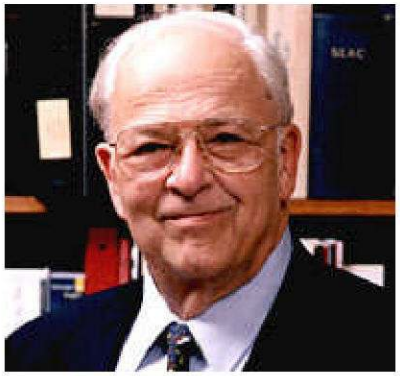
Available for Cooperative Research
Medical Isotopes – Advanced Science

Advanced Nuclear Transmutation Technology Subcommittee

Nuclear Energy Research Advisory Committee (NERAC)

Dr. Burton Richter, Chairman

- Report 24 October 2003. *"We again note the absence of good, fast neutron facilities in the United States. The final demise of the FFTF is to be regretted… limitations of foreign facilities…few fast neutron test reactors will be available [internationally] for research and development.*
- *Letter July 06 to WA Gov Gregoire "functionally equivalent to FFTF"*

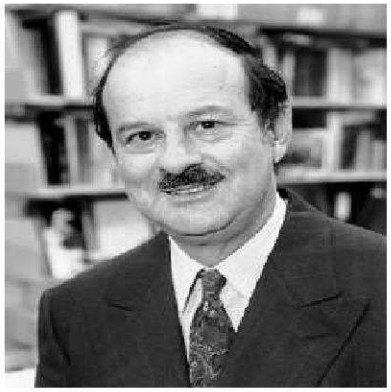


Dr. Burton Richter
The Nobel Prize in Physics in 1976
Stanford Linear Accelerator Center, Director Emeritus

Getting enough energy to satisfy the needs of the developing world without bringing on an eco-disaster is not going to be easy. It will require a marriage of science and technology with good international policy, something that is always hard to bring off. We need to get it right this time.

Dr. Neil Todreas, Professor MIT
GNEP Congressional Testimony, April 6, 2006

Advanced Burner Test Reactor (ABTR)



Nuclear fuel, because of the long lead time needed for irradiation testing, is always the critical path item in reactor development. For transmutation in TRU fueled elements such testing is essential, hence the need for a test reactor. Limited testing capability exists in Japanese, Russian, Indian and – for a very limited future period – French reactors, which I presume is being arranged. The U.S. facility, the FFTF, is now unavailable – is it irretrievably lost to us? **I support the need for a U.S. fast spectrum test reactor as part of a robust R&D program.** Timing dictates it be sodium cooled…..

Hanford Site
400 Area Complex Potential

- **FFTF (Fast Flux Test Facility)**
  - 400 MWth fast spectrum reactor
  - Ideal test capability - The only such reactor in USA
  - Flawless operation for over a decade
  - Shut Down in 1994
    - In deactivation, care and maintenance mode
    - Sodium drained from both primary and secondary loops (backfilled with very high purity argon gas)
    - Website: http://www.hanford.gov/rl/?page=304&parent=0
  - Tri-City Herald, OPINION,

    FFTF's potential worth serious consideration, 6/25/06

    http://www.tri-cityherald.com/tch/opinions/story/7899717p-7793269c.html

Columbia Basin Consulting Group

GLOBAL NUCLEAR ENERGY PARTNERSHIP (GNEP)

Response to DOE's Request for Expressions of Interest
TECHNOLOGY DEMONSTRATION PROGRAM

Columbia Basin Consulting Group (CBCG) of Richland WA is pleased to submit a response to the DOE's request for interest for the GNEP Technology Demonstration Program. CBCG is the successor organization to the Advanced Nuclear and Medical Systems, Inc (ANMS) who previously submitted proposals for reuse of qualified nuclear facilities for irradiation and advanced fuels cycle programs.

In June 2001, our team submitted a commercialization proposal for the Fast Flux Test Facility (FFTF), Fuels and Materials Examination Facility (FMEF), and the Maintenance and Storage Facility (MASF) complex focused on radio-isotope production for medical, commercial, and federal needs, and irradiation services. In parallel, ANL submitted a proposal for an Advanced Fuel Cycle Demonstration project based on ANL's pyroprocessing process utilizing INL facilities and the Hanford FFTF and supporting facilities.

The ANMS 2001 commercialization proposal consisted of a world class team for restart and operations, including:

- Duke Energy – Operations and startup
- Fluor Federal Services – Engineering and construction
- Nuclear Fuel Services – Nuclear fuel refurbishment and management
- SAIC – Isotope Production and Distribution (dropped out due to OCI)
- PNNL – Isotope Research and Production
- Edlow International – Fuel packaging and transport
- Compass Group – Labor Union Pension Fund Manager – Project Financing

The DOE formed an independent panel to review the responses under the direction of Mike Holland of Brookhaven National Laboratory, below is an excerpt from the Executive Summary of Panel's Report

- *The production of medical isotopes generated the most expressions of interest in FFTF operation, including the ANMS proposal.*
- *Foreign nations including France, Ukraine, Japan, South Korea, Germany, and the International Atomic Energy Agency support FFTF operation.*
- *The Nuclear Regulatory Commission stated that FFTF could be important.*
- *Expressions of need and support were received from Argonne National Laboratory, Idaho National Engineering and Environmental Laboratory, Los Alamos National Laboratory, Oakridge National Laboratory, and Pacific Northwest National Laboratory.*
- *Several expressions of interest were related to the use of FFTF for nuclear research. The ANL proposal could support the National Energy Policy for development of advanced nuclear fuel cycles and next-generation technologies for nuclear energy, as well as fuel-conditioning methods to reduce nuclear waste streams.*

The panel concluded that the ANMS and ANL proposals represent a potential private sector partnership for FFTF and a new mission, respectively, that are worthy of further consideration.

The panel further recommended combining the proposals into a public / private partnership to accomplish both objectives of advance fuels testing and commercial irradiation services. This response is based on carrying forward to recommendation of use of Hanford facilities for multi-purpose mission objectives and recommends the consideration of Public / Private Partnership contracting arrangements.

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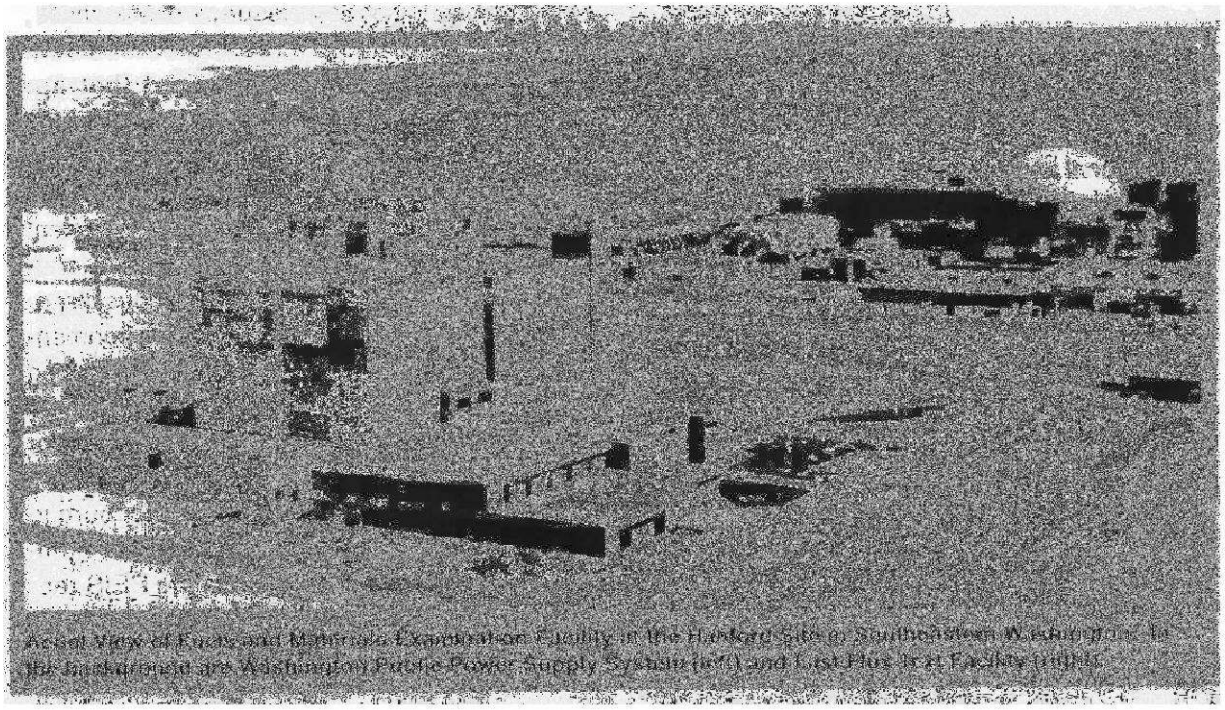
Hanford Capabilities

Hanford has an impressive complement of available facilities and a experienced cadre of personnel to effectively implement any federal energy, testing, or commercial / medical isotope project. Central to Hanford's capability advantage are the Fast Flux Test Facility (FFTF), the Fuels and Materials Examination Facility (FMEF), and the Maintenance and Storage Facility (MASF).

The FFTF, adjacent to FMEF, has been proposed for advanced fuel demonstration projects, transmutation of waste projects, a commercial production center of commercial and medical isotopes, as well as an international test platform for materials and research. The FFTF's broad neutron energy spectrum provides the capability to provide a broad range of irradiation services and produce significant quantities and varieties of isotopes. The FMEF is a 250,000 sq ft category one structure and was designed specifically to manufacture large quantities of plutonium-oxide fuels and to manipulate (disassemble and inspect) irradiated fuel assemblies. Because of its substantial size, it could readily support fuels testing, transmutation and other commercial ventures.



The original cost of FMEF was approximately $350 million; replacement costs were estimated in 1995 as $750 million. In 2006, this replacement cost could easily exceed $1.5 billion. The FFTF booked value was $640 million, however this did not include the "expense" funds or ancillary projects which brought the real cost in excess of $1.2 billion. In today's dollars, replacement of the FFTF could easily exceed $5 billion and more realistically approach $10 billion. Repair and restart of FFTF should be on the order of $500 million. FMEF requires only modification for the mission. Using these facilities to support GNEP and potential isotope projects represents a conservative significant savings estimate to the taxpayer of over $10 billion and offers a quick, environmentally friendly solution to support the GNEP objectives.

There is significant community support for an advanced nuclear energy mission at the Hanford facilities and for an isotope industry to locate in the TriCities area of southeastern Washington. In numerous venues, the Hanford Communities organization (Richland, Kennewick, Pasco, West Richland, Benton City, and Benton County) gave strong support to the reactor restart option and use of Hanford facilities

GNEP Support

This document responds to the DOE's Request for an Expression of Interest to identify prospective locations to host demonstration projects in support of the Global Nuclear Energy Partnership (GNEP). This response has focused on the currently existing and available facilities at the Hanford site to perform the mission of the Advanced Burner Test Reactor (ABTR) and support complex. These Hanford facilities include: the FFTF (a 400mw(t) fast spectrum sodium reactor); the FMEF (a 250,000 ft^2 category one nuclear facility), and MASF, a high-bay facility for maintenance and repair on contaminated equipment. Together the FFTF, FMEF, and MASF comprise a fully integrated, interconnected existing complex, well suited for the GNEP mission and immediately available for upgrade to mission support needs.

The FFTF complex facilities in support of an advanced fuel cycle test program was brought forward in 2001 as part of the Advanced Fuel Cycle Demonstration program proposal. This program when used in combination with the commercial isotopes and irradiation services proposal offered by ANMS, provided the DOE and the nation with a valuable, self-funded commercially viable and secure nuclear complex to support energy research, transmutation, isotope production, and irradiation services needs. The approach responds to the Global Nuclear Energy Partnerships program needs and is built around **pyroprocessing** technology developed at ANL, and used for the EBR-II Spent Fuel Treatment.

The pyroprocess technology will enable a 100-fold increase in the energy that can be produced from the uranium resource. Demonstration of the closed fuel cycle is prerequisite to establishing the fast reactor technology as an essentially unlimited energy source for the future. Closure of the fuel cycle using pyroprocessing requires recovery of actinides from fast reactor-irradiated metal fuel, manufacture of new subassemblies of metal fuel using this recycled material, irradiation of the recycled metal fuel subassemblies for sufficient time to demonstrate satisfactory fuel performance and subsequent recovery of the actinides from the recycled fuel.

Utilizing the **existing** facilities at the Fast Flux Test Facility (FFTF) as the Advanced Burner Test Reactor (ABTR) complex and operating within original design parameters may not require a new EIS. Proceeding on the basis of upgrades to existing facilities rather than new construction, provides the GNEP the only option available which can be on-line within a five year timeframe or better, and at a cost approximately one-tenth that for new facilities and several years advance in comparative schedules.

The Fast Spectrum Burner Reactor

The cornerstone of this submission is the reuse of existing Hanford facilities to support the ABTR mission.. These facilities offer the GNEP and existing, integrated advanced fuels fabrication testing and examination capabilities at a secured site which can be administered under the broader GNEP program.

The FFTF has an excellent operational safety record and is the only DOE existing nuclear reactor capable of providing a source of fast neutrons of sufficient magnitude to demonstrate key aspects of the advanced fuel cycle as well as supporting other nuclear energy research and development missions. The key features that make the restart of the FFTF attractive for the advanced fuel cycle demonstration follow:

- The FFTF is a fast reactor with features (e.g., power level, fast neutron flux level, subassembly hardware design, etc.) that are prototypic of the reactor envisioned for the ABTR.
- The facility has been well maintained, deactivation actions are fully reversible, and the infrastructure exists to support restart and operation. Restart costs are estimated in the $500 million range.
- Restarting the FFTF would be the most expedient way of providing the irradiation test facility needed for the Demonstration; replacement cost for this facility would be more than $5 billion.
- The FFTF core could be converted to metal fuel. Such conversions have been successful in other DOE reactors, i.e. the EBR-II core was converted to an advanced metallic high burnup fuel.

RESOLUTION NO. 1049

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF PUBLIC UTILITY DISTRICT NO. 1 OF FRANKLIN COUNTY, SUPPORTING EFFORTS MADE TO DETERMINE THE POTENTIAL OF THE FAST FLUX TEST FACILITY TO ANCHOR THE GLOBAL NUCLEAR ENERGY PARTNERSHIP, (FFTF FOR GNEP) THAT MAY LEAD TO AN IMPROVED ECONOMY AND JOB CREATION

WHEREAS, As part of the Presidents *Advanced Energy Initiative*, whose purpose is to develop innovative advanced reactors and new methods to recycle spent nuclear fuel *Global Nuclear Energy Partnership* (GNEP), announced February 6, 2006, it will develop and demonstrate Advanced Burner Reactors; AND

WHEREAS, Testing and certification of nuclear fuels and materials require an equivalent Fast Flux Test Facility reactor; AND

WHEREAS, The Fast Flux Test Facility is a sodium cooled fast neutron test reactor located in the 400 Area Complex at Hanford. FFTF is ideally suited for this new mission; AND

WHEREAS, Use of existing facilities , including FFTF, at the Hanford 400 area complex will have a cost savings to our nation on the order of $10 billion when compared to other sites within our nation; AND

WHEREAS, The Advanced Burner Reactor will build an improved nuclear fuel cycle that enhances energy security and enhances nonproliferation; AND

WHEREAS, Recycling spent nuclear fuel will enable a nuclear repository such as Yucca Mountain to handle U.S. waste for a full century: AND

WHEREAS, The Tri-Cities, Washington area has unique facilities, qualified scientists, engineers and labor that are needed to fully participate in Generation IV and GNEP advancements; AND

WHEREAS, FFTF for GNEP mission expands the job creation horizon for thousands of highly skilled workers and advances education in the sciences and in the trades;

NOW, THEREFORE BE IT HEREBY RESOLVED that the Commission supports efforts made to determine the potential of the Fast Flux Test Facility to anchor the Global Nuclear Energy Partnership, (FFTF for GNEP) that may lead to an improved economy and job creation.

APPROVED AND ADOPTED at an open public meeting this 8th day of August, 2006.

Stuart Nelson

Stuart Nelson, President

Charles Hall

Charles Hall, Vice President

William Gordon

William Gordon, Secretary

Advanced Burner Reactor Background

- **Support overall GNEP objectives**
  - Integral component of a closed fuel cycle
  - Expand the use of clean safe nuclear power
  - Produce less spent nuclear fuel

- **Initial Focus: Small-scale test reactor**
  - Reasonable balance between flux level, conversion ratio and cost
  - Nearly completed pre-conceptual design documents

PERSONAL COMMENTARY to EMAB

The Global Nuclear Energy Partnership specified the Advanced Burner Test Reactor, solicited Congressional Testimony, and Expressions of Interest. Dr. Todreas stated that the Advanced Burner Test Reactor was on the Critical Path in reactor development. A minimum of 6 Expressions of Interest noted the exceptional utility and value of the 400 Area Complex facilities, including the Fast Flux Test Facility. By utilizing these unique assets, it is said that 10 years and $10 billion can be saved.

The Department has also asked to see community support and that is forthcoming. One such Resolution is attached from Franklin Public Utility District. Other resolutions to date are from Energy Northwest, Port of Kennewick, City of West Richland, Benton PUD, numerous Labor organizations, etc.

During the USDOE – NE Industry Briefing, August 14, 2006, by Tim Frazier, the Department confirmed, "FFTF is an option that can be submitted." However, the subject of the Advanced Burner Test Reactor with Congressional Testimony, Expressions of Interest and massive community support becomes "Nearly completed pre-conceptual design documents." How can this possibly be? It appears as though these remarkably useful and valuable assets are simply hidden from view/consideration as an EM clean-up line item.

Dr. Todreas' question to Congress about the availability of the FFTF should be answered.

Please advise the Department of Energy of the usefulness and value for GNEP of these incredible facilities that are under the control of EM and located in the 400 Area Complex.

The major facilities are the mission ready Fuels Materials Examination Facility (FMEF), Maintenance And Storage Facility (MASF), and the world renowned Fast Flux Test Facility (FFTF).

Thank you for this opportunity for PUBLIC COMMENT.

Respectfully submitted,
August 23, 2006 in Richland Washington

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