Comments to FEAC

Mohamed A. Abdou

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Base Fusion Technology Research Should Be an Explicit Critical Element in the Restructured Fusion Program

- An Appropriate Balance Should Be Maintained Between Base Fusion Technology Research and Other Elements of the Program

  FEAC should determine the appropriate balance

- Specific Suggestions for the Strategy Document:

  1. Add a Fourth ISSUE on Fusion Technology:

     "Power Handling and Tritium Production Capability in the Unique Fusion Environment"

  2. <u>Replace</u> the last sentence of the first paragraph under "Strategy" which reads

     "The issue of fusion of fusion power technology, ... must be addressed in the future..."

     <u>By the following</u>

     "*The issue of fusion power technology, including blankets, is also fundamental to the evaluation of the feasibility and attractiveness of fusion. The Restructured Program will maintain a modest effort in selected key areas sufficient for the US to address critical issues and to remain a viable partner in the international program.*"

Base Technology Plays a Vital Role

- Fusion Technology Research is a Major Contributor to Science
  - e.g. particle transport, electromagnetics, fluid mechanics, MHD, chemistry, nuclear physics, material & engineering sciences
  - It is science with a purpose; provides "demand pull"
- Progress in Fusion is Now Hindered by Limitations of Available Technology

  e.g.
  - ITER has to keep power density low (~1MW/m^2) because available divertor/first wall/ blanket technology is severely limited
  - ITER could not incorporate tritium breeding blanket because of lack of sufficient scientific and technological data base

    [Danger: DT fusion experimental devices may become impossible to operate if they can not produce their own fuel]
- Fusion Technology is Vital to Concept Improvement
  - e.g. One goal of concept improvement is to increase power density:

    Advances in power handling technology are prerequisites to success
  - Plasma physics research must be done interactively with technology research.

    The goal is to have an optimum system that includes both plasma and in-vessel components. It is not to produce a good plasma for which no in-vessel technology can be developed

Fusion Technology Research is Vital to Resolving Critical Feasibility Issues and to Realization of Fusion's Potential as a Safe and Environmentally Attractive Energy Source

- Feasibility Issue:
  - Can a practical DT fusion system lead to inexhaustible energy source?

    Is the DT cycle viable?

    Recent results show that this must be a serious priority R&D issue

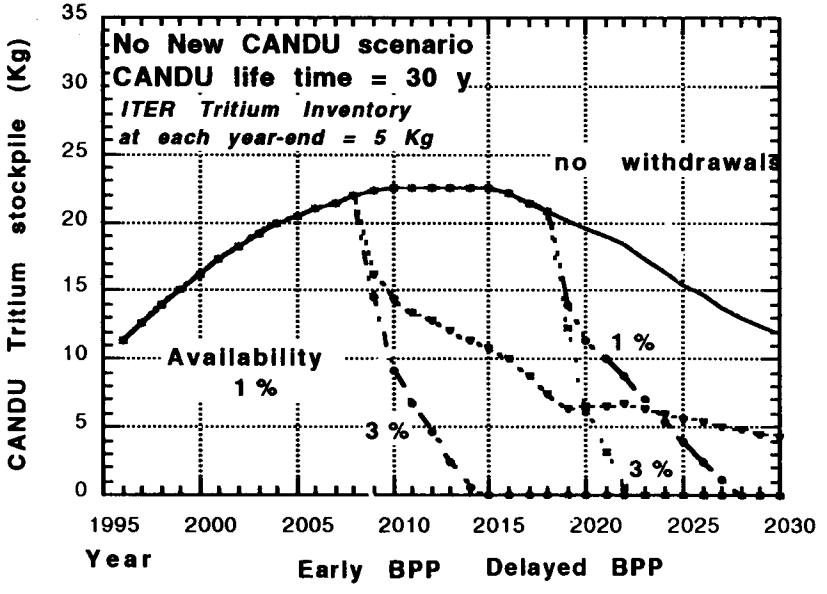
- Safety and Environmental Issues are dominated by the in-vessel components (blanket/first wall, divertor)
  - The CHALLENGE now is:

    To show that the in-vessel components can be developed to operate at high temperature and to breed sufficient tritium while minimizing decay heat, activation, tritium inventory, and failure rate
  - Suggested Milestone:

    Show that the DT fuel cycle can be closed in a system in which the in-vessel components operate without a failure for one month

Tritium Supply is Essential for D-T Fusion Research

Tritium in CANDU stockpile for two different ITER BPP start-up years



Tritium Available in ITER for the Next Operation Mode/Reactor as a Function of Tritium Breeding Ratio