Summary of Findings of Lehman Committee to Assess ITER Costing

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The Boeing Company

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ARIES Meeting at UCSD

Background

- The DOE-sponsored 2002 Fusion Summer Study was held in Snowmass Colorado, July 8-19, 2002
  - One of the key purposes was to have critical discussion and review of the candidate burning plasma options: ITER, FIRE and IGNITOR
    - The cost of ITER was based on very detailed engineering data and is used to establish a "relative value" to facilitate international negotiations on task sharing
    - There was no explicit contingency in the ITER estimates
    - The total ITER value, expressed in US 2002$, would be ~ $5B
- On 31 Oct 02, Dr. Raymond Orbach, Dir of Office of Science, asked Dr. Daniel Lehman, Dir of Constr Mgmt Support Division, to assemble a Committee to critically assess the cost of ITER

ITER Cost Assessment Committee Members

Department of Energy

Daniel Lehman, DOE/SC, Chair

Stephen Meador, DOE/SC

Consultants

Michael Harrison, BNL

Brad Nelson, ORNL

Lester Price, DOE/ORO

Michael Williams, PPPL

James Yeck, DOE/CH

Advisors

Joel Schultz, MIT

Lester Waganer, Boeing

Observers

Warren Marton, DOE/SC

Michael Holland, OSTP [part-time]

SC is Office of Science
ORO is Oak Ridge Operations
CH is Chicago Operations
OSTP is Office of Science and Technology Policy, Executive Office of the President

Meeting Agenda

Thursday, 11/21/02	**Met with ITER Technical Representatives**
Friday, 11/22/02	**Met with Dr. Aymar to Discuss ITER Cost Basis**
Saturday, 11/23/02	**Continued Cost Discussions w/ Dr. Aymar and Tech Staff**
Sunday, 11/24/02	**Wrote Draft Report and Clarified Costing Details**
Monday, 11/25/02	**Refined Draft, Reviewed w/ Dr. Aymar, Finalized Report**

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Conclusions

- **The Committee concluded that the ITER Team has prepared a complete cost estimate that is based on sound management and engineering principles, and is credible as a basis for establishing relative contributions by the Parties to the construction of ITER. The estimate is a synthesis by the ITER Team of multiple international industrial cost estimates for each of 85 procurement packages covering essentially the entire project; it includes a normalization of material and labor cost rates in various countries, and it emphasizes the value of individual components relative to each other. It is not comparable to a traditional DOE construction project cost estimate. The credibility of such a value estimate is supported by the design and R&D results that are unusually mature for a science project facing the decision to fund construction.**

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Conclusions, Continued

- **Because multiple Parties would construct the ITER project, with each responsible for procurements of in-kind hardware in its own territory with its own currency, a direct conversion of the ITER value estimate into a single currency is not particularly relevant; nevertheless, it is possible. Converting to U.S. dollars, the total would be about**

  $5 Billion (constant 2002 dollars) for the base estimate.

  - **$4 Billion for ITER hardware, initial spares, buildings, and installation and assembly of the hardware into the buildings**
  - **$1Billion for project management and engineering support during construction, R&D during construction, and commissioning.**
- **The U.S. considers commissioning to be part of the project period while the current ITER Parties consider it to be part of the operation period.**

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Conclusions, Continued

- Several of the current Parties have gone beyond the direct conversion process and prepared their own full cost estimate. European Union personnel presented the conclusions of their cost estimate to the Committee. Their analysis indicated close agreement with the ITER value estimate to within a few percent, although individual component costs varied by somewhat larger percentages.

- The current ITER Parties agree that the ITER value estimate is appropriate for establishing relative contributions by the Parties to the construction of ITER.
  - They are now negotiating an arrangement for sharing project scope on that basis, with the understanding that each Party would be financially responsible for their in-kind hardware contributions.

Conclusions, Continued

- The Committee concluded that in the event the U.S. decides to join the current negotiations, it should prepare, as soon as possible, its own cost estimate for a set of procurement packages for components the U.S. would be interested in providing.
  - Such a cost estimate should conform to current DOE project management procedures, including appropriate contingency and escalation cost.
- In addition, similar cost estimates should be prepared for the other types of potential U.S. contributions to ITER for common expenses (including contingency and escalation), such as :
  - Personnel assigned to the Central Team and Field Team
  - Common procurements (e.g., VV, Cryostat, Rad. Waste, Buildings)

Summary

The Committee concluded that the ITER Team has prepared a complete cost estimate that is based on sound management and engineering principles, and is credible as a basis for establishing relative contributions by the Parties to the construction of ITER. The proposed schedule developed by the ITER Team is reasonable. The management arrangements now being negotiated are critical to the project's success.