Remarks on Fusion Nuclear Technology and Materials

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Panel on Direction of the Future of Fusion Technology
Oakbrook, Illinois  October 8, 1990
Status of Fusion Nuclear Technology and Materials

It Could Be Better

- Serious Detailed Technical Planning
  - Understand the Issues
  - Have a Plan to Resolve the Issues

What is missing? Implementation

- Sharp decline in funding over the past several years in world major programs prevented the establishment of comprehensive serious programs.

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<table>
<thead>
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<tbody>
<tr>
<td>US</td>
<td>Sharp decline</td>
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<tr>
<td>USSR</td>
<td>Weak, weaker</td>
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<tr>
<td>Japan</td>
<td>New initiatives on hold</td>
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<td>Europe</td>
<td>Impressive enhancement</td>
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Recent Progress

Despite the sharp decline in funding, significant recent progress has been made.

(Thanks to previous investments, effective management of resources and broad technical capabilities from outside fusion.)

- Tritium Release from Solid Breeders
  - Tritium Inventory Likely to be Low

- Advances in Modelling MHD Effects in LM

- Conceptual and Experimental Advancement of Schemes to Reduce MHD Effects in LM

- Experiments Reduced Uncertainties in Predicting TRITIUM BREEDING

- New Experimental Techniques for Measuring Radioactivity, Decay Heat and Nuclear Heat

- Use of DT Point Neutron Source as a Line Source

- Proposed Designs and Materials for Low Activation
Future Directions?

Emphasize Areas Crucial to:

- Tritium Self Sufficiency
- Improved:
  
  Performance/Economics
  Safety and Environmental Impact

FNT and Material R&D
Must be Substantially Enhanced
Specifics for FNT and Materials R&D

- Driver Blanket on ITER with Credible R&D Now

- Serious Test Program on ITER with a Serious R&D Now
  - International Collaboration

- Near Term R&D (Examples Only)
  - In-Pile Experiments on Solid Breeders
  - Out-of-Pile Experiments for Thermal Control and Thermomechanical Testing
  - Measure Nuclear Heating, Radioactivity
  - Etc.

- Plan 14 MeV Neutron Source for Structural Materials