

PREFACE

SPECIAL ISSUES ON THE BLANKET COMPARISON AND SELECTION STUDY

DALE L. SMITH

*Argonne National Laboratory, 9700 South Cass Avenue
Argonne, Illinois 60439*

The blanket system is one of the most important components of a fusion reactor because it has a major impact on both the economics and safety of fusion energy. The primary functions of a blanket for a deuterium-tritium-fueled fusion reactor are to convert the fusion energy into sensible heat and to breed tritium for the fuel cycle. Numerous studies conducted worldwide over the last 15 years have proposed a large number of blanket concepts. Many of these concepts vary in material choices and major design features, and they pose widely different types of critical issues. Ideally, research and development (R&D) programs should seek to develop a broad data base sufficient to resolve the critical issues for all promising design options. This would permit selection of the most attractive concept for fusion applications. Because of limited R&D resources, one must select a limited number of concepts that appear to offer the greatest potential for fusion and focus the R&D effort on these concepts.

The Blanket Comparison and Selection Study (BCSS) was a two-year, multilaboratory project initiated by the U.S. Department of Energy, Office of Fusion Energy with the primary objectives of (a) defining a limited number of blanket concepts that should provide the focus for the U.S. blanket R&D program and (b) identifying and prioritizing the critical issues for the leading blanket concepts. To accomplish these objectives, the BCSS focused on the following areas:

1. development of reference design guidelines, evaluation criteria, and a methodology for evaluating and ranking candidate blanket concepts
2. compilation of the required data base and development of a uniform systems analysis used as a basis for comparison of the concepts
3. development of conceptual designs for comparative evaluation
4. evaluation of leading concepts for engineering feasibility, economic performance, and operational safety
5. identification and prioritization of R&D requirements for the leading blanket concepts.

The results of this study have been compiled in a three-volume topical report by D. L. Smith et al., titled "Blanket Comparison and Selection Study—Final Report," published by Argonne National Laboratory in September 1984 (ANL/FPP-84-1). Key parts of this extensive report have been condensed and incorporated into these special issues of *Fusion Technology*. The reports contained in these special issues include an overview and evaluation of concepts, design concept descriptions, and data base assessment and analyses.