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OVERVIEW

1.0 INTRODUCTION

1.1 BACKGROUND

The Inertial Fusion Energy (IFE) Reactor Design Studies were sponsored by the Department of Energy's Office of Fusion Energy. The results of the study conducted by the W. J. Schafer Associates (WJSA) team, which consisted of Bechtel, General Atomics (GA), Textron Defense Systems, and the University of Wisconsin, are reported here.

The primary objective of the IFE Reactor Design Studies was to provide the Department of Energy with an evaluation of the potential of inertial fusion for electric power production.[1] Conceptual designs were completed for two IFE electric power plants, one using an induction linac heavy ion beam (HIB) driver and the other using a Krypton Fluoride (KrF) laser driver. The two designs are the HIB-driven Osiris reactor and the KrF laser-driven SOMBRERO reactor. (SOMBRERO is an acronym for **SO**lid **M**oving **BRE**eder **R**eactor.)

These studies included the conceptual design and analysis of all aspects of the IFE power plants: the chambers, heat transport and power conversion systems, other balance of plant facilities, target systems (including the target production, injection, and tracking systems), and the two drivers. After the two point designs were developed, they were assessed in terms of their 1) environmental and safety aspects; 2) reliability, availability, and maintainability; 3) technical issues and technology development requirements; and 4) economics. Finally, we compared the design features and the results of the assessments for the two designs.

1.2 ORGANIZATION OF THE OVERVIEW

The main sections of the Overview correspond to the chapters of Volume 2 - Designs, Assessments, and Comparisons. Therefore, to get more detailed information on the topics described in the Overview, the reader is referred to the corresponding chapters in Volume 2.

Description of the Designs. Sections 2 to 4 contain brief descriptions of the designs. Section 2 is devoted to the Osiris HIB-driven power plant, Section 3 provides a description of the SOMBRERO laser-driven power plant, and Section 4 deals with the target systems for both plants.

Assessment of the Designs. Sections 5 to 8 are assessments of the designs. Section 5 covers the environmental and safety assessments for SOMBRERO and Osiris, Section 6 contains the reliability, availability, and maintainability (RAM) assessments, Section 7 summarizes the

technology development needs and priorities, and Section 8 summarizes the results of our economic assessment of the two designs.

Comparison of the Designs. Section 9 gives some of the key comparisons between the two designs.

Conclusions and Recommendations. Section 10 reproduces Chapter 10 from Volume 2 in its entirety.