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ICF SPECIAL STUDIES REPORT

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Submitted to the
Laser Fusion Program

September 16, 1987

The logo of the Lawrence Livermore National Laboratory, featuring a stylized 'U' and 'L' symbol to the left of the text 'Lawrence Livermore National Laboratory' which is arranged in a curved, stacked format.

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ICF Special Studies Final Report

P.O. # 1168403

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September 16, 1987

MASTER

ICF Special Studies Final Report
W. J. Schafer Associates Contract
P.O. No. 1168403

This report summarizes the tasks completed by W. J. Schafer Associates (WJSA) for Lawrence Livermore National Laboratory (LLNL) under Contract No. 1168403.

Four articles were written and submitted to LLNL for inclusion in the 1986 Laser Program Annual Report.

1. SAFIRE - A Systems Analysis Code for ICF Reactor Economics
2. ICF for Space Power
3. Parametric Studies for ICF Electric Power Plants
4. Economic Studies for Heavy-Ion Fusion Power Plants

Two major reports, documenting the SAFIRE Code, were prepared with the assistance of LLNL technical editors. These reports were published as UCRLs.

1. T. J. McCarville, W. R. Meier, C. F. Carson and B. B. Glasgow, "SAFIRE - A Systems Analysis Code for ICF Reactor Economics," UCRL-15872, Vol. 1 (January 12, 1987).
2. B. B. Glasgow and W. R. Meier, "SAFIRE User's Manual," UCRL-15872, Vol. 2 (January 12, 1987).

In preparing these reports, several errors, omissions and inconsistencies were uncovered in the SAFIRE code. A significant amount of time was spent correcting these problems. Once the code was in acceptable form, it was made available to other users via the MFECC net. Mike Tobin of LLNL was instructed on using the SAFIRE code.

A cost and performance model for an induction linac heavy-ion-beam driver was developed by McDonnell Douglas as part of the Heavy Ion Fusion System Assessment Study. WJSA incorporated the new HIB driver model in the SAFIRE Code as one of several driver options. A report documenting this modification to the SAFIRE code was submitted to LLNL and published as a UCRL.

W. R. Meier, "A New Heavy-Ion-Beam Driver Model for the SAFIRE Code," UCRL-15872, Vol.2, Supplement 1 (March 13, 1987).

The neutronics calculations used in GA Technologies' report on Cascade did not include the most recent modifications to the blanket design. WJSA modified the neutronics model for the Cascade chamber and completed some calculations for the final, reference blanket configuration. A report was written and submitted to John Pitts at LLNL. This report will be published as part of LLNL's final report on Cascade.

A briefing that summarized the ICF Program's economic studies, was prepared and presented to X and Y division scientists on February 5, 1987.

The economics chapter of the GA Technologies' report on Cascade was modified to make it consistent with the standard methods for economic analyses of ICF power plants. The chapter was rewritten to reflect these changes and submitted John Pitts at LLNL. This report will also be published as part of LLNL's final report on Cascade.

At LLNL's request, a presentation was prepared and given at the Fusion Power Associates Symposium, which was held August 27 & 28 at Princeton. The talk was a review of reactor design concepts for ICF and included some results from the economic studies.

Throughout the term of the contract, Wayne Meier of WJSA consulted with Mike Tobin on neutron activation analyses of the Laboratory Microfusion Capability (previously known as the High Gain Test Facility). WJSA also responded to program requests for help on various problems related to the economics of ICF.

In summary, all the tasks specified in the statement of work have been completed, and all the required documentation has been delivered to LLNL.