**Advanced Turbine System
Conceptual Design and Product Development**

**Quarterly Technical Progress Report (Draft)
for
May 1, 1998 through to July 31, 1998**

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Date: August 26, 1998

Contract No.: DE-AC21-95MC30245

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I. Introduction

II. WBS 1 - Project Plan

The Project Plan for the subject program was submitted (mailed) to the Department of Energy (DOE) on May 18, 1995. This task is complete.

III. WBS 2 - NEPA Report

The information required for the NEPA Report was submitted (mailed) to the DOE on June 22, 1995. This task is complete.

IV. WBS 3 - GFATS Selection

The technical work on this task has been completed and presented to the DOE. Final report is in preparation for this task and was also be presented to the DOE.

V. WBS 4 - Conversion to Coal

Surveys of potential Task 4 CFATS cycles were completed by ABB Power Plant Laboratories (PPL). A brief overview of the results of this work to date were also presented at the September 27, 1995, briefing with the DOE. No further efforts will be expended on this task as indicated in the 5th quarterly report.

VI. WBS 5 through WBS 8 Replanned Tasks

The following tasks are included in the revised contract:

- Turbine Aerodynamics& Aero-Thermal Integration
- Advanced Steam Cooled Vanes
- Advanced Air Cooled Blading
- Thermal Barrier Coating and Steam Oxidation

The following tasks were referenced in the contract and the completion status was part of the monthly reports since July 1996. The references correlate with the contract and the task numbers with the monthly reports.

Ref. 3.4.1 - Turbine Aerodynamics and Aero-Thermal Integration (Task 8.5)

- The Hardware manufacturing of the cooled blading is the critical path under this task. It poses by far more difficulties than anticipated, impacting the schedule in an 8 weeks delay. Achievements in the reporting period:
 - * The coolant manifold holes have been completed (internal cooling feed system)
 - * The laser drilling of the film holes has begun. The progress however is rather slow.
 - * The facility modifications have progressed as planned.
- Instrumentation manufacturing and calibration:

- * a test rig for through flow calibration of the blades and vanes has been commissioned
- Data reduction of the uncooled tests have been commenced on a time permit bases

Ref. 3.4.2 - Advanced Steam-Cooled Vanes**(Task 8.6)**

- The heat transfer measurements with steam and air were completed by end of May.
- The final report has been written

Ref. 3.4.3 Advanced Air Cooled Blading**(Task 8.3)**

- This task has been completed In December 1997.

Ref. 3.4.4 Thermal Barrier Coating and Steam Oxidation

- **Evaluation of TBC-Coating Systems in High Temperature Gradients**
 - * Cyclic testing of advanced metallic coatings in the burner rig has been completed after approximately 1500 hours of testing. Various coating systems have been evaluated including BAJ electroplated, HVOF and other advanced coating systems.
 - * Metallographic evaluations (SEM) has been completed.
 - * Preliminary report is in preparation
- **Monitoring of Degradation of TBC Coating Systems**
 - * This task has been completed in January 1998. Final report has been issued.
- **Thermomechanical Fatigue (TMF) of TBC Systems.**
 - * Testing of TMF of coated samples, including internally cooled samples has been completed
 - * A final report is in preparation.
- **Kinetics of Oxidation in Steam.**
 - * This task has been completed in January 1998. The final report has been issued.

VII. WBS 9 - Program Management/Reports

Work accomplished under this task during the subject period includes the following:

- ABB Monthly Status Reports including Summary Report, Milestone/Schedule Status, Labor Management Report, and Cost Management Report for the following months:
 1. April 1998 delivered (mailed to the DOE May 13, 1998
 2. May 1998 delivered (mailed) to the DOE June 19, 1998
 3. June 1998 delivered (mailed) to the DOE July 17, 1998
- ABB's thirteenth Quarterly Technical Progress Report (Draft) was submitted (mailed) to the DOE on May 11th, 1998. Awaiting approval by DOE.
- A status of ABB' Advanced Utility size Gas Turbines has been presented on the ASME TurboExpo 98 in Stockholm, Sweden.
- Contract modification M006 has been finalized July 27, 1998

VIII. General Discussion

Technical highlights for the reporting period are:

- The material test program for TMF testing and cyclic oxidation has been completed.
- The manufacturing of the cooled hardware for testing in the turbine test rig poses a further challenge to the program. The measurements are now scheduled to take place in fall.

IX. Program Redirection

Key Dates:

ABB Proposal mailed to DOE:	January 26, 1996
DOE Concurrence received:	April 29, 1996
Contract extension granted:	May 29, 1997

The revised program has been implemented in all ABB's development plans and the monthly reports since May 1996 report on the progress and actual status.