

DOE/PC/95231-31
DIST. CATEGORY UC-112
UTSI-01-1

TECHNICAL PROGRESS REPORT
FOR
UTSI/CFFF MHD PROGRAM COMPLETION
AND RELATED ACTIVITY

For The Period
April 1, 2001 – June 30, 2001

Work Performed Under Contract No. DE-AC22-95PC95231

Prepared for:
The United States Department of Energy

Prepared by
The University of Tennessee
Space Institute
Energy Conversion Research and Development Programs

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY	iv
TASK 1 – FACILITY MAINTENANCE AND PROPERTY MANAGEMENT	1
TASK 2 – REPORTING AND ARCHIVING	1
TASK 3 – SITE ENVIRONMENTAL COMPLIANCE AND REMEDIATION	2
TASK 4 – SITE REACTIVATION	2
TASK 5 – DISASSEMBLY AND DISMANTLEMENT (D&D) OF THE CFFF	2
TASK 6 – ADVANCED TECHNOLOGY, RESEARCH, DEVELOPMENT AND ENGINEERING FOR OTHER FEDERAL OR DOE PROGRAMS	2
<u>Subtask 6.02 – Evaluation of Methods for Application of Epitaxial Buffer and Superconductor Layers</u>	2
<u>Subtask 6.03 – Coated Conductor Development and Program Management</u>	2
<u>Subtask 6.04 – Optimum Coated Conductor</u>	2
<u>Subtask 6.05 – Cost/Performance Analyses of Potential Manufacturing Processes</u>	2
<u>Subtask 6.06 – Development of Real Time Process Control Using In-Situ Diagnostics</u>	3
OPEN ITEMS	3
SUMMARY STATUS ASSESSMENT AND FORECAST	3
ANALYSIS OF VARIANCE	4
APRIL 1, 2001 – JUNE 30, 2001 QUARTERLY VARIANCE REPORT	4

EXECUTIVE SUMMARY

Maintenance work on the DOE CFFF facility and other related government property is no longer authorized under this contract in accordance with the DOE-UT Settlement Agreement.. Environmental remediation preservation of the facility continued. Government property has been transferred to UTSI as owner which frees up many items for proper disposal. Actions are underway to dispose of other wastes, and control pests and water at the DOE CFFF.

A final technical report draft was prepared and submitted to DOE for review and comments. This report covered everything that was carried out by UTSI under the DOE Contract No. DE-AC22-95PC95231.

TASK 1 – FACILITY MAINTENANCE AND PROPERTY MANAGEMENT

In September 1998, a stop-work order was issued for work activity in the DOE Facility maintenance area. Work to administer government-owned property continued.

On September 22, 1999, Department of Energy and the University of Tennessee signed a SETTLEMENT AGREEMENT resolving all claims and property accountable under Tasks 1-5.

TASK 2 - REPORTING AND ARCHIVING

April, May and June 2001 Monthly Reports were submitted.

The Quarterly Key Staffing Report for the period January-March 2001, was submitted on April 30, 2001.

Quarterly Technical Progress Report for the period January – March 2001, was submitted on May 1, 2001.

During this quarter, a final technical report was prepared and submitted to DOE for review and comments. In this final technical report, summary of work completed at UTSI under DOE Contract No. DE-AC22-95PC95231 is provided. This work began on the contract effective date, September 15, 1995, and is still continuing on a very small basis to complete the groundwater remediation as of this date.

The work scope required UTSI to continue to maintain the DOE Coal Fired Flow Facility and keep it in readiness for anticipated testing. This effort was terminated in September 1998 by DOE stop-work letter. However, work continued on reporting, environmental restoration and on the High Temperature Superconductivity work that was already underway.

The work included preparing reports on the MHD POC tests that had been completed just prior to this contract initiation under an earlier contract with DOE Chicago.

Final technical report summarizes the environmental restoration work performed under the contract, including groundwater monitoring and remediation, removal of wastes from the facility, removal of asbestos from the cooling tower and actions in compliance with the license to discharge water into Woods Reservoir.

This report also covers the work in support of the DOE High Temperature Superconductivity program including:

- Assistance to DOE in preparing a development plan
- Cooperation with industry, national laboratories and other universities to promote the commercialization of thin film superconductors (coated conductors).
- Process Evaluations
- Process Diagnostic Development
- Process Economics

The assistance to DOE task also included convening an advisory board composed of all the major participants in the DOE program and preparing a draft development plan and Research and Development Roadmap leading to commercialization of the coated conductor technology. Under this program, cooperative agreements and cooperative work was undertaken with Oak Ridge National Laboratory, Midwest Superconductivity, Inc. EURUS Technologies, Inc., Westinghouse Electric Company, and others.

In the process evaluation task, four studies were completed by faculty, staff and students. Summaries of these studies are included in this final report. In process diagnostic development, three studies were completed, all emphasizing diagnostics that are applicable to real time control of manufacturing processes. In Process Economics, one study was completed that estimated the manufacturing cost of superconducting wire produced by the E-beam and MOCVD processes that were thought to be the most promising. An economic comparison to these two processes with the sol-gel based process was then made in the work carried out by Atul Sheth and Kevin Trembath.

TASK 3 - SITE ENVIRONMENTAL COMPLIANCE AND REMEDIATION

UTSI shall continue implementation and compliance with the State of Tennessee approved plan for groundwater remediation. UTSI shall remove from the site, and properly dispose of, all industrial type non-hazardous wastes. In addition, UTSI shall properly remove all asbestos-containing cooling water tower materials and dispose of these materials properly. In addition, UTSI shall continue the monitoring and treatment of holding pond effluent per the site Water Discharge Permit with the State of Tennessee.

- The Discharge Monitoring Reports (DMR's) for March, April and May, 2001, were prepared and submitted to the Tennessee Department of Environment and Conservation (TDEC). An agreement has been reached with the TDEC allowing UTSI to report "NO DISCHARGE" as long as there is no active testing at the CFFF. This agreement allows UTSI to discontinue monthly water sampling and testing.
- The Tennessee Department of Environment and Conservation (TDEC) approved the groundwater remediation plan and DOE provided funding to support this effort. UTSI prepared an RFQ for the drilling and sampling effort approved by TDEC. This document was released for bidding through the UT Knoxville Purchasing Office.

TASK 4 - SITE REACTIVATION

No work was scheduled or performed

TASK 5 - DISASSEMBLY AND DISMANTLEMENT (D&D) OF THE CFFF

No work was scheduled or performed

TASK 6 – ADVANCED TECHNOLOGY, RESEARCH, DEVELOPMENT AND ENGINEERING FOR OTHER FEDERAL OR DOE PROGRAMS

Subtask 6.02 Evaluation of Methods for Application of Epitaxial Buffer and Superconductor Layers

No Activity.

Subtask 6.03 Coated Conductor Development and Program Management

Discontinued effective September 30, 1999.

Subtask 6.04 Optimum Coated Conductor

No Activity.

Subtask 6.05 Cost Performance Analysis of Potential Manufacturing Processes

Discontinued effective August 31, 1999.

Subtask 6.06 Development of Real Time process Control using In-Situ Diagnostics

Discontinued effective September 30, 1999.

OPEN ITEMS

January 2000 Monthly Technical Progress Report
February 2000 Monthly Technical Progress Report
March 2000 Monthly Technical Progress Report
April 2000 Monthly Technical Progress Report
May 2000 Monthly Technical Progress Report
June 2000 Monthly Technical Progress Report
July 2000 Monthly Technical Progress Report
August 2000 Monthly Technical Progress Report
September 2000 Monthly Technical Progress Report
October 2000 Monthly Technical Progress Report
November 2000 Monthly Technical Progress Report
December 2000 Monthly Technical Progress Report
January 2001 Monthly Technical Progress Report
February 2001 Monthly Technical Progress Report
March 2001 Monthly Technical Progress Report
April 2001 Monthly Technical Progress Report
May 2001 Monthly Technical Progress Report
June 2001 Monthly Technical Progress Report
October –December 1999 Quarterly Technical Progress Report
January – March 2000 Quarterly Technical Progress Report
April – June 2000 Quarterly Technical Progress Report
July – September 2000 Quarterly Technical Progress Report
October – December 2000 Quarterly Technical Progress Report
January – March 2001 Quarterly Technical Progress Report
Kevin Trembath's Thesis Topical Report, "Statistically Designed Experimental Study of Sol-Gel Based Film Coating Scheme for High Temperature Superconductors and Buffer Materials and Related Manufacturing Process Cost Evaluation" submitted August 31, 2000.

SUMMARY STATUS ASSESSMENT AND FORECAST

Environmental restoration activities at the CFFF will continue and funding to cover these activities will be continued in accordance with the SETTLEMENT AGREEMENT.

Contract reporting requirements are being met on time. Future contract reporting requirements need to be reviewed and modified in accordance with the SETTLEMENT AGREEMENT.

APRIL 1, 2001, THROUGH JUNE 30, 2001, QUARTERLY VARIANCE REPORT

Planned vs. Actual Expenditures

(thousands of dollars)

TASK	PLANNED	ACTUALS	VARIANCE
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	3.3	-3.3
TOTALS	0.0	3.3	-3.3
COST ELEMENT			
DIRECT LABOR	0.0	2.0	-2
FRINGE BENEFITS	0.0	0.2	-0.2
EQUIPMENT	0.0	0.0	0
EXPENDABLE MATERIAL	0.0	0.0	0
OUTSIDE CONTRACTS	0.0	0.0	0
TRAVEL	0.0	0.0	0
TOTAL DIRECT COSTS	0	2.2	-2.2
INDIRECT COSTS	0.0	1.1	-1.1
TOTAL	0.0	3.3	-3.3

Planned vs. Authorized Funding

Cumulative

Task	PLANNED	AUTHORIZED FUNDING
1	1496.4	
2	614.3	
3	558.3	
4	0.0	
5	0.0	
SUBTOTAL	2669.0	2297.7
6	3689.7	3820
TOTAL	6358.7	6117.7