

**GA-C26592
(01/10)**

AMERICAN REINVESTMENT AND RECOVERY ACT (ARRA)

**QUARTERLY REPORT FOR THE PERIOD
OCTOBER 2009 THROUGH DECEMBER 2009**

**by
PROJECT STAFF**

**Prepared for
the U.S. Department of Energy under
Cooperative Agreement No. DE-FC02-04ER54698**

This is an informal progress report prepared for the contracting agency. The results and data may be preliminary or tentative and therefore are subject to revision or correction. This report may contain patentable material on which patent applications have not yet been filed and further distribution of this report should not be made without the prior approval of the contracting agency or the contractor.

**GENERAL ATOMICS PROJECT 30200
DATE PUBLISHED: JANUARY 2010**



\$12,335,000 of funding was obligated on September 28, 2009 for tasks to be accomplished through June 2011. These funds will be used for additional DIII-D operations, staff retention and facility upgrades to diagnostic and auxiliary heating systems. In the quarter, October to December 2009, Enhanced Operations expenditures totaled \$1,477,376 and supported 15.9 FTEs; Upgrade expenditures totaled \$565,261 and supported 7.1 FTEs. Cumulative expenditures through December 2009 are \$2,636,822 for Enhanced Operations and \$1,274,638 for Upgrades.

Enhanced Operations

Three weeks of additional DIII-D operations were completed as scheduled in October/November 2009 and focused on detailed experimental studies of the effect of non-axisymmetric error fields introduced by a set of coils installed on DIII-D to mimic the effects of Test Blanket Modules (TBMs) planned for ITER.

Upgrades

ECH Socket and Transmission Line

Design of the ECH socket and transmission line began in August 2009. An agreement was reached on the layout of the socket in an expansion of the area where the operational gyrotrons are located. A final design review was held on the socket and on the transmission line from the socket to just outside the machine hall. An option was raised during the final design review to use a different type of waveguide than is currently used that has potentially lower power losses. The design for the transmission line has not been finalized, nor the procurements begun, pending resolution of a cost analysis of this option. Also, the design for the transmission line within the machine hall is still being finalized as modifications to equipment within the hall are being determined to support the line and to obtain clear access to the assigned port for the launcher. The decision on the type of waveguide, system design completion and initiation of procurements will take place in January 2010. The final pit layout will be completed in March 2010.

High Voltage Power Supply

Design of the high voltage power supply was begun in September 2009. A preliminary design review was held and the final design is underway. Authorization was given at the preliminary design review to begin procurement of some additional components.

A purchase order for the two long-lead-time high power tetrodes was issued and the purchase requisition for the line reactor was prepared and approved.

Gyrotron

The quotation was received for the gyrotron from the potential vendor, CPI. It was reviewed and final discussions are underway with CPI. The purchase requisition was prepared and is being approved.

ECH Launcher

The ECH launcher specification was completed and agreed to with PPPL. PPPL is responsible for fabrication of the launcher.

Edge Diagnostics

Edge diagnostic design and initial procurements were begun in September 2009.

The upgrade of the Lithium Beam diagnostic is nearly complete. New control modules have been ordered and control circuitry upgraded. The system is fully assembled and is being readied for power-up.

New DACQ equipment and related electronics (fiber optic receivers/transmitters) were procured for the fixed Langmuir probes (SNL).

The design for the new IR/visible imaging periscope (LLNL) is being developed and a Physics Validation Review has been presented. The new IR cameras have been procured.

The expansion of the Thomson scattering system was begun in August 2009 and new lab space made available for the planned addition of the Edge Thomson system. The mechanical layout of the viewing port has been fully modeled in Solid Works and the complete existing optical design has been migrated to Zemax.

Initial measurements were made in July 2009 for the design of a system for measuring flows in the edge and scrape-off layers, using coherence imaging techniques. Additional measurements were made in December, this time looking at the lower divertor.

Core Diagnostics

The Test Blanket module assembly was completed and installed into the DIII-D port and was made ready for electrical testing the first week of October. The completed system included two racetrack coils for producing toroidal field, a central solenoid for vertical field, water cooling, graphite protection tiles, thermocouples on all key systems, a vacuum enclosure, a movable insertion system, and an array of magnetic probes and instrumentation.

The power system, control, monitoring and interlock system for the Test Blanket Module (TBM) was installed and tested and was made ready for experiments in mid October. This work included: installation of two current monitors for the TBM cables, modifications to the PCS for current control in the solenoid and the coil, modifications to the OPS computer procedures to monitor and check the TBM temperatures and water flow, creation of graphical

displays for the TBM temperatures and water flow, modifications to the patch program for the SPAs, and changes to the operations startup checklist and the baking checklist, and the writing of a startup traveler for the initial TBM testing.

The TBM assessment package was used in November for many experiments on DIII-D, with the participation of more than 15 International participants and the DIII-D team. The experiments were successful and the TBM package was removed on November 23rd after the completion of the experiments.

Two Yag lasers for the Thomson scattering systems have been ordered and received in August 2009.

The visible camera intensifier was ordered in July 2009 and the delivery was scheduled in early 2010. Following a failure at the vendor, the unit's delivery has been delayed for an indeterminate amount of time.

The prototype Fast Ion Loss detector system has been installed and is taking data. The prototype will serve as the basis for the design of the array.

Scientific Staff

Scientific staff were funded and retained to support diagnostic and experimental analysis under this task.

Milestone Status (Scheduled/Completed)

Enhanced Operations

- Begin 3 weeks of additional DIII-D Research Operations for FY10 (Nov 09/Oct 09)
- Complete 3 weeks of additional DIII-D Research Operations for FY10 (Dec 09/Nov 09)

Upgrades

- Complete design of ECH Socket & Transmission Line (Nov 09/On Hold as of 12/8/09)
- Begin ECH Socket & Transmission Line procurement (Dec 09/On Hold as of 12/8/09)
- Begin Gyrotron procurement (Dec 09/Dec 09)
- Install Test Blanket Diagnostic Module (Nov 09/Oct 09)

Upcoming Events (January – March 2010)

- Begin fabrication of Electron Cyclotron Heating Socket & Transmission Line (Jan 10)
- Complete High Voltage Power Supply design (Feb 10)
- Complete first phase of gyrotron manufacturing (Mar 10)
- Complete design of ECH Socket & Transmission Line (Nov 09/Mar 10 revised)
- Begin ECH Socket & Transmission Line procurement (Dec 09/Jan 10 revised)



GENERAL ATOMICS

P.O. BOX 85608 SAN DIEGO, CA 92186-5608 (858) 455-3000