



MONTHLY REPORT

December 1-31, 2008

Performing Organization: Brookhaven Science Associates
Location: Brookhaven National Laboratory
Upton, New York 11973-5000

Contract Period of Performance: FY2005 – FY2010



Brookhaven National Laboratory
EBIS MONTHLY PROGRESS REPORT
December 2008

I. Contractor Project Manager's Assessment

Technical Progress and Accomplishments

The Linac fabrication, which is on the Project critical path, continues to make good progress. The beryllium copper electron collector was successfully leak tested, and delivery is scheduled for early March. A design review was conducted at the HEBT dipole power supply vendor's facility and there were no technical or performance issues. The last large non-standard power supply procurement is now in the bid preparation stage and we expect solicitations to take place in January.

Issues and Concerns

ACCEL continues to experience quality control problems in preparing the superconducting solenoid for what is hopefully the final factory test, which is now scheduled for early January.

II. Detailed Status by WBS

WBS 1.1 – Structural components

Superconducting Solenoid

ACCEL completed the magnet assembly, an effort that has been in process since the failed factory test in September. The system has been pressure tested and vacuum leak tested. L. Snydstrup and M. Okamura travelled to the ACCEL company in BergischGladbach, Germany for the factory test on 18 December 2008. The liquid nitrogen (LN2) cool-down proceeded well, but the technicians were not able to remove the LN2 and do the next stage of cool-down with liquid helium. The problem was presumed to be a nitrogen ice block, caused by the failure of the technician to turn off the heat shield cryocooler after the LN2 cool-down. The opportunity for conducting the tests before the holidays was lost and Brookhaven left on 23 December. The continuation of the test was planned for after New Year's Day.

The procurement process for the spare superconducting solenoid continues. A pre-award survey of the highest valued bidder, Cryomagnetics, was conducted on 4 December. The specifications were reviewed in detail. A clear understanding of the documentation required by the contract was imparted to Cryomagnetics, particularly with regard to pressure vessel code compliance. Brookhaven found their resources and facilities for engineering and manufacture of the magnet system to be suitable.

Electron Collector

The beryllium copper electron collector was shipped to Brookhaven by Brush Wellman for vacuum leak testing, and received on 27 December. All electron beam welding of the EC has been completed successfully, and the unit had been leak checked by Acceleron, the electron beam welding company. A machining error on the back end of the unit was not expected to affect performance. The delivery date is estimated to be early March.

Central Drift Tube

The drift tube and internal structure were baked. The slanted mirror tubes were found to be magnetic (to an unacceptable degree). They will be processed at high temperature to try to reduce the magnetic properties, but will need to be remanufactured from a better non-magnetic stock material, if heat treatment is not adequate.

Linac, RFQ and Bunchers

IH-Linac

The heat treatment of the premachined, upper and lower cavity has been completed. The final machining of the cavity can now be completed. Conference calls between BNL and U. Ratzinger of IAP to discuss progress and technical issues continue weekly.

RFQ

High power RF testing was successfully completed in the EBIS test area. Cavity voltage levels greater than the maximum expected operating levels were achieved without difficulty.

Buncher Cavities

Manufacture of rebuncher cavity (C-1) continues.

Test EBIS

RHIC EBIS Electron Collector Tests

Testing of the RHIC electron collector continued with emphasis on reducing currents on the internal collector electrodes. The high voltage, low current supplies were stabilized using 1 μ F HV capacitors to allow for high instantaneous current flows during the electron beam pulse. Negative biasing was found to be effective in reducing currents on the reflector and repeller electrodes from 500mA to under 50mA for a 6A electron beam. The electron collector performance is deemed adequate to continue with electron beam development and ion production for LEBT and RFQ testing in January.

Collector Platform Electronics

Work has been completed on the electronics necessary to test and operate the RHIC electron collector at the Test EBIS facility. Isolated toroids as well as capacitively coupled resistor circuits have been installed to provide loss current measurement on the collector platform electrodes. Software development is complete for an optically coupled, multi-channel USB ADC. This system will be installed during mid January to transfer loss signals from the collector HV platform to laboratory ground. Power supplies with isolated control to provide biasing to the internal collector electrodes are also ready for installation.

Ion Optics

The acceleration break was installed with special aluminum o-ring sealed spacer, to accommodate the Bergoz toroid which is due in January. The LEBT (switchyard) chamber was reattached to the EBIS and the LEBT solenoid was installed over a thin walled stainless steel vacuum tube and bellows. The pepperpot emittance measurement device was installed after LEBT solenoid, for measurements at approximately the position where the RFQ aperture will be when it is installed at Test EBIS during January. Spark gap protection was installed on the 16 HV power supplies for 16-pole wide aperture deflector and adapter lens.

Tests of LEBT focusing solenoid

Power supplies and cooling were installed and tests made on LEBT solenoid in preparation of Test EBIS ion beam transport. The 1900 A pulser is a 2 Hz prototype of RHIC EBIS 5Hz LEBT solenoid pulser.

LEBT Chamber

The RHIC EBIS LEBT chamber and some internal components (such as spherical deflector electrodes) were received from central shops. The LEBT stand was assembled, and items were moved to RHIC EBIS assembly area in the Bldg 930 high bay. The design of the switchyard chamber weldment is completed. The detail designs of the deflectors for the switchyard chamber location are in process. The design of the shutters is completed. The electrostatic quadrupole quadruplets (3 assemblies) are in the Central Shop for fabrication.

WBS 1.2 – Controls

Effort was spent on console software, including work on power supply function control. Work continued on the global interlock system. The interlock matrix documentation continues to be updated through discussions with technical system leaders and preliminary design reviews. The detailed approach taken is sensitive to the individual specifications of components used in each subsystem and commercially available interlock system hardware. An intermediate system has been defined that will be used for initial RHIC EBIS testing.

WBS 1.3 – Diagnostic Systems

The Bergoz in-flange transformer and electronics arrived at the end of December. They will be tested next month.

WBS 1.4 – Magnet Systems

There was no activity during this reporting period.

WBS 1.5 – Power Supply Systems

In December, a successful design review of the “Big Bend” power supply was held at the vendor's facility. Both technical and manufacturing issues were examined, and no problems were found. Also, the procurement package for the power supplies for fast-pulsed quads was completed, including all approvals, and was sent to the Procurement Division. This RFP includes the four MEBT quads, and the LINAC and HEBT triplets.

WBS 1.6 – RF Systems

All three amplifiers for the rebuncher/debuncher cavities passed high power factory tests, and after minor modification to several control functions, will be shipped to BNL.

WBS 1.7 – Vacuum Systems

The bake out blankets have been received, inspected and fit tested to the EBIS chambers. Two blankets had redundant heating circuits and the issue is being resolved with the vendor. The mechanical pump remote relay boxes from Austin Scientific have been received.

WBS 1.8 – Cooling Systems

Work on the RFQ and Linac rf amplifier cooling water piping has started and all back pressure control valves and relief valve have been received. Piping is to be installed on separate support structures. Target completion date is 2/13/09.

WBS 1.9 – Facility Modifications

No activity scheduled for this reporting period.

WBS 1.10 – Installation

Work continues on the assembly of the high voltage platforms and work on the collector power supply HV cage has started. The installation of the ac distribution for the rf power amplifiers has begun. The three “short run” cable ports into the Booster enclosure from the 200 MeV Linac lower equipment bay were completed.

WBS 1.11 – Project Services

Much of the month was spent preparing for the DOE annual review of the project in January, including updating the EBIS website.

A Project Change Request to incorporate administrative changes to the Microsoft Project Schedule was begun. This PCR will not require the use of any contingency.

We have begun changing the schedule status file by incorporating new dates from the group leaders. Once the administrative PCR detailed above is approved, the same changes will be made in the status file. The monthly telecon with the Office of Science took place on November 11th.

WBS 1.12 – Commissioning

No activity scheduled.

SAFETY

The draft Unreviewed Safety Issue (USI) document for the EBIS Preinjector remains at 90% complete.

PHYSICS

No activity this reporting period.

Financial Status

EBIS Project		Burdened k\$				
		December Actuals	FY09 to date	Project to date (PTD) costs*	Commit- ments	Budget at Comple- tion
WBS	Title					
1.1	Structural components	51	132	3074	537	3252
1.2	Controls	4	91	707	0	756
1.3	Diagnostics/instrumentation	45	72	382	81	696
1.4	Magnet Systems	9	9	483	0	863
1.5	Power Supply Systems	59	136	1610	240	2331
1.6	RF Systems	49	99	2177	173	2761
1.7	Vacuum systems	26	92	1522	25	1609
1.8	Cooling Systems	0	24	216	0	259
1.9	Facility Modifications	2	6	492	0	550
1.10	Installation	124	273	819	62	2018
1.11	Project Services	29	80	955	0	1044
1.12	Commissioning		0	0	0	178
1.13	R&D/CDR		-71	1327	71	1400
	Contingency					1583
	Total	398	943	13763	1189	19300

* costs through Dec 2008