



MONTHLY REPORT

October 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
October 2008

I. Contractor Project Manager's Assessment

Technical Progress and Accomplishments

Low level testing of the RFQ at BNL has started. Linac cavity manufacturing is making good progress. The order for the HEBT dipoles power supply has been placed and the promised delivery date meets schedule requirements. The production of the three rf amplifiers for the rebuncher /debuncher cavities is on schedule.

Issues and Concerns

The completion of the superconducting solenoid repair continues to be a major concern. We continue to maintain close contact with ACCEL, and retesting of the repaired solenoid is now scheduled for mid December.

II. Detailed Status by WBS

WBS 1.1 – Structural components

Superconducting Solenoid

The factory test at ACCEL was concluded on Thursday, October 2, 2008. All the planned tests were completed, including operation at nominal field of 5 Tesla, quench test at nominal field by crash button, operation up to 10% over nominal field of 5 Tesla, magnetic field measurements, helium evaporation rate measurement, and axial load testing with an iron plate at the end of the magnet at nominal field. The magnet system failed to meet specifications in two areas: helium evaporation rates were too high and the magnetic field axis was misaligned with the inner bore axis. After review of the test results at Brookhaven, ACCEL was advised that the magnet system could not be accepted until the out-of-specification conditions were corrected. ACCEL provided a schedule to modify the vacuum vessel by adding end flanges (for easier access) and to correct the misalignment. The schedule shows factory testing during the last week in December and shipping of the system on January 7, 2009.

Procurement of the spare superconducting solenoid continued. The technical evaluation committee met for the first time on October 25 to discuss the scoring of the bids from five companies. The committee concluded that the three highest scoring companies would be asked to submit their best and final offer and to submit pricing for additional options: a quench protection system and a vacuum vessel configuration with end flanges.

Electron Collector

The Zr-Cr-Cu electron collector manufactured by Brookhaven has been installed in the Test EBIS for evaluation. The beryllium copper electron collector is currently being remanufactured by Brush Wellman. The delivery date is estimated to be early March.

Central Drift Tubes

During assembly of the NEG pumping system beneath the drift tube structure, several insulators were broken. It was determined that the method was not adequate and a more standard solution will be implemented. In addition, it was determined that some additional rework is needed to avoid high voltage corona associated with sharp edges of the perforated drift tube inserts. The split (slanted) drift tube has been scheduled for manufacturing. All parts are expected to be ready for assembly during November.

Linac, RFQ and Bunchers

IH-Linac

Significant progress has been made in the machining of the Linac cavity and drift tubes. Copper plating of the cavity by GSI is planned for January 2009. The order of the internal quadrupole triplet lens by IAP, Frankfurt will be placed soon. Conference calls between BNL and U. Ratzinger of IAP to discuss progress and technical issues are conducted weekly.

RFQ

The RFQ was delivered to Brookhaven on 30 September-1 October. Low level rf testing has started at BNL.

Buncher Cavities

Manufacture of rebuncher cavity (C-1) at IAP, Frankfurt continues.

Test EBIS

Electron Collector and Ion Optics

The RHIC EBIS collector was installed at the TestEBIS. Electrical connections were made to the internal electrodes, i.e., the extractor, suppressor, reflector, and repeller. The ion lens and 16-pole deflector were installed immediately after the electron collector and the electrical connections were made. Testing of the deflector system with its associated software and high voltage testing of the ion lens and collector electrodes was made. A low level bakeout was performed in preparation for operation with electron beam during November.

Collector Platform Electronics

Work is continuing on the electronics necessary to test and operate the RHIC electron collector at the TestEBIS facility. Isolated toroids as well as capacitively coupled resistor circuits have been constructed to provide loss current measurement on the collector platform electrodes. The signals will be transferred from the EBIS platform to laboratory ground using an optically coupled, multi-channel USB analog to digital converter. Software development is nearly complete.

External Ion Injection

Layout of the ion switchyard chamber, the ion deflectors, and the electromechanical shutter mounting is in progress.

WBS 1.2 – Controls

Progress on EBIS control software included the inclusion of standard "buffer" tools for retrieval of archived settings for loading or comparison to live values. A variety of plot options were implemented for data in the "drift tube" and "trigger" pages.

The work on the EBIS Interlock signal matrix document continued with the new data format established in September.

WBS 1.3 – Diagnostic Systems

The circuit boards for the EBIS current transformer amplifier were ordered and received, and assembly of the boards has begun. It is expected that testing of the boards will begin either in late November or early December. The Eurocard chassis for all of the diagnostics boards were also delivered this month.

WBS 1.4 – Magnet Systems

Work continues on the MEBT quadrupole magnets. The internal linac quadrupole has been studied to evaluate coordinating the construction of the MEBT quads so that they have similar power supply requirements.

WBS 1.5 – Power Supply Systems

The contract to build the power supply for the HEBT dipole magnets has been awarded. Detailed characterization of the fast pulsed quadrupoles (four in MEBT and three each in LINAC and HEBT) is nearly complete. The LEBT solenoid pulser will be constructed at BNL. Two reviews were held, and a prototype was tested. The major components (i.e. capacitor bank, charging power supply, and PLC) were ordered and will be delivered in January. The 100 kV EBIS platform pulser, which is nearly identical to that now used on the Test EBIS, is also being built at BNL and construction of the pulse driver has been completed.

The remainder of the Power Supply Interface units (PSIs) were delivered to BNL, and are being configured to match the individual power supplies. These continue to be installed and cabled to the power supplies. The AC power cable and DC output cable layouts were completed.

WBS 1.6 – RF Systems

Manufacture of the power amplifiers for the rebuncher and two debunchers is underway and delivery is expected in December.

WBS 1.7 – Vacuum Systems

The controllers for vacuum gauges located in the Booster Ring were installed and connected. Rack adapters for turbo controllers were purchased and received. DIN rail panels for EBIS PLC interface wiring were made. The RFQ cryopumps are now operating with the automatic controllers. A partial shipment of heating jackets for the EBIS was received. An order for rough pump remote control relays was initiated.

Drawings are being reviewed to uniquely identify vacuum devices. Detailed layout of the external injection lines continues and beam line assembly drawings were updated to show vacuum pumps and gate valves on the RFQ. The HEBT line was checked for steering magnet clearances.

WBS 1.8 – Cooling Systems

All system controls transmitters have been installed in the new piping. The next step is mounting the new PLC cabinet, and wiring to the various inline transmitters. This work requires removal of old electrical equipment and the power tie-in for the new pumps. This must wait for a power shutdown planned for early December when the Booster has a scheduled shutdown.

WBS 1.9 – Facility Modifications

No activity scheduled for this reporting period.

WBS 1.10 – Installation

Collector supply platform insulator tests

The insulator selected to isolate the OCEM electron collector power supply from the EBIS platform by 20 kV has been tested and determined to be satisfactory. At 30 kV and > 5 min no arcing or corona was observed; at 40 kV and >10 sec no arcing or corona was observed.

Ongoing mechanical installation work includes the mounting of isolation transformers that are external to the EBIS racks and preparation of the isolation deck of the collector power supply. The PSI's continue to be installed and connected to the power supplies. The AC power cable and DC output cable layouts were completed.

WBS 1.11 – Project Services

The remaining balance on the electron collector order with Brush Wellman had been accrued during FY08 as delivery of the unit was expected before fiscal year end. As the collector is still undelivered, the accrual was reversed, and the commitment reinstated (DOE R&D account).

The monthly telecon with the Office of Science took place on October 9th.

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\$				
		October Actuals	FY09 to date	Project to date (PTD) costs*	Commit- ments	Budget at Comple- tion
WBS	Title					
1.1	Structural components	23	23	2965	543	3501
1.2	Controls	67	67	684	1	776
1.3	Diagnostics/instrumentation	9	9	319	134	677
1.4	Magnet Systems	0	0	475	0	856
1.5	Power Supply Systems	40	40	1513	268	2429
1.6	RF Systems	30	30	2108	198	2970
1.7	Vacuum systems	20	20	1450	36	1502
1.8	Cooling Systems	0	0	192	24	251
1.9	Facility Modifications	2	2	489	0	541
1.10	Installation	72	72	617	18	1429
1.11	Project Services	23	23	897	0	1208
1.12	Commissioning		0	0	0	177
1.13	R&D/CDR	-71	-71	1327	71	1400
	Contingency					1583
	Total	215	215	13036	1293	19300
* costs through Oct 2008						