

PROJECT PROGRESS SUMMARY

April 2, 1991

CEBAF Flash Report #15 -

CEBAF Front End Test Under Way

Superconducting acceleration took place for the first time in the Continuous Electron Beam Accelerator Facility's injector tunnel at 4:30 p.m. on March 30, 1991. A 75-microampere electron beam was established in the 500-keV room-temperature section of the injector and accelerated in the two cavities of the injector's initial, 5-MeV quarter-cryomodule. CEBAF's Central Helium Liquifier provided cryogenic support for superconducting operation at 2 K.

The acceleration to 5 MeV marked the beginning of CEBAF's Front End Test (FET) of permanently installed accelerator subsystems identical to those being prepared for the full 4-GeV machine. Testing at 5 MeV will continue, with the FET ultimately proceeding to 25 MeV (1-1/4 cryomodules) and then to the accelerator's injection energy of 45 MeV (2-1/4 cryomodules). Congratulations and thanks to the CEBAF team for this achievement!

Semi-Annual Review

- Dates for the next Semi-Annual: 25-27 June 1991.

FET Operations

- Beam was run during three full shifts. The rest of the week was devoted to RF and software checkout, and to replacement, installation, and alignment of the cryomodule.
- The gradients and Q's of the cryounit were successfully measured on the first shift. Both cavities substantially exceeded spec by achieving 7 MeV/m.
- In the second run, the Q measurements were repeated, and the external Q was adjusted and verified. The cryounit was turned over to Ops for running beam.
- On 30 March 1991, the cavities were powered up to 5 MeV/m using the RF system in its nominal configuration. Seventy-five microamps of beam was established at low duty factor on the warm girder (500-keV section) on previously saved settings, and with a minor amount of fine tuning, at 4:30 p.m. the first beam was sent through the cavities. After proper phasing of the cavities the momentum was verified to be 5.0 MeV/c.
- Plans for this week include finishing hookup of the full cryomodule, cooling it down, and further running of 5-MeV beam.

WBS 1

- An additional twelve fundamental power coupler extension waveguides and twelve elbows have been welded at the seam. (The electron beam welder was down most of last week.) Delivered two more sets of niobium pair parts to the cavity assembly area.
- Three cavity pairs were tested last week. All had good Q's and field gradients; however, some cold leaks were seen and they must be checked before continuing.
- One cryounit was completed and another one delayed because the window-to-FPC-extension was resealed. Two cryounits are in the cryomodule assembly area.
- Installed cryomodule traveller #5 in the tunnel last week and aligned it Thursday. Cryomodule traveller #1 was removed and is getting the end cans taken off.
- Commissioned the quarter-cryomodule last Thursday. There is a microphonics problem that shows 55 Hz from a precautionary turbo-pump air cooling fan, which has been turned off. There is also 33 Hz on the helium and water piping; the source is most likely the Kinney pump, in which case sandbagging the pipes should improve the situation.
- Expecting the first delivery of end cans from Koch by the end of April.
- Twelve heated HOM loads are in various stages of production.

WBS 2

Magnets:

- One set of each of the coils for the remaining three types of arc dipoles, 2-meter (BB), 2-meter wide pole (BR), and 3-meter (BA) has been wound at United Magnet Technology, and the molds for BR coils were received.
- The design review for the revised spreader/recombiner and dog-leg dipoles was held.
- The proposals were received for the linac quadrupoles (QBs) and evaluation started.

Systems Integration:

- The method of accommodating the difference in the measured magnetic length and the physical length of the arc dipoles was chosen to be a radial movement inboard of up to 2 millimeters, easily handled by the stand adjustment mechanisms.

Operations:

- The quadrupole girders on either side of the first cryomodule position in the injector and the injector beam dump were removed and then repositioned to allow the exchange of the cryomodule at that position, and the devices were aligned for hookup.

WBS 3

RF Controls/Front End Test:

- Achieved stable regulated RF and accelerated beam to 5 MeV. Cavity Q's and gradients all meet expectations.

RF Power:

- Klystrons, coupler, and circulators continue to be shipped on schedule. Klystrons in hand now total 103. Next HOM filter due in May.

WBS 4

- In the north linac service building:

- Started installation of AC power to four HPAs.
- Finished all rack base grounding.
- Finished installation of waveguide supports.
- Started remaining floor grate cutting.
- Cable tray installation in the south linac tunnel is approximately 50% done.
- Investigated feasibility of hanging east and west arc cable trays independently of magnet stands to accelerate the tray installation schedule. Preliminary finding is that it is a reasonable alternative with only about \$5K additional cost.

WBS 5

Safety:

- Installed south linac service building conduits.

Diagnostics:

- Rewiring of FET harps completed.
- North linac BPM wire and cross-connect lists completed.
- First series of arc BPMs manufactured.

Software:

- Controls: Continued work on eight-seat software; ready for tests this week.
- PID loops: "Change of sensor" problem solved.
- Faster update of read/write boxes in TACL.
- "Software change control" database 90% complete.

WBS 6

- The large drift chamber prototype for the CLAS (a section of the Region III chambers) is now operational in the EEL. It has been tested with cosmic rays and has achieved a position resolution of less than 250 microns.
- The electromagnetic calorimeter prototype for the CLAS has been returned from Brookhaven National Laboratory, where it was tested with high-energy electron and pion beams. Cosmic ray tests will be performed in the EEL to optimize the timing properties of the calorimeter.

WBS 7

- Monday, 25 March: Re-started refrigerator.
- Tuesday, 26 March: Cryounit cooldown.
- Wednesday, 2 April: Cryomodule reconnection and cooldown.
- Monday 1 April: Installation of CHL completed for project Major Milestone #17.

WBS 8

- Nine third-lift sections on Hall A are now complete. This brings these wall sections up to the elevation of the dome tension ring.
- Continued forming and placing roof slab at truck access ramp A, now 85% complete.
- Beam-line and personnel access tunnels are complete to both Halls A and C.
- Walls for truck access tunnel C are now 65% complete.
- Began forming walls at Hall B.
- End station above ground contract was awarded to MCI Constructors of Woodbridge, VA on 1 April 1991.

Support Services

Machine Shop:

- Fabricating a welding test fixture for transfer line evaluation for WBS 7.
- An optical comparator is near operation for quality inspection of manufactured components.
- Raw material storage enclosure in process.

Stockroom:

- Weekly withdrawal activity: \$42,103.24.
- Monthly withdrawal activity: \$166,490.89.
- Twenty-eight Wyle Equipment racks delivered to users.
- Received new style safety glasses requested by Safety Office; four types available.
- One hundred six-pack cross-connects were ordered.

External Fabrication:

- Initiated fabrication of 2.5-watt amplifier cooling plate in CEBAF machine shop (WBS 3).
- Evaluated GE breaker lockout samples, and they look promising (WBS 4).
- Fabrication jobs for WBS 2 initiated in CEBAF machine shop: alignment wall bracket assembly and alignment arc dipole reference fixture.
- Initiated fabrication of BPM-type PM-20 welding fixture in CEBAF machine shop for WBS 5.
- Initiated a meeting between WBS 6 Hall C and Thomson Bearing Co. to evaluate the use of the "roundway" bearing to support the carriage. A prototype unit was selected.

Document Control:

- Evaluated the HPIB-to-Centronics converter device needed for the new direct imaging plotter. Conversion was successful.
- Microfilm card reader/printer PR has been let.

Announcements

- The next DOE Monthly Progress Meeting will be held Thursday, 4 April.
- The third BEAMS week begins 8 April.

Training Opportunities

- An April/May training bulletin has been distributed by Personnel.