

Accelerator Systems Division Highlights for the Week Ending August 10, 2001

ASD/LBNL: Front End Systems

The first Cherokee Porcelain (CP) ion-source antenna kept working well on the second test stand, with an accumulated time (6% duty factor) of more than 16 hrs. Four more antennae with an identical coating have been received at LBNL; they all show numerous fine cracks before ever being used in an ion source, but judging from the performance of the first CP antenna, these cracks are uncritical over an integrated running-time equivalent of two full shifts.

Remodeling work on the Blue Box continues at a steady pace; the main rack with ion-source ancillary systems has been installed on the new high-potential platform.

New bead pulls on RFQ Module #4 have shown a flat field profile but an elevated resonant frequency that is outside the high-power range of the klystron driver. We will trim the fixed tuners for this module to get it back to 402.5 MHz in preparation for power conditioning.

In view of the delivery-date uncertainty for the full-featured, Los Alamos built, LLRF system that will serve the RFQ klystron, we decided to build a fifth system of the simplified LBNL version that is being developed to drive the MEBT rebuncher rf systems.

All rf windows for the RFQ power couplers have by now been received. We are experiencing a temperature-rise problem with the first two new windows, however, and are discussing this issue with the vendor.

ASD/LANL: Warm Linac

The CCL Hot Model testing continues to progress extremely well. Los Alamos has now completely conditioned the two segments, achieving about 650 kW of peak input power. This level is about 50% more power than needed for the design E0 of 3.77 MV/m in segments 9 through 48, and more than double the power level needed for the segment-1 design E0 of 3.06 MV/m. We operated at 30 Hz, 1.05-ms pulse length, corresponding to 3.15% duty factor. (WBS 1.1.2.2)

We routinely operated with the low-level RF control system tracking the resonant frequency while the water system controlled the copper cavity surface temperature. Using this scheme, reflected power was typically 2 or 3 kW at 650-kW forward power. While the window and cavity were still showing signs of RF conditioning, the system would recover immediately after a vacuum trip. We can now run the power level up to any value below 650 kW without much response of the vacuum pressure. (WBS 1.1.2.2)

Radiation levels are dominated by cavity conditioning and have reached levels of 60 mrem/hr inside the 1/8-inch lead shielding and 10 mrem/hr outside of the shielding. Additional shielding has been added on axis, reducing the levels to below 0.2 mrem/hr outside of the shielding. (WBS 1.1.2.2)

The maximum average power achieved to date has been 20.5 kW that is 70% of the design power level at the full 7% RF duty factor. We were limited by the klystron power supply, but the prototype High Voltage Converter Modulator is now being connected to the 805-MHz RF power system and will be used to obtain full average power for the cavity in the next series of tests. (WBS 1.1.2.7)

Work has begun on preparing the LANL-supplied JLAB test-stand components. The ATS klystron and modulator have been moved to the ETL repair facility where the modulator lid has been removed and the condition of the components evaluated for repair or replacement. The new modulator lid is out for bid and a LANSCE klystron has been identified for use with the modulator. A RFP has been issued for repair of two LANSCE klystrons to replace the one being sent to JLAB. (WBS 1.4.1)



Fig. 1. Hot-model test cell with shielding in place.

The High Voltage Converter Modulator RFP has been issued. The new transformer substation with harmonic filters has been high pot tested and inspected and will be used with the HVCM to support CCL Hot Model testing. (WBS 1.4.1.2)

The DTL EMD drift-tube bids have been received and are being evaluated. Fabrication of the PMQ drift tubes is progressing well with component production in full swing. The RFP packages for the post couplers, slug tuners, vacuum ports, access ports, support stands, and seals went out this week. (WBS 1.4.2)

The ID and OD for all three tank sections associated with Tank #3 have been rough machined. Votaw is in the process of rough machining the remaining features for the drift tubes, post couplers, and slug tuners. The first tank section is currently at shipping and should be going out for stress relieve early next week. (WBS 1.4.2.2)



Fig. 2. DTL tank segment following machining.

A revised funding package has been prepared and submitted to ORNL to reflect the \$8M in additional budget authority that ORNL has granted Los Alamos for procurements this fiscal year. (WBS 1.4.6)

ASD/JLAB: Cold Linac

ASD/BNL: Ring

Work continues on the "ETC" for all WBS 1.5 systems, year-end planning for the FY01/02 fiscal year closeout and transition, and the upcoming ASAC review.

At the request of George Dodson, BNL engineers are working to develop Reliability scenarios and numbers related to MTBF (mean time between failure) and MTTR (mean time to repair) for specific WBS 1.5 systems.

Our vendor (SDMS) reports that vacuum chamber #2 for the Ring arc dipole magnet has been shipped to BNL.

Negotiations continue with SDMS, our beam pipe/vacuum vendor and apparent low bidder for the Ring collimators, to provide a first article collimator and procure all critical materials in the first phase of a multi option procurement package. There is some reluctance on the part of SDMS to accept less than the entire procurement package.

Joe Tuozzolo and Bill Birkholz visited three vendors earlier this week. They traveled to Stangenes, Quest and Allied Engineering. The purpose of the combined visits was to check on ongoing production runs, perform a pre-production review of the 26Q quads, and conduct a pre-award review of the 30Q quads.

Extraction kicker impedance measurements were started this week (w/o the YY correction loop). Measurements with the correction loop are next.

Visitors from the Project Office included Stuart Henderson (Commissioning), Dave Gurd and Bill DeVan (Controls).

Mike Nekulak and Bob van Wormer traveled to LANL to attend a Controls workshop that was sponsored by the Project Office.

A purchase order for BPM production (all flavors and sizes) has been signed.

Design of the collimator outer shield was started this week.

Design effort continued on the RTBT line. Changes include collimator relocation, fine tuning of extraction magnets, design of the extraction dump line and vacuum window.

Vacuum ion pumps: two 1st article pumps were received from our vendor, Physical Electronics, for BNL evaluation. We expect to release the production order later this month.

Bids for the 30Q44 and 30Q58 ($q = 21$) are due August 24. A pre award videoconference is being arranged with the Project Office for Monday, August 27.

Controls:

The CCL Hot model is at LANL operational. Although the control system is not prototypical, the control algorithm for the resonance cooling is. We expect to validate the control algorithm on the hot model.

On the DTL and CCL resonance cooling systems, an agreement has been reached to eliminate touch panels from the control racks and use EPICS screens to commission the resonance cooling and vacuum systems. This eliminates the need to implement a lot of software in the cooling PLC and vacuum PLC that were not in the scope of WBS 1.9.4, but were in other budgets that were being stretched to their limit.

Controls' planning is complete for the upcoming Source/LEBT electronics rework.

The Controls Group participated in the SCL LLRF FDR. This is a WBS 1.9 milestone.

Much effort was expended on the Estimate to Completion, both at Oak Ridge and the Partner Labs. We should be complete on time. We anticipate being a little over the baseline, but this is consistent with the direction to include in this exercise some changes that had been going to be treated as PCRs.

ASD/ORNL: Integration

Installation Support

ASD personnel are working on "acceptance criteria" forms to discuss with the partner labs (the completion date is 8/31/01 for issuing them to the partner labs). In addition to those, a system-by-system written summary is being developed that describes each system, the hand off process, and what is/is not being delivered. The acceptance criteria and the summary descriptions will form the overall hand-off plan.

The draft cryomodule installation estimate was completed for incorporation into primavera.

During a site walk through, it was noted that a chase opening was present for a chase that had been deleted. Conventional facilities and ASD personnel are ensuring that the sub-structures package incorporates all subsequent design changes.

Power to the ion source area is complete. Installing air piping to group areas as fill in work should be complete by 8/17. Installing power and DI water piping in the power supply test area. Installed storage racks in the RF area.

The CCL 1/2 module is now complete. DTL ion pumps and drift tube stems are fabricated and will be installed by 8/17. The high beta and partial medium beta cryo modules are complete and installed. The warm section table and bayonet boxes are also installed. Tray in the entire Linac mockup is complete.

Again much of this week was spent estimating the and inputting installation tasks and estimates into the ASD installation schedule and doing FY-02 work packages.

Worked on finishing up the presentation of the Davis Bacon determination to DOE.

Accelerator Physics

Eugene Tanke visited LANL to participate in CCL hot model testing, radiation level measurements at LANSCE, and to work on the linac commissioning plan.

The ORBIT collimation model is being exercised, and compared to previous calculations. Optimization of the primary collimator thickness to increase the overall collimation thickness is underway.

A beam break up instability is being investigated for the SNS. It appears to possibly be important with the large resistive impedances associated with thin coatings on the injection kicker chambers. This analysis will be considered in the injection kicker chamber/coating design.

Operations

The review committee for the SNS Timing System Final Design Review met last week at LANL. Although the final cmte rpt has not been issued, the cmte was pleased with the technical progress of the system hardware designs and felt procurement should proceed as planned. An associated review will be held in the near term to review the related software as well as the interfaces of the Timing System throughout the accelerator facility.

ASD attended as an observer the LANSCE cost and schedule review also at LANL last week. The material presented was in support of operations and the requisite infrastructure of the LANSCE facility and, in my view, was in general well received by the external review committee. Again, the final committee out-brief should be made available very soon. Since the LANSCE projections included cost and schedule through FY2007, it should be of use as a comparison to our ASD and combined SNS Facility budget estimates.

Ion Source Group

On Monday Paul Gibson started his new job as SNS front-end engineer. Being assigned to the ion source group, he started to work on duplicating the LBNL ion source stand by taking over the acquisition of the Big Blue box.

On Tuesday, at the SNS poster session, Sonali Shukla and Rahul Rauniyar presented some of the work they accomplished during this summer. After the sessions the informative posters were posted outside out side Robert Welton's office, room 312 at 701 Scarboro road. We wish Sonali the best for her physics studies at UT where she will start next week. And we wish Rahul the best for his graduate studies at Georgia Tech.

We continue to place many orders for duplicating the LBNL ion source stand. In a Thursday meeting we reviewed the current status and set priorities for the next 2 month.

Work continues on the antenna front. OFE Copper tubes have been vacuum fired to reduce gaseous impurities. Mark Janney from the ORNL metals and ceramic division continues to work on developing a high-tech antenna based on a proprietary process and mixture developed by GE, which hold the promise of a substantially increased thermal limit.

RF Group

Work proceeding on the Jlab RF system power supply. Bids are in for the supply and the award will be made soon, delivery in October. Parts for the crowbar are ordered. Control, interlock and status function are being worked on.

402.5 Waveguide pieces keep arriving. People will be spending more time with Jlab coordinating the RF system. More time will be spent with LANL on the LLRF system.

The subcontract award for the JLab test stand high voltage power supply occurred on August 8th. The successful bidder, Hipotronics, has quoted a 10 week delivery.

Cryo Transfer Line Group

We continue to assemble the 40 ft supply line sections of the transfer line that are to be installed from the Central Helium Liquefier to the tunnel.

We have assembled the gas purifier station salvaged from the coil test facility refrigerator and are making the final mountings to the portable skid.

The machine shop fabrication package for the return "T" section of the transfer line was let to vendors 8/10/01.

Mechanical Group

Magnet Measurement Group

Power Supply Group

Survey and Alignment Group

The Survey & Alignment Efforts for last week as well as this week will focus on the measuring of the global survey network.

Beam Diagnostics Group

General: Continued work on ETCs for all systems

1.5.7.1 BPM: Annealed 4 sets of raw material for the 21cm Ring BPMs and delivered them to the shop. Delivered updated drawings to shop for the RFQ's of the 21cm Ring BPMs and the common parts.

1.5.7.2 IPM: Continuing efforts to isolate new source of ringing in RHIC IPMs. Solution to that will be applied to

the SNS system.

1.5.7.3 BLM: Working with electrical design group on a PCB layout for the prototype BLM FE stage.

1.5.7.4 BCM: Testing continues on the prototype circuit board. Noise measurements have been made to compare against expectations. A different protected amplifier design is under investigation. A circuit board is in manufacture and expected next week. A 3U computer was received, and is being investigated for use as the BCM instrument computing facility.

1.5.7.6b Laser Wire Scanner: We had tunnel access and finalized the vacuum installation design. The necessary beam pipe is being prepared. Work continues on preparing the LPM on the bench. Actuators have been installed and the optics has been aligned. Controls group is preparing the RS232 code to control the laser. The visible alignment laser has been checked for alignment with the 1064nm laser. Laser divergence and beam envelope have been measured through both the Linac test optics and the MEBT platform optics. Tests have been performed that indicate that surface ablation of the beam pipe is a concern. A mechanical engineer is checking drawings for the MEBT LPM platform. A profile measurement chamber has been sent to us by LBNL with some modifications to the mounting hardware.

ORNL-SNS Beam Diagnostics Report: Every member of the group is working on hand-over documentation, installation planning, PADS, and the FY02 work package. We provided laser wire proposal to the division director on schedule. In this document, we, diagnostic groups of (BNL, LANL and ORNL) unanimously requested near-term R&D to evaluate the viability of the laser profile monitor. The summer interns presented their posters to both SNS and the ORNL. Their work was received extremely well.