

Accelerator Systems Division Highlights Ending May 21, 2004

Cryosystem Group

It is with great sadness that this weekly report records the death of Don Richied on Friday May 21 from a heart attack following shoulder surgery.

ASD/LANL: Warm Linac

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments: The fourth Thales 5-MW klystron completed its heat run and site acceptance test successfully. This klystron, along with three Thales 550-kW klystrons, several magnets, and ancillary equipment, was loaded on a van Thursday, May 20, for shipment to ORNL. The fifth, 550-kW Thales klystron (that failed site tests because of arcing across the output flange) has been removed and is being shipped back to Thales. Additional 5-MW and 550-kW klystrons are being prepared for site tests.

COUPLED CAVITY LINAC (WBS 1.4.4)

Accomplishments: CCL Module 4 arrived at ORNL the first week in May and is currently being assembled in the linac tunnel. This completes LANL's final CCL deliverable.

PHYSICS & DIAGNOSTICS (WBS 1.4.5)

Accomplishments: (1) *RTBT harp pickup*: Fabrication of the harp planes continues on schedule. (2) *RTBT harp electronics*: We received and tested the initial circuit board. A slight modification was required, and the revised board is currently being fabricated.

ASD/JLAB: Cold Linac

ASD/BNL: Ring

Half-cell #28 was shipped this week to SNS/OR. Work is underway on HC #29, 30 and 31. HC #29 will ship on June 8th as requested by ASD.

An RFQ for the RTBT 17D224 bend magnet core was released for vendor quotes. At the request of Ted Hunter, a complete set of production drawings was sent to ASD.

Ring collimators #2 and #3 arrived at SNS/OR from our vendor, SDMS, in France.

The vacuum chamber for the Ring primary collimator is ready for the TiN coating process that is to begin next week at BNL. Pre-coating bake-out is underway this weekend.

QA inspection of the TiN coating on the extraction kicker magnet ferrite is nearly complete. Production coating will follow.

Both injection dump septum magnets failed their high-potential tests at BNL. These magnets will be returned to NETC for repair. We will return them one at a time to allow continuation of the Injection Straight Section installation mock-up.

Work on the Injection Straight Section mock-up installation is progressing slowly. A second set of quad doublets has been included in the overall assembly scope. Vacuum chambers for the dump septum and chicane #4 are in the BNL Shops for minor rework.

Two extraction kicker PFN modules were shipped to SNS/OR from our vendor, APS.

A copy of the SNS Ring Diagnostics Production Plan has been signed by all principal parties and put on file through the SNS Document Control Center (DCC).

The two radiation hardened RTBT 36CDR30 corrector magnets have been delivered to the Magnetic Measurements Group for field testing. Set-up will begin late next week.

Jon Sandberg, Ken Rust and Ted Hunter will be at IE Power next week for acceptance testing of the Ring dipole PS rectifier; inspection of a 1st article 700 amp medium range PS; an injection kicker PS; assembly of a 2500 amp medium range PS.

A change order was written to the Tesla contract authorizing final payment to cover fiducial holes and thermal switches that were added to the original production contract for the 21Q40 Ring quadrupole magnets.



Injection straight section mock-up



Rad-hard correctors

Controls

The FE Building has been converted to air conditioning for the season and the supply duct to the FE Comm. Room has been opened. One of the wall A/C units is still running, however the second one cannot be run due to too much load on the electrical circuit. The temperature has not dropped as much as hoped; it is hovering around 75 deg. F. We will be installing more equipment in this room as part of the move from 701 Scarboro. The planned new dedicated air conditioning system is still months away due to other installation priorities.

All power-use readouts required to give complete accounting of power used on both Main A and Main B have been identified. These will be put on the site power-use screen. We are still trying to find out exactly how TVA calculates the 30-minute rolling average power and peak power for billing determination.

The spectrometer has been set back up for monitoring Cu and Si lines in the ion source plasma. This is important for early detection of antenna degradation in order to avoid catastrophic failure of the antenna (e.g. due to cooling water leaking into the vacuum system).

Checkout of the cryogenic control system for the first medium beta cryomodule (MB03) was started. Power was turned on to the cryo system racks. IOC and PLC modules were installed. All silicon diode temperature sensors appear to be reading properly on the EPICS screens. Checkout of the control valves is in progress.

The JLAB staff that designed the SCL vacuum controls visited and brought several more SCL vacuum control chassis along with more documentation. The time was spent answering questions re the design, reviewing our "to do" list, and installing equipment on hand. The impact on the control system of changes to the LEDP was assessed and luckily no control chassis modifications are required.

A meeting was held with CF to discuss logistical difficulties resulting from the installation schedule for the remainder of the backbone fiber. (The late installation date of fiber was putting our planned move to the CLO Central Control Room in January at risk). In the end it was determined that a temporary fiber can be run at relatively low cost from the CLO to the HEBT Service Building. Existing fiber can then be used to get from there to the FE Comm. Room.

Preparations are being made for the upcoming DOE CSCS review.

Linac Controls:

- LANL is pressing forward with conversion of linac control software to EPICS version 3.14. The RCCS, vacuum, and magnet control software are all moving this way.
- The magnet cooling water interlock (to be computed in the QMCS RCCS) will be installed by June 4th. LANL personnel will visit in early June to test the CCL magnet control software.

Ring Controls:

- All Yokogawa function generators have been received at BNL. Units have been inspected and tested and will be shipped to ORNL shortly.
- 10 BLM digitizers have been received, as well as all the Hytec DAC modules, and V294 timing fanout modules. This completes all BLM hardware purchases planned for FY04. (The purchase of the 11 remaining digitizers is planned for FY05). Assembly and shipment of all BLM IOCs will begin shortly.
- A strategy for loss-of-magnet-cooling-water-flow interlocking has been agreed upon for the HEBT/Ring/RTBT. Detailed installation design will follow.

Work continues on the change over from phase 0.4a to phase 1.1 PPS (DTL/ CCL RF processing). All the existing & new cables have been pulled into the phase 1 rack. All field cables have been pulled and are 75% terminated. The PLC programs are complete and integration testing is 75% complete. The new EPICS screens are 50% complete. Projected completion date for phase 1.1 is June 7th. AMISE craft are completing installation of PPS cable and conduit for the HEBT tunnel and should start work in the Ring tunnel next month

The LINAC ODH system control room rack has been set in the front end control room. AMISE crafts are finishing the terminations in the LINAC tunnel and pulling the remaining cable from the HEBT devices to the klystron ODH rack. The LINAC PLC program is 65% complete. The LINAC field devices (beacons and horns) have been tested.

Lawson Electric has installed the above ground conduit for the RTBT Chipmunks. A walkdown with CF and Lawson took place this week to determine the optimum design for the aboveground Chipmunk conduit for the HEBT and Ring. A design package will be prepared to have Lawson install this conduit, junction boxes, and Chipmunk enclosures and pull the cable from the service buildings to the Chipmunk locations.

Target PPS: The design for the PLC remote I/O rack for the primary limit switches is complete and ready for approval. The equipment for this rack has been ordered and assembly will begin as soon as the drawings are approved.

Instrument PPS: A walkdown of the instrument for beamline (BL) 2 was conducted this week. The locations and conduit routing for the PPS devices were determined. A prototype Instrument PPS user panel is being designed based on the BL 2 design requirements. An estimate was prepared for the Vulcan beamline to determine the cost associated with the PPS equipment, installation and testing.

Installation

Craft Snapshot 5/18/04

ASD productive craft workers	62.0
Foremen (Pd by 15% OH)	6.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	70.0
Less WBS 1.9, 1.2 etc	5.0
Less absent	2.0
TOTAL PD BY ASD/ORNL DB WPs	55.0

Accelerator Physics

Operations

We now have 3 Operators who will report to work this summer.

Ben Sanchez Chief Operator June 1
 Andy Arvin Chief Operator August 2
 Saul Matuvo Operator, Some time around July 1

Ian Evans from SLAC (SSRL) has agreed to serve on our ARR Committee. He will replace Dan Fitzgerald from LANL who is retiring.

Operations is staffing the control room from 08:00-5:00 M-F,

We are doing radiation calculation for the CCL dump

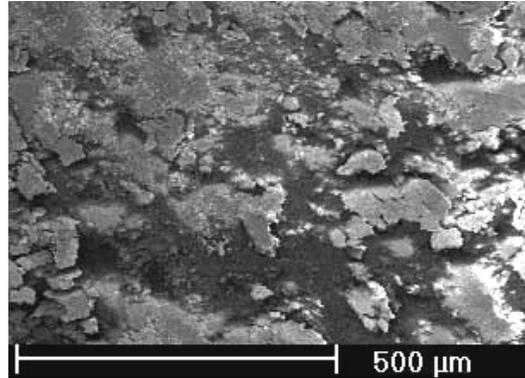
Working on the DataStream implementation

Working on CLO Move

Ion Source Group

A flow meter has been installed in the cooling line of the front end ion source extractor. The cooling is essential for removing the heat from the parasitic electron beam hitting the electron target attached to the extractor. The need for an individual flow meter became clear when we tried to understand the excessive extractor load current observed during DTL1-3 commissioning.

A 5 μ filter has been installed backing the existing 50 μ filter in the deionized water supply line on the hot spare stand. This is to filter out the particles that form a conductive layer and so shortened out the FE ion source and extractor as well as the Faraday cup on the ion source hot spare stand.



The noise from the ion source RF on BCM02 and BCM200 has been measured before applying reduction efforts recommended by Mike Thuot.

The source life time test on the hot spare stand has been terminated after 7 days because the cesiations gave only short lived enhancements.

Survey and Alignment Group

The DTL Tank assemblies 1, 2, & 3, have now been realigned to the updated global survey network. The alignment of DTL Tanks 4, 5, & 6, will begin early next week once these assemblies are made available to us.

Completed alignment of the downstream half of CCL4 (total of six segments), anticipate completion of the remaining upstream segments Friday.

Calculated the global position for the necessary bolt holes for the Ring Upper straight section including the three collimators and doublet magnet stands. One the holes were drilled and the plates installed, we subsequently leveled the collimator base plates.

Prepared new data for the layout of approximately 72 bolt holes for the lower straight section of the ring including RF Cavities and doublet magnet bolt holes.

Prepared the necessary data for the layout of the quarter cells. The actual layout of these holes will take place in early June after the completion of our global survey network update measuring campaign.

The primary goals of S & A at this juncture are to provide the necessary support for Target /Instrument as well as ASD in the DTL/CCL area. Our secondary goal is to provide support for the Ring when we have the necessary resources. Specifically, our plan is to first layout all pertinent ring stand bolt holes. This will allow the DB labor to continue coring the necessary holes and set the necessary equipment. Next we will begin a realignment campaign starting at the HEBT and continuing through the Ring aligning all components.

No additional RTBT measurements have been recorded since the first week of May. Measurements recorded at that time indicated that the RTBT tunnel floor 6.07 inches low with respect to ideal beam height. Our next regular scheduled monitoring of the RTBT floor elevations will be the first week of June. However, daily inspection of some simple monitoring benchmarks at the Target interface indicates that the RTBT is still settling at the rate of 1.5 – 3mm per week. Our latest slide show on the RTBT can be viewed on the Web Server, Note 121, posted May 10, 2004. <http://it.sns.ornl.gov/asd/public/html/sns0121/sns0121.html>

We have completed the measuring part of our global survey network through the HEBT / Ring / RBTB. We are presently adjusting the data. We are meeting our objective of having the updated network ready by June 1.

S & A performed measurements on the vacuum vessel located at the end of instrument line 2. The vacuum vessel is a cylindrical tank approximately eighteen feet in diameter and approximately thirteen feet in height. At the center of the tank is located a fixture which simulates the sample center for when experiments are conducted.

The beam line 2 Engineer has expressed interest in finding out the movement of this sample center once vacuum has been applied to the tank. Preliminary meetings early on with beam line engineer allowed us to express our needs for performing such a test. The procedure consisted of three stages: one, recording several measurements while the tank was at atmospheric pressure; second, recording measurements upon completion of the pump down stage; and third, recording measurements after the tank was returned to atmospheric pressure. The results were very positive from the engineer's standpoint.

Second, S&A continued on with campaign of mapping chopper cavities, bulk shield liner flanges, etc. This week, we completed measurements of two additional two chopper cavities. S & A was under a tight schedule to complete the chopper cavity measurements for the six core vessel insert plugs before June 3rd. However, after our meeting this week with the contractors, there was no indication that the core vessel insert schedule would be pushed up to the June 3rd date from the original end of July date.

Mechanical Group

Tanks 1-3 have been re-aligned to the new survey network in preparation for their connection to 4, 5, and 6. A known leak in DTL2 was fixed and the systems are ready to be leak tested again.

DTL4 tank is ready to be installed. Prep work on the water header connections in the tunnel is nearly complete. It will be moved in on 5/25 completing the DTL tank chain.

DTL5 tank is installed in the tunnel. Beamline interface connections are proceeding rapidly and testing of the cabling will begin as soon as the connections are finished. Water headers from the RCCS were fabricated and flushed to the tunnel. The headers are now connected to the tank and the water system is full and flowing at low pressure as we check for leaks. Ion pump installation is nearly complete.



DTL6 tank is installed in the tunnel. Beamline interface connections are proceeding rapidly and testing of the cabling will begin as soon as the connections are finished. Water headers from the RCCS were fabricated and will be flushed next week.



Water Systems Installation

- Piping fabrication/installation on the CCL-3 klystron continued.
- DTL-6 tunnel piping from the waveguide chase to the manifolds was completed and the filter connected for flushing.
- DTL-4 tunnel piping was started and awaiting the installation of tank to complete.
- Installation of the 805 MHz reference line connections was completed.
- Installation of the piping to the RF equipment on SCL-ME5 and SCL-ME6 continued.
- RCCS carts DTL-1, -2, -3, -5; CCL-1; and QMCS are running.
- The bids for the Collimator Cooling Water Systems were evaluated and now waiting for the responses to the requests for clarifications.
- The design for the SRF clean room DI water system is complete and a packaged water unit will be leased shortly.
- DeOX units have been ordered for the Injector and the test stand as well as the four klystron units

Ring Systems Installation activities occurring the week ending May 21.

- The RING Half-Cell #28 (Unit D4) was received and installed.
- The RING Collimators #2 & 3 were received and staged in the tunnel.
- The baseplates for RING Collimators #1, #2 & 3 were installed and grouted.
- The replacement top-plate for RTBT Collimator #1 was installed.
- Termination of magnet cables to the HEBT 12Q45 magnets continued.
- Installation of HEBT Service Building racks continued.

Magnet Task

Helped install components onto the CCL

Investigated and repaired a problem with our CCL Quad measurement coil

Measured another CCL Quad

Mapped another SCL 8Q35

Installed some Klixons on 12Q45's

Electrical Group

The first 8 magnets of CCL2 have been connected to power supplies and tested.

Most of the medium power supplies (18 of 22) have been installed in the HEBT Building.

Two extraction kicker PFN units have been delivered.

Installation of power supplies in the Ring Service building has started

DTL 5 and 6 terminations completed (no visible progress in SCL AC as of now)

HEBT SB rack row 1 and 2 bases set in place and anchored

HEBT SB rack row 3 AC feeders to sub panels terminated

HEBT tunnel magnet Klixon rewiring in progress

RING substation RN-SS3 feeder terminations completed, SS4 near completion

Upgrades and final installation is now complete through SCL-ME2. All future modulator installations will integrate upgrades into the installation process. Checkout was completed for SCL-ME2, and other than some minor modifications to the start pulse sequence, the unit is ready to support klystron checkout. Checkout of CCL-ME4 is still awaiting relocation of the pipefitters to allow for safe checkout operations, which should begin the week of Memorial Day. CCL-ME4 has the LANL-designed 20 and 40 kHz harmonic trap installed. SCL-ME1 was reconfigured to its original configuration to allow for high average power testing the week of Memorial Day.

HPRF

Cleaning of the CCL-3 waveguide complete today with the installation of the phase shifter.

Changing out the defective MCI bellows proceeding, work being done on Friday when Crafts are away.

SCL-ME2 klystrons and transmitters being readied for testing. Mainly waiting on network installation. 6 more CPI klystrons staged in the gallery waiting positioning and pipefitters. 6- Thales 550KW klystrons being readied in the RFTF.

Electricians started installation of SCL-ME-3 installation

LLRF

Beam Diagnostics