

Accelerator Systems Division Highlights for the Week Ending February 14, 2003

ASD/LANL: Warm Linac

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments this week: (1) We processed the first 5-MW, 805-MHz Thales klystron up to full beam power and full RF. We operated at 60 Hz, 1.35 msec, 5 MW output for about 5 minutes. Some arcing started that has required further tube conditioning at lower power for the time being, but this represents a very important internal milestone. We continue working on getting the tube well conditioned to allow for extended heat runs. (2) E2V 2.5-MW, 402.5-MHz klystron no. 9 passed its factory acceptance tests. E2V proved out the shim design during serial no 9 tests that will address the RF gasket problem on serial numbers 1 through 8. (3) CPI 550-kW, 805-MHz klystron no. 9 passed its factory acceptance tests.

Concerns & Actions: In the initial work with the 5-MW Thales klystron, we discovered a problem with the design of the output transition. We have developed a temporary fix using SF₆ to allow us to use the first tube at full power. Thales is engineering a permanent fix that will be presented in the near future.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: (1) We demonstrated for the first time operation of the prototype converter/modulator to 137.2 kV, 71.1 amps, 1.35 ms gate pulse, and 805 kW average power. This was a very important internal milestone. We operated at this level for a relatively short time because of the aforementioned conditioning problems with the klystron, but we look forward to more time at this level as the tube is conditioned. During the above operations, the converter-modulator system operated with approximately 94% efficiency, but we need more operating time to really confirm that measurement. The Power Factor is about 0.86 on the transformer secondary. (2) David Baca (LANL) was at ORNL this week to support converter modulator lifting fixture design activities.

Concerns & Actions: David Baca (LANL) and David Anderson (ASD) were at Dynapower this week to address fabrication problems of the boost transformer. We put together a schedule for ORNL/LANL visits to Dynapower for testing of converter/modulators. Dynapower Chief Engineer told us that they will support acceptance tests, and the delivery of the next three HVCMs and the replacement transformer for the RFQ HVCM by the end of February.

DRIFT-TUBE LINAC (WBS 1.4.2)

Accomplishments: (1) The repaired Tank-3 drift tubes have their stems straightened. The final processing (baking/drying, leak checking, magnet mapping, flow testing, cleaning and packing for shipment) of repaired tank three drift tubes is underway and will continue through the weekend. We expect to ship the first batch to ORNL on Feb 17. (2) First batch of fifteen T-3 top hats is completed and will be shipped to ORNL next week. (3) Two batches each of Tank-1 diverter/sleeve and diverter/body brazes were completed. Drift tube caps are being machined. Magnet insertion should begin soon, with first e-beam cap welds at ESCO scheduled next for 2/18. (4) Dale Schrage was a Sciaky Corp this week to qualify e-beam welding parameters for the EMD drift tubes. Excellent results were obtained, allowing the elimination of a cosmetic pass. (5) A second electroless nickel treatment of the T-3 drive iris resulted in a marked improvement to the vacuum leak. A third pass will be implemented. (6) Six LANL employees returned following a two-week session helping ORNL with the T-3 resonance control cooling system (RCCS) and vacuum system cabling, installation, and checkout (Fig. 1).

Concerns & Actions: (1) We held a videoconference with ORNL to integrate the LANL delivery and ORNL assembly schedules. The logic was improved and we found potential solutions to tighten the schedule. (2) Vacuum installation at ORNL was hindered by incomplete of cable installation. We expressed our concerns to ORNL to insure that this does not become a critical path item.

COUPLED-CAVITY LINAC (WBS 1.4.4)

Accomplishments: (1) The water flow test control panel assembly for the CCL was completed at LANL. It is on the way to Germany for flow testing the cells and the segments. (2) Flange welding on segment-2 has been completed and is preparing for final leak test tomorrow. (3) Segment-1 has been through tuning prior to the stack braze and is waiting to get into the furnace. ACCEL has scheduled this brazing for early next week. (4) All other aspects of the cavity manufacturing are moving along rapidly and the second furnace is fully occupied with septum and endwall brazing activities.



Fig. 1: LANL personnel performing DTL RCCS cabling installation and checkout at ORNL

PROJECT MANAGEMENT (WBS 1.4.6)

Accomplishments: John Bretzke joined LANL SNS Division as the Deputy Division Leader for Project Management, effective this week. John comes to us from the LANL Project Management Division where he served as Interim Division Leader. Prior to that appointment, John was the Project Director for the LANL Strategic Computing Complex, a \$100M construction project that was completed ahead of schedule and under budget. John has a BA in Chemical Engineering and a Masters in Business Administration. He has more than 20 years technical and managerial experience within the DOE NNSA complex, with duties including process engineering, production planning, nuclear facilities modifications, facilities management, and project management. John replaces Will Fox, who will join the SNS-3 Group to continue his active role on our critical path delivery of accelerator structures to ORNL. Please join us in thanking Will for his technical and leadership contributions to the Division Office over the last 2½ years, where he elevated our performance by his high standards, clear thinking, and respectful demeanor.

ASD/JLAB: Cold Linac

Cryomodule M-1 assembly continues. The cold mass and space frame have been inserted into the vacuum vessel and attachment of the end cans is underway. Assembly of cryomodule M-2 has begun with rollout of the cavity string from the clean room into the cryomodule assembly area (see photo).



Figure 1 Production Cryomodule M-1 in Assembly.

Three cavities have been qualified for the M-3 string.

Replacement valves and acid plumbing have been received from the electropolish cabinet vendor and are being installed.

Repairs to the eddy current scanner continue to be ineffective in achieving normal operation. Interactions with the designer/builder continue.

ASD/BNL: Ring

"All Hands" group photo taken when T. Mason, C. Strawbridge and N. Holtkamp were at Brookhaven.

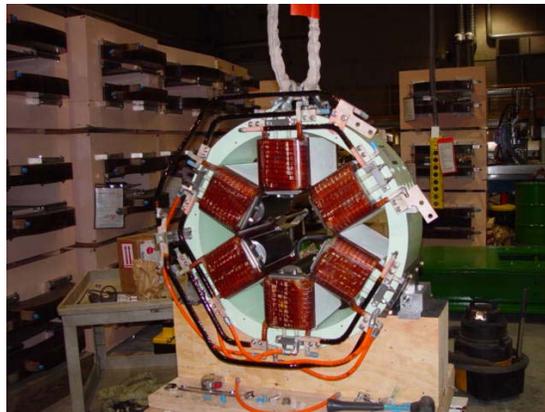


Bob Lambiase and Steve Savatteri are back from IE Power (Canada) where they witnessed (assisted) the successful testing of the 1st article Medium Energy power supply (5ka). Bob Lambiase is detailing the various accomplishments in his trip report that will be distributed later this week. The plan is to have IE Power ship this unit directly to SNS/OR in the near term.

A. Zaltsman is making headway on testing the RF Power Amplifier #2. During initial testing it was determined that internal shorting was due to inadequate clearance around the tube socket. This problem has since been resolved and our as-built drawings will be revised to reflect the change.

We are still waiting for the first article RF Tune power supply that was shipped by Danfysik two weeks ago. The vendor has given us the tracking number for this shipment.

Field measurements continue on the 21Q40 quads. Earlier this week, P. Wanderer reported that twenty-two magnets have been fully measured.



Ring half-cells magnet assembly: work continues on units #2, 3 and 4. We plan to ship HC #2 within 10 days.

The 21S26 sextupole has been received from Alpha Magnetics. Receiving inspection is underway before we begin electro/mechanical testing.

We continue to work with Stangenes to resolve “out of tolerance” issues related to the 26Q40 magnet pole pieces. After numerous discussions with Stangenes, Quest (their subcontractor) and our AP Physics Group, BNL has developed and proposed a remedial plan for their consideration.

Complete drawing packages for the Ring (2&3) and RTBT (1) Collimators were sent to our vendor, SDMS (FR.). In this week’s teleconference, SDMS reported on the (good) fabrication progress that is being made on the two HEBT collimators, scheduled for delivery this spring.

Welding effort on the HEBT vacuum chambers is underway in support of ASD’s Installation schedule (delivery in early March).

An RFQ has been written for the Injection Bending Magnet #1.

Magnet stands for the 21Q40 magnets have been released for fabrication.

An RFQ has been released to Contracts for the exterior shielding for the HEBT Collimators.

Magnet spare parts:

- PCR RI 03 006 - several procurement options are being reviewed against authorized spending and vendor deadlines. This PCR includes a spare injection dump septum magnet, a sextupole magnet (26S26) and coils.
- Other spare parts that are on-hold pending Project Office approval include Ring vacuum chamber assemblies, as outlined in PCR RI 02 014.

Work on ETC continues. A videoconference between BNL and SNS Project Control Groups was initiated this week in order to clarify issues related to MPM analysis.

Fabrication progress on the HEBT Collimator vacuum beam pipes (SDMS).



Controls

Work continued in preparation for the upcoming installation of the D-plate. The D-plate Emittance Control System Hardware was set-up and delivered to the site. Cabling and connector terminations can now begin. MPS equipment for the D-Plate has also been installed on site. Installation testing is proceeding. System testing can commence as equipment becomes available and required systems are on line.

A JAVA-based tool called “MDA Browser” for visualizing and displaying data captured from EPICS scan tasks – including emittance scans - has been installed and integrated. Emittance analysis will be incorporated into the package as well. A much-needed printing capability has been added to EDM – the SNS display manager.

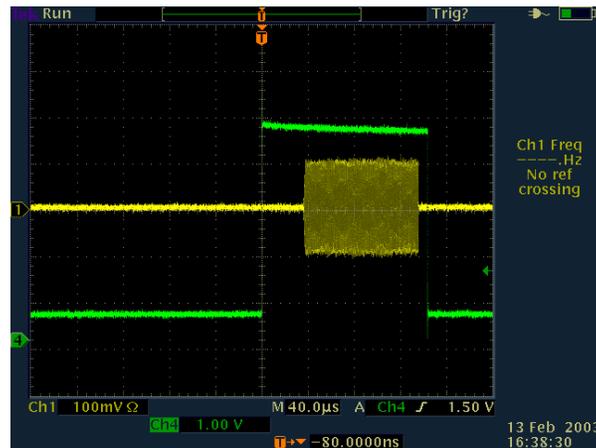
The emittance control rack is shown below, next to the D-plate itself.



A Document entitled "How to build an IOC application " has been released for comment. This document will provide guidelines for implementing IOC applications consistent with SNS Control Systems Software Group policy. This is in support of a changing Application Development Environment (ADE) that will allow us to run multiple versions of EPICS. Work proceeded on developing scripts to facilitate and automate the conversion and upgrading of EPICS versions.

An alarm handler demonstration supporting all known Process Variables (PVs) of interest was given to operations this week. These include Front End, Conventional and Timing System PVs. Safety, MPS and D-Plate will be added shortly. A demonstration of the EPICS "Back-up and Restore" Application (BURT) was also given to Operations.

Device Support and EPICS integration for the second-generation Low-Level RF (LLRF) controllers from Berkeley was completed and turned over for testing. Below is a 'scope picture of the output of a LLRF box running with no cavity but under control of the iocCore device support, the yellow trace is the RF and the green is the RF gate.



Work on the WBS 1.9 (Controls) Estimate to Complete was completed this week, and entry into the project controls MPM system started at ORNL, LANL and BNL.

The contract for installation of the site communication backbone using a "blown fiber" technique was signed, and a kickoff meeting was held.

At BNL, the final revision of utility modules is undergoing tests prior to delivery to ORNL. Tests include timing system and RTDL frame decoding. A complete MPS system was received at BNL, installed and cabled. Software is expected soon, and the complete system should be available for BLM testing by the end of the month.

Sverdrup has shipped the first set of PLC racks for phase I of the PPS (LINAC segment). These racks include the permanent and temporary PLC racks for the front end and the first remote PLC cabinet for the klystron building. The remaining three cabinets are scheduled for delivery the first week of March.

The temporary control panel for the DTL 3 conditioning effort was also delivered this week. This panel will be used to control the second HVCM used to produce RF for DTL 3. When DTL 1 is ready, this system will be removed and both DTL 1 and 3 will be controlled by PPS phase 0.4 equipment

A meeting was held this week to review the proposed design for the DTL 3 and PPS phase 0.4 design to ensure compliance with ORNL's procedure on radiation generating devices. This procedure will be used as criteria for PPS equipment for DTL 1 and 3 conditioning (no beam) operations prior to the next accelerator readiness review schedule. It was concluded at the meeting that the proposed DTL 3 and phase 0.4 equipment met all the applicable requirements of the procedure.

Cable design for the CHL and LINAC/ klystron building is proceeding based on the current Oxygen deficiency Hazard (ODH) system design. The intent is to have the cabling databases complete in time to have the ODH system cabling installed at the same time as the PPS cable (klystron) and cryogenic control cabling (CHL).

The Chipmunk vendor is still trying to determine the nature of the problems that are affecting performance of the electrometer section of the remaining seven production devices that have not been shipped. A Keithley electrometer has been ordered to measure leakage currents of electrometer components. Temperature cycling testing of the three production units that have been delivered continues to indicate that these units have acceptable performance during the 48 hour thermal stress test.

Design of the Target PPS PLC I/O equipment for the primary shutter limit switches will be coordinated with the Target Control System design for the primary shutter controls. Sverdrup will be tasked with the design for both systems.

Draft requirements have been developed for the dedicated open/closed limit switches for the PPS that will be installed on the secondary shutters on some beam lines. These shutters will normally be used to "safe" the instrument prior to personnel access, resulting in stringent requirements on the switches themselves.

An inter-group cross laboratory team effort including IC&S, Vacuum, Diagnostics and Electrical groups has made progress on the control interface for the fast valve closing system. The Control interface design was completed (Control/Diagnostics); a function test of controller, sensor and valve was completed (Control/Vacuum); wiring work for fast valve closing system was started (Electrical) and control interface software development was started (Control)



The planned solution for DTL serial vacuum control was to use an IOC board "pc-mip" card. In collaboration between ORNL and LANL vacuum control teams, a decision was made to use Hytec VME 64X serial solution

instead. The integration of Hytec serial driver and EPICS has been completed and is ready to distribute to LANL and BNL. The proposed controls hardware is illustrated above, and a vacuum system test set-up below.



Installation

Craft Snapshot 2/12/03

ASD craft workers	61.0
Foremen, ES&H, etc	9.0
Less WBS 1.9 controls	2.0
Less absent	1.0
TOTAL	67.0

The DTL #3 - #1 Planning was reviewed again in the ASD Friday Morning Installation Meeting.

Paul Gibson will assist Gary Johnson with DTL installation and field co ordination.

The first shipment of DTL #3 drift tubes is scheduled to be received next week.

The DTL #1 tank will be installed in the tunnel on 3/15/03.

LANL will visit SNS again the first week in March for further collaboration on DTL #3.

402.5 MHz Reference Line (RFQ to DTL #6) installation is ready to begin next week - WO 2/17/03.

Vacuum cable terminations will be completed by DB labor under a SRO. Mechanical techs are not available to perform this task.

Conventional Facilities piping modifications to DI Room #1 in the Klystron Hall are essentially complete. This means that cavitation issues should be resolved, but the noise problem still exists.

The HEBT assess pad was poured on Thursday, 2/13/03. ASD should have limited access to this area. Coordination with CF and the crane installation subcontractor is required. Contact Mike Hechler.

Given CUB availability of 5/03, ASD will require temporary utilities for the CHL. This issues needs resolution.

Accelerator Physics

Further global database filling is in progress. Tables for beamline devices have been prepared for the HEBT and are being stored in the database.

T. Pelaia has produced an oscilloscope application, which goes beyond that provided by EPICS. With this application one will be able to perform mathematical manipulations of waveforms (averaging, FFT, etc.)

GUIs for DTL commissioning applications are being prepared. First release of phase-scan application was demonstrated.

Operations Group

Commissioning Lessons Learned – Mario's write up is complete and integrated with Sash Alexandrov's. It will be sent out for one more round of review then submit to tracking.

The RGD process was reviewed for DTL 3 processing and the PPS Phase 0.4 was reviewed at a meeting this week. Plans for the RGD appear adequate to the ORNL representative.

We are looking at options for an Operator Training requirements and tracking system

An Office and Lab plan layout was sent to Group Leaders. There was a meeting to discuss the current concept on Thursday.

A Videoconference was held with the ARR Committee on Friday. DOE approved the ARR Plan of Action Rev 1. A general approach was developed for the Readiness Review of DTL Tank 1.

A Maintenance Planning was held Tuesday with the MIS group. Maintenance plans were due from Group Leaders Monday. There were a few replies, Power Supplies, Water, preliminary from Controls. All equipment should be in the ETS – All equipment in the ETS should be in the Maintenance Plan

Ion Source Group

While we continue our effort to have 3 interchangeable ion sources fully tested and ready by the start of the DTL commissioning, we started planning our move to the site. The timing of moving the entire ion source group and hot spare stand is intended to distribute the efforts in clearing out RATS by fall. We are aiming at moving as quickly as possible to have enough time to start up the hot spare stand in the FEB before the DTL commissioning starts.

To establish a computer controlled timing system for the hot spare stand, we have started to test the DS340 arbitrary waveform generator from SRS. Using the internal rep rate, the TTL output provides a usable gate for the QEI RF pulse generator. Test showed that the gate is high for about 5 s while self-testing after the unit is switched on. This problem can be neutralized through smart integration. In all other cases, the gate stays low except when functioning as programmed.

Mechanical Group

Design concepts for the shielding walls, required for the operation of DTL-1 and DTL-3, have been developed. The basic concepts were reviewed and accepted this week.

Gluing the cooling lines to the outside of DTL-3 tank is ~25% complete. The thermally conductive epoxy that is being used is easy to apply and does a good job of filling the gaps between the cooling tube and the tank.

Magnet Task

We now have three Beam Tubes installed in HEBT Dipoles. Four HEBT dipoles have been re-brazed and pressure checked.

There are now a total of 12 out of 33 12Q45's that have been mapped and fiducialized.

The DTL/CCL R175QN45 has been mapped and accepted.

The CCL 1st article Quadrupole is being returned to the vendor. There is a fit up problem between the coils and core on one side of the magnet that causes an alignment problem.

Linac HPRF

Linac LLRF

ORNL

JLAB Test: Hengjie Ma and Mark Crofford installed and checked out the LLRF system at JLab last week with remote assistance from Larry Doolittle, Ernest Williams, Kay Kasemir, Eric Bjorklund and others. Except for a few hours of last minute cabling and padding of signal levels, the work is complete. The status of the high power RF system was checked; it is operating normally. We are planning for the following people to be at JLab on Feb. 24: Larry Doolittle, Kay Kasemir, Hengjie Ma OR Mark Crofford, and Mark Champion. We plan to make use of the cooldown period to further check out the LLRF system. We are in close contact with JLab and will amend our schedule if necessary.

Reference System: Chip Piller and Taylor Davidson continue to prepare for the installation of the reference system. Chip has been working with Teresa Toomey regarding cable routing and installation. We participated in the Friday morning site installation meeting to discuss possible schedule interference with DTL installation work and will meet at the site on Feb. 17 to review the tunnel installation with the Mechanical Engineering and Diagnostics group representatives. The first polyethylene replacement spacers for the 3-1/8 inch rigid coaxial reference line have been received and characterized.

Error Budget: The second draft of Hengjie Ma's jitter and drift error analysis of the LLRF control system was sent out for comment.

The P3 resource loaded schedules for ORNL, LANL and LBNL are nearly complete and the funding PCR is in progress.

Craig Swanson visited LANL Feb. 12-14 and worked with Matt Stettler and Mark Prokop on FPGA coding issues.

The [4th report of the LLRF Advisory Board](#) was issued this week.

Larry Doolittle, Dave Thomson, Mark Crofford and Mark Champion met via teleconference to resolve outstanding MPS interface issues on the RFQ through DTL6 installation.

There was lively discussion among the team on how best to implement resonance control.

At ORNL we participated for the first time in the biweekly LLRF videoconference held with DESY, JLab and Cornell. The Warsaw group (collaborating with DESY) presented their work on simulation. The presentation and links to their papers were distributed.

We are working with Controls to acquire the IOCs, timer cards and utility modules for the DTL1-6 LLRF installation. We plan to begin installing the VXI crates next week.

LANL

Work continues on producing the Rev 0 of the new hardware platform for the LLRF system.

Analog Front-end. Awaiting the delivery of the first two prototype units by the end of February.

Digital Front-end. The final review material was sent out on February 10. This included assembly drawings, parts lists, Gerbers, etc. We are performing formal checking of the documents before proceeding to fabrication and assembly on February 19 as planned.

RF Output module: The initial schematic was completed and sent to the reviewers. The initial cut of the schematic is complete. We are currently looking at parts placement on the board. This board is about a week behind the schedule and is expected to go to fab and assembly the last week of February.

Motherboard: The board design is in progress and will go to CAD next week. This board is about 2 weeks behind schedule but is not on the critical path. The initial testing of the DEF will be done with SNS BPM PCI carrier; hence this board is not needed until April.

We are working on the procurement agreement with Suntron (the board manufacturer). To expedite delivery we are shipping the long lead items from LANL to Suntron.

We calibrated and tested the last three HPMs this week. They were shipped to Mark Crofford at ORNL. We also shipped to Crofford the speedup parts and some spare gates he needed, along with a draft of the HPM ATP and a set of schematics for the test set. An HPM test stand was also shipped to ORNL.

Craig Swanson of ORNL visited LANL this week as a part of firmware development collaboration. The draft of the interface control document (ICD) specifying the firmware specifications including interface between the hardware, firmware and software was reviewed by Craig and will be updated with his suggestions. Next week work will start on translating Craig's version of the LBNL application firmware to VHDL. That is expected to be done by the end of February and the entire set of phase I functionality will be verified with MATLAB models in March. The initial testing will be with the DFE/PCI in April and with DFE/VXI in May.

Work has also continuing on implementing NC resonance control in an EPICS IOC. Stan Brown who did the original work on RCCS and the CCL Hot Model has joined the resonance control team and will help us implement the system.

Started the effort to assemble the necessary hardware infrastructure for DTL installation.
Worked with our project office to finalize a resource loaded schedule that could be used for tracking the project.

LBNL

The digital boards are still under loading at the vendor. We had a minor delay in the file transfer to their machines (missing or not finding the proper XY coordinates), which is now being investigated. We are doing a thorough job on such a small run because this would allow for a quick and very inexpensive follow-on run if there were such a need. I anticipate we should have the full run of boards by next week. No impact on schedule is expected, as these boards are not on the critical path.

We met internally on the modeling efforts. Larry has now seen how Matlab and Simulink handle calls to C-routines and is going to adapt his C-based model to fit in the Matlab packaging requirements. This will allow for validation of the models developed independently, as well as transfer of the existing C-model among the collaboration.

We shipped a nano-engine to SNS to replace one unit apparently not working properly. We also requested the MEFT system that is having difficulties to be shipped back to Berkeley for troubleshooting. This system was operated during the final week of FE commissioning at SNS without the 2.5 MHz reference connected due to a failed input on the digital board.

Fabrication of one more chassis is continuing in the background, to be prepared for the DTL1 test. All components are in hand.

Larry is still working on the autostart algorithms, with some success. These algorithms are not ready to be released yet.

We are proposing to test the RF systems installed in the front end building to do a system measurement under some power (e.g., using the 100W transmitter driver to power the RFQ). This would test noise performance of the system without the pulsed power running, as well as phase/amplitude noise of the driver chain. We had initial discussions

with SNS. The ideal timeframe for these activities is next week, before the JLAB efforts ramp up. This would allow for a more detailed characterization of the system before ASAC.

A potential (internal) problem is that the credit card purchasing system is being shut down due to recent worries about possible abuses: In spite of several audits that revealed no irregularities, this system will be stopped. It will be resumed after new guidelines are put in place. This could result in major procurement delays, and we are trying to be pro-active to make this seamless to the collaboration.

Electrical Systems Group

Mark Wezensky joined the group this week as an engineer. Mark comes to us from Continental Electronics, where he worked on modulators and transmitters. Mark also worked at Fermi and the SSC on dc and pulsed power supplies.

Tests on the front-end quad power supplies have shown that we can keep them at reasonable temperatures with additional cooling fans and increased spacing between units. This will require the installation of an additional rack. Estimates of the cost for this work have been completed and we will implement this before 4/15/03. Total cost will be about \$8K for parts and about 300 MH of labor.

DTL 3 vacuum and water skid trunk cable termination completed.

CCL AC, DC and instrumentation trays completed.

CCL vacuum racks delivered and installed.

Survey and Alignment Group

Cryogenics Group

The outer vacuum leaks on the LN2 Dewar have been repaired and no leaks have been detected on the inner vessel.

The gas management racks, instrument air compressor and dryer, recovery compressor and motor starter are all being installed.

The warm gas compressors are wired and being prepared to be bumped to test for correct motor rotation. Work continues on the cold room piping package and the south wall piping.

Tunnel: Work continues welding the 8" inner lines for the upstream return modules. The warm gas piping is continuing and we are installing the piping to the upstream relief valve system.

Transfer lines: Return module HB15/16 and return module BH 17/18 are completed and ready for shipment to the tunnel. The supply expansion can is completed and ready for shipment to the CHL. (Picture) Work has started assembling the return expansion can.



Beam Diagnostics

BNL SNS Beam Diagnostics Progress Report:

General: Preparations continue for the upcoming Design Review. Confirmed date is March 25th and 26th. Preparations are underway for ASAC Review. BNL will host a visit from ORNL Diagnostics on the 25th and 26th of February.

1.5.7.1 BPM: Continue to check the baseband prototype board. Signal has been traced through all amplifiers and the system filters. Work continues on the RF front end section. Implementing TDR calibration scheme to complement beam-based alignment/calibration, daughter card for baseband board is in preparation. Revisiting the log amp design. Continued machining parts for the additional 6 units of 30cm BPMs.

1.5.7.3 BLM: The 8 channel AFE board is being stuffed. The controls interface document has been written with instructions on how to communicate via digital I/O to the 8-channel AFE. Construction of AFE test stand continues. The final PCB design specs for the 32 channel MPS interface VME module are being refined. Expect delivery of the 10 LND Incorporated BLM ion chamber detectors next week. This delivery has been repeatedly delayed and is moving close to the critical path for DTL. Working with Elma on cost estimates for delivering assembled AFE chassis based upon our design specs. AFE power supplies have been received.

1.5.7.4 BCM: Testing of the stuffed BCM electronics boards continues. Four additional boards are expected to be back from stuffing next week. Received ceramic gaps for HEBT from Ceramaseal. Performed stress analysis on the vacuum chamber during bake-out. Result shows stress in Kovar slightly below yield with 200 C bake-out temperature.

1.5.7.6 Wire Scanners: Continued coordination and design efforts with LANL. Parts for HEBT beam boxes are expected in the next week or two. Exploring the possibility of adding scrapers to the Ring wire scanners for Beam-in-Gap and Halo measurements.

LANL SNS Beam Diagnostics Progress Report:

BPM pickups: We received 6 each vacuum feedthroughs for the DTL BPMs - enough to finish the batch of 10 BPMs. Work on DTL BPM fabrication will now resume. Work continues to map the SCL BPMs. Approximately 22 out of 34 have been mapped so far.

BPM electronics: The next generation PCI motherboards, clock daughter cards, and DFE cards have been fabricated and one each has been mostly stuffed. Some locator holes are too big on these boards, which complicate the assembly but do not (yet) compromise functionality. Testing will commence soon.

WS actuators: The actuator for DTL-1 has been tested and certified ready for installation. This completes the wire scanner actuators needed for DTL-1 and the D-plate. It will be shipped to ORNL soon. The order for the remaining

DTL and CCL actuators was finally placed. We also placed the order for the 8 and 18-inch prototypes. The DTL beam boxes are being re-machined to remove fabrication imperfections. This will cause the wire scanner flanges to move in by about 3 mm. While this will not affect the functionality of our wire scanner system, it must be taken into account and the drawings must be updated.

WS electronics: The electronics for DTL-1 and the D-plate wire scanners have been tested and, with the exception of the interlock wiring, are ready to ship to ORNL. We added fans to the Phytron driver chassis, and they now run much cooler.

D-plate: The slit and harp stepper motor actuators have been tested and certified ready to install. They will be shipped to ORNL soon. Work continues to prepare the mechanical drawing package for release.

ED/FC: The two actuators for DTL-1 and the D-plate have passed their water flow tests. We are now working to address a vacuum sealing problem at the top of the shaft where the electrical boxes screw on. Work continues on the LabView software.

Software: We received maps for the remaining timing registers. We are beginning to integrate them into existing software.

Misc: We are working with ORNL on the actuator interlock system. Thanks to ORNL for their help with this.

ORNL SNS Beam Diagnostics Progress Report:

D-plate: Peter Ladd held the first D-plate fast valve installation meeting. Johnny Tang and Saeed presented their approach to the group. Johnny is implementing the Fast valve controls; Coles will check the implementation and MPS integration. Andy is working on anti-collision circuit for the D-plate actuators. We expect to finish the termination of all D-plate cables by Feb-28th-2003. Mike Plum and Tom agreed on a list of D-plate deliverables that will satisfy the February 28 milestone (D-plate delivery) and allow installation to commence.

Other systems: Wim is working on the software for the anti-chopper diagnostics. He is also working with Dave Thomson on the bi-directionality of the EPICS shared memory. Andy Webster has completed the relay logic for the Collision Avoidance system. This system assures that devices sharing the same beam box will not collide. Andy and Tom are also ironing out MPS interface issues. Craig Deibele presented Fast Faraday Cup results at the AP videoconference. A ring diagnostics workshop was organized to prepare for ASAC and the upcoming DAC review. It will take place on Feb 25 and 26th at Brookhaven. Three candidates for invited talks at ICALEPCS were contacted and responded positively. All are associated with SNS and good give the project some good exposure. The fourth report of the LLRF Advisory Board was released.