Brookhaven National Laboratory

SNS

Ring and Transfer Lines Systems

F E B R U A R Y

MONTHLY REPORT

01 February – 28 February 2001

Performing Organization: Brookhaven Science Associates
Location: Brookhaven National Laboratory
Upton, New York 11973-5000

Contract Period: October 1998 – September 2005

Brookhaven National Laboratory
SNS MONTHLY PROGRESS REPORT
February 2001
Ring and Transfer Lines Systems

I. Senior Team Leader Assessment

1. TECHNICAL PROGRESS AND ACCOMPLISHMENTS

Ring Development – BNL

- Prof. R. Gluckstern of the University of Maryland visited BNL for a week to work with SNS/BNL staff on the impedance of extraction kicker with the "YY Loop". A better theoretical understanding is needed to compare with the simulation calculation and measurement.

- Two visitors from CEA/Saclay visited BNL to have exchange with SNS on the accelerator system design. They gave a talk on the concept of "CONCERT" for multi-purpose European Neutron facility.

- The Provino beam loss and collimation study will resume in April with bending crystals to test the efficiency and life-time. If successful, this can be used as cleaning mechanism in the ring.

Ring and Transfer Lines – BNL

- The SNS/BNL physics group participated SNS ASAC review on February 5-7 at ORNL. The committee recommended that better loss model be developed for realistic estimate. They also suggested complete impedance and instability analysis for the ring system to be presented in the next review in September.

- Three internal design reviews were conducted on Ring System components. They are, 1. Corrector Octupole magnet (21CO26), 2. Corrector Sextupole magnet (21cs26), and 3. RTBT collimator. The reviews suggested some changes that will be incorporated to generate the RFQ.

- On February 14, the BNL and SNS/ORNL mechanical groups on the ring half-cell assembly conducted a 3.5 hours Videoconference. This covered the half-cell support, assembly procedures, magnet measurement and fiducilization, survey, BPM mounting, travelers and shipping.

- In the same meeting, the magnetic measurements of the 5 meter long HEBT dipole magnets were also discussed. The ASD engineer group suggested that BNL does the complete first article magnetic field measurement at BNL. The vendor, Tesla only does transfer function measurement at several excitations. The production measurement will be done at ORNL with direct shipment of magnet from the vendor to SNS. The first magnet will arrive at BNL in August.

- The contract for corrector power supply has been awarded to Danfyzik for HEBT, AR, and RTBT. LANL wants to purchase another 100 unit at same price as an add on to BNL order.

- A pair of Power Supply Interface (PSI) was acceptance tested at Apogee and delivered to BNL for performance test. Since the design is more versatile and cost less, ASD suggested that LANL use the same design.

- The prototype Laser Wire Scanner was tested in the BNL linac beam line to generate both horizontal and vertical Gaussian beam profiles with the standard deviation very close to historical data.

- BNL vacuum group staff participated in the Jlab vacuum hardware/controller review. BNL decided to use commercial units instead of Jlab's "special design" since the Jlab design needs substantial rework to suit ring large ion pumps and have only limited remote diagnostic capabilities.

- On February 12th, D. Gurd, B. Devan, and T. Shea visited BNL to discuss integration issues related to Diagnostic and Control effort at BNL.

- BNL engineers worked with SNS/ORNL designer, A. DeCarlo on the equipment layout in the ring service building. This will reduce the ring service building dimension to save cost on the conventional facility.

2. ISSUES AND ACTIONS

- The proposed R&D effort to develop diamond-structure foil is on-hold. Without progress, the SNS has to use existing carbon foil with much shorter life-time.

- The early transfer of components from BNL to SNS/ORNL as suggested in the cost reduction plan needs more iteration to ensure quality of component and future performance.

- The baseline of the Accelerator Complex of the SNS needs clear definition to ensure interface among the accelerators.

3. COST AND SCHEDULE STATUS

3.1 VARIANCE ANALYSIS AND PROJECT COST PERFORMANCE REPORTS

WBS 1.1.3 R&D

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4564.7	4564.7	4403.3	0	0%	161.3	3.5%

Variance Statement: Variances are within thresholds. No analysis requied.

Project Impact: None.

Corrective Action: None.

WBS 1.5 Ring and Transfer Lines

BCWS	BCWP	ACWP	SV	%	CV	%
23915.3	23376.4	23179.9	(538.6)	-2.3%	196.8	0.8%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None

3.2 MILESTONE STATUS

WBS 1.5 has no level 0 milestones. Milestone status is listed below.

Milestones	Level 1	Level 2	Level 3	Level 4	Level 5
Project	1	2	10	13	157
FY01	0	0	0	4	31
Due in Next 30 days	0	0	0	0	0
Total Due at present	0	0	3	11	78
Made	0	0	3	10	75
Missed	0	0	0	1	5
Ahead of Schedule					2

3.3 PROJECT CRITICAL PATH ANALYSIS

The critical path for the Ring is the Diagnostic Instrumentation, specifically the BPMs. The next area that is critical within the ring is vacuum chambers and the ring dipole and quad magnet assemblies.

II. Detail R&D Subproject Status

WBS 1.1.3 – Ring System Development

In February main activity of the group involved study of new working points following ASAC recommendation. As a result, we now basically have two options.

Analytic work on understanding the impedance of the extraction kickers continued. The main unresolved question is to understand/verify the strong dependence of the resonant frequency on the permeability as found by V.A. Danilov.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4564.7	4564.7	4403.3	0.00	0.0%	161.3	3.5%

Variance Statement: Cum variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

III. Detail Line Item Subproject Status

WBS 1.5.1 – HEBT Systems

Discussions continued with Tesla Engineering Ltd and the Project office on magnet measurements. The final agreement is that Tesla will not do magnet measurements on any of the ring dipole magnets that they produce. Tesla accepted this outcome and the cost of magnetic measurements will be removed from the contract. Tesla did agree to do a single point magnetic measurement at the center of the magnet as part of the testing procedure prior to shipping.

SNS-ORNL (T. Hunter) will take over responsibility for doing the magnetic measurement of the production dipole magnets. T. Hunter will be setting up a measurement facility in the RATS building to do these measurements. SNS-BNL will do the integrated measurement of the first article dipole magnet to verify that it meets the Physics Group parameters. That magnet will then be shipped to ORNL. ORNL is requesting that BNL fabricate a long measurement coil for doing the integrated measurement on the production magnets at ORNL. P. Wanderer will have one of his engineers design and fabricate the necessary coil.

The procurement package (statement of work with phased procurement, specifications with magnetic measurements, and drawings) for the 12Q45 quadrupoles and 16CD20 corrector magnets was prepared and sent out for bid. One more 3D magnetic analysis was done and a final design review was held before the bid package was released.

The revised drawings for the standard and injection dipole chambers are released. The extraction dipole chamber revisions are modeled and being checked. The wire scanner in the HEBT arcs was moved to QH12 to allow the standardization of quadrupole chamber.

Integration with the vacuum chamber is continuing.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2122.3	2040.6	1858.9	(81.7)	-3.8%	181.7	8.9%

Variance Statement: Cum variances are within thresholds. No analysis required. Current period SV of -$77.2K (-44.4%) is driven by 1.5.1.1 SV of -$31.5K Vendor Fab 1st delivery 8D533 Magnet and 1.5.1.2 SV of -$39.9K HEBT Dipole PS procurement.

Project Impact: None.

Corrective Action: None.

WBS 1.5.2 – Injection Systems

Detailed design of the revised injection septum magnets and the injection kickers continues. The dump septum magnet drawings still await back correction because the designer is working on checking. A four designer has been assigned checking drawings to reduce the backlog. The injection foil mechanism had some additional minor changes. It will be approved next month. The injection C magnet is back in the checking queue. It has been set at 1GeV.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1618.3	1565.9	1769.4	(52.7)	-3.3%	(203.5)	-13.0%

Variance Statement: Injection System cum period CV of -$203.5K (-13.0%). This is labor driven 1.5.2.2 Injector Kicker Power Supply CV of -$105.6K and 1.5.2.5 Stripped Foil CV of -$85K which reflects higher costs than planned.

Project Impact: None.

Corrective Action: None.

WBS 1.5.3 – Magnet Systems

The ring magnet assembly area has been moved from building 912 to building 902. This will allow magnetic measurement to be done in the same building at _ cell assembly. The coils have been moved to this building and QA testing continues. The coil test specifications have been written and are going through the approval cycle. The _ cell transport containers have been ordered.

The core steel for The Allied Engineering (production order for the 1.3 GeV ring dipole magnet cores) will be poured in March.

The order for the 21Q40 has been placed with the low bidder Tesla Engineering Ltd. The bids for the 27CDM30 corrector procurement package are due in the beginning of March. The parts for the first _ cell base support are being fabricated.

A design review for the 21CS30 and 21CO30 sextupole and octopole corrector magnets was held. It was agreed that the field strength of the 21CS30 was higher than needed and resulted in the power supply not running at a current that provided optimal regulation. The number of windings on the magnet was reduced to bring the magnet to specifications. The detail drawings for the magnet are being generated.

Detailed design has been completed on the large aperture ring straight section doublet quadrupole assembly. This includes both quadrupole designs and the corrector design. The

drawings are in the checking queue. Both the 26Q40 and the 30Q45 quadrupoles are being modeled in Opera 3D to verify the end fields before the final design review.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3419/5	3335.5	3632.7	(84.0)	-2.5%	(297.1)	-8.9%

Variance Statement: Cum variances are within thresholds. No analysis required. Current period SV & CV are driven by 1.5.3.1 High Field Magnets SV -$40.1K & CV -$189K.

Project Impact: None.

Corrective Action: None.

WBS 1.5.4 – Power Supply Systems

The Power Supply Interface/Controller (PSI/PSC) are being tested and de-bugged. The analog tests have provided results that have allowed us to proceed with the long lead A/D and D/A production orders for the boards.

The Final Design Review for the Low Field correctors will be held at the vendor's facility on March 29th an 30th. Along with the BNL attendees, the power supply engineer from LANL will also attend. It is likely that LANL will order units identical to those that will be purchased by BNL, for the LINAC.

Both electrical and mechanical designs are proceeding with the extraction kickers. On the mechanical side, the high voltage tank that holds the PFNs is being designed. On the electrical side, the specification for the PFN capacitors is being completed. Other components for the prototype are already at BNL: the thyratron, the high power resistors, and charging supply.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
603.7	498.7	404.1	(105.0)	-17.4%	94.6	19.0%

Variance Statement: Power Supply Systems Cum period SV -$105K (-17.4%) and Current period SV -$40K (-46.8%) are driven by 1.5.4.1 High Power PS System, which is slightly behind schedule.

Project Impact: None.

Corrective Action: None.

WBS 1.5.5 – Ring Vacuum System

The revised drawings of arc half-cell chambers have been completed and are in checking. The layout of the injection straight section chambers were revised to provide more pumping ports and to reduce the length of the doublet chambers. Design of vacuum chambers at extraction section and at beginning of RTBT line has started. Orders were placed for the arc bellows and pump crosses.

A meeting was held at Jefferson Laboratory to discuss the suitability of JLAB ion pump power supplies for use throughout the SNS vacuum systems and the RF interlock requirement. A turbopump station design was also presented and accepted as SNS standard. The draft specification and SOW for large ion pump were completed and distributed to PO, partner lab and the vendors for review. An order was generated to purchase one set of gauges and controller for evaluation.

Development of TiN coating on extraction kicker ferrites and ceramics has been started. A PCR on coating of extraction kicker ferrites with TiN was submitted to PO for approval. The vacuum system DCD was drafted and submitted for comments.

The pressure profiles in HEBT, Ring arcs and RTBT were modeled using Vaccalc and found to be consistent with previous calculation. The simulation also shows that the locations of leaks at end of RTBT inside the Target building can not be identified through pressure profiles measured with vacuum gauges.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1679.9	1609.0	1520.7	(70.9)	-4.2%	88.3	5.5%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.5.6 – RF System

Began assembling the first RF cavity. Held the final, in factory, review of the anode supply. The first article is scheduled for delivery by the end of March. Began assembly of the capacitor bank for the anode supply.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3124.8	3043.3	2778.7	(81.5)	-2.6%	264.6	8.7%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.5.7 – Ring Diagnostics

General:

- 8753 was interfaced to PC/LabVIEW for extraction kicker impedance measurements.

WBS 1.5.7.1 – BPM

- x-y table adapter plate drawing for 21cm Ring PUE completed, released to shops.
- Drawings for 12cm HBET PUEs are in checking, detailed design of 30cm Ring PUE continues.
- Drawings were signed off for the 12cm HEBT PUE.
- Impedance checking of 21cm Ring PUE was completed.
- Feedthru quote came in far above vendor estimate of six months ago (due to re-organization and facilities movement at Kaman), not-critical specs were relaxed to permit an additional vendor to bid.
- Production quantities of Ring and HEBT PUEs went to outside vendors for quote.
- A group member reviewed the MIT-Bates EPICS-based real-time turn-by-turn phase space display.

WBS 1.5.7.2 – IPM

- electron detector AFE board was received and stuffed, is ready for testing.
- Detector modifications (shielding) to reduce ringing were completed. Network analyzer measurements show the modifications were successful.
- Electron detector AFE testing shows a gain of about 100 and good S/N ratio, with a BW of around 20MHz.
- Assembly of the last electron detector is complete, preparations are underway for installation in test chamber and calibration with the electron gun.

WBS 1.5.7.3 – BLM

- Lab testing of the effect of spot knocking continues.
- Efforts to clarify the situation regarding ion chamber bias polarity continue.

WBS 1.5.7.4 – BCM

- A group member travelled to LANL for the BPM review, and while there worked to strengthen the collaboration with LANL to use the PCI-based digitizer interface. There has been additional focus on inter-lab commonality of DC conversion circuitry on the AFE daughterboards.
- A new revision of the Draft Interface Control Document (ICD) was completed and distributed for comments.
- Work continues on finalizing the AFE schematics.
- Work continues on the BCM system 'brochure', which is almost ready for review.
- Bob Webber visited BNL. We presented work to show the feasibility of using digital droop compensation to take advantage of a single transformer for both fast and slow data. It was also pointed out that the system could calculate, on a periodic basis, the droop time constant by using the droop signal recovery for each pulse. A summary of the work was provided in written document form. Bob will read it and digest it before making more comments.
- The Analog Front End design for the BCM has been completed sufficiently to start the circuit board layout effort. Parts deliveries continue.

WBS 1.5.7.5 – Tune

- Efforts continue on beam modelling for the prototype PLL tune measurement. Beam simulation is computer intensive, and a good work-around was implemented by replacing the lengthy FIR-based convolution with the equivalent and much faster LaPlace transform/IIR equivalent.
- Analog circuit changes (comparator, level shifter) for prototype PLL tune measurement were completed. Prototype AFE board layout is complete, board is out for fabrication.
- Investigation of a resonant quadrupole pickup continues.

WBS 1.5.7.6a – Carbon Wire Scanner

- Detail drawings for the MEBT wire scanner are ready for checking.
- Work continues on details of carbon wire attachment, including lab tests of adhesives for attaching ceramic insulators to stainless steel.
- Response to Design Review Action Items concerning wire heating was circulated.

WBS 1.5.7.6b – Laser Wire Scanner

- Based upon the results outlined below, we are preparing a proposal implement laser wires as the primary profile diagnostic in all areas with H-minus beam.
- Detailed design of a cylindrical lens is in progress. This will permit reduction of laser power by a factor of ten, and makes the laser wire cost-competitive with carbon wires.
- Horizontal and vertical beam profiles were acquired in the AGS Linac POP experiment. The gaussian fits have sigmas of X=3.15mm and Y=6.42mm. These values agree quite closely with the beam size expected by the linac operators. Jpegs of the data were circulated throughout the project.

- The spectral power in the BNL linac was measured and there were lines at 250kHz and 200 MHz. Bandpass filters centered around 50-70MHz were ordered and received, and improved profiles were acquired.
- A boxcar averager was ordered for data collection. With appropriate filtering this should be a good solution to at least 3 sigma in the linac.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2448.5	2320.1	2567.2	(128.3)	-5.2%	(247.1)	-10.7%

Variance Statement: Ring System Diagnostic Instrumentation Cum period CV -$247.1K (-10.7%) is driven by 1.5.7.2 Ring Profile Monitor CV -$145.2K and 1.5.7.5 Ring Tune Monitor CV -$125K which reflect higher costs than planned. Current period SV -$76.5K (-31.3%) is driven by 1.5.7.4 Ring Beam Current Monitor SV -$30.2K and 1.5.7.5 Ring Tune Monitor SV -$34.

Project Impact: None.

Corrective Action: None.

WBS 1.5.8 – Collimation and Shielding

Drawings of the tube structure (double walled and helium control valves) have been prepared, and will be combined with the drawing of the RTBT inner collimator structure as a package. This package is currently in checking.

The prototype moveable shield has been completed and is currently being painted. A safety review of its operation is planned.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
716.6	712.5	764.4	(4.1)	-0.6%	(51.9)	-7.3%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.5.9 – Extraction System

The detail fabrication drawings for the prototype extraction kicker are still in the checking queue. The layout of an oil filled version of PFN design was reviewed and then given to designer for

detailing. This design includes a sealed oil tank and a U-shape top plate with most of the components installed under it. This U-shape top plate will keep oil level higher than any device in the tank. The resistor pack will be cooled by convection heat transfer and is submerged in the oil tank. The resistor pack is mounted from top plate and can be removed for service.

A revised layout of the Extraction Region was developed; from the Lambertson Septum to the first 21Q40 quadrupole in the extraction transfer line, including vacuum chambers, transitions, bellows and flanges. The new layout allows for the correction in beam elevation to the Target Station while minimizing beam loss throughout the region.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
546.7	515.8	464.6	(31.0)	-5.7%	51.1	9.9%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None

Corrective Action: None.

WBS 1.5.10 – RTBT System

The Vertical Dipole Pitching Magnets (formerly 17DV50), of which there are now three, have been re-engineered. The magnets 3D model is currently being reworked to reflect the change in aperture, field strength, and coil design.

A preliminary 3D model has been developed of the region from the last (31QN45) magnet to the tunnel wall penetration at Extraction Dump; including the dump window. A finite element analysis was performed on the dump window constructed from AlBeMet compound by BrushWellman. The FEA proved the feasibility of locating an edge-cooled window in this accessible region where the energy density is highest.

The vendor for mineral insulated coil sent a sample short length of conductor to BNL for evaluation. This is the water cooled conductor for the 36Q45 quadrupole magnets. A request as been sent for the cost of the conductor required to build a set of coils for one magnet for test and evaluation.

Drawings for the inner collimator structure for a RTBT collimator are complete and an internal review has taken place. Modifications suggested at the review have been incorporated. These drawings will be combined with the drawings of the Ring collimator as a package to be bid on by potential manufacturers. This item will be the first collimator to be manufactured.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
912.4	1013.1	906.8	100.7	11.0%	106.3	10.5%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.5.12 – Technical Support

Beam dynamics studies for a new working point were conducted including frequency maps and resonance identification. The conclusion is that we may want to move below the 4th order resonances in both plains to avoid excitation due to fringe-fields.

- The 21Q38 quadrupole magnet has been modeled with TOSCA 3D. The dominant dodecapole error is around 9e-4 and the next allowed harmonic (b_10) is 42E-4. All other harmonics are less then 1e-4. Tracking with this new error table is in progress.

- The sextupole corrector was modeled in TOSCA 3D. The first allowed harmonic b_9 is 1% of the integrated sextupole field. The influence in the dynamics is negligible due to the low field of the corrector.

Started application development with control group of injection bump magnet current setting, visualization, its interface with EPICS and user

Updating SNS/BNL naming database and optical database.

We have started calculating loss pattern along the entire accelerator.

Measured the kick impedance.

Reviewed the magnets list for transfer lines and ring.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
6718.5	6718.5	6511.6	0.0	0.0%	206.9	3.1%

Variance Statement: Variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.9.1 – R&D

WBS 1.9.2.2 – Global Timing

A prototype eventlink master remains set up in the SNS controls lab for driver development.

(V101) – Eventlink input modules:

This task is complete. 12 modules have been built

V124s – Beam synchronous decoder:

A prototype PCB has been purchased and assembled at Brookhaven. Prototype testing has begun. A revised draft of the V124s module description has been written. This task is on schedule.

V123S – Beam synchronous encoder:

Assembly of additional prototype V123s modules is underway.

Orders are being generated for components to begin building the SNS RTDL system. At a meeting earlier this month at Brookhaven, SNS has agreed to wait until Brookhaven has redesigned the RTDL input module for the RHIC system to purchase its production modules. The only remaining question is what modules should we build for prototype systems until the production modules are built? The original 2 channel modules are usable in the production system, but are less cost effective than the 8 channel modules to be developed,

Brookhaven has agreed to begin construction of 12 eventlink fan out chassis and generate an cost estimate to revise the 1 x 8 fanout to a 1 x 16 fanout.

While you were here at Brookhaven last month, we discussed adding a PLL in front of the V123s to avoid problems if the RF chassis supplying the 32x clock is reset or powered off. The system used at RHIC does NOT solve this problem. In the case of RHIC, the PLL is switched over to the reference clock on the occurrence of an event only. The event initializes the LLRF and during that time the clock supplied by the RF is unavailable for about 1 ms. This does not solve the problem that can arise from the RF turning off the eventlink clock source. This needs more discussion.

WBS 1.9.5.1 – Ring Controls Integration

Dave Gurd and Bill Devan from ORNL were at BNL this month for 2.5 days. There was a review of the project status for power supplies, Vacuum, RF, Timing, Diagnostics, Database, Naming conventions and application software.

We have setup equipment in the lab to test timing boards. We have received assistance from CA personnel to demonstrate that the new timing board is operational before developing Epics driver software. We are using some CA hardware to build a system that will enable testing the hardware. The development of timing driver software has started.

Documentation for the SNS/BNL naming convention and database entry is being written. We are continuing to update the Naming and optical database.

BNL has been working with ORNL to the setup of the ADE and new server at ORNL.

WBS 1.9.5.2 – Power Supplies

PSI/PSC:

We received a prototype of the PSC and PSI boards for testing. We wrote software to check out the hardware. We found that a problem with the fiber optic receiver logic was giving us various intermittent problems. Apogee was able to correct the problems and now we are planning to do some more extensive testing. Setpoint and readback accuracy and long term reliability test will be performed.

Ethernet Digitizer & Function Generator:

We have not as yet received any more information from Yokogawa on how to program the Ethernet interface. These will be needed for the injection supply controls. An injection power supply is expected to be ready for testing in the summer. The power supply group wants software and hardware ready to test the supply. We will have a meeting next month to determine the schedule requirement.

Software Development:

There was a meeting with Dave Gurd and Bill Devan from ORNL to review the developments in the power supply and other areas. We demonstrated some of the power supply engineering screens that were developed with input from the power supply group. We also demonstrated Web based software that presented graphs of waveforms with scaling and overlay options. The latter is an analysis tool for browsing and studying of waveform data from power supplies.

WBS 1.9.5.3 – Diagnostics

There was a meeting with the diagnostic group while Dave Gurd and Tom Shea were at BNL. It was agreed that more work had to be done on defining the diagnostics interface to controls. Next month an ICD for the Beam Current Monitor is planned. Controls will assist the diagnostics group generate the ICD.

This month we were able to implement the controls for the LeCroy scope from a PC using Labview and portable channel access server software. Next month we will add software to run a motor controller on the same PC using Labview.

WBS 1.9.5.4 – Vacuum

A preliminary ICD for the SNS Ring Vacuum system was completed.

There was a vacuum meeting at JLAB this month. The purpose was to review the hardware used at JLAB and determine if it was suitable for the whole SNS. Some questions remain and it was agreed that the decision on what hardware to use would be postponed a few months.

The Vacuum controls lab at BNL was upgraded by adding some real vacuum components. This will help in the development of controls in a few months.

WBS 1.9.5.5 – Application Software

UAL 2.0: Online SNS Simulation Facility:

A demo of the SNS Ring Application Manager with MEDM-based Power Supply Applications was implemented. This demo is designed after the NSLS Application Manager and Windows Explorer and aims to consolidate and organize heterogeneous engineering and commissioning applications (e.g. MEDM screens, Java packages, scripts, etc).

Installed and tested the JCA (Java interface to Channel Access) package on the sun1.sns.bnl.gov server. In addition, the small demo has been implemented to test the JCA package with Swing Components in the multithreaded environment. The demo is designed to access data from the Power Supply Simulator IOC.

UAL 1.0: Off-line Simulation Environment:

The Web documentation for the ORBIT module of UAL 1.0 environment has been prepared. This documentation includes the description of Perl API and C++ classes for parallel and non-parallel versions of the ORBIT module. The new WEB-server Apache/1.3.14 was installed on the Sun-Solaris system to allow testing new online UAL documentation. Apache/1.3.14 allows easiest control than the existing WEB-server. . A DOC++, version 3.2, documentation system for C/C++ and Java applications, has been installed onto Sun-Solaris system and Linux cluster. This system enables us to generate WEB documentation on the base of comments into a source code of applications.

Support and consultations were provided to the AP-group (Alexei Fedotov) during the initial period of work with the parallel version of UAL 1.0 on the Linux cluster. A part of the supporting documentation was revised.

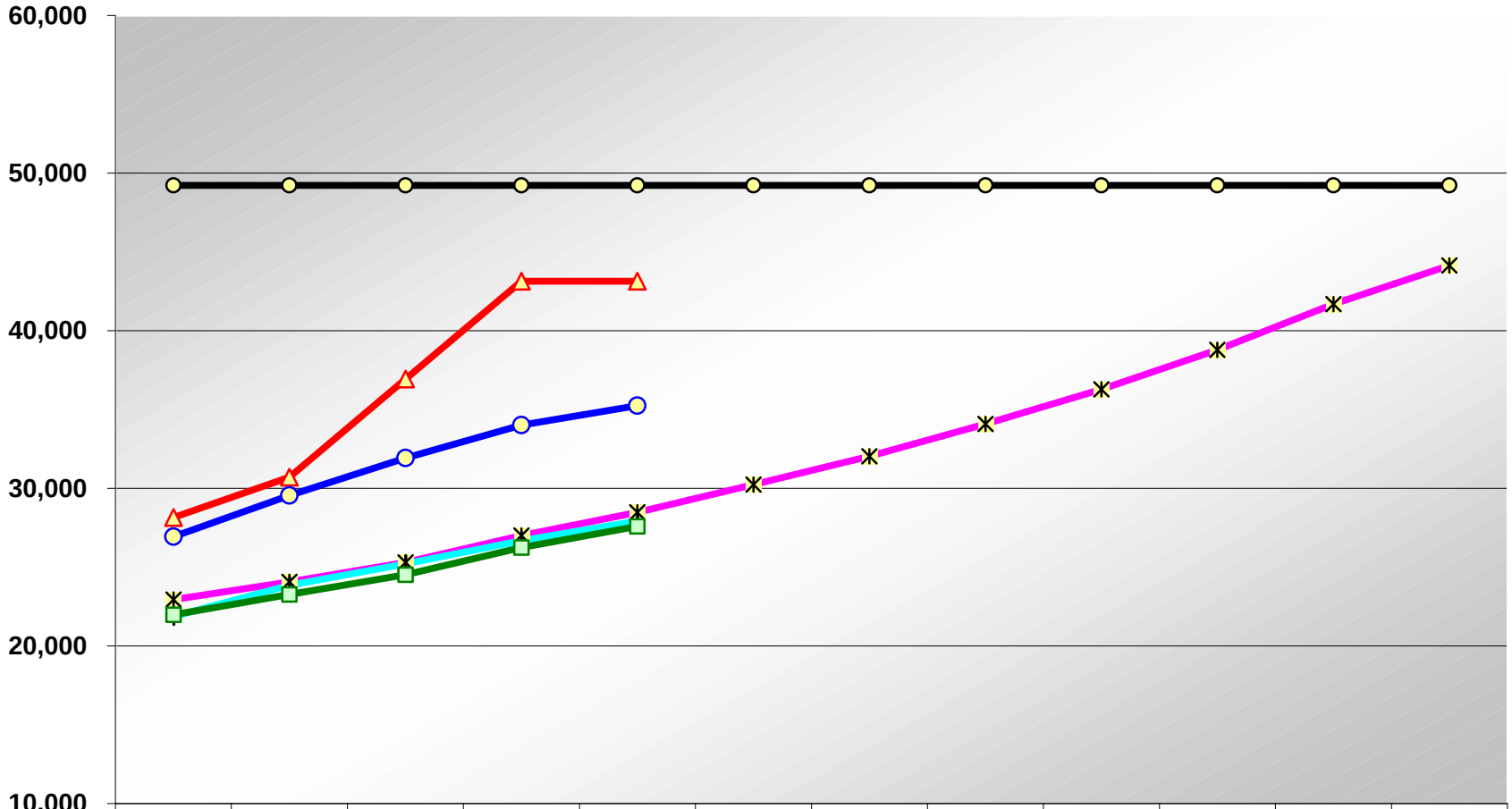
Worked with French colleagues planning to evaluate the UAL 1.0 simulation environment for the CONCERT (Combined Neutron Center for European Research and Technology) project. During this visit we have identified common tasks and approach for installing the UAL 1.0 environment on their computer system before the UAL 1.0 public release.

WBS 1.9.5.6 – RF

There was a review of the planned architecture for the High Level RF with the controls group, Dave Gurd, and Alex Zaltsman.

IV. Earned Value Reports and Charts

1.5 & 1.1.3 Performance Measurement Chart



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Cum Planned BA	49,225	49,225	49,225	49,225	49,225	49,225	49,225	49,225	49,225	49,225	49,225	49,225
Cum Authorized BA	28,155	30,710	36,924	43,138	43,138							
Cum Actual BA	26,928	29,553	31,930	34,012	35,242							
Cum BCWS	22,943	24,067	25,297	27,013.5	28,480	30,234	32,041	34,075	36,278	38,790	41,692	44,135
Cum BCWP	21,864	23,850	25,201	26,688	27,938							
Cum ACWP	21,979	23,263	24,516	26,238	27,582							

Months

U.S. DEPARTMENT OF ENERGY
COST PERFORMANCE REPORT - WORK BREAKDOWN STRUCTURE (FORMAT 1)

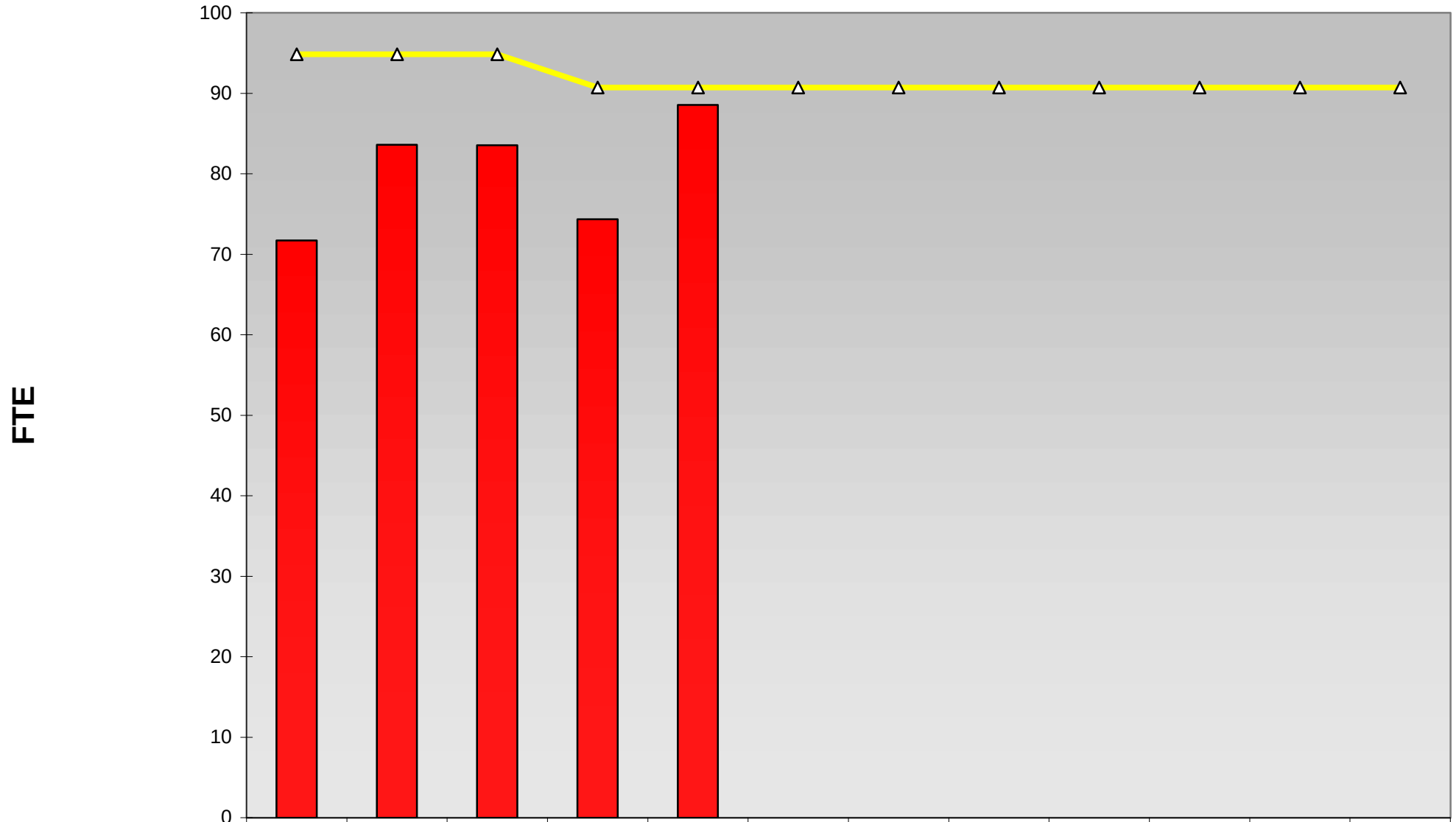
PROJECT TITLE: SPALLATION NEUTRON SOURCE	**REPORTING PERIOD:** 1-Feb-01 thru 28-Feb-01	**PROJECT NUMBER:** 99-E-334
		START DATE: October 1998
PARTICIPANT NAME AND ADDRESS: Brookhaven National Laboratory, Brookhaven, NY	**BCWS PLAN DATE:** October 1999	**COMPLETION DATE:** November 2006

WORK BREAKDOWN STRUCTURE	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance				
	Work Scheduled	Work Performed	of Work Performed	Schedule	Cost	Work Scheduled	Work Performed	of Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
1.1.3 Rings System Development	70.1	70.1	94.4	0.0	(24.3)	4,564.7	4,564.7	4,403.3	0.0	161.3	5,111		
1.5 Ring & Transfer Line System	1,396.4	1,179.9	1,250.0	(216.4)	(70.1)	23,915.3	23,376.7	23,179.9	(538.6)	196.8	121,682		
1.5.1 HEBT (High Energy Beam Transport) Systems	173.9	96.6	102.3	(77.2)	(5.7)	2,122.3	2,040.6	1,858.9	(81.7)	181.7	10,700		
1.5.2 Injection Systems	65.9	56.7	63.0	(9.2)	(6.3)	1,618.6	1,565.9	1,769.4	(52.7)	(203.5)	9,066		
1.5.3 Magnet Systems	178.3	133.1	302.2	(45.2)	(169.1)	3,419.5	3,335.5	3,632.7	(84.0)	(297.1)	16,165		
1.5.4 Power Supply System	85.5	45.5	32.3	(40.0)	13.2	603.7	498.7	404.1	(105.0)	94.6	5,355		
1.5.5 Vacuum System	61.1	81.8	79.7	20.7	2.1	1,679.9	1,609.0	1,520.7	(70.9)	88.3	11,332		
1.5.6 RF System	148.5	119.5	83.1	(29.0)	36.4	3,124.8	3,043.3	2,778.7	(81.5)	264.6	13,159		
1.5.7 Ring Systems Diagnostic Instrumentation	244.6	168.1	192.1	(76.5)	(24.1)	2,448.5	2,320.1	2,567.2	(128.3)	(247.1)	16,271		
1.5.8 Collimation and Shielding	38.3	19.2	22.4	(19.1)	(3.2)	716.6	712.5	764.4	(4.1)	(51.9)	2,779		
1.5.9 Extraction System	53.7	30.3	21.7	(23.4)	8.7	546.7	515.8	464.6	(31.0)	51.1	5,092		
1.5.10 RTBT (Ring to Target Beam Transport) System	62.5	145.0	44.4	82.5	100.6	912.4	1,013.1	906.8	100.7	106.3	8,635		
1.5.11 Cable	0.0	0.0	0.0	0.0	(0.0)	3.8	3.8	0.7	0.0	3.0	2,674		
1.5.12 Technical Support	284.1	284.1	306.7	0.0	(22.6)	6,718.5	6,718.5	6,511.6	0.0	206.9	20,454		
WBS SUBTOTAL	1,466.5	1,250.0	1,344.4	(216.4)	(94.4)	28,480.0	27,941.4	27,583.2	(538.6)	358.1	126,792		
UNDISTRIBUTED BUDGET													
SUBTOTAL	1,466.5		1,344.4			28,480.0		27,583.2			126,792		
MANAGEMENT RESERVE													
TOTAL	1,466.5		1,344.4			28,480.0		27,583.2			126,792		

RECONCILIATION TO CONTRACT BUDGET BASE

DOLLARS EXPRESSED IN: THOUSANDS	SIGNATURE OF PARTICIPANT'S PROJECT DIRECTOR: Bill Weng	DATE: March 26, 2001

1.5 & 1.1.3 WBS Labor Accounts



	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Actual Monthly FTE	72	84	84	74	89							
Planned Monthly FTE	95	95	95	91	91	91	91	91	91	91	91	91

Months

1.5 & 1.1.3 WBS Labor Accounts Chart 1