Brookhaven National Laboratory

SNS

Ring and Transfer Lines Systems

M A Y

MONTHLY REPORT

01 May – 31 May 2001

Performing Organization:	Brookhaven Science Associates
Location:	Brookhaven National Laboratory Upton, New York 11973-5000
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Brookhaven National Laboratory
SNS MONTHLY PROGRESS REPORT
May 2001
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I. Senior Team Leader Assessment

1. TECHNICAL PROGRESS AND ACCOMPLISHMENTS

Ring Development – BNL

- The laser wire profile monitor received great attention at the diagnostic workshop in Europe. The merit of the device is the non-destructive nature of the process and the resolution it could afford with a special electron detector. The AGS plan to develop a similar device for the 200 MeV Linac operation.

- A ceramic vacuum chamber has been acquired to develop the Ti-N coating procedure for the injection kicker. This coating serves two purposes, one is to reduce the secondary electron emission coefficient, the other is to provide good conduction for the image current.

- The first PFN model for the extraction kicker confirmed the design parameters and performance of the kicker waveform required. The engineering prototype will be constructed for detailed specification of the PFN. Mass production of eleven more units will be done by industry.

Ring and Transfer Lines – BNL

- The first prototype of the 21 cm ring BPM has been assembled and tested for performance. This unit will be incorporated into the first half-cell assembly. Mass production of about 40 units for the ring is under preparation. The HEBT and RTBT BPMs are also in the first article development stage.

- The transfer function of the 21Q40 has been measured to confirm the 3-D design calculation. The integral field varies by about half percent which can be compensated by excitation. The 26Q40 bid is higher than our estimate by about 10%. We have signed the contract with vendor for first delivery in November.

- The test of the first ring vacuum chamber has been completed. The end configuration of the chamber has been improved. The mass production has began and we expect steady

delivery starting October in time for future half-cell. The 6 m long vacuum chamber for the HEBT line is on its way to BNL to arrive in the middle of June.

- The Allied Engineering has completed the final machining of the ring dipole core. This unit is expected to arrive at BNL in mid June. All the required components for the first half-cell, including the base, have been on hand for half-cell assembly. This one will be the one without sextupole.

- The bid package for the 21 cm multipole field sextupole and octupole correctors has been completed and will be sent to vendor by the end of June for RFQ.

- The design of the medium power supply has been reviewed by the project office and the bid package is under preparation for vendor's quote.

- Two more design review by the project office was conducted in this month, one was the injection area layout and the other is the half-cell assembly. The injection area configuration is energy-dependent within 5% of linac energy. Since now the injection energy is fixed at 1.0 GeV, we can produce the final configuration for construction.

- A videoconference was conducted between BNL and ORNL on the final beam pipe design for three beam dumps. The final resolution follow the practice of the RTBT to target agreement. That means that the demarcation line of responsibility is at the final optical element of the upstream transport system. ORNL will lead on the design of last pipe connecting to the dump and the associated shielding and maintenance procedures.

- BNL participated in the DOE review on May 15-18 at ORNL. The committee recognized the restructure of the SNS/BNL staff and the reporting of the STL directly to the lab director and expected a more focused staff and better support from BNL. BNL completed 7 out of 9 required control documents for the design of level 3 systems and interface with other level 2 systems. The EDIA of the WBS 1.5 has been reduced by simplifying design, reducing manpower, and following new DOE guideline. The BNL rate falls within the DOE recommendation and found to be not excessive compared to other partner labs.

- The DOE review committee also recommended to restore the chromaticity sextupoles, to complete the impedance and instability study, and to continue improve on the e-p issue.

- During the STL videoconference, the BNL procurement performance seemed to fall behind the original plan. The problem is created by the phase funding of some of the procurement contract. From now on, BNL will have about 5 more APP procurements and will purchase those components in full supply to meet the procurement plan.

2. ISSUES AND ACTIONS

- We have completed our machine study at Provino on collimation and loss model. No more study is under plan since the funding has been terminated. A report will be generated on the results of the study.

- DOE review recommended that the SNS project has to do a bottoms-up estimate on the Estimate-to-Complete.

- The early handoff agreement has to be finalized before the estimate can begin.

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	%
4804.4	4804.4	4969.9	0.00	0.0%	(165.5)	-3.4%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV -$46.5K is driven by 1.1.3.2 Injection & Extraction whereas ACWP (labor) is greater than BCWP.

Project Impact: None.

Corrective Action: None.

WBS 1.5 Ring and Transfer Lines

BCWS	BCWP	ACWP	SV	%	CV	%
29126.6	27208.1	28226.0	(1918.5)	-6.6%	(1017.9)	-3.7%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period SV -$788.1K (-40.3%) is driven by 1.5.1, 1.5.6 & 1.5.7. See details below.

Project Impact: None.

Corrective Action: None

3.2 MILESTONE STATUS

WBS 1.5 and 1.1.3 have no level 0 milestones. Milestone status is listed below.

Milestones	Level 1	Level 2	Level 3	Level 4	Level 5
Project	1	2	8	13	160
FY01	0	0	0	4	30
Due in Next 30 days	0	0	0	0	5
Total Due at present	0	0	3	11	86
Made	0	0	3	11	79
Missed	0	0	0	1	9
Ahead of Schedule	0	0	0	1	2

3.3 PROJECT CRITICAL PATH ANALYSIS

The critical path for the Ring is the Diagnostic Instrumentation, specifically the BPM and IPM systems. 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

Simulations of the RF system including dynamic tuning and low level loops continued.

The group mainly worked on the following:

- The group presented five talks in the DOE Review.
- The group will be presenting 25 papers to PAC.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4808.4	4808.4	4969.9	0.00	0.00%	(165.5)	-3.4%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV -$46.5K is driven by 1.1.3.2 Injection & Extraction whereas ACWP (labor) is greater than BCWP.

Project Impact: None.

Corrective Action: None.

III. Detail Line Item Subproject Status

WBS 1.5.1 – HEBT Systems

Three phone conferences were held with Tesla during the month. They have completed fabricating parts for the winding fixture and have started to assemble it. They are still on schedule to start winding coils in June. Metals USA shipped the steel to Tesla on May 30. They estimate three weeks for shipping time to the UK. There is an issue with the work schedule for the long milling machine at Tesla for making the cores. Tesla is working on a resolution.

The purchase order for production of the 12Q45 quadrupoles and 16CD20 corrector magnets was awarded to Danfysik. This is a phased procurement with _ the magnets funded this fiscal year. There was some delay as Danfysik renegotiated the payment schedule. An engineer has been assigned to this project and two phone conferences have been held. The present estimated delivery date is still 10/30/01 though Danfysik has not ordered materials yet. A request was made by the instrumentation group to put trim windings on the 12Q45. An ECN was generated and the drawing changes are underway. A price change will have to be negotiated with Danfysik and then a PCR request will be generated with the funding coming from the instrumentation group.

Vendor visits for both Tesla and Danfysik are being planned for June. All the necessary paper work has been submitted and approved.

Detail drawings of the 21cm quadrupole chambers and components in the HEBT arc are complete. Design work is underway on the 12 cm HEBT vacuum system using the layout created last month. The vendor has shipped the first standard HEBT dipole chamber due to arrival at BNL in mid June. The drawings for HEBT extraction dipole chambers have undergone physics review, approved, released and provided to the vendor. Potential vendors were contacted to supply high quality 4.5" and 8" tubes for HEBT and RTBT. Quotes for 8" Inconel 625 bellows were received from potential vendors.

Integration of the absorber with the vacuum chamber is continuing.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2603.5	2350.5	2254.8	(253.0)	-9.7%	95.7	4.1%

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

Current period SV -$197.6K (-88.6%) and CV -$194.7K (-766.6%) is driven by 1.5.1.1 HEBT Magnets and Support whereas Capital Equipment was expensed ($121,781) without crediting BCWP. BCWP will be adjusted in the next reporting period.

Project Impact: None.

Corrective Action: None.

WBS 1.5.2 – Injection Systems

The injection foil mechanism fabrication has been approved and is underway. Both septum magnet drawings are still in the final approval stage with a videoconference design review scheduled for June 6. Work continues on designing the beam tubes and component installation for the injection region straight section. This includes the transition from the HEBT line and the transition into the beam dump line. The beam tube for the foil mechanism is being redesigned to incorporate a revised stripped electron collector plate design.

The checking of long injection kicker drawings was completed. An internal design review was held and the use of alternate ferrite types was the major outcome. After further review it was determined that the present ferrite design is best suited for this application. A bid package is being prepared for the magnet coil and other components are being ordered. Ceramic Tubes without end cuffs have been ordered for testing. The pricing for the production ceramic vacuum chambers with end flanges, the vacuum bellows, and the ferrites has been received from vendors.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1751.4	1789.8	2038.6	38.5	2.2%	(248.8)	-13.90%

Variance Statement: Cum CV of -$248.8K (-13.9%) is driven by WBS 1.5.2.2 Injection Kicker PS whereas actual costs were greater than planned due to the redesign of the PS (programmable). Current period SV of -$26.1K (-35.5%) and CV of -$49 (-103.3%) are driven by 1.5.2.5 Injection Dump Stripping Foil (late procure) and 1.5.2.2 Injection Kicker Power Supply whereas ACWP (labor) is greater than BCWP.

Project Impact: None.

Corrective Action: None.

WBS 1.5.3 – Magnet Systems

QA testing of the magnet coils continues delivery of the coils is almost complete. 4 coils were returned to Stangenes for repair. We await the outcome. No further invoices will be approved until the repairs are complete. The core steel is at Allied Engineering and is being machined to the final dimensions. G. Mahler visited both Allied and Stangenes. Photographs have been forwarded to the project office. The first cores will be shipped to BNL in June.

Three phone conferences were held with Tesla during the month. Tesla Engineering Ltd had to split the order for the magnet steel because its European vendor was unable to roll larger steel pieces. The magnet poles will be made by Metals USA. They are scheduled to be shipped by the end of June. To maintain our schedule for the first article, Tesla has purchased a sample piece of steel to machine a pole tip profile. This will use it to verify the CNC program. Tesla

will also have the first four billets for the poles air shipped from Metals USA so they can start final machining ASAP. The drawings for the coil fixtures are nearly complete.

Two phone conferences were held with Danfysik and they have confirmed their schedule for production of the 27CDM30 corrector. The steel and the wire for the magnets are in house and they have started machining the core pieces. They will be winding their first coil in June. They have slipped their schedule slightly but still plan to have the 1st article unit shipped to BNL by July 19, 2001.

The measurements of the 1.3 GeV 1st article magnet on the first base were completed. The base does not affect the performance of the magnet. The second and third _ cell bases were delivered to the assembly area. The RFQ for the 21CS30 and 21CO30 sextupole and octopole corrector magnets has been sent out for bids. The bids for the first article 26Q40 magnet were received. Contract award is imminent. The drawings for the 30Q44 are being checked. The parameters and magnetic analysis of the 21S26 sextupole are nearly complete and the 26S26 has been started.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4206.2	3950.9	4974.7	(255.3)	-6.1%	(1,023.8)	-25.9%

Variance Statement: Magnet System has a cum CV of -$1,023.8K (25.9%) and is driven by WBS 1.5.3.1 High Field Magnets whereas actual material purchases are greater than performed

Project Impact: None.

Corrective Action: None.

WBS 1.5.4 – Power Supply Systems

Prototype testing of the PSI/PSC system was completed, and first articles of each type of built and is currently under test. Production parts have been procured, and full production is scheduled to start by the end of June.

A videoconference was held with SNS-ORNL to discuss the medium range power supplies and the grouping into standard models of voltage and current. The RFP package was not released to procurement in May, but will be released to them in June.

The order for the additional low field corrector for the mineral insulated PCRs were placed. Design and construction of these units is proceeding on schedule, and first article testing is scheduled for the second week of October.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1018.9	856.2	480.1	(162.7)	-16.0%	376.1	43.9%

Variance Statement: Power Supply Systems with cum period SV -$162.7K (-16.0%) and a cum period CV $376.1K (43.9%) are driven by WBS 1.5.4.1 Ring Quadrupole PS Procure and 1.5.4.2 Ring Low Power and Ring Low Field Power PS respectively. Current period variances reflect greater BCWP than ACWP for Ring Low Field PS, WBS 1.5.4.2.3.

Project Impact: None.

Corrective Action: None.

WBS 1.5.5 – Ring Vacuum System

The first dipole chamber arrived at BNL in early May and has been measured by the Survey Group. The welding fixture drawings for the halfcell chambers are complete and the material has been purchased. The arc Conflat flanges have been inspected. The pump port screens were ordered. Order of the large Evac flanges for the injection chambers was placed. Vendor has delivered three 1st article half cell Inconel bellows. The 1st article ring all-metal gate valve was tested and is being packaged for shipment to ORNL. RFQ for the ion pumps has been released to vendors and the bid is due back in late June.

Feedback on the ion pump controller and gauge controller specifications was received from Partner Labs and is being reviewed. A statement of work for the ion pump controllers is being drafted. A third vacuum gauge controller vendor reported a cold cathode analog signal response time of ~ 35ms. Work continues on preparing turbomolecular pump cart specification and statement of work. Work on vacuum control ladder logic software is under way.

The vacuum APP status for FY01 was reviewed and provided to PO for DOE review. Two PAC2001 papers, one on TiN coating development and the other on vacuum control, have been drafted. Sample ceramic beam tubes were received for TiN coating development of injection kicker chambers.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1911.6	1777.2	1796.4	(134.3)	-7.0%	(19.1)	-1.1%

Variance Statement: Cum Variances are within thresholds. No analysis required.
Current period variances reflect BCWS greater than BCWP for 1.5.5.5.3 Furnace Cleaning and Tin Coating; and ACWP greater than BCWP for 1.5.5.1 Ring Vacuum Chambers.

Project Impact: None.

Corrective Action: None.

WBS 1.5.6 – RF System

Assembly of the power amplifier and beam simulator continues. The cavity shroud is in the shops. The capacitor bank for the anode supply is being assembled

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3583.5	3236.2	3398.3	(347.3)	-9.7%	(162.1)	-5.0%

Variance Statement: Cum Variances are within thresholds. No analysis required.
Current period variance reflects BCWS greater than BCWP for WBS 1.5.6.1.2 RF Power Supply procure.

Project Impact: None.

Corrective Action: None.

WBS 1.5.7 – Ring Diagnostics

1.5.7.1 – BPM

- Signed-off ECNs for released 21cm Ring, and 21cm HEBT, and 12cm HEBT BPMs.
- A PO has been written for additional material for the 30cm Ring BPM flanges.
- Received all parts for the two pre-production12cm HEBT BPMs from the shop.
- BPM Quotes are under review from an outside vendor and central shop
- A structural analysis has been performed on the 21cm Ring and HEBT BPMs to check the recently released vaccuum chamber design. Maximum stress has a safety factor of 2.4. An analysis of the 26cm HEBT BPM yielded a stress safety factor of 5.9. ANSYS modeling of the RTBT 36cm BPM is in progress.

1.5.7.2 – IPM

- All parts for the two additional electron detectors are expected shortly.
- Work on the instrument box for the SNS Ring is in progress.
- The design of a screen to avoid the swamping image current signals observed from the existing electron detectors in the AGS booster is in progress.

1.5.7.3 – BLM

- Discussions/video conferences and a trip to LANL were conducted to address BLM interface to the MPS.
- Discussions about BLM polarity testing to address response flatness, and x-ray contribution are on-going. A small quantity on bottles has been ordered for testing.
- Arrangements for ion chamber testing at JLAB for x-ray response are underway.

1.5.7.4 – BCM

- Circuit board has been constructed., and parts kits have been prepared for stuffing.
- Circuit modifications have been made to accommodate reduced resolution requirements. This resulted in only three gains required.
- Discussions begun on interfacing BCM to the MPS to protect the early Linac stages.
- Discussions begun to include an additional output for wire scanner MPS interface.

1.5.7.5 – Tune

- Work continues on prototype efforts

1.5.7.6a – Carbon Wire Scanner

- All shop built MEBT parts are completed.
- Preparations for PDR July 17th are underway.
- PAC 2001 wire heating paper is underway.

1.5.7.6b – Laser Wire Scanner

- Work continues to try to establish a test place at 200 MeV in BLIP for the laser wire scanner. The plan is to have this instrument running when H-minus beam is available in BLIP in late July.
- The issue of servo motor drive has been decided as opposed to stepper motors.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3490.4	2914.3	3226.2	(576.1)	-16.5%	(311.9)	-10.7%

Variance Statement: Ring System Diagnostics Instrumentation has a cum SV of -$576.1 (-16.5%) and CV of -$311.9 (-10.7%) which reflects greater BCWS than BCWP for 1.5.7.1 Beam Position Monitor Procure and Fab Assy; and ACWP greater than BCWP for 1.5.7.6 Wire Scanner System. Current period variances are driven by the same activities.

Project Impact: None.

Corrective Action: 1.5.7.1 BPM Procure and Fab Assy; BCWP will out perform BCWS next month, variance will drop below threshold.

WBS 1.5.8 – Collimation and Shielding

1.5.8.1 – Ring Collimation

Preliminary results of the dose estimates with and without the magnetic field present indicate that there is a significant increase in the dose due to secondary protons compared to cases without the magnetic field. Drawings of the a 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 has been submitted to vendors for bid

1.5.8.2 – Moveable Shielding

The prototype moveable shield has been completed and is currently being painted. A safety review of its operation has been carried out and modifications to address questions raised by the review are being carried out.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
880.4	804.3	867.5	(76.1)	-8.6%	(63.2)	-7.9%

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 have been approved and all of the parts are on order. The design of the oil filled version of PFN was completed and estimated. A design review was held and it was decided to revise the component layout to reduce the stray inductance. This and larger capacitors will result in the PFN tank being larger than the present layout. The design is being modified.

Effort continues on revising the layout of the extraction region to take into account the roll of the lambertson magnet continues.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
765.9	592.8	609.7	(173.2)	-22.6%	(16.9)	-2.9%

Variance Statement: Extraction System with a cum SV of -$173.2K (-22.6%) is driven by WBS 1.5.9.2.2 Charging Power Supply -$112.7K, whereas BCWS is greater than BCWP. Current period variances are driven by the same activities.

Project Impact: None

Corrective Action: None.

WBS 1.5.10 – RTBT System

Design of the fixtures for winding the solid radiation resistant bus (for the 41CD30 correctors) continues. Parts have been released to the shops for fabrication.

Design layout for the complete vacuum system for the Ring to Target Building transfer line (RTBT) is being developed. This includes all vacuum chambers, bellows, quick disconnect and Conflat flanges, pumps, instrumentation, etc. Design layout for the RTBT dipole 17D240 used at the RTBT bend (as well as the future transfer line to proposed second target) has been completed. This includes the "Y-shaped" boxed vacuum chamber, coils and iron core.

RTBT vacuum layout was reviewed and updated with the latest information on diagnostic equipment and extraction dump window.

The prototype moveable shield has been completed and is currently being painted. A safety review of its operation has been carried out and modifications to address questions raised by the review are being carried out.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1224.4	1245.4	1015.2	21.0	1.7%	230.3	18.5%

Variance Statement: RTBT System has a cum CV of $230.3K (18.5%) and is driven by 1.5.10.5.1 RTBT Collimator Detail Design and 1.5.10.5.2 RTBT End of Line Collimator Design whereas ACWP is less than BCWP.

Project Impact: None.

Corrective Action: None.

WBS 1.5.12 – Technical Support

- Impedance measurement of kicker magnet continued.
- The efficiency study of the momentum collimation in the HEBT line completed.
- The RTBT collimators are redistributed to increase the efficiency.
- The study of resonance crossing with space charge which is directly related to the choice of working point.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
7680.9	7680.9	7563.8	0.0	0.0%	117.2	1.5%

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

Event Link

Ron Nelson, Coles Sibley and I rewrote the SNS Timing System SRD this month. It is posted on the ORNL website at:

http://www.sns.gov/projectinfo/ics/192/1922/1922.html

Arrangements will soon be made for the Timing System final design review.

A prototype eventlink master and RTDL master remain set up in the SNS controls lab for driver development.

An Agilent f/o receiver was purchased and has been delivered. This component is available off the shelf from Arrow. This part is pin for pin and spec for spec compatible with the Amp parts used on the RHIC f/o receiver modules. We will run tests in one of our modules to verify its claims.

V123S – Beam synchronous encoder:

Rework of the five prototype modules is complete this week. After the design review, artwork changes will be made to incorporate the changes and two production SNS encoders will be built.

V124s – Beam synchronous decoder:

The prototype PCB has been assembled at Brookhaven. Preliminary testing, except for interrupt testing is done. A second V124s module was tested this month. J. Tang will develop test software so that testing of the interrupt function can be completed. This software will be written in June. Some minor PCB changes are required. Finalization of the PCB artwork will wait until the design review. Two front panels are being fabricated.

The SNS prototype timing systems are ready for shipping to the member labs. Systems will be shipped to LBNL, ORNL and LANL this week.

RTDL

Eight V105s and 12 two channel V106s have been built and tested this month. The CRC modification to the RTDL transmission was tested this month. All V105s are configured as SNS encoders with the CRC.

EPICS software development for the RTDL system is well along. Prototype RTDL systems are ready for shipping to the member labs.

Eventlink Fanouts-

We can use RHIC spares for prototype systems. The production fanouts will be 1X16.

WBS 1.9.2.2 –Timing Software

Event Timing System:

VxWorks drivers and IOC Console level software for RTDL low level VME module test is ready for engineers to use for testing related VME modules. A hardware firmware bug was found and it has been fixed.

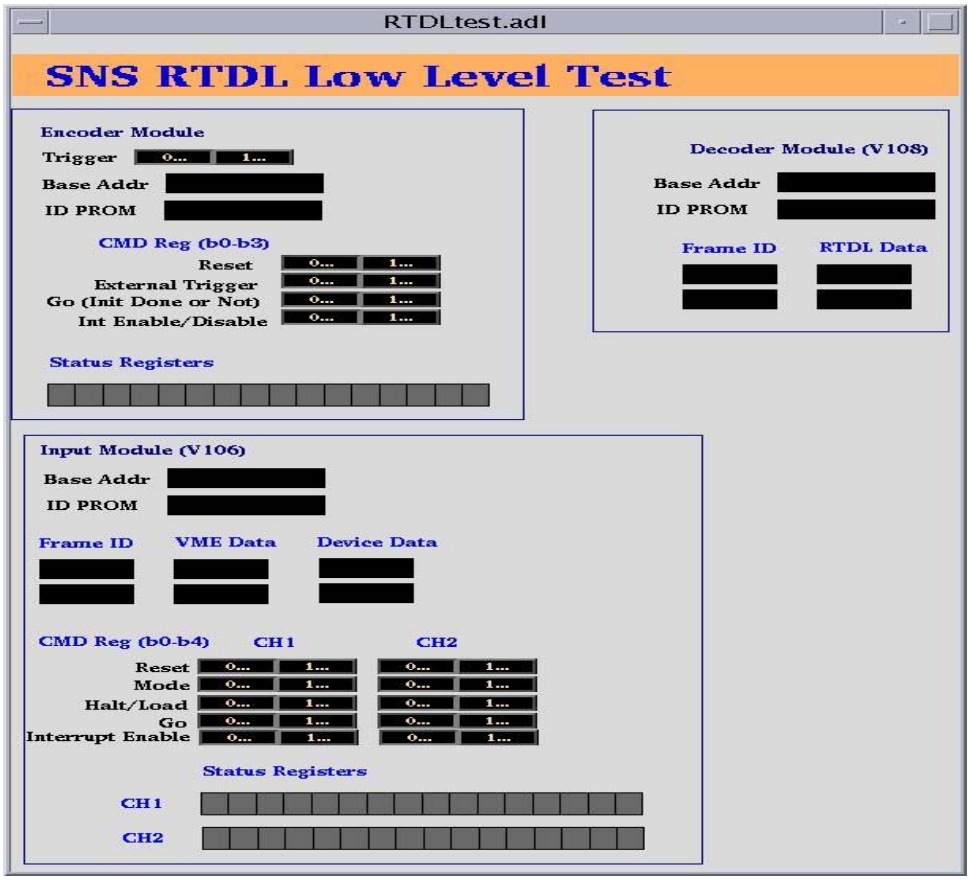
EPICS graphical interface is near finished and will be ready to use in 2-3 days

Since event system master modules will be delivered to partner labs in June we are providing software that will allow sending messages from the master module to hardware being developed. The software will allow hardware testing of the Utility module being built at LANL, the beam permit hardware being built at ORNL and diagnostic equipment being built at LBNL while driver development proceeds at BNL

APS' event generator and receiver records (4 special record types) are under evaluation for portability to use for SNS timing and RTDL VME modules. A report on this will be circulated within SNS ICS group for discussion.

RTDL System:

The RTDL and Event timing systems are in a similar state. Hardware will be delivered to the partner labs in June. Software to allow testing of the boards is available and will be place don the web to make it accessibility to all labs. Work has started on Epics driver software.



WBS 1.9.5.1 -Ring Controls Integration

The installation of the Epics software on a Linux computer was completed. We were able to successfully move an application from the Sun to a Linux compute. The only remaining problem is the lack of Capfast on the Linux system. With the completion of the initial test, we will now try to port other applications and also test Epics workstation software. The installation of Linux at BNL was simplified because we are affectively copying the ORNL configuration to BNL and much of this work was done by E. Williams at ORNL.

Some tests were done to see the effect of increasing the Epics clock rate. It is anticipated that diagnostic of power supply devices might want to run at a rate higher than normal. In doing this a bug was found that reported very high CPU usage at higher clock rates. When this was corrected, it was demonstrated that the CPU clock could be significantly increased without putting an undue load on the CPU

WBS 1.9.5.2 - Power Supply Controls

PSI:

As stated last month testing of the individual PSI boards was completed. This month we concentrated on testing the PSC boards. Now we are setting up to test the PSI boards is a system configuration with one PSC but multiple PSI boards. For a valid test we need several PSI boards, which we expect to have next month when we get delivery of first article boards.

PSC:

Most of the issues with the PSC have been resolved. We modified the link tester so that it could generate bad checksums on command. It can also read messages and report checksum errors. Our tests showed that valid checksums are being generated. When messages with bad checksums are sent to the PSI they are not acted on. When messages with bad checksums are received by the PSC they report a bad checksum error.

We noted an error is reported when the serial port interface is used together when a hardware trigger is used. This is not an anticipated operating mode but the problem needs to be understood and addressed.

Epics Driver:

A small amount of work was done on the Epics driver but most of our software work was testing the PSC and PSI hardware and preparing for tests of the injection power supply. A good part of the Epics driver is written but with only one PSC we do not have the opportunity to check out both the boards and the driver at the same time. Also a change made to the PSC to fix a problem sometimes means the driver has to be changed. Next month we expect to get another PSC with most of the problems eliminated. This should allow us to continue with the Epics driver development and test.

Ethernet Digitizer & Function Generator:

We still do not have software for the Ethernet function generator and digitizers we hoped to use for the injection power supply controls. As a backup system we acquired on loan a Wavetek arbitrary function generator with a GPIB interface. Presently we plan to use this to test the injection power supplies. We are evaluating vendor software for generating and modifying waveforms. Unfortunately labview drivers were not provided with the instrument.

We are still waiting to see if the Yokogawa representatives will provide us with Ethernet software for their function generator.

Power Supply Testing at the Factory;

We are preparing Labview software to test power supplies at the factory. The first test will be of the injection supply in late June.

WBS 1.9.5.3 – Diagnostics

We had expected to get an ICD for the collimators completed in May. This has been delayed and probably will not be available until July. While it is nearly complete, the PAC meeting in June is expected to cause a couple weeks delay.

The ICD for the BCM is nearly complete and should be available in June or July.

The ICD for the BLM is proceeding. It was decided that this will be a VME system and its expected that work will start soon on testing ADC boards. Accurate ADC measurements are required for this system.

WBS 1.9.5.4 - Vacuum

An outline for PAC2001 paper on SNS Ring Vacuum Control System is done.

PLC ladder logic programming on valve interlocking and its global control system interfaces, operator interface screens are planned to be worked on during the rest of FY01.

An abstract on “SNS vacuum instrumentation and control systems” has been submitted to ICALEPCS 2001. The focus of this paper is “collaboration” effort.

WBS 1.9.5.5 - Application Software

SNS Ring Application Toolkit.

The prototype of the UAL Accelerator Manager has been completed and installed on the BNL and ORNL computers. The Accelerator Manager is the second module of the UAL 2.0 application toolkit. Formally, it is designed as a browser/editor of accelerator lattices and element attributes. Also, it can be considered as a test of the UAL accelerator object (a set of Java containers with accelerator lattices and element attributes) that will be shared by diverse commissioning and engineering applications. The Accelerator Manager illustrates how these containers are integrated with Optics database, XML file, and Swing-based GUI.

The source of the UAL 2.0 Application Toolkit has been located under the Control Version System (CVS). In addition, the CGI script cvsweb has been installed on the sun1.sns.bnl.gov server to provide the WWW interface to the CVS repository (http://sun1.sns.bnl.gov:8080/cgi-bin/cvsweb.cgi).

Ant (http://jakarta.apache.org/ant) tool has been added to the UAL 2.0 development environment. Ant is a popular build tool that uses Java[tm] technology to perform all build-related tasks. Because it is based on Java technology, Ant is a cross-platform build tool that works anywhere. The project build process is described in the XML files. These files are analogous to traditional makefiles but do not use shell-based commands to execute tasks. Instead, Ant runs each task by a Java class that implements a specific task interface.

Two new Integrators have been worked out and implemented in the UAL 1.0 Environment:
(1) FFTTImpedanceIntergator and
(2) TimpedanceWF.

The first is an exact copy (accordingly to the result of calculation) of the ORBIT Timpedance integrator (ORNL), and the second is the new code based on the approach suggested by Mike Blaskiewicz. These integrators are needed to deal with the transverse impedance instabilities excited by the kicker.

The benchmarking of three codes has been performed (two new UAL's integrators and ORBIT tracker). During the benchmarking, ORNL's ORBIT code was debugged with help of Slava Danilov and Jeff Holms (ORNL).

The Perl interface to the new UAL's integrators has been developed.

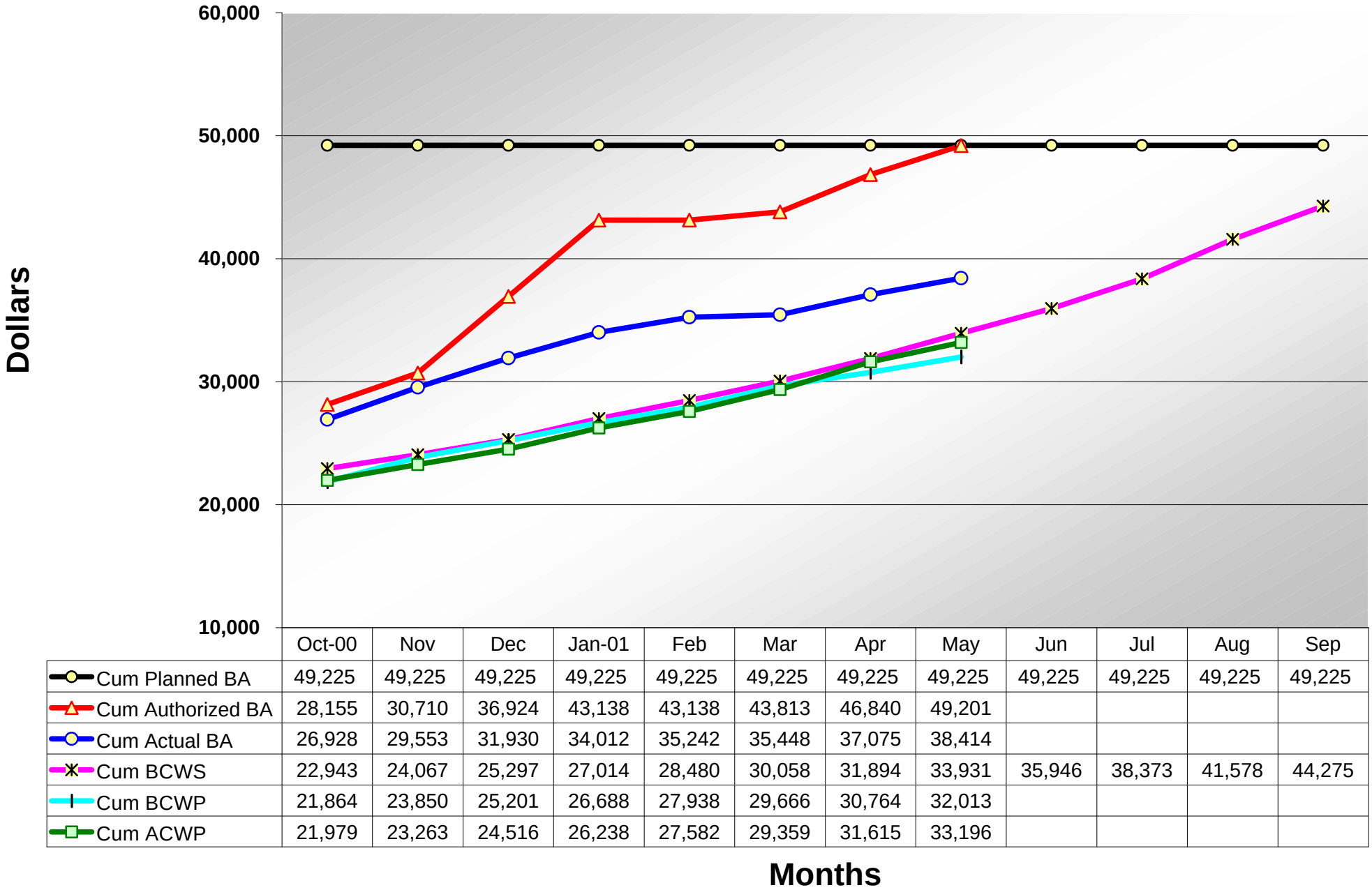
New Perl module dealing with a painting scheme was implemented into the SNS Perl package to provide the injection from arbitrary file (parallel and serial versions). It is necessary for Front_to_End simulation.
The classes PaintingSchemeFE, PaintingSchemeFE_P and BunchTranslatorFE were implement.

WBS 1.9.5.6 – RF

There was no work done on the RF system. The ICD was expected in May but it has been postponed to July.

IV. Earned Value Reports and Charts

1.5 & 1.1.3 Performance Measurement Chart



	Oct-00	Nov	Dec	Jan-01	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	43,813	46,840	49,201				
Cum Actual BA	26,928	29,553	31,930	34,012	35,242	35,448	37,075	38,414				
Cum BCWS	22,943	24,067	25,297	27,014	28,480	30,058	31,894	33,931	35,946	38,373	41,578	44,275
Cum BCWP	21,864	23,850	25,201	26,688	27,938	29,666	30,764	32,013				
Cum ACWP	21,979	23,263	24,516	26,238	27,582	29,359	31,615	33,196				

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

PROJECT TITLE: SPALLATION NEUTRON SOURCE	**REPORTING PERIOD:** 1-May-01 thru 30-May-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 of Work Performed	Variance		Budgeted Cost		Actual Cost of Work Performed	Variance				
	Work Scheduled	Work Performed		Schedule	Cost	Work Scheduled	Work Performed		Schedule	Cost	Budgeted	Revised Estimate	Variance
1.1.3 Rings System Development	81.2	81.2	127.7	0.0	(46.5)	4,804.4	4,804.4	4,969.9	0.0	(165.5)	5,111		
1.5 Ring & Transfer Line System	1,955.6	1,167.5	1,453.4	(788.1)	(285.9)	29,126.6	27,208.1	28,226.0	(1,918.5)	(1,017.9)	122,520		
1.5.1 HEBT (High Energy Beam Transport) Systems	223.0	25.4	220.1	(197.6)	(194.7)	2,603.5	2,350.5	2,254.8	(253.0)	95.7	10,641		
1.5.2 Injection Systems	73.5	47.4	96.4	(26.1)	(49.0)	1,751.4	1,789.8	2,038.6	38.5	(248.8)	9,210		
1.5.3 Magnet Systems	268.0	240.47	252.9	(27.6)	(12.4)	4,206.2	3,950.9	4,974.7	(255.3)	(1,023.8)	16,165		
1.5.4 Power Supply System	155.6	254.3	28.7	98.7	225.6	1,018.9	856.2	480.1	(162.7)	376.1	5,465		
1.5.5 Vacuum System	99.5	38.1	115.5	(61.4)	(77.5)	1,911.6	1,777.2	1,796.4	(134.3)	(19.1)	11,498		
1.5.6 RF System	150.4	1.6	84.4	(148.7)	(82.7)	3,583.5	3,236.2	3,398.3	(347.3)	(162.1)	13,159		
1.5.7 Ring Systems Diagnostic Instrumentation	400.6	87.0	211.4	(313.6)	(124.4)	3,490.4	2,914.3	3,226.2	(576.1)	(311.9)	16,271		
1.5.8 Collimation and Shielding	55.4	30.7	31.8	(24.7)	(1.1)	880.4	804.3	867.5	(76.1)	(63.2)	2,779		
1.5.9 Extraction System	79.0	25.1	61.1	(54.0)	(36.0)	765.9	592.8	609.7	(173.2)	(16.9)	5,756		
1.5.10 RTBT (Ring to Target Beam Transport) System	120.1	87.3	27.9	(32.8)	59.4	1,224.4	1,245.4	1,015.2	21.0	230.3	8,222		
1.5.11 Cable	3.1	2.9	0.0	(0.3)	2.9	9.4	9.5	0.7	0.1	8.8	2,899		
1.5.12 Technical Support	327.3	327.3	323.3	0.0	4.0	7,680.9	7,680.9	7,563.8	0.0	117.2	20,454		
WBS SUBTOTAL	2,036.7	1,248.6	1,581.1	(788.1)	(332.4)	33,931.1	32,012.5	33,195.9	(1,918.5)	(1,183.3)	127,631		
UNDISTRIBUTED BUDGET													
SUBTOTAL	2,036.7		1,581.1			33,931.1		33,195.9			127,631		
MANAGEMENT RESERVE													
TOTAL	2,036.7		1,581.1			33,931.1		33,195.9			127,631		

RECONCILIATION TO CONTRACT BUDGET BASE

DOLLARS EXPRESSED IN:	SIGNATURE OF PARTICIPANT'S PROJECT DIRECTOR:	DATE:
THOUSANDS	Bill Weng	June 19, 2001