Brookhaven National Laboratory

SNS

Ring and Transfer Lines Systems

S E P T E M B E R

MONTHLY REPORT

01 September – 30 September 2002

Performing Organization:	Brookhaven Science Associates
Location:	Brookhaven National Laboratory Upton, New York 11973-5000
Contract Period:	October 1998 – June 2006

Brookhaven National Laboratory
SNS MONTHLY PROGRESS REPORT
September 2002
Ring and Transfer Lines Systems

I. Senior Team Leader Assessment

1. TECHNICAL PROGRESS AND ACCOMPLISHMENTS

- We returned a total of $1.1 M to the SNS project, based on the estimated reduction in the SNS Ring/Transport system baseline cost considering the reduced overhead rates on large-amount procurements.

- We have completed FY 2002 with an excellent financial performance. The Budget Authorization (BA) for BNL's SNS effort is $26M for FY 2003, a reduction of about $2M in support of project office's BA needs for FY03. Certain procurements were deferred from FY03 to FY04, still in time to support the commissioning of the Ring/Transport.

- The 7th Accelerator Systems Advisory Committee (ASAC) review was held at ORNL. BNL's efforts and achievements were recognized and praised by the committee. There were no outstanding issues.

- The ASAC committee endorsed our proposal to implement electron-cloud mitigation measures in key areas, including solenoids for the collimation region, clearing electrodes for the injection region, and video monitoring system on the stripped-electron collectors.

- A procedure to prevent copper-to-stainless-steel brazing leak, which occurred among 3 out of 6 vendors on SNS Ring/Transport magnets, was successfully tested by the vendors.

- In support of the Front End commissioning, C-AD is preparing six "chip-monk" radiation monitors to be shipped to ORNL before end of October 2002.

- The Accelerator Physics group recommends using electro-magnetic magnets, instead of permanent-field magnets, for steering electrons in the ionization profile monitor (IPM). Such a practice is believed to be necessary, since the strength of each IPM magnet is 10 times higher than a corrector,s strength, and a few percent change of permanent magnet's field due to radiation damage or thermal variation would impediment operation.

- Following the visit of our KEK colleagues (Profs. Yamane and Suzuki), a proposal was made to perform laser-stripping experiments at AGS linac. Partial funds were already available from KEK PS division to support the laser experiment.

2. ISSUES AND ACTIONS

- None.

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	%
5115.0	5115.0	5112.9	0.00	0.0%	2.1	0.0%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV reflects $7.4K BCWP and no ACWP.

Project Impact: None.

Corrective Action: None.

WBS 1.5 Ring and Transfer Lines

BCWS	BCWP	ACWP	SV	%	CV	%
60630.9	59331.4	58218.6	(1299.52)	-2.1%	1112.8	1.9%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period SV is driven by WBS 1.5.2, 1.5.4 and 1.5.10.
Additionally, PCR's RI02-013, 017, 021 & 022 were incorporated this period.

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	0	1	3	13	127
FY02	0	0	0	0	28
Due in Next 30 days	0	0	0	0	0
Total Due at present	0	0	3	12	109
Made	0	0	3	12	95
Missed	0	0	0	0	14
Ahead of Schedule	0	0	0	0	0

3.3 PROJECT CRITICAL PATH ANALYSIS

The critical path items for the Ring are the Ring Sextupole magnet, followed by the BCM.

II. Detail R&D Subproject Status

WBS 1.1.3 – Ring System Development

All work covered by R&D funds is essentially complete.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
5115.0	5115.0	5112.9	0.00	0.0%	2.1	0.0%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV reflects $7.4K BCWP and no ACWP.

Project Impact: None.

Corrective Action: None.

III. Detail Line Item Subproject Status

WBS 1.5.1 – HEBT Systems

Phone conferences continued with Tesla during the month on the HEBT dipole magnet. They are preparing the final two magnets for shipping. Phone conferences continued with Danfysik during the month. A solution to the water fittings problem was negotiated with Danfysik. ORNL has begun repairs of the magnets at SNS. Also Danfysik sent a brazed sample to BNL that demonstrated their ability to properly braze stainless steel fittings with the approved braze material.

The 12cm quadrupole chamber welding fixture is being designed. The 12cm quadrupole pipes adjacent to HEBT collimators have been revised to accommodate the removable shields. Assembly and welding of the 21cm quadrupole chambers continue. The design of the stands for drift pipes and ion pumps continues.

Drawings of the HEBT momentum dump are complete, and are being reviewed. Revised ways of allowing for vacuum chamber settling and interfering with the outer shield are being investigated. An acceptable solution is being worked out.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
5566.0	5901.8	4699.6	335.78	6.0%	1202.2	20.4%

Variance Statement: Cum CV of $1202.2K (20.4%) is material driven by 1.5.1.1.1 HEBT 8D533 Magnet, whereas 6 of 9 magnets were received (580K). ACWP is understated and will be debited in subsequent current periods.

Current period CV is driven by material deliveries for WBS 1.5.1.3 HEBT Dipole Chamber & HEBT Turbomol pump whereas BCWP was adjusted and ACWP will be accounted for in subsequent periods.

Project Impact: None.

Corrective Action: None.

WBS 1.5.2 – Injection Systems

New England Technicoil has begun work on the #2 and #3 chicane magnets and the dump septum magnet. BNL technical representatives visited them during the month. New England Technicoil has returned the repaired #4 magnet and acceptance testing was completed. The magnet is in line for the magnet measurement facility.

The long pulsed dipole full power test is continuing. A finite element model checked the displacement of the coil due to the vibration caused by the long injection kicker current profile and the strength of the coil is easily capable of taking this small motion. In order to dampen the vibration and quiet the magnet, a wedge clamp is being made that will provide 100 lbs. clamping force in each coil. The first two ceramic chambers are in the vacuum lab for bake out and Titanium-Nitride coating. They will not be available until November. In the mean time the vacuum group will provide a coated test chamber for magnet measurements.

A purchase order for 5 more Long kicker ceramic chambers and 4 short kicker ceramic chambers has been issued to Ceramaseal. Ceramic Magnetics, Inc. was the only bidder for the injection kicker ferrite. The purchase order has been issued. The final 6 short magnet coils have arrived from Everson Electric. Acceptance testing will be done next month.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4716.1	4965.0	4460.4	248.95	5.3%	504.7	10.2%

Variance Statement: Cum CV of $504.7K (10.2%) is material driven by 1.5.2.1 Pulsed Magnet, Ferrite Blocks, whereas first delivery and final delivery BCWP have been taken in advance of BCWS and ACWP producing a positive cum SV and CV. ACWP and BCWS are understated and will be accrued in subsequent current periods; i.e., final delivery for Ferrite Blocks 5/03. Current period SV is partly driven by WBS 1.5.2.3 DC magnets labor & material ($164.4K); and WBS 1.5.2.4 Injection DC PS material ($109.2K). Current period variances are also driven by a decrease in % complete to 1.5.2.5 Stripping Foil Assy & Support; from 80% to 60% complete in the current period, previously overstated.

Project Impact: None.

Corrective Action: None.

WBS 1.5.3 – Magnet Systems

The SNS magnet parameter sheets for each magnet type are being reviewed separately by the cognizant physicists, engineers, and managers. A meeting will be held next month prior to finalizing the parameters and to define the acceptance criteria for the magnets.

At this time there are 27 17D120 ring dipole magnets (ITF that is $<1 \times 10^{-4}$ from the nominal value) that have been fully shimmed and magnetically measured. Another magnet has been initially measured and shimmed. Power supply failure stopped the measurements near the end of the month. The power supply is being repaired.

The 17 21Q40's now at BNL passed initial inspection with a few water leaks as detailed below. Tesla has another batch of six magnets in the mail. The last seven magnets for phase I will be

assembled and shipped in November. Production measurements of the eight 21Q40 have been completed. Seven magnets have integral fields that are close enough for them to be matched in the same power supply string. The 21Q40 quadrupole for the first half cell has been chosen. Magnet measurement was stopped when a water leak occurred at a braze joint for one of the stainless steel fittings. Removal of the joint showed the same poor penetration of the braze material that occurred in the other failed braze joints. All of the quadrupoles were inspected again. Magnets #'s 01 & 05 both leaked upon receiving from manufacturer and before the addition of the 20 ftlbs torque check that was added to our inspection routine. Magnet #01 was repaired by us and the failed bus bar jumper with the fitting from #05 was returned to Tesla, repaired, returned, and successfully re-tested. Magnets #'s 9, 11, and 17 developed leaks that were found during receiving inspection with the torque check. There were a total of (5) bad fittings on those three magnets. Finally Magnet # 10 leaked after installation and preparation in the magnet measurement facility. It had one bad fitting. At this time the magnet measurement of the 21Q40's was stopped to re-evaluate the condition of the fittings.

During this downtime for fitting repair, some time was taken to improve the stability of the power supply. The power supply later failed. It has since been repaired and will be checked with one of the quadrupoles next week. Due to the water leaks and the power supply problems the production measurement facility was switched over to testing 21CS26 correctors. At this time three of the 21CS26 correctors have completed production magnetic measurements and have been accepted. The magnet for the first half cell was chosen.

The drawings for the 26S26 high field sextupole are being checked and the procurement package is being prepared.

Wiring of the measuring coil for the 26Q and 30Q quadrupoles and related magnets continued this month. It is about 95% complete and will be tested in October.

The pole tip modification of the 26Q40 magnet was completed and the magnet was reassembled. Magnetic measurements of the first 26Q40 with modified pole and chamfer have been completed. The revised chamfer provided too much correction. From the results an ECN for the changing the chamfer to an intermediate dimension was issued. The second set of pole tips is now being modified to verify the final dimension before production can proceed.

Measurement and analysis of the first 30Q58 were completed. The results indicated that the pole profile needs to be modified to achieve the required field quality. The pole shape was verified by quality assurance, a modification to the pole shape was approved, the poles were remachined to the new dimensions, and now the magnet is being reassembled. The magnet will be measured again in October after the 41CDM30 first article measurements are complete.

Danfysik returned the damaged 27CDM30 after repair. This order will be complete when it is acceptance tested.

The 36CDM30 corrector was received from NETC Technicoil. It has failed dimensional inspection and high potting. It will be returned to the manufacturer for repair.

The Alpha Magnetics 41CDM30 1st article magnetic measurement has been completed and the go ahead for production was given.

Alpha Magnetics has begun winding the first coil for the 21S26 sextupole magnet.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
10975.7	10734.4	11029.2	(241.35)	-2.2%	(294.8)	-2.7%

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

Current period SV -$284.4K (-62.8%) is material driven by WBS 1.5.3.2 Low Field Magnets, whereas BCWS shows the planned material delivery for which BCWP was taken in a prior current period, thus showing a negative SV. Current period CV -$263.4K (-156.7%) is labor driven by 1.5.3.3 Magnet Measurement.

Project Impact: None.

Corrective Action: None.

WBS 1.5.4 – Power Supply Systems

- The outstanding technical issues with the Low Field Correctors were resolved. The units are in full production and have started shipping.
- The contract for the medium range power supply changes was placed in September. First article testing of the 5040A, 18V unit will be performed in early December.
- The contract for the main dipole power supply was also placed in September. A design review will be held in December.
- The proposals submitted for the production of the extraction kickers are being evaluated. The order should be placed in October.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1214.5	955.0	1100.2	(259.53)	-21.4%	(145.2)	-15.2%

Variance Statement: Cum SV of -$259.5 is driven by Ring Quad PS & Sextupole 1st delivery and Low Field PS deliveries. CV of -$145.2K (-15.2%) is driven by WBS 1.5.4.1 & 1.5.4.2 whereas BCWP for material is understated and will be adjusted in subsequent current periods.

Current period SV -$251.6K (-95.4%) is material driven by WBS 1.5.4.1 Ring Quad PS 1st delivery & 1.5.4.2 Ring Low Field PS, whereas deliveries are delayed.

Project Impact: None.

Corrective Action: None.

WBS 1.5.5 – Ring Vacuum System

The first halfcell chamber was assembled into the halfcell magnets. The 2nd RF cavity pipes have been assembled for TiN coating. Third set has been leak checked, baked, and is ready for coating.

The status of ring vacuum systems, including Ring, HEBT, RTBT, TiN coating and I&C, was reviewed with project office lead vacuum engineer during his visit. The vacuum team leader attended the ASAC review at ORNL and presented the status of ring vacuum systems and the progress in coating, SEY and beam scrubbing.

Work on the HEBT PLC ladder logic is completed. Work on EPICS application and edm screen continues with records for status monitoring in HEBTVacControl.db & HEBTVacMonitor.db added. FY03 work planning was submitted for approval.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
5037.9	4963.5	5001.5	(74.31)	-1.5%	(38.0)	-0.8%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV -$84.3K (-50.8%) is labor driven by 1.5.5.1 Ring Vacuum Chambers whereas labor ACWP increased 47% over the previous current period.

Project Impact: None.

Corrective Action: None.

WBS 1.5.6 – RF System

- Prepared for and attend ASAC
- Assembly of the cavities continuing – first cavity is 90% complete
- PA chassis are sent for plating
- Anode PS order placed with Lambda EMI
- Tuning PS order is placed with Danfysik

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
7255.5	6981.1	6920.4	(274.46)	-3.8%	60.7	0.9%

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

Current period SV -$710.9K (-54.7%) is material driven by WBS 1.5.6.1 High Level RF; whereas BCWS for the RF Cavity deliveries were scheduled in this current period and BCWP was taken in a previous current period. Current period CV $189K (32.2%) is labor driven by WBS 1.5.6.1 High Level RF & 1.5.6.2 Low Level RF.

Project Impact: None.

Corrective Action: None.

WBS 1.5.7 – Ring Diagnostics

Work is progressing on the Design Manual update, rack power requirements, and cabling. Three group members will attend the ORNL ICFA Diagnostics Workshop in October. Presentations will be given on measurement of incoherent tune, halo measurement, transverse profile measurement in the SNS Ring, and low power laser wire measurements. During this time at ORNL group members will also participate in MEBT re-commissioning.

Work continues on matrix methods of beam-based BPM offset determination. A draft AP note by Richard Talman and Nikolay Malitsky reports on a possible implementation, which requires no additional power supplies, cabling, or relays. Work continues on the BPM IFE, which will share many features with the BCM IFE. Active components have been ordered for the prototype AFE. We expect a board stuffed and ready for testing in the coming month. Design of the baseband/RF multiplexer is in progress. Work continues on BPM impedance calculations and measurements.

A PCR is in progress for electromagnets for the IPM. Detailed design has begun. Work continues on the luminescence profile monitor. Assembly of Argonne-style electron detectors for testing in RHIC ring (and comparison with CERN style detectors) is underway.

Vendor fabrication and evaluation of the improved BLM ion chamber prototypes continues. Cost remains a major consideration. Design effort continues on the analog front end chassis, including backplane, module layout, power supply choice, and interface methods with the controls IOC. Met with SNS controls to discuss the choice of HV bias, digital input, digital output, ADC, and DAC VME boards. Reviewing the detector automatic test and evaluation system used for RHIC BLM's, and planning upgrades for the SNS BLM application. Received some details on the neutron detectors for the Linac, and began considering signal processing and integration techniques. Submitted documentation to the electrical design group to begin work on the 8 channel AFE module schematic, as well as the PCB which resides inside the ion chamber detector. Discussions continue on finding the additional rack space needed to implement the

hardware required for system redundancy throughout the SNS facility. Testing of the ISEG VME HV bias supply switching noise influence on adjacent digitizer boards is in process.

The MEBT BCM Electronics were shipped to ORNL. Software upgrades are still in process. The weldment for the prototype HEBT BCM was completed. Calibrator development continues.

Refurbished MEBT carbon wire scanners were delivered to ORNL. Work continues on attachment method for the carbon wires. An ECN is in progress to incorporate latest changes into the documentation. Discussions of aperture requirements for the HEBT wire scanners (fabricated by LANL) continue.

We continue to await guidance from ORNL on laser wire testing at the AGS Linac. An interesting proposal to radically reduce required laser power and system cost by increasing gain at the detector with a MCP is being refined, and will be presented at the ORNL Workshop.

Discussions are underway with machine physicists and mechanical engineers to begin implementing the third camera in the Video Foil Monitor system (as recommended by the ASAC Review Committee), to monitor the electron catcher.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
7093.8	6558.4	6676.6	(535.39)	-7.5%	(118.2)	-1.8%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV $127.1K (38.4%) is material driven by WBS 1.5.7.2 Ring Profile Monitors; whereas BCWP reflects material deliveries for which ACWP was accrued in a prior current period, thus showing a favorable CV in the current period.

Project Impact: None.

Corrective Action: None.

WBS 1.5.8 – Collimation and Shielding

Work is continuing on the first scraper for the Ring. The ring secondary and tertiary absorber drawings are being reviewed. Specifications for the flange at the ends of the vacuum chamber are still being finalized. Finally, the vacuum chambers before and after the primary collimator are being integrated with the collimator. The collimator lifting fixture is being integrated into the secondary shielding.

Drawings of the modified shield are complete. A review with project office staff was carried out, and the drawings are now in checking.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1790.3	1611.2	1634.4	(179.1)	-10.0%	(23.2)	-1.4%

Variance Statement: Cum schedule variance (SV) of -$179.1K (-10.0%) is material driven by 1.5.8.1 Ring Collimator 1st delivery; whereas delivery will be in March '03 thus reducing the SV.
Current period variances are within thresholds. No analysis required.

Project Impact: None.

Corrective Action: None.

WBS 1.5.9 – Extraction System

There were 5 bids for the PFN RFQ. Based on the questions and comments from the bidding companies, some modifications were made to PFN's mechanical design. The drawings were revised, reviewed, and approved. Detailed design of the down stream extraction pulsed magnet assembly is complete and is ready for checking. The detailed design of the upstream assembly is underway. An extraction kicker design review is scheduled for 10/9/02.

Internal design meetings were held on the Extraction Lambertson Septum magnet. The electromagnetic design and optics for both the circulating beam position and profile and extracted beam position and profile were optimized for multiple working points to provide the largest aperture. The revised geometry has been modeled and checked and development of the assembly layout and eventual fabrication drawings in Pro-E is underway. A final design review for the extraction region and magnets will be held on 10/9/02 as well.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1687.2	1622.2	1712.8	(65.00)	-3.9%	(90.5)	-5.6%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period SV $30.8K (48.3%) is labor driven by WBS 1.5.9.3 17DS244 Mag Assy & Support (FY02).

Project Impact: None

Corrective Action: None.

WBS 1.5.10 – RTBT System

The order for the 27CD30 corrector dipole magnet that is used in both the RTBT and in the HEBT line has been placed with New England Technicoil. They were visited during the month.

Raynor is machining the cores for the large aperture radiation resistant quadrupoles. A presentation was made to Peter Ladd on 9/19 for the RTBT and HEBT Magnet and Vacuum System layouts. Important notes on installation issues were addressed. The layout drawings were distributed to all. The magnet stand assembly drawings for the RTBT/HEBT 21Q40/27CD30 magnets are in checking.

Detailing of RTBT magnet vacuum chambers and drift spaces pipes continues. Eight varieties of RTBT 21Q40 magnet vacuum chambers are in checking queue. RTBT/HEBT magnet stands, including ion pump mount, are being appended to open order for manufacture. Design for RTBT/HEBT vacuum pipe supports is complete awaiting review. Qualified foundries have been identified for RFQ of required base and head castings.

The first unit has been shipped to ORNL. Methods of reducing the lifting requirements for the crane are being investigated. These include modifying the top plate of the inner shield box. The technique developed for this collimator will be used on the ring collimators as well.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3040.3	2785.2	3041.7	(255.10)	-8.4%	(256.4)	-9.2%

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

Current period SV of -$90.3K (-117.8%) is driven by a decrease to % complete in RTBT Magnet Design and RTBT Magnet Assy, each from 80% to 62% complete. Current period of -$241.2K is also driven by the same decrease in % complete and additionally, the arrival of current period ACWP (material expenses) for which BCWS and BCWP were previously recorded.

Project Impact: None.

Corrective Action: None.

WBS 1.5.12 – Technical Support

- Closed the books for FY02 successfully.
- Submitted FY03 work statements and B/A requirements.
- Working on FY03 schedule and funding packages.
- Group presented 6 talks in the ASAC review.
- Instability threshold studies due to RF and new EK impedance were completed.
- The impedance budget was updated.

- The studies on resonance corrections are started.

- Comparison of electromagnet versus permanent magnet for the IPM was completed.

- Group representative participated in the Tune Feedback Workshop (BNL, September 23) and presented the talk "UAL Beam Modelling"

- Implemented a prototype of the Accelerator Instrumentation Models (AIM): http://www.ual.bnl.gov/ref/v1/doc/doxygen/html/namespaces.html
  AIM is designed as a collection of diagnostics devices. At this time, it includes the Beam Transfer Function (BTF) package with two classes: Kicker and BPM. The module is implemented as a C++ shared library and can be integrated with Matlab and other diagnostics toolkits.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
12252.8	12252.8	11941.1	0.00	0.0%	311.6	2.5%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current period CV of $97.8K (32.9%) is driven by an adjustment to overhead which reduced ACWP by $52.4K. Without the reduction to ACWP the cost % would not have exceeded the 25% threshold.

Project Impact: None.

Corrective Action: None.

WBS 1.9.5.1 -Ring Controls Integration

The first draft of a revised design manual for ring controls is complete. This is expected to facilitate communication and better understanding of controls issues among the other groups (RF, vacuum, magnet power supply, diagnostics). This design manual includes sections on the central timing system, but is still lacking in documentation on the Machine Protection System. This weakness will have to be made up in the future.

WBS 1.9.5.2 - Power Supply Controls

A new version of the Power Supply (PSC) application was submitted to CVS. The PSC application was modified to adhere to accepted device and signal naming conventions, and to support timing modules, and to adhere to the latest SNS standards for IOC applications.

WBS 1.9.5.3 – Diagnostics

Work continues on the BLM IOC application. The current BLM system design provides redundant HV power supplies, but does not provide redundancy in other IOC components. However, the possibility of providing a higher degree of redundancy in the future is recognized (budget conditions allowing). Therefore the BLM system is being designed in a very modular fashion, with low channel count components, so that components can be moved to separate IOCs in the future, if desired. However, steps need to be taken to ensure that there is sufficient cabinet space allocated for such expansion.

There was a setback with the choice of HV power supply. The unit selected (ISEG 204Q) does not function correctly when accessed from a MVME2100 processor board (or any other processor which supports address pipelining). ISEG is reworking the SNS unit to correct the problem. If that rework is unsuccessful, there is a proven, but more expensive, fallback solution from Bertan.

Analysis of ADCs for the IPM system continues. Three ADCs are under analysis, the Struck SIS3301, the Hytec VTR2536 (used in the RHIC IPM system), and the ICS 145-8A. The report of the analysis of the VTR2536 is now available on the BNL SNS web site along with the SIS3301.

The BCM Labview software was enhanced to correct some bugs and to add new features. The enhanced software has been sent to ORNL in preparation for MEBT commissioning next month. In addition, effort is underway to replace the Portable Channel Access Server in the BCM software with iocCore software. This effort is also expected to be complete in advance of MEBT commissioning.

WBS 1.9.5.4 - Vacuum

The HEBT Valve control PLC program is largely complete. More PLC components have been ordered so that work on the Ring Valve control PLC program can commence.

Hytec RS-485 IP modules are being ordered so that work can resume on Ion Pump and Gauge Controller support, using the SNS standard hardware for RS-485.

WBS 1.9.5.5 - Application Software

User documentation for the LLRF beam control application is complete and has been released for use by the RF group in upcoming tests.

Work has begun on a BLM application in collaboration with the ORNL accelerator physics group. The application is loosely based on the RHIC BLM application, but will be developed in the XAL framework. It will include control panels, and a waterfall display with false colors providing the magnitude dimension. The waterfall will be implemented using the JClass software package.

The parameter page “control” was demonstrated to partner labs, and is being submitted to CVS so that other labs might use this tool in their development.

WBS 1.9.5.6 – RF

Work continues to port the Bittware DSP “Host Interface Library” to the MVME2100 processor board. Some bugs were encountered which delayed progress. The vendor is now actively involved correcting the bugs. Despite this setback, the HIL is functional enough to support the upcoming RF system tests. EPICS device support is still needed.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4111.5	4094.9	4185.3	(16.51)	-0.4%	(90.3)	-2.2%

Variance Statement: Cum variances are within thresholds. No analysis required.
Current SV of -$109.2K (-53.3%) is driven by 1.9.5.2 Power Supply Controls Fabricate; CV -$32.1K (-33.6%) is driven 1.9.5.4 Vacuum Controls & 1.9.5.5 Application Programming.

Project Impact: None.

Corrective Action: None.

IV. Earned Value Reports and Charts

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

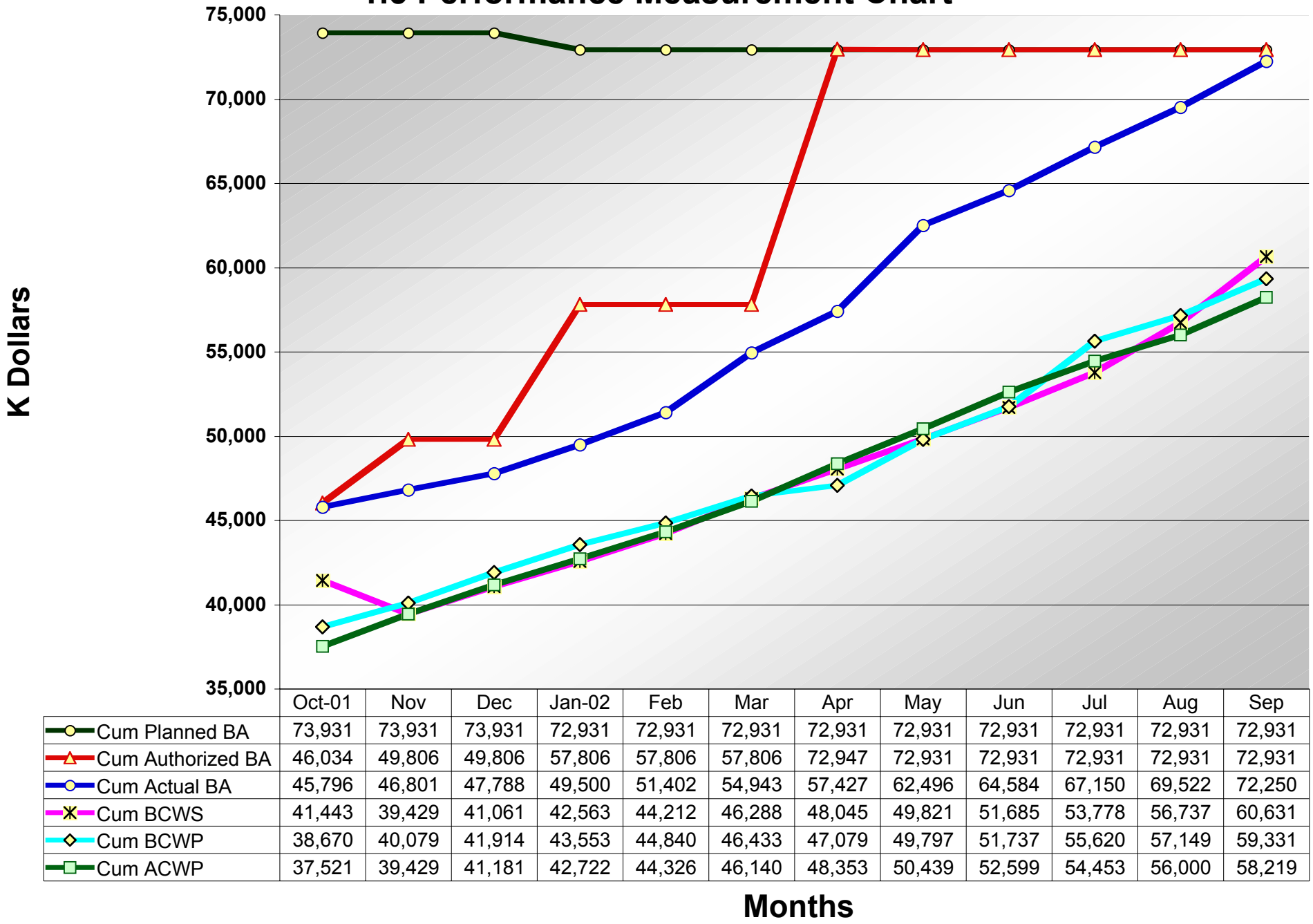
PROJECT TITLE: SPALLATION NEUTRON SOURCE	**REPORTING PERIOD:** 1-Sep-02 thru 30-Sep-02	**PROJECT NUMBER:** 99-E-334
		START DATE: October 1998
PARTICIPANT NAME AND ADDRESS: Brookhaven National Laboratory, Brookhaven, NY	**BCWS PLAN DATE:** October 1999	**COMPLETION DATE:** November 2006

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	7.4	7.4	0.00	0.0	7.4	5,115.0	5,115.0	5,112.9	0.0	2.1	5,115	5,115	0.0
1.5 Ring & Transfer Line System	3,893.8	2,182.9	2,219.0	(1,711.0)	(36.1)	60,630.9	59,331.4	58,218.6	(1,299.5)	1,112.8	112,076	112,076	0.0
1.5.1 HEBT (High Energy Beam Transport) Systems	465.4	505.6	222.7	40.2	282.8	5,566.0	5,901.8	4,699.6	335.8	1,202.2	9,841	9,841	0.0
1.5.2 Injection Systems	396.5	(8.9)	93.2	(405.5)	(102.2)	4,716.1	4,965.0	4,460.4	248.9	504.7	9,301	9,301	0.0
1.5.3 Magnet Systems	452.4	168.07	431.4	(284.4)	(263.4)	10,975.7	10,734.4	11,029.2	(241.3)	(294.8)	16,935	16,935	0.0
1.5.4 Power Supply System	263.9	12.3	35.8	(251.6)	(23.6)	1,214.5	955.0	1,100.2	(259.5)	(145.2)	3,746	3,746	0.0
1.5.5 Vacuum System	195.8	166.0	250.2	(29.9)	(84.3)	5,037.9	4,963.5	5,001.5	(74.3)	(38.0)	9,727	9,727	0.0
1.5.6 RF System	1,298.4	587.6	398.5	(710.9)	189.0	7,255.5	6,981.1	6,920.4	(274.5)	60.7	11,875	11,875	0.0
1.5.7 Ring Systems Diagnostic Instrumentation	346.6	330.6	203.5	(16.0)	127.1	7,093.8	6,558.4	6,676.6	(535.4)	(118.2)	13,584	13,584	0.0
1.5.8 Collimation and Shielding	36.9	43.4	47.3	6.5	(4.0)	1,790.3	1,611.2	1,634.4	(179.1)	(23.2)	3,380	3,380	0.0
1.5.9 Extraction System	63.7	94.5	108.7	30.8	(14.3)	1,687.2	1,622.2	1,712.8	(65.0)	(90.5)	6,165	6,165	0.0
1.5.10 RTBT (Ring to Target Beam Transport) System	76.7	(13.6)	227.6	(90.3)	(241.2)	3,040.3	2,785.2	3,041.7	(255.1)	(256.4)	7,235	7,235	0.0
1.5.11 Cable	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.0	0.0	0.7	0.7	0.0
1.5.12 Technical Support	297.6	297.6	199.8	0.0	97.8	12,252.8	12,252.8	11,941.1	0.0	311.6	20,287	20,287	0.0
WBS SUBTOTAL	3,901.2	2,190.2	2,219.0	(1,711.0)	(28.7)	65,745.9	64,446.4	63,331.5	(1,299.5)	1,114.9	117,191		
UNDISTRIBUTED BUDGET													
SUBTOTAL	3,901.2		2,219.0			65,745.9		63,331.5			117,191		
MANAGEMENT RESERVE													
TOTAL	3,901.2		2,219.0			65,745.9		63,331.5			117,191		

RECONCILIATION TO CONTRACT BUDGET BASE

DOLLARS EXPRESSED IN:	SIGNATURE OF PARTICIPANT'S PROJECT DIRECTOR:	DATE:
THOUSANDS	Jie Wei	October 22, 2002

1.5 Performance Measurement Chart



	Oct-01	Nov	Dec	Jan-02	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Cum Planned BA	73,931	73,931	73,931	72,931	72,931	72,931	72,931	72,931	72,931	72,931	72,931	72,931
Cum Authorized BA	46,034	49,806	49,806	57,806	57,806	57,806	72,947	72,931	72,931	72,931	72,931	72,931
Cum Actual BA	45,796	46,801	47,788	49,500	51,402	54,943	57,427	62,496	64,584	67,150	69,522	72,250
Cum BCWS	41,443	39,429	41,061	42,563	44,212	46,288	48,045	49,821	51,685	53,778	56,737	60,631
Cum BCWP	38,670	40,079	41,914	43,553	44,840	46,433	47,079	49,797	51,737	55,620	57,149	59,331
Cum ACWP	37,521	39,429	41,181	42,722	44,326	46,140	48,353	50,439	52,599	54,453	56,000	58,219