Brookhaven National Laboratory

SNS

Ring and Transfer Lines Systems

J A N U A R Y

MONTHLY REPORT

01 January – 31 January 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
January 2001
Ring and Transfer Lines Systems

I. Senior Team Leader Assessment

1. TECHNICAL PROGRESS AND ACCOMPLISHMENTS

Ring Development – BNL

- The diamond-structure foil produced by Good Fellow company showed long life-time at SNS power level.

- An industrial firm is being seeked to improve on the mechanical integrity under free hanging condition.

- A PCR will be generated to get approval for additional R&D funding for that purpose.

- A current sheet winding for the extraction kicker has been produced and tested with a prototype magnet.

- The measurement showed that there is no reduction in rise time and the coupling impedances are reduced by a factor of two to three in the operating frequency range. This amount of reduction is sufficient to allay the danger of transverse instability.

- The prototype laser wire scanner has been assembled and installed in the HEBT for testing. The required safety review and operation procedure has been in place. Real beam test will be convened in the first week of February.

- The study of the TiN coating of the ring vacuum chamber has been completed. The resultant bottoms have been sent to CERN for testing on the coefficient of secondary electron emission. The best one will be used as the standard for future work. A new procedure has to be developed for the kicker made of ferrite.

- Contract agreement was signed between IHEP and SNS/BNL for the study of crystal-assisted collimation at Provino. If successful, this can be used to improve the collimation efficiency for 1.0 GeV beam.

Ring and Transfer Lines – BNL

- The 21Q40/27CDM30 magnets have been assembled on a common support to measure the cross coupling relationship between magnetic fields through the external iron. The deviation from the single magnet will be evaluated by the Physics group to determine the effects on the particle dynamics.

- Bids have been received for the 21Q40 production order. The total package costs about 1.0 M$ which will be paid for with 01 and 02 budget. The low bidder, Tesla, agree with the option of more spares added at the same price before the production is completed.

- The 27CDM30 corrector package has been completed and is ready for vendor bid in the first week of February.

- Final bids were evaluated and the order was placed with the Allied Engineering for the Ring dipole core assembly. The additional units needed for the future operational spares have to be supported by the contingency with the approval of the project office.

- Open bids for the half-cell assembly girders have been evaluated. The BNL shop was awarded the fabrication contract for its competitive price and ease of communication and design corrections.

- Ring dipole coils continue to arrive at BNL from Stangenes, Inc. Incoming inspection has been carried out in the assembly area in Building 902 where the magnet assembly will take place. Magnetic measurement will be done in the same building. This will simplify the whole assembly, testing, and final half-cell manufacturing tremendously.

- The bid for lower field power supply has been sent out to vendors. The response is due back the end of January. The total number of units has been reduced from 52 to 16.

- Vacuum chamber of the HEBT line is under design iteration with the vendor with the target first article fabrication next month.

- The project office directed reduction of ring R&D efforts on collimation, e-p instability and code bench marking have resulted in a PCR in the total amount of about 1.0 M$. Small amount of fund was kept to complete study already initiated.

- The work plan, APPs and resource-loaded schedule are being developed to support the funding in FY 2001. Due to reduction of fund, some procure will be delayed until FY 2002 and some will be supported in years 01 and 02.

- New lattice drawing will be revised to reflect the changes in interfaces, correct A/E IBD angle, provide ASD global references, also include height reference dimension in RTBT.

2. ISSUES AND ACTIONS

- Many quantity procurements are placed now and in the next year for the long-lead ring component.

- The project office has to find an effective way of approving and supporting the spare units which cannot be charged to TEC.

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	%
4494.6	4494.6	4308.9	0.00	0.0%	185.6	4.1%

Variance Statement: Cumulative variances are within thresholds. No analysis required. Current period cost variance (CV) -$71.4K (-92.1%) is caused by higher than planned distributed technical services.

Project Impact: None.

Corrective Action: None.

WBS 1.5 Ring and Transfer Lines

BCWS	BCWP	ACWP	SV	%	CV	%
22,518.9	22,196.7	21,929.8	(322.2)	-1.4%	266.9	1.2%

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	160
FY01	0	0	0	4	31
Due in Next 30 days	0	0	0	1	0
Total Due at present	0	0	3	11	76
Made	0	0	3	9	72
Missed	0	0	0	2	6

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

Beam dynamics studies for a new working point (6.23,5.24) were conducted and presented to ASAC, including i) frequency maps ii) resonance identification iii) diffusion mechanism iv) Dynamic aperture

In collaboration with Jeff Holmes and others, the injection chicane and bump was added in the lattices and a fine tuning of the ring has been achieved for two promising working point candidates, (6.40,4.30) and (6.40, 6.30). The chromaticity correction for these lattices is in progress.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4494.6	4494.6	4308.9	0.00	0.0%	185.6	4.1%

Variance Statement: Cumulative variances are within thresholds. No analysis required. Current period cost variance (CV) -$71.4K (-92.1%) is caused by higher than planned distributed technical services.

Project Impact: None.

Corrective Action: None.

WBS 1.1.12.1 – PSR Instability

Technical Progress/Accomplishments

Nothing new to report.

III. Detail Line Item Subproject Status

WBS 1.5.1 – HEBT Systems

The Tesla Engineering Ltd and Sigma Phi were visited during the month. Tesla was visited to determine progress on the dipole purchase order and to review the magnet measurement part of the specification and purchase order. A long coil measurement set-up designed by P. Wanderer s group was discussed. Tesla expressed interest in doing the long coil measurement but they requested that BNL provide both the calibrated long coil and the electronics to read the coil. Tesla would build the coil support and would do the magnetic measurement. They will come back with a cost estimate for doing the measurements in this fashion. Tesla also repeated their proposal to measure the magnet with a short hall probe set-up. They forwarded specifications on their measurement equipment and a report that they did on measuring another magnet. This information was forwarded to P. Wanderer and T. Hunter. A final decision on magnet measurements awaits their review. Tesla has placed the order for both the magnet core steel and the coil copper. The next item on their schedule are their fabrication prints. Tesla believes at this time that they will be delivering the first article magnet in July.

Sigma Phi fabricated the coils for the SNS quadrupole prototype. Unfortunately during the visit it was noted that Sigma Phi has quality issues. Sigma Phi has a magnet measurement facility in their magnet assembly area. They also do short coil magnet measurements but their facility is set up and running and has a calibration magnet. They will be on the HEBT quadrupole/corrector bid list; but, if they win the bid there must be close review of their production efforts.

The statement of work with phased procurement and specifications with magnetic measurements for the 12Q45 quadrupoles and 16CD20 corrector magnets are prepared and the drawings await final approval. One more 3D magnetic analysis is being done to verify the 12Q45 magnet s performance and then it will be sent out to bid. The final count of quadrupoles and correctors has been set.

The revised drawing for the standard dipole chambers has been released. The extraction beam pipe angle down stream of the momentum scrappers was modeled using RayTrace and Opera-2D codes for stripped H^+ beam. The angle of the designed extraction pipe is found to be suitable for energy range of 800 MeV to 1.3 GeV.

Integration with the vacuum chamber is continuing.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1948.4	1943.9	1756.5	(4.5)	(0.2%)	187.4	9.6%

Variance Statement: Current period CV -$98K (-52.9%) is driven by 1.5.1.1 HEBT Magnets & Support -$85.9K. This CV is caused by higher than planned material costs.

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 have been checked and await back correction. Three designers are now assigned checking drawings to reduce the back log; one of them was working on the dump septum. The injection foil mechanism has been checked and awaits final approval. The injection C magnet work is on hold pending the decision on injection energy.

The detail drawings of long Injection kicker are complete and are in the checking queue. The jumper connectors were revised to reduce the beam line space the magnets use. The distances between all jumper connectors to the main coil are all within 5.3 inches. This allows additional space around the bellows for future use. The change in injection energy being proposed should not change the parameters for the kicker so this checking job will be pushed through so a magnet can be built this year.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1552.7	1509.2	1706.4	(43.5)	(2.8%)	(197.2)	(13.1%)

Variance Statement: Injection System has a cum period CV of -$197.2K (-13.1%). This is primarily due to 1.5.2.2 Injection Kicker Power Supply and 1.5.2.5 Stripped Foil. Where actual material cost of work performed (ACWP) is greater than budgeted cost of work performed (BCWP) resulting in a negative cost variance CV.

Project Impact: None.

Corrective Action: None.

WBS 1.5.3 – Magnet Systems

The Allied Engineering (production order for the 1.3 GeV magnet cores) has placed the order for the core steel. The production coils continue to arrive from Stangenes Inc; they are more than half way through the order. They are being tested in the 912-assembly area. Alternate areas for assembly are being investigated. The goal is to have an area where assembly and magnetic measurement can be done side by side.

The bids for the 21Q40 have been received and evaluated. This RFQ is being rebid to include a change in number the HEBT 21Q40 s and additional steel in the magnet core. The 1.3 GeV first

article 21Q40 is being assembled. Additional steel is being ordered to determine the extent of saturation at the highest operating currents.

The 27CDM30 corrector procurement package — drawings, specification, and statement of work — was completed and it has been sent out for bid. Magnet measurements and 3D computer analysis of the assembled 21Q40 and 27CDM30 corrector magnet were completed. As a result the steel to steel gap between the quadrupole and the correctors has been set at 8 .

Steel has been ordered for the first _ cell base support.

Detailed design work continues on both the 21CS30 and 21CO30 sextupole and octupole corrector magnets continued. A design review is scheduled for February.

Detailed design continues on the large aperture ring straight section doublet quadrupole assembly. This includes both quadrupole designs and the corrector design.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3241.2	3202.4	3330.4	(38.8)	(1.2%)	(128.0)	(4.0%)

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

Project Impact: None.

Corrective Action: None.

WBS 1.5.4 – Power Supply Systems

A Power Supply Interface (PSI) and Power Supply Controller (PSC) prototype has been delivered to BNL, and we are evaluating its performance. This work should be completed by the end of February. After this is done, the drawings will be updated, and construction of the First Article will begin.

The contract for the Low Field Correction Power Supplies has been awarded Danfysik A/S. The Final Design Review is scheduled at the vendor's facility for the end of March.

We participated in a Power Supply Workshop at LANL to see where common equipment could be used by both BNL and LANL. It seems possible that LANL can make use of both our PSI/PSC power supply interfaces and also the Low Field Correctors that we recently ordered. We are also working towards commonality in the Medium Power Supplies that we expect to release to procurement this June.

PCRs relating to power supplies were written for low field correctors, splitting the ring circuit for the 21cm and 26cm quads, adding sextupoles, a beam height change in the RTBT, and PFN design changes.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
518.2	453.2	371.8	(65.0)	(12.5%)	81.4	18.0%

Variance Statement: Power Supply Systems has a current period SV of -$54.4K (-55.6%) and a cum SV of -$65K (-12.5%) and CV of $81.4K (18%). The current SV is due to less performance than planned. The positive cum CV is due to less cost than planned.

Project Impact: None.

Corrective Action: None.

WBS 1.5.5 – Ring Vacuum System

The drawings of four types of halfcell vacuum chambers have been completed and are in checking. To accommodate the future high field sextupoles, the dipole chambers will be shortened by 3.5" at straight ends. The dipole chamber vendor is fabricating another prototype chambers correcting the deficiencies found in the 1st prototype. RFQs have been issued for the arc halfcell bellows and pump crosses. A model of the halfcell welding fixture was made.

The preliminary ICD between ring vacuum system and control system is complete. The draft MPS Vacuum IRD was reviewed after a design meeting with Control and Vacuum personnel at BNL and ORNL. List of I/O channels for PLC logic is being generated. The draft specification for vacuum gauges and gauge controllers is under revision. Work on ion pump controller specification is being started. A draft large ion pump specification has been prepared. A vacuum chamber with gauges, ion pumps and gate valve has been assembled and will be hooked up to the Vacuum Controls test stand. Two RGAs and the associated radiation dosimeters installed in AGS Booster are operational.

The vacuum team leader attended the DTL and CCL vacuum final design review. The impact of installation cost transfer to ORNL on the vacuum system performance and risk was forwarded to ORNL. The SEY of TiN coated samples were analyzed by CERN and found to be below 2, with those coated by magnetron sputtering faring better than those of straight DC sputtering. A PCR on coating of extraction kicker ferrites with TiN was drafted. Development of TiN coating on materials other than stainless steel has been started.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1618.8	1527.2	1441.0	(91.6)	(5.7%)	86.2	5.6%

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

Project Impact: None.

Corrective Action: None.

WBS 1.5.6 – RF System

Parts of the first cavity are being manufactured. Assembly should start in February. Work on the power supplies and power amplifiers continued. Estimated impact of transferring all installation and commissioning to ORNL. RF simulations, which include dynamic tuning, have been started. There are no surprises so far.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2976.3	2923.8	2695.6	(52.5)	1.8%	228.2	7.8%

Variance Statement: Current period SV of -$61.0K (-37.6%) is due to the High Level RF System performance being less than planned. The positive cum CV is due to ACWP being less than performed.

Project Impact: None.

Corrective Action: None.

WBS 1.5.7 – Ring Diagnostics

A detailed response was prepared to the Diagnostics Advisory Committee recommendations which followed from the project- wide Diagnostics Review at ORNL on December 13-14. This response was delivered to the project office for inclusion in materials presented at the ASAC Review.

Layout work is progressing in collaboration with vacuum group on locations, chamber dimensions and bellows specifications for all diagnostics in HEBT, as well as the Ring injection area. Additional manpower was assigned to cable routing and rack space and power requirements, and work has begun to create the next level of detail in the database.

Two Ring 21cm BPM PUEs returned from hydrogen furnace copper brazing. Conflats were welded on and final assembly was completed. One is sitting on the wire scanner, awaiting measurement. POs were written for raw material for all BPM PUEs. ILRs were written for shop work for all BPM PUEs.

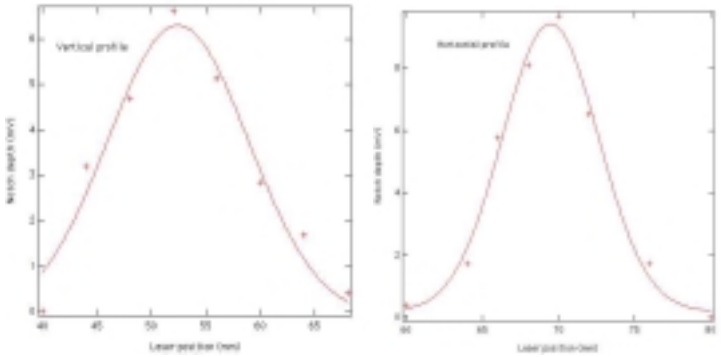
The possibility of running the IPM without microchannel plates is being investigated, to overcome the non-linearity that arises from electron energy dependence of mcp gain. Refinement of rf shielding to cope with beam coupling continues, with parts received from shops and installed on prototype, and now awaiting wire measurements. Calculations have begun to explore the feasibility of doing profile measurements by scanning the beam with a transverse electron beam. While not practical for small beams, for the large beam present in the Ring this technique may be useful. The results of these calculations will give a better model for the potential distribution within the beam, and will be applied to the problem of the MCP sensitivity roll off with electron energy. The electron detector AFE board was received and stuffed, is ready for testing.

Lab testing of the effect of spot knocking on loss monitor bottles is underway, will continue to determine whether spot knocking has a predictable effect on performance. Discussions of PCI vs. VME for BLM system actively continue.

Developed, simulated, and applied an algorithm, to "real" scope data, to compensate for current transformer droop. This was done to accommodate unchopped macro-pulses for Linac testing. The simple algorithm that restored the baseline cannot be used for unchopped beams. Finalizing schematics for MEBT BCM Front-End-Electronics. Continued to update parts list for BCM system electronics, and ordered the inductors required for the 7MHz Gaussian signal filters. Items not yet ordered include RF matching transformers, heat sinks and connectors. Parts have started to come in. Work continued on characterizing the new FCT220 50:1 transformer. Measurements indicate a rise time near 400ns (Bergoz measured 374ps), and a droop of the order of 0.088% per μsec (Bergoz measured 0.098%).Testing of the FCT using bread-boarded amplifiers revealed an asymmetric distortion in the amplifier output for positive going vs. negative going signals. Found distortion was due to the need to pull the output of the AD602 to the negative supply through a 1K resistor. This provided needed additional current drive in the negative direction. In addition it was found that a single stage provided adequate gain. The effects of noise on algorithms to compensate for droop using a base-line restoration technique were investigated. An algorithm was developed to compensate for the droop in the transformer by passing the signal through a digital pole-zero canceling IIR filter. This performed well, and will be used in the final design. The base-line restorer must also be used after the digital compensator to restore the DC level that is removed by the lower frequency pole provided by the compensator. This need be done only on a macro-pulse basis, since droop is restored to 0.1%/mS by the digital filter. A method using a least squares fit regression algorithm on the tail of the transformer signal to calculate the transformer droop time constant is under investigation. This algorithm could also be applied only during test-pulse calibration. If it can be done quickly, it will provide a continuous update of the transformer parameters.

Laser-wire measurements have started downstream of the RFQ, at 750 KeV on the AGS linac. The scope is timed in and the 10ns notch has been observed in the output of the current transformer.

Horizontal and vertical beam profiles were acquired. 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.



Alternatives to the Q-switched pulsed laser are also being explored. It may be possible to modulate a CW laser at some frequency where there is little beam power and to measure the beam modulation with a resonant current transformer. This technique transforms the somewhat difficult task of synchronizing to the 10ns laser pulse in the time domain into a perhaps easier task of locking to a much smaller continuous signal in the frequency domain. CW laser cost will drive the decision.

A prototype carbon wire scanner is installed in the laser wire test box. A designer has been assigned and work is progressing on detail drawings for the MEBT wire scanner review. Work continues on details of carbon wire attachment, and on wire heating calculations.

Prototype I/Q demodulator for PLL tune measurement is tracking phase, bandwidth is limited by LabVIEW. Efforts to move algorithm into DSP have begun. AP group has expressed desire to have available tune from measurement of frequency of quadrupole oscillations. Investigation of a resonant quadrupole pickup has begun.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2203.9	2152.0	2375.1	(51.8)	(2.4%)	(223.0)	-(10.4%)

Variance Statement: Ring System Diagnostic Instrumentation has a cum period CV of -$223K (-10.4%). This is primarily due to actual cost of work performed (ACWP) is greater than budgeted cost of work performed (BCWP) resulting in a negative cost variance (CV).

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 are currently being checked. This drawing will be combined with the drawing of the RTBT inner collimator structure as a package.

The standard test piece has been manufactured and has been filled with lead. This item has been forwarded to the manufacture to calibrate the ultra-sonic density meter. Preliminary measurements are being evaluated.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
678.3	693.3	742.0	14.9	2.2%	(48.7)	(7.0%)

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 were completed and are in the checking queue. An opera 3D magnetic finite element model was built to calculate the field properties and magnetic forces on the kicker core and bus bars. Based on the results, this magnet will meet the magnetic and structural requirements. A result summary is being prepared. An updated layout for the out-of-the-tunnel oil filled version of PFN is being worked on. This design includes a sealed oil tank and a top plate with most of the components mounted to it for ease of maintenance. A separate oil filled resistor assembly with the cooling flow arrangement will be installed on the top of the plate.

Work continues on a 3D model of the lambertson septum and its support stand. Pending PCR approval, the pitching magnet doublet is being laid in after the RTBT line doublet. A cost estimate for the PCR is being generated.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
493.0	485.4	443.0	(7.6)	(1.5%)	42.4	8.7%

Variance Statement: Extraction System has a current period SV of -$25.4K (-48.0%) which is primarily due to less work performed than planned in the power supply area.

Project Impact: None

Corrective Action: None.

WBS 1.5.10 – RTBT System

Charlie Pearson visited Knight's Chicago office where the downstream RTBT/Conventional interface was reviewed. They worked out the size and positions of the shielding access hatches in the Target building for the 36Q80 quadrupole doublet assemblies. Knight promised to look into the ability to store the shielding for one hatch on top of the other hatch when required for repairs or maintenance. Knight also agreed to make door and truck access hatches on the other end of the target building larger.

The design of the 21Q40 quadrupole configuration for the transfer lines was completed and the base assembly has been included in the RFQ for the ring 21Q40 quadrupoles. The RTBT/HEBT versions of these quadrupoles will be ordered in fy2002 as part of the phased procurement for the ring quadrupoles.

Drawings for the inner collimator structure for a RTBT collimator are complete and an internal review has taken place. Modifications suggested at the review are being 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	%
849.9	868.1	862.4	18.2	2.1%	5.7	0.6%

Variance Statement: RTBT System has a current period CV of -$75.7K (-129%) which is due to higher cost than performed for behind schedule work which is now back on schedule.

Project Impact: None.

Corrective Action: None.

WBS 1.5.12 – Technical Support

The half cell assembly layout was discussed in a meeting with the mechanical group. The position and design of the ion pumps was refined in order to accommodate the required 8" distance between the magnet and the low-field corrector.

The final design of octupole and sextupole corrector was discussed in a meeting with the mechanical group. We agreed that the performance was acceptable and can proceed with the assembly of the magnets, for testing and measurements.

Interference studies of Quad-corrector assembly are continued by W. Meng and others. The non negligible effect of the quadrupole field to the corrector field components was verified by measurements and simulations.

A preliminary TRIM quadrupole ps connection scheme was communicated to the power supply group.

Studies are been initiated for adding skew quadrupole windings in all correcting dipole for local coupling correction.

The design of the 21Q40 quad was slightly changed by W. Meng by adding 1" thickness in the magnet bore in order to reduce the saturation at the edges when running the magnet with 1.3 GeV compatible currents. The multi-pole components of this new magnet were found to be very close (within 10%) to the ones of the previous design, thus having a negligible effect in beam dynamics.

Collimator were rearranged in the HEBT, in the new configurations 21 cm quad was replaced with 21 cm quad in the LAMS of the HEBT.

The number of the dipole corrector and BPM were reduce to half in the HEBT and RTBT and this scheme still can correct the 1 inch of ground settlement.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
6434.4	6434.4	6204.9	0	0%	229.5	3.6%

Variance Statement: Cum 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 has been set up in the SNS controls lab for driver development.

(V101) – Eventlink input modules:

Front panels for the 12 event link input modules arrived this month completing this task.

V124s – Beam synchronous decoder:

We are very close to going out for a prototype PCB purchase. 100% of the parts for the prototype have been delivered. Sufficient components to build several prototype PCBs have been

ordered. A preliminary draft of the V124s module description was reviewed. A revised copy has been generated. This task is on schedule.

V123S – Beam synchronous encoder:

Assembly of additional prototype V123s modules has begun. Components and PCBs for all remaining prototype V123s modules are in house. The PCB will be revised after the timing system design review this summer to produce the production modules.

A method of using a VME 64x chassis with the BNL P2 backplane needed for the Eventlink and RTDL systems was tested and works. This will allow the timing and RTDL systems to use standard SNS VME chassis.

Orders will go out this month for components to begin building the SNS RTDL system.

WBS 1.9.5.1 – Ring Controls Integration

Naming Database:

We continue to update the names database and monitor to make sure that device names follow the SNS naming convention.

WBS 1.9.5.2 – Power Supplies

PSI/PSC:

There was a trip to Apogee Labs to check on the status of the PSC and PSI controllers and to review the acceptance test software and procedures. We assisted in some preliminary testing and identified some problems that are being corrected. We are writing PSC test software which will be used for acceptance testing.

Ethernet Digitizer:

We have contacted the Yokogawa rep and arranged for a demonstration of their fast digitizer and function generator. The specs and performance are a good match to our requirements for the injection power supplies. The unit has an ethennet interface which is one of the standard field busses we want to utilize. We are not able to get assurance that an Ethernet driver, the source code, or the protocol will be made available to us. The Yokogawa rep is looking into getting us the documentation or software we need. KEK uses this hardware. We will contact KEK to see if we can obtain an Epics driver.

Software Development:

Our simulation IOC is operational. We wrote some engineering screens and presented them to the power supply group for evaluation. They asked for some changes and new screens are being developed to meet their requirements. As we develop waveforms displays and get feedback from Engineers we find many options are needed. We have developed a WEB based display that does many of the functions requested by Engineers.

Fiber Interface Testing:

We have started to build a test interface device. We are building two, one for ORNL and one for BNL. It is used to test the interface to the PSI.

WBS 1.9.5.3 – Diagnostics

We had meetings with the diagnostic group to discuss the hardware architecture for some of the diagnostic devices. The chief topic was the comparison of VME versus PC architecture.

Last month we setup a PC, Labview and channel access server. This month we upgraded to Labview version 6. The goal for next month is to demonstrate a system that has an interface to the LeCroy scope for the diagnostic group. Following that we will integrate motion control and a fast digitizer into the system. This system will be used to test prototype hardware.

WBS 1.9.5.4 – Vacuum

We attended a vacuum review at LANL of the DTL and CCL designs last month.

There have been discussions with the other labs to determine what hardware will be ordered for the Vacuum systems. JLAB has a requirement for fast response that requires the use of non-commercial hardware. BNL and LANL anticipated using commercial hardware. A follow up meeting is planned to determine what hardware should be used. The preliminary ICD is being held up until March when this issue should be resolved.

WBS 1.9.5.5 – Application Software

UAL 2.0: Online SNS Simulation Facility.

Implemented the frame of the SNS Ring Application Toolkit. This toolkit aims to consolidate and organize heterogeneous engineering and commissioning applications (e.g. MEDM screens, Java packages, scripts, etc) to make it easier for operators, engineers to access programs. The structure is similar to browsers used by explorer.

UAL 1.0: Off-line Simulation Environment.

A new release of UAL 1.0 Environment including the parallel extensions and examples of user's scripts has been completed and installed in the public directory. This release includes the new SNS Perl package. The new SNS package includes several new Perl modules, C++ classes with Perl interfaces that provide facilities for parallel calculation.

The timing of the UAL 1.0 parallel version was carried out. The performance factor for the real scenario was 6.7 in comparison with the non-parallel version.

The new SNS classes, PaintingSchemeP and SCTrackerP, have been implemented as adapters to the parallel versions of ACCSIM and ORBIT modules of UAL 1.0 Environment.

The new ALE MPI package has been introduced. This package contains the BunchSender extension (C++ and Perl modules) for operating with bunches of particles on different CPU in the case of parallel calculation. This new extension is used in the diagnostics module of the SNS package.

WEB documentation for the SNS UAL software is being prepared.

WBS 1.9.5.6 – RF

A draft ICD for the high level RF is still in progress. We plan to setup a PLC development stations soon and plan to order the parts next month. We will setup development VME systems for the low level RF system.

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-Jan-01 thru 31-Jan-01	**PROJECT NUMBER:** 99-E-334
		START DATE: October 1998
PARTICIPANT NAME AND ADDRESS: Brookhaven National Laboratory Brookhaven, NY	**BCWS PLAN DATE:** October 2000	**COMPLETION DATE:** June 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	77.5	77.5	148.8	0.0	(71.4)	4,494.6	4,494.6	4,308.9	0.0	185.7	5,111		
1.5	Ring & Transfer Line System	1,639.3	1,409.2	1,573.9	(230.1)	(164.7)	22,518.9	22,196.7	21,929.9	(322.2)	266.9	122,333		
1.5.1	HEBT (High Energy Beam Transport) Systems	201.8	186.7	285.5	(15.1)	(98.8)	1,948.4	1,943.9	1,756.5	(4.5)	187.4	10,700		
1.5.2	Injection Systems	81.7	51.7	57.0	(30.1)	(5.4)	1,552.7	1,509.2	1,706.4	(43.5)	(197.2)	9,066		
1.5.3	Magnet Systems	319.2	305.7	305.7	(13.5)	0.0	3,241.2	3,202.4	3,330.4	(38.8)	(128.0)	16,165		
1.5.4	Power Supply System	97.8	43.5	20.3	(54.4)	23.1	518.2	453.2	371.8	(65.0)	81.4	5,355		
1.5.5	Vacuum System	66.8	56.0	75.1	(10.8)	(19.1)	1,618.8	1,527.2	1,441.0	(91.6)	86.2	11,332		
1.5.6	RF System	162.1	101.1	94.7	(61.0)	6.4	2,976.3	2,923.8	2,695.6	(52.5)	228.2	13,159		
1.5.7	Ring Systems Diagnostic Instrumentation	274.0	266.9	226.6	(7.1)	40.2	2,203.9	2,152.1	2,375.1	(51.8)	(223.0)	16,271		
1.5.8	Collimation and Shielding	20.6	17.6	80.4	(3.0)	(62.8)	678.3	693.3	742.0	14.9	(48.7)	2,779		
1.5.9	Extraction System	52.2	26.8	38.3	(25.4)	(11.5)	493.0	485.4	443.0	(7.6)	42.4	5,092		
1.5.10	RTBT (Ring to Target Beam Transport) System	68.4	58.6	134.2	(9.8)	(75.7)	849.9	868.1	862.4	18.2	5.7	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	294.8	294.8	255.8	0.0	38.9	6,434.4	6,434.4	6,204.9	0.0	229.5	21,105		
WBS SUBTOTAL		1,716.8	1,486.6	1,722.7	(230.1)	(236.1)	27,013.5	26,691.3	26,238.8	(322.2)	452.5	127,443		
UNDISTRIBUTED BUDGET														
SUBTOTAL		1,716.8		1,722.7			27,013.5		26,238.8			127,443		
MANAGEMENT RESERVE														
TOTAL		1,716.8		1,722.7			27,013.5		26,238.8			127,443		

RECONCILIATION TO CONTRACT BUDGET BASE

DOLLARS EXPRESSED IN: THOUSANDS	SIGNATURE OF PARTICIPANT'S PROJECT DIRECTOR: Bill Weng	DATE: February 21, 2001