Brookhaven National Laboratory

SNS

Ring and Transfer Lines Systems

J U N E

MONTHLY REPORT

01 June – 30 June 2001

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
June 2001
Ring and Transfer Lines Systems

I. Senior Team Leader Assessment

1. TECHNICAL PROGRESS AND ACCOMPLISHMENTS

Ring Development – BNL

- The R&D budget has been reduced to zero. All design work will be supported by construction budget.

Ring and Transfer Lines – BNL

- Physics justification and metal coating of the ceramic vacuum chamber of the injection kicker have been under study. The concern is the field penetration and heating of the chamber. A proper material and thickness has to be found for the coating.

- Ti-N coating of the ferrite of extraction kicker has been performed. Measurement of resistivity will determine the proper thickness of Ti-N for the final design.

- Four metal gate valves has been delivered to ORNL. More of them will be delivered for testing and installation. Discussion were held with partner labs on high voltage cables, termination and UPS for vacuum instruments.

- Bids are in for all seven Ring system collimators. Further iteration on the design and cost estimates are ongoing with three vendors. Final award will be in July.

- Half-cell support based number 8 has been completed and delivered to magnet group for use.

- BNL engineers visited Tesla Engineering Limited in England to review the progress of 8D533 HEBT dipole magnet and the 21Q40 quadrupoles. Tesla made steady progress in the production of SNS ring magnets. We expect early delivery in September for half-cell assembly. BNL engineers also visited Danfysik in Denmark to review the progress on the SNS contract of 12 cm HEBT quadrupoles and 27 cm corrector magnets. To make sure both quality and schedule of those contract, BNL has weekly phone conference with both Tesla and Danfysik.

- Four pre-production BPMs have been sent out for brazing. After complete BPMs have been produced, a final cost estimate of all 80 BPMs will be produced by BNL shop.

- The BCM circuit board has been staffed, and initial test has begun. Analog signals have been tracked through stage filters in the chain to ADC.

- Ten SNS staff attended the PAC at Chicago presenting 30 papers on the status and progress of the ring system. Among them, five are oral presentations. Many papers on SNS Front End and Linac system are also presented. ADMS displayed SNS Ring Vacuum chamber in the PAC industrial exhibition and Tesla Engineering showed photo of HEBT dipole magnet.

- Three BNL SNS staff participated in the Miniworkshop on Linac Space Charge Effects. The sources of beam emittance blow-up were discussed and methods to alleviate the effects have also been proposed.

- ORNL and BNL reached an agreement of early handoff of ring accelerator components. After component transfer, ORNL will lead the effort of installation and commissioning in their planning, ETC estimating and execution. BNL staff will participate in those activities per request from ORNL to be specified in a second agreement document.

- BNL staff are working on the bottoms-up ETC to the handoff to ORNL and also preparing for the ASAC review in September.

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	%
4881.9	4881.9	5047.8	0.00	0.0%	(165.9)	-3.4%

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

Project Impact: None.

Corrective Action: None.

WBS 1.5 Ring and Transfer Lines

BCWS	BCWP	ACWP	SV	%	CV	%
31061.7	28779.1	29688.6	(2282.6)	-7.3%	(909.5)	-3.2%

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

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	161
FY01	0	0	0	4	30
Due in Next 30 days	0	0	0	0	0
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 are the high field magnets, specifically the chromaticity sextupoles and the 30Q44/Q58 magnets.

II. Detail R&D Subproject Status

WBS 1.1.3 – Ring System Development

- Jie and Yannis taught the course in USPAS.
- Paper on magnet fringe field accepted for publication in PRE.
- Two people from the group attended the space charge workshop at Oak Ridge.
- The group presented 25 papers to the PAC including one invited and three oral talks.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4881.9	4881.9	5047.8	0.00	0.0%	(165.9)	-3.4%

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

Project Impact: None.

Corrective Action: None.

WBS 1.1.12.1 – PSR Instability

Technical Progress/Accomplishments

Simulations of the RF system including dynamic tuning and low level loops continued. Preliminary engineering work on the low level system began.

III. Detail Line Item Subproject Status

WBS 1.5.1 – HEBT Systems

The first standard dipole chamber has been received, leak-checked and tested for magnetic permeability. It is currently undergoing dimensional inspection. RFQ for 8" Inconel 625 bellows was issued. Preliminary quotes on 8" pump tees were received from vendor and are being evaluated. An order was placed for 4.5" and 8" diameter 316L beam tubes for both HEBT and RTBT. Design work continues on the 12 cm vacuum system, with details generated around the collimators.

Phone conferences continued with Tesla during the month and J. Brodowski, T. Hunter ORNL, and G. Mahler visited them. They have wound three coils for the HEBT dipole that were inspected by the visitors. They are fabricating the potting fixture. Tesla received the steel for the first article HEBT dipole and have scheduled it for machining in July.

J. Brodowski, T. Hunter ORNL, and G. Mahler also visited Danfysik. The drawings for the 12Q45 were updated to add the instrumentation groups trim windings. Danfysik has them and is working on a price.

The revised collimator length and vacuum line components are in the process of being designed.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
2822.9	2708.5	2328.9	(114.4)	-4.1%	379.6	14.0%

Variance Statement: Cum CV $379.6K (14%) is driven by 1.5.1.1 HEBT Magnets and Support; whereas procurement progress of 1.5.1.1.2, 12Q4 and 1.5.1.1.3, 16CD20 Corrector Vendor Fab was acknowledged. Additionally, an adjustment was made to 1.5.1.1 HEBT Magnets and Supports whereas $121,781 was expensed last month without crediting BCWP. Current period SV $138.6K (63.2%) and CV $284K (79.3%) reflect the same explanation as the cum variance.

Project Impact: None.

Corrective Action: None.

WBS 1.5.2 – Injection Systems

The injection foil mechanism fabrication is underway. A video design review of the injection septum magnet was held. Injection septum magnet drawings were completed reviewed and approved. They are in the shops for cost estimate. The dump septum drawings are nearly complete. A design review is scheduled for July.

The checking of long injection kicker drawings was completed. An internal design review was held. The bid package for the magnet coil has been sent out to vendors. First article Ceramic Tubes with end cuffs have been ordered. An order is being prepared for the magnet ferrite.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1826.6	1929.5	2160.9	102.9	5.6%	(231.4)	-11.99%

Variance Statement: Cum CV of -$231.4K (-11.99%) 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 $64.4K (85.6%) is driven by 1.5.2.3, 24D76 Magnet, Detail Design.

Project Impact: None.

Corrective Action: None.

WBS 1.5.3 – Magnet Systems

The first two cores were received from Allied Engineering. They look very good and assembly of the first magnets has begun. Measurement of the first 1.3 GeV dipole continued on the base assembly and it was measured with the first vacuum beam pipe from SDMS. The magnet physics group defined the final pole tip end-shaping piece and the pieces have been ordered from Allied Engineering.

Phone conferences continued with Tesla during the month and they were visited as noted in section 1.5.1. Tesla machined a sample 21Q40 pole. Two discontinuities were noted. A piece of the pole is being sent to BNL for inspection. The winding fixture for the 21Q40 has been fabricated. Overall the schedule as slipped a few weeks with the first magnet scheduled for shipping by the end of August.

Phone conferences were held with Danfysik and they were visited noted in section 1.5.1. The first core has been wound. They are using European standard wire that required a revision to the winding drawing because of the difference in diameter. The drawings have been revised. They have slipped their schedule again. They plan to airship the 1st article unit to BNL by July 31, 2001.

The bids for the 21CS30 and 21CO30 sextupole and octopole corrector magnets were received. New England Technicoil was the low bidder. The contract for the first article 26Q40 magnet was award to Stangenes. Visits to both vendors will be made in the near future. The bid package for the 30Q44 is being prepared. Drawings for the 41CD30 corrector are nearly complete. A design review will be held in July. 3D magnetic analysis of the 21S26 and 26S26 high field sextupole is underway.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
4462.4	4119.1	5308.9	(343.3)	-7.7%	(1,189.8)	-28.9%

Variance Statement: Magnet System has a cum CV of -$1,189.8K (-28.9%) and is driven by WBS 1.5.3.1 High Field Magnets whereas ACWP for purchased materials is greater than BCWS. FY01 BCWS does not reflect FY00 authorized material purchases received and paid for in FY01. Current period SV -$88K (-34.3%) & CV -$166K (-98.7%) is driven by 1.5.3.2 Low Field Magnets 27CDM30 & 41CD30 Correctors Procurement and 1.5.3.1 High Field Magnets respectively.

Project Impact: None.

Corrective Action: None.

WBS 1.5.4 – Power Supply Systems

The medium range power supply RFP is in the procurement department. It will be released in July, with a bid closing date at the end of August. The order should be placed in September.

Both components of the power supply control system (PSI and PSC) are in production. These units will start to be delivered to BNL during the last part of July, and all units will be delivered to either BNL or ORNL by the end of August.

First article testing of the injection bump power supply is ongoing, and will continue in July. This was the first unit to use the PSI/PSC for acceptance tests.

Work continues on the low field correctors. The schedule is still on track for first article testing in October. These units will also be tested with the PSI/PSC.

The main dipole specification will be written and released to procurement during August.

June also included PAC 2001 participation.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1174.5	901.7	510.0	(272.9)	-23.2%	391.6	43.4%

Variance Statement: Power Supply Systems with cum period SV -$272.9K (-23.2%) and a cum period CV $391.6K (43.4%) are driven by WBS 1.5.4.1 Ring Quadrupole PS Procure and 1.5.4.2 Ring Low Field PS, respectively. Current period SV -$110.2K (-70.8%) is driven by 1.5.4.1 & 1.5.4.2 whereas vendor procure under performed.

Project Impact: None.

Corrective Action: None.

WBS 1.5.5 – Ring Vacuum System

After dimensional inspection by Survey Group, the first dipole chamber is being tested inside the dipole magnet. The fabrication of welding fixture for halfcell chambers has been started. Three 1st article Inconel bellows have been leak-checked, the remaining bellows are due to arrival at BNL in early July. All the pump tee/quadrupole beam tubes have arrived. They are being vacuum fired to reduce magnetic permeability. Five sets of large Evac flanges for the injection chambers were received. The injection vacuum chamber design was reviewed in a PO video conference.

The order for large ion pumps has been placed with the low bidder, PHI. SNS/ORNL has received four all metal gate valves and is waiting for the shipment of 5th valve from BNL. RFQ for five additional valves was generated. The draft turbomolecular pump cart specification and SOW are being revised with comments from internal review and from three potential vendors. The specification and SOW for ion pump controller are being finalized with feedback from partner labs and from vendors. Discussions were held with partner labs on high voltage cables, termination and UPS for vacuum instruments.

Three papers, on TiN coating development, on vacuum control development and on HEBT momentum scraper dipole chamber, were completed and presented at PAC2001. Discussions were held with PO and AP group on the coating parameters for both injection and extraction kickers. Thick TiN coating was deposited on sample injection kicker ceramic chamber with excellent bonding but high resistivity. Extraction kicker ferrite samples were also coated with TiN with excellent bonding.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1983.7	1830.7	1878.9	(153.0)	-7.7%	(48.2)	-2.6%

Variance Statement: Cum period variances are within thresholds. No analysis required. Current period CV -$29K (-54.3%) is driven by 1.5.5.1 Ring Vacuum Chambers whereas BCWP is slightly understated and does not account for all material deliveries.

Project Impact: None.

Corrective Action: None.

WBS 1.5.6 – RF System

Mechanical assembly of the power amplifier was completed; wiring is in progress. The cavity is fully assembled.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3784.6	3401.5	3464.2	(383.1)	-10.1%	(62.8)	-1.8%

Variance Statement: RF System with a cum SV of -$383K (-10.1%) and is driven by 1.5.6.1.2 RF High Voltage PS Procurement. Current period CV of $99.4K (60.1%) is driven by 1.5.6.1 High Level RF System. Rf Power Supplies are behind schedule due to late prototype delivery.

Project Impact: None.

Corrective Action: Prototype testing will be completed and production unit deliveries will follow.

WBS 1.5.7 – Ring Diagnostics

1.5.7.1 – BPM

- Reviewed quotations from central shop and an outside vendor. We have requested and received a partial re-quote from the vendor to get more consistency with central shop. Statement of work for the BPM PUE purchase was finalized, and a PO for production BPM PUEs was submitted to purchasing. Central shop lifted the PO and submitted a re-quote, and we are in the process of a comparative evaluation of the quotes.

- Received all parts for the two 12cm HEBT BPMs from the shop. Assembly of first article 12cm and 21cm HEBT BPM PUEs was completed. These PUEs were shipped out for brazing.

- Developed ANSYS model for the structural analysis of the RTBT 36cm BPM.

- See item in BCM section on Mat Stettler's visit.

1.5.7.2 – IPM

- Paper and poster presented at PAC01

- Two electron detectors are ready for assembly.

1.5.7.3 – BLM

- Discussions continued to plan activities to resolve issues with BLM polarity, response flatness, x-ray signal contribution, and interfacing with the MPS system.

- Front end circuit design and component selection and evaluation is in process.

1.5.7.4 – BCM

- Paper and poster presented at PAC01.

- Matt Stettler visited from LANL to coordinate work on the interface to PCI for the BCM and BPM systems. A computer was set up with NT, and Matt installed his circuitboard and software. The board seems to work as far as it was tested. Matt worked on a DLL for the DMA access but it was not completed before he had to leave. Matt left us with the board to allow us to use it and work with it.

- The BCM circuit board has been stuffed, and initial testing has begun. Analog signals have been tracked through all stages and filters in the chain to the ADC. The DAC used for gain control has been temporarily disabled due to an inability to communicate digitally with the board on the bench. A reference voltage for testing has replaced the DAC. The ADC seems to be generating digital information. The ADC clock (65MHz) causes disturbance on the analog lines. New artwork to better isolate the RF/digital signals from the signal conditioning electronics is probably required.

- A break-out circuit board is being designed to plug into the BCM daughter board connectors allowing access to the digital signaling connections without inserting the BCM circuit board into Matt's digital interface board. The digital signal analyzer will be used to generate digital commands and store digital data.

- A sensitivity analysis of the droop compensation algorithm to errors in measuring the transformer time constant was performed. It showed that errors due to droop measured at 1ms are of the order of transformer time constant measurement error (0.16% error in transformer droop time constant yields 0.1% error in droop).

- Discussion of calibration concepts continues.

- A summer intern is investigating cable equalization.
- Purchase reqs were written for two rackmount computers (2Uchassis) of the style proposed for use in BPM and BCM systems.

1.5.7.5 – Tune

- Prototype tune measurement efforts continue.

1.5.7.6a – Carbon Wire Scanner

- Paper and poster presented at PAC01.
- Spring fingers and ball plungers were installed for the fork, preparations are underway for position accuracy and repeatability measurements.
- Berkeley beam box is expected the first week in July. The first article scanner will be installed in the beam box when it arrives.

1.5.7.6b – Laser Wire Scanner

- - Paper and poster presented at PAC01.
- Shop drawings are being prepared for the MEBT Laser Wire. We have a platform design which clears all known obstructions. The mirror mount, slides and motion control electronics have been ordered. LBNL has informed us that the vacuum chamber for MEBT will be available the first week of July.
- Work progresses on the 200MeV BLIP Laser Wire at the AGS Linac. The SCL beam profile box is not compatible with the BLIP line requirements (the aperture is too small). Given that, the plan is to move the 750KeV POP experiment to BLIP. The 200mJ laser head has been returned with the pointer HeNe laser installed. All required reviews were completed, and installation approval has been received.
- Mike Plum has been given details of the laser beam stop and window sizes required for Laser wire in SCL. The linac profile boxes are being designed with access for Laser wire.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
3893.3	3052.1	3447.5	(841.2)	-21.6%	(395.5)	-13.0%

Variance Statement: Ring System Diagnostics Instrumentation has a cum SV of -$841.2 (-21.6%) and CV of -$395.5 (-13%) and is driven by 1.5.7.6 Wire Scanner, SV -$400.9K; and 1.5.7.5 Ring Tune Monitor, CV -$209.2K. Current period SV -$265.1K (-65.8%) & CV -$83.5K (-60.1%) are driven by 1.5.7.6 Wire Scanner Procure Fab & Assy and 1.5.7.5 Ring Tune Monitor, respectively.

Project Impact: None.

Corrective Action: None.

WBS 1.5.8 – Collimation and Shielding

1.5.8.1 – Ring Collimation

Bids from three vendors have been received, and are currently being evaluated.

1.5.8.2 – Moveable Shielding

Modifications to the prototype shield are still being carried out.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
934.0	835.9	909.4	(98.2)	-10.5%	(73.6)	-8.8%

Variance Statement: Collimation and Shielding has a cum SV of -$98.2K (-10.5%) and is driven by 1.5.8.1.1 Ring Collimators. There is an analysis underway to determine the need for a prototype fabrication; the analysis has delayed and may void the prototype fabrication for this WBS and transfer the requirement to WBS 1.5.10.5. This delay is responsible for the cum SV.

Project Impact: None.

Corrective Action: None.

WBS 1.5.9 – Extraction System

The fabrication of the prototype extraction kicker is under way. The design of the revised oil filled version of PFN is nearly complete. It will be forwarded to the shops for fabrication in July.

Effort continues on revising the layout of the extraction region and the RTBT line to take into account the roll of the lambertson magnet. A design review was held on the layout of that region.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
839.5	633.6	680.0	(205.9)	-24.5%	(46.4)	-7.3%

Variance Statement: Extraction System with a cum SV of -$205.9K (-24.5%) is driven by WBS 1.5.9.2.2 Charging Power Supply Procure. Current period SV -$32.7K (-44.5%) is driven by 1.5.9.2.2; Charging Power Supply and CV -$29.5K (-72.2%) is driven by 1.5.9.2 Extraction Kicker Power Supply.

Project Impact: None

Corrective Action: None.

WBS 1.5.10 – RTBT System

The vacuum window for Linac and Extraction dumps has been reviewed and approved. The complete schematic for RTBT vacuum system has been revised after an internal review. Draft details of the magnet chambers and drift space beam pipes have been generated with the counts for flange types, bellows and pump ports, and are currently being checked.

Fabrication of the fixtures for winding the solid radiation resistant bus (for the 41CD30 correctors) continues. A price for the water-cooled radiation resistant cool was received from the vendor that is higher than the cost estimate for the 36Q80 quadrupoles. A PCR has been submitted. H. Ludwig is modifying a study he did for the cables that feed the 36Q80 to provide a dose estimate at the magnet coils. A review of the aperture requirements and magnet strength indicate that the 30Q58 quadrupole may be used in place of the first 36Q80 quadrupole at the end of the line.

Design layout for the complete vacuum system for the Ring to Target Building transfer line (RTBT) is continued. A design reviews were held. The complete schematic for the RTBT Vacuum System was presented. Certain revisions have since been implemented. System layout has been updated to reflect the latest schematic. Magnet chamber and drift space beam pipe spool details have been generated and are currently being checked.

The beam window for the Linac and Extraction Dumps was reviewed during a videoconference with the project office and approved. Detail design will proceed from the current layout.

Bids from three vendors have been received, and are currently being evaluated.

Variance Analysis (Cumulative to date) ($K)

BCWS	BCWP	ACWP	SV	%	CV	%
1344.6	1370.9	1057.5	26.3	2.0%	313.4	22.9%

Variance Statement: RTBT System has a cum CV of $313.4K (22.9%) and is driven by 1.5.10.5 RTBT Collimator & Shielding whereas labor is underperforming the plan. Current period CV of $83.2K (66.3%) is driven by 1.5.10.1 RTBT Magnet & Support and 1.5.10.3 RTBT Vacuum System whereas labor is also underperforming the plan.

Project Impact: None.

Corrective Action: None.

WBS 1.5.12 – Technical Support

- Impedance measurement of kicker magnet continued.
- The study of RTBT collimators' redistribution has completed and PCR is being written.

- 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	%
7986.2	7986.2	7941.6	0.0	0.0%	44.6	0.6%

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

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 tested. It is an approved second source for use in the RHIC f/o receiver modules. This part is pin for pin and spec for spec compatible with the Amp parts used on the RHIC f/o receiver modules.

Prototype timing systems have been sent to LANL, LBNL and ORNL this month. The systems consist of a V123s and V101 as an event link master. A V105s and two V106 for the RTDL master. Backplane assemblies for each system and two link fanouts were also shipped. In addition, the V105s was modified to output PECL instead of TTL signal levels to be compatible with the link fanouts.

V124s – Beam synchronous decoder:

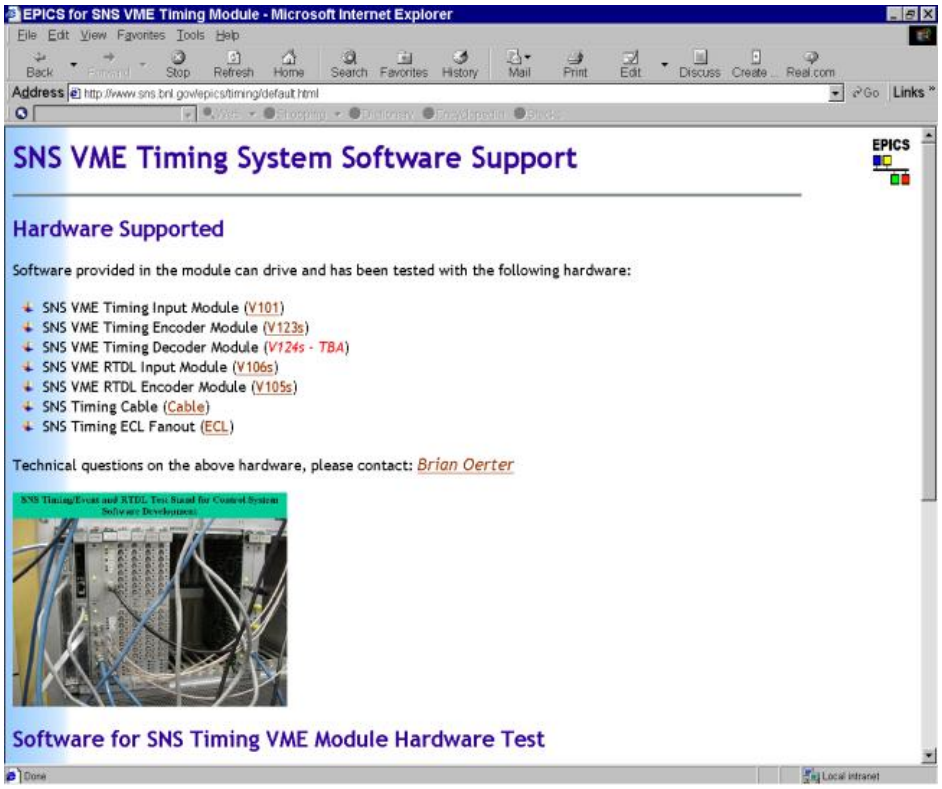
No activity.

RTDL

The V105s was modified to include a CRC checkwork instead of just parity. This modification was successfully tested this month and was included in the V105s shipped to the member labs.

WBS 1.9.2.2 –Timing Software

Software driver for VME-based SNS event and RTDL system test has been developed and software is available from SNS web page at BNL (http://www.sns.bnl.gov)



Prototype of EPICS support for VME-based SNS event and RTDL system is under development. Its draft design document is soon to be released for discussion. To goal is to make the software interface compatible to the extent possible with timing software used at APS and other EPICS installations. Because of hardware differences the software cannot be identical. The design document will allow for a discussion of interface options.

WBS 1.9.5.1 -Ring Controls Integration

The checkout of the EPICS software installed on the Linux computer is continuing. E. Williams is working with Tom Nepsee and J. Tang to install software and checkout differences noted between the SUN and Linux installation. Some of the problems are just due to differences in the rev number of the installed software. Presently we are working on the installation of Capfast software for power supply applications.

WBS 1.9.5.2 - Power Supply Controls

PSI:

We expected to have completed testing of the first article PSC and PSI boards this week. In testing the first article boards we found problems in both the PSC and PSI boards that were attributable to bad registration on the first article PC boards from the manufacturer. The production PC boards were checked and they do not have these problems. The production PSI boards went to manufacturer this month. We hope to get a few samples by the end of the month so we can set up a system test with multiple PSI boards.

PSC:

As noted previously a problem was found on the first article PSC boards. A bad PC board caused a short when one board was inserted into the VME crate damaging the board. We have asked for another first article board, which should be delivered this month. We are continuing testing with the prototype boards. Testing showed some error bits are set when the power is turned on or off. Some modifications to the PSC PGA code are being made to fix the problem. The PSC is expected to go into production in a July.

Injection Power Supply Testing at the Factory:

A PSC and PSI were taken to Canada for testing of the injection power supply. A laptop was provided with Labview software for simple power supply testing. Software was written for a Wavetek function generator to allow the engineer to generate pulses with the proper waveshape for testing the power supply response. The test was successful. The PSI was able to turn the supply on and off and report status bits. The test ensured that the power supply and PSI interfaces were compatible and that the system provided would be useful in testing power supplies.

Another test of the power supply is scheduled for later in the month.

Ethernet Digitizer & Function Generator:

We have been in contact with Yokogawa personnel and they have agreed to let us have a copy of their software with the understanding that documentation and comments are written in Japanese and they will not be able to provide support. They will also provide us with hardware for testing. Previous tests indicate that noise on the function generator outputs may be high and must be measured before equipment selection.

Epics Power Supply Software:

We started integrating the PSC/PSI device support code with the application, working in the Linux environment as per our agreement with E. Williams to try porting our applications to Linux. We had to move it to the Solaris environment, because of a problem with the VME 32-bit address mapping function in the Board Support Package. The problem has been reported to Ernest Williams at ORNL, and he has confirmed that it exists. We will continue working in the Solaris environment until a fix is available for Linux.

The Epics software test configuration consists of a PSC with one PSI and a Power Supply Simulator. The following functions have been tested:

- Setting the Current Setpoint from an MEDM screen.
- Readback of measured values from the PSI connector to the MEDM screen.

- Sending ON, OFF, STANDBY, RESET and NEGATIVE POLARITY commands from an MEDM screen to the PSI connector.
- Activation of ENABLE CHANNEL and CLEAR ERROR STATUS functions from an MEDM screen.

WBS 1.9.5.3 – Diagnostics

Work on the ICD for the beam current monitor is continuing. We expect that a draft document should be available in July. The delay is due to vacations. M. Stetler was at BNL and discussed the PC hardware and software. It was decided that S. Peng would help with the writing of the channel access server for the prototype of the BCM system. He will work with Matt on the definition of the Labview interface and channel access requirements.

We are working with Dick Witkover on the plans for the Beam Loss monitors. This will be a VME system so differs from the other diagnostic systems that will be PC based. An ICD is being written. The system has a requirement for accurate measurement of analog signals so the first step is expected to be the selection and testing of ADC boards.

There have been no discussions on ICDs for other diagnostic equipment.

WBS 1.9.5.4 - Vacuum

A paper for PAC2001 on SNS Ring Vacuum Control System was submitted.

WBS 1.9.5.5 - Application Software

Beebe-Wag and J. Tang presented a paper at PAC "Injection Painting Optimization with Fuzzy Logic Expert System".

A PAC paper was submitted "A Parallel Extension of the UAL Environment" by N. Malitsky and A. Shishlo.

The design of the Orbit Difference Display application based on the UAL 2.0 Application Toolkit was prepared.

Nikolay Malitsky participated in the High Level Application meeting at ORNL, June 13-14.

Worked started on the development of the UAL web site. At this time, the site provides the latest snapshot, API specification, and interface to the CVS of the UAL 2.0 software.

The parallel version of the two new integrators have been worked out and implemented in the UAL 1.0 Environment:

(1) TImpedanceWF_P (Mike Blaskiewicz's algorithm implementation)
(2) FFTTImpedance_P (the ORBIT's algorithm implementation)

These C++ classes are subclasses of the TImpedanceWF and FFTTImpedance classes dealing with the transverse impedance kick.

The SNS::SuperTracker Perl module was worked out to manage others trackers. It provides the possibilities of arranging together others trackers describing different physical effects. The new two trackers TeapotTracker and SpaceChargeTracker (and SpaceChargeTrackerP - the parallel version) were implemented into the SNS package.

The Perl packages TImpMBTracker and TimpOrbitTracker (and their parallel versions: TImpMBTrackerP and TimpOrbitTrackerP) were implemented into the SNS shell. These packages implement the interfaces to the TimpedanceWF and FFTTImpedance C++ classes and are the trackers that can be used by the SNS::SuperTracker.

WBS 1.9.5.6 – RF

No work has been conducted in this area this month. We are still waiting for the high level RF interfaces bit definitions and a description of the Low level RF requirements.

IV. Earned Value Reports and Charts

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

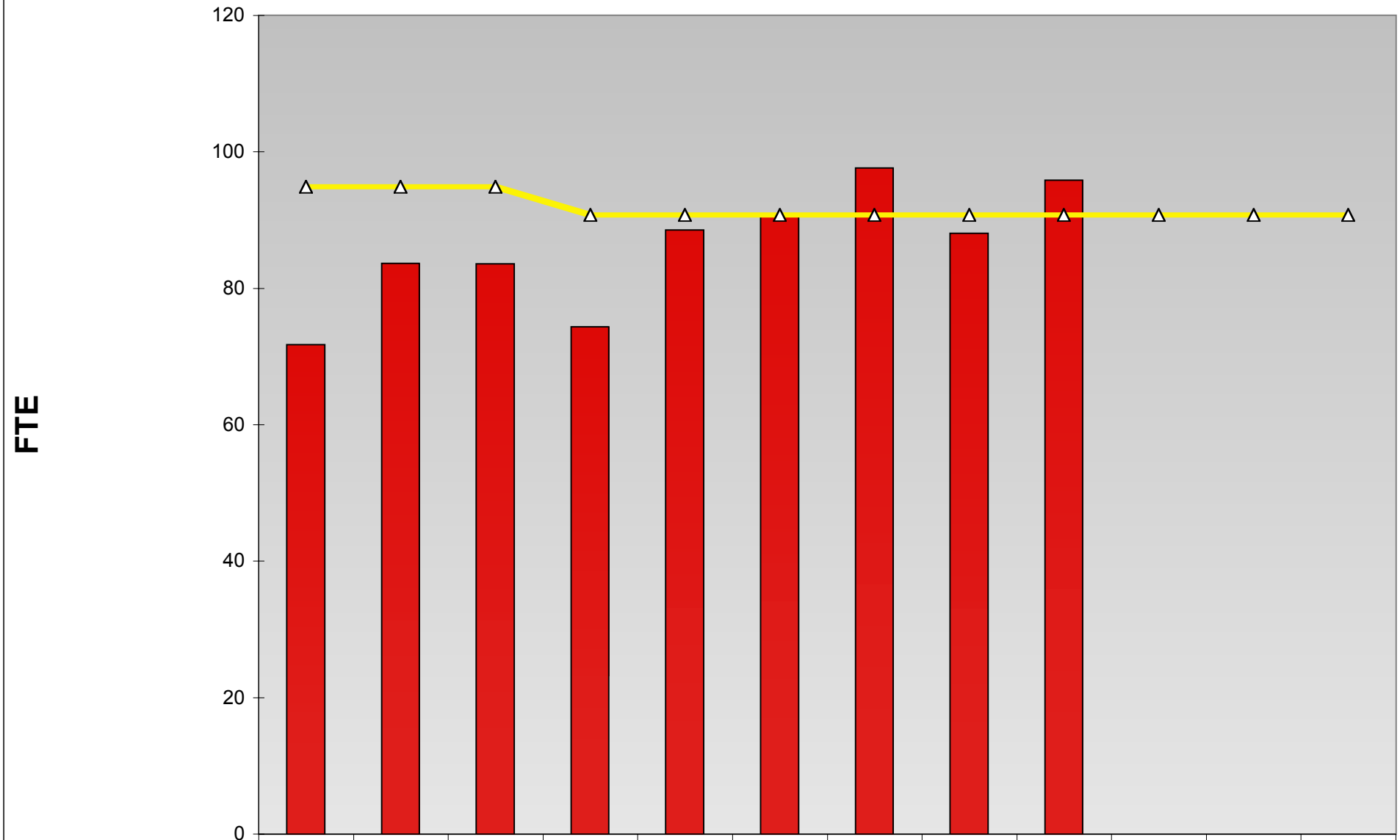
PROJECT TITLE: SPALLATION NEUTRON SOURCE	**REPORTING PERIOD:** 1-Jun-01 thru 30-Jun-01	**PROJECT NUMBER:** 99-E-334
		START DATE: October 1998
PARTICIPANT NAME AND ADDRESS: Brookhaven National Laboratory Brookhaven, NY	**BCWS PLAN DATE:** October 1999	**COMPLETION DATE:** November 2006

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	77.5	77.5	77.9	0.0	(0.4)	4,881.9	4,881.9	5,047.8	0.0	(165.9)	5,111		
1.5	Ring & Transfer Line System	1,938.2	1,573.8	1,462.6	(364.4)	111.2	31,061.7	28,779.1	29,688.6	(2,282.6)	(909.5)	123,136		
1.5.1	HEBT (High Energy Beam Transport) Systems	219.4	358.0	74.1	138.6	284.0	2,822.9	2,708.5	2,328.9	(114.4)	379.6	10,643		
1.5.2	Injection Systems	75.2	139.6	122.3	64.4	17.4	1,826.6	1,929.5	2,160.9	102.9	(231.4)	9,210		
1.5.3	Magnet Systems	256.2	168.20	334.3	(88.0)	(166.1)	4,462.4	4,119.1	5,308.9	(343.3)	(1,189.8)	16,322		
1.5.4	Power Supply System	155.6	45.5	29.9	(110.2)	15.5	1,174.5	901.7	510.0	(272.9)	391.6	5,847		
1.5.5	Vacuum System	72.1	53.4	82.5	(18.7)	(29.0)	1,983.7	1,830.7	1,878.9	(153.0)	(48.2)	11,498		
1.5.6	RF System	201.1	165.3	65.9	(35.8)	99.4	3,784.6	3,401.5	3,464.2	(383.1)	(62.8)	13,159		
1.5.7	Ring Systems Diagnostic Instrumentation	402.9	137.8	221.3	(265.1)	(83.5)	3,893.3	3,052.1	3,447.5	(841.2)	(395.5)	16,271		
1.5.8	Collimation and Shielding	53.6	31.6	41.9	(22.1)	(10.3)	934.0	835.9	909.4	(98.2)	(73.6)	2,779		
1.5.9	Extraction System	73.5	40.8	70.3	(32.7)	(29.5)	839.5	633.6	680.0	(205.9)	(46.4)	5,756		
1.5.10	RTBT (Ring to Target Beam Transport) System	120.2	125.5	42.3	5.3	83.2	1,344.6	1,370.9	1,057.5	26.3	313.4	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	2,976		
1.5.12	Technical Support	305.2	305.2	377.8	0.0	(72.5)	7,986.2	7,986.2	7,941.6	0.0	44.6	20,454		
WBS SUBTOTAL		2,015.7	1,651.3	1,540.5	(364.4)	110.8	35,943.6	33,661.0	34,736.4	(2,282.6)	(1,075.4)	128,247		
UNDISTRIBUTED BUDGET														
SUBTOTAL		2,015.7		1,540.5			35,943.6		34,736.4			128,247		
MANAGEMENT RESERVE														
TOTAL		2,015.7		1,540.5			35,943.6		34,736.4			128,247		

RECONCILIATION TO CONTRACT BUDGET BASE

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

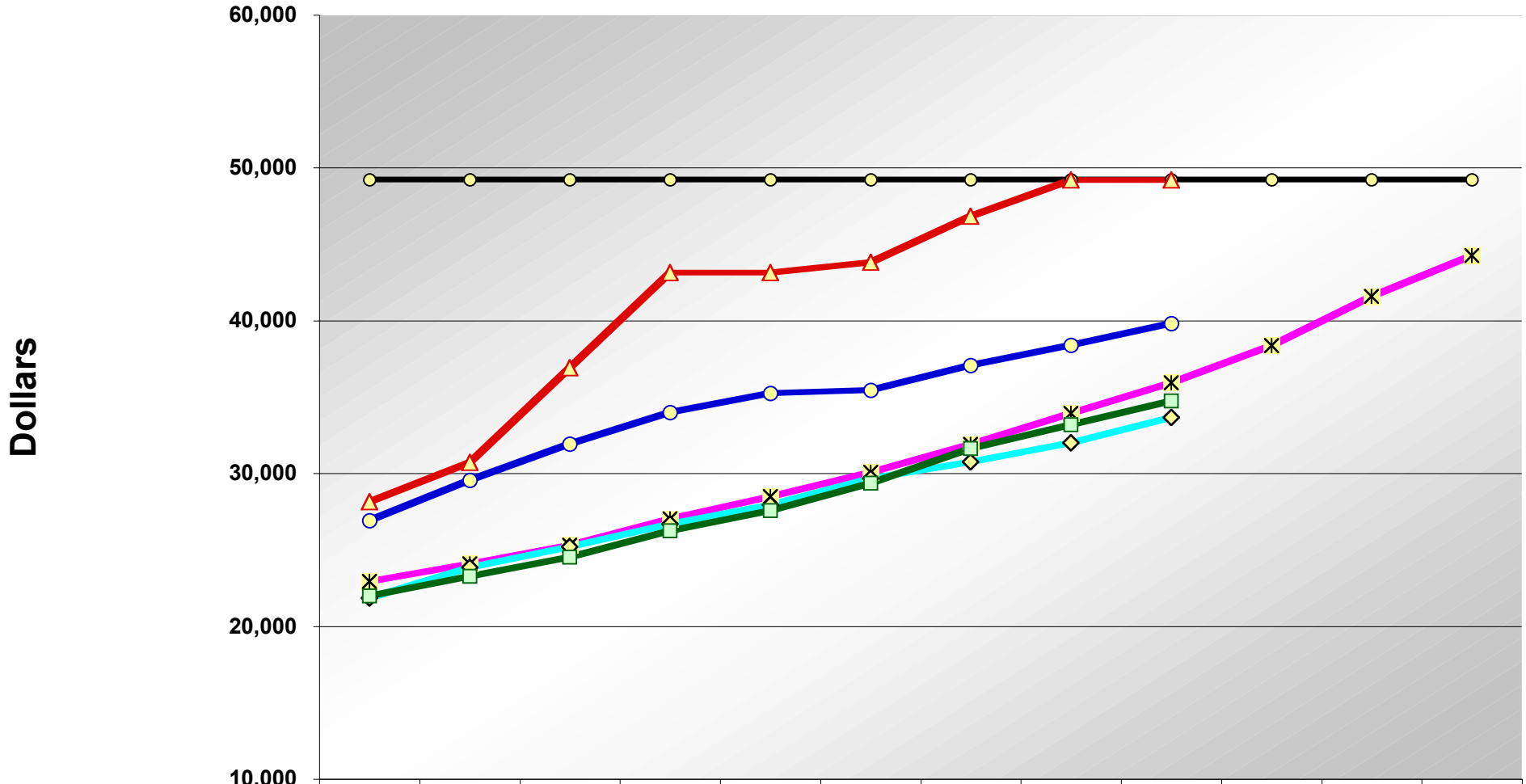
1.5 & 1.1.3 WBS Labor Accounts



	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Actual Monthly FTE	72	84	84	74	89	91	98	88	96			
Planned Monthly FTE	95	95	95	91	91	91	91	91	91	91	91	91

Months

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	49,201			
Cum Actual BA	26,928	29,553	31,930	34,012	35,242	35,448	37,075	38,414	39,832			
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	33,661			
Cum ACWP	21,979	23,263	24,516	26,238	27,582	29,359	31,615	33,196	34,736			

Months