

NScD Upgrade Projects Status Report
APRIL 2016



MAG G 11T magnet and lift fixture

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1. Instrument Upgrades Summary Status Table

		New FY16													FY15 Pilot Projects		
Beamline(s)/Area		CG2/4A	CG2	CG4B	HB2C	1B	1B	4A	6	11A	12	15	17	SE	18	CG2	CG3
Title		5T mag for pol. Ref/SANS	GPSANS collimator replacement	Larmor Dev. Beamline	WAND Phase II upgrade	NOMAD background reduction	NOMAD sample changer	Mag. Ref. Improvement Project	EO-SANS detector vessel/sample area modifications	POWGEN Upgrade	TOPAZ Goniometer	NSE Magnetism Capability	SEQUOIA vacuum upgrade	14T SNS magnet	ARCS vacuum upgrade	MagG (11T)	BioSANS detector
Project Lead		Fitzsimmons	Crow	Robertson	Frontzek	Robertson	Carruth	Fitzsimmons	Heller	Huq	Huq	Ehlers	Jones	Stone	Jones	Armitage	Urban
Conceptual Design Review	Project organization (team)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Top-down cost estimate (labor and materials)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	High level milestone list	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Risk assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Long lead procurement requests (if applicable)																
Final Design Review	Project Plan	✓			✓			✓	✓	✓					✓		
	Design Criteria Document (if applicable)							✓	✓	✓				✓		✓	
	Update cost estimate based on final design	✓								✓				✓	✓	✓	
	Detailed schedule/milestone list	✓								✓				✓	✓	✓	
	Specified completion criteria	✓								✓				✓	✓	✓	
Project Execution	Submit request/documents for procurement funds	✓						✓		✓	✓			✓	✓	✓	
	% of major procurement (>\$25K) contracts awarded (\$ awarded/\$ estimated)	100								41	100				100	100	100
	Equipment installation complete														✓		
	Equipment ready for integrated testing														✓		
	Commissioning complete														✓		
Closeout	Completion Report													✓			
Accounting	Funding (Capital (C) or Operating (O))	O	C	C	C	O	C	C	O	C	O	O	C	C	O	C	C
	Account open	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	Project complete	✓	✓

2. Project: 5T mag for pol. Ref/SANS for CG2/4A

2.1 Project Lead: M. Fitzsimmons

2.2 Estimated Total Cost

- \$256K

2.3 Progress

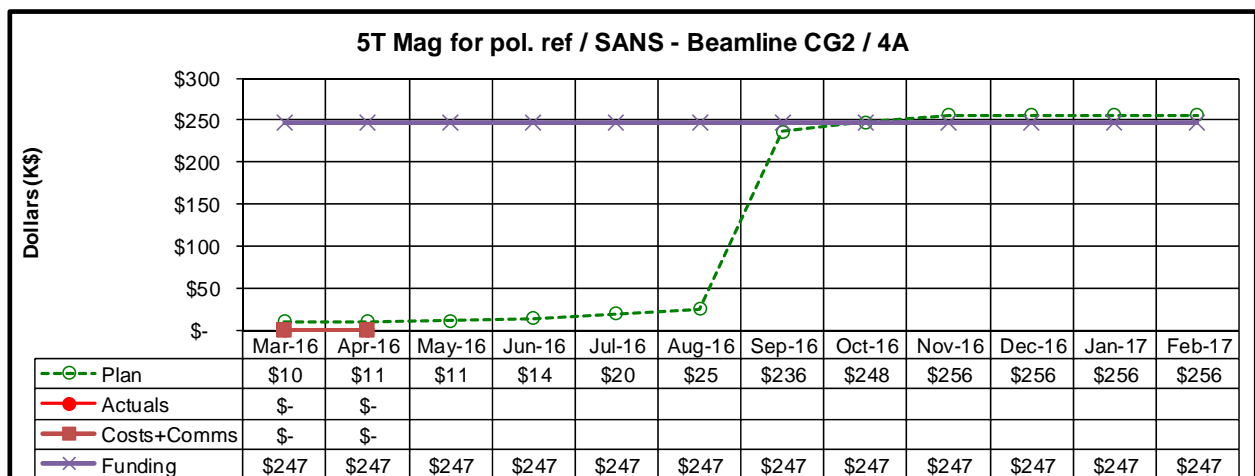
- Vendor bids were received and evaluated and a vendor selected.

2.4 Issues/Concerns

- The bid selected was ~\$20K higher than the original estimate.
- This slight cost increase will be reflected in the May report data.

2.5 Milestones

CG2/4A: 5T mag for pol. Ref/SANS	Current planned date	Actual completion date
Define requirements	Feb-16	Feb-16
Issue RFP	Feb-16	Mar-16
Select vendor and award contract	May-16	May-16
Acceptance testing at vendor	Sep-16	
Receive magnet and complete acceptance testing on site	Nov-16	
Perform first experiments at HFIR	Nov-16	
Perform first experiments at BL4A	Nov-17	



3. Project: GPSANS collimator replacement

3.1 Project Lead: L. Crow

3.2 Estimated Total Cost

- \$1,025K

3.3 Progress

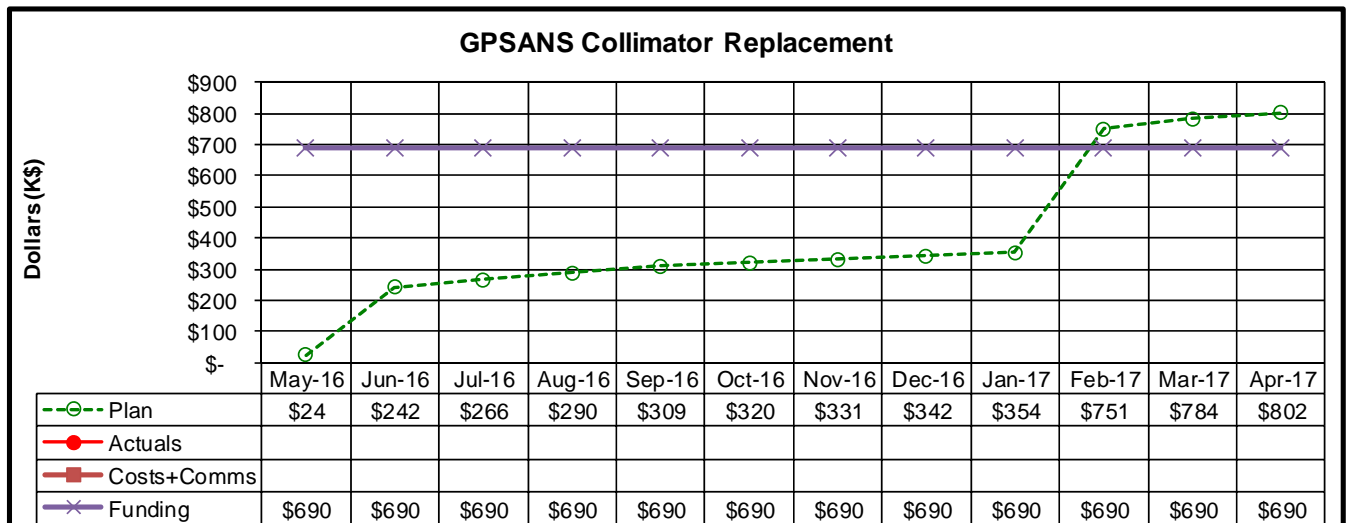
- Lowell Crow and Barton Bailey visited NIST to look at their SANS instruments for design ideas
- As a result of more detailed review of optical elements to be included in the collimator guide system, particularly the polarizer and flippers, the team is currently reconsidering the baseline design

3.4 Issues/Concerns

- None

3.5 Milestones

CG2: GPSANS collimator replacement	Current planned date	Actual completion date
Revise collimator base design	May-16	
Award contract for new guide	May-16	
Award contract for prototype collimator	Jun-16	
Award contract for new collimator sections	Jul-16	
All equipment on site	Feb-17	
Complete offline assembly and alignment	Aug-17	
New collimator guide assemblies installed at the beamline	Nov-17	



4. Project: Larmor Dev. Beamline at CG4B

4.1 Project Lead: L. Robertson

4.2 Estimated Total Cost

- \$500K

4.3 Progress

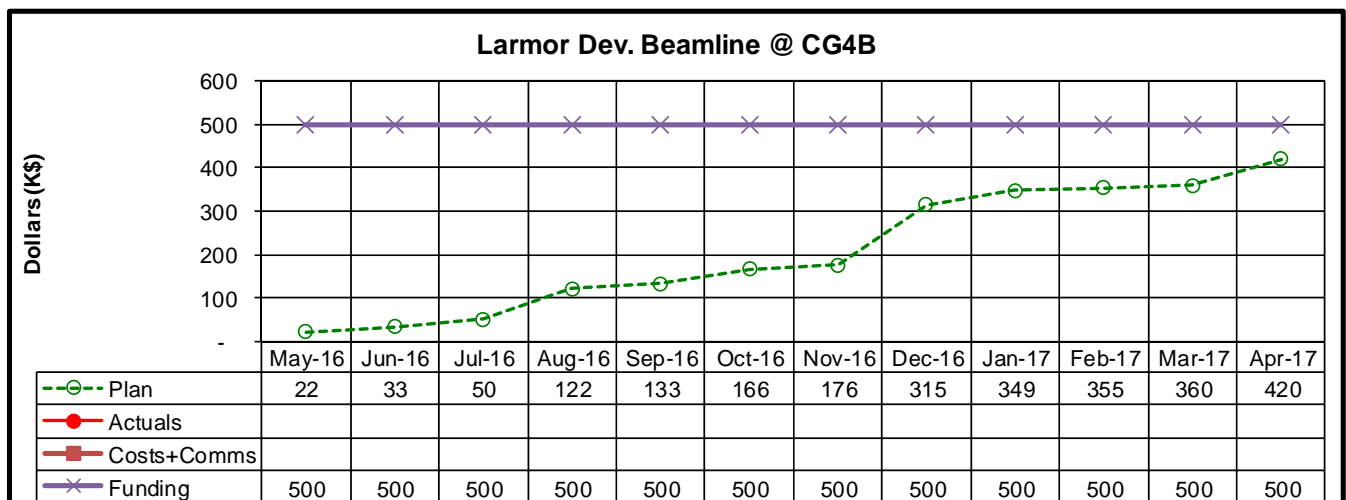
- A revised DCD has been issued
- Design of the monochromator is underway and should be on track for a design review and procurement in May or June. The goal is to be ready for monochromator installation in one of the short HFIR outages this summer, although it is most likely that this will happen in the October outage as currently scheduled.

4.4 Issues/Concerns

- None.

4.5 Milestones

CG4B: Larmor Dev. Beamline	Current planned date	Actual completion date
Award contract for monochromator	May-16	
Install monochromator	Aug-16	
Award contract for shield wall	Mar-17	
Install shield wall	May-17	
Award contract for shutter	Mar-17	
Install shutter	May-17	
Award contract for beamstop	Mar-17	
Install beamstop	May-17	
Award contract for support rail	Mar-17	
Install support rail	May-17	



5. Project: WAND Phase II upgrade

5.1 Project Lead: M. Frontzek

5.2 Estimated Total Cost

- TBD

5.3 Progress

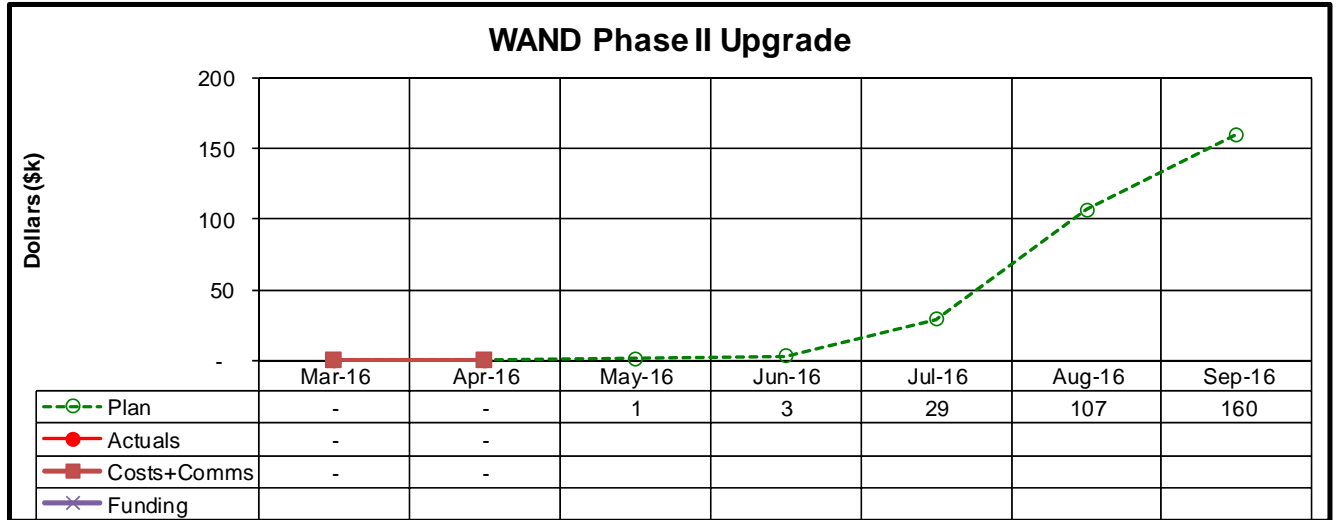
- A productive and educational meeting with LANL staff was held. Several scenarios for the transportation of the BNL120 detector to ORNL were discussed.

5.4 Issues/Concerns

- The BNL120 detector is outside the DOT exceptions for shipment of compressed gases. To fulfill DOT requirements, the counting gas has to be lowered below 29psig or (as another option) completely removed prior to shipment. The equipment to do this is not available at LANL (we want to keep the detector gas) and has to be shipped from ORNL. Preferably, the builders of the detector from Brookhaven National Laboratory will join us and, in a combined effort from LANL, BNL and ORNL, the detector will be readied for shipment in the first two weeks of August.
- Several issues have been identified (e. g. PSO and ESO certification at LANL, Pressure Safety training at LANL for BNL personnel) and we are currently working to determine the best plan to address those issues and have the detector ready for shipping in August.

5.5 Milestones

HB2C: WAND Phase II upgrade	Current planned date	Actual completion date
Receive detector from Los Alamos (with BNL support)	Aug-16	
Set-up detector offline	Sep-16	
Design phase completed (Electronics, detector housing, detector table, collimator, software)	Feb-17	
Fabrication/procurement completed	Sep-17	
WAND ² implementation in Mantid functional	Feb-18	
Start installation of WAND ²	Oct-17	
Complete installation of WAND ²	Feb-18	
Testing and commissioning complete	Mar-18	
Return to user program	Apr-18	



6. Project: NOMAD background reduction

6.1 Project Lead: M. Tucker

6.2 Estimated Total Cost

- \$143K (Phase 1)

6.3 Progress

- The new corrective sample well flange is being manufactured by the vendor and should be delivered within the 6 weeks requested. The vendor has also agreed to deliver a simple single piece design within the same period.
- We have determined that the 80/20 support frame holding the forward scattering detectors must be modified to prevent secondary scattering that contributes to the instrument background.
- The incident collimation and sample well are being redesigned so that they are not mechanically coupled and will allow the incident collimation to be adjusted in-situ.
- The old reentrant well will have new vanadium windows fitted which will allow the background to be characterized with the beam travelling through just vanadium to the beam stop. At present there is no clear path to the beam stop without passing through the aluminum back of the current reentrant well.
- We are evaluating the effectiveness of tiling the front (upstream end) of the NOMAD cave where the detector vessel is located with B4C in epoxy.
- We have determined that the boroflex mask at the entrance to the detector vessel must be removed or the opening enlarged as it is clipping the beam.
- A new mount for placing a neutron camera in the sample well is being designed. The image will be indexed to the nominal beam centerline.
- A new design for primary collimation and beam defining slits is being developed. At present, the benefits of traditional (sliding door) or rotating (saloon door) slits are being investigated.



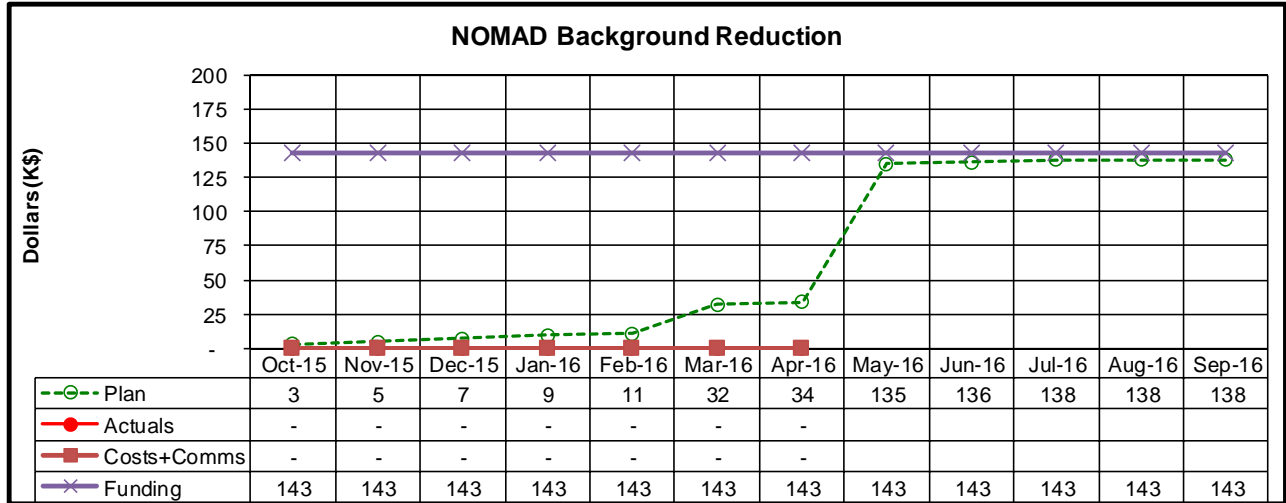
Figure 1: Concept drawing of beam defining slit option for NOMAD

6.4 Issues/Concerns

- The new corrective sample well flange may not arrive in time for immediate installation and testing to fit within the SNS run schedule.
- The windows in the new sample well design may generate unacceptable additional background.
- The milestones in the two project phases need to be revised to be more in line with the new information on the hardware issues identified thus far. This will be completed this month.

6.5 Milestones

1B: NOMAD background reduction	Current planned date	Actual completion date
<i>Phase 1</i>		
Diagnostic measurements complete	Jul-16	
Vessel re-alignment complete	Aug-16	
<i>Phase 2</i>		
Award procurement of prototype radial collimators	Oct-16	
Install and test prototypes	Aug-16	
Award procurement of final design radial collimators	TBD	
Install/test final radial collimators	Sep-16	
Project complete	Oct-16	



7. Project: NOMAD Sample changer

7.1 Project Lead: M. Everett

7.2 Estimated Total Cost

- \$591K

7.3 Progress

- The team met with SNS sample environment to discuss resource availability for this project.
- The first development meeting to discuss technically feasible solutions that can reach the temperature range required was also completed.

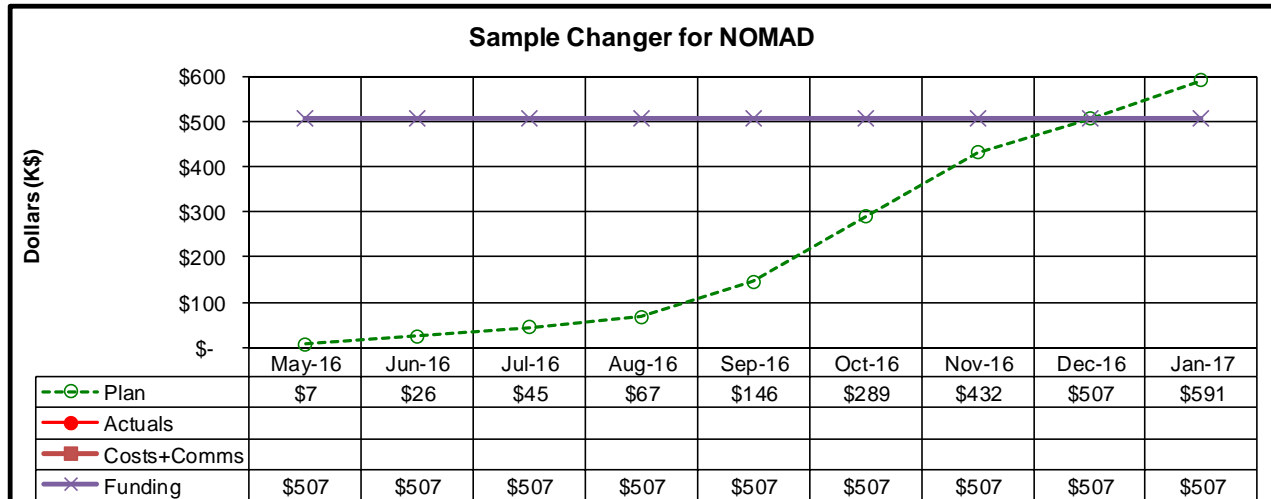
7.4 Issues/Concerns

- John Wenzel will not be available at all until July and then only at 50% time. This will likely have a negative impact on the milestones shown below. The team is exploring the possibility of involving a vendor in this effort.
- It is estimated that only ~30% of the originally planned PAC design could be used.
- The degree to which the new design differs from the original approved project scope will likely require that the project go before the Steering Committee for reconsideration and re-approval prior to initiating any major activities.

7.5 Milestones

1B: NOMAD sample changer	Current planned date	Actual completion date
Finalize design of changer and re-entrant well	Jun-16	
Contracts for all required components awarded	Jul-16	
All components on site	Aug-16	
Complete assembly of sample changer in lab	Sep-16	
Controls completed and tested	Oct-16	

1B: NOMAD sample changer (cont'd)	Current planned date	Actual completion date
Changer installed and initial commissioning complete	Dec-16	
Deployed to user program	Jan-17	



8. Project: Mag. Ref. Improvement Project

8.1 Project Lead: M. Fitzsimmons

8.2 Estimated Total Cost

- \$1,478K

8.3 Progress

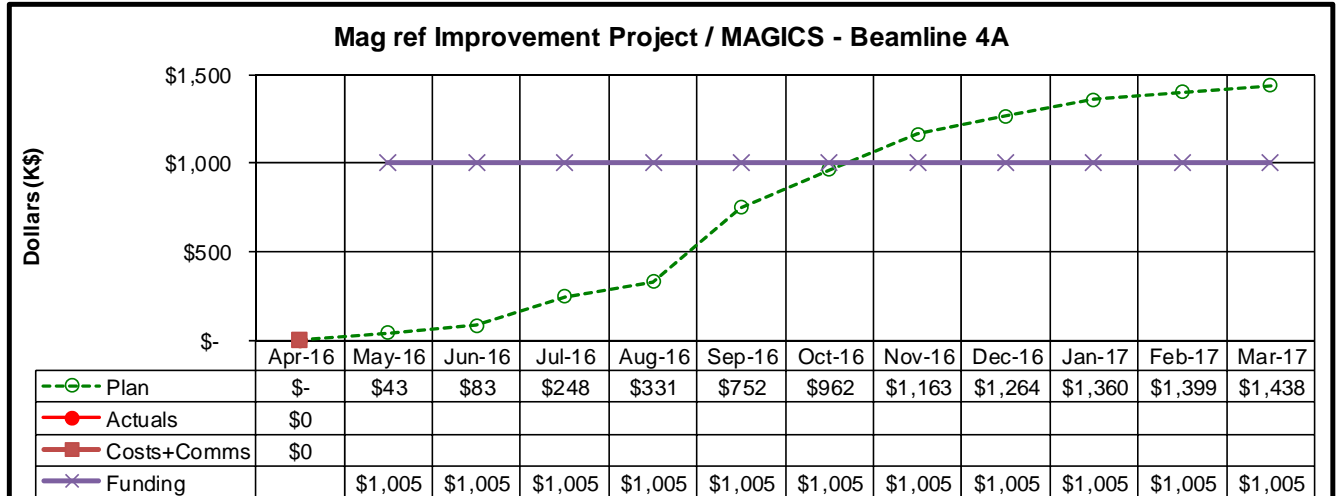
- The team is ready to place an order for the hexapod cryostat mount but no charge code has yet been opened.

8.4 Issues/Concerns

- None

8.5 Milestones

4A: Mag. Ref. Improvement Project	Current planned date	Actual completion date
Complete conceptual design review	Jan-16	Jan-16
Award contract for hexapod cryostat mount	May-16	
Complete final design review	Jun-16	
Award contract for remaining components	Jul-16	
Assemble detector table and complete offline testing (location TBD)	Oct-16	
All equipment installed at the beamline	Dec-16	
Systems testing at the beamline	Feb-17	
Commissioning with neutrons complete	Apr-17	



9. Project: EQ-SANS detector vessel/sample area modifications

9.1 Project Lead: W. Heller

9.2 Estimated Total Cost

- \$353K

9.3 Progress

- Results of radiological calculations have been discussed with the Radiation Safety Committee. The recommendation is that the replacement of the existing detector tank cone with new design is acceptable provided that the existing sample environment enclosure (a.k.a. the phonebooth) or a steel plate of equal or greater thickness be present to cover the large hole at the top of the sample area enclosure.
- The design of the cone replacement and associated hardware has been finalized.

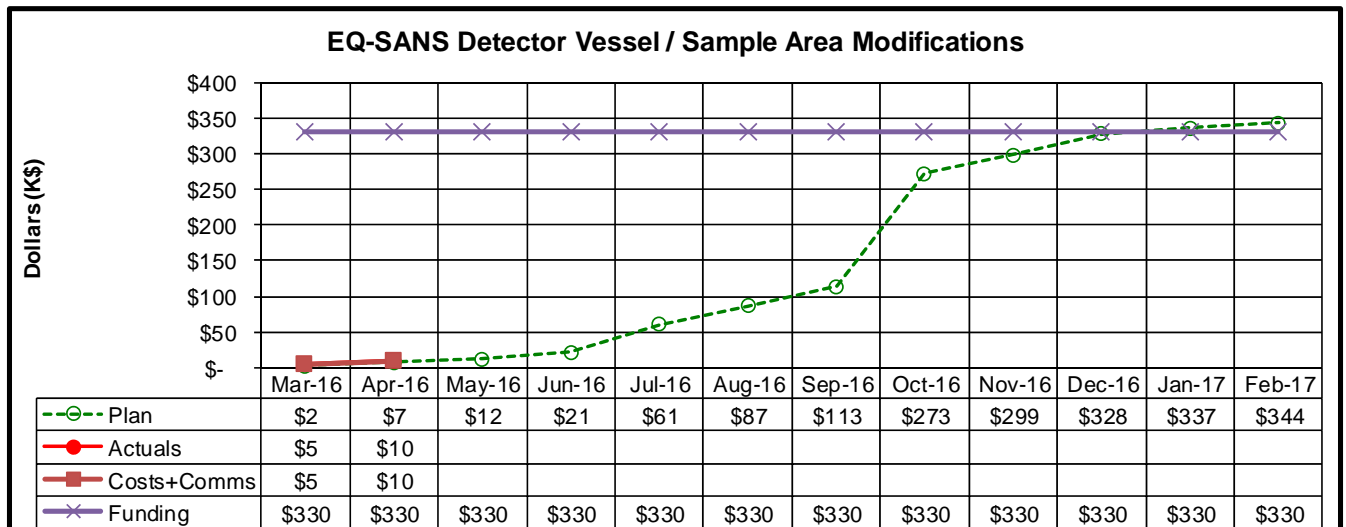
9.4 Issues/Concerns

- Discussions regarding how to work with sample environments mounted to the flange on which the sample environment enclosure, such as magnets and cryostats, need to be held. At present, no models of such sample environments exist to allow performance of radiological calculations.

9.5 Milestones

6: EQ-SANS detector vessel/sample area modifications	Current planned date	Actual completion date
Complete design of cone replacement	Apr-16	
Verify radiological safety/operating constraints	Apr-16	
Award contract for cone fabrication	May-16	
Award contract for sample table and sample environment mounting apparatus	Aug-16	
Award contract for shield plug and flange adapters	May-16	

6: EQ-SANS detector vessel/sample area modifications (cont'd)	Current planned date	Actual completion date
Award contract for telescoping beam extender	Jun-16	
All equipment on site and ready for installation	Oct-16	
All equipment installed and ready for operation with neutrons	Feb-17	
Complete radiological survey	Mar-17	



10. Project: POWGEN Upgrade Project

10.1 Project Lead: A. Huq

10.2 Estimated Total Cost

- \$3,661K

10.3 Progress

- The support hardware for the coarse radial collimator has been received
- The contracts for the reaction bonded boron carbide shielding and the upstream optics assembly have been awarded
- The beam monitor has been received
- Cycle testing (1,000 cycles) of the .011 inch thick 1100-O aluminum get lost tube window has been successfully completed

10.4 Issues/Concerns

- None



Figure 2: Support hardware for the radial collimator



Figure 3: Beam monitor

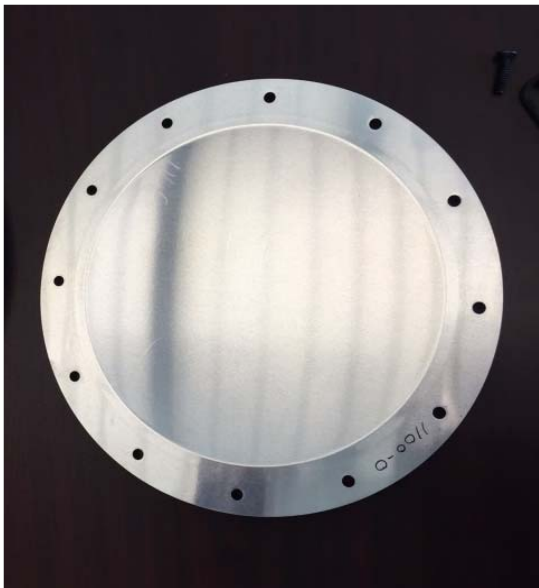


Figure 4: GLT window tested for 1,000 cycles

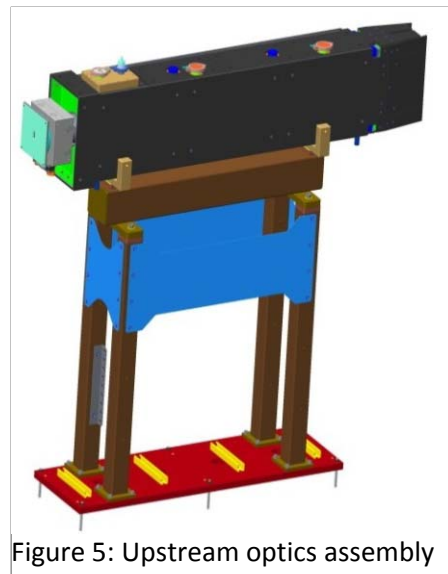
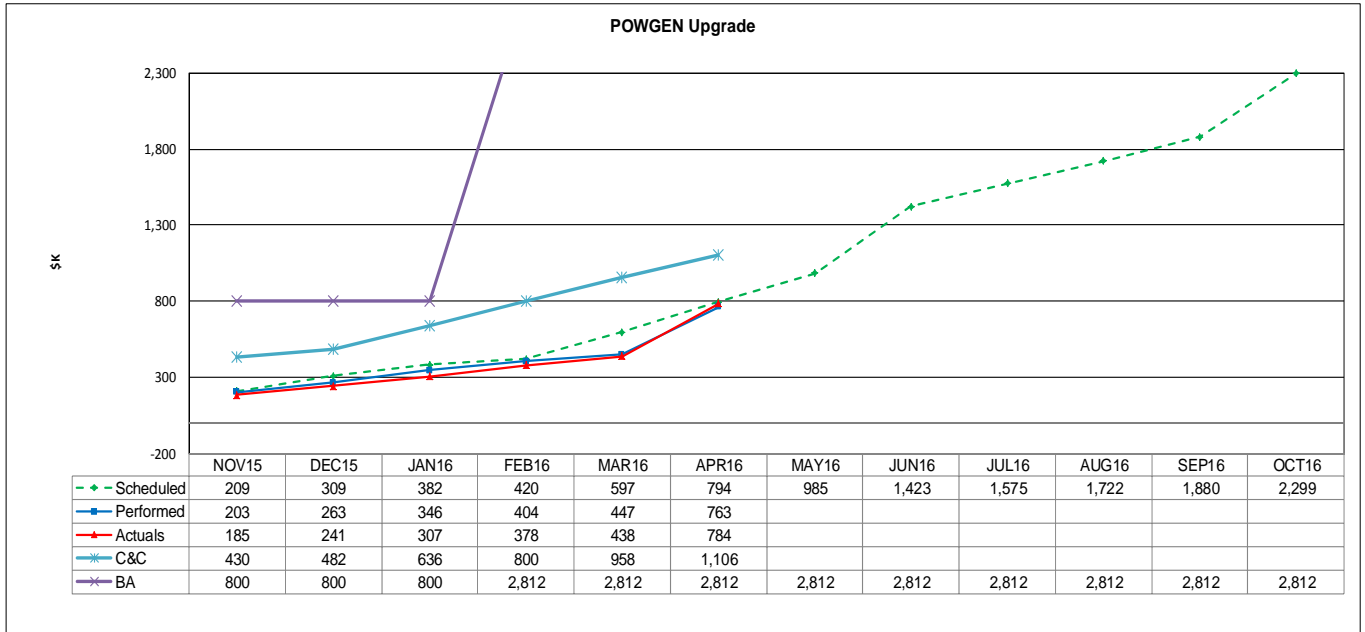


Figure 5: Upstream optics assembly

10.5 Milestones

11A: POWGEN Upgrade	Current planned date	Actual completion date
Sample vessel ready for installation (assembled-tested-fiducialized)	Oct-16	
Optics ready For installation (assembled-tested-fiducialized)	Sep-16	
10 New modules assembled & tested	Jan-17	
Begin removal of existing detector modules	Apr-17	
Complete modification of existing modules	Jun-17	
Begin reinstallation of modified detectors and new detectors	Aug-17	
Complete IRR for modified instrument	Aug-17	
Project complete	Sep-17	



11. Project: TOPAZ Cryo – Goniometer Project

11.1 Project Lead: A. Huq

11.2 Estimated Total Cost

- \$205K

11.3 Progress

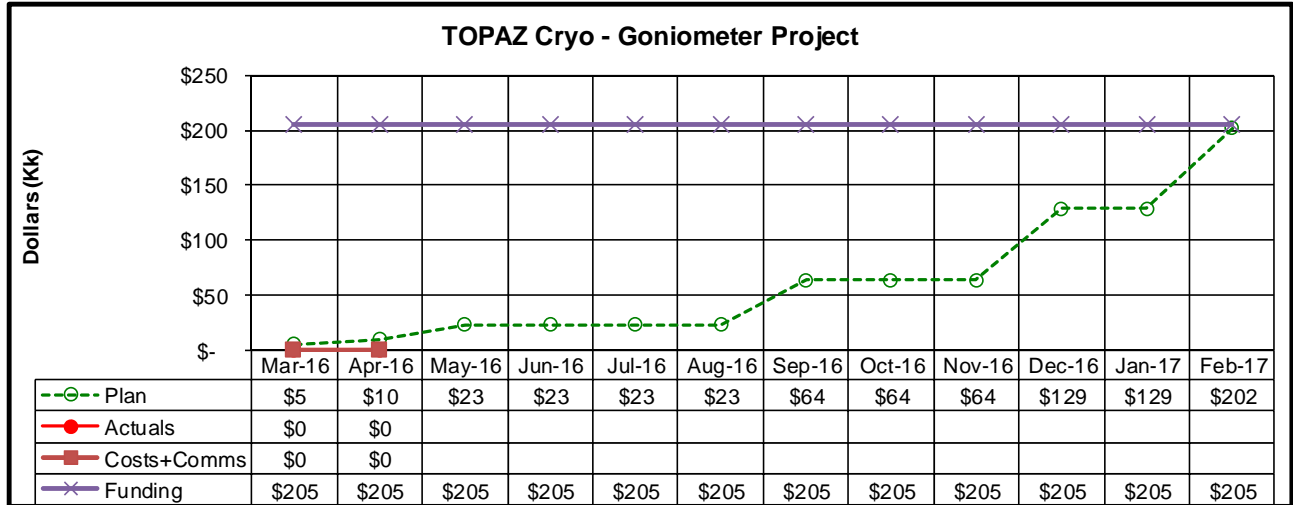
- The contract for the goniometer was awarded and the first milestone payment for upfront costs for the baseline test was approved.

11.4 Issues/Concerns

- None

11.5 Milestones

2: TOPAZ Cryo - Goniometer Project	Current planned date	Actual completion date
Award contract for cryo-goniometer	Mar-16	Apr-16
Presentation of design by vendor to SNS staff	Apr-16	May-16
Approve detailed design and start fabrication of goniostat	May-16	
Complete factory acceptance test of goniostat in vacuum chamber	Sep-16	
Approve vendor design of cryostat	Sep-16	
Cryo-goniometer on site	Jan-17	
Off-line acceptance testing complete	Mar-17	
Commissioned and ready for use by TOPAZ users	May-17	



12. Project: NSE Magnetism Capability

12.1 Project Lead: G. Ehlers

12.2 Estimated Total Cost

- \$194K

12.3 Progress

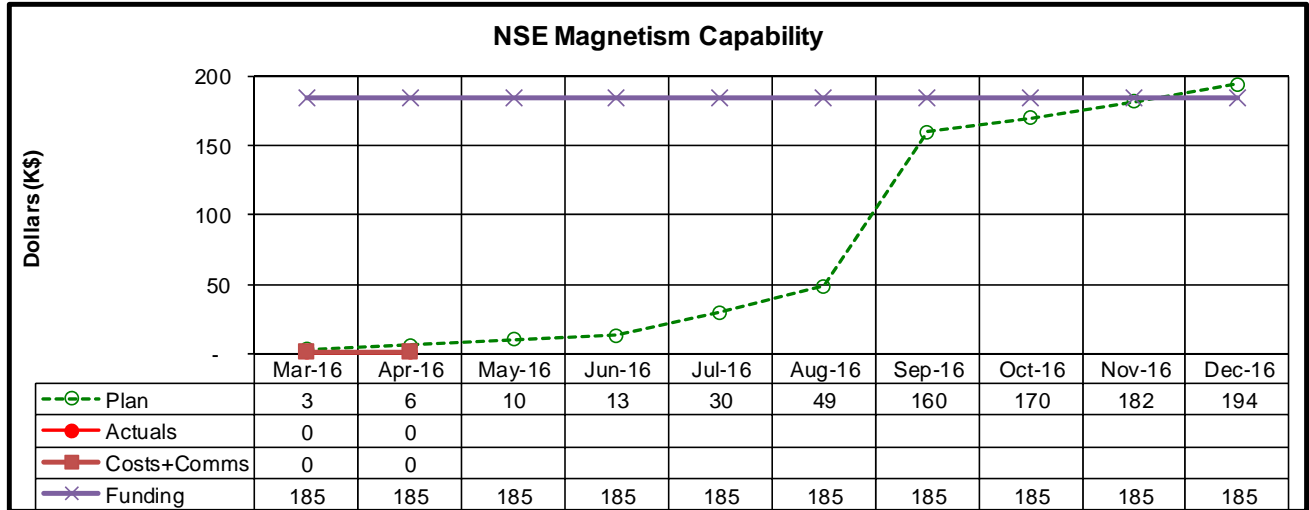
- Four potential vendors were solicited to provide quotes for the cryostat. Of the 4, 3 declined to bid and only 1 submitted a quote. Per our technical subject matter expert, this vendor did not meet our requirements as there have been issues with this vendor’s performance on other projects. Based on this experience and the fact that none of the bidders believed they could meet the performance requirements, there is little confidence that this vendor could deliver either and no contract was awarded.
- The main reason the other vendors did not bid was that they could not do it within the dimensional constraints that were imposed. Due to the limited headroom above the sample position, a “short” cryostat was specified.

12.4 Issues/Concerns

- Reevaluation of the cryostat design is required and is underway.

12.5 Milestones

15: NSE Magnetism Capability	Current planned date	Actual completion date
Complete first experiment with existing CCR	Dec-15	Dec-15
Award contract for compact bottom loading CCR	TBD	
CCR on site and ready for installation	TBD	
Complete first experiment at ³ He temperature	TBD	



13. Project: SEQUOIA vacuum upgrade

13.1 Project Lead: L. Jones

13.2 Estimated Total Cost

- \$1,339K

13.3 Progress

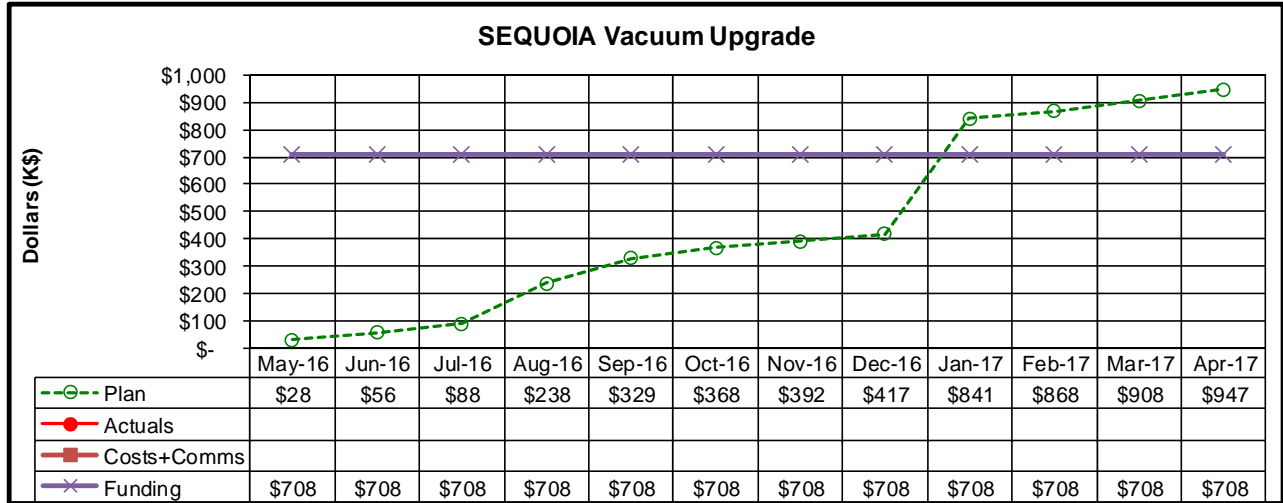
- The Design Criteria Request (DCR) has been completed
- The controls work for Phase I has begun
- The project team worked with finance to open the charge codes required to buy materials and start charging planning/design time in preparation for the Phase I tasks over the Summer 2016 Outage.
- Unfortunately, opening the accounts took longer than expected and this delayed the procurements by a few weeks. The schedule appears aggressive but still feasible.

13.4 Issues/Concerns

- None

13.5 Milestones

	Current planned date	Actual completion date
17: SEQUOIA vacuum upgrade – Phase I		
Install and integrate turbo pump	Jun-16	
Procurements awarded	Oct-16	
Installation complete	Jul-16	
Commissioning with neutrons complete	Aug-16	
Project complete	Sep-16	



14. Project: 14T SNS magnet

14.1 Project Lead: M. Stone

14.2 Estimated Total Cost

- \$2,165K

14.3 Progress

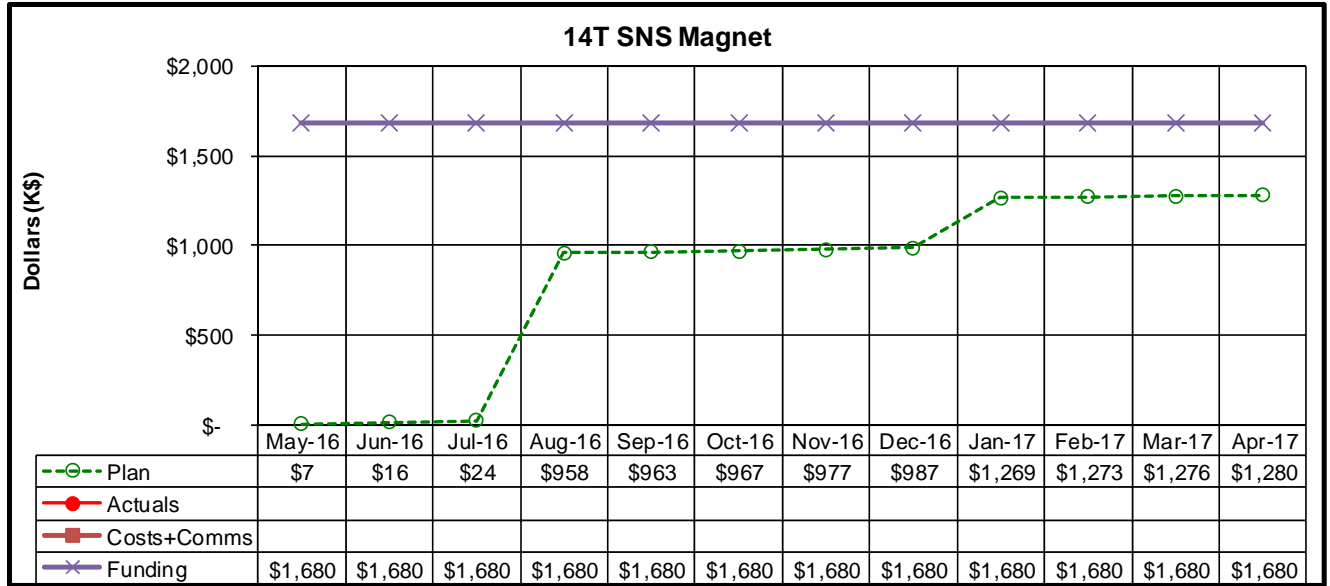
- No input this month

14.4 Issues/Concerns

- All progress is on hold until a charge code is assigned.

14.5 Milestones

SE: 14T SNS magnet	Current planned date	Actual completion date
Define requirements	Feb-16	Feb-16
Issue RFP	TBD	
Select vendor and award contract	May-16	
Preliminary design review (at Seller's site or by teleconference at the buyer's discretion)	Aug-16	
50% design review and document package (at the Seller's site, or by teleconference, at the buyer's discretion.)	Sep-16	
Factory acceptance testing at the Seller's site	Sep-17	
Magnet received	Jun-17	
Commissioning at SNS complete	Nov-17	



15. Project: ARCS vacuum upgrade

15.1 Project Lead: L. Jones

15.2 Estimated Total Cost

- N/A

15.3 Progress

- Project is complete

15.4 Issues/Concerns

- None

15.5 Milestones

	Current planned date	Actual completion date
18: ARCS vacuum upgrade		
Install and test upgrade	Feb-16	Feb-16

16. Project: MagG (11T) for CG2

16.1 Project Lead: D. Armitage

16.2 Estimated Total Cost

- \$1,328K

16.3 Progress

- The magnet has been received at ORNL and has been unpacked by the vendor's engineer.

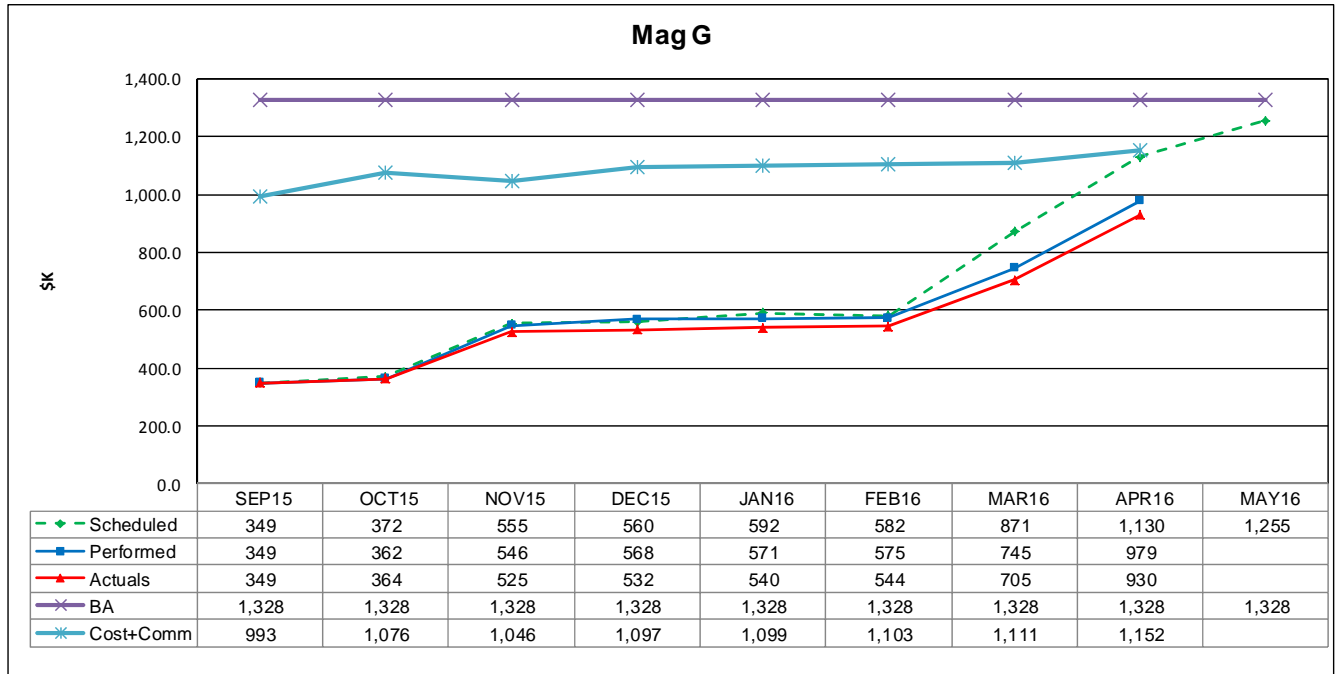
- The testing and approval of the lift fixture was completed and a lift plan has been developed.

16.4 Issues/Concerns

- None

16.5 Milestones

CG2: MagG (11T)	Current planned date	Actual completion date
Complete acceptance testing at the vendor	Mar-16	Mar-16
Receive lifting fixture	Mar-16	Mar-16
Award contract for lifting fixture	Mar-16	Mar-16
Receive magnet	Apr-16	Apr-16
Receive goniometer	May-16	
Complete DAS modifications for new goniometer	May-16	
Install goniometer and magnet at beamline	May-16	



17. Project: BioSANS detector expansion

17.1 Project Lead: V. Urban

17.2 Estimated Total Cost

- \$500K

17.3 Progress

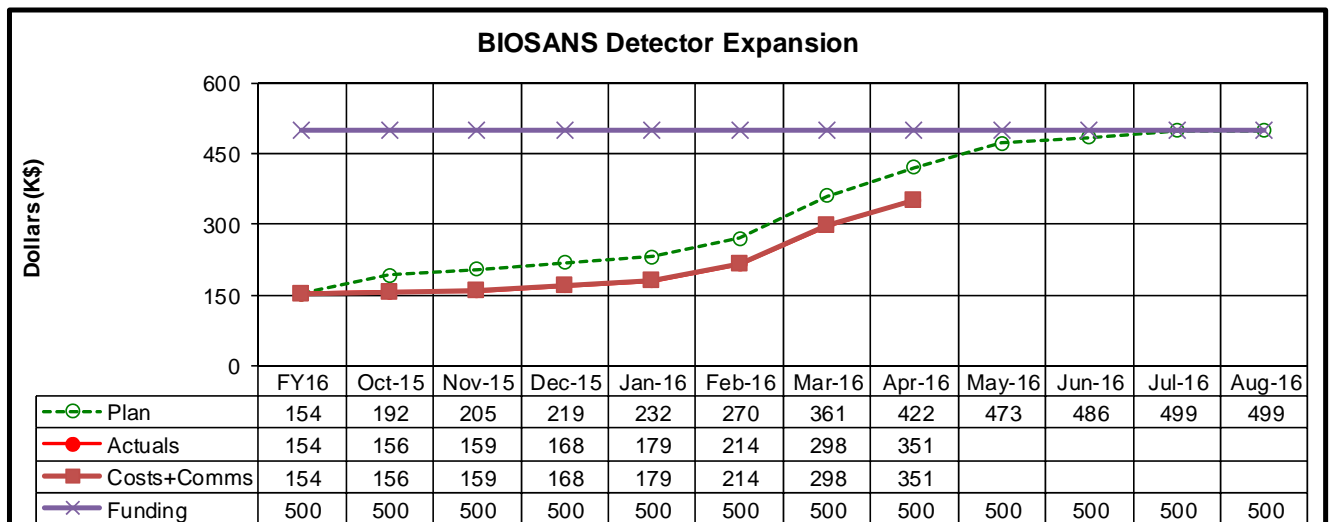
- The new control cabinet panel for detector cooling has been received. It rearranges the controls for the low angle detector and adds controls for the high angle detector
- The west wing carriage has been assembled and installed on the maintenance cart
- The THK rails, rotation axis encoder, and detector adapter plate are installed and aligned
- The mechanism for the rotation axis and the calibration arm stage have been installed
- Electrical work is continuing
 - The internal cabling has been installed in the tank
 - Wiring of calibration arm motors, encoder, rotation axis motor, encoder and limits is underway
 - The internal lights are being wired
 - The PLC wiring checks have been successfully completed. The PLC code for the new interlock has been loaded and testing in progress
- The calibration arm stage, gearbox, rotation axis stage, hardstops, replacement laser encoder and associated mounting components have all been received

17.4 Issues/Concerns

- None

17.5 Milestones

CG3: BioSANS detector	Current planned date	Actual completion date
Complete installation of west wing detector upgrade	Jun-16	
Complete commissioning of new detectors	Jul-16	



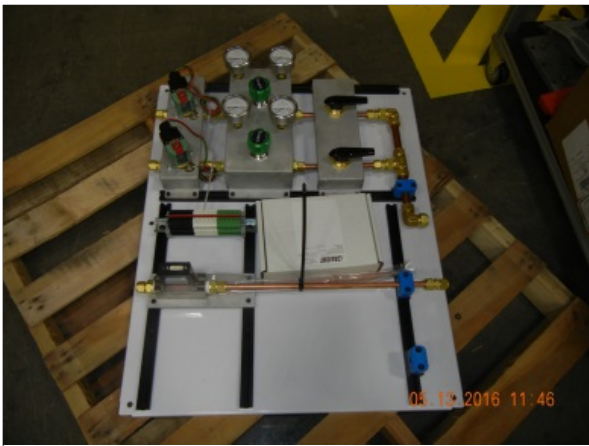


Figure 6: New control panel

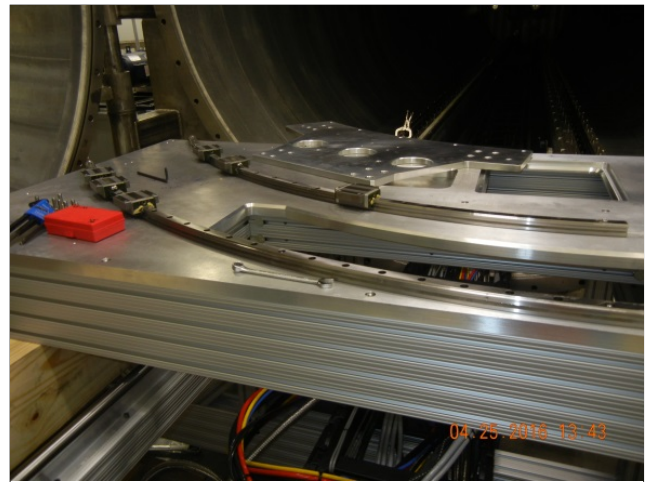


Figure 7: Installation of THK rails

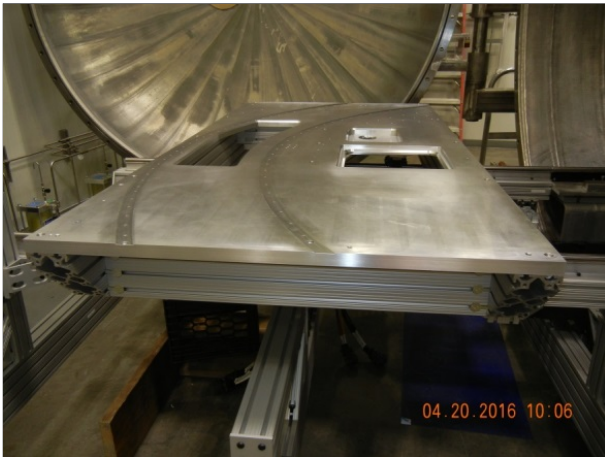


Figure 8: Assembly of carriage

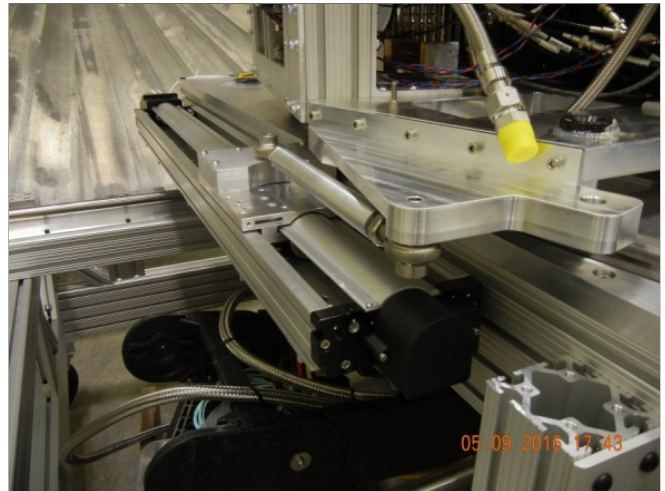


Figure 9: Installation of mechanism for rotation axis



Figure 9: Alignment of detector plate in carriage



Figure 10: Lifting the detector for installation



Figure 11: Securing the detector to the carriage

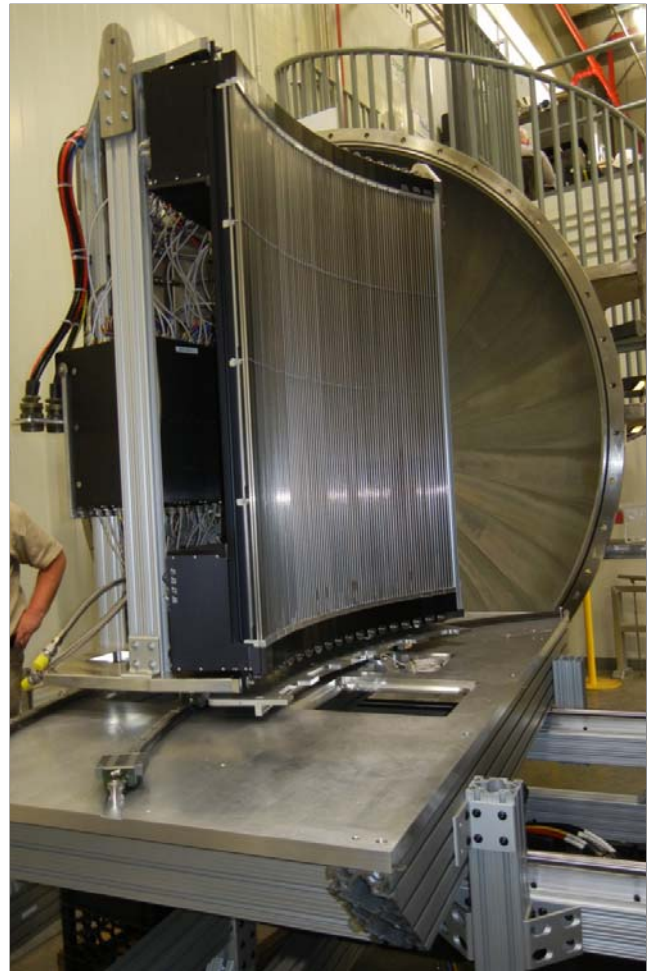


Figure 12: West wing detector secured to maintenance carriage

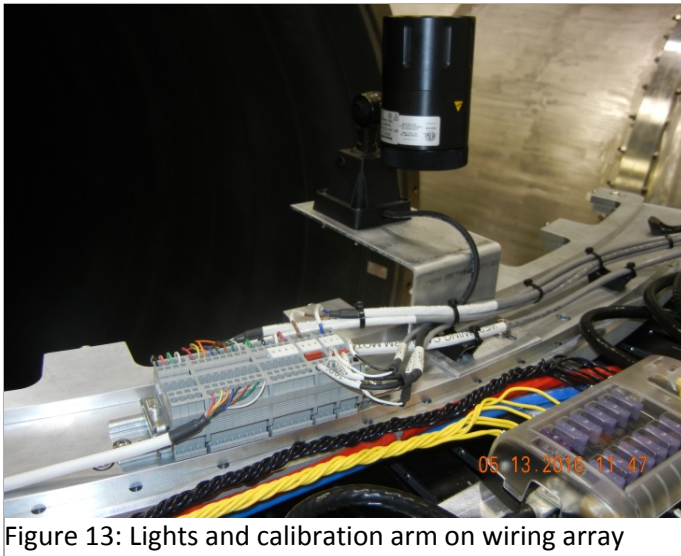


Figure 13: Lights and calibration arm on wiring array

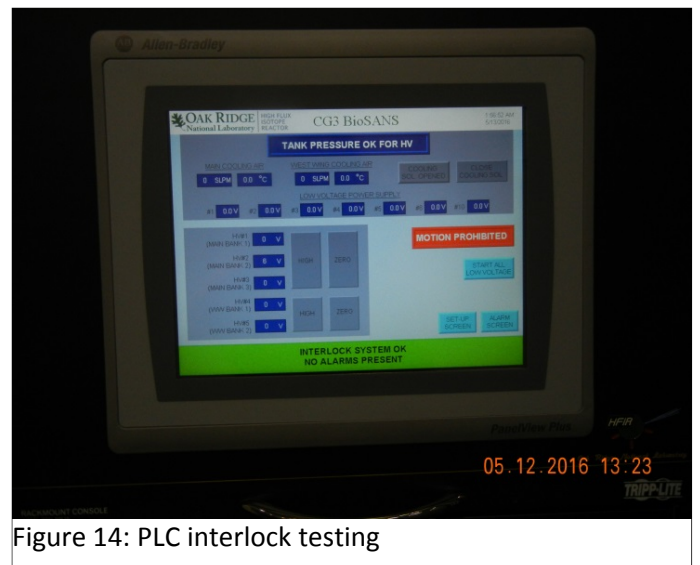


Figure 14: PLC interlock testing



Figure 15: Rotation axis stage



Figure 16: Calibration arm, gear box and encoder



Figure 17: Calibration arm parts