NSLS-II Experimental Tools (NEXT) Project

Estimate at Complete (EAC) Review

August 28, 2015 – September 4, 2015

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Acronyms

AC – Actual Cost

ACWP – Actual Cost of Work Performed

ALD – Associate Laboratory Director

BAC – Budget at Completion

BCWP – Budgeted Cost of Work Performed

BCWS – Budgeted Cost of Work Scheduled

BNL – Brookhaven National Laboratory

CAM – Control Account Manager

CD4 – Critical Decision 4

CPI – Cost Performance Index

DOE – Department of Energy

EAC – Estimate at Completion

ESH – Environment, Safety & Health

ESM – Electron Spectro-Microscopy

ETC – Estimate to Complete

EVMS – Earned Value Management System

FXI – Full-Field X-ray Imaging

FY - Fiscal Year

ID/FE – Insertion Devices/Front Ends

ISR – In-Situ and Resonant Hard X-ray

ISS – Inner Shell Spectroscopy

IRR – Instrument Readiness Review

KPP – Key Performance Parameters

MIE – Major Item of Equipment

NEXT – NSLS-II Experimental Tools

NSLS-II – National Synchrotron Light Source II

PPM – Procurement & Property Management

PS – Photon Sciences

RFQ – Request for Quotation

RFP – Request for Proposal

SIX – Soft Inelastic X-ray

SMI – Soft Matter Interfaces

SOW – Statement of Work

SPI – Schedule Performance Index

TPC – Total Project Cost

WBS – Work Breakdown Structure

Executive Summary

This National Synchrotron Light Source (NSLS-II) NEXT Estimate at Complete (EAC) Review was conducted from August 28, 2015 to September 4, 2015 and was based on information supplied by the project team using a July, 2015 data date.

The review team found that the EAC, using any of the standard EAC calculations, shows that the NEXT Project will be completed within the Total Project Cost (TPC) of $90M.

The review team believes that cost growth for the NEXT Project should now be nearing stabilization. All Control Account Managers (CAMs) have affirmed to the review team that they can complete their scope within the cost that is in their most current EAC (August, 2015). If unforeseen costs arise, most CAMs have scope items that can be removed to make room for unforeseen essential items. A few CAMs stated that they can cover the known scope but are concerned that they don't have any items that can be successfully de-scoped. Therefore, the review team believes it is essential that any remaining contingency be retained for cost growth in areas where there is no scope contingency, until project scope completion can be guaranteed, or until additional scope removal items can be identified.

Corrective actions have been proposed by the NEXT Project Team to help to ensure cost containment and project completion. The review team believes these to be reasonable and many of the actions contained in the corrective action plan are already being implemented.

Background

The National Synchrotron Light Source II (NSLS-II) is a highly optimized, third-generation synchrotron facility that enables the study of material properties and functions, particularly materials at the nanoscale, at a level of detail and precision never before possible. NSLS-II will provide world-leading brightness and flux as well as exceptional beam stability over a broad range of photon energies from infrared to hard x-rays. NSLS-II is designed to house at least 58 beamlines. These experimental facilities will support a large user program that carries out research in such diverse fields as materials science, chemistry, environmental science, physics, biology and medicine. The NSLS-II project scope provided for the design, construction and installation of accelerator hardware, civil construction of facilities, and six best in class beamlines.

Beyond the initial suite of project beamlines, the Department of Energy (DOE) approved the NEXT Project, a Major Item of Equipment (MIE) project to develop and fabricate five insertion device beamlines for NSLS-II by carrying out the design, engineering, fabrication/procurement, assembly, and installation of the beamlines onto the NSLS-II experimental floor, followed by standalone integrated testing of installed hardware and equipment. The project scope also includes the design, engineering, and partial scope of a sixth beamline.

For the life of the NEXT Project, the project team has been using standard EAC calculation methods and annual comprehensive EAC exercises to ensure that the project remains on target for successful project completion. Starting in June of 2015, the NEXT Project implemented a more precise, detailed method for calculating the Estimate at Complete (EAC) that sums the Actual Cost (AC) and the Estimate to Complete (ETC) on a monthly basis. The project experienced growth in EAC of $2.8M between May and July 2015, and is expected to grow another ~$0.6M in August. As a result, John Hill, NSLS-II Director, asked Diane Hatton, the Director of Planning, Performance and Quality Management at BNL to conduct a review of the causes of this EAC growth and to review the proposed corrective action plan.

Introduction

A review of the NEXT EAC was carried out between August 28, 2015 and September 4, 2015. The focus of this review was to understand the EAC and accrual processes and to determine if the corrective action plan is sufficient to control cost growth.

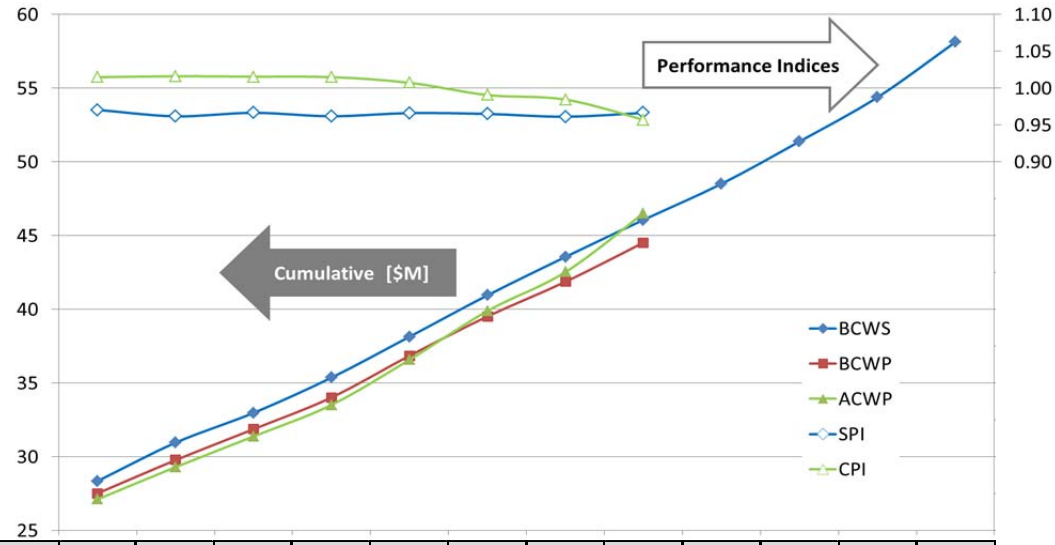
This report is broken down into seven sections.

- The first section lists some basic NEXT project statistics
- Section 2.0 covers the EAC
- Section 3.0 discusses accruals and the processes and complications associated with them
- Section 4.0 addresses labor tracking issues
- Section 5.0 addresses the corrective action plan
- Section 6.0 is a review team summary
- Section 7.0 covers the responses to the charge questions

The final portion of the report is the Appendices that contain the reference materials for this assessment. The Charge is shown in Appendix A. The review team is listed in Appendix B. The review contributors with their titles and contact information are shown in Appendix C. Finally, the proposed corrective actions are shown in Appendix D.

1.0 Statistics and Background Data

1.1 Cumulative SPI and CPI at the end of July 2015 are at .97 and .96, respectively.



Cum $M	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15
BCWS	28.4	31.0	33.0	35.4	38.1	41.0	43.6	46.1	48.5	51.4	54.4	58.1
BCWP	27.5	29.8	31.9	34.0	36.9	39.5	41.9	44.5				
ACWP	27.1	29.3	31.4	33.5	36.6	39.9	42.5	46.5				
SPI	0.97	0.96	0.97	0.96	0.97	0.97	0.96	0.97				
CPI	1.01	1.02	1.02	1.01	1.01	0.99	0.98	0.96				
ETC								39.0	36.6	33.6	30.7	26.9

Figure 1. NEXT Performance

1.2 Major Procurements

98% of all major procurements (61 out of 62) have now been awarded for a total of $33.9M out of $34M.

1.3 Cost Growth Summary

Cost growth for the NEXT Project is detailed in Figure 2, below. Roughly half of the growth is associated with scope additions.

NEXT Cost Growth History since CD-2

Month	Growth On Existing Scope	Added Scope	Total Contingency Consumed	Drivers
Dec-13	$0.088 M		$0.088 M	ISR labor addition
Jan-14	$0.070 M		$0.070 M	Contract awards, FXI hutch design, Controls material
Feb-14	$0.119 M		$0.119 M	ISS gas handling system material, and labor
Mar-14	$0.459 M		$0.459 M	SMI white beam optics package award, escalation on procurements
Apr-14	-$0.179 M		-$0.179 M	Contract awards
May-14	-$0.112 M		-$0.112 M	Contract awards
Jun-14	$0.399 M		$0.399 M	ISS schedule revisions, ESM wavefront sensor revisions
Jul-14	-$0.826 M		-$0.826 M	Contract awards
Aug-14	$0.378 M	$3.733 M	$4.111 M	ISR, SMI and ESM endstation scope additions, schedule revisions
Sep-14	$0.000 M		$0.000 M	(Comprehensive EAC exercise)
Oct-14	$2.392 M		$2.392 M	Awards for ESM/SIX, SMI, and ISS
Nov-14	$0.583 M		$0.583 M	Procurement refinements for Controls and ISR
Dec-14	$0.000 M	$1.008 M	$1.008 M	ID/FE Installation (WBS 2.12 - FY15)
Jan-15	$0.849 M	$1.488 M	$2.336 M	FXI hutches, EPU current strip power supplies, labor additions for Common Systems (WBS 2.3), contract awards
Feb-15	$0.272 M	$1.304 M	$1.576 M	IRR and closeout additions, ISS contract awards
Mar-15	$1.034 M		$1.034 M	SIX spectrometer award
Apr-15	-$0.040 M		-$0.040 M	Cost correction
May-15	$0.002 M		$0.002 M	Endstation awards
Jun-15	$0.279 M		$0.279 M	Additional equipment racks for SIX
June EAC	$1.737 M	$1.297 M	$3.034 M	Management update items: ID/FE Installation (WBS 2.12 - FY16), Sprinklers and Smoke Detectors, ISS endstation items, Common systems, Management items. Actual cost overruns (cumulative): Project support, Utilities, PPS
TOTAL	$7.504 M	$8.830 M	$16.333 M	

Figure 2. NEXT Cost Growth History since CD-2

1.4 Other Statistics as of 7/31/2015:

Plan (BCWS or PV) – $46,068K cumulative

Earned (BCWP or EV) - $44,525K cumulative

Actual (ACWP or AC) - $46,520K cumulative

Budget at Completion - $82,360K

Estimate at Completion - $85,563

Planned % Complete – 55.9%

Earned % Complete – 54.1%

Contingency (on BAC) - $7,640K

Total Project Cost (TPC) - $90,000K

2.0 Estimate at Complete (EAC)

The EAC is used to determine the final cost of the project. There are various methods that are used to determine the EAC and some that are more appropriate than others at various project stages. The four traditional methods are outlined below and are included here because the review team felt that they are important in the context of this review. The estimated final Cost (EAC) for the NEXT Project using data as of July 31 is shown using each of the methods.

2.1 EAC = BAC/CPI

Using this method NEXT EAC = $86,048,440

2.2 EAC = AC+(BAC-EV)

Using this method NEXT EAC = $84,353,892

2.3 EAC = AC+(BAC-EV)/CPI*SPI

Using this method NEXT EAC = $87,418,029

2.4 EAC = AC+ Bottom Up Estimate to Complete (assessed monthly by activity/resource by CAM and approved by PM)

EAC method 2.4 is being used as of July 31, on the NEXT project and will be confirmed during the comprehensive Bottom Up Estimate which has just begun.

July 31, 2015 EAC using method 2.4 for NEXT = $85,562,848

NEXT has been monitoring EAC throughout the life of the project using the various methods outlined above, but, given the later phase of the project, they are appropriately now using the Bottom Up Estimate to Complete method (2.4) to confirm that the project can be completed within the $90M Total Project Cost (TPC).

From an historical perspective, EAC for the NSLS-II Project was conducted during the last year of the project and updated monthly using the method described in 2.4 above. A spreadsheet was used, outside of the Primavera/Cobra system, in order to track and evaluate the estimates from the CAMs on the work to go. This method proved tedious and prone to errors and it was agreed by the parties involved that a better system needed to be developed to track EAC.

The NEXT management team, together with their project controls staff, took into account the Lessons Learned on EAC from the NSLS-II project and developed a method using Primavera/Cobra which takes the actual costs to date and adds them to the work to go or ETC directly out of the working schedule. Using the

Primavera/Cobra system proved to be a more robust way to capture the ETC information. Since status is taken monthly against the working schedule, this method systematically takes into account schedule delays and captures cost overruns automatically from prior reporting periods. The change to this method addressed the issues that occurred during the final year of the NSLS-II Project and was put into practice for NEXT beginning in June, 2015.

The review team spent a significant amount of the review discussing this EAC method with project management, CAMs, and support staff, and found that this method is appropriate. This method has prudently and appropriately highlighted a number of issues that will need to be addressed and refined during the balance of the NEXT Project.

As was the case with the NSLS-II Project, everyone on the project team has to come to the realization that the project is winding down and that project completion should be the most critical focus for the balance of the NEXT project. That means that all estimates should now be final and all efforts should be devoted to completing and delivering the agreed upon scope. Additionally, the cost of the work to go is very critical and it needs to be looked at and tracked in detail every month. This change will require increased administrative focus and effort on the part of the CAMs as they continue to take full responsibility for the WBS elements from a scope, schedule and cost perspective. Diligence in watching costs and ensuring that any scope deviations can be covered by a reduction in a non-critical effort will be of key importance.

Since the AC + Bottom Up method to track EAC takes the costs to date (AC) and adds the Estimate to Complete from the working schedule to calculate the EAC, it is critical that all costs are included either in the AC or the ETC. Missed accruals and invoices that have not completely made it through the financial system can be excluded from AC and, by definition, since the work is complete, they would not show up in the working schedule going forward and be excluded from the ETC. The switch over to this method brought this issue to light and some accruals were erroneously excluded from both the AC and the ETC. There is no question in the minds of the review team that there will be additional accruals and invoices that fall into this "in-between" category, so the project management team should work with the project controls and budget staff to find a way to capture those items in the ETC.

Corrective actions proposed by the project team with regard to EAC are shown below.

1. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Ensure stability of the EAC** – Enforce zero cost growth and do not consider further draws on contingency until EAC stabilizes and risk reduces."

2. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Control Project Costs** – With EAC directly dependent on ACWP [AC], cost control is a key aspect of EAC growth control. See Cost Control Section below." [Note: Appendix D contains the full NEXT EAC Growth and Cost Control Corrective Actions.]

3. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Enforce zero-cost growth until EAC stabilizes and project risk reduces –** Increases must be accompanied by offsetting deletion of future scope, while ensuring that NEXT KPPs will be met and that all NEXT beamlines will be ready to operate and perform first-class science following NEXT CD-4."

4. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Transition to Operations Early Where Possible -** Complete construction and conduct IRRs early where possible, to pull the project schedule forward."

5. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Increase project management oversight of procurements** – Large-value procurements have had a high degree of project management oversight throughout the life of the NEXT project. Beginning in July 2015, the threshold for project management approval of all small-value procurements was reduced from $25K to $5K."

6. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Identify potential scope deletions -** ….Each NEXT beamline will identify further potential scope deletions, with associated cost and schedule impact, to be exercised as needed to control cost growth."

3.0 Accruals

Accruals are an important component of an Earned Value Management System to keep AC in line with the EV. If suppliers do not provide invoices for work accomplished, Technical Representatives can forward an accrual request (with appropriate backup) to the Business Services Group and ask that they accrue the cost for that work. That accrual will charge their account, keeping the AC in line with the EV. An accrual call goes out each month with a deadline for receipt, leaving time for the accrual paperwork to be processed. Based on the results of this review, it became clear that CAMs did not consistently recognize the importance of accruals and missed some accrual deadlines. Additionally, a review and a focus on the procurement schedule earlier in the project resulted in

the inclusion of interim milestones along with the contractual milestones. These interim milestones also require accruals, leaving some CAMs having to make numerous accruals each month. This became overwhelming to some of the CAMs and they were not able to process their accruals in a timely fashion. Additionally, these interim milestones added a level of complexity to the routine used to process monthly accruals because the interim milestones relate to contractual milestones that often contain multiple account numbers corresponding to various WBS elements.

1. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Process Outstanding Accruals** - Outstanding accruals not processed in June were processed in July and August. Accruals will be processed monthly, as the corresponding value is earned. With accruals processed, the cumulative cost variance represents the cost of performance earned to date."

2. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Improve Accrual Methods** – Working with Business Services, the method of collecting non-invoiced accrual status on large procurement contracts will be simplified. The availability of reports showing invoices, payments, and accruals on all major procurement contracts will permit all project staff to check the status of accruals in their area, to trigger processing of new accruals and to verify that accruals have been processed."

3. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**CAM Education** – Provide hands-on, one-on-one instruction and guidance for critical CAM functions such as earning value and processing accruals. Continue to urge all CAMs to control costs in their areas, to question labor charges, and to process accruals in a timely fashion."

4.0 Labor

An important and key aspect of bringing a project to completion is the labor it takes to complete the work scope. Labor will play a key role at the end of the project and the NEXT project team needs to be prepared for the fact that some final work will take longer than anticipated. The NEXT CAMs interviewed identified issues and problems associated with tracking labor and ensuring that the labor charges to their accounts were correct. Diligence will be required from now until the end of the project to ensure that the labor charges are appropriate. Additional reporting and assistance may be needed to help with this effort and CAMs need to make the time to do some of the administrative tasks necessary to ensure that charges to their accounts are appropriate.

1. CORRECTIVE ACTION PROPOSED BY NEXT PROJECT MANAGEMENT – "**Improve Cost Reporting** – Enhanced monthly cost reports from Business Services will allow CAMs to properly identify the sources of cost overages and thereby make appropriate corrections in a timely fashion."

5.0 Corrective Action Plan

The NEXT Corrective Action Plan was reviewed by the review team and deemed appropriate to address the Growth and Cost Control Issues. Some comments on that plan include that stronger management oversight should be articulated in this plan by using the word "require" rather than "urge" (as seen in the CAM Education Corrective Action item). Also, in the Actions to Benefit Future Projects section, section (i) should be reviewed with the Business Services group as it appears that this problem might need to be resolved differently as opening new accounts for each type of cost will be burdensome from a financial perspective and may be time-consuming to manage as the number of accounts for CAMs to remember, use, and track will become overwhelming, often requiring corrections every month.

6.0 Summary

The NEXT Project is moving into the project completion stage. The early start of monthly EAC reporting using the AC + ETC method brought to light some issues that require correction. They can now be managed early to ensure that the project can be brought to completion on time and within the TPC. It takes time to move successfully into regularly using the EAC during the final stages of a project and it is normal to have some fluctuation in the EAC during this time. The NSLS-II Project experience was similar and is depicted in the graph below.

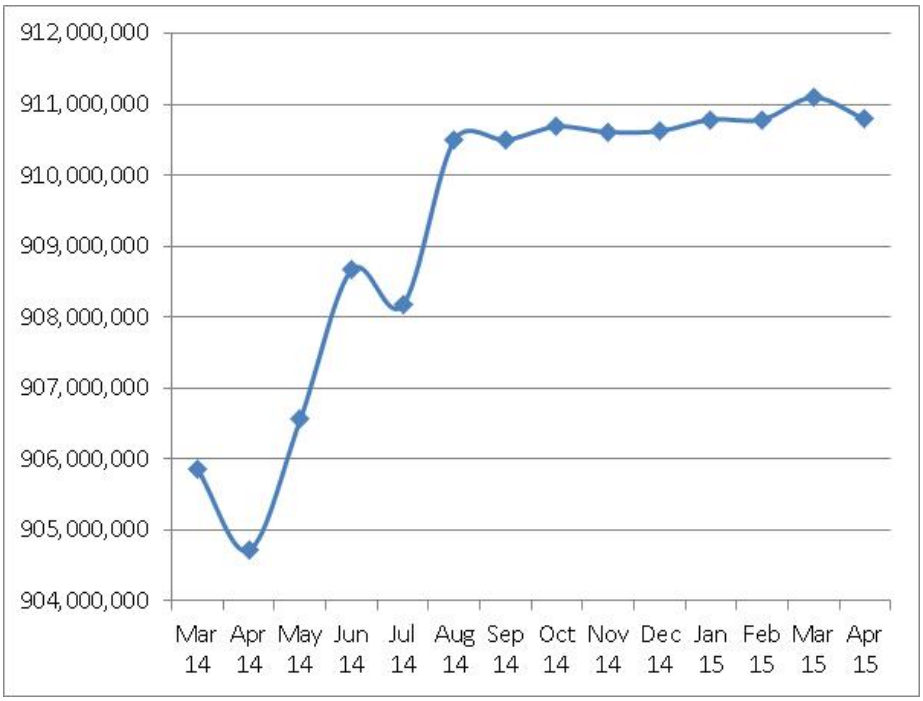


Figure 3. NSLS-II EAC Growth during the Final Year of the NSLS-II Project

The most important issue is ensuring that the NEXT Project will be able to complete its scope on time and within the TPC. To ensure that we understood that this was, in fact, the case, the review team spoke to or contacted each active Level 2 WBS Manager and asked them all a question similar to the following:

"Given the scope that you have to deliver, will you be able to do so with the amount of funds identified in your EAC and under the assumption that you will not be able to use any contingency? That means that if something comes up that wasn't planned or you need more labor than anticipated, you will be able to add the essential item(s) and take out something else to make up for it."

The CAMs all responded affirmatively, although some noted that they didn't think that they had any scope that could be removed if unforeseen items arise.

That being said, it is essential that additional contingency be held aside for those WBS elements to ensure successful project completion. Given that the success of projects within the Office of Science is based, in good part, on the fact that contingency is held and is essential for project success, this is not unexpected or unusual. Additional scope additions may not be possible and should only be added once project completion with the existing scope is guaranteed.

Additionally, both NSLS-II and BNL management have affirmed that they will do everything possible to ensure that resources will be available when required by the NEXT Project team.

One additional note is that since the ACWP (or AC) contains actual labor costs, there is always a slight variance from the BCWS (PV), which was based on estimated labor categories. Based on the information gathered during this review, the review team expects that the total EAC figure will fluctuate each month due to these slight variances, but, given the information that was gathered during the review, we would not expect that those variances will be large.

Given all of the above, the review team believes that the project will be successful in completing within the TPC of $90M.

7.0 Response to Charge Questions

7.1 Have we now accrued all performed work that has not yet been invoiced?

> Yes. All "catch up" accruals have been completed with the August 31 data. Each month additional new accruals will be required and invoices will need to be monitored to ensure that they are included in the ACWP (AC). The review team anticipates that not all accruals and invoices will make the month end cut off each month because many factors play into the timing and meeting the month-end cutoff is sometimes difficult. A system needs to be put in place to ensure that when that happens, these missed accruals or invoices are captured in the ETC for that month.

7.2 Are there other issues inherent in the execution of the NEXT project that contributed to the EAC growth?

> Yes. Support staff are spread thin, CAMs are busy delivering scope, and sometimes changes are incorporated into the "system" that have not been fully vetted with all the parties involved.

7.3 Are there outstanding issues that could cause cost growth in the remainder of the project?

> Yes. While most CAMs can work within their budgets and scope requirements to deliver, some CAMs don't have scope that they can remove from the project without impacting their deliverables. Contingency or scope deletions from other areas will need to be used if something unforeseen arises.

7.4 Is the proposed corrective action plan likely to be effective?

Yes.

7.5 Are there other actions the project should take to control cost growth?

Management should be stronger in their oversight of the NEXT Project to require that all CAMs take full responsibility for their WBS elements. That includes doing the administrative tasks necessary to verify labor charges and ensure that all non-invoiced work is either accrued or included in the ETC.

Appendices

A. Charge

B. Review Team

C. Review Contributors

D. Proposed Corrective Actions

Appendix A

Charge

Estimate at Complete (EAC) Review
August 28, 2015

Charge for NEXT Estimate at Complete (EAC) Review

Starting in June the NSLS-II NEXT project switched to calculating the Estimate At Complete (EAC) for the project as the sum of the Actual Cost of Work Performed (ACWP) and the Estimate To Complete (ETC). In June this saw the EAC rise by $1.7 M to $84.4 M, in July it rose by a further $1.1 M to $85.6 M and we are projecting another $1.0 M rise in August (to be offset by a reduction in scope). This EAC growth is a matter of grave concern to the management and threatens the success of the project, with the contingency on EAC reduced to $3.8 M (23% of unobligated work-to-go).

I would like to ask you to lead a review of the causes of this EAC growth and to look at the proposed corrective action plan. Key questions to be addressed include:

1. Have we now accrued all performed work that has not yet been invoiced?
2. Are there other issues inherent in the execution of the NEXT project that contributed to the EAC growth?
3. Are there outstanding issues that could cause cost growth in the remainder of the project?
4. Is the proposed corrective action plan likely to be effective?
5. Are there other actions the project should take to control cost growth?

I would appreciate a draft report by September, 4th 2015.

I am very grateful for your help in this matter. This is a very important issue to NSLS-II and to the laboratory.

Appendix B

Review Team

Estimate at Complete (EAC) Review
August 28, 2015 – September 4, 2015

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Appendix C

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Estimate at Complete (EAC) Review
August 28, 2015 – September 4, 2015

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Appendix D

Proposed Corrective Action Plan

Estimate at Complete (EAC) Review
August 28, 2015 – September 4, 2015

NEXT EAC Growth Corrective Actions

September 2015

Overview

Starting with June 2015 EMVS report, NEXT is reporting the Estimate At Complete (EAC) as the sum of the Actual Cost of Work Performed (ACWP) and the Estimate To Complete (ETC). This method of calculating EAC is appropriate when the project is approximately a year from completion, as is the case for NEXT, when actual costs to date become a better indicator of the final project cost than baseline cost estimates. However, unprocessed accruals have contributed to artificially low ACWP and thereby to an artificially low EAC value. For NEXT, a relatively large number of accruals were processed in June and July, and a similarly large number are expected in August, at which point the accrual catch-up phase will be complete. These accruals contributed to EAC growth in these months. EAC grew $1.7M in June, $1.1M in July, and is expected to grow $0.5M in August, including a reduction in scope of $0.5M. The August 2015 EMVS reporting is expected to show $3.8M contingency on EAC, which is roughly 10% of EAC work remaining. More than half of the remaining EAC work is obligated in fixed price contracts, so the $3.8M contingency on EAC represents greater than 20% of unobligated work-to-go.

The accruals processed in August will bring the costed work on NEXT major procurement contracts up to the total earned value to date on these contracts, within a percent or two. Going forward, accruals will be processed either in the month that the value is earned or the following month, as determined by the specific earned performance and accrual dates: the monthly calendars for EVMS and Business Ops differ by ~1 week.

Besides the accruals which were processed in June, July, and August 2015, the other major contributor to EAC growth is labor cost overages experienced to date. The total project cost overage through July is $2M and will be perhaps $3.2M through August. This amounts to 4-7% cost overage on value earned to date, a fractional increase that is not uncommon for labor-dominated work. The labor overages are most significant in

WBS 2.01 (Project Management & Support), WBS 2.03 (Common Systems, esp. Utilities), and WBS 2.12 (ID/FE Installation), since these Level 3 WBS areas consist of labor more than M&S. Keep in mind that the baseline estimates for NEXT were developed at a point in the life of the NSLS-II project when most of the beamline development work had not been completed, so actual costs were not available to inform NEXT cost estimates. NEXT has added labor for Common Systems and ID/FE Installation to EAC when actual costs for these activities in other beamline projects have become known.

NEXT EAC will be maintained as the most complete estimate of costs likely to impact the NEXT project. Actions taken and to be taken to improve EAC reporting are described below.

NEXT cost will be contained going forward, with no draws on contingency exercised within the foreseeable future. The means of cost containment to be utilized in order to maintain a stable EAC are described below. Some of these actions have already been implemented and the remainder will be implemented as soon as possible. NEXT project management will strongly enforce zero cost growth until the EAC situation stabilizes and project risk reduces, which is likely to be well into FY16. With designs essentially complete at this point, cost containment will be accomplished with minimal impact on technical scope.

NEXT EAC Growth and Cost Control Corrective Actions

The EAC and cost growth corrective actions already implemented or planned to be implemented as soon as possible are described below, separated into those actions dealing with EAC Growth and those dealing with Cost Control in general.

NEXT EAC Growth Corrective Actions

Process outstanding accruals

Outstanding accruals not processed June were processed in July and August. Accruals will be processed monthly, as the corresponding value is earned. With

accruals processed, the cumulative cost variance represents the cost of performance earned to date.

Improve accrual methods

Working with Business Services, the method of collecting non-invoiced accrual status on large procurement contracts will be simplified. The availability of reports showing invoices, payments, and accruals on all major procurement contracts will permit all project staff to check the status of accruals in their area, to trigger processing of new accruals and to verify that accruals have been processed.

Ensure stability of EAC

Enforce zero cost growth and do not consider further draws on contingency until EAC stabilizes and risk reduces.

CAM education

Provide hands-on, one-on-one instruction and guidance for critical CAM functions such as earning value and processing accruals. Continue to urge all CAMs to control costs in their areas, to question labor charges, and to process accruals in a timely fashion.

Increase communication among BNL stakeholders in the EAC process

BNL stakeholders in the EAC process include Project Management, Project Controls, Business Services, and NSLS-II and BNL management. Recurring meetings among subsets of these stakeholders are held at which EAC issues appear on the agenda. These meeting series include weekly project meetings, weekly meetings with Project Controls, monthly EVMS reporting meetings with each CAM, with attendance from both Project Controls and Business Services, weekly NSLS-II Project Management Oversight Group meetings, bi-weekly meetings between Project Controls and Business Operations, and monthly BNL-wide Project Oversight Board meetings.

Control project costs

With EAC directly dependent on ACWP, cost control is a key aspect of EAC growth control. See Cost Control section below

Actions to benefit future projects

Identify all unprocessed accruals prior to switching from EAC to ETC mode and include them in the ETC adjustments until they are processed.

NEXT Cost Control Corrective Actions

Increase project management oversight of procurements

Large-value procurements have had a high degree of project management oversight throughout the life of the NEXT project. Beginning in July 2015, the threshold for project management approval of all small-value procurements was reduced from $25K to $5K.

Identify potential scope deletions

The first set of potential scope deletions is not-yet-awarded procurements related to secondary endstation equipment. The only major procurement remaining in this category (SMI DCD and related activities) was removed from scope in August. Each NEXT beamline will identify further potential scope deletions, with associated cost and schedule impact, to be exercised as needed to control cost growth.

Enforce zero cost growth until EAC stabilizes and project risk reduces

Increases must be accompanied by offsetting deletion of future scope, while ensuring that NEXT KPPs will be met and that all NEXT beamlines will be ready to operate and perform first-class science following NEXT CD-4.

Transition to operations early where possible

Complete construction and conduct IRRs early where possible, leading to some NEXT beamlines transitioning to operations earlier than the currently-planned internal early project completion date of Sept. 30, 2016. The fraction of that beamline's staff effort that is devoted to operations is then charged to operations and not to NEXT. Three of the 5 NEXT beamlines are expected to complete construction, installation, testing, and IRRs of their IDs, FEs, and beamline photon delivery systems (PDSs) prior to September 2016. The NEXT IRR schedule is in development with NSLS-II operations, with the first IRRs expected to be conducted in October/November 2015.

Improve cost reporting

Enhanced monthly cost reports from Business Operations will allow CAMs to properly identify the sources of cost overages and thereby make appropriate corrections in a timely fashion.

Actions to benefit future projects

(i) Where a single account exists in NEXT, for example for the beamline systems of a given beamline, create separate accounts to capture different types of costs, for

simpler tracking, such as: Large procurements, Small value procurements, and Labor. This strategy would enable simple monitoring of cost variances in these three cost categories.

(ii) Enforce finalization of designs at the planned point in the project to avoid subsequent design changes that drive up project cost.

(iii) Generate detailed reports of beamline project cost performance, including NEXT, to inform cost estimates for subsequent projects.