Self-Assessment Review Report

of the

Brookhaven Science Associates (BSA) Earned Value Management System (EVMS)

Brookhaven National Laboratory (BNL)

June - July 2015

Final

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1.0 Self-Assessment Review Summary

A self-assessment surveillance review was conducted on the certified Brookhaven Science Associates (BSA) Earned Value Management System (EVMS) on June 29 – July 01, 2015. The three day surveillance review took place at the Brookhaven National Laboratory (BNL) facility located in Upton, New York. The objective of the self-assessment surveillance review is to ensure that the BSA EVMS continues to meet the ANSI/EIA-748 Standard and that implementation of the BSA EVMS remains effective. The surveillance review team membership contained participants from other Office of Science National Laboratories to ensure the independence of the review process. A list of the reviewers in attendance can be found in Appendix B.

The surveillance review was based on an examination of the previously certified BSA EVMS description and procedures, previous surveillance reviews, and the BSA EVMS application on the National Synchrotron Light Source II Experimental Tools (NEXT) and the USA Toroidal Large Hadron Collider Apparatus Detector Phase 1 Upgrade (LHC ATLAS-U) projects. These projects were required to fully implement the enterprise BSA EVMS and were respectively 49% and 28% percent complete (using May 2015 data) at the time of the review.

The surveillance review team determined the BSA EVMS is a beneficial management tool and the implementation of their certified Earned Value Management System is largely in compliance with the criteria of the ANSI/EIA-748-B standard. However, the surveillance review team identified three corrective action requests (CARs) and eleven continuous improvement opportunities (CIOs). A summary of the CARs and CIOs are listed below with further details and supporting information included in Section 2.0 and Appendix A of this report.

1.1 CARs (guidelines listed with the corrective action)

- CAR-01 Inaccuracies With Work Authorization Documents (GL-03) [Previously CAR-02 in closeout slides]
- CAR-02 Use Of Percent Complete Earned Value Techniques Without Acceptable Measurement (GL-07) [Previously CAR-03 in closeout slides]
- CAR-03 Un-costed Effort Used On Management Tasks (GL-16) [Previously CAR-04 in closeout slides]

1.2 CIOs (guidelines listed with the continuous improvement initiative)

There are a total of eleven CIOs; seven with an asterisk and four without.

With an asterisk:

- CIO-01* Variance Thresholds & Analysis At Control Account Level (GL-23)
- CIO-02* Increase In Project Support Personnel (GL-02)
- CIO-03* Project Management Center Knowledge Sharing Across Complex (GL-02)
- CIO-04* High Amounts Of Level Of Effort Within A Single Control Account (GL-7 & GL-12)
- CIO-05* Change Control Documentation (GL-29 & GL-32)
- CIO-06* Missing Logic In Schedules [High Float Values] (GL-06)
- CIO-07* Schedule Baseline Preservation (GL-31 & GL-32) [Previously CAR-01 in closeout slides]

Without an asterisk:

- CIO-08 Implementation Of Change Requests (GL-28, GL-30 & GL-32) [Previously CIO-07 in closeout slides]
- CIO-09 Method To Collect Actual Values On Contributed Effort (GL-08) [Previously CIO-08 in closeout slides]
- CIO-10 Method Of Adjustment Of Actual Financial Data Brought Into Cobra (GL-21) [Previously CIO-09 in closeout slides]
- CIO-11 Corrective Action Plan Tracking (GL-26) [Previously CIO-11 in closeout slides]

Further details on the surveillance review plan, team participants, and the guideline areas for which they were responsible are identified in Appendix B. Individuals interviewed during the surveillance are identified in the agenda shown in Appendix C.

2.0 Individual Guideline Review, Analysis, and Comments

This section covers the review and analysis of the five major EVMS categories: 1) Organization; 2) Planning, Scheduling, and Budgeting; 3) Accounting Considerations; 4) Analysis and Management Reports; and 5) Revisions and Data Maintenance. Each category has the associated guidelines identified, BSA EVMS compliance, and related observations from the responsible surveillance review team member.

Compliance is indicated along with any corresponding CAR or CIO with each of the 32 guidelines. Some of the CARs/CIO*s/CIOs may affect more than one guideline. If this is the case, the CAR/CIO*/CIO will appear in more than one guideline and will address the specific violation/corrective action for that particular guideline. More details regarding the definition of CAR, CIO*, and CIO can be found in the Surveillance Review Plan in Appendix B.

2.1 Organization

Guideline 1: Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.

Reviewer Name: Jennifer Fortner
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:
Each project had a hierarchical Work Breakdown Structure (WBS) which digests the project's scope of work into logical deliverables. Each of the project WBS's presented went down multiple levels below the project level with Control Accounts assigned at levels 3, 4, or 5.

The WBS dictionaries were reviewed and adequately detailed. The WBS elements were found to define the scope of the project. The project WBS elements were found to be utilized for organizing project documents such as the Responsibility Assignment Matrix (RAM), Work Authorization Document (WAD), and project schedule.

Guideline 2: Identify the program organizational structure including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.

Reviewer Name: Jennifer Fortner
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:
Each project's organization chart defined its Organizational Breakdown Structure (OBS) showing the organizational elements in which the work was planned and being controlled. The OBS facilitated the assignment of responsibility, accountability, and authority by WADs for all the work to be performed by each of the projects. The CAMs interviewed were aware of their role within the project's organization and to whom they reported.

The staffing for the LHC ATLAS-U project appears light in areas of project support. This project is arguably one of the hardest of the Brookhaven portfolio to manage due to it being a research and

development collaboration. The project controls members interviewed acknowledge this complexity and difficulty in keeping up with the work required given the current support levels. A need for augmented support is evident when looking at project controls implementation of functions related to finance, quality control, and issuing reports early. While the project team has developed processes and is still perfecting them, the project is only going to become more arduous as it progresses to more complex stages of the project life cycle (execution and close) and becomes more aggressive in their goals of completion. Based on this evaluation, support augmentation for these project functions is recommended. See CIO-02* for further information.

While not specifically called out in either project's OBS, the Surveillance Review Team was presented with the new BSA/BNL Project Management Center as a part of the Planning, Performance, and Quality Management Office. The Project Management Center's purpose is to provide central lab-wide project management related support, to include the standard lab-wide implementation of EVMS. It was discussed that this is a relatively new centralized approach from an organizational perspective. The review committee commends the centralization of EVMS implementation, however, the collaboration and sharing of improvements, lessons learned, and knowledge equally between the two projects reviewed was not evident. See CIO-03* for further information.

CIO-02*

Subject (Issue): Increase In Project Support Personnel

Referenced Guideline(s): 2

Referenced Data Trace:

Interviews performed onsite and review of project documentation (prior reviews, monthly reports, schedules, etc.)

Description of Issue:

Due to the complex nature of the LHC ATLAS-U project, a research and development collaboration, the need for augmented support related to project controls would be beneficial. The exponential curve for project related support is evident since the project is only going to become more arduous during its progression to more complex stages of the project life cycle (execution and close) and become more aggressive in their goals of completion. Some items discussed during this review (quality control of work authorization documents, changes to the baseline schedule, review of financial data, and later than typical close of monthly reporting) potentially exist due to the amount that support functions are already over allocated. This support primarily applies to project controls and finance. Supplementing the current support on the project with additional DOE 413.3b and EVMS experienced resources should be explored.

Recommendation:

Based on the information gathered during the review, it is recommended that BNL assess the level of

work required to support the LHC ATLAS-U project and assess the need for increased support functions.

CIO-03*

Subject (Issue): Project Management Center Knowledge Sharing Across Complex

Referenced Guideline(s): 2

Referenced Data Trace:

Interviews performed onsite, review of project documentation, findings during the review process, presentations given to the reviewers, and the BSA EVMS Program Description.

Description of Issue:

Based on the presented purpose of the Project Management Center – to provide central lab-wide project management related support – and the BSA EVMS Program Description statements – Section 6.3 Responsibility Of The Laboratory Project Management Office (LPMO) – there is an expectation of a standard lab-wide implementation of EVMS. During the course of the review, it became evident that the LHC ATLAS-U project had some of the same issues discovered in the prior reviews (see CAR-02 for an example) and had other issues that are commonly shared as best practices in enterprise like systems (see CIO-04* and CIO-05* for an example).

Recommendation:

The review committee commends the approach to centralizing the implementation of the EVMS, however, the collaboration and sharing of improvements, lessons learned, and knowledge equally between the two projects reviewed was not evident and needs to be improved. It is recommended that BNL establish a method for sharing information between projects/groups and revisit its documentation related to lab-wide EVMS implementation for ownership of policy and oversight functions.

Guideline 3: Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.

Reviewer Name: Jennifer Fortner
Compliant with ANSI/EIA-748: **No**

Observations and Findings:

The integration of the planning, scheduling, budgeting, work authorization and cost accumulation processes is accomplished at the intersection of the project's work breakdown structure and the project's organizational structure. This is represented in the dollarized Responsibility Assignment Matrix (RAM) that exists for each of the projects. The CAMs interviewed were aware of the Control

Accounts (CAs) assigned to them through the work authorization process. However, in reviewing and data tracing the Work Authorization Documents (WADs) a systemic issue was uncovered related to the period of performance for both projects. Additional inaccuracies were found related to cost values tracing between the RAM and WADs but these were either corrected during the initial documentation review and prior to onsite arrival or deemed minor errors (transposition of numbers). See CAR-01 for more details.

While no requirement exists related to projects using the exact same templates, there were vast differences in content related to work authorization documentation between the two projects. NEXT provides WAD packages for CAMs to sign containing all information required for a data trace (cover sheet, baseline schedule, and detailed control account planning report) where LHC ATLAS-U provides only the cover sheet. These differences lead to some confusion when doing traces and required that specific documentation be requested during the review to help trace and clarify. In some instances, the provided documentation did not trace back to information on the posted WAD and could have contributed to the issues related to CAR-01. This is an instance where it could be helpful to have a sharing of information/best practices between projects to help streamline content and quality control.

Also, note that the difference in dates discussed in CAR-01 is not the same as the issue discussed in CIO-07*. Using the correct baseline for the LHC ATLAS-U project, there are still issues with the period of performance shown on the WADs.

CAR-01
Subject (Issue): Inaccuracies With Work Authorization Documents

Referenced Guideline(s): 3

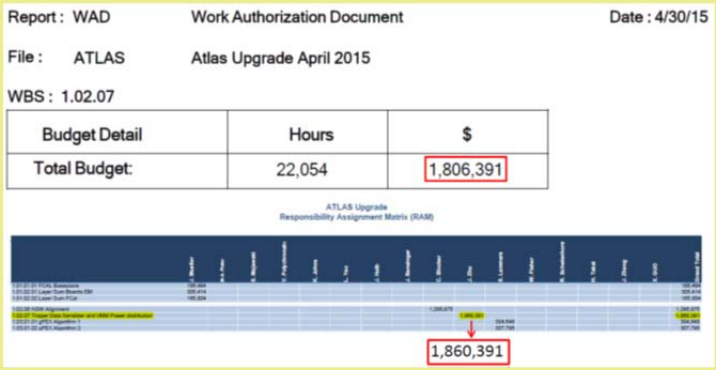
Referenced Data Trace:

1. BSA EVMS Program Description Section 1.4.3
2. WADs Values did not match RAM provided
    a. 1.02.07 LHC ATLAS-U
    b. 2.03.02 NEXT
    c. 2.03.03 NEXT
    d. 2.04.02 NEXT
    e. 2.06.02 NEXT
3. WADs Period of Performance does not trace
    a. 1.01.03.01 LHC ATLAS-U
    b. 1.01.03.05 LHC ATLAS-U
    c. 1.02.06 LHC ATLAS-U
    d. 1.03.04.01 LHC ATLAS-U

e. 1.03.04.02 LHC ATLAS-U
f. 1.03.04.03 LHC ATLAS-U
g. 2.03.02 NEXT
h. 2.03.03 NEXT
i. 2.05.02 NEXT
j. 2.09.02 NEXT
k. 2.12.01 NEXT
l. 2.12.02 NEXT
m. 2.12.03 NEXT

Description of Issue:

As stated in the BSA EVMS Program Description, the WAD is "the project manager's vehicle to delegate responsibility for budget, schedule, and scope requirements to the control account manager at the work package level. The signing of a work authorization document by all parties represents a multilateral commitment to authorize and manage the work within the budget and agreed-upon schedule." During the course of the review and in performing data traces, many errors were discovered with the WADs. Some of these errors were related to budget and others were schedule (period of performance). The screen shot below shows an example of a budget error as it relates to the RAM:



Report : WAD Work Authorization Document Date : 4/30/15

File : ATLAS Atlas Upgrade April 2015

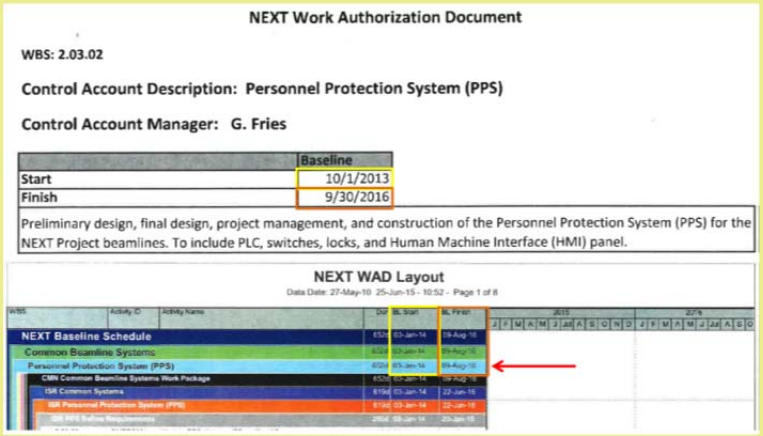
WBS : 1.02.07

Budget Detail	Hours	$
Total Budget:	22,054	1,806,391

ATLAS Upgrade
Responsibility Assignment Matrix (RAM)

1,860,391

The screen shot below shows an example of a period of performance error as it relates to the schedule:



NEXT Work Authorization Document

WBS: 2.03.02

Control Account Description: Personnel Protection System (PPS)

Control Account Manager: G. Fries

	Baseline
Start	10/1/2013
Finish	9/30/2016

Preliminary design, final design, project management, and construction of the Personnel Protection System (PPS) for the NEXT Project beamlines. To include PLC, switches, locks, and Human Machine Interface (HMI) panel.

NEXT WAD Layout

Data Date: 27-May-10 25-Jun-15 - 10:52 - Page 1 of 8

NEXT Baseline Schedule
Common Beamline Systems
Personnel Protection System (PPS)
CMN Common Beamline Systems Work Package
ISR Common Systems
ISR Personnel Protection System (PPS)

While some of these issues seem trivial or were corrected while onsite, they were rampant throughout the WADs on both projects. Since these documents represent the agreement between the PM and CAM on the work (scope, schedule, and cost) to be completed, it is important that these documents align with the other elements of the project baseline.

During the course of interviews and discussion with project members, it was pointed out that some issues related to the WAD data traces came from the implementation of the newest version of Cobra across the lab complex. This implementation created some challenges with creating and updating the WADs. Based on these issues found, this was likely a contributing issue but not the only issue.

Recommendation:

BNL needs to review the issues discovered, determine the root cause(s), and create a long term solution to prevent further issues related to the WADs.

Guideline 4: Identify the company organization or function responsible for controlling overhead (indirect costs).

Reviewer Name: Jennifer Fortner & Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

The CAMs were aware that their portion of the project included both direct and indirect costs. The indirect rates are under the direction of the Business Development and Analysis department reporting to the Chief Financial Officer's office. Detailed data traces were performed in the Accounting Considerations guidelines (GL) 16 – 21.

Guideline 5: Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

Reviewer Name: Jennifer Fortner
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Each project had a RAM that identifies the established control accounts with their associated budgets. Work/planning packages have been generated under the control accounts. Actual costs and performance data are collected at the control account level which provides essential information for management control. Generally, most CAs appeared to be at an appropriate level (Level 3, 4, or 5). The charge codes are where actual costs are collected for the work performed. The charge codes are either at the same level as the CA or at a lower level than the CA, to be used for better insight into cost and schedule progress. There was an issue with the documentation of the CAs as it relates to the WADs and RAM on both projects but these issues have been referenced under GL-03 CAR-01.

2.2 Planning, Scheduling, and Budgeting

Guideline 6: Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.

Reviewer Name(s): Greg Capps
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

The project schedules for both NEXT and LHC ATLAS-U were very well thought out and constructed. Analysis using Acumen Fuse returned very good scores of 88 on NEXT and 84 on LHC ATLAS-U. Both projects should be commended for well-developed schedules on complex projects.

Both schedules summarized using the project WBS, but were also augmented with additional coding that greatly increased schedule organization and usefulness to the scientific staff.

Both schedules were resource loaded and the resource selection and units appeared to be reasonable to perform the work, but were not verified by a technical/scientific reviewer.

CAM's for both projects displayed ownership and understanding of their schedules, and were able to clearly discuss the tasks, logic, critical paths within each control account and explain the resources.

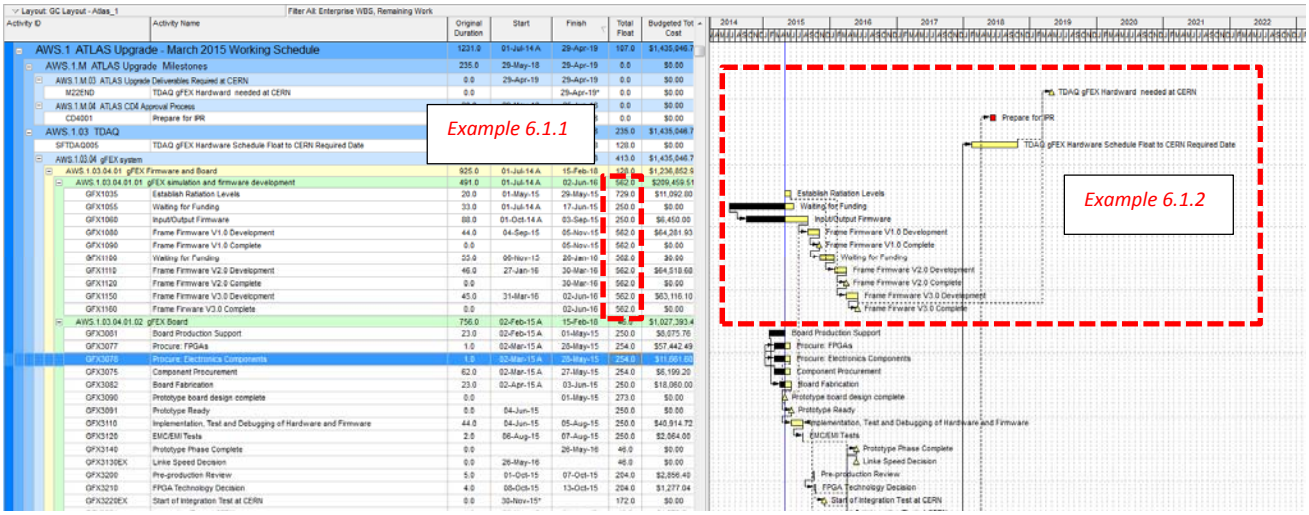
The schedules appeared to contain tasks and milestones necessary to perform, monitor, and track the scope of work. Critical events and deliverables are defined within the WBS and subsequent control accounts. The activity/task identification and decomposition in the LHC ATLAS-U schedule in particular was commendable, which is especially important considering the collaborative nature of the work.

Both schedules contained solid logic ties for the vast majority of tasks and were able to provide critical and near critical paths that where reasonable and traceable. The LHC ATLAS-U project contains many inter-project links to the international schedule and closely monitors these milestones and their associated logic ties.

While both schedules contain well developed logic structures, it was observed that both NEXT and LHC ATLAS-U contain some areas within the schedule logic that could use some improvement. During the LHC ATLAS-U 1.03.04 CAM interview regarding 1.03.04.01.01 schedule (Example 6.1) the high float numbers (729 & 562 days identified in box example 6.1.1 are astronomically high) were questioned, along with the logic that tied the activities into the 1.03.04.01.01 float buffer (SFTDSA005) and to the gFEX Hardware needed at CERN milestone (M22END) as shown in box example 6.1.2. The CAM, while looking at the detailed schedule, acknowledged this logic should be analyzed as the 1.03.04.01.01 tasks should have ties between the firmware version completions to tasks within WBS 1.03.04.01.02. The addition of these logic ties would most likely reduce the float

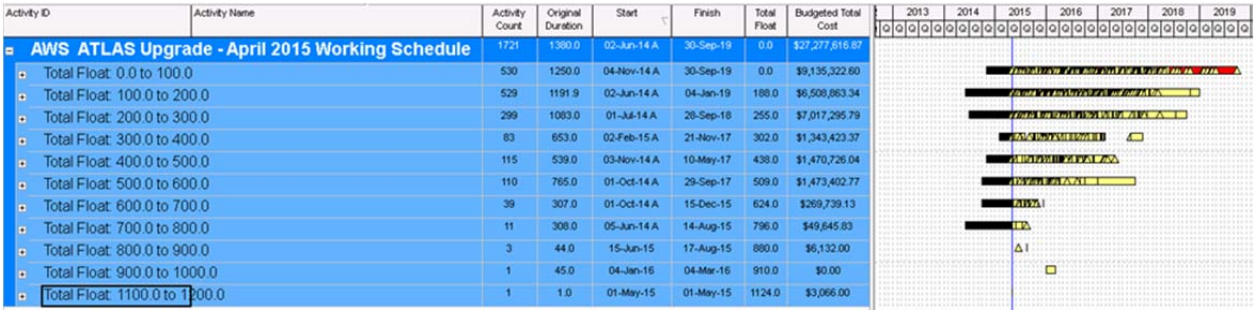
significantly on the activities within WBS 1.03.04.01.01, and may impact the critical path within the control account; which only has 46 days of float before the float buffer activity.

Post review completion, it was stated to the committee that the gFEX subproject does not have missing logic on the high float activities. If this is the case, it should be better explained by the CAM during the interview.



Example 6.1

Further examination of the LHC ATLAS-U project schedule reveals that of the ~1720 remaining activities, ~650 have total float values that are greater than 200 days; which is roughly 38% of remaining activities. Additionally, there are ~280 activities that possess between greater than 400 days of total float; which is roughly 15% of the remaining activities. See image below for documented float counts. Values this high are questionable and are worthy of a second review. Additionally, CAMs should be able to provide explanations of why the float values are so high in certain areas.

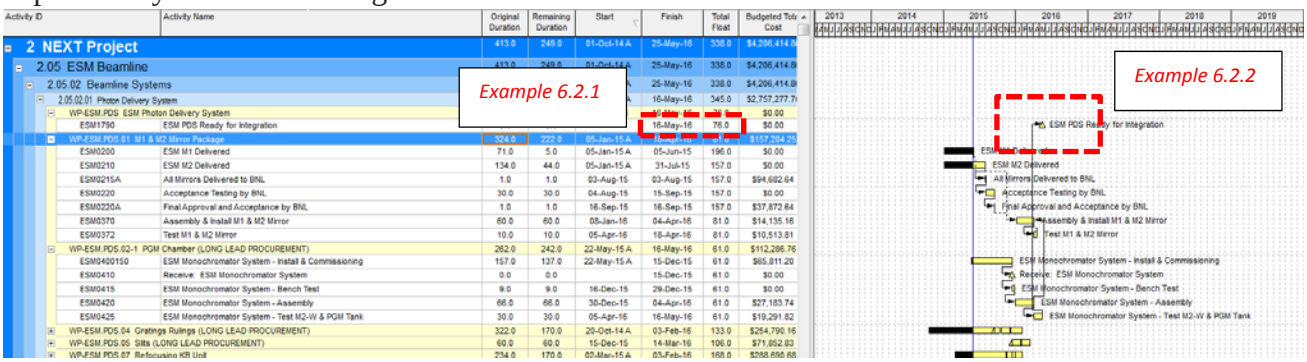


Activity ID	Activity Name	Activity Count	Original Duration	Start	Finish	Total Float	Budgeted Total Cost
AWS ATLAS Upgrade - April 2015 Working Schedule		1721	1380.0	02-Jun-14 A	30-Sep-19	0.0	$27,277,616.87
Total Float: 0.0 to 100.0		530	1250.0	04-Nov-14 A	30-Sep-19	0.0	$9,135,322.60
Total Float: 100.0 to 200.0		529	1191.9	02-Jun-14 A	04-Jan-19	188.0	$6,508,863.34
Total Float: 200.0 to 300.0		299	1083.0	01-Jul-14 A	28-Sep-18	255.0	$7,017,295.79
Total Float: 300.0 to 400.0		83	653.0	02-Feb-15 A	21-Nov-17	302.0	$1,343,423.37
Total Float: 400.0 to 500.0		115	539.0	03-Nov-14 A	10-May-17	438.0	$1,470,726.04
Total Float: 500.0 to 600.0		110	765.0	01-Oct-14 A	29-Sep-17	509.0	$1,473,402.77
Total Float: 600.0 to 700.0		39	307.0	01-Oct-14 A	15-Dec-15	624.0	$269,739.13
Total Float: 700.0 to 800.0		11	308.0	05-Jun-14 A	14-Aug-15	796.0	$49,645.83
Total Float: 800.0 to 900.0		3	44.0	15-Jun-15	17-Aug-15	880.0	$6,132.00
Total Float: 900.0 to 1000.0		1	45.0	04-Jan-16	04-Mar-16	910.0	$0.00
Total Float: 1100.0 to 1200.0		1	1.0	01-May-15	01-May-15	1124.0	$3,066.00

During the NEXT 2.05.02 CAM interview regarding the schedule, (Example 6.2) questions regarding the installation of the monochromator system were asked. During the discussion it was noted that the ESM PDS would be installed during outage starting on 03May16. The ESM PDS (ESM1790) will not be ready until 16May16 and this milestones currently shows 76 days of float (Example 6.2.1); which is calculated from the Early Completion Milestone (M2075 shown in Example 6.2.2). It was pointed out to the CAM if the ESM PDS was tied to the start of the outage the float & CP would be

significantly different in this WBS. The CAM acknowledged that the project was in the process of incorporating the outage milestones to the schedule, and that these milestones had not yet been fully incorporated.

Post review completion, supplemental information was provided to the review committee stating that the CAM has the goal of completing the noted system by the shutdown but that it is not a requirement for the KPPs on the NEXT project. As such, the CAM stated the shutdown is a constraint but it is not and the float in the schedule is correct. If this is the case, it should be better explained by the CAM during the interview.



Example 6.2

Further examination of the NEXT schedule reveals that of the ~1600 remaining activities, ~360 have total float values that are greater than 200 days; which is roughly 20% of remaining activities. Additionally, there are several activities that possess between 300 and 500 days of total float. See image below for documented float counts. Values this high are questionable and are worthy of a second review. Additionally, CAMs should be able to provide explanations of why the float values are so high in certain areas.

CIO-06*

Subject (Issue): Missing Logic In Schedules [High Float Values]

Referenced Guideline(s): 6, especially focusing on the statement “identifies significant task interdependencies”

Referenced Data Trace:

There were interviews with CAMs and traces conducted on the schedule logic, especially around

areas of high float calculations.

Description of Issue:
While the detailed project schedules in both projects are well developed from a standard tool assessment (constraints, leads/lags, etc.), there were observations made regarding the possibility of missing logic in both the NEXT and LHC ATLAS-U schedules due to the areas with high float numbers. While all schedules of this size and complexity will have some trivial logic ties missing, the high value of float within the observed schedules could indicate a more significant number missing and impact the critical path.

Recommendation:
An assessment of the high float activities and scrub of the logic for both projects would be helpful in reconfirming the project's critical path and the critical paths within each control account. The inclusion of the outage milestones in the NEXT project is highly recommended as they are essential to properly calculate float on the equipment installation schedules. Additional training with CAMs to prepare them to speak to their areas of high float, if correctly high, would be beneficial.

Guideline 7: Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.

Reviewer Name(s): Greg Capps
Compliant with ANSI/EIA-748: **No**

Observations and Findings:
The CAM's in both projects understood their scopes of work, their deliverables and were generally able to clearly discuss and support their assessment of the control account status. Both LHC ATLAS-U and NEXT have well decomposed schedules and numerous milestones that facilitate the tracking and measuring of progress. LHC ATLAS-U contains a high level of LOE within certain control accounts, see GL-12 (CIO-04*) for further information.

Both projects use the "% Complete" earned value technique (EVT) on the vast majority of the non-LOE activity tasks, and this works very well as the majority of the tasks representing discrete work are less than 3 months in duration. There were examples in both projects of discrete activities with durations, or remaining durations, greater than three months, which makes using the % Complete EVT difficult to quantify. To assist with this difficulty, Section 2.1.2.1 Discrete Effort, within the BNL EVMS requires activities over 3 months in duration to have a quantifiable method for assessing % Complete.

For these long duration activities, the NEXT project was able to provide a list of the activities with durations >3 months (Example 7.1) along with a significant number of supporting documents (deliverable/status spreadsheets shown in Examples 7.2 and 7.3) used by the CAM's to support their assessment of the % complete on these longer tasks.

Diagon								
I. Jarrige		SIX4033	Fabrication Support - Diagon	50%	178	15-Dec-14 A	28-Aug-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4034	Delivery - Diagon	50%	117	17-Mar-15 A	28-Aug-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4035	Acceptance - Diagon	50%	113	23-Mar-15 A	28-Aug-15 C	Non-Optics Spreadsheet used as backup
Baffle Slits - Water Cooled								
E. Vescovo		ESM4580	PO Prep and Submittal - Baffle Slits - water cooled	70%	64	01-Apr-15 A	30-Jun-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4590	Fabrication Support - Baffle Slits - water cooled	30%	120	18-May-15 A	5-Nov-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4036	PO Prep and Submittal - Baffle Slits - water cooled	70%	64	01-Apr-15 A	30-Jun-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4037	Fabrication Support - Baffle Slits - water cooled	30%	120	18-May-15 A	5-Nov-15 C	Non-Optics Spreadsheet used as backup
Diagn. Unit - Water Cooled								
E. Vescovo		ESM4620	PO Prep and Submittal - Diagn. Unit - water cooled	10%	64	01-Jun-15 A	28-Aug-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4630	Fabrication Support - Diagn. Unit - water cooled	10%	120	16-Jun-15 A	7-Dec-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4040	PO Prep and Submittal - Diagn. Unit - water cooled	10%	64	01-Jun-15 A	28-Aug-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4041	Fabrication Support - Diagn. Unit - water cooled	10%	120	16-Jun-15 A	7-Dec-15 C	Non-Optics Spreadsheet used as backup
Baffle Slits								
E. Vescovo		ESM4660	PO Prep and Submittal - Baffle slits	50%	110	05-Jan-15 A	10-Jun-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4670	Fabrication Support - Baffle slits	50%	183	12-Jan-15 A	30-Sep-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4680	Delivery - Baffle slits	50%	179	19-Jan-15 A	1-Oct-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4690	Acceptance - Baffle slits	50%	206	26-Jan-15 A	16-Nov-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4044	PO Prep and Submittal - Baffle slits	50%	110	05-Jan-15 A	10-Jun-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4045	Fabrication Support - Baffle slits	50%	183	12-Jan-15 A	30-Sep-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4046	Delivery - Baffle slits	50%	179	19-Jan-15 A	1-Oct-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4047	Acceptance - Baffle slits	50%	206	26-Jan-15 A	16-Nov-15 C	Non-Optics Spreadsheet used as backup
Diagnostic Units								
E. Vescovo		ESM4700	PO Prep and Submittal - Diagnostic Units	50%	110	05-Jan-15 A	10-Jun-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4710	Fabrication Support - Diagnostic Units	50%	146	12-Jan-15 A	7-Aug-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4720	Delivery - Diagnostic Units	50%	141	19-Jan-15 A	7-Aug-15 C	Non-Optics Spreadsheet used as backup
E. Vescovo		ESM4730	Acceptance - Diagnostic Units	50%	153	26-Jan-15 A	31-Aug-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4048	PO Prep and Submittal - Diagnostic Units	50%	110	05-Jan-15 A	10-Jun-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4049	Fabrication Support - Diagnostic Units	50%	123	12-Jan-15 A	7-Jul-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4050	Delivery - Diagnostic Units	50%	119	19-Jan-15 A	8-Jul-15 C	Non-Optics Spreadsheet used as backup
I. Jarrige		SIX4051	Acceptance - Diagnostic Units	50%	146	26-Jan-15 A	20-Aug-15 C	Non-Optics Spreadsheet used as backup
M2 Mirror Polishing								

Example 7.1

DESIGNING WORK PROGRESS

ITEMS	COMPONENTS	DESCRIPTION	DUE DATE	% COMPLETE	STATUS
1	PGM	3D MODELS	30-Mar-15	100%	DONE
		ICD DRAWING	30-Mar-15	95%	IN REVIEW
2	SLITS	3D MODELS	30-Mar-15	100%	DONE
		ICD DRAWING	30-Mar-15	95%	IN REVIEW
3	M1	3D MODELS	30-Mar-15	100%	
		ICD DRAWING	30-Mar-15	95%	
4	M3	3D MODELS	30-Mar-15	100%	DONE
		ICD DRAWING	30-Mar-15	100%	?
5	M4	3D MODELS	30-Mar-15	100%	DONE
		ICD DRAWING	30-Mar-15	100%	?
6	M5	3D MODELS	TBD	100%	
		ICD DRAWING	TBD	95%	
7	PGM SURVEY	3D MODELS	3-Apr-15	100%	DONE
		2D DRAWING	3-Apr-15	95%	IN REVIEW
8	SLITS SURVEY	3D MODELS	15-Apr-15	100%	DONE
		2D DRAWING	15-Apr-15	95%	IN REVIEW
9	M3 SURVEY	3D MODELS	15-Apr-15	100%	
		2D DRAWING	15-Apr-15	95%	
10	M4 SURVEY	3D MODELS	15-Apr-15	100%	
		2D DRAWING	15-Apr-15	95%	
11	SUPPORT SURVEY	3D MODELS	30-Jun-15	100%	
		2D DRAWING	30-Jun-15	95%	

Example 7.2

Commercial Components

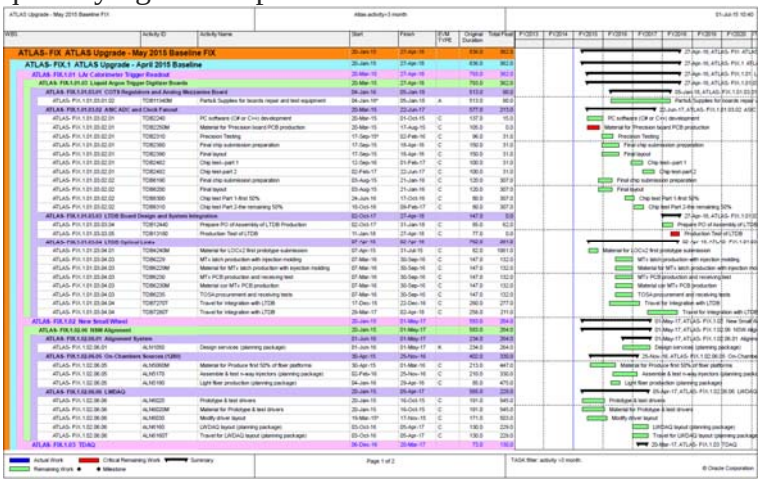
Item	Description	Part Number	Quantity	Price		Source	Status	
				Unit Price	Total		ESM	SIX
1	6" Spherial UHV Chamber	53-140200-G	1	$3,180.00	$3,180.00	KimballPhysics	Deliveried	
2	2" Linear Manipulator(2.75"CF)	660002(modified)	4	$1,315.00	$5,260.00	MDC		
3	1.33"CF BNC Feedthrough(1-pin)	630000	4	$92.70	$370.80	MDC		
4	Connector Inline(10PK)		1	$58.50	$58.50	MDC		
5	1.33"CF Blank Flange		4	$20.00	$80.00	MDC		
6	Fitting and Gasket	-	-		$500.00	-		
				Cost	$6,269.30			

Custom-Made Components

Item	Description	Part Number	Quantity	Price		Source	Status	
				Unit Price	Total		ESM	SIX
1	OFHC Blades	PD-ESM-BL-DG-2001	4	$361.21	$1,444.85	BNL(CenterShop)	Deliveried	
2	Collison Stop	-	1		$1,000.00			
				Cost	$2,444.85			
				Total Cost	$8,714.15			
				Budget	$10,000.00			

Example 7.3

The LHC ATLAS-U project provided a list of their activities with durations >3 months (Example 7.4). However, they currently do not support the % Complete assigned to these activities with any quantifiable documentation (Example 7.5); but did offer several very practical methods for quantifying % Complete in the future.



Example 7.4

From: Chris Bee [mailto:christopher.bee@stonybrook.edu]
Sent: Wednesday, July 01, 2015 9:51 AM
To: Fortner, Jennifer C.
Cc: Jon Kotcher; John Hobbs; Xiaofeng Guo
Subject: %complete statusing

Hi Jennifer,
Below how we plan to address statussing the few longer tasks in the project, broken down into several classes of task. I attach also the list of such tasks from Xiaofeng

A specific example is given for "Testing" below

* Testing: Progress thru explicit test plan developed by all collaborators - by nature includes explicit steps to final goal of testing successful. Status by successful completion of each nominated step in the test plan.

Typical steps for a processor board testing task could include:

- Power-up control - 15%

- I/o integrity verification - 25%

- Processing speed assessment - 35%

- Control and configuration verification - 25%

* Travel: number of explicit trips completed

* Software development: Success of initial implementation of sub components of the s/w deliverable in question. Success == compilation & run-time passes together with verification of input/output coherence.

Typical steps: component initialization, configuration, input functions, processing logic, output formatting and logic, monitoring and control functions. Each function, depending on its relative size in terms of code lines will be assigned a % of the total task to enable individual statussing.

* Production/receiving: Explicit production & reception steps defined with manufacturer and with project engineers, that need to be completed in series and are then statused.

Example 7.5

CAR-02

Subject (Issue): Use Of Percent Complete Earned Value Techniques Without Acceptable Measurement

Referenced Guideline(s): 7 and BNL EVMS Program Description Section 2.1.2.1

Referenced Data Trace:

The detailed schedule was reviewed for in progress activities with durations, or remaining durations >3 months and CAM's were asked to discuss the % Complete values assigned to activities.

Description of Issue:

ANSI/EIA-748, Guideline 7 requires quantifiable indicators to measure progress. While this is open to interpretation, it is common best practice to encourage activity decomposition to durations less than 3 months so the activity completion and its deliverable serves as a quantifiable measurement. If activities are longer than 3 months the CAM should have some clear, quantifiable method for assessing % complete; such as: # of drawings complete, # of units installed, # of parts purchased, # of tests completed. The reason this is such a critical issue is that indiscriminate or careless assessment of % Complete completely invalidates the EVM methodology. To assist projects in providing accurate % Complete values, BNL EVMS Section 2.1.2.1 has been written to require:

Discrete efforts of longer duration (e.g., greater than three monthly performance or accounting periods) should be divided into sub-tasks with interim milestones (with each interim milestone representing an intermediate, tangible outcome) or measured with other techniques, including weighted milestone and percent complete based on predefined milestones.

The expert opinion method is employed at each measurement period, when the responsible worker or manager makes an assessment of the percentage of work complete. These estimates are usually for the cumulative progress made against the plan for each task. If there are objective indicators that can be used to arrive at the percent complete (e.g., number of units of product completed divided by the total number of units to be completed), then they should be used.

This issue was previously observed during the May 2014 BNL EVMS review and was subsequently identified as a CIO. As this issue was again observed during this review on LHC ATLAS-U, the committee believes this should be raised to the level of a CAR.

Recommendation:

The BNL should increase consultation between the laboratory projects to ensure this element is understood, incorporated, and applied into their processes.

Guideline 8: Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefinitized work.

Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.

Reviewer Name(s): Greg Capps
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

The NEXT and LHC ATLAS-U have developed resource loaded schedules from which time-phased budgets at the control account level are generated. These are baselined and establish the basis against which monthly and cumulative performance is measured.

The CAM's in both projects were able to discuss their schedules, estimates, WADs, and control account plans which contained the time-phased budgets. There were issues identified with the LHC ATLAS-U project regarding the baseline schedule provided and its traceability to the control account plans, further information on this can be found in CIO-07*.

The LHC ATLAS-U project is a scientific collaboration of multiple federal agencies, national laboratories, universities and interfaces with the international LHC ATLAS-U project at CERN. All of this leads to various resources and funding sources. Example 8.1 shows that a total of ~41,000 hours of no-cost effort are supporting the project. Of this ~23,000 hours are on discrete, non-LOE tasks, with the balance of the effort on LOE project management tasks.

Sum of Value	FY15	FY16	FY17	FY18	Grand Total
1.01.01.01 FCAL Baseplane	64	85	138		287
AR-U-EE Arizona Un-Costed EE	12	32	22		66
HOURS	12	32	22		66
AR-U-PHY Arizona Un-Costed Physicist	52	53	116		221
HOURS	52	53	116		221
1.01.01.02 Baseplane L3 Management	194	194			388
AR-U-PHY Arizona Un-Costed Physicist	194	194			388
HOURS	194	194			388
1.01.02.01 Layer Sum Boards EM	799	483	985		2,267
PITTSBURGH-STU Pittsburgh Undergratuate Student	80	231	677		988
HOURS	80	231	677		988
PITTSBURGH-U-EE Pittsburgh Un-costed EE	323	51	99		473
HOURS	323	51	99		473
PITTSBURGH-U-ET Pittsburgh Un-costed ET	230	111	89		430
HOURS	230	111	89		430
PITTSBURGH-U-PHY Pittsburgh Un-costed Physicist	166	91	119		376
HOURS	166	91	119		376
1.01.02.02 Layer Sum FCal	96	64	38		198
AR-U-EE Arizona Un-Costed EE	70	36	24		130
HOURS	70	36	24		130
AR-U-PHY Arizona Un-Costed Physicist	26	28	14		68
HOURS	26	28	14		68
1.01.02.03 F/E Electronics L3 Management	234	234	234		702
PITTSBURGH-U-PHY Pittsburgh Un-costed Physicist	234	234	234		702
HOURS	234	234	234		702
1.01.03.02 ASIC ADC and Clock Fanout	1,890	1,400			3,290
NEVIS-U-PSTDOC Nevis Un-costed Postdoc	986	704			1,690
HOURS	986	704			1,690
NEVIS-U-STU Nevis Un-costed Student	904	696			1,600
HOURS	904	696			1,600
1.01.03.04 LTDB Optical Links	50	259	224		533
SMU-U-PHY SMU Un-costed Physicist	50	259	224		533
HOURS	50	259	224		533
1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	634	634	634	100	2,002
BNL-U-PHY Brookhaven Un-costed Physicist	634	634	634	100	2,002
HOURS	634	634	634	100	2,002
1.01.04.02 AMC Testing Optical I/O and Carrier Board	3,955	1,341	2,164		7,460
AR-U-PHY Arizona Un-Costed Physicist	710				710
HOURS	710				710
SB-U-ET Stony Brook Un-costed ET			820		820
HOURS			820		820
SB-U-PHY Stony Brook Un-costed Physicist	2,170	986	884		4,040
HOURS	2,170	986	884		4,040
SB-U-STU Stony Brook Un-costed Student	1,075	355	460		1,890
HOURS	1,075	355	460		1,890
1.01.04.03 Firmware and Integration	678	640	145	202	1,665
AR-U-EA Arizona Un-costed Engineer Aid	409	489	65	167	1,129
HOURS	409	489	65	167	1,129
AR-U-EE Arizona Un-Costed EE	269	151	80	35	536
HOURS	269	151	80	35	536
1.01.04.04 LAr Digital Processing System L3 Management	434	434	434	100	1,402
OR-U-PHY Oregon Un-costed Physicist	434	434	434	100	1,402
HOURS	434	434	434	100	1,402
1.01.05 LAr L2 Management	1,100	1,100	1,100	300	3,600
NEVIS-U-PHY Nevis Un-costed Physicist	1,100	1,100	1,100	300	3,600
HOURS	1,100	1,100	1,100	300	3,600
1.02.01 VMM Chip	266	266	266	222	1,020
AR-U-PHY Arizona Un-Costed Physicist	266	266	266	222	1,020
HOURS	266	266	266	222	1,020
1.02.02 Front End Card	1,348	1,378	534	376	3,636
AR-U-EA Arizona Un-costed Engineer Aid	351	461	82	62	956
HOURS	351	461	82	62	956
AR-U-EE Arizona Un-Costed EE	731	651	185	92	1,660
HOURS	731	651	185	92	1,660
BRANDEIS-U-PHY Brandeis Un-costed Physicist	266	266	266	222	1,020
HOURS	266	266	266	222	1,020
1.02.03 ART Data Driver Card (ADDC)	240				240
BNL-U-STU Brookhaven Un-costed Student	240				240
HOURS	240				240
1.02.07 Trigger Data Serializer and VMM Power distribution	518				518
MICHIGAN-GSTU Michigan Undergraduate Student	518				518
HOURS	518				518
1.02.08 NSW L2 Management	1,184	1,184	1,184	888	4,440
BNL-U-PHY Brookhaven Un-costed Physicist	592	592	592	444	2,220
HOURS	592	592	592	444	2,220
BRANDEIS-U-PHY Brandeis Un-costed Physicist	592	592	592	444	2,220
HOURS	592	592	592	444	2,220
1.03.01.01 gFEX Algorithm 1	55				55
OR-U-PHY Oregon Un-costed Physicist	55				55
HOURS	55				55
1.03.01.04 Algorithm Firmware L3 Management	236	236	236	137	845
BNL-U-PHY Brookhaven Un-costed Physicist	236	236	236	137	845
HOURS	236	236	236	137	845
1.03.02 FEX ATCA Hub	236	236	236	137	845
MSU-U-PHY MSU Un-costed Physicist	236	236	236	137	845
HOURS	236	236	236	137	845
1.03.03 e/j FEX Fiber plant	607	472	538	313	1,930
MSU-U-PHY MSU Un-costed Physicist	450	309	351	180	1,290
HOURS	450	309	351	180	1,290
MSU-U-STU MSU Un-costed Student	157	163	187	133	640
HOURS	157	163	187	133	640
1.03.06 TDAQ L2 Management	334	334	334	205	1,207
IN-U-PHY Indiana Un-costed Physicist	334	334	334	205	1,207
HOURS	334	334	334	205	1,207
1.04.01 DOE Project Management	880	880	880	440	3,080
BNL-U-ADMIN Brookhaven Un-Costed Admin	880	880	880	440	3,080
HOURS	880	880	880	440	3,080
Grand Total	16,032	11,853	10,304	3,420	41,610

Example 8.1

CIO-09

Subject (Issue): Method To Collect Actual Values On Contributed Effort

Referenced Guideline(s): 8, specifically "…budget baseline…against which program performance can be measured."

Referenced Data Trace:

The detailed resource loaded schedule was reviewed for no-cost or contributed effort; which are resources that are essentially free to the project.

Description of Issue:

The majority of science projects, to include LHC ATLAS-U, are collaborations often made up of multiple federal agencies, national laboratories, universities and international organizations. This mixture of organizations and funding sources often create a situation to where resources are provided to a project that are no-cost or contributed to the project. While beneficial to the project, this can often present challenges to a capital asset project executing ANSI compliant EVMS.

The first challenge is the question of full capitalization of an asset. The full value of the asset is not capitalized as the asset is undervalued by the amount of the contributed amount. While not an EVMS issue, the desire to capitalize the full value of the asset can push projects to attempt to include values of the contributed resource into the TPC, which would eventually make this an EVMS issue.

The second challenge is regarding an ANSI compliant method for tracking project progress. While it is essential to include contributed resources in the project plan/resource loaded schedule, these resources do not receive actual values, thus actual value variances cannot be determined. It can be argued that one has established a budget baseline against which performance cannot be measured, thus one is in violation of this, and other ANSI guidelines. Solutions have been proposed to measure performance on hours, but this has been proven to be laborious, often of doubtful accuracy and of little value. Finding a method that is both compliant with the ANSI standard and effective is challenging.

Recommendation:

Projects like LHC ATLAS-U are common in the DOE SC portfolio and the questions regarding compliant EVMS have existed for years. The BNL should work with SC OPA and other SC laboratories to develop guidance and best practice to firmly address this situation. In the interim, LHC ATLAS-U should closely monitor those areas of the project schedule that have high values of contributed effort. Monitoring schedule progress, milestones and deliverables will be the first indicator that contributed resources may be underperforming. The project may want consider adding milestones to these areas and creating "budget baseline of milestones' to track the performance against.

Guideline 9: Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.

Reviewer Name(s): Greg Capps
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

The NEXT and LHC ATLAS-U resource loaded schedule contained detailed cost estimates for each control account that were coded multiple ways, to include element of cost. The budget estimates were clear, easy to follow and seemed reasonable. The estimates were traceable to the WADs and RAM. The CAMs were able to explain the resources needed for their scopes of work and knowledgeable of resource constraints, if they existed.

Guideline 10: To the extent it is practicable to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.

Reviewer Name(s): Greg Capps
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Both the NEXT and LHC ATLAS-U projects authorized work via WADs and decomposed the control accounts into work and planning packages. Actual costs are collected at the control account level for both projects, and variance analysis is generally performed at the CA level. The CAMs are familiar with their work and planning packages and were able to discuss their VARs.

Fully decomposed schedule activities are defined as work packages, and summary, future activities are defined as planning packages. All work and planning packages have start/finish dates have budgets assigned and have a clear tie back to the RAM.

Only a few planning packages existed between the projects as the schedules have been nearly fully decomposed. The logic between work packages is generally very good and allows for a natural flow of activities.

Guideline 11: Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.

Reviewer Name(s): Laurie Casarole
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Traces were conducted on each project to confirm the sums of the work and planning packages equaled the control account budgets. The dollarized RAM and CPR equal their respective control account budgets. There were inaccuracies found on both projects related to the WADs (time-phasing of schedule versus control account plans and the values on the WADs versus RAM/CPR) which are documented in CIO-07* under GL-31 and CAR-01 under GL-03. As it relates to this guideline, the noted inaccuracies were either corrected prior to the review conclusion or not a direct impact on the baseline budget (just the schedule and represented time-phasing).

Guideline 12: Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impracticable may be classified as level of effort.

Reviewer Name(s): Laurie Casarole
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

During the CAM interviews and discussions, there was an understanding of Level of Effort (LOE) and its proper use. Time phased budgets are established on both projects and the use of LOE activities within the schedule appeared identifiable and coded as LOE. The NEXT project has an overall LOE amount of 19% and no control accounts that exceed 15% within a mixed earned value metric environment. The LHC ATLAS-U project has an overall LOE amount of 14% but three control accounts exceeding 20% within a mixed earned value metric environment. See example below.

Control Account	LOE	Grand Total	LOE
1.01.01.01		$186,484	0%
1.01.02.01		$305,414	0%
1.01.02.02		$165,804	0%
1.01.03.01	$100,148	$343,645	29%
1.01.03.02		$2,382,944	0%
1.01.03.03		$4,650,345	0%
1.01.03.04		$2,557,388	0%
1.01.04.01		$77,607	0%
1.01.04.02		$1,816,723	0%
1.01.04.03	$2,236	$754,452	0%
1.02.01	$0	$3,232,178	0%
1.02.02	$0	$2,292,920	0%
1.02.03	$0	$1,076,435	0%
1.02.04.01		$1,114,604	0%
1.02.04.02	$80,960	$356,422	23%
1.02.05		$29,999	0%
1.02.06		$1,286,875	0%
1.02.07	$125,565	$1,860,391	7%
1.03.01.01		$304,648	0%
1.03.01.02		$307,795	0%
1.03.01.03		$19,101	0%
1.03.02	$0	$1,861,565	0%
1.03.03	$0	$871,576	0%
1.03.04.01		$1,362,536	0%
1.03.04.02		$47,202	0%
1.03.04.03	$48,808	$167,099	29%
1.03.05.01		$359,955	0%
1.03.05.02		$635,726	0%
1.04.01	$3,772,981	$3,772,981	100%
1.04.02	$963,022	$963,022	100%
Grand Total	$5,093,720	$35,163,837	14%

Some of the activities coded as LOE could potentially be measured in an alternate way since their description doesn't lend itself to the typical LOE definition. From the BSA EVMS Program

Description, “Some project activities do not produce tangible outcomes that can be measured objectively. Examples include project management and operating a project technical library.” For example, activities listed in CA 1.01.03.01 shown below appear to lend themselves to discrete measurement based on the use of “tests” and “material” in their descriptions (thus, assumed tangible deliverables).

CA	WP	DESCRIPTION	BAC	PMT	PMTD
1.01.03.01	TDB11330	Diagnostic Work @ CERN	17,498.99	A	LOE
1.01.03.01	TDB11165M	Material for Neutron radiation test	2,589.04	A	LOE
1.01.03.01	TDB11340M	Parts& Supplies for boards repair and test equipment	868.91	A	LOE
1.01.03.01	TDB11160	Gamma and Proton radiation tests	6,236.39	A	LOE
1.01.03.01	TDB11165	Neutron radiation test	9,609.79	A	LOE
1.01.03.01	TDB11170	Report on AMB radiation tests	4,701.60	A	LOE
1.01.03.01	TDB11270	Test/characterize/repair LTDB and associated Boards	27,491.79	A	LOE
1.01.03.01	TDB11290	Participate in Tests @ CERN	8,749.49	A	LOE
1.01.03.01	TDB11320	Diagnostic Work @ Penn	22,401.53	A	LOE

The mixing of LOE within a control account should be avoided since, as noted in the BSA EVMS Program Description, “earned value of LOE only documents the passage of time and not actual project progress. Consequently, within a discrete or apportioned control account, the inclusion of the LOE activity should be avoided and is kept to a minimum to prevent any distortion of the performance measurement data.” While there isn’t a documented minimum, common practice is to limit the LOE amount to 15% or less when in a mixed account. See further details in CIO-04*.

CIO-04*

Subject (Issue): High Amounts Of Level Of Effort Within A Single Control Account

Referenced Guideline(s): 7, 12

Referenced Data Trace:

LHC ATLAS-U RAM; LHC ATLAS-U UG Percent of EVM Type; LHC ATLAS-U UG EVT Activity Count; BSA EVMS Program Description Sections 2.1.2, 2.1.2.3, and 2.2.3

Description of Issue:

In review of the LHC ATLAS-U project there are three control accounts identified as having LOE amounts over 20%. Both the BSA EVMS Program Description and the ANSI/EIA Standard state that LOE activities should be avoided and kept to a minimum in discrete control accounts in order to prevent any distortion of the performance measurement data. A high amount of LOE causes a skew in the EVM reporting metrics and should be controlled or lowered. The example below demonstrates the impact of LOE within a control account on both SPI and CPI.

	SPI	CPI			CPI								
	0.70	0.80			1.00								
Meas Work			LOE Work			Combined Meas & LOE			Combined Indices			SPI	CPI
BCWS	BCWP	ACWP	BCWS	BCWP	ACWP	BCWS	BCWP	ACWP	SPI	CPI	% LOE	Incr	Incr
100	70	87.5	0.0	0.0	0.0	100	70	87.5	0.70	0.80	0%	0.00	0.00
100	70	87.5	10.0	10.0	10.0	110	80	97.5	0.73	0.82	9%	0.03	0.02
100	70	87.5	20.0	20.0	20.0	120	90	107.5	0.75	0.84	17%	0.05	0.04
100	70	87.5	30.0	30.0	30.0	130	100	117.5	0.77	0.85	23%	0.07	0.05
100	70	87.5	40.0	40.0	40.0	140	110	127.5	0.79	0.86	29%	0.09	0.06
100	70	87.5	50.0	50.0	50.0	150	120	137.5	0.80	0.87	33%	0.10	0.07
100	70	87.5	60.0	60.0	60.0	160	130	147.5	0.81	0.88	38%	0.11	0.08
100	70	87.5	70.0	70.0	70.0	170	140	157.5	0.82	0.89	41%	0.12	0.09
100	70	87.5	80.0	80.0	80.0	180	150	167.5	0.83	0.90	44%	0.13	0.10
100	70	87.5	90.0	90.0	90.0	190	160	177.5	0.84	0.90	47%	0.14	0.10
100	70	87.5	100.0	100.0	100.0	200	170	187.5	0.85	0.91	50%	0.15	0.11
100	70	87.5	110.0	110.0	110.0	210	180	197.5	0.86	0.91	52%	0.16	0.11
100	70	87.5	120.0	120.0	120.0	220	190	207.5	0.86	0.92	55%	0.16	0.12
100	70	87.5	130.0	130.0	130.0	230	200	217.5	0.87	0.92	57%	0.17	0.12
100	70	87.5	140.0	140.0	140.0	240	210	227.5	0.88	0.92	58%	0.18	0.12
100	70	87.5	150.0	150.0	150.0	250	220	237.5	0.88	0.93	60%	0.18	0.13
100	70	87.5	160.0	160.0	160.0	260	230	247.5	0.88	0.93	62%	0.18	0.13
100	70	87.5	170.0	170.0	170.0	270	240	257.5	0.89	0.93	63%	0.19	0.13
100	70	87.5	180.0	180.0	180.0	280	250	267.5	0.89	0.93	64%	0.19	0.13
100	70	87.5	190.0	190.0	190.0	290	260	277.5	0.90	0.94	66%	0.20	0.14
100	70	87.5	200.0	200.0	200.0	300	270	287.5	0.90	0.94	67%	0.20	0.14
100	70	87.5	210.0	210.0	210.0	310	280	297.5	0.90	0.94	68%	0.20	0.14
100	70	87.5	220.0	220.0	220.0	320	290	307.5	0.91	0.94	69%	0.21	0.14
100	70	87.5	230.0	230.0	230.0	330	300	317.5	0.91	0.94	70%	0.21	0.14

Notice the impact on SPI & CPI as LOE percent increases

Notes: 1.Cells in orange are not protected -- the rest are.
2. Notice that as the SPI and/or CPI for measurable w ork decreases, the LOE masking effect on measurable effort increases.
3. Also notice that, as the CPI for the LOE w ork increases, the LOE masking of measurable w ork increases.
4. LOE usually carries a CPI approaching 1.0 or higher because it is easier to estimate and control.

Due to these impacts, it is common practice to restrict LOE usage to 15% or less within a mixed control account.

Recommendation:

Review application of the LOE earned value techniques on the work packages within control accounts that contain over 15% and determine how to resolve. BNL should consider adding specific language regarding a threshold amount to their system description to avoid further confusion on application per control account.

Guideline 13: Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.

Reviewer Name(s): Laurie Casarole & Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Overheads appear to be appropriately applied to the resource costs, and the overhead amounts are

included in the control account totals. The indirect rates are under the direction of the Business Development and Analysis department reporting to the Chief Financial Officer's office. Budgets are developed with the proper overheads applied which are included in the control account totals.

The BSA EVMS Program Description has three sections that define overhead costs:

3.1.9 Indirect Cost Accumulation [Guide 13, 19 {2.2h, 2.3d} p.16

Indirect costs are allocated at least monthly to project control accounts. Indirect costs are applied to each project at the current approved annual rates. The BNL CAS Disclosure Statement explains in detail the process concerning the collection and reporting of indirect costs. See Section 3.2.1 for more information regarding the CAS Disclosure Statement

3.2.2 Application of Indirect Cost Pools [Guide 4, 13, 19, 24 {2.1d, 2.2h, 2.3d, 2.4c}] p.16

As described in 3.2.1 above, BNL's CAS Disclosure Statement identifies all indirect cost pools, and defines how these cost pools are distributed to the final or benefiting cost objectives. The current CAS Disclosure Statement may be obtained from the Budget Office at BNL.

The project's designated budget representative shall review the performance measurement baseline (PMB) and all baseline change proposals (BCPs) to ensure that cost accounting standards are followed. The project's designated budget representative shall ensure that the applications of direct and overhead resources are handled in accordance with Generally Accepted Accounting Principles (GAAP), applicable Cost Accounting Standards and the BNL Cost Accounting Standards Board Disclosure Statement

3.2.4 Revisions to Indirect Rates [Guide 4, 13, 19, 24 {2.1d, 2.2h, 2.3d, 2.4c}] p.17

Occasionally, new program, project, or business requirements that could not be anticipated in prior years present themselves in the current year. Accordingly, revisions to current-year rates and out-year rate projections may be necessary. BNL strives to conduct current-year operations to reduce or eliminate revisions to current year rates. Typically, revisions to current-year pricing structures are reviewed for compliance with Federal Cost Accounting Standards (CAS) and are fully disclosed by the Budget Office. Rates are effective for a given fiscal year (FY). Therefore, rate changes implemented during the year are retroactive to the beginning of the fiscal year. Retroactive rate revisions are recorded on the Laboratory General Ledger in the month the revision is implemented, and these costs are then accurately recorded in the Actual Cost (AC) of the project management report. Material impacts to the project baseline are addressed through the use of the formal project management change-control process.

Guideline 14: Identify management reserves and undistributed budget.

Reviewer Name(s): Laurie Casarole
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Management Reserve (MR) and Undistributed Budget (UB), if used, are being properly managed for the projects reviewed. Separate logs are maintained to track the allocation of Contingency and/or MR which clearly identifies the control account changes. The LHC ATLAS-U project maintains two separate logs, due to multiple funding types (DOE and NSF). The DOE portion utilizes both MR and Contingency funds.

Traces were done for the approved PCR's that reconciled to the Baseline Change Log and the applicable monthly CPR Format 1 report.

Guideline 15: Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.

Reviewer Name(s): Laurie Casarole
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

The following data traces were conducted and confirmed the summary of the control accounts and contingency equal the TPC:

NEXT, the TPC is $90M. The May RAM is $81.1M with remaining contingency $8.8M and is consistent with the May CPR; and is consistent with the available contingency.

LHC ATLAS-U, is made up of two types of funding: the DOE TPC is $33.2M ($26M PMB + $7.1M contingency) plus NSF Funding of $11.4M ($8.6M PMB + $2.8 contingency) which is consistent with the remaining contingency and April CPR.

2.3 Accounting Considerations

Guideline 16: Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **No**

Observations and Findings:

Based on direct observations ANSI guideline 16 was met, but there was an issue with the disclosure statement that needs to be addressed.

BNL has a well-defined project accounting system that provides a detailed structure and cost accumulation system that can mirror a project planned execution, budgets and organizational structure. This formal accounting system also interfaces with Cobra and the Integrated Project Data (IPDv2) system on NEXT and the HAMMER on LHC ATLAS-U, both of which provide automated project reporting methods for documenting and writing project variances.

Both NEXT and LHC ATLAS-U projects were reviewed for FY15 data through period 8. All direct

costs are accumulated at the lowest level –cost account, and were traceable from source documents e.g. contractor invoices, accruals and labor, to the entries on the ledger. All entries were also traceable forward through the hierarchical "roll-up" structure in the PeopleSoft ledger software and tied to the Cost Performance report via a cross reference table that listed the WBS structure and corresponding Project and Activity in the accounting system. All invoices or accruals tested are in the same periods as reported, and are consistent with BNL's Disclosure Statement of Direct Cost with the exception of the noted issue, discussed further in CAR-03 below.

Tested accruals were appropriately approved and documented back to the milestones stipulated in the contract document. All monthly totals are carried forward from month to month with correct year to date (YTD) totals displayed on the Cost Performance Report (CPR).

Reference Documents:
NEXT:
WBS cross reference to PS project – activity
Monthly Budget & Expense Reports (B&E) periods 5 WBS 2.12.1
Monthly Budget & Expense Reports (B&E) periods 6 WBS 2.12.02
Variance Report WBS 2.12.03 period 7
Variance Report WBS 2.05 periods 6
Accrual JJ X-Ray , contract 278708, 75,000 period 7

LHC ATLAS-U:
WBS cross reference to PS project – activity
Monthly Budget & Expense Reports (B&E) periods 5 WBS 1.2.6
Monthly Budget & Expense Reports (B&E) periods 6 WBS 1.2.7
Agreed period 6 adjustment report to period 6 variance report and Budget and Expense Report for WBS 1.2.7
Accrual MEMO-00008829, University of Oregon, Contract 260905, 6,381.81, period 6

CAR-03
Subject (Issue): Un-costed Effort Used On Management Tasks

Referenced Guideline(s): 16

Referenced Data Trace: Disclosure Statement section 3.1.0, LHC ATLAS-U Resource Loaded Schedule

Description of Issue:
LHC ATLAS-U is not charging their labor in accordance with the direct charging requirements in the

BNL disclosure statement. Some members of the LHC ATLAS-U program are charging their time working on LHC ATLAS-U to their core Field Work Proposals (FWPs). The BNL Disclosure Statement states "All labor, materials, and other applicable costs are charged directly to the benefiting project or program when the cost is either directly associated with a specific project or program and/or can be readily identifiable to a specific project or program."

Recommendation:

This practice is not isolated to LHC ATLAS-U so a more global solution or change across the DOE complex may be necessary. In the meantime, BNL should look at their practices to ensure compliance to or needed edit of the Disclosure Statement. This process is currently underway after discussion the BNL Budget Officer.

Guideline 17: When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Based on the direct observations and clarity of the reports the ANSI guideline 17 was met.

BNL has a well-defined project accounting system that provides a detailed structure and cost accumulation system. This system has the ability to collect cost at the lowest level without allocation or division into higher level WBS elements. This was evident in both projects reviewed, NEXT and LHC ATLAS-U.

Each cost element (project – activity) was uniquely identifiable to a WBS element via a cross reference table and was not split or reallocated into multiple WBS elements. All WBS / cost collections accounts follow a hierarchical roll up into higher level WBS numbers utilizing a consistent numbering sequence. This logic was consistent with the budget development so that direct comparisons between actual direct charges and their budgets could be made.

Although there were two distinct projects in this review, the manner and logic applied in the cost structure development in each was consistent to provide management with the financial framework to perform variance analysis.

Referenced documents:

NEXT:

WBS cross reference to PS project – activity and B&R code

Monthly Budget and Expense Report (B&E) periods 5 & 6, WBS 2.05.01

Monthly Budget and Expense Report (B&E) periods 5 & 6, WBS 2.05.02

LHC ATLAS-U:
WBS cross reference to PS project – activity and B&R code
Monthly Budget and Expense Report (B&E) periods 5 & 6, WBS 1.1.3.1
Monthly Budget and Expense Report (B&E) periods 5 & 6, WBS 1.1.3.2

Guideline 18: Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:
Based on the direct observations and clarity of the reports the ANSI guideline 18 was met.

The project Responsibly Assignment Matrix provides the cross walk between the project Work Breakdown Structure (WBS) and Organizational Breakdown Structure (OBS). The RAM for both projects NEXT and LHC ATLAS-U clearly define who is responsible for each WBS element at the lowest level. The RAM could be cross footed to each projects Organizational chart in addition to the cross reference table for project- activity in the accounting ledger.

As in guideline 17 there was no evidence of re-allocation of lower level cost into multiple higher level Organizational Breakdown Structure (OBS) elements on the two projects under review, NEXT and LHC ATLAS-U. Each project has a complete and current RAM with the intersection between the organization and WBS identifying the amount budgeted for the WBS element and who was the responsible Cost Account Manager (CAM). These budgets were carried over to the Variance Analysis Report (VAR) and the same CAM's were identified on the variance report as on the RAM.

Referenced Documents:
NEXT:
Responsibility Assignment Matrix (RAM)
Project Organization Chart
WBS cross reference to PS project/activity
Monthly Budget and Expense Report (B&E) period 5 WBS 2.01.01
Monthly Budget and Expense Report (B&E) period 5 WBS 2.01.02
Variance Report WBS 2.03.03, period 8

LHC ATLAS-U:

Responsibility Assignment Matrix (RAM)
Project Organization Chart
WBS cross reference to PS project/activity
Monthly Budget and Expense Report (B&E) period 5 WBS 1.3.5.1
Monthly Budget and Expense Report (B&E) period 5 WBS 1.3.5.2
Variance Report WBS 1.01.04.02, period 6

Guideline 19: Record all indirect costs which will be allocated to the project.

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

Based on the direct observations and clarity of the reports the ANSI guideline 19 was met.

The indirect rates are under the direction of the Business Development and Analysis department reporting to the Chief Financial Officer's office. The BNL Disclosure Statement defines indirect cost as Organizational Burden Pools, General & Administrative Pool, and Service Center and Expense Pool allocations. Within these pools indirect expense are further delineated to other expense pools for example: Material Burden Pools, Laboratory Directed Research & Development, Space Charges, etc. The accumulation of costs with no single end cost objective is consistent with the ANSI standard. BNL collects cost identifiable to a chargeable object for the indirect cost center, e.g. Material Burden, Service Center & Expense Pools.

BNL has a well-defined project accounting system that provides a detailed structure and cost accumulation system that can mirror the indirect cost structure. The BNL accounting system allows for comparison of actual indirect cost to indirect budgets within the organizational structure. The PeopleSoft ledger provides a hierarchical "roll-up" structure that is consistent with the indirect organizational structure. The organizational chart clearly identifies the management responsible for controlling the indirect staff and influencing the indirect cost. The Business Development and Analysis Office has an easily accessible SharePoint site to review all rates by resource category with clear unambiguous description of each category and a matrix map of what rates are applied to each category by indirect cost pool. Data traces were performed on sample expense in various resource categories to validate the rates applied compared to the published documents without exception.

It should also be noted that at the last review, in May 2014, CIO-05 was documented indicating a manual process in place that was not documented well for the application of reduced burdens on large procurements. BNL has since automated this process creating a new resource category for large procurements so correct burdens get applied automatically.

Reference Documents:

BNL Disclosure Statement dated: August , 2014
Resource Category Code Description Listing
Taxable Base Listing for Indirect Rates FY 2015
Indirect Rates utilized for Estimating and Pricing FY 2015
CFO Organizational Chart

Guideline 20: Identify unit costs, equivalent unit costs, or lot costs when needed.

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **Not Applicable**

Observations and Findings:
This guideline is not applicable in this review. The scope of these projects, NEXT and LHC ATLAS-U do not utilize any standard, lot or equivalent unit cost methods. These methods are more applicable for a manufacturing concern.

Guideline 21: For EVMS, the material accounting system will provide for:

- **Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques.**
- **Cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material.**
- **Full accountability of all material purchased for the project including the residual inventory.**

Reviewer Name: Steve McAlary
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:
Based on the direct observations and clarity of the reports, the ANSI guideline 21 was met with a recommendation for the adjustment to actuals relating to LHC ATLAS-U.

Both projects under review have construction related procurements and, as such, much of the material is directly shipped to the site for installation or into central receiving for future deployment to the project site. In the cases where the material is directly shipped to the BNL site the technical representative or Cost Account Manager (CAM) would acknowledge the material and the cost would be reflected by an accrual or the processing of an invoice at the end of the period. This is in accordance with BNL's Disclosure Statement Continuation Sheet section 2.3.0 (B) – "In addition, material and or contracts are accrued based upon receipt / percent completion as necessary to comply with GAAP. The accrual is made directly to the requisitioner's project. Such projects can be final cost objections or intermediate cost objectives." Where material is shipped to the central receiving

facility, the material is checked in and a receiver is entered into the system. Once received the system automatically generates an accrual against the project – activity assigned to the purchase order and by extension to the WBS's on the projects. The accrual upon receipt is in accordance with the BNL Disclosure Statement Continuation Sheet section 2.3.0 (B) –"Cost of material is accrued upon receipt of materials delivered and or upon approval of invoice for contracts."

The LHC ATLAS-U project is a heavy collaboration effort. As such, there are many complex timing differences between BNL's need to report actuals/accruals and the other collaborators (primarily Universities). This timing difference creates the need for adjustments to actual General Ledger data being brought into Cobra each month. See CIO-10 for further information.

Reference Documents:
BNL Disclosure Statement dated: August 7, 2014
NEXT:
WBS cross reference to PS project/activity
Monthly Budget and Expense Report (B&E) period 5 WBS 2.02.08
Monthly Budget and Expense Report (B&E) period 5 WBS 2.02.09

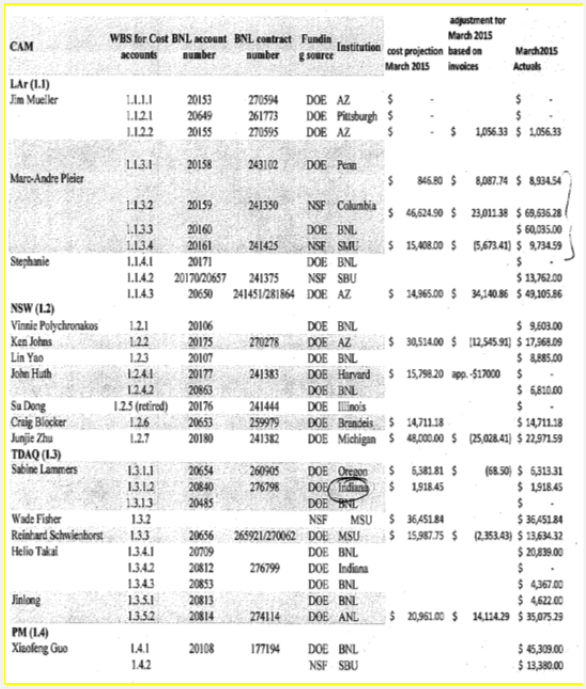
LHC ATLAS-U:
WBS cross reference to PS project/activity
Monthly Budget and Expense Report (B&E) period 5 WBS 1.3.4.1
Monthly Budget and Expense Report (B&E) period 5 WBS 1.3.4.2
Invoice 4009270-8, University of Arizona, contract 270278, $21,150.587
Invoice 271640-12, University of Oregon, contract 260905, $6,366.79

CIO-10
Subject (Issue): Method Of Adjustment Of Actual Financial Data Brought Into Cobra

Referenced Guideline(s): 21

Referenced Data Trace:
Adjustments for March 2015

Description of Issue:
There are many complex timing differences creating adjustments to actual General Ledger data being brought into Cobra each month due to University lags and invoice amounts versus accruals performed. LHC ATLAS-U receives estimates for the last 10 days of each accounting period from all of its collaborators, these are reconciled and adjusted against the actual invoice received (may or may not be next accounting period). See adjustments sheet for March below.



CAM	WBS for Cost accounts	BNL account number	BNL contract number	Funding source	Institution	cost projection March 2015	adjustment for March 2015 based on invoices	March2015 Actuals
LAr (1.1)								
Jim Mueller	1.1.1.1	20153	270594	DOE	AZ	$ -		$ -
	1.1.2.1	20649	261773	DOE	Pittsburgh	$ -		$ -
	1.1.2.2	20155	270595	DOE	AZ	$ -	$ 1,056.33	$ 1,056.33
Marc-Andre Pleier	1.1.3.1	20158	243102	DOE	Penn	$ 846.80	$ 8,087.74	$ 8,934.54
	1.1.3.2	20159	241350	NSF	Columbia	$ 46,624.90	$ 23,011.38	$ 69,636.28
	1.1.3.3	20160		DOE	BNL			$ 60,035.00
	1.1.3.4	20161	241425	NSF	SMU	$ 15,408.00	$ (5,673.41)	$ 9,734.59
Stephanie	1.1.4.1	20171		DOE	BNL			$ -
	1.1.4.2	20170/20657	241375	NSF	SBU			$ 13,762.00
	1.1.4.3	20650	241451/281864	DOE	AZ	$ 14,965.00	$ 34,140.86	$ 49,105.86
NSW (1.2)								
Vinnie Polychronakos	1.2.1	20106		DOE	BNL			$ 9,603.00
Ken Johns	1.2.2	20175	270278	DOE	AZ	$ 30,514.00	$ (12,545.91)	$ 17,968.09
Lin Yao	1.2.3	20107		DOE	BNL			$ 8,885.00
John Huth	1.2.4.1	20177	241383	DOE	Harvard	$ 15,798.20	app. -$17000	$ -
	1.2.4.2	20863		DOE	BNL			$ 6,810.00
Su Dong	1.2.5 (retired)	20176	241444	DOE	Illinois			$ -
Craig Blocker	1.2.6	20653	259979	DOE	Brandeis	$ 14,711.18		$ 14,711.18
Junjie Zhu	1.2.7	20180	241382	DOE	Michigan	$ 48,000.00	$ (25,028.41)	$ 22,971.59
TDAQ (1.3)								
Sabine Lammers	1.3.1.1	20654	260905	DOE	Oregon	$ 6,381.81	$ (68.50)	$ 6,313.31
	1.3.1.2	20840	276798	DOE	Indiana	$ 1,918.45		$ 1,918.45
	1.3.1.3	20485		DOE	BNL			$ -
Wade Fisher	1.3.2			NSF	MSU	$ 36,451.84		$ 36,451.84
Reinhard Schwienhorst	1.3.3	20656	265921/270062	DOE	MSU	$ 15,987.75	$ (2,353.43)	$ 13,634.32
Helio Takai	1.3.4.1	20709		DOE	BNL			$ 20,839.00
	1.3.4.2	20812	276799	DOE	Indiana			$ -
	1.3.4.3	20853		DOE	BNL			$ 4,367.00
Jinlong	1.3.5.1	20813		DOE	BNL			$ 4,622.00
	1.3.5.2	20814	274114	DOE	ANL	$ 20,961.00	$ 14,114.29	$ 35,075.29
PM (1.4)								
Xiaofeng Guo	1.4.1	20108	177194	DOE	BNL			$ 45,309.00
	1.4.2			NSF	SBU			$ 13,380.00

Recommendation:

A monthly cumulative reconciliation is recommended to ensure manual adjustment errors are identified in a timely manner (current procedure is an annual reconciliation at year end only). Documenting these procedures would further clarify the process.

2.4 Analysis and Management Reports

Guideline 22: At least on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system:

- **Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.**
- **Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.**

Reviewer Name: Deepa Rasalkar
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

CAMs from NEXT and LHC ATLAS-U were interviewed. During discussions, CAMs indicated that

they have a process to status the schedule at the activity level using spreadsheets or statusing meetings.

Cost performance reports (CPRs) are generated on a monthly basis. CAMs were able to show their monthly CPR and identify their specific Control Accounts and schedule/cost variances. CAMs understood that monthly performance (through monthly schedule statusing process) against plan would provide a schedule variance; the monthly performance against actual costs from the accounting system (which includes accrual data from the CAM) would generate the cost variance.

CAMs review labor hour reports on a monthly basis and if there are any mischarges to their CAs they can request an adjustment retroactively but the adjustments are made in the current period.

The project is providing cost and schedule metrics at the Control Account and Work Package level that include the time phased BCWS, BCWP, ACWP and EAC. Additionally, various reports show SPI and CPI trend charts at the Cost Account level are available to the CAMs.

The CAMs were familiar with the monthly reporting process described in the EVMS System Surveillance and Maintenance and were able to demonstrate their methodologies using the reports provided.

Guideline 23: Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.

Reviewer Name: Deepa Rasalkar
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

At BNL, the ANSI guideline is supplemented with the EVMS System Surveillance and Maintenance document. Per Section 2.3 2 CAMs must perform root cause analysis at the Control Account level and must develop, plan, communicate and implement corrective actions at the level.

Both NEXT and LHC ATLAS-U CAMS were interviewed and they had a good understanding of the schedule and cost variances on the CPR's. The CAMs were able to walk us through the CPR's and the variances in their Control Accounts for the most part.

On the NEXT project, the Integrated Project Database (IPD) is used to post all documents related to monthly Earned value and indicates when variance thresholds are tripped and the CAMs need to do variance analysis. CAM's received monthly reports and email notifications if they had a control account level variance that need to be reported in any month.

On the LHC ATLAS-U project, the HAMMER tool is being used to do the variance analysis. The CAMs can drill down to the lower WBS level and activities to do analysis. If a variance threshold is

tripped, the cost and schedule variances are highlighted thus indicating that a variance analysis needs to be performed.

On LHC ATLAS-U project, even though some of the Control Accounts are at WBS L4, the variance thresholds were formally defined only at WBS L3 and L2. During interviews with CAMs, Project Manager, and PMCS, it was mentioned that the same thresholds apply for control accounts at L4 and they were highlighted in the HAMMER accordingly. While this complies with the need of identification of variance analysis, it was at the CAMs discretion if the CA variances were officially written and documented. It appeared that most CAMs were following the practice of writing variances at the CA level if the threshold was triggered, however, there were two instances where CA variances were not written when the threshold was exceeded. See CIO-01* for further details.

CIO-01*

Subject (Issue): Variance Thresholds & Analysis At Control Account Level

Referenced Guideline(s): 23

Referenced Data Trace: LHC ATLAS-U Contract Performance Reports and Current and Cumulative Variance Reports for February, March, and April 2015

Description of Issue: On LHC ATLAS-U project, the variance thresholds are defined at WBS L3 and L2. See below for threshold table.

Level	Current Period*	Cumulative to Date*
Level 3	$25k in Schedule Variance and +/- 10% in SPI -or- $25k in Cost Variance and +/- 10% in CPI.	$50k in Schedule Variance and +/- 10% in SPI -or- $50k in Cost Variance and +/- 10% in CPI.
Level 2	$100k in Schedule Variance and +/- 10% in SPI -or- $100k in Cost Variance and +/- 10% in CPI.	$250k in Schedule Variance and +/- 10% in SPI -or- $250k in Cost Variance and +/- 10% in CPI.

Some of the control accounts for this project are at WBS L4. During interviews with CAMs, the Project Manager, and PMCS, it was mentioned that the same thresholds listed for L3 apply for control accounts at L4 but it was at the CAMs discretion if the CA variances need to be officially written and documented. Control Accounts 1.01.03.01 and 1.01.03.04 both exceeded the CA level variances in the current and/or cumulative periods, but no variance reports were provided for these Control Accounts. See truncated graphics below for examples (extra CAs were removed so the graphics could fit within a reasonable area):

ATLAS Upgrade CPR - April 2015

ATLAS Upgrade Cost Peformance Report (CPR)	Current Period					Cumulative to Date				
	Cur Per BCWS	Cur Per BCWP	Cur Per ACWP	Cur Per SV	Cur Per CV	Cumm to Date BCWS	Cumm to Date BCWP	Cumm to Date ACWP	Cumm to Date SV	Cumm to Date CV
1.01 LAr Calorimeter Trigger Readout	192,418	157,284	171,550	-35,134	-14,266	4,008,823	3,985,937	3,961,615	-22,887	24,321
1.01.01.01 FCAL Baseplane	15,015	8,604	7,063	-6,412	1,540	79,247	63,823	64,957	-15,424	-1,134
1.01.03.03 LTDB Board Design and System Integration	22,634	31,504	48,938	8,869	-17,434	1,358,426	1,357,836	1,439,051	-590	-81,215
1.01.03.04 LTDB Optical Links	74,341	28,718	49,928	-45,623	-21,210	694,693	715,258	675,288	20,564	39,970

ATLAS Upgrade CPR - March 2015

ATLAS Upgrade Cost Peformance Report (CPR)	Current Period					Cumulative to Date				
	Cur Per BCWS	Cur Per BCWP	Cur Per ACWP	Cur Per SV	Cur Per CV	Cumm to Date BCWS	Cumm to Date BCWP	Cumm to Date ACWP	Cumm to Date SV	Cumm to Date CV
1.01 LAr Calorimeter Trigger Readout	196,988	158,505	212,265	-38,483	-53,760	3,816,405	3,828,653	3,790,066	12,247	38,587
1.01.02.02 Layer Sum FCal	12,218	11,007	1,056	-1,211	9,951	64,626	64,901	51,383	275	13,518
1.01.03.01 COTS Regulators and Analog Mezzanine	26,171	1,326	8,935	-24,844	-7,608	199,711	172,525	226,747	-27,187	-54,222
1.01.03.02 ASIC ADC and Clock Fanout	38,061	29,639	69,636	-8,421	-39,997	651,882	654,818	669,442	2,936	-14,624
1.01.03.03 LTDB Board Design and System Integration	49,470	37,901	60,035	-11,569	-22,134	1,335,792	1,326,333	1,390,113	-9,460	-63,781
1.01.03.04 LTDB Optical Links	21,391	15,385	9,735	-6,006	5,651	620,353	686,540	625,360	66,187	61,180

ATLAS March 2015.xlsx

March 2015

Cumulative to Date Variance Explanation and Impact Analysis

WBS	CD-BCWS	CD-BCWP	CACW	CD-SV	CD-CV	CD-SPI	CD-CPI	Explanation on Variance	Impact Analysis for Variance	Variance In	Updated by
1.01.03.01	199,711	172,525	226,747	-27,187	-54,222	0.86	0.76				
1.01.03.04	620,353	686,540	625,360	66,187	61,180	1.11	1.10				

ATLAS Upgrade CPR - February 2015

ATLAS Upgrade Cost Peformance Report (CPR)	Current Period					Cumulative to Date				
	Cur Per BCWS	Cur Per BCWP	Cur Per ACWP	Cur Per SV	Cur Per CV	Cumm to Date BCWS	Cumm to Date BCWP	Cumm to Date ACWP	Cumm to Date SV	Cumm to Date CV
1.01 LAr Calorimeter Trigger Readout	155,152	172,009	212,147	16,857	-40,138	3,619,417	3,670,147	3,577,801	50,730	92,346
1.01.01.01 FCAL Baseplane	273	2,014	3,698	1,741	-1,684	45,116	37,533	57,894	-7,583	-20,361
1.01.03.02 ASIC ADC and Clock Fanout	53,931	61,605	32,492	7,673	29,113	613,822	625,179	599,806	11,357	25,372
1.01.03.03 LTDB Board Design and System Integration	37,093	37,897	63,834	804	-25,937	1,286,322	1,288,432	1,330,078	2,110	-41,646
1.01.03.04 LTDB Optical Links	19,082	31,417	32,381	12,335	-965	598,962	671,155	615,625	72,193	55,529

ATLAS February 2015.xlsx

February 2015

Cumulative to Date Variance Explanation and Impact Analysis

WBS	CD-BCWS	CD-BCWP	CACW	CD-SV	CD-CV	CD-SPI	CD-CPI	Explanation on Variance	Impact Analysis for Variance	Variance In	Updated by
1.01.03.04	598,962	671,155	615,625	72,193	55,529	1.12	1.09				

Recommendation: The variance thresholds should be defined at the Control Account level and the CAMs need to make sure the analysis is done at the Control Account level. The monthly variance reports also need to be written at the Control Account Level and documented when the thresholds are triggered.

Guideline 24: Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.

Reviewer Name: Deepa Rasalkar & Steve McAlary
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:
CAMs were aware of processes and procedures at BNL that are used to control indirect costs. CAMs were aware that indirect costs are applied to their Control Accounts on a monthly basis. They were aware that revisions to rates may occur during the year and any rate change made by the budget office has the chance of impacting their Control Accounts with the potential of causing a reportable variance.

Guideline 25: Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the project.

Reviewer Name: Deepa Rasalkar
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:
Both projects provide monthly progress reports to DOE as required by DOE Order 413.3B Section 16.

NEXT project monthly reports contain technical progress, CPR's summarizing at WBS L2 and L3, CPI/SPI trend charts, approved and upcoming PCRs, summarized variance explanations, and a project summary schedule.

LHC ATLAS-U project monthly reports contain technical progress and a summarized project CSSR.

Both NEXT and LHC ATLAS-U report into PARS-II on a monthly basis.

Guideline 26: Implement managerial action taken as the result of earned value information.

Reviewer Name: Deepa Rasalkar
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:
On both projects, various Earned Value Reports including CPR's, CPI/SPI trend charts etc., are provided to the team to recognize any potential issues in the projects. All reports are reviewed monthly by the project team.

At BNL, the ANSI guideline is supplemented with the BNL EVMS Program Description document. Per section 2.3.5, 2.3.6, 2.4.2 and Appendix C of that document, it is required that corrective actions are developed, implemented, and resolved in a timely manner.

On NEXT, the corrective actions were logged in the variance analysis reports, CAMs were aware and able to speak to the corrective actions, and in the interviews discussed going over the corrective actions during the weekly meetings. They were able discuss how these meetings are used to cover status and resolutions of the corrective actions plans but there was no documented evidence to provide tracked closure.

On LHC ATLAS-U, the corrective actions were logged in a separate report but during the interviews

the CAMs were not able to discuss how these were tracked, covered during any other meeting, nor drove to resolution. Though there is no requirement to have a corrective action log in the BNL EVMS Program Description document, there was no way to track and see if the corrective actions were closed in a timely manner. Additionally, the CAMs could not speak to the tracking of the corrective actions.

CIO-11

Subject (Issue): Corrective Action Plan Tracking

Referenced Guideline(s): 26

Referenced Data Trace: Variance reports for NEXT and LHC ATLAS-U, corrective actions reports for LHC ATLAS-U, CAM interviews

Description of Issue: On LHC ATLAS-U, even though a corrective action plan was reported on the corrective action report and provided as a log, upon interviewing the CAMs they were not able to clearly discuss if the corrective action plans were regularly reviewed and if they were driven to resolution. On both projects the corrective action plans didn't have any due dates assigned to them or any status other than open, making it difficult to determine if they were discussed or resolved in a timely manner.

Recommendation: It is highly recommended that corrective actions be tracked and CAMs need to make sure they are closed in a timely manner. If they are discussed in weekly meetings, the corrective actions could be reported in meeting minutes with a date associated with those. Also, recommend assigning a due date to the corrective actions so they are closed in a timely manner.

Guideline 27: Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.

Reviewer Name: Deepa Rasalkar
Compliant with ANSI/EIA-748: **Yes**

Observations and Findings:

At BNL, the ANSI guideline is supplemented with the BNL EVMS Program Description document. Per this document, the CAMs are required to periodically (at least annually) develop a comprehensive Estimate at Completion (EAC) at the control account level. Per the ANSI intent guide, "on a monthly basis, the control account manager should review the status of the expended effort and the achievability of the forecast."

CAMs on both projects were interviewed and they seem to have a good understanding of the EAC and when the EAC is required to be updated.

On NEXT, the CAMs have been updating EACs regularly and a log is maintained showing all the EAC updates to date. It is worth noting that the NEXT project is trying to implement a new EAC process by incorporating the EAC changes in P6 and integrating into Cobra. That will make the EAC process faster, easier, and more traceable.

On LHC ATLAS-U, the last 3 months of CPR data showed that the EAC equaled the BAC. But in interviewing the CAMs, it seemed like the CAMs were regularly looking at their budgets and EAC and if required they would initiate an EAC change, it was just not warranted at this time.

2.5 Revisions and Data Maintenance

Guideline 28: Incorporate authorized changes in a timely manner, recording the effects of such changes in the budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.

Reviewer Name: Kelly Krug
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

This was an area of concern for the last review committee, and should still be monitored, but is showing progress and being addressed in at least one month of data provided. The NEXT Baseline Change Log reflects many PCR origination and approval dates in the month following the implementation of the change requests; however, this process has changed. It should be noted that no evidence was found that history ever actually changed, it is just the optics of how change requests are originated and approved. As of May 2015, the NEXT project implemented a new "CPR Monthly Cycle Timeline" (see Appendix A for example of how the timeline works) which requires change request approval and implementation prior to the end of the current month. The log reflects this with four PCRs originated, approved and implemented in May 2015 prior to month end and the collection of status.

The LHC ATLAS-U project has generally originated, approved, and implemented the BCPs within the month or shortly thereafter. It assumed that the LHC ATLAS-U project will be implementing the new timeline process to ensure all BCPs are implemented prior to the end of the month.

This issue was addressed in the previous EVMS Surveillance Report dated May 2014. The implementation of the new process is in progress but not yet complete across all projects reviewed, however, enough data was presented to downgrade this issue to a CIO. See CIO-08 for further

details.

CIO-08
Subject (Issue): Implementation Of Change Requests

Referenced Guideline(s): 28, 30, & 32

Referenced Data Trace:
Documents traced:

1. FY15 Change Logs for NEXT and LHC ATLAS-U
2. NEXT PCRs: 14-049, 15-070, 15-086
3. LHC ATLAS-U BCPs: DOE-011, DOE-016, DOE-017, DOE-018, NSF-011
4. CPR Monthly Cycle Timeline – 3 Month Example
5. Supporting documentation for above baseline changes including:
    a. P6 before and after
    b. Cobra before and after
    c. WAD
    d. RAM
    e. CPR
    f. Control Account Plans

Description of Issue:
Many of the PCRs in the NEXT project were processed after financial month end closing and collection of performance status but before the submission deadline for the reporting period. Based on the dates shown in the Baseline Change Log, many PCRs were not implemented - in what best practice would call - a timely manner and without impacting current period. It should be noted that all PCRs reviewed were implemented without changing history. The timeframe for implementation of PCRs gives the appearance of changing history or having knowledge of potential variances while still accepting PCRs. The LHC ATLAS-U project had some BCPs that were implemented after the financial closing and the work performance status for the reporting period but impacting current period tasks. However, this was not as prevalent on either project as seen in past reviews. On NEXT, this is largely attributed to the recent implementation of a new CPR monthly cycle timeline, which requires change request approval and implementation prior to the end of the current month. The NEXT project implemented the new process in May 2015 and this was reflected in the four May PCRs listed in the Baseline Change Log. This is still relatively new and needs to be monitored for timely implementation. It was not clear if this has been shared with the LHC ATLAS-U project prior to the review, it was only presented on NEXT. This was a CIO* in the previous review dated May 2014.

Recommendation:

PCRs should be initiated, approved, and implemented in a timely manner (prior to the end of the month). This is especially true when activities are being impacted in near term schedule periods. BNL has developed a new month end timeline and are in the process of implementing this across all projects at the lab. The Lab is rolling out the process to the other projects and it is recommended that implementation take place in all projects as soon as possible.

Guideline 29: Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.

Reviewer Name: Kelly Krug
Compliant with ANSI/EIA-748: **Yes (With CIO)**

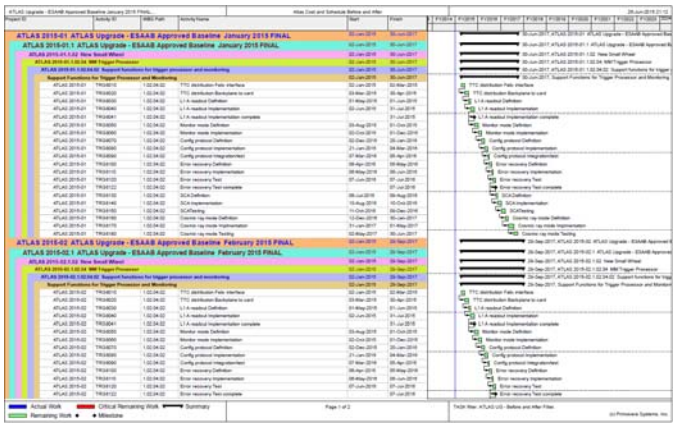
Observations and Findings:

Data traces were performed on NEXT with relative ease. Traces were performed from the change forms through the P6 schedule delta reports, Cobra cost delta data reports, WADs, RAMs, and Cost Performance Reports. The backup information provided for the change requests were sufficiently detailed, containing before-after-delta by month by activity information. Many NEXT project WADs had incorrect BAC values but were corrected during the review or incorrect period of performance data. Examples included 2.02.02, 2.02.03, 2.04.02, and 2.06.02. See CAR-01 for further information.

Performing data traces on the LHC ATLAS-U project were difficult. When the data was posted for the review, the project only provided the BCP forms with none of the typical backup documentation (P6 schedule delta reports and Cobra cost delta data reports) for change requests. After requesting the backup detail, the review team was provided the P6 baseline schedules and summarized cost data (FY only). Example shown below.

BCP DOE-004 cost change

Sum of Value Row Labels	Column Labels FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
DOE							
Dec 2014 Baseline							
1.03.01.01 gFEX Algorithm 1			98,352	134,571	39,250	14,096	286,270
1.03.02 FEX ATCA Hub		90,968	0	0	0	0	90,968
1.03.03 e/j FEX Fiber plant		34,052	246,903	160,111	154,062	26,449	621,576
Dec 2014 Baseline Total		**125,020**	**345,255**	**294,682**	**193,312**	**40,545**	**998,815**
Jan 2015 Proposed							
1.03.01.01 gFEX Algorithm 1			113,664	134,571	39,250	14,096	301,582
1.03.02 FEX ATCA Hub		90,968	6,981	0	0	0	97,949
1.03.03 e/j FEX Fiber plant		34,052	246,903	160,111	404,062	26,449	871,576
Jan 2015 Proposed Total		**125,020**	**367,549**	**294,682**	**443,312**	**40,545**	**1,271,108**
DELTA							
1.03.01.01 gFEX Algorithm 1		0	15,312	0	0	0	15,312
1.03.02 FEX ATCA Hub		0	6,981	0	0	0	6,981
1.03.03 e/j FEX Fiber plant		0	0	0	250,000	0	250,000
DELTA Total		**0**	**22,293**	**0**	**250,000**	**0**	**272,293**



The review team then requested the detailed cost data via e-mail. The project team sent the detailed time-phased data at much later that night. However, this information still did not contain the detail of activity level changes by month, only the monthly change in total. See truncated example below (months of data in the middle was removed to allow for graphic to fit).

Report: ATLAS Befor After-Excel pivot table defaulting to a RAM

report

BCP DOE-017 Before and After Cost Report (Monthly)

Control Account	1.01.03.03 LTDB Board Design and System Integration

Sum of Value	SOURCE		
Date	MAR 2015 Baseline	APR 2015 Baseline	MAR/APR DELTA
Sep-13	98,453	98,453	0
Mar-14	301,127	301,127	0
Apr-14	111,105	111,105	0
May-14	0	0	0
Jun-14			0
Jul-14			0
Aug-14			0
Sep-14	555,818	555,818	0
Oct-14	37,905	37,905	0
Nov-14	59,420	59,420	0
Dec-14	49,106	49,106	0
Jan-15	36,295	36,295	0
Feb-15	37,093	37,093	0
Mar-15	49,470	49,470	0
Apr-15	56,774	22,634	-34,140
May-15	91,598	54,436	-37,162
Jun-15	144,153	72,938	-71,216
Jul-15	118,830	54,635	-64,195
Jul-17	78,865	106,985	28,121
Aug-17	302,452	264,621	-37,830
Sep-17	76,424	40,511	-35,914
Oct-17	169,660	162,815	-6,845
Nov-17	65,117	88,122	23,005
Dec-17	35,727	57,796	22,069
Jan-18	122,911	251,440	128,529
Feb-18		50,489	50,489
Mar-18		56,120	56,120
Apr-18		28,420	28,420
May-18		12,858	12,858
Jun-18			0
Jul-18			0
Aug-18			0
Sep-18			0
Grand Total	4,624,062	4,650,345	26,284

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Not having detailed information as part of the original change request package allows for assumption that the data is not produced at the time of the original change request creation nor analyzed by the team during the change control process, rather only at the highest level. It is important to review the detailed time-phased data to ensure historical data is not changed and future changes are impacted as expected. While the LHC ATLAS-U project team provided additional backup information, the information provided was still very difficult to trace. This was a stark contrast to the tracing of the information provided by NEXT. See CIO-05* for further information.

The LHC ATLAS-U project WADs had an instance of incorrect BAC values and incorrect period of performance data. Examples included 1.02.07, 1.01.03.01, and 1.03.04.02. See CAR-01 for further information.

While performing the last of the data traces for April on the LHC ATLAS-U project, it was discovered that the baseline P6 schedule did not trace to the control account plans. After questions in the interviews and further review by the PMCS team, it was determined that there were changes made to the April 2015 baseline after it was uploaded into PARS II but before the review. This led to the file and PDFs presented for the review to be incorrect. See CIO-07* under GL-31 for further information.

CIO-05*

Subject (Issue): Change Control Documentation

Referenced Guideline(s): 29 & 32

Referenced Data Trace:

1. CAM and PMCS Interviews
2. FY15 Logs for NEXT and LHC ATLAS-U

3. NEXT PCRs: 14-049, 15-070, 15-086
4. LHC ATLAS-U BCPs: DOE-011, DOE-016, DOE-017, DOE-018, NSF-011
5. Supporting documentation for above baseline changes including:
    a. P6 before and after
    b. Cobra before and after
    c. WAD
    d. RAM
    e. CPR
    f. Control Account Plans

Description of Issue:

While performing data traces, it was difficult to confirm the validity of the LHC ATLAS-U data. The typical supporting information was not originally provided as part of the change request package. Upon providing the requested information, it was not easily traceable and in some instances inadequate to perform detailed traces on anything other than the highest level numbers tying out. Delta reports for cost appear to be done by fiscal year typically and do not have the level of detail to review changes by activity by month with a before-after-delta format. Schedule data is equally difficult to assess as the schedules are not directly compared to each other versus displayed separately and the reviewer (CAM, PM, PMCS, etc.) is left having to check line for line between each of the two schedules. The change request packages presented for LHC ATLAS-U are cumbersome to confirm validity and make it difficult to grasp how others on the project team have the ability to confirm correctness prior to implementation. When a reviewer questioned the project team if they produced monthly data with each BCP to ensure they didn't change history, the response was that there are only two of them that make the changes and they know they aren't changing history. While this may have been said tongue-in-cheek, it is in line with the documentation provided and a concern for long term quality control.

The change request packages presented for NEXT contained the level of detail expected and required for understanding the extent of a change. It was apparent in reviewing these two projects that information or best practices related to documentation on change requests were not shared.

Recommendation:

The change control documentation should include detailed backup information per approved change request. This not only provides documentation to the project but allows for proper quality control to ensure the change was implemented as expected. BNL should make an effort to share best practices between projects related to items such as this.

Guideline 30: Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments,

effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.

Reviewer Name: Kelly Krug
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:
During a review of the change requests on the LHC ATLAS-U project, BCP DOE-011 appeared to change history for the payment of a forgotten invoice. However, it was pointed out that this was a correction of an accounting error and was implemented in the current month as a correction. The CD-2 approved baseline included S=P=A as of October 1, 2014. It was determined in March 2015 that there was a missing invoice. When they obtained the invoice, they made a change to the current period to record the costs into the baseline. This was considered a correction of an accounting error because if the invoice had been received when appropriate, the costs would have been reflected in the CD-2 PMB. Other changes traced during the review for the LHC ATLAS-U project revealed no change requests that directly impacted historical information.

A review of the change requests for the NEXT project revealed no change requests that directly impacted historical information.

As previously noted, both projects had examples of change requests that were processed after financial month end closing and collection of performance status but before the submission deadline for the reporting period. While improvements have clearly been made, not continuing with these practices could lead to a view that retroactive changes (or at least current period changes) are being made. See GL-28 for further information on CIO-08.

Guideline 31: Prevent revisions to the program budget except for authorized changes.

Reviewer Name: Kelly Krug
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:
A data trace on the LHC ATLAS-U project uncovered an issue with the April baseline presented to the reviewers. This change impacted a number of control accounts and over 120 activities causing WADs, P6, and Cobra to no longer reconcile. Further information on this can be found in CIO-07*.

A review of the NEXT project did not uncover any unauthorized changes. A detailed trace of change requests and current baseline to WADs and control account plans, revealed no apparent evidence that project's scope, cost, or schedule baselines had been revised without properly authorized change requests for the months provided.

CIO-07*
Subject (Issue): Schedule Baseline Preservation

Referenced Guideline(s): 31 & 32

Referenced Data Trace:

1. FY15 Logs for NEXT and LHC ATLAS-U
2. NEXT PCRs: 14-049, 15-070, 15-086
3. LHC ATLAS-U BCPs: DOE-011, DOE-016, DOE-017, DOE-018, NSF-011
4. Supporting documentation for above baseline changes including:
    a. P6 before and after
    b. Cobra before and after
    c. WAD
    d. RAM
    e. CPR
    f. Control Account Plans
    g. April Baseline Schedule

Description of Issue:

During data traces on the LHC ATLAS-U project, an issue was uncovered indicating an unauthorized change occurred to the April baseline. This change impacted a number of control accounts and over 120 activities causing WADs, P6, and Cobra to no longer reconcile. Not enough information could be gathered and provided to the review team before the conclusion of the review to determine a root cause or the magnitude of the impact (was the change in P6 or Cobra and which – if either – were correct). Post review conclusion, documentation and further information was provided by the project team to the review committee. This information included (and can be found in Appendix A):

- Comparison files showing Cobra matching for April and May
- March evidence of P6/Cobra matching
- April evidence of P6/Cobra not matching
- April evidence of P6/Cobra matching (after correction)
- May evidence of P6/Cobra matching
- April P6 baseline schedule with working attached (corrected) {*not in Appendix A due to size*}
- May P6 baseline schedule with working attached {*not in Appendix A due to size*}
- April revised Cobra CAP report of the baseline {*not in Appendix A due to size*}
- May revised Cobra CAP report of the baseline {*not in Appendix A due to size*}
- A summary of what occurred to cause April not to match what was provided to the reviewers

Based on the information, it was concluded that a change to the April baseline file was made in the P6 schedule just prior to exporting the XER and creating the PDFs for the review. This change was never integrated into Cobra as the cost baseline nor was it imported as the schedule or cost baseline file for PARS-II. While this does lighten the potential magnitude of the change, it was still a change made outside of the authorized baseline control process. Changes of this nature can compromise the integrity of the overall project schedule.

Additionally, it is important to understand that there are effectively three baselines on a project that come together to create the overall performance baseline. These three baselines are: scope (derived and documented within the WBS dictionary), schedule (derived and documented from the scheduling tool), and cost (derived and documented from the scheduling tool for units/time-phasing and integrated into the cost tool for total burden rates). Based on the information provided, it is relatively clear that the scope baseline was not impacted and it is possible that the cost baseline (as it relates to the totals coming from the rated cost tool Cobra) was not impacted. However, it is not possible to say that the schedule baseline was not impacted. Despite this change being viewed as the equivalent of a typo and the review team believing that this was not done with any kind of malicious intent, there are still issues that need to be address regarding the root cause of why a change like this happened without notice in the first place. By ensuring that schedule revisions are controlled, documented, traceable, and quality checked, the integrity of the entire performance baseline is maintained and can be verified. At this time, the review committee cannot comfortably state that all aspects of this are being followed.

Recommendation:

A review of the root cause that lead to the unauthorized/undocumented change in the LHC ATLAS-U project's baseline schedule needs to be determined and methods for prevention of unauthorized revisions need to be put into place.

Guideline 32: Document changes to the performance measurement baseline.

Reviewer Name: Kelly Krug
Compliant with ANSI/EIA-748: **Yes (With CIO)**

Observations and Findings:

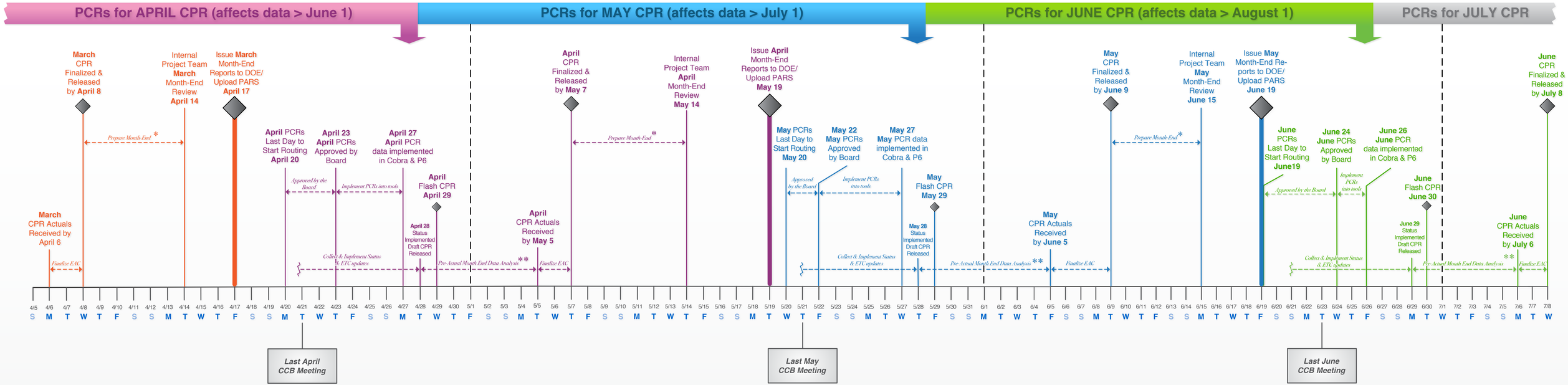
Data traces were performed on NEXT with relative ease while performing data traces on the LHC ATLAS-U project were difficult. More specific details related to the documentation of changes for both of these projects can be found under GL-28, GL-29, and GL-31 for CIO-08, CIO-05*, and CIO-07* that apply to this guideline.

Appendices

Appendix A – Supporting Information

CPR MONTHLY CYCLE TIMELINE

3 MONTH EXAMPLE



***PREPARE MONTH-END**

- *Month End processing is complete with CAM inputs and actuals
- *EAC and reports are analyzed by Project Management
- *Final reports posted to IPDv2
- *Variance Analysis Generated/Approved in IPDv2

****PRE-ACTUAL MONTH END DATA ANALYSIS**

- **Schedule status has been entered into the Forecast schedule
- **Approved PCRs have been implemented into the Baseline schedule
- **Status and Baseline changes have been integrated into Cobra
- **Perform analysis of the schedule variances
- **Perform schedule critical and near critical path analysis
- **Process Accruals
- **Update Cobra and P6 coding (work group coding)
- **Tie out Cobra, P6 Baseline, and P6 Working schedules

Report: ATLAS Befor After-Excel pivot table defaulting to a RAM

report

Comparison files showing Cobra matching for April and May

Currency reported in: Dollars

Report Options
Criteria: WBS (2), Control Account, Work Package, Work Package.ATLAS FUNDING, Work Package.ATLAS WP
Calendar Set: 00 Basic Calendar Set
Cost Sets: Scheduled, Actuals, Performed

Sum of Value

			FY13	FY14							FY15											
			Sep-13	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
APRIL 2015	1.01.01.01 FCAL Baseplane	BCWS	3,248	15,366	1,207	0				9,303	545	11,000	3,914	260	273	19,116	15,015	7,734	7,800	5,160	2,895	2,347
	1.01.01.02 Baseplane L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS						0		2,787	1,177	0	580	178		4,089	263	229	25,427	6,530	149,610	
	1.01.02.02 Layer Sum FCal	BCWS	3,248	15,366	1,207	0				7,545	4,142	14,334	224	202	6,139	12,218	8,663	5,236				4,084
	1.01.02.03 F/E Electronics L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS		47,901	20,321	0				82,672	12,263	2,471	2,883	2,256	2,773	26,171	4,288	197	1,909	10,942	12,254	5,017
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	37,502	79,903	38,133	0				190,092	52,226	27,660	80,486	53,889	53,931	38,061	32,709	43,639	81,502	59,591	98,126	89,990
	1.01.03.03 LTDB Board Design and System Integration	BCWS	98,453	301,127	111,105	0				555,818	37,905	59,420	49,106	36,295	37,093	49,470	22,634	54,436	72,938	54,635	41,241	46,907
	1.01.03.04 LTDB Optical Links	BCWS	126,649	102,872	82,809	0				204,923	20,042	16,585	8,548	17,451	19,082	21,391	74,341	28,134	32,710	27,456	24,530	37,788
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS		13,079	2,247	0				37,758			17,517	7,007								
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	27,358	66,157	32,675	0				99,308	82,764	108,645	68,234	34,503	17,641	1,928	3,746	6,244	6,868	6,868	57,332	5,765
	1.01.04.03 Firmware and Integration	BCWS		33,152	5,156	0				65,501	44,198	24,930	18,237	20,241	18,220	24,543	30,757	15,577	11,664	18,903	17,834	28,718
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	35,174	47,230	8,567	0				43,413	11,645	57,254	69,427	13,047	-39,979	14,904	16,475	63,118	15,878	6,619	7,597	9,178
	1.02.02 Front End Card	BCWS	12,816	31,184	3,670	0				71,430	49,715	20,719	32,874	31,349	15,203	6,823	3,967	5,828	20,955	27,370	18,303	23,359
	1.02.03 ART Data Driver Card (ADDC)	BCWS		44,192	8,178	0				72,587	14,972	14,698	12,625	12,995	14,202	15,009	16,510	15,733	16,011	9,269	9,069	8,771
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	28,762	45,301	9,719	0				83,765	10,617	13,424	14,795	9,770	59,140	19,694	25,018	13,887	7,789	7,789	7,435	9,623
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS									0			12,594	15,638	9,913	10,501	9,131	15,798	16,373	15,629	15,040
	1.02.05 MM RODs (retired)	BCWS		29,999																		
	1.02.06 NSW Alignment	BCWS		14,340	14,340	0				81,651	19,746	12,365	17,224	14,592	21,998	23,298	27,252	32,740	35,798	41,077	39,039	100,182
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	52,910	122,213	70,202	0				201,767	109,815	32,976	38,473	83,405	39,549	33,178	41,633	139,364	49,010	16,317	30,234	15,259
	1.02.08 NSW L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS				0				15,312	15,024	7,644	8,959	7,152	10,048	7,332	8,030	6,982	7,681	7,681	7,367	7,520
	1.03.01.02 gFEX Algorithm 2	BCWS										15,344	17,767	28,215	8,336	8,480	9,287	8,076	6,057		839	4,405
	1.03.01.03 Rod Firmware (retired)	BCWS		19,101																		
	1.03.01.04 Algorithm Firmware L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS			6,981	0	0	0	0	120,613	46,772	35,277	47,651	57,228	25,867	18,354	12,437	98,250	47,485	33,413	45,976	207,148
	1.03.03 e/j FEX Fiber plant	BCWS			2,302	0				31,750	21,404	6,038	11,857	7,013	8,932	87,661	19,183	15,293	13,070	40,669	5,860	9,924
	1.03.04.01 gFEX Firmware and Board	BCWS		14,704		0				19,447	1,710	10,328	10,506	7,986	12,012	19,527	19,600	27,137	31,756	114,236	31,079	19,982
	1.03.04.02 gFEX data injector	BCWS																38,808	7,374	1,020		
	1.03.04.03 gFEX L3 Management	BCWS					0			16,239	4,295	3,514	4,100	3,709	3,905	4,100	4,490	3,905	4,295	4,295	4,100	4,100
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS					0			18,358	5,171	3,872	4,517	7,040	26,760	4,112	4,500	4,049	4,402	4,403	10,650	10,652
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS							0	46,958	30,937	13,663	14,241	22,897	24,687	16,769	23,158	19,993	14,831	14,127	18,241	18,742
	1.03.06 TDAQ L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	501,396	295,101	61,927	0				436,778	65,186	53,334	62,223	56,297	59,260	62,223	68,149	59,260	65,186	65,186	62,223	62,223
	1.04.02 NSF Project Management	BCWS							0	72,913	18,725	15,321	17,874	16,172	17,023	17,874	19,577	17,023	18,725	18,725	17,874	17,874
APRIL 2015 Total			**927,516**	**1,338,288**	**480,746**	**0**	**0**	**0**	**0**	**2,588,689**	**680,996**	**580,816**	**634,841**	**563,743**	**477,732**	**566,239**	**522,184**	**740,002**	**622,918**	**618,655**	**735,339**	**764,597**
MAY 2015	1.01.01.01 FCAL Baseplane	BCWS	3,248	15,366	1,207	0				9,303	545	11,000	3,914	260	273	19,116	15,015	7,734	7,800	5,160	2,895	2,347
	1.01.01.02 Baseplane L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS						0		2,787	1,177	0	580	178		4,089	263	229	25,427	6,530	149,610	
	1.01.02.02 Layer Sum FCal	BCWS	3,248	15,366	1,207	0				7,545	4,142	14,334	224	202	6,139	12,218	8,663	5,236				4,084
	1.01.02.03 F/E Electronics L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS		47,901	20,321	0				82,672	12,263	2,471	2,883	2,256	2,773	26,171	4,288	197	1,909	10,942	12,254	5,017
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	37,502	79,903	38,133	0				190,092	52,226	27,660	80,486	53,889	53,931	38,061	32,709	43,639	81,502	59,591	98,126	89,990
	1.01.03.03 LTDB Board Design and System Integration	BCWS	98,453	301,127	111,105	0				555,818	37,905	59,420	49,106	36,295	37,093	49,470	22,634	54,436	72,938	54,635	41,241	46,907
	1.01.03.04 LTDB Optical Links	BCWS	126,649	102,872	82,809	0				204,923	20,042	16,585	8,548	17,451	19,082	21,391	74,341	28,134	32,710	27,456	24,530	37,788
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS		13,079	2,247	0				37,758			17,517	7,007								
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	27,358	66,157	32,675	0				99,308	82,764	108,645	68,234	34,503	17,641	1,928	3,746	6,244	6,868	6,868	57,332	5,765
	1.01.04.03 Firmware and Integration	BCWS		33,152	5,156	0				65,501	44,198	24,930	18,237	20,241	18,220	24,543	30,757	15,577	11,664	18,903	17,834	28,718
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	35,174	47,230	8,567	0				43,413	11,645	57,254	69,427	13,047	-39,979	14,904	16,475	63,118	15,878	6,619	7,597	9,178
	1.02.02 Front End Card	BCWS	12,816	31,184	3,670	0				71,430	49,715	20,719	32,874	31,349	15,203	6,823	3,967	5,828	20,955	27,370	18,303	23,359
	1.02.03 ART Data Driver Card (ADDC)	BCWS		44,192	8,178	0				72,587	14,972	14,698	12,625	12,995	14,202	15,009	16,510	15,733	16,011	9,269	9,069	8,771
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	28,762	45,301	9,719	0				83,765	10,617	13,424	14,795	9,770	59,140	19,694	25,018	13,887	7,789	7,789	7,435	9,623
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS									0			12,594	15,638	9,913	10,501	9,131	15,798	16,373	15,629	15,040
	1.02.05 MM RODs (retired)	BCWS		29,999																		
	1.02.06 NSW Alignment	BCWS		14,340	14,340	0				81,651	19,746	12,365	17,224	14,592	21,998	23,298	27,252	32,740	35,798	41,077	39,039	100,182
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	52,910	122,213	70,202	0				201,767	109,815	32,976	38,473	83,405	39,549	33,178	41,633	139,364	49,010	16,317	30,234	15,259
	1.02.08 NSW L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS				0				15,312	15,024	7,644	8,959	7,152	10,048	7,332	8,030	6,982	7,681	7,681	7,367	7,520
	1.03.01.02 gFEX Algorithm 2	BCWS										15,344	17,767	28,215	8,336	8,480	9,287	8,076	6,057		839	4,405
	1.03.01.03 Rod Firmware (retired)	BCWS		19,101																		
	1.03.01.04 Algorithm Firmware L3 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS			6,981	0	0	0	0	120,613	46,772	35,277	47,651	57,228	25,867	18,354	12,437	98,250	47,485	33,413	45,976	207,148
	1.03.03 e/j FEX Fiber plant	BCWS			2,302	0				31,750	21,404	6,038	11,857	7,013	8,932	87,661	19,183	15,293	13,070	40,669	5,860	9,924
	1.03.04.01 gFEX Firmware and Board	BCWS		14,704		0				19,447	1,710	10,328	10,506	7,986	12,012	19,527	19,600	27,137	31,756	114,236	31,079	19,982
	1.03.04.02 gFEX data injector	BCWS																38,808	7,374	1,020		
	1.03.04.03 gFEX L3 Management	BCWS					0			16,239	4,295	3,514	4,100	3,709	3,905	4,100	4,490	3,905	4,295	4,295	4,100	4,100
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS					0			18,358	5,171	3,872	4,517	7,040	26,760	4,112	4,500	4,049	4,402	4,403	10,650	10,652
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS							0	46,958	30,937	13,663	14,241	22,897	24,687	16,769	23,158	19,993	14,831	14,127	18,241	18,742
	1.03.06 TDAQ L2 Management	BCWS									0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	501,396	295,101	61,927	0				436,778	65,186	53,334	62,223	56,297	59,260	62,223	68,149	59,260	65,186	65,186	62,223	62,223
	1.04.02 NSF Project Management	BCWS							0	72,913	18,725	15,321	17,874	16,172	17,023	17,874	19,577	17,023	18,725	18,725	17,874	17,874
MAY 2015 Total			**927,516**	**1,338,288**	**480,746**	**0**	**0**	**0**	**0**	**2,588,689**	**680,996**	**580,816**	**634,841**	**563,743**	**477,732**	**566,239**	**522,184**	**740,002**	**622,918**	**618,655**	**735,339**	**764,597**
DELTA	1.01.01.01 FCAL Baseplane	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.02 Layer Sum FCal	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.03 LTDB Board Design and System Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.04 LTDB Optical Links	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.03 Firmware and Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.02 Front End Card	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.03 ART Data Driver Card (ADDC)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.05 MM RODs (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.06 NSW Alignment	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.02 gFEX Algorithm 2	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.03 Rod Firmware (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.03 e/j FEX Fiber plant	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.01 gFEX Firmware and Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.02 gFEX data injector	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.03 gFEX L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.02 NSF Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

			FY16											
			Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
APRIL 2015	1.01.01.01 FCAL Baseplane	BCWS	2,757	7,143	2,363	5,995	1,572			2,786	21,232	4,038	4,422	
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	21,200	0	1,167				1,289	1,504	1,647	60,936
	1.01.02.02 Layer Sum FCal	BCWS	29,520	3,762	6,023	7,873	1,865	103	2,486	5,567	4,071	3,542	4,473	3,695
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	1,685	497	635	3,866	4,030	4,644	4,402	4,611	4,611	4,402	4,821	4,611
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	65,749	21,891	170,354	52,082	86,698	37,474	67,381	114,150	45,247	58,507	31,992	26,328
	1.01.03.03 LTDB Board Design and System Integration	BCWS	62,073	78,733	155,197	130,268	134,089	96,965	91,133	107,920	76,762	69,547	177,011	74,064
	1.01.03.04 LTDB Optical Links	BCWS	31,928	44,087	35,098	88,771	53,933	199,240	23,159	52,338	51,278	29,485	26,829	261,324
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS												
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	5,920	25,522	6,483	13,567	26,063	30,633	15,065	393,900	16,294	29,658	35,429	6,000
	1.01.04.03 Firmware and Integration	BCWS	21,192	11,318	11,063	12,253	13,871	17,013	28,533	20,140	15,166	15,428	15,521	6,233
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	6,146	11,828	15,881	502,877	31,054	37,455	16,676	18,886	26,791	29,924	568,949	0
	1.02.02 Front End Card	BCWS	25,215	15,510	16,769	8,886	15,127	27,051	21,496	30,610	53,981	27,600	825,415	21,595
	1.02.03 ART Data Driver Card (ADDC)	BCWS	10,804	27,898	24,636	21,906	21,420	24,911	7,321	5,660	8,884	8,765	11,049	17,519
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	12,390	10,620	12,769	11,269	11,631	12,897	41,058	28,134	18,745	3,552	3,891	2,368
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	15,860	12,987	9,935	9,394	9,887	11,466	9,712	10,042	10,801	10,169	11,377	10,077
	1.02.05 MM RODs (retired)	BCWS												
	1.02.06 NSW Alignment	BCWS	37,756	100,780	24,021	30,179	115,787	35,538	35,600	85,691	31,464	22,113	23,198	22,190
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	21,160	86,399	31,114	30,095	32,139	32,069	22,263	25,768	21,501	14,509	110,832	22,363
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	7,860	8,515	14,352	7,151	7,456	8,271	7,411	7,756	17,251	14,676	16,321	17,551
	1.03.01.02 gFEX Algorithm 2	BCWS	4,537	4,642	9,720	8,188	8,708	9,566	8,734	8,726	16,895	16,881	18,619	29,622
	1.03.01.03 Rod Firmware (retired)	BCWS												
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	29,712	24,592	35,166	33,962	48,188	30,869	32,966	35,289	28,795	22,086	25,297	28,509
	1.03.03 e/j FEX Fiber plant	BCWS	6,172	7,377	14,280	13,460	13,460	15,934	17,511	13,638	9,561	7,982	15,431	25,304
	1.03.04.01 gFEX Firmware and Board	BCWS	18,006	25,246	32,259	29,454	29,454	11,221	14,130	20,531	21,120	21,819	18,020	10,932
	1.03.04.02 gFEX data injector	BCWS												
	1.03.04.03 gFEX L3 Management	BCWS	4,092	3,507	4,482	4,092	4,092	4,482	4,092	4,287	4,287	4,092	4,482	4,287
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	10,737	9,685	12,376	10,799	10,647	11,657	7,430	6,102	6,097	5,818	15,463	17,206
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	7,925	9,987	12,761	11,993	12,675	13,883	21,862	26,353	23,972	23,689	19,589	13,089
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	50,516	43,299	55,327	50,516	50,516	55,327	50,516	52,921	52,921	50,516	55,327	52,921
	1.04.02 NSF Project Management	BCWS	17,835	15,288	19,534	17,835	17,835	19,534	17,835	18,685	18,685	17,835	19,534	18,685
APRIL 2015 Total			**507,547**	**611,115**	**753,799**	**1,116,730**	**763,366**	**748,202**	**568,772**	**1,100,491**	**607,703**	**518,141**	**2,064,938**	**757,406**
MAY 2015	1.01.01.01 FCAL Baseplane	BCWS	2,757	7,143	2,363	5,995	1,572			2,786	21,232	4,038	4,422	
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	21,200	0	1,167				1,289	1,504	1,647	60,936
	1.01.02.02 Layer Sum FCal	BCWS	29,520	3,762	6,023	7,873	1,865	103	2,486	5,567	4,071	3,542	4,473	3,695
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	1,685	497	635	3,866	4,030	4,644	4,402	4,611	4,611	4,402	4,821	4,611
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	65,749	21,891	170,354	52,082	86,698	37,474	67,381	114,150	45,247	58,507	31,992	26,328
	1.01.03.03 LTDB Board Design and System Integration	BCWS	62,073	78,733	155,197	130,268	134,089	96,965	91,133	107,920	76,762	69,547	177,011	74,064
	1.01.03.04 LTDB Optical Links	BCWS	31,928	44,087	35,098	88,771	53,933	199,240	23,159	52,338	51,278	29,485	26,829	261,324
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS												
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	5,920	25,522	6,483	13,567	26,063	30,633	15,065	393,900	16,294	29,658	35,429	6,000
	1.01.04.03 Firmware and Integration	BCWS	21,192	11,318	11,063	12,253	13,871	17,013	28,533	20,140	15,166	15,428	15,521	6,233
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	6,146	11,828	15,881	502,877	31,054	37,455	16,676	18,886	26,791	29,924	568,949	0
	1.02.02 Front End Card	BCWS	25,215	15,510	16,769	8,886	15,127	27,051	21,496	30,610	53,981	27,600	825,415	21,595
	1.02.03 ART Data Driver Card (ADDC)	BCWS	10,804	27,898	24,636	21,906	21,420	24,911	7,321	5,660	8,884	8,765	11,049	17,519
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	12,390	10,620	12,769	11,269	11,631	12,897	41,058	28,134	18,745	3,552	3,891	2,368
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	15,860	12,987	9,935	9,394	9,887	11,466	9,712	10,042	10,801	10,169	11,377	10,077
	1.02.05 MM RODs (retired)	BCWS												
	1.02.06 NSW Alignment	BCWS	37,756	100,780	24,021	30,179	115,787	35,538	35,600	85,691	31,464	22,113	23,198	22,190
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	21,160	86,399	31,114	30,095	32,139	32,069	22,263	25,768	21,501	14,509	110,832	22,363
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	7,860	8,515	14,352	7,151	7,456	8,271	7,411	7,756	17,251	14,676	16,321	17,551
	1.03.01.02 gFEX Algorithm 2	BCWS	4,537	4,642	9,720	8,188	8,708	9,566	8,734	8,726	16,895	16,881	18,619	29,622
	1.03.01.03 Rod Firmware (retired)	BCWS												
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	29,712	24,592	35,166	33,962	48,188	30,869	32,966	35,289	28,795	22,086	25,297	28,509
	1.03.03 e/j FEX Fiber plant	BCWS	6,172	7,377	14,280	13,460	13,460	15,934	17,511	13,638	9,561	7,982	15,431	25,304
	1.03.04.01 gFEX Firmware and Board	BCWS	18,006	25,246	32,259	29,454	29,454	11,221	14,130	20,531	21,120	21,819	18,020	10,932
	1.03.04.02 gFEX data injector	BCWS												
	1.03.04.03 gFEX L3 Management	BCWS	4,092	3,507	4,482	4,092	4,092	4,482	4,092	4,287	4,287	4,092	4,482	4,287
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	10,737	9,685	12,376	10,799	10,647	11,657	7,430	6,102	6,097	5,818	15,463	17,206
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	7,925	9,987	12,761	11,993	12,675	13,883	21,862	26,353	23,972	23,689	19,589	13,089
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	50,516	43,299	55,327	50,516	50,516	55,327	50,516	52,921	52,921	50,516	55,327	52,921
	1.04.02 NSF Project Management	BCWS	17,835	15,288	19,534	17,835	17,835	19,534	17,835	18,685	18,685	17,835	19,534	18,685
MAY 2015 Total			**507,547**	**611,115**	**753,799**	**1,116,730**	**763,366**	**748,202**	**568,772**	**1,100,491**	**607,703**	**518,141**	**2,064,938**	**757,406**
DELTA	1.01.01.01 FCAL Baseplane	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.02 Layer Sum FCal	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.03 LTDB Board Design and System Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.04 LTDB Optical Links	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.03 Firmware and Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.02 Front End Card	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.03 ART Data Driver Card (ADDC)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.05 MM RODs (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.06 NSW Alignment	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.02 gFEX Algorithm 2	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.03 Rod Firmware (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.03 e/j FEX Fiber plant	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.01 gFEX Firmware and Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.02 gFEX data injector	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.03 gFEX L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.02 NSF Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
DELTA Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

			FY17											
			Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
APRIL 2015	1.01.01.01 FCAL Baseplane	BCWS	1,290	5,483	3,548	1,668	1,658	2,207	1,919	1,828	1,555	2,812	2,843	919
	1.01.01.02 Baseplane L3 Management	BCWS												
	1.01.02.01 Layer Sum Boards EM	BCWS	664	2,509	1,623	1,629	1,494	1,718	1,494	1,718	1,643	1,568	1,718	373
	1.01.02.02 Layer Sum FCal	BCWS		10,215										
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	1,734	6,549	4,237	5,006	9,986	5,728	3,488	4,011	3,836	3,662	4,011	3,619
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	11,094	41,715	26,984	96,984	22,993	37,650	34,966	40,210	38,462	36,714	40,210	36,714
	1.01.03.03 LTDB Board Design and System Integration	BCWS	41,059	142,818	91,379	75,149	55,661	61,273	44,166	76,507	59,812	106,985	264,621	40,511
	1.01.03.04 LTDB Optical Links	BCWS	7,905	62,718	50,323	35,674	262,716	66,600	31,818	34,693	29,004	28,346	31,420	33,895
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS												
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	7,420	29,679	21,157	46,991	9,424	10,838	7,681	13,466	393,632	18,916	14,039	2,626
	1.01.04.03 Firmware and Integration	BCWS	2,626	3,842	2,863	4,763	48,260	7,366	15,058	11,677	6,428	8,041	11,690	12,492
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	1,051,830	5,494	20,567	16,796	17,825	11,734	9,845	14,503	10,131	21,983	405,454
	1.02.02 Front End Card	BCWS	8,728	9,501	39,415	50,307	3,387	3,885	5,976	197,502	6,412	391,380	41,714	40,267
	1.02.03 ART Data Driver Card (ADDC)	BCWS	3,990	15,364	13,783	13,783	14,439	16,085	13,001	11,904		52,738	3,446	309,041
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	3,334	12,597	464,411	5,110	4,646	25,465	7,114	8,181	2,785	12,028	13,174	8,592
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	4,197	16,179	10,706	10,919	10,160	11,684	10,071	11,547	11,045	2,452	2,686	2,452
	1.02.05 MM RODs (retired)	BCWS												
	1.02.06 NSW Alignment	BCWS	10,439	143,751	12,283	9,779	5,881	6,763	11,012	9,541	8,990	1,417	3,166	2,330
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	14,454	52,343	28,547	21,010	18,117	21,083	25,509	23,956	10,435	40,104	25,030	23,058
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	3,322	8,149				2,905	7,263	8,352	7,835	1,425		
	1.03.01.02 gFEX Algorithm 2	BCWS	3,856	5,141				3,360	8,400	9,660	9,062	1,648		
	1.03.01.03 Rod Firmware (retired)	BCWS												
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	13,189	93,911	47,658	35,980	32,410	34,348	29,008	33,455	223,651	32,201	34,555	26,580
	1.03.03 e/j FEX Fiber plant	BCWS	10,855	26,423	12,531	12,531	261,174	13,080	11,374	12,796	11,936	12,381	11,956	7,025
	1.03.04.01 gFEX Firmware and Board	BCWS	306,072	91,643	44,669	40,371	37,224	21,927	14,900	11,740	5,395		65,384	37,084
	1.03.04.02 gFEX data injector	BCWS												
	1.03.04.03 gFEX L3 Management	BCWS	1,792	6,771	4,381	4,381	3,983	4,580	3,983	4,580	4,381	4,182	4,580	4,182
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	5,549	9,138	7,977	8,941	8,128	9,354	8,137	9,364	8,960	15,020	18,299	11,733
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	5,467	16,726	10,591	13,740	9,480	10,902	9,480	8,575	8,203	7,830	31,174	12,515
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	20,562	77,679	50,263	50,263	45,694	52,548	45,694	52,548	50,263	47,978	52,548	47,978
	1.04.02 NSF Project Management	BCWS	7,810	29,503	19,090	19,090	17,355	19,958	17,355	19,958	19,090	18,223	19,958	18,223
APRIL 2015 Total			**497,407**	**1,972,176**	**973,915**	**584,636**	**901,065**	**469,133**	**380,598**	**627,615**	**937,319**	**858,183**	**720,205**	**1,087,663**
MAY 2015	1.01.01.01 FCAL Baseplane	BCWS	1,290	5,483	3,548	1,668	1,658	2,207	1,919	1,828	1,555	2,812	2,843	919
	1.01.01.02 Baseplane L3 Management	BCWS												
	1.01.02.01 Layer Sum Boards EM	BCWS	664	2,509	1,623	1,629	1,494	1,718	1,494	1,718	1,643	1,568	1,718	373
	1.01.02.02 Layer Sum FCal	BCWS		10,215										
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	1,734	6,549	4,237	5,006	9,986	5,728	3,488	4,011	3,836	3,662	4,011	3,619
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	11,094	41,715	26,984	96,984	22,993	37,650	34,966	40,210	38,462	36,714	40,210	36,714
	1.01.03.03 LTDB Board Design and System Integration	BCWS	41,059	142,818	91,379	75,149	55,661	61,273	44,166	76,507	59,812	106,985	264,621	40,511
	1.01.03.04 LTDB Optical Links	BCWS	7,905	62,718	50,323	35,674	262,716	66,600	31,818	34,693	29,004	28,346	31,420	33,895
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS												
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	7,420	29,679	21,157	46,991	9,424	10,838	7,681	13,466	393,632	18,916	14,039	2,626
	1.01.04.03 Firmware and Integration	BCWS	2,626	3,842	2,863	4,763	48,260	7,366	15,058	11,677	6,428	8,041	11,690	12,492
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	1,051,830	5,494	20,567	16,796	17,825	11,734	9,845	14,503	10,131	21,983	405,454
	1.02.02 Front End Card	BCWS	8,728	9,501	39,415	50,307	3,387	3,885	5,976	197,502	6,412	391,380	41,714	40,267
	1.02.03 ART Data Driver Card (ADDC)	BCWS	3,990	15,364	13,783	13,783	14,439	16,085	13,001	11,904		52,738	3,446	309,041
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	3,334	12,597	464,411	5,110	4,646	25,465	7,114	8,181	2,785	12,028	13,174	8,592
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	4,197	16,179	10,706	10,919	10,160	11,684	10,071	11,547	11,045	2,452	2,686	2,452
	1.02.05 MM RODs (retired)	BCWS												
	1.02.06 NSW Alignment	BCWS	10,439	143,751	12,283	9,779	5,881	6,763	11,012	9,541	8,990	1,417	3,166	2,330
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	14,454	52,343	28,547	21,010	18,117	21,083	25,509	23,956	10,435	40,104	25,030	23,058
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	3,322	8,149				2,905	7,263	8,352	7,835	1,425		
	1.03.01.02 gFEX Algorithm 2	BCWS	3,856	5,141				3,360	8,400	9,660	9,062	1,648		
	1.03.01.03 Rod Firmware (retired)	BCWS												
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	13,189	93,911	47,658	35,980	32,410	34,348	29,008	33,455	223,651	32,201	34,555	26,580
	1.03.03 e/j FEX Fiber plant	BCWS	10,855	26,423	12,531	12,531	261,174	13,080	11,374	12,796	11,936	12,381	11,956	7,025
	1.03.04.01 gFEX Firmware and Board	BCWS	306,072	91,643	44,669	40,371	37,224	21,927	14,900	11,740	5,395		65,384	37,084
	1.03.04.02 gFEX data injector	BCWS												
	1.03.04.03 gFEX L3 Management	BCWS	1,792	6,771	4,381	4,381	3,983	4,580	3,983	4,580	4,381	4,182	4,580	4,182
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	5,549	9,138	7,977	8,941	8,128	9,354	8,137	9,364	8,960	15,020	18,299	11,733
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	5,467	16,726	10,591	13,740	9,480	10,902	9,480	8,575	8,203	7,830	31,174	12,515
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	20,562	77,679	50,263	50,263	45,694	52,548	45,694	52,548	50,263	47,978	52,548	47,978
	1.04.02 NSF Project Management	BCWS	7,810	29,503	19,090	19,090	17,355	19,958	17,355	19,958	19,090	18,223	19,958	18,223
MAY 2015 Total			**497,407**	**1,972,176**	**973,915**	**584,636**	**901,065**	**469,133**	**380,598**	**627,615**	**937,319**	**858,183**	**720,205**	**1,087,663**
DELTA	1.01.01.01 FCAL Baseplane	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.02 Layer Sum FCal	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.03 LTDB Board Design and System Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.04 LTDB Optical Links	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.03 Firmware and Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.02 Front End Card	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.03 ART Data Driver Card (ADDC)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.05 MM RODs (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.06 NSW Alignment	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.02 gFEX Algorithm 2	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.03 Rod Firmware (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.03 e/j FEX Fiber plant	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.01 gFEX Firmware and Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.02 gFEX data injector	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.03 gFEX L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.02 NSF Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0
DELTA Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

			FY18												Grand Total
			Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	
APRIL 2015	1.01.01.01 FCAL Baseplane	BCWS	1,264												186,484
	1.01.01.02 Baseplane L3 Management	BCWS													0
	1.01.02.01 Layer Sum Boards EM	BCWS	8,650												305,414
	1.01.02.02 Layer Sum FCal	BCWS													165,804
	1.01.02.03 F/E Electronics L3 Management	BCWS													0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	3,345	3,345	3,193	760									343,645
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	39,602	34,902	8,451										2,382,944
	1.01.03.03 LTDB Board Design and System Integration	BCWS	162,815	88,122	57,796	251,440	50,489	56,120	28,420	12,858					4,650,345
	1.01.03.04 LTDB Optical Links	BCWS	37,963	37,802	25,552	21,240	12,065	4,660	212						2,557,388
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS													77,607
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	2,809	2,534	752	823	716	788	752	823	286				1,816,723
	1.01.04.03 Firmware and Integration	BCWS	12,860	10,033	9,142	10,610	8,579	2,755							754,452
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	3,232,178
	1.02.02 Front End Card	BCWS	29,048	577	0	0	0	0	0	0	0	0	0	0	2,292,920
	1.02.03 ART Data Driver Card (ADDC)	BCWS	23,148	104,299	3,303	2,517									1,076,435
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	2,761	6,073	2,484										1,114,604
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS													356,422
	1.02.05 MM RODs (retired)	BCWS													29,999
	1.02.06 NSW Alignment	BCWS	1,565												1,286,875
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	21,592	8,637											1,860,391
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS				6,486	7,610								304,648
	1.03.01.02 gFEX Algorithm 2	BCWS				7,501	7,520								307,795
	1.03.01.03 Rod Firmware (retired)	BCWS													19,101
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	22,304	9,397	10,206	3,831	0	0	0	0	0	0	0	0	1,861,565
	1.03.03 e/j FEX Fiber plant	BCWS	7,460	6,191	5,071	5,554	2,173	0	0	0	0	0	0	0	871,576
	1.03.04.01 gFEX Firmware and Board	BCWS	40,015	36,618	14,793	2,498									1,362,536
	1.03.04.02 gFEX data injector	BCWS													47,202
	1.03.04.03 gFEX L3 Management	BCWS													167,099
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	6,851												359,955
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	13,412	610											635,726
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	44,202	44,202	42,193	46,211	40,184	44,202	42,193	46,211	42,193	44,202	46,211	40,184	3,772,981
	1.04.02 NSF Project Management	BCWS	19,680	19,680	18,786	20,575	17,891	19,680	18,786	20,575	18,786	19,680	20,575	17,891	963,022
APRIL 2015 Total			**501,347**	**413,024**	**201,722**	**380,047**	**147,228**	**128,205**	**90,362**	**80,468**	**61,265**	**63,883**	**66,786**	**58,075**	**35,163,837**
MAY 2015	1.01.01.01 FCAL Baseplane	BCWS	1,264												186,484
	1.01.01.02 Baseplane L3 Management	BCWS													0
	1.01.02.01 Layer Sum Boards EM	BCWS	8,650												305,414
	1.01.02.02 Layer Sum FCal	BCWS													165,804
	1.01.02.03 F/E Electronics L3 Management	BCWS													0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	3,345	3,345	3,193	760									343,645
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	39,602	34,902	8,451										2,382,944
	1.01.03.03 LTDB Board Design and System Integration	BCWS	162,815	88,122	57,796	251,440	50,489	56,120	28,420	12,858					4,650,345
	1.01.03.04 LTDB Optical Links	BCWS	37,963	37,802	25,552	21,240	12,065	4,660	212						2,557,388
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS													77,607
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	2,809	2,534	752	823	716	788	752	823	286				1,816,723
	1.01.04.03 Firmware and Integration	BCWS	12,860	10,033	9,142	10,610	8,579	2,755							754,452
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	3,232,178
	1.02.02 Front End Card	BCWS	29,048	577	0	0	0	0	0	0	0	0	0	0	2,292,920
	1.02.03 ART Data Driver Card (ADDC)	BCWS	23,148	104,299	3,303	2,517									1,076,435
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	2,761	6,073	2,484										1,114,604
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS													356,422
	1.02.05 MM RODs (retired)	BCWS													29,999
	1.02.06 NSW Alignment	BCWS	1,565												1,286,875
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	21,592	8,637											1,860,391
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS				6,486	7,610								304,648
	1.03.01.02 gFEX Algorithm 2	BCWS				7,501	7,520								307,795
	1.03.01.03 Rod Firmware (retired)	BCWS													19,101
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	22,304	9,397	10,206	3,831	0	0	0	0	0	0	0	0	1,861,565
	1.03.03 e/j FEX Fiber plant	BCWS	7,460	6,191	5,071	5,554	2,173	0	0	0	0	0	0	0	871,576
	1.03.04.01 gFEX Firmware and Board	BCWS	40,015	36,618	14,793	2,498									1,362,536
	1.03.04.02 gFEX data injector	BCWS													47,202
	1.03.04.03 gFEX L3 Management	BCWS													167,099
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	6,851												359,955
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	13,412	610											635,726
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	44,202	44,202	42,193	46,211	40,184	44,202	42,193	46,211	42,193	44,202	46,211	40,184	3,772,981
	1.04.02 NSF Project Management	BCWS	19,680	19,680	18,786	20,575	17,891	19,680	18,786	20,575	18,786	19,680	20,575	17,891	963,022
MAY 2015 Total			**501,347**	**413,024**	**201,722**	**380,047**	**147,228**	**128,205**	**90,362**	**80,468**	**61,265**	**63,883**	**66,786**	**58,075**	**35,163,837**
DELTA	1.01.01.01 FCAL Baseplane	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.01.02 Baseplane L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.01 Layer Sum Boards EM	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.02 Layer Sum FCal	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.02.03 F/E Electronics L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.01 COTS Regulators and Analog Mezzanine	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.02 ASIC ADC and Clock Fanout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.03 LTDB Board Design and System Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.04 LTDB Optical Links	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.03.05 Liquid Argon Trigger Digitizer Boards L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.01 Optical Transceiver and Backed BUS Layout	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.02 AMC Testing Optical I/O and Carrier Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.03 Firmware and Integration	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.04.04 LAr Digital Processing System L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.01.05 LAr L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.01 VMM Chip	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.02 Front End Card	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.03 ART Data Driver Card (ADDC)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.01 MM Trigger Processor Emulation and production	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.04.02 Support functions for trigger processor and monitoring	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.05 MM RODs (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.06 NSW Alignment	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.07 Trigger Data Serializer and VMM Power distribution	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.02.08 NSW L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.01 gFEX Algorithm 1	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.02 gFEX Algorithm 2	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.03 Rod Firmware (retired)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.01.04 Algorithm Firmware L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.02 FEX ATCA Hub	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.03 e/j FEX Fiber plant	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.01 gFEX Firmware and Board	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.02 gFEX data injector	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.04.03 gFEX L3 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.01 GBT I/O for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.05.02 TTC and BUSY for demonstrator and FELIX	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.03.06 TDAQ L2 Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.01 DOE Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.04.02 NSF Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

March evidence of P6/Cobra matching - edited to show only first page, all activities provided did not have deltas

ca1	wp	descrip	COBRA START DATE	COBRA FINISH DATE	P6 START DATE	P6 FINISH DATE	START DATE DELTA	FINISH DATE DELTA	bac
1.01.01.01	FBP1090MP	Payment for Material cost for PCB Procurement	12/16/2014	12/16/2014	12/16/2014	12/16/2014	0	0	3,900.00
1.01.01.01	FBP1130	Assembly Preparation	12/31/2014	3/2/2015	12/31/2014	3/2/2015	0	0	560.50
1.01.01.01	FBP1140	Assembly	3/3/2015	3/11/2015	3/3/2015	3/11/2015	0	0	2,242.00
1.01.01.01	FBP1150	Order cables etc.for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	1,283.76
1.01.01.01	FBP1150M	Material cost for cables for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	819.00
1.01.01.01	FBP1170	LabVIEW coding	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	6,713.60
1.01.01.01	FBP1180	Dummy FEB Layout and Fabrication	10/1/2014	10/20/2014	10/1/2014	10/20/2014	0	0	545.14
1.01.01.01	FBP1190	Dummy FEB Assembly	3/25/2015	4/1/2015	3/25/2015	4/1/2015	0	0	2,211.28
1.01.01.01	FBP1190MP	Payment for Material for Dummy FEB Fabrication and Assembly	3/25/2015	3/25/2015	3/25/2015	3/25/2015	0	0	5,850.00
1.01.01.01	FBP1200	Dummy FEB Commission	4/2/2015	4/10/2015	4/2/2015	4/10/2015	0	0	2,211.28
1.01.01.01	FBP1210	Dummy LTDB PCB Layout and Fabrication	3/25/2015	4/22/2015	3/25/2015	4/22/2015	0	0	3,780.68
1.01.01.01	FBP1220	Dummy LTDB Assembly	4/23/2015	4/30/2015	4/23/2015	4/30/2015	0	0	2,211.28
1.01.01.01	FBP1220MP	Payment for Material for Dummy LTDB PCB Fab and Assembly	4/23/2015	4/23/2015	4/23/2015	4/23/2015	0	0	5,850.00
1.01.01.01	FBP1230	Dummy LTDB Commission	5/1/2015	5/15/2015	5/1/2015	5/15/2015	0	0	2,211.28
1.01.01.01	FBP1240	Dummy Calorimeter/Calibration PCB Layout and Fab	4/23/2015	5/27/2015	4/23/2015	5/27/2015	0	0	3,780.68
1.01.01.01	FBP1250	Dummy Calorimeter/Calibration Board Assembly	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	2,211.28
1.01.01.01	FBP1250M	Material for Dummy Calorimeter Assembly	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	5,850.00
1.01.01.01	FBP1260	Dummy Calorimeter/Calibration Board Commission	6/5/2015	6/15/2015	6/5/2015	6/15/2015	0	0	2,211.28
1.01.01.01	FBP1270	Mechanical testing	6/16/2015	7/17/2015	6/16/2015	7/17/2015	0	0	448.40
1.01.01.01	FBP1280	Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,793.60
1.01.01.01	FBP1280T	Travel for Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,557.36
1.01.01.01	FBP1290	Test electrical properties	7/20/2015	8/18/2015	7/20/2015	8/18/2015	0	0	3,464.32
1.01.01.01	FBP1300	Document test results	8/19/2015	10/1/2015	8/19/2015	10/1/2015	0	0	3,467.67
1.01.01.01	FBP1320	FCal Baseplane Prototype design work	10/2/2015	11/5/2015	10/2/2015	11/5/2015	0	0	3,169.68
1.01.01.01	FBP1330	FCal Baseplane Prototype fabrication	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	2,277.60
1.01.01.01	FBP1330M	Material cost for FCal Baseplane Prototype	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	6,700.00
1.01.01.01	FBP1340	Preparation for Final Design Review	1/12/2016	1/21/2016	1/12/2016	1/21/2016	0	0	3,074.88
1.01.01.01	FBP1350	Revisit of Final design if necessary	1/25/2016	2/3/2016	1/25/2016	2/3/2016	0	0	1,784.16
1.01.01.01	FBP1360	Production Readiness Review	5/23/2016	5/27/2016	5/23/2016	5/27/2016	0	0	1,784.16
1.01.01.01	FBP1380	Final layout changes	1/12/2016	2/9/2016	1/12/2016	2/9/2016	0	0	2,707.84
1.01.01.01	FBP1390	FCal baseplane PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	1,731.90
1.01.01.01	FBP1390M	Material cost for FCal Baseplanes PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	16,080.00
1.01.01.01	FBP1400	FCal baseplane Components order	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	2,162.14
1.01.01.01	FBP1400M	Material for FCal Baseplane components	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	10,720.00
1.01.01.01	FBP1420	FCal baseplane Assembly	10/4/2016	1/9/2017	10/4/2016	1/9/2017	0	0	11,287.68
1.01.01.01	FBP1425	Assembly Certification jig	1/10/2017	2/7/2017	1/10/2017	2/7/2017	0	0	918.88
1.01.01.01	FBP1440	Production testing	2/8/2017	5/10/2017	2/8/2017	5/10/2017	0	0	6,334.24
1.01.01.01	FBP1450	Document test results	5/11/2017	8/9/2017	5/11/2017	8/9/2017	0	0	4,594.40
1.01.01.01	FBP1460	Ship FCal Baseplane to CERN	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	980.00
1.01.01.01	FBP1460M	Material cost for shipping FCal Baseplane to CERN	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	284.00
1.01.01.01	FBP1480	Document As-Built FCal Baseplanes	7/13/2017	9/13/2017	7/13/2017	9/13/2017	0	0	4,594.40
1.01.01.01	FPB20153FY13	Baseplanes FY13 Actuals AZ-JR 20153	9/30/2013	9/30/2013	9/30/2013	9/30/2013	0	0	3,248.10
1.01.01.01	FPB20153FY14	Baseplanes FYf14 Actuals AZ-JR 20153	3/31/2014	3/31/2014	3/31/2014	3/31/2014	0	0	15,365.89
1.01.01.01	FPB20153FY14.1	Baseplanes APRIL 2014 Actuals AZ-JR 20153	4/30/2014	4/30/2014	4/30/2014	4/30/2014	0	0	1,207.00
1.01.01.01	FPB20153FY14.2	Baseplanes SEPTEMBER 2014 Actuals AZ-JR 20153	9/2/2014	9/2/2014	9/2/2014	9/2/2014	0	0	9,302.75
1.01.01.01	FPB20153FY14.3	Lag Payment for Prior Work	11/28/2014	11/28/2014	11/28/2014	11/28/2014	0	0	11,000.00
1.01.02.01	LSB1160M	Payment for Material for PCB prototype and	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
1.01.02.01	LSB1200M	Payment for Material for PCB prototype and	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
1.01.02.01	LSB1240	PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	169.95
1.01.02.01	LSB1240M	Material for PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	588.30

April evidence of P6/Cobra not matching - edited to show only those activities with start or finish deltas

program	ca1	wp	descrip	COBRA START	COBRA FINISH	P6 START	P6 FINISH	START DATE DELTA	FINISH DATE DELTA	bac
ATLAS 2015-04	1.01.01.01	FBP1090MP	Payment for Material cost for PCB Procurement	12/16/2014	12/16/2014	12/16/2014	12/16/2014	0	0	3,900.00
ATLAS 2015-04	1.01.01.01	FBP1130	Assembly Preparation	12/31/2014	3/2/2015	12/31/2014	3/2/2015	0	0	560.50
ATLAS 2015-04	1.01.01.01	FBP1140	Assembly	3/3/2015	3/11/2015	3/3/2015	3/11/2015	0	0	2,242.00
ATLAS 2015-04	1.01.01.01	FBP1150	Order cables etc.for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	1,283.76
ATLAS 2015-04	1.01.01.01	FBP1150M	Material cost for cables for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	819.00
ATLAS 2015-04	1.01.01.01	FBP1170	LabVIEW coding	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	6,713.60
ATLAS 2015-04	1.01.01.01	FBP1180	Dummy FEB Layout and Fabrication	10/1/2014	10/20/2014	10/1/2014	10/20/2014	0	0	545.14
ATLAS 2015-04	1.01.01.01	FBP1190	Dummy FEB Assembly	3/25/2015	4/1/2015	3/25/2015	4/1/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1190MP	Payment for Material for Dummy FEB Fabrication and Assembly	3/25/2015	3/25/2015	3/25/2015	3/25/2015	0	0	5,850.00
ATLAS 2015-04	1.01.01.01	FBP1200	Dummy FEB Commission	4/2/2015	4/10/2015	4/2/2015	4/10/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1210	Dummy LTDB PCB Layout and Fabrication	3/25/2015	4/22/2015	3/25/2015	4/22/2015	0	0	3,780.68
ATLAS 2015-04	1.01.01.01	FBP1220	Dummy LTDB Assembly	4/23/2015	4/30/2015	4/23/2015	4/30/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1220MP	Payment for Material for Dummy LTDB PCB Fab and Assembly	4/23/2015	4/23/2015	4/23/2015	4/23/2015	0	0	5,850.00
ATLAS 2015-04	1.01.01.01	FBP1230	Dummy LTDB Commission	5/1/2015	5/15/2015	5/1/2015	5/15/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1240	Dummy Calorimeter/Calibration PCB Layout and Fab	4/23/2015	5/27/2015	4/23/2015	5/27/2015	0	0	3,780.68
ATLAS 2015-04	1.01.01.01	FBP1250	Dummy Calorimeter/Calibration Board Assembly	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1250M	Material for Dummy Calorimeter Assembly	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	5,850.00
ATLAS 2015-04	1.01.01.01	FBP1260	Dummy Calorimeter/Calibration Board Commission	6/5/2015	6/15/2015	6/5/2015	6/15/2015	0	0	2,211.28
ATLAS 2015-04	1.01.01.01	FBP1270	Mechanical testing	6/16/2015	7/17/2015	6/16/2015	7/17/2015	0	0	448.40
ATLAS 2015-04	1.01.01.01	FBP1280	Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,793.60
ATLAS 2015-04	1.01.01.01	FBP1280T	Travel for Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,557.36
ATLAS 2015-04	1.01.01.01	FBP1290	Test electrical properties	7/20/2015	8/18/2015	7/20/2015	8/18/2015	0	0	3,464.32
ATLAS 2015-04	1.01.01.01	FBP1300	Document test results	8/19/2015	10/1/2015	8/19/2015	10/1/2015	0	0	3,467.67
ATLAS 2015-04	1.01.01.01	FBP1320	FCal Baseplane Prototype design work	10/2/2015	11/5/2015	10/2/2015	11/5/2015	0	0	3,169.68
ATLAS 2015-04	1.01.01.01	FBP1330	FCal Baseplane Prototype fabrication	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	2,277.60
ATLAS 2015-04	1.01.01.01	FBP1330M	Material cost for FCal Baseplane Prototype	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	6,700.00
ATLAS 2015-04	1.01.01.01	FBP1340	Preparation for Final Design Review	1/12/2016	1/21/2016	1/12/2016	1/21/2016	0	0	3,074.88
ATLAS 2015-04	1.01.01.01	FBP1350	Revisit of Final design if necessary	1/25/2016	2/3/2016	1/25/2016	2/3/2016	0	0	1,784.16
ATLAS 2015-04	1.01.01.01	FBP1360	Production Readiness Review	5/23/2016	5/27/2016	5/23/2016	5/27/2016	0	0	1,784.16
ATLAS 2015-04	1.01.01.01	FBP1380	Final layout changes	1/12/2016	2/9/2016	1/12/2016	2/9/2016	0	0	2,707.84
ATLAS 2015-04	1.01.01.01	FBP1390	FCal baseplane PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	1,731.90
ATLAS 2015-04	1.01.01.01	FBP1390M	Material cost for FCal Baseplanes PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	16,080.00
ATLAS 2015-04	1.01.01.01	FBP1400	FCal baseplane Components order	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	2,162.14
ATLAS 2015-04	1.01.01.01	FBP1400M	Material for FCal Baseplane components	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	10,720.00
ATLAS 2015-04	1.01.01.01	FBP1420	FCal baseplane Assembly	10/4/2016	1/9/2017	10/4/2016	1/9/2017	0	0	11,287.68
ATLAS 2015-04	1.01.01.01	FBP1425	Assembly Certification jig	1/10/2017	2/7/2017	1/10/2017	2/7/2017	0	0	918.88
ATLAS 2015-04	1.01.01.01	FBP1440	Production testing	2/8/2017	5/10/2017	2/8/2017	5/10/2017	0	0	6,334.24
ATLAS 2015-04	1.01.01.01	FBP1450	Document test results	5/11/2017	8/9/2017	5/11/2017	8/9/2017	0	0	4,594.40
ATLAS 2015-04	1.01.01.01	FBP1460	Ship FCal Baseplane to CERN	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	980.00
ATLAS 2015-04	1.01.01.01	FBP1460M	Material cost for shipping FCal Baseplane to CERN	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	284.00
ATLAS 2015-04	1.01.01.01	FBP1480	Document As-Built FCal Baseplanes	7/13/2017	9/13/2017	7/13/2017	9/13/2017	0	0	4,594.40
ATLAS 2015-04	1.01.02.01	LSB1160M	Payment for Material for PCB prototype and assembly	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
ATLAS 2015-04	1.01.02.01	LSB1200M	Payment for Material for PCB prototype and assembly	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
ATLAS 2015-04	1.01.02.01	LSB1240	PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	169.95
ATLAS 2015-04	1.01.02.01	LSB1240M	Material for PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	588.30
ATLAS 2015-04	1.01.02.01	LSB1290T	Travel for Final Design Review	3/13/2015	3/16/2015	3/13/2015	3/16/2015	0	0	3,975.00
ATLAS 2015-04	1.01.02.01	LSB1300M8	IC order - Procurement closeout	8/7/2015	8/7/2015	8/7/2015	8/7/2015	0	0	114,845.00
ATLAS 2015-04	1.01.02.01	LSB1320M	Material for IC radiation test	6/4/2015	8/6/2015	6/4/2015	8/6/2015	0	0	11,766.00
ATLAS 2015-04	1.01.02.01	LSB1320T	Travel for IC radiation test	6/4/2015	8/6/2015	6/4/2015	8/6/2015	0	0	1,590.00
ATLAS 2015-04	1.01.02.01	LSB1340	Procure burn-in Oven	3/17/2015	6/25/2015	3/17/2015	6/25/2015	0	0	824.00
ATLAS 2015-04	1.01.02.01	LSB1340M8	Burn-in Oven - Procurement closeout Payment	6/26/2015	6/26/2015	6/26/2015	6/26/2015	0	0	19,570.00
ATLAS 2015-04	1.01.02.01	LSB1370M	Material for order other LSB components	8/7/2015	8/13/2015	8/7/2015	8/13/2015	0	0	33,578.00
ATLAS 2015-04	1.01.02.01	LSB1400M60	Procurement Closeout	12/4/2015	12/4/2015	12/4/2015	12/4/2015	0	0	21,200.00
ATLAS 2015-04	1.01.02.01	LSB1470	test preproduction samples	2/19/2016	2/25/2016	2/19/2016	2/25/2016	0	0	1,167.00

ATLAS 2015-04	1.01.02.01	LSB1515	LSB Assembly Procurement Closeout	9/15/2016	9/15/2016	9/15/2016	9/15/2016	0	0	59,360.00
ATLAS 2015-04	1.01.02.01	LSB1520	PCB boards testing-part 1(50%)	6/7/2016	1/23/2017	6/7/2016	1/23/2017	0	0	11,993.35
ATLAS 2015-04	1.01.02.01	LSB1540	PCB board testing-part 2 (remaining 50%)	1/24/2017	9/7/2017	1/24/2017	9/7/2017	0	0	12,174.22
ATLAS 2015-04	1.01.02.01	LSB1570M	Material for Deliverable shipped to CERN	10/5/2017	10/5/2017	10/5/2017	10/5/2017	0	0	8,650.00
ATLAS 2015-04	1.01.02.02	LSB20155FY14.22	Lag payment for Earlier work	11/28/2014	11/28/2014	11/28/2014	11/28/2014	0	0	11,007.00
ATLAS 2015-04	1.01.02.02	LSB2070	PCB order for each LSB type of FCal	10/1/2014	11/7/2014	10/1/2014	11/7/2014	0	0	2,690.40
ATLAS 2015-04	1.01.02.02	LSB2070M	Material cost for PCB order	10/1/2014	10/20/2014	10/1/2014	10/20/2014	0	0	1,950.00
ATLAS 2015-04	1.01.02.02	LSB2080	Order Components for FCal LSB prototype	11/10/2014	11/21/2014	11/10/2014	11/21/2014	0	0	2,690.40
ATLAS 2015-04	1.01.02.02	LSB2080M	Material cost for FCal LSB components	11/10/2014	2/11/2015	11/10/2014	2/11/2015	0	0	650.00
ATLAS 2015-04	1.01.02.02	LSB2100	Assembly FCal LSB prototype	2/12/2015	3/11/2015	2/12/2015	3/11/2015	0	0	10,089.00
ATLAS 2015-04	1.01.02.02	LSB2120	FCal prototype Testing	3/12/2015	5/13/2015	3/12/2015	5/13/2015	0	0	9,397.80
ATLAS 2015-04	1.01.02.02	LSB2130	Document results	3/12/2015	5/29/2015	3/12/2015	5/29/2015	0	0	9,397.80
ATLAS 2015-04	1.01.02.02	LSB2160	LSB FCal final design review	3/12/2015	3/12/2015	3/12/2015	3/12/2015	0	0	3,286.20
ATLAS 2015-04	1.01.02.02	LSB2170	PCB order for FCal LSB production	9/21/2015	10/7/2015	9/21/2015	10/7/2015	0	0	2,721.42
ATLAS 2015-04	1.01.02.02	LSB2170M	Material cost for PCB order of FCal LSBs	9/21/2015	10/7/2015	9/21/2015	10/7/2015	0	0	3,946.15
ATLAS 2015-04	1.01.02.02	LSB2180	Order Components for FCal LSB production	10/8/2015	10/21/2015	10/8/2015	10/21/2015	0	0	4,156.56
ATLAS 2015-04	1.01.02.02	LSB2180M	Material cost for FCal LSB components production	10/8/2015	10/21/2015	10/8/2015	10/21/2015	0	0	22,780.00
ATLAS 2015-04	1.01.02.02	LSB2200	Contract LSB assembly	11/5/2015	11/13/2015	11/5/2015	11/13/2015	0	0	1,847.36
ATLAS 2015-04	1.01.02.02	LSB2205	Vendor assembly of FCal LSB	11/16/2015	12/28/2015	11/16/2015	12/28/2015	0	0	6,700.00
ATLAS 2015-04	1.01.02.02	LSB2206	Customized Additions to LSBs	12/29/2015	1/26/2016	12/29/2015	1/26/2016	0	0	8,659.50
ATLAS 2015-04	1.01.02.02	LSB2209	LABVIEW program	1/27/2016	2/16/2016	1/27/2016	2/16/2016	0	0	2,151.20
ATLAS 2015-04	1.01.02.02	LSB2210M	Material cost for shipment for Burn-in at Pittsburgh	1/27/2016	3/21/2016	1/27/2016	3/21/2016	0	0	268.00
ATLAS 2015-04	1.01.02.02	LSB2240	LSB Production testing	4/5/2016	6/8/2016	4/5/2016	6/8/2016	0	0	6,149.76
ATLAS 2015-04	1.01.02.02	LSB2260	Document test results	5/6/2016	7/18/2016	5/6/2016	7/18/2016	0	0	7,766.20
ATLAS 2015-04	1.01.02.02	LSB2265	Document As-Built FCal LSBs	7/19/2016	9/27/2016	7/19/2016	9/27/2016	0	0	9,917.40
ATLAS 2015-04	1.01.02.02	LSB2280	LSB FCal Ship to CERN	11/18/2016	11/25/2016	11/18/2016	11/25/2016	0	0	10,215.00
ATLAS 2015-04	1.01.03.01	TDB1080M	Payment for Reg Study PCB and parts	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	5,362.50
ATLAS 2015-04	1.01.03.01	TDB1090M	Payment for Material for Design Test fixture	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	1,237.50
ATLAS 2015-04	1.01.03.01	TDB11110	Design Validation at BNL with Demo LTDB	10/1/2014	10/10/2014	10/1/2014	10/10/2014	0	0	2,657.28
ATLAS 2015-04	1.01.03.01	TDB11160	Gamma and Proton radiation tests	3/25/2015	9/30/2016	09/01/2015*	9/30/2016	0	0	6,236.39
ATLAS 2015-04	1.01.03.01	TDB11165	Neutron radiation test	1/4/2016	9/27/2017	01/04/2016*	9/27/2017	0	0	9,609.79
ATLAS 2015-04	1.01.03.01	TDB11165M	Material for Neutron radiation test	11/2/2015	9/29/2017	1/4/2016	11/29/2017	-63	-61	2,589.04
ATLAS 2015-04	1.01.03.01	TDB11165T	Travel for radiation test	2/1/2017	2/7/2017	02/01/2017*	2/7/2017	0	0	2,100.00
ATLAS 2015-04	1.01.03.01	TDB11170	Report on AMB radiation tests	3/15/2016	3/15/2017	03/15/2016*	3/15/2017	0	0	4,701.60
ATLAS 2015-04	1.01.03.01	TDB11180	Design Pulser Control, DAQ equipment	10/1/2014	3/31/2015	10/1/2014	3/31/2015	0	0	9,440.81
ATLAS 2015-04	1.01.03.01	TDB11180M	Material for Pulser Control, DAQ equipment	10/1/2014	1/2/2015	10/1/2014	1/2/2015	0	0	2,805.00
ATLAS 2015-04	1.01.03.01	TDB11190	Data Acquisition Software for testing	6/16/2015	9/17/2015	6/16/2015	9/17/2015	0	0	11,456.58
ATLAS 2015-04	1.01.03.01	TDB1120	Gamma Radiation test at BNL	10/2/2014	1/15/2015	10/2/2014	1/15/2015	0	0	945.76
ATLAS 2015-04	1.01.03.01	TDB11200	Test Log Data Base Development	7/15/2015	10/15/2015	7/15/2015	10/15/2015	0	0	7,702.98
ATLAS 2015-04	1.01.03.01	TDB11270	Test/characterize/repair LTDB and associated Boards	1/4/2016	1/5/2018	1/4/2016	1/5/2018	0	0	27,491.79
ATLAS 2015-04	1.01.03.01	TDB11280	Test Boards on LTDB @ BNL	1/24/2017	2/22/2017	24-Jan-2017*	2/22/2017	2	0	2,819.04
ATLAS 2015-04	1.01.03.01	TDB11290	Participate in Tests @ CERN	1/4/2016	1/5/2018	1/4/2016	1/5/2018	0	0	8,749.49
ATLAS 2015-04	1.01.03.01	TDB11290T	Travel for Participate in Tests @ CERN	2/6/2017	3/17/2017	02/06/2017*	3/17/2017	0	0	3,500.00
ATLAS 2015-04	1.01.03.01	TDB1130	Proton radiation test at U. of Penn	1/16/2015	3/31/2015	1/16/2015	3/31/2015	0	0	3,248.38
ATLAS 2015-04	1.01.03.01	TDB11320	Diagnostic Work @ Penn	1/4/2016	1/5/2018	2/6/2017	2/8/2019	-399	-399	22,401.53
ATLAS 2015-04	1.01.03.01	TDB11330	Diagnostic Work @ CERN	1/4/2016	1/5/2018	2/6/2017	2/8/2019	-399	-399	17,498.99
ATLAS 2015-04	1.01.03.01	TDB11340M	Parts& Supplies for boards repair and test equipment	1/4/2016	1/5/2018	2/6/2017	2/8/2019	-399	-399	868.91
ATLAS 2015-04	1.01.03.01	TDB1150	Analyze Data	4/1/2015	5/1/2015	4/1/2015	5/1/2015	0	0	4,533.90
ATLAS 2015-04	1.01.03.01	TDB1160	prepare reports	7/1/2015	7/31/2015	5/4/2015	6/3/2015	58	58	5,589.30
ATLAS 2015-04	1.01.03.01	TDB1170	Deliver report at collaboration meeting	8/3/2015	8/3/2015	6/4/2015	6/4/2015	60	60	4,152.00
ATLAS 2015-04	1.01.03.01	TDB1170T	Travel for Deliver report at collaboration meeting	8/3/2015	8/3/2015	6/4/2015	6/4/2015	60	60	1,980.00
ATLAS 2015-04	1.01.03.01	TDB20158FY15	payment for COTS Regulator design and AMB test	3/17/2015	3/30/2015	03/17/2015*	3/30/2015	0	0	23,071.71
ATLAS 2015-04	1.01.03.02	TDB2100M	Payment for Material for 'Precision board assembly	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	5,150.00
ATLAS 2015-04	1.01.03.02	TDB2125	Testing	10/1/2014	10/31/2014	10/1/2014	10/31/2014	0	0	3,244.62
ATLAS 2015-04	1.01.03.02	TDB2140M	Payment for Material for 'Radiation test board production and asse	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	5,150.00
ATLAS 2015-04	1.01.03.02	TDB2160 M	Material for Radiation tests at MGH	10/1/2014	10/16/2014	10/1/2014	10/16/2014	0	0	4,550.00

ATLAS 2015-04	1.01.03.02	TDB8110	Prototype testing	8/3/2015	10/14/2015	8/3/2015	10/14/2015	0	0	43,338.64
ATLAS 2015-04	1.01.03.02	TDB8120	Radiation test board design (schematic and layout)	8/3/2015	8/6/2015	8/3/2015	8/6/2015	0	0	4,642.56
ATLAS 2015-04	1.01.03.02	TDB8130	Radiation test board production and assembly	8/7/2015	9/1/2015	8/7/2015	9/1/2015	0	0	2,370.00
ATLAS 2015-04	1.01.03.02	TDB8130M	Material for 'Radiation test board production and assembly	8/7/2015	9/1/2015	8/7/2015	9/1/2015	0	0	6,180.00
ATLAS 2015-04	1.01.03.02	TDB8140	Radiation test preparation (setup, software)	8/7/2015	9/18/2015	8/7/2015	9/18/2015	0	0	9,705.60
ATLAS 2015-04	1.01.03.02	TDB8150M	Material for Radiation tests at MGH	10/6/2015	10/6/2015	10/6/2015	10/6/2015	0	0	4,690.00
ATLAS 2015-04	1.01.03.02	TDB8150T	Travel for Radiation tests at MGH	10/6/2015	10/6/2015	10/6/2015	10/6/2015	0	0	670.00
ATLAS 2015-04	1.01.03.02	TDB8170T	Travel for Production readiness review	10/16/2015	10/16/2015	10/16/2015	10/16/2015	0	0	2,680.00
ATLAS 2015-04	1.01.03.02	TDB8190	Final chip submission preparation	8/3/2015	1/21/2016	8/3/2015	1/21/2016	0	0	35,494.73
ATLAS 2015-04	1.01.03.02	TDB8200	Final layout	8/3/2015	1/21/2016	8/3/2015	1/21/2016	0	0	30,762.10
ATLAS 2015-04	1.01.03.02	TDB8210	Packaging preparation	1/22/2016	3/3/2016	1/22/2016	3/3/2016	0	0	29,886.00
ATLAS 2015-04	1.01.03.02	TDB8220	Submission	2/5/2016	2/5/2016	2/5/2016	2/5/2016	0	0	15,900.00
ATLAS 2015-04	1.01.03.02	TDB8230	Packaging	5/31/2016	5/31/2016	5/31/2016	5/31/2016	0	0	4,881.60
ATLAS 2015-04	1.01.03.02	TDB8230M	Material for Packaging	5/31/2016	5/31/2016	5/31/2016	5/31/2016	0	0	31,800.00
ATLAS 2015-04	1.01.03.02	TDB8240	QA board firmware develoment	2/8/2016	3/8/2016	2/8/2016	3/8/2016	0	0	26,154.40
ATLAS 2015-04	1.01.03.02	TDB8250	QA board design (schematics and layout)	3/21/2016	4/19/2016	3/21/2016	4/19/2016	0	0	19,490.40
ATLAS 2015-04	1.01.03.02	TDB8260	QA board PCB production and assembly	4/20/2016	6/23/2016	4/20/2016	6/23/2016	0	0	2,440.80
ATLAS 2015-04	1.01.03.02	TDB8260M	Material for QA board PCB production and assembly	4/20/2016	6/23/2016	4/20/2016	6/23/2016	0	0	6,360.00
ATLAS 2015-04	1.01.03.02	TDB8270	QA board software	4/20/2016	6/23/2016	4/20/2016	6/23/2016	0	0	16,660.00
ATLAS 2015-04	1.01.03.02	TDB8280	QA test stand setup	4/20/2016	6/23/2016	4/20/2016	6/23/2016	0	0	26,488.60
ATLAS 2015-04	1.01.03.02	TDB8280M	Material for 'QA test stand setup	4/20/2016	6/23/2016	4/20/2016	6/23/2016	0	0	21,200.00
ATLAS 2015-04	1.01.03.02	TDB8300	Chip test Part 1-first 50%	6/24/2016	10/17/2016	6/24/2016	10/17/2016	0	0	40,338.47
ATLAS 2015-04	1.01.03.02	TDB8310	Chip test Part 2-the remaining 50%	10/18/2016	2/9/2017	10/18/2016	2/9/2017	0	0	41,382.00
ATLAS 2015-04	1.01.03.02	TDB8320	Integration support	2/10/2017	11/14/2017	2/10/2017	11/14/2017	0	0	75,657.12
ATLAS 2015-04	1.01.03.02	TDB8330	Payback to Operations	1/3/2017	1/3/2017	1/3/2017	1/3/2017	0	0	70,000.00
ATLAS 2015-04	1.01.03.03	TDB10050	Finalize Design of Cooling Interface for LTDB Prototype	12/16/2015	2/16/2016	12/16/2015*	2/16/2016	0	0	43,961.43
ATLAS 2015-04	1.01.03.03	TDB10060	Fabrication of Cooling Interface for LTDB Prototype	2/17/2016	4/19/2016	2/17/2016	4/19/2016	0	0	34,555.74
ATLAS 2015-04	1.01.03.03	TDB10070	Finalize Design of Cooling Interface for LTDB Pre-production	4/20/2016	7/5/2016	04/20/2016*	7/5/2016	0	0	54,170.95
ATLAS 2015-04	1.01.03.03	TDB10070T	Travel for Finalize Design of Cooling Interface for LTDB Pre-produ	4/20/2016	7/5/2016	4/20/2016	7/5/2016	0	0	3,300.00
ATLAS 2015-04	1.01.03.03	TDB10090	Procurement of Cooling Interface	7/6/2016	8/22/2016	7/6/2016	8/22/2016	0	0	18,076.03
ATLAS 2015-04	1.01.03.03	TDB10090MP	Payment for Material for 'Procurement of Cooling Interface	8/23/2016	8/23/2016	8/23/2016	8/23/2016	0	0	71,176.02
ATLAS 2015-04	1.01.03.03	TDB10100	Delivery of Cooling Interface	8/24/2016	11/23/2016	8/24/2016	11/23/2016	0	0	24,097.08
ATLAS 2015-04	1.01.03.03	TDB10110	Acceptance Test of Cooling Interface	11/25/2016	1/30/2017	11/25/2016	1/30/2017	0	0	31,038.88
ATLAS 2015-04	1.01.03.03	TDB12120	Identify Components of LTDB Prototype Schematics Design	10/1/2014	10/29/2014	10/1/2014	10/29/2014	0	0	19,947.23
ATLAS 2015-04	1.01.03.03	TDB12121	Identify Components of LTDB Prototype Schematics Design	6/1/2015	6/30/2015	6/1/2015	6/30/2015	0	0	1,844.52
ATLAS 2015-04	1.01.03.03	TDB12130A	Schematics Design of LTDB Prototype	7/1/2015	9/30/2015	7/1/2015	9/30/2015	0	0	44,116.16
ATLAS 2015-04	1.01.03.03	TDB12130COMPLET	Schematic Design of LTDB Prottype - Finished Portion	10/30/2014	12/31/2014	10/30/2014	10/30/2014	0	62	27,038.88
ATLAS 2015-04	1.01.03.03	TDB12130TCOMPLE	Travel for Schematic Designof LTDB Prototype - Finished Portion	10/30/2014	12/31/2014	01-Oct-2014*	11/28/2014	33	33	3,225.00
ATLAS 2015-04	1.01.03.03	TDB12140	Compoments Placement of LTDB Prototype Layout Design	10/1/2015	10/30/2015	10/1/2015	10/30/2015	0	0	26,663.40
ATLAS 2015-04	1.01.03.03	TDB12150	Layout Design of LTDB Prototype	11/2/2015	12/31/2015	11/2/2015	12/31/2015	0	0	95,801.13
ATLAS 2015-04	1.01.03.03	TDB12160	Prepare PO of Fabrication of LTDB Prototype PCB	12/2/2015	12/31/2015	12/2/2015	12/31/2015	0	0	2,415.70
ATLAS 2015-04	1.01.03.03	TDB12160M	Material for 'Prepare PO of Fabrication of LTDB Prototype PCB	12/2/2015	12/31/2015	12/2/2015	12/31/2015	0	0	14,520.00
ATLAS 2015-04	1.01.03.03	TDB12170	Fabrication of LTDB Prototype PCB	1/4/2016	1/29/2016	1/4/2016	1/29/2016	0	0	18,293.96
ATLAS 2015-04	1.01.03.03	TDB12180	Procurement of LTDB Prototype Parts	1/4/2016	1/29/2016	1/4/2016	1/29/2016	0	0	2,228.20
ATLAS 2015-04	1.01.03.03	TDB12180M	Material for Procurement of LTDB prototype Parts	1/4/2016	1/29/2016	1/4/2016	1/29/2016	0	0	10,560.00
ATLAS 2015-04	1.01.03.03	TDB12190	Prepare PO of Assembly of LTDB Prototype	1/4/2016	1/29/2016	1/4/2016	1/29/2016	0	0	690.20
ATLAS 2015-04	1.01.03.03	TDB12190M	Material for 'Prepare PO of Assembly of LTDB Prototype	1/4/2016	1/29/2016	1/4/2016	1/29/2016	0	0	6,600.00
ATLAS 2015-04	1.01.03.03	TDB12200	Assembly of LTDB Prototype	2/1/2016	2/29/2016	2/1/2016	2/29/2016	0	0	25,292.53
ATLAS 2015-04	1.01.03.03	TDB12210	Preparation of Test Setup for LTDB Prototype	1/4/2016	2/29/2016	1/4/2016	2/29/2016	0	0	22,932.10
ATLAS 2015-04	1.01.03.03	TDB12210T	Travel for Preparation of Test Setup for LTDB Prototype	1/4/2016	2/29/2016	1/4/2016	2/29/2016	0	0	3,300.00
ATLAS 2015-04	1.01.03.03	TDB12220	Evaluation of LTDB Prototype Power and Clock Circuits	3/1/2016	3/31/2016	3/1/2016	3/31/2016	0	0	31,896.24
ATLAS 2015-04	1.01.03.03	TDB12230	Evaluation Test of LTDB Prototype	4/1/2016	5/31/2016	4/1/2016	5/31/2016	0	0	63,792.48
ATLAS 2015-04	1.01.03.03	TDB12230T	Travel for Evaluation Test of LTDB Prototype	4/1/2016	5/31/2016	4/1/2016	5/31/2016	0	0	6,600.00
ATLAS 2015-04	1.01.03.03	TDB12250	Identify Components of LTDB Pre-production Design	6/1/2016	6/30/2016	6/1/2016	6/30/2016	0	0	31,896.24
ATLAS 2015-04	1.01.03.03	TDB12260	Schematics Design of LTDB Pre-production	7/1/2016	8/31/2016	7/1/2016	8/31/2016	0	0	63,792.48
ATLAS 2015-04	1.01.03.03	TDB12260T	Travel for Schematics Design of LTDB Pre-production	7/1/2016	8/31/2016	7/1/2016	8/31/2016	0	0	6,600.00

ATLAS 2015-04	1.01.03.03	TDB12270	Components Placement of LTDB Pre-production Layout Design	9/1/2016	9/30/2016	9/1/2016	9/30/2016	0	0	31,896.24
ATLAS 2015-04	1.01.03.03	TDB12280	Layout Design of LTDB Pre-production	10/3/2016	11/30/2016	10/3/2016	11/30/2016	0	0	83,826.26
ATLAS 2015-04	1.01.03.03	TDB12280T	Travel for Layout Design of LTDB Pre-production	10/3/2016	11/30/2016	10/3/2016	11/30/2016	0	0	3,400.00
ATLAS 2015-04	1.01.03.03	TDB12290	Prepare PO of Fabrication of LTDB Pre-production PCB	11/1/2016	11/30/2016	11/1/2016	11/30/2016	0	0	710.90
ATLAS 2015-04	1.01.03.03	TDB12290M	Material for Prepare PO of Fabrication of LTDB Pre-production PC	11/1/2016	11/30/2016	11/1/2016	11/30/2016	0	0	14,960.00
ATLAS 2015-04	1.01.03.03	TDB12300	Fabrication of LTDB Pre-production PCB	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	1,421.80
ATLAS 2015-04	1.01.03.03	TDB12310	Procurement of LTDB Pre-production Parts	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	3,612.10
ATLAS 2015-04	1.01.03.03	TDB12310M	Material for 'Procurement of LTDB Pre-production Parts	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	10,880.00
ATLAS 2015-04	1.01.03.03	TDB12310T	Travel for 'Procurement of LTDB Pre-production Parts	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	3,400.00
ATLAS 2015-04	1.01.03.03	TDB12320	Prepare PO of Assembly of LTDB Pre-production	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	1,421.80
ATLAS 2015-04	1.01.03.03	TDB12320M	Material for 'Prepare PO of Assembly of LTDB Pre-production	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	6,800.00
ATLAS 2015-04	1.01.03.03	TDB12330	Assembly of LTDB Pre-production	1/3/2017	1/31/2017	1/3/2017	1/31/2017	0	0	13,081.47
ATLAS 2015-04	1.01.03.03	TDB12340	Preparation of Test Setup for LTDB Pre-production	12/1/2016	1/31/2017	12/1/2016	1/31/2017	0	0	54,746.78
ATLAS 2015-04	1.01.03.03	TDB12350	Evaluation of LTDB Pre-production Power and Clock Circuits	2/1/2017	2/28/2017	2/1/2017	2/28/2017	0	0	32,852.80
ATLAS 2015-04	1.01.03.03	TDB12360	Evaluation Test of LTDB Pre-production	3/1/2017	4/28/2017	3/1/2017	4/28/2017	0	0	65,705.60
ATLAS 2015-04	1.01.03.03	TDB12360T	Travel for Evaluation Test of LTDB Pre-production	3/1/2017	4/28/2017	3/1/2017	4/28/2017	0	0	6,800.00
ATLAS 2015-04	1.01.03.03	TDB12380	Revision of LTDB Schematics Design for Final Production	5/1/2017	6/30/2017	5/1/2017	6/30/2017	0	0	65,705.60
ATLAS 2015-04	1.01.03.03	TDB12380T	Travel for Revision of LTDB Schematics Design for Final Producti	5/1/2017	6/30/2017	5/1/2017	6/30/2017	0	0	6,800.00
ATLAS 2015-04	1.01.03.03	TDB12390	Revision of LTDB Layout Design for Final Production	7/3/2017	8/31/2017	7/3/2017	8/31/2017	0	0	75,769.11
ATLAS 2015-04	1.01.03.03	TDB12390T	Travel for Revision of LTDB Layout Design for Final Production	7/3/2017	8/31/2017	7/3/2017	8/31/2017	0	0	3,400.00
ATLAS 2015-04	1.01.03.03	TDB12400	Procurement Oversight for Fabrication of LTDB Production PCB	8/1/2017	10/31/2017	8/1/2017	10/31/2017	0	0	1,436.03
ATLAS 2015-04	1.01.03.03	TDB12400M80	Assembly of LTDB Production PCB - Procurement closeout (Payn	10/31/2017	10/31/2017	10/31/2017	10/31/2017	0	0	87,750.00
ATLAS 2015-04	1.01.03.03	TDB12410	Fabrication of LTDB Production PCB	9/1/2017	10/31/2017	9/1/2017	10/31/2017	0	0	10,105.53
ATLAS 2015-04	1.01.03.03	TDB12420	Procurement of LTDB Production Parts	8/1/2017	8/31/2017	8/1/2017	8/31/2017	0	0	2,410.10
ATLAS 2015-04	1.01.03.03	TDB12420MP	Payment for Material for 'Procurement of LTDB Production Parts	8/31/2017	8/31/2017	8/31/2017	8/31/2017	0	0	151,410.42
ATLAS 2015-04	1.01.03.03	TDB12430	LTDB Production Parts delivery	9/1/2017	10/31/2017	9/1/2017	10/31/2017	0	0	48,509.60
ATLAS 2015-04	1.01.03.03	TDB12430T	Travel for LTDB Production Parts delivery	9/1/2017	10/31/2017	9/1/2017	10/31/2017	0	0	3,452.38
ATLAS 2015-04	1.01.03.03	TDB12440	Prepare PO of Assembly of LTDB Production	10/2/2017	1/31/2018	10/2/2017	1/31/2018	0	0	8,787.00
ATLAS 2015-04	1.01.03.03	TDB12440M80	Assembly of LTDB Production - Procurement closeout (Payment)	1/31/2018	1/31/2018	1/31/2018	1/31/2018	0	0	91,665.00
ATLAS 2015-04	1.01.03.03	TDB12450	Assembly of LTDB Production	11/1/2017	1/31/2018	11/1/2017	1/31/2018	0	0	35,074.34
ATLAS 2015-04	1.01.03.03	TDB12450T	Travel for Assembly of LTDB Production	11/1/2017	1/31/2018	11/1/2017	1/31/2018	0	0	7,000.00
ATLAS 2015-04	1.01.03.03	TDB13050	Mechanical Model of LTDB Prototype	3/16/2015	11/4/2015	09/08/2015*	11/4/2015	0	0	42,913.92
ATLAS 2015-04	1.01.03.03	TDB13060	Thermal Analysis of Cooling Design for LTDB Prototype	11/5/2015	1/7/2016	11/5/2015	1/7/2016	0	0	63,548.84
ATLAS 2015-04	1.01.03.03	TDB13070	Mockup Preparation of for LTDB Prototype Test	12/8/2015	2/8/2016	12/8/2015	2/8/2016	0	0	65,741.14
ATLAS 2015-04	1.01.03.03	TDB13070MP	Payment for Material for 'Mockup Preparation of for LTDB Prototy	2/9/2016	2/9/2016	2/9/2016	2/9/2016	0	0	31,680.00
ATLAS 2015-04	1.01.03.03	TDB13080	Mechanical Support of Evaluation Test of LTDB Prototype	2/10/2016	5/11/2016	2/10/2016	5/11/2016	0	0	77,086.00
ATLAS 2015-04	1.01.03.03	TDB13080MP	Payment for Material for Mechanical Support of Evaluation Test of	5/12/2016	5/12/2016	5/12/2016	5/12/2016	0	0	31,680.00
ATLAS 2015-04	1.01.03.03	TDB13100	Mechanical Model of LTDB Pre-production	5/13/2016	8/16/2016	5/13/2016	8/16/2016	0	0	46,897.55
ATLAS 2015-04	1.01.03.03	TDB13110	Board Integration Model of LTDB Pre-production assembly	8/17/2016	10/13/2016	8/17/2016	10/13/2016	0	0	44,211.56
ATLAS 2015-04	1.01.03.03	TDB13120	Full Assembly Integration Model of LTDB Pre-production assembl	10/14/2016	12/15/2016	10/14/2016	12/15/2016	0	0	48,302.00
ATLAS 2015-04	1.01.03.03	TDB13130	Mockup Preparation of for LTDB Pre-production Test	12/16/2016	3/21/2017	12/16/2016	3/21/2017	0	0	67,434.17
ATLAS 2015-04	1.01.03.03	TDB13130MP	Payment for Material for Mockup Preparation of for LTDB Pre-proc	8/24/2016	8/24/2016	2/17/2017	2/17/2017	-177	-177	32,640.00
ATLAS 2015-04	1.01.03.03	TDB13140	Mechanical Support of Evaluation Test of LTDB Preproduction	3/22/2017	6/22/2017	3/22/2017	6/22/2017	0	0	78,896.40
ATLAS 2015-04	1.01.03.03	TDB13140MP	Payment for Material for Mechanical Support of Evaluation Test of	7/23/2017	7/23/2017	6/23/2017	6/23/2017	30	30	32,640.00
ATLAS 2015-04	1.01.03.03	TDB13150	Mockup Preparation of for LTDB Production Test	7/3/2017	8/30/2017	7/3/2017	8/30/2017	0	0	72,841.68
ATLAS 2015-04	1.01.03.03	TDB13150MP	Payment for Material for Mockup Preparation of for LTDB Product	8/31/2017	8/31/2017	8/31/2017	8/31/2017	0	0	32,640.00
ATLAS 2015-04	1.01.03.03	TDB13160	Preparation of Mechanical Test Setup for LTDB Production	9/1/2017	11/1/2017	9/1/2017	11/1/2017	0	0	76,582.63
ATLAS 2015-04	1.01.03.03	TDB13160MP	Payment for Material for 'Preparation of Mechanical Test Setup fo	11/2/2017	11/2/2017	11/2/2017	11/2/2017	0	0	33,600.00
ATLAS 2015-04	1.01.03.03	TDB13170	Preparation of Electrical Test Setup for LTDB Production	11/3/2017	1/9/2018	11/3/2017	1/9/2018	0	0	92,683.34
ATLAS 2015-04	1.01.03.03	TDB13170MP	Payment for Material for 'Preparation of Electrical Test Setup for L	1/10/2018	1/10/2018	1/10/2018	1/10/2018	0	0	65,000.00
ATLAS 2015-04	1.01.03.03	TDB13180	Production Test of LTDB	1/11/2018	4/17/2018	1/11/2018	4/27/2018	0	-10	173,134.24
ATLAS 2015-04	1.01.03.03	TDB13200	LTDB Acceptance Test at CERN	4/30/2018	5/11/2018	4/30/2018	5/11/2018	0	0	7,286.75
ATLAS 2015-04	1.01.03.03	TDB13200T	Travel for Reception Test of LTDB at CERN	4/30/2018	5/11/2018	4/30/2018	5/11/2018	0	0	7,000.00
ATLAS 2015-04	1.01.03.03	TDB1400	Schematics Design of LTDB Pre-Prototype	12/1/2014	3/31/2015	12/01/2014*	3/31/2015	0	0	127,570.00
ATLAS 2015-04	1.01.03.03	TDB1400T	Travel for Schematics Design of LTDB Pre-Prototype	12/1/2014	3/31/2015	12/1/2014	3/31/2015	0	0	6,450.00
ATLAS 2015-04	1.01.03.03	TDB1420	Compoments Placement of LTDB Pre-Prototype Layout Design	4/1/2015	4/30/2015	4/1/2015	4/30/2015	0	0	25,174.10

ATLAS 2015-04	1.01.04.02	DPS2150	ATCA Atlas functionality (v2) schematic	8/21/2015	1/6/2016	4/15/2015	8/27/2015	128	132	23,474.91
ATLAS 2015-04	1.01.04.02	DPS2150T	Travel for ATCA v2 schematic	8/21/2015	1/6/2016	4/15/2015	8/27/2015	128	132	2,816.42
ATLAS 2015-04	1.01.04.02	DPS2160	ATCA v2 parts procurement	11/2/2015	11/6/2015	6/25/2015	7/1/2015	130	128	5,639.00
ATLAS 2015-04	1.01.04.02	DPS2160M	Material for: ATCA v2 parts procurement	11/2/2015	11/6/2015	6/25/2015	7/1/2015	130	128	14,809.26
ATLAS 2015-04	1.01.04.02	DPS2170	ATCA v2 layout	1/7/2016	3/8/2016	8/28/2015	10/29/2015	132	131	21,049.60
ATLAS 2015-04	1.01.04.02	DPS2170M	Material for ATCA v2 layout	1/7/2016	3/8/2016	8/28/2015	10/29/2015	132	131	8,520.00
ATLAS 2015-04	1.01.04.02	DPS2190	ATCA v2 PCB+ assembly	2/18/2016	3/21/2016	10/12/2015	11/11/2015	129	131	8,270.20
ATLAS 2015-04	1.01.04.02	DPS2190M	Material for ATCA v2 PCB+ assembly	2/18/2016	3/21/2016	10/12/2015	11/11/2015	129	131	22,260.00
ATLAS 2015-04	1.01.04.02	DPS2200	ATCA v2 validation	3/22/2016	8/24/2016	1/25/2016	6/27/2016	57	58	34,863.40
ATLAS 2015-04	1.01.04.02	DPS2200M	Material for ATCA v2 validation	3/22/2016	8/24/2016	1/25/2016	6/27/2016	57	58	24,168.00
ATLAS 2015-04	1.01.04.02	DPS2200T	Travel for ATCA v2 validation	3/22/2016	8/24/2016	1/25/2016	6/27/2016	57	58	2,840.00
ATLAS 2015-04	1.01.04.02	DPS2220	ATCA v3 parts procurement	7/28/2016	8/3/2016	5/31/2016	6/6/2016	58	58	5,639.00
ATLAS 2015-04	1.01.04.02	DPS2220M	Material for: ATCA v3 parts procurement	7/28/2016	8/3/2016	5/31/2016	6/6/2016	58	58	29,622.76
ATLAS 2015-04	1.01.04.02	DPS2230	ATCA v3 schematic	3/22/2016	9/27/2016	1/25/2016	7/29/2016	57	60	13,813.80
ATLAS 2015-04	1.01.04.02	DPS2240	ATCA v3 layout	9/28/2016	11/14/2016	8/1/2016	9/16/2016	58	59	16,218.28
ATLAS 2015-04	1.01.04.02	DPS2240M	Material for ATCA v3 layout	9/28/2016	11/14/2016	8/1/2016	9/16/2016	58	59	8,738.82
ATLAS 2015-04	1.01.04.02	DPS2250	ATCA v3 PCB+ assembly	11/15/2016	1/3/2017	9/19/2016	11/2/2016	57	62	8,518.00
ATLAS 2015-04	1.01.04.02	DPS2250M	Material for ATCA v3 PCB+ assembly	11/15/2016	1/3/2017	9/19/2016	11/2/2016	57	62	22,890.00
ATLAS 2015-04	1.01.04.02	DPS2260	ATCA v3 validation	1/4/2017	4/6/2017	11/3/2016	2/8/2017	62	57	18,292.50
ATLAS 2015-04	1.01.04.02	DPS2260T	Travel for ATCA v3 validation	1/4/2017	4/6/2017	11/3/2016	2/8/2017	62	57	7,300.00
ATLAS 2015-04	1.01.04.02	DPS2270	ATCA Carrier Board Production	4/7/2017	7/10/2017	2/9/2017	5/10/2017	57	61	18,292.50
ATLAS 2015-04	1.01.04.02	DPS2270M60	Procurement Closeout - ATCA Carrier Board Production	6/21/2017	6/21/2017	4/24/2017	4/24/2017	58	58	369,525.26
ATLAS 2015-04	1.01.04.02	DPS2280	ATCA Carrier Board Validation	5/23/2017	8/22/2017	3/27/2017	6/23/2017	57	60	45,491.60
ATLAS 2015-04	1.01.04.02	DPS2280T	Travel for ATCA Carrier Board Validation	5/23/2017	8/22/2017	3/27/2017	6/23/2017	57	60	2,920.00
ATLAS 2015-04	1.01.04.02	DPS2290T	Travel for Integration Support	8/23/2017	6/12/2018	6/26/2017	4/13/2018	58	60	7,517.07
ATLAS 2015-04	1.01.04.03	DPS1240M	Payment for Material for Develop Optical Test Card v1 FW (8 ch)	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	4,715.10
ATLAS 2015-04	1.01.04.03	DPS1280	Develop Optical Test Card v1 FW (8 ch) - Module Integration	10/2/2014	1/14/2015	10/2/2014	1/14/2015	0	0	4,931.64
ATLAS 2015-04	1.01.04.03	DPS1300	Develop Optical Test Card FW v2 - SERDES I/O	1/15/2015	2/13/2015	1/15/2015	2/13/2015	0	0	8,035.00
ATLAS 2015-04	1.01.04.03	DPS1310	Develop Optical Test Card FW v2 - Data Processing	2/16/2015	3/17/2015	2/16/2015	3/17/2015	0	0	4,542.30
ATLAS 2015-04	1.01.04.03	DPS1330	Develop Optical Test Card v2 FW - Monitor out	3/18/2015	4/13/2015	3/18/2015	4/13/2015	0	0	4,542.30
ATLAS 2015-04	1.01.04.03	DPS1340	Develop Optical Test Card FW v2 - Module Integration	4/14/2015	5/11/2015	4/14/2015	5/11/2015	0	0	3,068.50
ATLAS 2015-04	1.01.04.03	DPS1370	Develop Optical Test Card Data Generator FW v1 - SERDES I/O	1/15/2015	1/29/2015	1/15/2015	1/29/2015	0	0	2,978.25
ATLAS 2015-04	1.01.04.03	DPS1380	Develop Optical Test Card Data Generator FW v1 - Data Compari	1/30/2015	3/26/2015	1/30/2015	3/26/2015	0	0	3,158.75
ATLAS 2015-04	1.01.04.03	DPS1400	Develop Optical Test Card Data Generator FW v1 - Results out	5/12/2015	7/14/2015	5/12/2015	7/14/2015	0	0	3,158.75
ATLAS 2015-04	1.01.04.03	DPS1410	Develop Optical Test Card Data Generator FW v1 - Module Integr	7/15/2015	9/10/2015	7/15/2015	9/10/2015	0	0	3,158.75
ATLAS 2015-04	1.01.04.03	DPS1440	Change FW platforms -Learn Quartus	10/2/2014	12/31/2014	10/2/2014	12/31/2014	0	0	12,768.96
ATLAS 2015-04	1.01.04.03	DPS1440M	Material for Change FW platforms if needed	10/2/2014	1/2/2015	10/2/2014	1/2/2015	0	0	25,972.70
ATLAS 2015-04	1.01.04.03	DPS1445	Change FW platforms -Learn IP	1/5/2015	3/31/2015	1/5/2015	3/31/2015	0	0	14,127.36
ATLAS 2015-04	1.01.04.03	DPS1450	Develop LAr Adv. Mezz. Card FIR and buffer FW v1	4/1/2015	5/14/2015	4/1/2015	5/14/2015	0	0	7,137.90
ATLAS 2015-04	1.01.04.03	DPS1450M	Material for Develop LAr Adv. Mezz. Card FIR and buffer FW v1	4/1/2015	5/14/2015	4/1/2015	5/14/2015	0	0	5,066.10
ATLAS 2015-04	1.01.04.03	DPS1450T	Travel for Develop LAr Adv. Mezz. Card FIR and buffer FW v1	4/1/2015	5/14/2015	4/1/2015	5/14/2015	0	0	6,525.34
ATLAS 2015-04	1.01.04.03	DPS1451M	Purchase parts for LTDB	3/10/2015	3/16/2015	03/10/2015*	3/16/2015	0	0	2,236.00
ATLAS 2015-04	1.01.04.03	DPS1455	Complete remaining 50% of LAr Adv. Mezz. Card FIR and buffer	5/15/2015	6/30/2015	5/15/2015	6/30/2015	0	0	6,748.56
ATLAS 2015-04	1.01.04.03	DPS1470	Develop LAr Adv. Mezz. Card Other Task FW v1	7/1/2015	9/29/2015	7/1/2015	9/29/2015	0	0	18,772.00
ATLAS 2015-04	1.01.04.03	DPS1490	Develop LAr Adv. Mezz. Card FIR and buffer FW v2	3/29/2016	5/11/2016	3/29/2016	5/11/2016	0	0	7,218.18
ATLAS 2015-04	1.01.04.03	DPS1490M	Material for Develop LAr Adv. Mezz. Card FIR and buffer FW v2	3/29/2016	5/11/2016	3/29/2016	5/11/2016	0	0	4,283.98
ATLAS 2015-04	1.01.04.03	DPS1490T	Travel for Develop LAr Adv. Mezz. Card FIR and buffer FW v2	3/29/2016	5/11/2016	3/29/2016	5/11/2016	0	0	8,401.35
ATLAS 2015-04	1.01.04.03	DPS1495	Complete remaining 50% of LAr Adv. Mezz. Card FIR and buffer	5/12/2016	6/28/2016	5/12/2016	6/28/2016	0	0	6,950.84
ATLAS 2015-04	1.01.04.03	DPS1510	Develop LAr Adv. Mezz. Card Other Task FW v2	6/29/2016	8/30/2016	6/29/2016	8/30/2016	0	0	13,386.24
ATLAS 2015-04	1.01.04.03	DPS1530	Develop LAr Adv. Mezz. Card FIR and buffer FW prod	3/29/2017	5/11/2017	3/29/2017	5/11/2017	0	0	7,297.04
ATLAS 2015-04	1.01.04.03	DPS1530 M	Material for Develop LAr Adv. Mezz. Card FIR and buffer FW prod	3/29/2017	5/11/2017	3/29/2017	5/11/2017	0	0	2,079.66
ATLAS 2015-04	1.01.04.03	DPS1530T	Travel for Develop LAr Adv. Mezz. Card FIR and buffer FW prod	3/29/2017	5/11/2017	3/29/2017	5/11/2017	0	0	8,653.44
ATLAS 2015-04	1.01.04.03	DPS1535	Complete remaining 50% of LAr Adv. Mezz. Card FIR and buffer	5/12/2017	6/28/2017	5/12/2017	6/28/2017	0	0	7,159.36
ATLAS 2015-04	1.01.04.03	DPS1550	Develop LAr Adv. Mezz. Card Other Task FW prod	6/29/2017	8/29/2017	6/29/2017	8/29/2017	0	0	13,499.34
ATLAS 2015-04	1.01.04.03	DPS1570	Final testing at CERN	8/30/2017	10/26/2017	8/30/2017	10/26/2017	0	0	4,632.37
ATLAS 2015-04	1.01.04.03	DPS2330	Payment for Develop Carrier switch/FPGA I/O	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	2,075.75

ATLAS 2015-04	1.01.04.03	DPS2340	Payment for Develop Carrier switch/FPGA configuration paths	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	2,075.75
ATLAS 2015-04	1.01.04.03	DPS2350	Payment for Develop Carrier switch/FPGA software/firmware task	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	2,075.75
ATLAS 2015-04	1.01.04.03	DPS2370	Develop ethernet FW for Carrier card v1	10/2/2014	12/30/2014	10/2/2014	12/30/2014	0	0	8,580.52
ATLAS 2015-04	1.01.04.03	DPS2370M	Material for Develop ethernet FW for Carrier card v1	10/2/2014	11/28/2014	10/2/2014	11/28/2014	0	0	4,715.10
ATLAS 2015-04	1.01.04.03	DPS2380	Develop 2nd 50% ethernet FW for Carrier card v1	12/31/2014	2/16/2015	12/31/2014	2/16/2015	0	0	6,917.82
ATLAS 2015-04	1.01.04.03	DPS2390	Develop high speed protocol FW for Carrier card v1	3/4/2015	5/4/2015	3/4/2015	5/4/2015	0	0	8,046.36
ATLAS 2015-04	1.01.04.03	DPS2390M	Material for Develop 10 GbE FW v1	3/4/2015	5/4/2015	3/4/2015	5/4/2015	0	0	7,667.40
ATLAS 2015-04	1.01.04.03	DPS2400	Develop 2nd 50% high speed protocol FW for Carrier card v1	5/5/2015	7/6/2015	5/5/2015	7/6/2015	0	0	10,641.96
ATLAS 2015-04	1.01.04.03	DPS2420	Develop GigaBitTransceiver FW for Carrier card v1	7/7/2015	8/19/2015	7/7/2015	8/19/2015	0	0	5,210.41
ATLAS 2015-04	1.01.04.03	DPS2430	Develop 2nd 50% GigaBitTransceiver FW for Carrier card v1	8/20/2015	10/6/2015	8/20/2015	10/6/2015	0	0	5,567.01
ATLAS 2015-04	1.01.04.03	DPS2440	Integrate FW for Carrier card v1	10/7/2015	11/19/2015	10/7/2015	11/19/2015	0	0	2,509.92
ATLAS 2015-04	1.01.04.03	DPS2445	Integrate 2nd 50% FW for Carrier card v1	11/20/2015	1/8/2016	11/20/2015	1/8/2016	0	0	2,509.92
ATLAS 2015-04	1.01.04.03	DPS2460	Develop ethernet FW for Carrier card v2	2/22/2016	3/18/2016	2/22/2016	3/18/2016	0	0	3,439.52
ATLAS 2015-04	1.01.04.03	DPS2480	Develop high speed protocol FW for Carrier card v2	3/21/2016	5/3/2016	3/21/2016	5/3/2016	0	0	6,950.84
ATLAS 2015-04	1.01.04.03	DPS2480M	Material for high speed protocol FW for Carrier card v2	3/21/2016	5/3/2016	3/21/2016	5/3/2016	0	0	4,408.60
ATLAS 2015-04	1.01.04.03	DPS2485	Develop 2nd 50% high speed protocol FW for Carrier card v2	5/4/2016	6/20/2016	5/4/2016	6/20/2016	0	0	7,351.85
ATLAS 2015-04	1.01.04.03	DPS2500	Develop GigaBitTransceiver FW for Carrier card v2	6/21/2016	7/22/2016	6/21/2016	7/22/2016	0	0	3,955.32
ATLAS 2015-04	1.01.04.03	DPS2520	Integrate FW for Carrier card v2	7/25/2016	8/24/2016	7/25/2016	8/24/2016	0	0	3,160.64
ATLAS 2015-04	1.01.04.03	DPS2540	Develop ethernet FW for prod Carrier card	10/18/2016	12/19/2016	10/18/2016	12/19/2016	0	0	3,350.90
ATLAS 2015-04	1.01.04.03	DPS2560	Develop high speed protocol FW for prod Carrier card	12/20/2016	2/3/2017	12/20/2016	2/3/2017	0	0	7,159.36
ATLAS 2015-04	1.01.04.03	DPS2560MP	Payment for Material for Develop 10 GbE FW prod	2/6/2017	2/6/2017	2/6/2017	2/6/2017	0	0	42,528.84
ATLAS 2015-04	1.01.04.03	DPS2565	Develop 2nd 50% high speed protocol FW for prod Carrier card	2/7/2017	3/23/2017	2/7/2017	3/23/2017	0	0	8,811.52
ATLAS 2015-04	1.01.04.03	DPS2580	Develop GigaBitTransceiver FW for prod Carrier card	3/24/2017	5/23/2017	3/24/2017	5/23/2017	0	0	8,147.52
ATLAS 2015-04	1.01.04.03	DPS2600	Integrate FW for prod Carrier card	5/24/2017	7/26/2017	5/24/2017	7/26/2017	0	0	3,350.90
ATLAS 2015-04	1.01.04.03	DPS2620	Final testing of Carrier Card FW at CERN	7/27/2017	8/23/2017	7/27/2017	8/23/2017	0	0	1,914.80
ATLAS 2015-04	1.01.04.03	DPS3020	Optical Test Card v1 tests - 8 channel SERDES FW using VC707	10/1/2014	11/28/2014	10/1/2014	11/28/2014	0	0	1,547.73
ATLAS 2015-04	1.01.04.03	DPS3040	Optical Test Card v1 tests - 8 channel Data Handling and Bufferin	10/1/2014	10/30/2014	10/1/2014	10/30/2014	0	0	3,770.99
ATLAS 2015-04	1.01.04.03	DPS3050	Optical Test Card v1 tests - Ethernet communication	10/1/2014	11/28/2014	10/1/2014	11/28/2014	0	0	854.22
ATLAS 2015-04	1.01.04.03	DPS3080M	Material for Optical Test Card v1 plus Commerical Carrier - Power	10/1/2014	11/28/2014	10/1/2014	11/28/2014	0	0	9,308.00
ATLAS 2015-04	1.01.04.03	DPS3090	Optical Test Card v1 plus Commercial Carrier tests - Ethernet test	10/1/2014	11/28/2014	10/1/2014	11/28/2014	0	0	2,382.16
ATLAS 2015-04	1.01.04.03	DPS3100	Optical Test Card v1 plus Commercial Carrier - High speed protoc	10/1/2014	11/28/2014	10/1/2014	11/28/2014	0	0	1,882.66
ATLAS 2015-04	1.01.04.03	DPS3110	Optical Test Card v2 tests - 40 channel SERDES using two Optica	1/2/2015	3/4/2015	1/2/2015	3/4/2015	0	0	8,058.11
ATLAS 2015-04	1.01.04.03	DPS3120	Optical Test Card v2 tests - 40 channel Data Handling and Bufferi	3/5/2015	5/4/2015	3/5/2015	5/4/2015	0	0	9,441.66
ATLAS 2015-04	1.01.04.03	DPS3150	Optical Test Card v2 plus Carrier Card v1 tests - Ethernet tests	7/1/2015	8/17/2015	7/1/2015	8/17/2015	0	0	6,152.32
ATLAS 2015-04	1.01.04.03	DPS3150M	Material for Optical Test Card v2 plus Carrier Card v1 tests - Ether	7/1/2015	8/17/2015	7/1/2015	8/17/2015	0	0	2,158.00
ATLAS 2015-04	1.01.04.03	DPS3160	Optical Test Card v2 plus Carrier Card v1 tests - Other OTC v2 to	8/18/2015	10/2/2015	8/18/2015	10/2/2015	0	0	6,002.46
ATLAS 2015-04	1.01.04.03	DPS3170	Optical Test Card v2 plus Carrier Card v1 tests - Other Carrier Cai	10/5/2015	11/18/2015	10/5/2015	11/18/2015	0	0	6,574.31
ATLAS 2015-04	1.01.04.03	DPS3210	Specify AAMC v1 tests	7/1/2015	8/28/2015	7/1/2015	8/28/2015	0	0	902.50
ATLAS 2015-04	1.01.04.03	DPS3230	Adv. Mezz. Card v1 tests - suite 1	8/31/2015	10/28/2015	8/31/2015	10/28/2015	0	0	8,131.59
ATLAS 2015-04	1.01.04.03	DPS3250	Adv. Mezz. Card v1 tests - suite 2	10/29/2015	12/30/2015	10/29/2015	12/30/2015	0	0	8,478.95
ATLAS 2015-04	1.01.04.03	DPS3260	Adv. Mezz. Card v1 tests - suite 3	12/31/2015	3/1/2016	12/31/2015	3/1/2016	0	0	16,681.91
ATLAS 2015-04	1.01.04.03	DPS3280	Specify Adv. Mezz. Card v1 plus Carrier Card v1 tests	7/1/2015	8/28/2015	7/1/2015	8/28/2015	0	0	1,624.50
ATLAS 2015-04	1.01.04.03	DPS3290	Adv. Mezz. Card v1 plus Carrier card v1 - Power tests	8/31/2015	10/29/2015	8/31/2015	10/29/2015	0	0	8,167.96
ATLAS 2015-04	1.01.04.03	DPS3290M	Material for Adv. Mezz. Card v1 plus Carrier card v1 - Power tests	8/31/2015	10/29/2015	8/31/2015	10/29/2015	0	0	13,484.33
ATLAS 2015-04	1.01.04.03	DPS3310	Adv. Mezz. Card v1 plus Carrier Card v1 tests - Ethernet tests	10/30/2015	12/31/2015	10/30/2015	12/31/2015	0	0	8,298.98
ATLAS 2015-04	1.01.04.03	DPS3320	Adv. Mezz. Card v1 plus Carrier Card v1 - High speed protocol tes	1/4/2016	3/2/2016	1/4/2016	3/2/2016	0	0	8,274.69
ATLAS 2015-04	1.01.04.03	DPS3400	Specify Adv. Mezz. Card v2 plus Carrier Card v2 tests	2/1/2016	2/29/2016	2/1/2016	2/29/2016	0	0	836.64
ATLAS 2015-04	1.01.04.03	DPS3410	Adv. Mezz. Card v2 plus Carrier card v2 tests - suite 1	3/1/2016	5/16/2016	3/1/2016	5/16/2016	0	0	15,555.38
ATLAS 2015-04	1.01.04.03	DPS3410M	Material for Adv. Mezz. Card v2 plus Carrier card v2 tests - suite 1	3/1/2016	5/16/2016	3/1/2016	5/16/2016	0	0	5,441.74
ATLAS 2015-04	1.01.04.03	DPS3430	Adv. Mezz. Card v2 plus Carrier Card v2 tests - suite 2	5/17/2016	8/3/2016	5/17/2016	8/3/2016	0	0	15,899.12
ATLAS 2015-04	1.01.04.03	DPS3440	Adv. Mezz. Card v2 plus Carrier Card tests v2 - suite 3	8/4/2016	10/20/2016	8/4/2016	10/20/2016	0	0	15,984.19
ATLAS 2015-04	1.01.04.03	DPS3580	Specify prod Adv. Mezz. Card plus prod Carrier Card tests	1/27/2017	2/27/2017	1/27/2017	2/27/2017	0	0	957.40
ATLAS 2015-04	1.01.04.03	DPS3590	Adv. Mezz. Card plus Carrier card tests - suite 1	8/23/2017	10/23/2017	6/26/2017	8/24/2017	58	60	20,183.23
ATLAS 2015-04	1.01.04.03	DPS3590M	Material for Adv. Mezz. Card plus Carrier card tests - suite 1	8/23/2017	10/23/2017	6/26/2017	8/24/2017	58	60	1,420.00
ATLAS 2015-04	1.01.04.03	DPS3610	Adv. Mezz. Card plus Carrier Card tests - suite 2	10/24/2017	12/22/2017	8/25/2017	10/25/2017	60	58	20,065.82
ATLAS 2015-04	1.01.04.03	DPS3620	Adv. Mezz. Card plus Carrier Card tests - suite 3	12/26/2017	2/26/2018	10/26/2017	12/28/2017	61	60	20,759.30

ATLAS 2015-04	1.01.04.03	DPS3740	Final testing at CERN	2/27/2018	3/28/2018	12/29/2017	1/30/2018	60	57	3,030.96
ATLAS 2015-04	1.02.01	VMM1126	VMM2 test at BNL -part 2	10/9/2014	12/19/2014	10/9/2014	12/19/2014	0	0	19,753.20
ATLAS 2015-04	1.02.01	VMM1130	VMM2 Test at CERN phase 1	10/9/2014	12/9/2014	10/9/2014	12/9/2014	0	0	5,516.16
ATLAS 2015-04	1.02.01	VMM1130T	Travel for VMM2 Test at CERN phase 1	10/9/2014	12/9/2014	10/9/2014	12/9/2014	0	0	7,795.04
ATLAS 2015-04	1.02.01	VMM1140	VMM2 Test at CERN phase 2	12/10/2014	2/25/2015	12/10/2014	2/25/2015	0	0	12,662.12
ATLAS 2015-04	1.02.01	VMM1140M	Material for VMM2 Test at CERN phase 2	12/11/2014	2/26/2015	12/10/2014	2/25/2015	1	1	6,192.00
ATLAS 2015-04	1.02.01	VMM1140T	Travel for VMM2 Test at CERN phase 2	12/10/2014	3/1/2015	12/10/2014	2/25/2015	0	4	6,192.00
ATLAS 2015-04	1.02.01	VMM1150	VMM2 Test at CERN phase 3	2/26/2015	4/28/2015	2/26/2015	4/28/2015	0	0	7,976.32
ATLAS 2015-04	1.02.01	VMM1150M	Material for VMM2 Test at CERN phase 3	2/26/2015	4/28/2015	2/26/2015	4/28/2015	0	0	6,450.00
ATLAS 2015-04	1.02.01	VMM1160M	Material for Distribute VMM2	4/29/2015	7/2/2015	4/29/2015	7/2/2015	0	0	1,290.00
ATLAS 2015-04	1.02.01	VMM2010	VMM3 start design of remaining features	12/22/2014	3/3/2015	12/22/2014	3/3/2015	0	0	9,193.60
ATLAS 2015-04	1.02.01	VMM20106FY14.3	payment for Graduate Student in CERN	11/28/2014	11/28/2014	11/28/2014	11/28/2014	0	0	44,154.00
ATLAS 2015-04	1.02.01	VMM2020	VMM3 Final Design Changes	3/4/2015	5/12/2015	3/4/2015	5/12/2015	0	0	8,044.40
ATLAS 2015-04	1.02.01	VMM2020MP	Payment for Material for VMM3 Design Features and Changes	5/13/2015	5/13/2015	5/13/2015	5/13/2015	0	0	53,550.00
ATLAS 2015-04	1.02.01	VMM2020T	Travel for VMM3 Design Features and Changes	3/4/2015	5/12/2015	3/4/2015	5/12/2015	0	0	3,096.00
ATLAS 2015-04	1.02.01	VMM2022	Establish parameters and and storage buffer depth of VMM Digita	3/4/2015	6/2/2015	3/4/2015	6/2/2015	0	0	11,433.00
ATLAS 2015-04	1.02.01	VMM2026	Develop the Digital System HDL	6/3/2015	8/31/2015	6/3/2015	8/31/2015	0	0	11,433.00
ATLAS 2015-04	1.02.01	VMM2028	Design Implementation of Digital Interface	9/1/2015	12/11/2015	9/1/2015	12/11/2015	0	0	15,561.11
ATLAS 2015-04	1.02.01	VMM2030	VMM3 Layout	5/14/2015	7/27/2015	5/14/2015	7/27/2015	0	0	11,951.68
ATLAS 2015-04	1.02.01	VMM2040	VMM3 Final Design Review	6/25/2015	7/27/2015	6/25/2015	7/27/2015	0	0	4,596.80
ATLAS 2015-04	1.02.01	VMM2050M02	VMM3 Submission to MOSIS	7/31/2015	8/3/2015	7/31/2015	8/3/2015	0	0	919.36
ATLAS 2015-04	1.02.01	VMM2080	Prepare Package with BGA Substrate	8/4/2015	10/29/2015	8/4/2015	10/29/2015	0	0	9,693.03
ATLAS 2015-04	1.02.01	VMM2110	First batch VMM3 Test at BNL	11/10/2015	12/10/2015	11/10/2015	12/10/2015	0	0	10,415.68
ATLAS 2015-04	1.02.01	VMM2120	Remaning VMM3 test at BNL	12/11/2015	1/12/2016	12/11/2015	1/12/2016	0	0	4,734.40
ATLAS 2015-04	1.02.01	VMM2130M10	Procurement closeout and payment for Fabrication of VMM3 Chip	1/8/2016	1/12/2016	1/8/2016	1/12/2016	0	0	477,000.00
ATLAS 2015-04	1.02.01	VMM2130M12	Procurement closeout for VMM3 production	1/8/2016	1/12/2016	1/8/2016	1/12/2016	0	0	1,420.32
ATLAS 2015-04	1.02.01	VMM2140	VMM3 Test at SPS1-phase 1	1/13/2016	3/25/2016	1/13/2016	3/25/2016	0	0	20,548.56
ATLAS 2015-04	1.02.01	VMM2140M	Material for VMM3 Test at SPS1-phase 1	1/13/2016	3/25/2016	1/13/2016	3/25/2016	0	0	15,840.00
ATLAS 2015-04	1.02.01	VMM2140T	Travel for VMM3 Test at SPS1-phase 1	1/13/2016	3/25/2016	1/13/2016	3/25/2016	0	0	6,336.00
ATLAS 2015-04	1.02.01	VMM2150	VMM3 Test at SPS2-phase 2	3/28/2016	5/27/2016	3/28/2016	5/27/2016	0	0	19,054.80
ATLAS 2015-04	1.02.01	VMM2150T	Travel for VMM3 Test at SPS2-phase 2	3/28/2016	5/27/2016	3/28/2016	5/27/2016	0	0	6,336.00
ATLAS 2015-04	1.02.01	VMM2160	VMM3 Test at SPS2-phase 3	5/31/2016	8/2/2016	5/31/2016	8/2/2016	0	0	7,468.80
ATLAS 2015-04	1.02.01	VMM2170	Distribute VMM3	12/11/2015	2/10/2016	12/11/2015	2/10/2016	0	0	5,835.00
ATLAS 2015-04	1.02.01	VMM2180	VMM3A Design	12/11/2015	2/2/2016	12/11/2015	2/2/2016	0	0	10,652.40
ATLAS 2015-04	1.02.01	VMM2190	VMM3A Layout	2/3/2016	3/25/2016	2/3/2016	3/25/2016	0	0	5,918.00
ATLAS 2015-04	1.02.01	VMM2200	VMM3A Production Readiness Review	2/3/2016	3/25/2016	2/3/2016	3/25/2016	0	0	3,550.80
ATLAS 2015-04	1.02.01	VMM2210M01	preparation for submission	2/3/2016	3/25/2016	2/3/2016	3/25/2016	0	0	2,367.20
ATLAS 2015-04	1.02.01	VMM2240	Prepare Package with BGA Substrate	5/2/2016	6/29/2016	5/2/2016	6/29/2016	0	0	9,468.80
ATLAS 2015-04	1.02.01	VMM2270	Test VMM3A Samples at BNL	8/1/2016	8/2/2016	8/1/2016	8/2/2016	0	0	13,203.20
ATLAS 2015-04	1.02.01	VMM2270MP	Payment for Material for Test VMM3A Samples at BNL	8/3/2016	8/3/2016	8/3/2016	8/3/2016	0	0	54,900.00
ATLAS 2015-04	1.02.01	VMM2280M10	Procurement closeout and payment for VMM3A Fabrication at MC	8/4/2016	8/8/2016	8/4/2016	8/8/2016	0	0	477,000.00
ATLAS 2015-04	1.02.01	VMM2280M12	Procurement closeout for VMM3A production	8/4/2016	8/8/2016	8/4/2016	8/8/2016	0	0	1,420.32
ATLAS 2015-04	1.02.01	VMM2300M01	Order Final Wafers-preparation and specification	8/4/2016	8/15/2016	8/4/2016	8/15/2016	0	0	3,787.52
ATLAS 2015-04	1.02.01	VMM2300M10	Procurement closeout and payment for Wafers	10/14/2016	10/18/2016	10/14/2016	10/18/2016	0	0	1,030,050.00
ATLAS 2015-04	1.02.01	VMM2310	Final Testing VMM3A (5%)	10/19/2016	11/18/2016	10/19/2016	11/18/2016	0	0	11,402.00
ATLAS 2015-04	1.02.01	VMM2320	Final Testing VMM3A (45%)	11/21/2016	2/20/2017	11/21/2016	2/20/2017	0	0	28,181.28
ATLAS 2015-04	1.02.01	VMM2330	Final Testing VMM3A (50%)	2/21/2017	4/21/2017	2/21/2017	4/21/2017	0	0	15,008.00
ATLAS 2015-04	1.02.01	VMM2340	First Distribution of VMM3A Chips	11/21/2016	1/23/2017	11/21/2016	1/23/2017	0	0	7,315.20
ATLAS 2015-04	1.02.01	VMM2350	2nd Distribution of VMM3A Chips	1/24/2017	3/23/2017	1/24/2017	3/23/2017	0	0	7,315.20
ATLAS 2015-04	1.02.01	VMM2360	3rd Distribution of VMM3A Chips	3/24/2017	5/22/2017	3/24/2017	5/22/2017	0	0	7,315.20
ATLAS 2015-04	1.02.01	VMM2370	Test VMM3A at CERN-phase 1	2/21/2017	5/15/2017	2/21/2017	5/15/2017	0	0	19,507.20
ATLAS 2015-04	1.02.01	VMM2380	Test VMM3A at CERN-phase 2	5/16/2017	8/2/2017	5/16/2017	8/2/2017	0	0	33,519.20
ATLAS 2015-04	1.02.01	VMM2390	Test VMM3A at CERN-phase 3	8/3/2017	9/20/2017	8/3/2017	9/20/2017	0	0	23,120.00
ATLAS 2015-04	1.02.01	VMM2390T	Travel for Test VMM3A at CERN-phase 3	8/3/2017	9/20/2017	8/3/2017	9/20/2017	0	0	6,528.00
ATLAS 2015-04	1.02.01	VMM2400M	payback to operations	9/21/2017	9/25/2017	9/21/2017	9/25/2017	0	0	396,900.00
ATLAS 2015-04	1.02.01	VMM3010	Design Test Rig	11/6/2015	2/8/2016	11/6/2015	2/8/2016	0	0	7,101.60

ATLAS 2015-04	1.02.01	VMM3020	Protoype Test Rig Fabrication	2/9/2016	4/11/2016	2/9/2016	4/11/2016	0	0	14,466.00
ATLAS 2015-04	1.02.01	VMM3030	Exercise Test Rig	4/12/2016	5/11/2016	4/12/2016	5/11/2016	0	0	2,367.20
ATLAS 2015-04	1.02.01	VMM3040	Design Modifications	5/12/2016	6/13/2016	5/12/2016	6/13/2016	0	0	10,415.68
ATLAS 2015-04	1.02.01	VMM3050	Final Test Rig Fabrication	6/14/2016	8/16/2016	6/14/2016	8/16/2016	0	0	62,571.40
ATLAS 2015-04	1.02.02	FEC1040M	Payment for Material for Initial Test	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	6,255.48
ATLAS 2015-04	1.02.02	FEC1045	PCB Final Assembly	10/2/2014	10/8/2014	10/2/2014	10/8/2014	0	0	1,345.20
ATLAS 2015-04	1.02.02	FEC1045M	Material for PCB Final Assembly	10/2/2014	10/8/2014	10/2/2014	10/8/2014	0	0	2,819.76
ATLAS 2015-04	1.02.02	FEC1050	Test	10/9/2014	10/22/2014	10/9/2014	10/22/2014	0	0	5,369.04
ATLAS 2015-04	1.02.02	FEC1060	Distribution and Support	10/23/2014	11/5/2014	10/23/2014	11/5/2014	0	0	4,533.39
ATLAS 2015-04	1.02.02	FEC2011	MMFE Firmware Development 50%	11/6/2014	1/8/2015	11/6/2014	1/8/2015	0	0	17,777.47
ATLAS 2015-04	1.02.02	FEC2015	DAQ Firmware Devleopment	10/1/2014	1/8/2015	10/1/2014	1/8/2015	0	0	7,114.75
ATLAS 2015-04	1.02.02	FEC2019M	Purchse Demonstrator Parts	10/1/2014	10/30/2014	10/1/2014	10/30/2014	0	0	9,141.25
ATLAS 2015-04	1.02.02	FEC2020M	Layout	10/1/2014	10/6/2014	10/1/2014	10/6/2014	0	0	15,573.60
ATLAS 2015-04	1.02.02	FEC2030	PCB Initial Fabrication	10/31/2014	11/10/2014	10/31/2014	11/10/2014	0	0	3,158.75
ATLAS 2015-04	1.02.02	FEC2040	PCB Initial Assembly	11/11/2014	12/2/2014	11/11/2014	12/2/2014	0	0	6,317.50
ATLAS 2015-04	1.02.02	FEC2050	Initial Test	12/3/2014	12/22/2014	12/3/2014	12/22/2014	0	0	16,380.86
ATLAS 2015-04	1.02.02	FEC2060	PCB Final Fabrication	12/23/2014	1/7/2015	12/23/2014	1/7/2015	0	0	1,083.00
ATLAS 2015-04	1.02.02	FEC2060M	Material for PCB Final Fabrication	12/23/2014	1/7/2015	12/23/2014	1/7/2015	0	0	10,146.00
ATLAS 2015-04	1.02.02	FEC2070	PCB Final Assembly	1/8/2015	1/28/2015	1/8/2015	1/28/2015	0	0	5,415.00
ATLAS 2015-04	1.02.02	FEC2070M	Material for PCB Final Assembly	1/8/2015	1/28/2015	1/8/2015	1/28/2015	0	0	14,176.00
ATLAS 2015-04	1.02.02	FEC2080	Testing	1/29/2015	3/11/2015	1/29/2015	3/11/2015	0	0	21,039.12
ATLAS 2015-04	1.02.02	FEC2080M	Material for Testing	1/29/2015	3/11/2015	1/29/2015	3/11/2015	0	0	1,260.00
ATLAS 2015-04	1.02.02	FEC2087	MM FE Board development for MM test beam	5/29/2015	7/28/2015	05/29/2015*	7/28/2015	0	0	20,600.00
ATLAS 2015-04	1.02.02	FEC2088	Firmware development for MM test beam	5/29/2015	8/21/2015	05/29/2015*	8/21/2015	0	0	15,471.43
ATLAS 2015-04	1.02.02	FEC2090	Distribution and Support	3/12/2015	6/11/2015	3/12/2015	6/11/2015	0	0	6,788.30
ATLAS 2015-04	1.02.02	FEC4000	Design	9/1/2015	10/30/2015	09/01/2015*	10/30/2015	0	0	5,079.72
ATLAS 2015-04	1.02.02	FEC4000M	Material for Design	9/1/2015	10/30/2015	9/1/2015	10/30/2015	0	0	9,007.25
ATLAS 2015-04	1.02.02	FEC4000T	Travel for - Design	12/23/2014	1/14/2015	9/1/2015	10/30/2015	-252	-289	6,524.04
ATLAS 2015-04	1.02.02	FEC4010M	Layout	11/2/2015	12/14/2015	11/2/2015	12/14/2015	0	0	3,896.31
ATLAS 2015-04	1.02.02	FEC4020	PCB Fabrication	12/15/2015	1/13/2016	12/15/2015	1/13/2016	0	0	650.72
ATLAS 2015-04	1.02.02	FEC4020M	Material for PCB Fabrication	12/15/2015	1/13/2016	12/15/2015	1/13/2016	0	0	10,441.61
ATLAS 2015-04	1.02.02	FEC4030	PCB Initial Assembly	2/1/2016	2/18/2016	2/1/2016	2/18/2016	0	0	929.60
ATLAS 2015-04	1.02.02	FEC4040	Initial Test	2/19/2016	3/16/2016	2/19/2016	3/16/2016	0	0	5,643.76
ATLAS 2015-04	1.02.02	FEC4050	PCB Final Assembly	3/17/2016	4/6/2016	3/17/2016	4/6/2016	0	0	1,115.52
ATLAS 2015-04	1.02.02	FEC4050M	Material for PCB Final Assembly	3/17/2016	4/6/2016	3/17/2016	4/6/2016	0	0	14,588.89
ATLAS 2015-04	1.02.02	FEC4060	Final Test	4/7/2016	5/17/2016	4/7/2016	5/17/2016	0	0	10,446.12
ATLAS 2015-04	1.02.02	FEC4070	Distribution Support	5/18/2016	7/26/2016	5/18/2016	7/26/2016	0	0	4,969.10
ATLAS 2015-04	1.02.02	FEC5000	Design	6/30/2015	9/16/2015	06/30/2015*	9/16/2015	0	0	18,350.20
ATLAS 2015-04	1.02.02	FEC5000M	Material for Design	6/30/2015	9/16/2015	6/30/2015	9/16/2015	0	0	4,273.00
ATLAS 2015-04	1.02.02	FEC5005M	Purchasea V1 Parts	9/17/2015	11/2/2015	9/17/2015	11/2/2015	0	0	2,793.65
ATLAS 2015-04	1.02.02	FEC5010M	Layout	9/17/2015	12/14/2015	9/17/2015	12/14/2015	0	0	9,680.85
ATLAS 2015-04	1.02.02	FEC5020	PCB Initial Fabrication	12/15/2015	1/6/2016	12/15/2015	1/6/2016	0	0	650.72
ATLAS 2015-04	1.02.02	FEC5030	PCB Initial Assembly	1/7/2016	2/12/2016	1/7/2016	2/12/2016	0	0	1,115.52
ATLAS 2015-04	1.02.02	FEC5040	Initial Test	2/15/2016	4/18/2016	2/15/2016	4/18/2016	0	0	23,845.89
ATLAS 2015-04	1.02.02	FEC5050	PCB Final Fabrication	4/19/2016	5/3/2016	4/19/2016	5/3/2016	0	0	929.60
ATLAS 2015-04	1.02.02	FEC5050M	Material for PCB Final Fabrication	4/19/2016	5/3/2016	4/19/2016	5/3/2016	0	0	10,146.00
ATLAS 2015-04	1.02.02	FEC5060	PCB Final Assembly	5/4/2016	5/26/2016	5/4/2016	5/26/2016	0	0	5,019.84
ATLAS 2015-04	1.02.02	FEC5060M	Material for PCB Final Assembly	5/4/2016	5/26/2016	5/4/2016	5/26/2016	0	0	14,176.00
ATLAS 2015-04	1.02.02	FEC5070	Final Test	5/27/2016	7/28/2016	5/27/2016	7/28/2016	0	0	32,785.02
ATLAS 2015-04	1.02.02	FEC5070M	Material for Final Test	5/27/2016	7/28/2016	5/27/2016	7/28/2016	0	0	1,340.00
ATLAS 2015-04	1.02.02	FEC5070T	Travel for Final Test	5/27/2016	7/28/2016	5/27/2016	7/28/2016	0	0	8,401.16
ATLAS 2015-04	1.02.02	FEC5080	Distribution and Support	7/29/2016	9/29/2016	7/29/2016	9/29/2016	0	0	5,261.40
ATLAS 2015-04	1.02.02	FEC5080T	Travel for -Distribution and Support	7/29/2016	9/29/2016	7/29/2016	9/29/2016	0	0	8,401.16
ATLAS 2015-04	1.02.02	FEC7000	Design	6/13/2016	7/28/2016	6/13/2016	7/28/2016	0	0	26,264.46
ATLAS 2015-04	1.02.02	FEC7000M	Material for Design	6/13/2016	7/11/2016	6/13/2016	7/11/2016	0	0	8,692.58
ATLAS 2015-04	1.02.02	FEC7005M	Purchase of MM FE-8 Production Parts	7/29/2016	8/29/2016	7/29/2016	8/29/2016	0	0	30,852.36

ATLAS 2015-04	1.02.03	DDC4040M01	procurement preparation for ADDC PCB fabrication	2/16/2017	4/11/2017	2/16/2017	4/11/2017	0	0	2,290.80
ATLAS 2015-04	1.02.03	DDC4040M10	PCB Layout if needed	4/5/2017	5/30/2017	4/5/2017	5/30/2017	0	0	15,462.90
ATLAS 2015-04	1.02.03	DDC4040M12	PCB Fabrication Submission	7/5/2017	7/28/2017	7/5/2017	7/28/2017	0	0	52,621.80
ATLAS 2015-04	1.02.03	DDC4040M16P	Payment for Procurement closeout - payment for ADDC PCB fabr	9/28/2017	9/28/2017	9/28/2017	9/28/2017	0	0	297,570.00
ATLAS 2015-04	1.02.03	DDC4070M01	Prepare specification for ADDC PCB Assembly	4/19/2017	5/8/2017	4/19/2017	5/8/2017	0	0	7,931.70
ATLAS 2015-04	1.02.03	DDC4070M14P	Payment for Procurement closeout -payment for ADDC PCB Asse	11/20/2017	11/20/2017	11/20/2017	11/20/2017	0	0	103,041.00
ATLAS 2015-04	1.02.03	DDC4070T	Travel for ADDC PCB Assembly	7/31/2017	8/17/2017	7/31/2017	8/17/2017	0	0	1,632.00
ATLAS 2015-04	1.02.03	DDC4080	Test Final ADDC -phase 1	8/28/2017	9/27/2017	8/28/2017	9/27/2017	0	0	6,521.84
ATLAS 2015-04	1.02.03	DDC4090	Test Final ADDC -phase 2	9/28/2017	10/26/2017	9/28/2017	10/26/2017	0	0	24,502.39
ATLAS 2015-04	1.02.03	DDC4100	procurement closeout	10/27/2017	10/30/2017	10/27/2017	10/30/2017	0	0	943.84
ATLAS 2015-04	1.02.03	DDC4110	Final Specs and Documentation	8/28/2017	9/27/2017	8/28/2017	9/27/2017	0	0	4,581.60
ATLAS 2015-04	1.02.03	DDC4120	Ship ADDC To CERN	11/21/2017	1/22/2018	11/21/2017	1/22/2018	0	0	7,078.80
ATLAS 2015-04	1.02.04.01	TRG1050	Plan GBT implementation with BNL engineers	10/1/2014	10/3/2014	10/1/2014	10/3/2014	0	0	1,004.55
ATLAS 2015-04	1.02.04.01	TRG1100	Firmware design/test	10/1/2014	10/29/2014	10/1/2014	10/29/2014	0	0	1,292.90
ATLAS 2015-04	1.02.04.01	TRG1110	Integrate ART-PG/ADDCE	10/30/2014	1/26/2015	10/30/2014	1/26/2015	0	0	6,787.40
ATLAS 2015-04	1.02.04.01	TRG1110M	Material cost for Integrate ART-PG/ADDCE	10/30/2014	1/26/2015	10/30/2014	1/26/2015	0	0	15,856.85
ATLAS 2015-04	1.02.04.01	TRG1120	Integrate real ADDC with 32 GBT links	1/27/2015	4/20/2015	1/27/2015	4/20/2015	0	0	7,630.97
ATLAS 2015-04	1.02.04.01	TRG1120T	Travel cost for Integrate real ADDC with 32 GBT links	1/27/2015	4/20/2015	1/27/2015	4/20/2015	0	0	1,136.00
ATLAS 2015-04	1.02.04.01	TRG2010	Test beam I	10/1/2014	12/24/2014	10/1/2014	12/24/2014	0	0	10,938.00
ATLAS 2015-04	1.02.04.01	TRG2010T	Travel cost for Test beam I	10/1/2014	3/1/2015	10/1/2014	12/24/2014	0	67	5,822.00
ATLAS 2015-04	1.02.04.01	TRG3010	Procure LiAr ATCA Carrier Cards, AMC cards, Powered Crate, Sv	1/2/2015	3/1/2015	1/2/2015	2/26/2015	0	3	4,246.60
ATLAS 2015-04	1.02.04.01	TRG3010MP	Payment for Material cost for Procure LiAr ATCA Carrier Cards, A	2/27/2015	2/27/2015	2/27/2015	2/27/2015	0	0	53,045.00
ATLAS 2015-04	1.02.04.01	TRG3020	Crate communication with Shelf Manager	3/2/2015	3/27/2015	3/2/2015	3/27/2015	0	0	14,539.40
ATLAS 2015-04	1.02.04.01	TRG3025	Integrate real ADDC	4/1/2016	6/1/2016	04/01/2016*	6/1/2016	0	0	11,266.00
ATLAS 2015-04	1.02.04.01	TRG3030	Procure GBT links and other hardware	3/30/2015	4/24/2015	3/30/2015	4/24/2015	0	0	4,246.60
ATLAS 2015-04	1.02.04.01	TRG3030M	Material cost for Procure GBT links and other hardware	3/30/2015	4/24/2015	3/30/2015	4/24/2015	0	0	15,450.00
ATLAS 2015-04	1.02.04.01	TRG3040	Remote FPGA configuration - Carrier and AMC	4/27/2015	5/22/2015	4/27/2015	5/22/2015	0	0	14,539.40
ATLAS 2015-04	1.02.04.01	TRG3050	Set up ATCA crate hardware (Liquid Argon DPS)	5/26/2015	7/21/2015	5/26/2015	7/21/2015	0	0	12,064.30
ATLAS 2015-04	1.02.04.01	TRG3060	Incorporate TTC backplane signals	7/22/2015	9/16/2015	7/22/2015	9/16/2015	0	0	12,064.30
ATLAS 2015-04	1.02.04.01	TRG3080	Port TP Algorithm to LAR system	9/17/2015	12/10/2015	9/17/2015	12/10/2015	0	0	30,393.03
ATLAS 2015-04	1.02.04.01	TRG3090	Debug mode - Error monitoring and recovery	12/11/2015	2/8/2016	12/11/2015	2/8/2016	0	0	20,267.82
ATLAS 2015-04	1.02.04.01	TRG3100	Trigger data monitor (Raw trigger data)	2/9/2016	4/4/2016	2/9/2016	4/4/2016	0	0	20,267.82
ATLAS 2015-04	1.02.04.01	TRG3110	DCS integration	4/5/2016	5/2/2016	4/5/2016	5/2/2016	0	0	14,617.78
ATLAS 2015-04	1.02.04.01	TRG5010	Integrate ATCA based Trigger Processor on Module 0	4/1/2016	6/24/2016	4/1/2016	6/24/2016	0	0	60,362.52
ATLAS 2015-04	1.02.04.01	TRG5020	Data collection and analysis	6/27/2016	9/20/2016	6/27/2016	9/20/2016	0	0	10,488.00
ATLAS 2015-04	1.02.04.01	TRG6020	NSW FE Coordination	10/1/2014	3/31/2016	10/1/2014	3/31/2016	0	0	19,976.10
ATLAS 2015-04	1.02.04.01	TRG7010M10	LiAr ATCA Carrier and AMC cards procurement oversight	10/3/2016	12/1/2016	10/3/2016	12/1/2016	0	0	16,301.80
ATLAS 2015-04	1.02.04.01	TRG7010M14	Material cost for Procure LiAr ATCA Carrier and AMC cards	12/9/2016	12/13/2016	12/9/2016	12/13/2016	0	0	461,020.64
ATLAS 2015-04	1.02.04.01	TRG7020	Production test stand hardware	12/14/2016	3/9/2017	12/14/2016	3/9/2017	0	0	14,401.40
ATLAS 2015-04	1.02.04.01	TRG7020MP	Paymet for Material for Production test stand hardware	3/10/2017	3/10/2017	3/10/2017	3/10/2017	0	0	18,503.35
ATLAS 2015-04	1.02.04.01	TRG7030	Test stand software	3/13/2017	6/5/2017	3/13/2017	6/5/2017	0	0	21,696.70
ATLAS 2015-04	1.02.04.01	TRG7040	Production QA/QC	6/28/2017	9/21/2017	6/28/2017	9/21/2017	0	0	35,512.40
ATLAS 2015-04	1.02.04.01	TRG7050	Trigger Processor Electronics Shipping	10/18/2017	12/13/2017	10/18/2017	12/13/2017	0	0	11,318.20
ATLAS 2015-04	1.02.04.02	TRG8010	TTC distribution Felix interface	1/2/2015	3/2/2015	1/2/2015	3/2/2015	0	0	26,514.00
ATLAS 2015-04	1.02.04.02	TRG8020	Prep Lab for Vertical Slice Test	3/3/2015	4/21/2015	3/3/2015	4/21/2015	0	0	10,882.37
ATLAS 2015-04	1.02.04.02	TRG8030	Setup Work Station	4/22/2015	6/2/2015	4/22/2015	6/2/2015	0	0	8,766.35
ATLAS 2015-04	1.02.04.02	TRG8040	Initial On line Software Development	6/3/2015	6/30/2015	6/3/2015	6/30/2015	0	0	6,045.76
ATLAS 2015-04	1.02.04.02	TRG8041	Test Beam I	6/3/2015	8/31/2015	6/3/2015	8/31/2015	0	0	18,122.83
ATLAS 2015-04	1.02.04.02	TRG8050	Revise On-line Software	7/1/2015	7/14/2015	7/1/2015	7/14/2015	0	0	2,720.59
ATLAS 2015-04	1.02.04.02	TRG8060	Develop Initial Analysis Code	7/15/2015	8/4/2015	7/15/2015	8/4/2015	0	0	4,534.32
ATLAS 2015-04	1.02.04.02	TRG8070	Analyze Data test beam I	8/5/2015	9/1/2015	8/5/2015	9/1/2015	0	0	6,045.76
ATLAS 2015-04	1.02.04.02	TRG8080	Test Beam II	9/2/2015	12/1/2015	9/2/2015	12/1/2015	0	0	16,650.14
ATLAS 2015-04	1.02.04.02	TRG8090	Modify On-line Software	9/2/2015	9/29/2015	9/2/2015	9/29/2015	0	0	5,743.47
ATLAS 2015-04	1.02.04.02	TRG8100	Modify Analysis code	9/30/2015	11/10/2015	9/30/2015	11/10/2015	0	0	9,331.42
ATLAS 2015-04	1.02.04.02	TRG8110	Analyze Data from test beam II	11/11/2015	1/12/2016	11/11/2015	1/12/2016	0	0	11,208.96
ATLAS 2015-04	1.02.04.02	TRG8120	Setup Test Chamber	1/13/2016	2/23/2016	1/13/2016	2/23/2016	0	0	9,340.80

ATLAS 2015-04	1.02.07	FEC9072M	Travel for Power Block Final Design Prototype	5/12/2015	6/16/2015	5/12/2015	6/16/2015	0	0	7,500.00
ATLAS 2015-04	1.02.07	FEC9072T	Travel for Power Block Final Design Prototype	5/12/2015	6/16/2015	5/12/2015	6/16/2015	0	0	8,816.22
ATLAS 2015-04	1.02.07	FEC9074	Radiation / B Field TestsPB FD Prototype	5/12/2015	6/23/2015	5/12/2015	6/23/2015	0	0	5,360.15
ATLAS 2015-04	1.02.07	FEC9074M	Material for Radiation / B Field TestsPB FD Prototype	5/12/2015	6/23/2015	5/12/2015	6/23/2015	0	0	9,954.00
ATLAS 2015-04	1.02.07	FEC9074T	Travel for Radiation / B Field TestsPB FD Prototype	5/12/2015	6/23/2015	5/12/2015	6/23/2015	0	0	3,016.44
ATLAS 2015-04	1.02.07	FEC9076	DCDC Converter Cooling Tests	6/24/2015	8/12/2015	6/24/2015	8/12/2015	0	0	4,051.91
ATLAS 2015-04	1.02.07	FEC9076M	Material for Cooling Tests	6/24/2015	8/12/2015	6/24/2015	8/12/2015	0	0	1,300.00
ATLAS 2015-04	1.02.07	FEC9078	Power Block Final Design	8/13/2015	9/30/2015	8/13/2015	9/30/2015	0	0	7,889.88
ATLAS 2015-04	1.02.07	FEC9078T	Travel Power Block Final Design	8/13/2015	9/30/2015	8/13/2015	9/30/2015	0	0	6,985.44
ATLAS 2015-04	1.02.07	TDS1070M	Payment for Material for Submission (v1)	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	75,000.00
ATLAS 2015-04	1.02.07	TDS1090M	Material cost for Packaging (v1)	1/6/2015	1/16/2015	1/6/2015	1/16/2015	0	0	53,000.00
ATLAS 2015-04	1.02.07	TDS11080	Transceiver/Routing Testing in FPGA Eval Board (v1)	10/1/2014	10/30/2014	10/1/2014	10/30/2014	0	0	2,315.25
ATLAS 2015-04	1.02.07	TDS11090	Integration of Optoelectronics Firmware (v1)	10/31/2014	12/31/2014	10/31/2014	12/31/2014	0	0	7,338.19
ATLAS 2015-04	1.02.07	TDS11100	Simulation of full router firmware (v1)	1/2/2015	3/3/2015	1/2/2015	3/3/2015	0	0	7,512.91
ATLAS 2015-04	1.02.07	TDS11110	Router prototype mockup testing w/ Eval Board (v1)	3/4/2015	4/30/2015	3/4/2015	4/30/2015	0	0	7,338.19
ATLAS 2015-04	1.02.07	TDS11120	Power/Service chip selection and PCB board design (v1)	10/1/2014	5/29/2015	10/1/2014	5/29/2015	0	0	2,675.40
ATLAS 2015-04	1.02.07	TDS11130	Prototype construction (v1)	6/1/2015	6/29/2015	6/1/2015	6/29/2015	0	0	3,669.10
ATLAS 2015-04	1.02.07	TDS11130M	Material cost for Prototype construction (v1)	6/1/2015	6/29/2015	6/1/2015	6/29/2015	0	0	10,090.91
ATLAS 2015-04	1.02.07	TDS11140	Prototype testing (v1)	6/30/2015	8/28/2015	6/30/2015	8/28/2015	0	0	7,512.91
ATLAS 2015-04	1.02.07	TDS11150	Transceiver and Routing Firmware Design (v2)	8/31/2015	10/29/2015	8/31/2015	10/29/2015	0	0	7,620.00
ATLAS 2015-04	1.02.07	TDS11160	Simulation (v2)	10/30/2015	11/30/2015	10/30/2015	11/30/2015	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11170	Router mockup testing w/ Eval Board (v2)	12/1/2015	12/30/2015	12/1/2015	12/30/2015	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11180	PCB board design (v2)	12/31/2015	1/29/2016	12/31/2015	1/29/2016	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11190	Prototype construction (v2)	2/1/2016	2/29/2016	2/1/2016	2/29/2016	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11190M	Material cost for Prototype construction (v2)	2/1/2016	2/29/2016	2/1/2016	2/29/2016	0	0	10,090.91
ATLAS 2015-04	1.02.07	TDS11200	Prototype testing (v2)	3/1/2016	3/29/2016	3/1/2016	3/29/2016	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11210	Final Firmware modifications (final)	3/30/2016	5/27/2016	3/30/2016	5/27/2016	0	0	7,737.79
ATLAS 2015-04	1.02.07	TDS11220	PCB board design (final)	5/31/2016	6/28/2016	5/31/2016	6/28/2016	0	0	3,778.92
ATLAS 2015-04	1.02.07	TDS11230	Full production (final)	6/29/2016	8/29/2016	6/29/2016	8/29/2016	0	0	7,737.79
ATLAS 2015-04	1.02.07	TDS11240	Testing boards, QA/QC (final)	8/30/2016	11/15/2016	8/30/2016	11/15/2016	0	0	10,066.87
ATLAS 2015-04	1.02.07	TDS3010	Design single chip test board	10/1/2014	12/31/2014	10/1/2014	12/31/2014	0	0	4,715.22
ATLAS 2015-04	1.02.07	TDS3020	Firmware development	1/2/2015	2/20/2015	1/2/2015	2/20/2015	0	0	9,324.48
ATLAS 2015-04	1.02.07	TDS3030M	Material cost for Single chip test fixture fabrication	3/13/2015	4/1/2015	3/13/2015	4/1/2015	0	0	10,000.00
ATLAS 2015-04	1.02.07	TDS3040	Single chip test	4/2/2015	6/11/2015	4/2/2015	6/11/2015	0	0	18,807.90
ATLAS 2015-04	1.02.07	TDS4010	Design (v2, preliminary)	10/1/2014	1/21/2015	10/1/2014	1/21/2015	0	0	20,369.40
ATLAS 2015-04	1.02.07	TDS4020	Design (v2, final)	1/22/2015	3/25/2015	1/22/2015	3/25/2015	0	0	27,678.42
ATLAS 2015-04	1.02.07	TDS4020M	Material cost for Design (v2, final)	1/22/2015	3/25/2015	1/22/2015	3/25/2015	0	0	4,500.00
ATLAS 2015-04	1.02.07	TDS4020T	Travel cost forDesign (v2, final)	1/22/2015	3/25/2015	1/22/2015	3/25/2015	0	0	12,000.24
ATLAS 2015-04	1.02.07	TDS4030	Layout (v2)	3/26/2015	4/20/2015	3/26/2015	4/20/2015	0	0	10,663.98
ATLAS 2015-04	1.02.07	TDS4040	Simulation (v2)	4/21/2015	5/22/2015	4/21/2015	5/22/2015	0	0	35,300.82
ATLAS 2015-04	1.02.07	TDS4050M	Material cost for Submission (v2)	7/31/2015	7/31/2015	7/31/2015	7/31/2015	0	0	75,000.00
ATLAS 2015-04	1.02.07	TDS4070MP	Payment for Material cost for Packaging (v2)	11/12/2015	11/12/2015	11/12/2015	11/12/2015	0	0	53,000.00
ATLAS 2015-04	1.02.07	TDS5010	Design single chip test board	5/20/2015	7/21/2015	5/20/2015	7/21/2015	0	0	14,092.68
ATLAS 2015-04	1.02.07	TDS5020	Firmware development	7/22/2015	8/14/2015	7/22/2015	8/14/2015	0	0	4,715.22
ATLAS 2015-04	1.02.07	TDS5030	Single chip test fixture fabrication	8/17/2015	8/31/2015	8/17/2015	8/31/2015	0	0	4,715.22
ATLAS 2015-04	1.02.07	TDS5030M	Material cost for Single chip test fixture fabrication	8/17/2015	8/31/2015	8/17/2015	8/31/2015	0	0	10,000.00
ATLAS 2015-04	1.02.07	TDS5040	Single chip test	11/12/2015	12/28/2015	11/12/2015	12/28/2015	0	0	18,402.54
ATLAS 2015-04	1.02.07	TDS6010	Design (final version, preliminary)	2/19/2015	12/31/2015	10/6/2015	12/31/2015	-229	0	32,351.27
ATLAS 2015-04	1.02.07	TDS6010M	Material cost for Design (final version, preliminary)	2/19/2015	12/31/2015	10/6/2015	12/31/2015	-229	0	4,500.00
ATLAS 2015-04	1.02.07	TDS6010T	Travel cost forDesign (final version, preliminary)	2/19/2015	12/31/2015	10/6/2015	12/31/2015	-229	0	12,000.24
ATLAS 2015-04	1.02.07	TDS6020	Design (final version, final)	1/4/2016	1/11/2016	1/4/2016	1/11/2016	0	0	29,349.60
ATLAS 2015-04	1.02.07	TDS6030	Layout (final)	1/12/2016	2/9/2016	1/12/2016	2/9/2016	0	0	9,713.46
ATLAS 2015-04	1.02.07	TDS6040	Simulation (final)	2/10/2016	3/28/2016	2/10/2016	3/28/2016	0	0	33,364.44
ATLAS 2015-04	1.02.07	TDS6070P	Payment for Packaging (final)	8/17/2016	8/17/2016	8/17/2016	8/17/2016	0	0	80,000.00
ATLAS 2015-04	1.02.07	TDS7010	10% done	10/3/2016	1/3/2017	10/3/2016	1/3/2017	0	0	61,466.52
ATLAS 2015-04	1.02.07	TDS7010M	Material cost for Chip test	10/3/2016	1/4/2017	10/3/2016	1/4/2017	0	0	10,000.00

ATLAS 2015-04	1.02.07	TDS7010T	Travel cost forChip test	10/3/2016	1/4/2017	10/3/2016	1/4/2017	0	0	12,999.42
ATLAS 2015-04	1.02.07	TDS7020	30% done	1/5/2017	3/21/2017	1/5/2017	3/21/2017	0	0	40,218.37
ATLAS 2015-04	1.02.07	TDS7030	50% done	3/22/2017	6/7/2017	3/22/2017	6/7/2017	0	0	60,979.69
ATLAS 2015-04	1.02.07	TDS7040	75% done	6/8/2017	8/24/2017	6/8/2017	8/24/2017	0	0	66,053.29
ATLAS 2015-04	1.02.07	TDS7050	100% done	8/25/2017	11/10/2017	8/25/2017	11/10/2017	0	0	60,623.40
ATLAS 2015-04	1.02.07	TDS8010	Tester design	4/14/2016	6/15/2016	4/14/2016	6/15/2016	0	0	37,310.54
ATLAS 2015-04	1.02.07	TDS8020	Tester firmware development	6/16/2016	7/29/2016	6/16/2016	7/29/2016	0	0	21,812.66
ATLAS 2015-04	1.02.07	TDS8030	Tester fabrication	8/17/2016	8/30/2016	8/17/2016	8/30/2016	0	0	2,892.21
ATLAS 2015-04	1.02.07	TDS8030M	Material cost for Tester fabrication	8/17/2016	8/30/2016	8/17/2016	8/30/2016	0	0	20,000.00
ATLAS 2015-04	1.02.07	TDS8040	Tester verification	8/31/2016	10/3/2016	8/31/2016	10/3/2016	0	0	17,467.78
ATLAS 2015-04	1.02.07	TDS9020	Chamber readout setup	10/1/2014	1/20/2015	10/1/2014	1/20/2015	0	0	12,545.43
ATLAS 2015-04	1.02.07	TDS9030	Electronics test using cosmic rays	1/21/2015	11/10/2017	1/21/2015	11/10/2017	0	0	54,294.20
ATLAS 2015-04	1.02.07	TDS9030M	Material cost for Electronics test using cosmic rays	1/21/2015	11/10/2017	1/21/2015	11/10/2017	0	0	10,000.00
ATLAS 2015-04	1.03.01.01	AFW2040	Configure FPGA simulation	10/1/2014	10/30/2014	10/1/2014	10/30/2014	0	0	4,625.84
ATLAS 2015-04	1.03.01.01	AFW2050	Extract test vectors from MonteCarlo	10/1/2014	11/14/2014	10/1/2014	11/14/2014	0	0	3,456.29
ATLAS 2015-04	1.03.01.01	AFW2065	Define sharing protocol between FPGAs (energy sharing scheme)	10/1/2014	12/5/2014	10/1/2014	12/5/2014	0	0	16,408.64
ATLAS 2015-04	1.03.01.01	AFW20654FY14.3DC	gFEX Algorithm 1 SEPTEMBER 2014 Actuals 20658 - Adjustmer	2/2/2015	2/2/2015	02/02/2015*	2/2/2015	0	0	3,066.00
ATLAS 2015-04	1.03.01.01	AFW2070	Algo1: Test/Evaluation Material	12/8/2014	12/8/2014	12/8/2014	12/8/2014	0	0	1,195.00
ATLAS 2015-04	1.03.01.01	AFW2075	Estimate FPGA Resource Usage	12/8/2014	12/10/2014	12/8/2014	12/10/2014	0	0	1,047.36
ATLAS 2015-04	1.03.01.01	AFW2080	Implement FPGA version 1 pileup correction	12/11/2014	1/30/2015	12/11/2014	1/30/2015	0	0	12,044.64
ATLAS 2015-04	1.03.01.01	AFW2090	Implement FPGA version 1 maxima selection	2/2/2015	3/6/2015	2/2/2015	3/6/2015	0	0	8,728.00
ATLAS 2015-04	1.03.01.01	AFW2100	Implement energy summing algorithm	3/9/2015	4/17/2015	3/9/2015	4/17/2015	0	0	10,473.60
ATLAS 2015-04	1.03.01.01	AFW2110	Implement version 1 energy calibration	4/20/2015	5/15/2015	4/20/2015	5/15/2015	0	0	6,982.40
ATLAS 2015-04	1.03.01.01	AFW2120	Evaluate and optimize FPGA resources for version 1	5/18/2015	6/15/2015	5/18/2015	6/15/2015	0	0	6,982.40
ATLAS 2015-04	1.03.01.01	AFW2130	Design of low level debugging tools	6/16/2015	8/25/2015	6/16/2015	8/25/2015	0	0	17,456.00
ATLAS 2015-04	1.03.01.01	AFW2140	Version 1 Firmware integration	8/26/2015	10/21/2015	8/26/2015	10/21/2015	0	0	14,115.28
ATLAS 2015-04	1.03.01.01	AFW2170	Refine data formats and bunch train information	10/22/2015	12/3/2015	10/22/2015	12/3/2015	0	0	10,788.00
ATLAS 2015-04	1.03.01.01	AFW2180	Implement version 2 pileup correction	12/4/2015	12/22/2015	12/4/2015	12/22/2015	0	0	4,495.00
ATLAS 2015-04	1.03.01.01	AFW2190	Adapt algorithm to use external input parameters where possible	12/23/2015	2/5/2016	12/23/2015	2/5/2016	0	0	11,237.50
ATLAS 2015-04	1.03.01.01	AFW2195EX	System Test at CERN	11/30/2015	12/4/2015	11/30/2015*	12/4/2015	0	0	3,596.00
ATLAS 2015-04	1.03.01.01	AFW2195T	Travel for System Test at CERN	11/30/2015	12/4/2015	11/30/2015	12/4/2015	0	0	4,301.40
ATLAS 2015-04	1.03.01.01	AFW2200	Implement version 2 parameter driven algorithm	2/8/2016	4/1/2016	2/8/2016	4/1/2016	0	0	14,384.00
ATLAS 2015-04	1.03.01.01	AFW2210	Technical performance verification of parameter driven algorithm	4/4/2016	6/13/2016	4/4/2016	6/13/2016	0	0	17,980.00
ATLAS 2015-04	1.03.01.01	AFW2230	Extract LAr test vectors from LAr demonstrator	6/14/2016	7/5/2016	6/14/2016	7/5/2016	0	0	5,394.00
ATLAS 2015-04	1.03.01.01	AFW2240	Document firmware	7/6/2016	8/16/2016	7/6/2016	8/16/2016	0	0	10,788.00
ATLAS 2015-04	1.03.01.01	AFW2260	Test version 2 algorithm in prototype	8/17/2016	9/28/2016	8/17/2016	9/28/2016	0	0	10,788.00
ATLAS 2015-04	1.03.01.01	AFW2270T	Travel for Test version 2 algorithm in prototype (BNL)	9/22/2016	9/28/2016	9/22/2016	9/28/2016	0	0	2,934.60
ATLAS 2015-04	1.03.01.01	AFW2280	Preparation and Participation in FDR	6/17/2016	6/30/2016	6/6/2016	6/17/2016	11	13	5,394.00
ATLAS 2015-04	1.03.01.01	AFW2300T	Travel for Final Design Review (CERN)	6/24/2016	6/30/2016	6/13/2016	6/17/2016	11	13	4,301.40
ATLAS 2015-04	1.03.01.01	AFW2310	Develop high-level FPGA debugging tools	7/1/2016	7/29/2016	6/20/2016	7/18/2016	11	11	7,192.00
ATLAS 2015-04	1.03.01.01	AFW2320	Develop FPGA monitoring tools	8/1/2016	8/19/2016	7/19/2016	8/8/2016	13	11	5,394.00
ATLAS 2015-04	1.03.01.01	AFW2330	Update Firmware to version 3 gFEX algorithm	8/22/2016	10/3/2016	8/9/2016	9/20/2016	13	13	10,798.45
ATLAS 2015-04	1.03.01.01	AFW2340	Verify technical performance in simulation	10/4/2016	11/14/2016	9/21/2016	11/1/2016	13	13	11,112.00
ATLAS 2015-04	1.03.01.01	AFW2360	Verify technical performance in pre-production gFEX	3/22/2017	5/31/2017	3/9/2017	5/17/2017	13	14	18,520.00
ATLAS 2015-04	1.03.01.01	AFW2390	Final algorithm documentation	6/1/2017	7/6/2017	5/18/2017	6/22/2017	14	14	9,260.00
ATLAS 2015-04	1.03.01.01	AFW2410	Verify technical performance on production gFEX	1/9/2018	2/12/2018	12/26/2017	1/30/2018	14	13	9,538.00
ATLAS 2015-04	1.03.01.01	AFW2420T	Travel for: Verify technical performance in production gFEX (CER	2/6/2018	2/12/2018	1/24/2018	1/30/2018	13	13	4,558.20
ATLAS 2015-04	1.03.01.02	AFW2510	Algo2: Test/Evaluation Material	1/15/2015	1/15/2015	1/15/2015	1/15/2015	0	0	19,995.00
ATLAS 2015-04	1.03.01.02	AFW2530	Algo2: Configure FPGA simulation	11/3/2014	11/14/2014	11/3/2014	11/14/2014	0	0	8,076.00
ATLAS 2015-04	1.03.01.02	AFW2535	Algo2: Define sharing protocol between FPGAs	11/17/2014	11/28/2014	11/17/2014	11/28/2014	0	0	7,268.40
ATLAS 2015-04	1.03.01.02	AFW2550	Algo2: Implement FPGA version 1 pileup correction	12/1/2014	12/31/2014	12/1/2014	12/31/2014	0	0	17,767.20
ATLAS 2015-04	1.03.01.02	AFW2560	Algo2: Implement energy summing algorithm	1/2/2015	2/12/2015	1/2/2015	2/12/2015	0	0	12,114.00
ATLAS 2015-04	1.03.01.02	AFW2570	Algo2: Implement version 1 energy calibration	2/13/2015	3/12/2015	2/13/2015	3/12/2015	0	0	8,076.00
ATLAS 2015-04	1.03.01.02	AFW2580	Algo2: Evaluate and optimize FPGA resources for version 1	3/13/2015	4/9/2015	3/13/2015	4/9/2015	0	0	8,076.00
ATLAS 2015-04	1.03.01.02	AFW2590	Algo2: Design of low level debugging tools	4/10/2015	6/19/2015	4/10/2015	6/19/2015	0	0	20,190.00
ATLAS 2015-04	1.03.01.02	AFW2600	Algo2: v1 Firmware integration	8/26/2015	12/17/2015	8/26/2015	12/17/2015	0	0	16,479.40

ATLAS 2015-04	1.03.01.02	AFW2600T	Travel for System test to CERN	11/30/2015	12/4/2015	11/30/2015	12/4/2015	0	0	3,765.40
ATLAS 2015-04	1.03.01.02	AFW2670	Algo2: Refine data formats and bunch train information	12/18/2015	2/1/2016	12/18/2015	2/1/2016	0	0	12,477.60
ATLAS 2015-04	1.03.01.02	AFW2680	Algo2: Implement version 2 pileup correction	2/2/2016	2/18/2016	2/2/2016	2/18/2016	0	0	5,406.96
ATLAS 2015-04	1.03.01.02	AFW2690	Algo2: Adapt algorithm to use external input parameters where po	2/19/2016	4/1/2016	2/19/2016	4/1/2016	0	0	12,893.52
ATLAS 2015-04	1.03.01.02	AFW2700	Algo2: Implement version 2 parameter driven algorithm	4/4/2016	5/27/2016	4/4/2016	5/27/2016	0	0	16,636.80
ATLAS 2015-04	1.03.01.02	AFW2710	Algo2: Technical performance verification of parameter driven alg	5/31/2016	8/9/2016	5/31/2016	8/9/2016	0	0	20,796.00
ATLAS 2015-04	1.03.01.02	AFW2740	Algo2: Document firmware	8/10/2016	9/21/2016	8/10/2016	9/21/2016	0	0	12,477.60
ATLAS 2015-04	1.03.01.02	AFW2760	Algo2: Test version 2 algorithm in prototype	9/22/2016	9/28/2016	9/22/2016	9/28/2016	0	0	12,477.60
ATLAS 2015-04	1.03.01.02	AFW2770	Algo2: Travel for Test version 2 algorithm in prototype [BNL]	9/22/2016	9/28/2016	9/22/2016	9/28/2016	0	0	2,130.60
ATLAS 2015-04	1.03.01.02	AFW2780	Algo2: Preparation and Participation in Final Design Review (FDR	6/17/2016	6/30/2016	6/6/2016	6/17/2016	11	13	4,159.20
ATLAS 2015-04	1.03.01.02	AFW2780T	Travel for FDR to CERN	6/24/2016	6/30/2016	6/13/2016	6/17/2016	11	13	3,765.40
ATLAS 2015-04	1.03.01.02	AFW2810	Algo2: Develop high-level FPGA debugging tools	7/1/2016	7/29/2016	6/20/2016	7/18/2016	11	11	8,318.40
ATLAS 2015-04	1.03.01.02	AFW2820	Algo2: provide monitoring information to algo1	8/1/2016	8/5/2016	7/19/2016	7/25/2016	13	11	2,079.60
ATLAS 2015-04	1.03.01.02	AFW2830	Algo2: Update Firmware to version 3 gFEX algorithm	8/8/2016	9/19/2016	7/26/2016	9/6/2016	13	13	12,477.60
ATLAS 2015-04	1.03.01.02	AFW2840	Algo2: Verify technical performance in simulation	9/20/2016	10/31/2016	9/7/2016	10/18/2016	13	13	12,739.68
ATLAS 2015-04	1.03.01.02	AFW2860	Algo2: Verify technical performance in pre-production gFEX	3/22/2017	5/31/2017	3/9/2017	5/17/2017	13	14	21,420.00
ATLAS 2015-04	1.03.01.02	AFW2890	Algo2: Final algorithm documentation	6/1/2017	7/6/2017	5/18/2017	6/22/2017	14	14	10,710.00
ATLAS 2015-04	1.03.01.02	AFW2910	Algo2: Verify technical performance on production gFEX	1/9/2018	2/12/2018	12/26/2017	1/30/2018	14	13	11,031.00
ATLAS 2015-04	1.03.01.02	AFW2920T	Travel for Verify Tech Peformance in Production gFEX to CERN	2/6/2018	2/12/2018	1/24/2018	1/30/2018	13	13	3,990.20
ATLAS 2015-04	1.03.02	HUB1040	Version 1 of TTC Interface	10/1/2014	10/29/2014	10/1/2014	10/29/2014	0	0	1,463.44
ATLAS 2015-04	1.03.02	HUB1045M	Xilinx Software Yearly Licence Fee	12/1/2014	12/31/2014	12/1/2014	12/31/2014	0	0	1,214.49
ATLAS 2015-04	1.03.02	HUB1050	Version 1 of IPMC Interface	10/1/2014	10/30/2014	10/1/2014	10/30/2014	0	0	11,083.96
ATLAS 2015-04	1.03.02	HUB1060	Version 1 of DCS Interface	10/31/2014	12/1/2014	10/31/2014	12/1/2014	0	0	13,834.30
ATLAS 2015-04	1.03.02	HUB1070	Version 1 of Ethernet Switch Interfaces	12/2/2014	1/19/2015	12/2/2014	1/19/2015	0	0	21,406.24
ATLAS 2015-04	1.03.02	HUB1080	Version 1 of FEX Data interface	1/20/2015	2/17/2015	1/20/2015	2/17/2015	0	0	10,907.42
ATLAS 2015-04	1.03.02	HUB1090	Simulated integration of version1 FW	2/18/2015	4/17/2015	2/18/2015	4/17/2015	0	0	17,823.64
ATLAS 2015-04	1.03.02	HUB1100	Firmware Integration on prototype Hub complete	5/22/2015	9/15/2015	05/22/2015*	9/15/2015	0	0	51,931.14
ATLAS 2015-04	1.03.02	HUB1110T	Travel to CERN for HW/FW integration test	9/16/2015	9/29/2015	9/16/2015	9/29/2015	0	0	7,639.30
ATLAS 2015-04	1.03.02	HUB1119	Preparation for starting version 2	9/1/2015	9/24/2015	09/01/2015*	9/24/2015	0	0	16,584.64
ATLAS 2015-04	1.03.02	HUB1119M	Xilinx Software Yearly Licence Fee	12/1/2015	12/31/2015	12/1/2015	12/31/2015	0	0	1,249.87
ATLAS 2015-04	1.03.02	HUB1120	Version 2 of TTC and IMPI FW	9/25/2015	11/25/2015	9/25/2015	11/25/2015	0	0	31,183.36
ATLAS 2015-04	1.03.02	HUB1130	Version 2 of Ethernet Switch Interface	11/27/2015	1/29/2016	11/27/2015	1/29/2016	0	0	31,274.39
ATLAS 2015-04	1.03.02	HUB1140	Version 2 of DCS FW	2/1/2016	3/31/2016	2/1/2016	3/31/2016	0	0	31,274.39
ATLAS 2015-04	1.03.02	HUB1150	Version 2 of FEX Data interface	4/1/2016	4/28/2016	4/1/2016	4/28/2016	0	0	15,581.67
ATLAS 2015-04	1.03.02	HUB1160	Simulated integration of V2 FW	4/29/2016	6/1/2016	4/29/2016	6/1/2016	0	0	15,581.67
ATLAS 2015-04	1.03.02	HUB1170	Detailed System Testing Begins	6/2/2016	2/8/2017	6/2/2016	2/8/2017	0	0	83,076.44
ATLAS 2015-04	1.03.02	HUB1175M	Xilinx Software Yearly Licence Fee	12/1/2016	12/30/2016	12/1/2016	12/30/2016	0	0	1,214.43
ATLAS 2015-04	1.03.02	HUB1190	Version 3 of TTC and IMPI FW	2/9/2017	4/6/2017	2/9/2017	4/6/2017	0	0	17,808.84
ATLAS 2015-04	1.03.02	HUB1200	Version 3 of Ethernet Switch Interface	4/7/2017	5/5/2017	4/7/2017	5/5/2017	0	0	8,904.42
ATLAS 2015-04	1.03.02	HUB1210	Version 3 of DCS FW	5/8/2017	6/8/2017	5/8/2017	6/8/2017	0	0	8,904.42
ATLAS 2015-04	1.03.02	HUB1220	Version 3 of FEX Data interface	6/9/2017	7/10/2017	6/9/2017	7/10/2017	0	0	8,904.42
ATLAS 2015-04	1.03.02	HUB1230	Detailed System Testing Begins	7/11/2017	9/12/2017	7/11/2017	9/12/2017	0	0	17,808.84
ATLAS 2015-04	1.03.02	HUB1245M	Xilinx Software Yearly Licence Fee	12/1/2017	12/29/2017	12/1/2017	12/29/2017	0	0	1,236.15
ATLAS 2015-04	1.03.02	HUB1250	Validate production FW on production Hub	9/13/2017	10/10/2017	9/13/2017	10/10/2017	0	0	8,997.92
ATLAS 2015-04	1.03.02	HUB2040	Hub Preliminary Design Review	10/1/2014	10/6/2014	10/1/2014	10/6/2014	0	0	4,817.20
ATLAS 2015-04	1.03.02	HUB2040T	Travel for Hub Preliminary Design Review (CERN)	10/1/2014	10/6/2014	10/1/2014	10/6/2014	0	0	9,854.48
ATLAS 2015-04	1.03.02	HUB2050	Version 2 of Hub Design Specifications	10/7/2014	10/15/2014	10/7/2014	10/15/2014	0	0	1,391.92
ATLAS 2015-04	1.03.02	HUB2100	Version 1 of Hub motherboard schematic	10/7/2014	11/14/2014	10/7/2014	11/14/2014	0	0	10,382.20
ATLAS 2015-04	1.03.02	HUB2110	Version 1 of Hub layout	10/7/2014	11/7/2014	10/7/2014	11/7/2014	0	0	13,793.34
ATLAS 2015-04	1.03.02	HUB2120	PCB Simulation of Hub Version 1	11/10/2014	12/2/2014	11/10/2014	12/2/2014	0	0	18,599.11
ATLAS 2015-04	1.03.02	HUB2125	Preparation for Hub Final design review	12/3/2014	12/16/2014	12/3/2014	12/16/2014	0	0	9,400.37
ATLAS 2015-04	1.03.02	HUB2130	Hub Final Design Review (CERN)	12/17/2014	12/26/2014	12/17/2014	12/26/2014	0	0	6,490.43
ATLAS 2015-04	1.03.02	HUB2130T	Travel for Hub Final Design Review (CERN)	12/17/2014	12/26/2014	12/17/2014	12/26/2014	0	0	4,835.01
ATLAS 2015-04	1.03.02	HUB2140	Preparation of Hub Design Version 1	12/29/2014	1/30/2015	12/29/2014	1/30/2015	0	0	21,509.05
ATLAS 2015-04	1.03.02	HUB2141M1	Pre-Prototype Board - Write Specifications	12/29/2014	1/6/2015	12/29/2014	1/6/2015	0	0	8,891.85
ATLAS 2015-04	1.03.02	HUB2141M2	Pre-Prototype Board - Identify vendors	1/7/2015	1/14/2015	1/7/2015	1/14/2015	0	0	7,973.24

ATLAS 2015-04	1.03.03	FFP1015	active technology survey	10/7/2014	3/11/2015	10/7/2014	3/11/2015	0	0	9,811.62
ATLAS 2015-04	1.03.03	FFP1015MP	Payment for Material cost for active technology survey (Misc. Part	3/12/2015	3/12/2015	3/12/2015	3/12/2015	0	0	69,525.00
ATLAS 2015-04	1.03.03	FFP1030	v0 design	10/1/2014	11/24/2014	10/1/2014	11/24/2014	0	0	1,876.20
ATLAS 2015-04	1.03.03	FFP1033	Fiber Plant v0 parts procurement	11/25/2014	12/31/2014	11/25/2014	12/31/2014	0	0	4,549.17
ATLAS 2015-04	1.03.03	FFP1033M	Material cost for Fiber Plant v0 parts procurement	11/25/2014	12/31/2014	11/25/2014	12/31/2014	0	0	4,120.00
ATLAS 2015-04	1.03.03	FFP1035	Fiber plant v0 assembly preparation	1/2/2015	1/28/2015	1/2/2015	1/28/2015	0	0	4,441.35
ATLAS 2015-04	1.03.03	FFP1036	Fiber Plant v0 assembly	1/29/2015	3/10/2015	1/29/2015	3/10/2015	0	0	9,508.89
ATLAS 2015-04	1.03.03	FFP1040	Fiber Plant v0 validation	3/11/2015	5/22/2015	3/11/2015	5/22/2015	0	0	18,391.59
ATLAS 2015-04	1.03.03	FFP1050	Fiber Plant v1 design	2/27/2015	6/5/2015	2/27/2015	5/7/2015	0	29	34,092.17
ATLAS 2015-04	1.03.03	FFP1055T	Travel for v1 design review	6/8/2015	6/15/2015	5/26/2015	6/2/2015	13	13	4,835.00
ATLAS 2015-04	1.03.03	FFP1060	Fiber Plant v1 parts procurement	6/16/2015	7/24/2015	6/3/2015	7/13/2015	13	11	14,762.25
ATLAS 2015-04	1.03.03	FFP1060MP	Payment for Material cost for Fiber Plant v1 parts procurement	7/27/2015	7/27/2015	7/14/2015	7/14/2015	13	13	30,900.00
ATLAS 2015-04	1.03.03	FFP1065	Wait for v1 parts delivery	7/28/2015	8/21/2015	7/15/2015	8/10/2015	13	11	3,830.97
ATLAS 2015-04	1.03.03	FFP1070	Fiber Plant v1 assembly	8/24/2015	10/1/2015	8/11/2015	9/18/2015	13	13	13,246.20
ATLAS 2015-04	1.03.03	FFP1080	Fiber Plant v1 validation	10/2/2015	10/30/2015	9/21/2015	10/19/2015	11	11	5,684.89
ATLAS 2015-04	1.03.03	FFP1090	Fiber Plant v1 to CERN	11/2/2015	12/2/2015	10/20/2015	11/18/2015	13	14	8,197.01
ATLAS 2015-04	1.03.03	FFP1100	Fiber Plant v1 testing at CERN	12/3/2015	3/25/2016	11/19/2015	3/14/2016	14	11	52,559.98
ATLAS 2015-04	1.03.03	FFP1105	Interface document	3/28/2016	4/6/2016	3/15/2016	3/24/2016	13	13	7,510.63
ATLAS 2015-04	1.03.03	FFP1110T	Travel for technology decision	4/12/2016	4/19/2016	3/30/2016	4/6/2016	13	13	5,076.99
ATLAS 2015-04	1.03.03	FFP2005	Fiber Plant v2 specification	4/12/2016	6/7/2016	3/30/2016	5/24/2016	13	14	25,416.06
ATLAS 2015-04	1.03.03	FFP2010	Fiber Plant v2 component validation	6/8/2016	8/3/2016	5/25/2016	7/21/2016	14	13	15,584.03
ATLAS 2015-04	1.03.03	FFP2020	Fiber Plant v2 design active	8/4/2016	10/27/2016	7/22/2016	10/14/2016	13	13	43,994.37
ATLAS 2015-04	1.03.03	FFP2030	Fiber Plant v2 design passive	9/2/2016	11/22/2016	8/22/2016	11/9/2016	11	13	26,976.86
ATLAS 2015-04	1.03.03	FFP2060T	Travel for production readiness review review	11/28/2016	11/29/2016	11/14/2016	11/15/2016	14	14	5,331.01
ATLAS 2015-04	1.03.03	FFP2070	Labor for v2 Fiber plant parts order	11/30/2016	2/8/2017	11/16/2016	1/26/2017	14	13	29,049.47
ATLAS 2015-04	1.03.03	FFP2070M8	v2 parts order - Procurement closeout (payment)	2/9/2017	2/9/2017	1/27/2017	1/27/2017	13	13	250,000.00
ATLAS 2015-04	1.03.03	FFP3000	Fiber Plant v2 partial assembly at MSU	2/10/2017	5/8/2017	1/30/2017	4/25/2017	11	13	12,697.29
ATLAS 2015-04	1.03.03	FFP3005	Fiber Plant v2 MSU testing	5/9/2017	7/10/2017	4/26/2017	6/26/2017	13	14	8,464.86
ATLAS 2015-04	1.03.03	FFP3010	v2 ship to CERN	7/11/2017	8/21/2017	6/27/2017	8/8/2017	14	13	7,736.23
ATLAS 2015-04	1.03.03	FFP3020	Fiber Plant v2 partial assembly at CERN	2/9/2017	6/7/2017	1/27/2017	5/24/2017	13	14	30,930.05
ATLAS 2015-04	1.03.03	FFP3030	Fiber Plant v2 testing at CERN	6/8/2017	9/7/2017	5/25/2017	8/24/2017	14	14	23,208.69
ATLAS 2015-04	1.03.03	FFP3040	Fiber Plant v2 complete assembly	9/8/2017	11/13/2017	8/25/2017	10/31/2017	14	13	15,778.85
ATLAS 2015-04	1.03.03	FFP3050	Fiber Plant v2 validation	11/14/2017	2/13/2018	11/1/2017	1/31/2018	13	13	15,936.98
ATLAS 2015-04	1.03.04.01	GFX1035	Establish Ratiation Levels	5/1/2015	5/29/2015	05/01/2015*	5/29/2015	0	0	11,092.80
ATLAS 2015-04	1.03.04.01	GFX1060	Input/Output Firmware	10/1/2014	2/4/2015	10/1/2014	2/4/2015	0	0	6,450.00
ATLAS 2015-04	1.03.04.01	GFX1080	Frame Firmware V1.0 Development	6/12/2015	8/13/2015	6/12/2015	8/13/2015	0	0	63,195.96
ATLAS 2015-04	1.03.04.01	GFX1110	Frame Firmware V2.0 Development	11/2/2015	1/7/2016	11/2/2015	1/7/2016	0	0	64,518.68
ATLAS 2015-04	1.03.04.01	GFX1150	Frame Firmware V3.0 Development	1/8/2016	3/10/2016	1/8/2016	3/10/2016	0	0	63,116.10
ATLAS 2015-04	1.03.04.01	GFX3000	Specify Integration with L1	12/4/2014	12/15/2014	12/4/2014	12/15/2014	0	0	8,874.24
ATLAS 2015-04	1.03.04.01	GFX3010	Define Form Factor	1/2/2015	1/16/2015	1/2/2015	1/16/2015	0	0	3,409.56
ATLAS 2015-04	1.03.04.01	GFX3020	Identify FPGA (Critical Component)	1/19/2015	2/2/2015	1/19/2015	2/2/2015	0	0	3,409.56
ATLAS 2015-04	1.03.04.01	GFX3030	Define Optical Links and Power Management	2/3/2015	2/16/2015	2/3/2015	2/16/2015	0	0	3,099.60
ATLAS 2015-04	1.03.04.01	GFX3050	Schematic Design	2/17/2015	4/10/2015	2/17/2015	4/10/2015	0	0	36,265.32
ATLAS 2015-04	1.03.04.01	GFX3060	Preliminary Design Review	11/17/2014	11/20/2014	11/17/2014	11/20/2014	0	0	2,479.68
ATLAS 2015-04	1.03.04.01	GFX3060T	Travel for Preliminary Design Review	11/17/2014	11/20/2014	11/17/2014	11/20/2014	0	0	6,450.00
ATLAS 2015-04	1.03.04.01	GFX3075	Component Procurement	4/13/2015	7/9/2015	4/13/2015	7/9/2015	0	0	6,199.20
ATLAS 2015-04	1.03.04.01	GFX3077	Procure: FPGAs	7/10/2015	7/10/2015	7/10/2015	7/10/2015	0	0	57,442.49
ATLAS 2015-04	1.03.04.01	GFX3078	Procure: Electronics Components	7/10/2015	7/10/2015	7/10/2015	7/10/2015	0	0	11,661.60
ATLAS 2015-04	1.03.04.01	GFX3080	Board Layout	4/13/2015	6/11/2015	4/13/2015	6/11/2015	0	0	30,196.32
ATLAS 2015-04	1.03.04.01	GFX3081	Board Production Support	6/12/2015	7/15/2015	6/12/2015	7/15/2015	0	0	8,075.76
ATLAS 2015-04	1.03.04.01	GFX3082	Board Fabrication	7/16/2015	8/17/2015	7/16/2015	8/17/2015	0	0	18,060.00
ATLAS 2015-04	1.03.04.01	GFX3110	Implementation, Test and Debugging of Hardware and Firmware	8/18/2015	10/19/2015	8/18/2015	10/19/2015	0	0	41,257.31
ATLAS 2015-04	1.03.04.01	GFX3120	EMC/EMI Tests	10/20/2015	10/21/2015	10/20/2015	10/21/2015	0	0	2,112.00
ATLAS 2015-04	1.03.04.01	GFX3200	Pre-production Review	10/1/2015	10/7/2015	10/1/2015	10/7/2015	0	0	2,856.40
ATLAS 2015-04	1.03.04.01	GFX3210	FPGA Technology Decision	10/8/2015	10/13/2015	10/8/2015	10/13/2015	0	0	1,277.04
ATLAS 2015-04	1.03.04.01	GFX3221	Integration Test at CERN	4/18/2016	4/21/2016	4/5/2016	4/8/2016	13	13	4,570.24

ATLAS 2015-04	1.03.04.01	GFX3221T	Travel for Integration Test at CERN	4/18/2016	4/21/2016	4/5/2016	4/8/2016	13	13	3,960.00
ATLAS 2015-04	1.03.04.01	GFX3230	Schematic Design	4/22/2016	6/15/2016	4/11/2016	6/2/2016	11	13	36,395.64
ATLAS 2015-04	1.03.04.01	GFX3250	Establish Q/A Criteria	6/16/2016	6/23/2016	6/3/2016	6/10/2016	13	13	7,662.24
ATLAS 2015-04	1.03.04.01	GFX3255	Final design review	6/24/2016	6/30/2016	6/13/2016	6/17/2016	11	13	3,192.60
ATLAS 2015-04	1.03.04.01	GFX3270	Board Layout	7/1/2016	8/17/2016	6/20/2016	8/4/2016	11	13	31,825.20
ATLAS 2015-04	1.03.04.01	GFX3280	Component Procurement	7/1/2016	9/26/2016	6/20/2016	9/13/2016	11	13	6,385.20
ATLAS 2015-04	1.03.04.01	GFX3285	Board Production Support	8/18/2016	9/23/2016	8/5/2016	9/12/2016	13	11	9,402.90
ATLAS 2015-04	1.03.04.01	GFX3287M8	Procure: FPGAs - Procurement closeout (payment)	10/3/2016	10/3/2016	9/20/2016	9/20/2016	13	13	243,285.84
ATLAS 2015-04	1.03.04.01	GFX3288	Procure: Electronic Components	10/4/2016	10/10/2016	9/21/2016	9/27/2016	13	13	44,100.00
ATLAS 2015-04	1.03.04.01	GFX3290	Board Fabrication	9/27/2016	10/28/2016	9/14/2016	10/17/2016	13	11	18,946.67
ATLAS 2015-04	1.03.04.01	GFX3300	Board Acceptance Testing	10/31/2016	11/15/2016	10/18/2016	11/2/2016	13	13	21,282.24
ATLAS 2015-04	1.03.04.01	GFX3320	Test/Debug Firmware	11/16/2016	1/5/2017	11/3/2016	12/21/2016	13	15	60,299.68
ATLAS 2015-04	1.03.04.01	GFX3325	Board Tests	1/6/2017	3/3/2017	12/22/2016	2/20/2017	15	11	72,714.32
ATLAS 2015-04	1.03.04.01	GFX3330	Compliance Test with L1 (Need Input from other Subsystems)	3/6/2017	3/15/2017	2/21/2017	3/2/2017	13	13	3,665.28
ATLAS 2015-04	1.03.04.01	GFX3335	Production Readiness Review (CERN)	3/16/2017	3/21/2017	3/3/2017	3/8/2017	13	13	2,353.60
ATLAS 2015-04	1.03.04.01	GFX3335T	Travel for Review for Production Readiness Review (CERN)	3/16/2017	3/21/2017	3/3/2017	3/8/2017	13	13	3,400.00
ATLAS 2015-04	1.03.04.01	GFX3350	Schematic Design	10/3/2016	12/5/2016	10/3/2016	12/5/2016	0	0	59,191.20
ATLAS 2015-04	1.03.04.01	GFX3360	Production Board Design Review	12/6/2016	12/12/2016	12/6/2016	12/12/2016	0	0	3,288.40
ATLAS 2015-04	1.03.04.01	GFX3375	Board Layout	3/22/2017	5/11/2017	3/9/2017	4/28/2017	13	13	27,565.74
ATLAS 2015-04	1.03.04.01	GFX3380	Component Procurement	12/6/2016	3/20/2017	12/6/2016	3/20/2017	0	0	6,576.80
ATLAS 2015-04	1.03.04.01	GFX3390	Board Production Support	5/12/2017	6/21/2017	5/1/2017	6/8/2017	11	13	10,430.28
ATLAS 2015-04	1.03.04.01	GFX3400P	Payment for Board Fabrication	8/8/2017	8/8/2017	7/26/2017	7/26/2017	13	13	35,280.00
ATLAS 2015-04	1.03.04.01	GFX3410	Acceptance Test	8/9/2017	8/23/2017	7/27/2017	8/10/2017	13	13	19,508.72
ATLAS 2015-04	1.03.04.01	GFX3430	Firmware and Functional Tests	8/24/2017	11/15/2017	8/11/2017	11/2/2017	13	13	107,701.07
ATLAS 2015-04	1.03.04.01	GFX3440	Reliability Qualification for ATLAS	11/16/2017	11/29/2017	11/3/2017	11/15/2017	13	14	16,440.48
ATLAS 2015-04	1.03.04.01	GFX3450	Shipment to CERN	11/30/2017	12/7/2017	11/16/2017	11/24/2017	14	13	1,023.12
ATLAS 2015-04	1.03.04.01	GFX3470	Installation to L1	12/8/2017	12/14/2017	11/27/2017	12/1/2017	11	13	2,359.60
ATLAS 2015-04	1.03.04.01	GFX3470T	Travel for Installation to L1	12/8/2017	12/14/2017	11/27/2017	12/1/2017	11	13	7,000.00
ATLAS 2015-04	1.03.04.01	GFX3480	Test at CERN	12/15/2017	1/8/2018	12/4/2017	12/22/2017	11	17	7,078.80
ATLAS 2015-04	1.03.04.02	GFX2010	Procurement Support of FEX tester board	5/5/2015	5/29/2015	5/5/2015	5/29/2015	0	0	807.60
ATLAS 2015-04	1.03.04.02	GFX2010M	Tester Board Procurment	5/5/2015	5/29/2015	5/5/2015	5/29/2015	0	0	38,000.00
ATLAS 2015-04	1.03.04.02	GFX2030	Adapt firmware for gFEX	6/2/2015	7/2/2015	6/2/2015	7/2/2015	0	0	8,076.00
ATLAS 2015-04	1.03.04.02	GFX2040	Shipment to BNL	7/6/2015	7/7/2015	7/6/2015	7/7/2015	0	0	318.00
ATLAS 2015-04	1.03.04.03	TL3M430	FY15 gFEX System L3 Management	10/1/2014	9/30/2015	10/1/2014	9/30/2015	0	0	48,808.32
ATLAS 2015-04	1.03.04.03	TL3M440	FY16 gFEX System L3 Management	10/1/2015	9/30/2016	10/1/2015	9/30/2016	0	0	50,272.64
ATLAS 2015-04	1.03.04.03	TL3M450	FY17 gFEX System L3 Management	10/3/2016	9/29/2017	10/3/2016	9/29/2017	0	0	51,779.20
ATLAS 2015-04	1.03.05.01	FLX1030	VHDL coding of GBT	10/1/2014	10/31/2014	10/1/2014	10/31/2014	0	0	2,585.70
ATLAS 2015-04	1.03.05.01	FLX1040	RTL behavior simulation of GBT implementation	11/3/2014	12/31/2014	11/3/2014	12/31/2014	0	0	4,194.58
ATLAS 2015-04	1.03.05.01	FLX1050	Test on the GBT implementation on the demonstrator	1/2/2015	2/27/2015	1/2/2015	2/27/2015	0	0	4,022.20
ATLAS 2015-04	1.03.05.01	FLX1060M	Material for GBT implementation for demonstrator completed	2/27/2015	2/27/2015	2/27/2015	2/27/2015	0	0	19,350.00
ATLAS 2015-04	1.03.05.01	FLX1060T	2 one week trips for GBT implementation for demonstrator to CEI	1/2/2015	2/27/2015	1/2/2015	2/27/2015	0	0	6,450.00
ATLAS 2015-04	1.03.05.01	FLX1080	VHDL coding of internal data generators	10/1/2014	10/31/2014	10/1/2014	10/31/2014	0	0	2,585.70
ATLAS 2015-04	1.03.05.01	FLX1090	Test internal data generators on the demonstrator	11/3/2014	12/31/2014	11/3/2014	12/31/2014	0	0	4,194.58
ATLAS 2015-04	1.03.05.01	FLX2010	Identify the implementation specs of GBT for the FELIX I/O	3/2/2015	3/31/2015	3/2/2015	3/31/2015	0	0	2,126.02
ATLAS 2015-04	1.03.05.01	FLX2020	Allocate FPGA resources for the prototype GBT implementation	4/1/2015	4/30/2015	4/1/2015	4/30/2015	0	0	2,126.02
ATLAS 2015-04	1.03.05.01	FLX2030	VHDL coding of prototype GBT implementation	5/1/2015	5/29/2015	5/1/2015	5/29/2015	0	0	2,068.56
ATLAS 2015-04	1.03.05.01	FLX2040	RTL behavior simulation of the prototype GBT implementation	6/1/2015	7/31/2015	6/1/2015	7/31/2015	0	0	4,424.42
ATLAS 2015-04	1.03.05.01	FLX2050	Test the prototype GBT implementation on the FELIX I/O evaluati	8/3/2015	9/30/2015	8/3/2015	9/30/2015	0	0	4,194.58
ATLAS 2015-04	1.03.05.01	FLX2050M	Material for Test the prototype GBT implementation on the FELIX	8/3/2015	9/30/2015	8/3/2015	9/30/2015	0	0	6,450.00
ATLAS 2015-04	1.03.05.01	FLX2050T	2 one week trips for Test the prototype GBT implementation on th	8/3/2015	9/30/2015	8/3/2015	9/30/2015	0	0	6,450.00
ATLAS 2015-04	1.03.05.01	FLX3010	Allocate FPGA resources for 8b/10b decoder	1/2/2015	3/2/2015	1/2/2015	3/2/2015	0	0	4,079.66
ATLAS 2015-04	1.03.05.01	FLX3020	VHDL coding of 8b/10b decoder	3/3/2015	6/2/2015	3/3/2015	6/2/2015	0	0	6,435.52
ATLAS 2015-04	1.03.05.01	FLX3030	RTL behavior simulation of 8b/10b decoder	6/3/2015	8/5/2015	6/3/2015	8/5/2015	0	0	4,481.88
ATLAS 2015-04	1.03.05.01	FLX3040	Test 8b/10b decoder on the FELIX I/O evaluation board	8/6/2015	10/6/2015	8/6/2015	10/6/2015	0	0	4,321.50
ATLAS 2015-04	1.03.05.01	FLX4010	Identify the specs for direct low latency transferring (DLLT) and sc	10/1/2015	1/5/2016	10/1/2015	1/5/2016	0	0	19,115.14
ATLAS 2015-04	1.03.05.01	FLX4020	Allocate FPGA resources for the prototype implementation of DLL	1/6/2016	3/3/2016	1/6/2016	3/3/2016	0	0	11,658.46

April evidence of P6/Cobra matching after correction - edited to show only first page, all activities provided did not have deltas

ca1	wp	descrip	COBRA START DATE	COBRA FINISH DATE	P6 START DATE	P6 FINISH DATE	START DATE DELTA	FINISH DATE DELTA	bac
1.01.01.01	FBP1130	Assembly Preparation	12/31/2014	3/2/2015	12/31/2014	3/2/2015	0	0	560.50
1.01.01.01	FBP1140	Assembly	3/3/2015	3/11/2015	3/3/2015	3/11/2015	0	0	2,242.00
1.01.01.01	FBP1150	Order cables etc.for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	1,283.76
	FBP1150M	Material cost for cables for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	819.00
1.01.01.01	FBP1170	LabVIEW coding	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	6,713.60
1.01.01.01	FBP1180	Dummy FEB Layout and Fabrication	10/1/2014	10/20/2014	10/1/2014	10/20/2014	0	0	545.14
1.01.01.01	FBP1190	Dummy FEB Assembly	3/25/2015	4/1/2015	3/25/2015	4/1/2015	0	0	2,211.28
1.01.01.01	FBP1190MP	Payment for Material for Dummy FEB Fabri	3/25/2015	3/25/2015	3/25/2015	3/25/2015	0	0	5,850.00
1.01.01.01	FBP1200	Dummy FEB Commission	4/2/2015	4/10/2015	4/2/2015	4/10/2015	0	0	2,211.28
1.01.01.01	FBP1210	Dummy LTDB PCB Layout and Fabrication	3/25/2015	4/22/2015	3/25/2015	4/22/2015	0	0	3,780.68
1.01.01.01	FBP1300	Document test results	8/19/2015	10/1/2015	8/19/2015	10/1/2015	0	0	3,467.67
1.01.01.01	FBP1320	FCal Baseplane Prototype design work	10/2/2015	11/5/2015	10/2/2015	11/5/2015	0	0	3,169.68
1.01.01.01	FBP1330	FCal Baseplane Prototype fabrication	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	2,277.60
1.01.01.01	FBP1330M	Material cost for FCal Baseplane Prototype	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	6,700.00
1.01.01.01	FBP1340	Preparation for Final Design Review	1/12/2016	1/21/2016	1/12/2016	1/21/2016	0	0	3,074.88
1.01.01.01	FBP1350	Revisit of Final design if necessary	1/25/2016	2/3/2016	1/25/2016	2/3/2016	0	0	1,784.16
1.01.01.01	FBP1360	Production Readiness Review	5/23/2016	5/27/2016	5/23/2016	5/27/2016	0	0	1,784.16
1.01.01.01	FBP1380	Final layout changes	1/12/2016	2/9/2016	1/12/2016	2/9/2016	0	0	2,707.84
1.01.01.01	FBP1390	FCal baseplane PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	1,731.90
1.01.01.01	FBP1220	Dummy LTDB Assembly	4/23/2015	4/30/2015	4/23/2015	4/30/2015	0	0	2,211.28
1.01.01.01	FBP1220MP	Payment for Material for Dummy LTDB PCB	4/23/2015	4/23/2015	4/23/2015	4/23/2015	0	0	5,850.00
1.01.01.01	FBP1390M	Material cost for FCal Baseplanes PCB ord	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	16,080.00
1.01.01.01	FPB20153FY13	Baseplanes FY13 Actuals AZ-JR 20153	9/30/2013	9/30/2013	9/30/2013	9/30/2013	0	0	3,248.10
1.01.01.01	FBP1230	Dummy LTDB Commission	5/1/2015	5/15/2015	5/1/2015	5/15/2015	0	0	2,211.28
1.01.01.01	FBP1240	Dummy Calorimeter/Calibration PCB Layou	4/23/2015	5/27/2015	4/23/2015	5/27/2015	0	0	3,780.68
1.01.01.01	FBP1250	Dummy Calorimeter/Calibration Board Asse	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	2,211.28
1.01.01.01	FBP1250M	Material for Dummy Calorimeter Assembly	5/28/2015	6/4/2015	5/28/2015	6/4/2015	0	0	5,850.00
1.01.01.01	FBP1260	Dummy Calorimeter/Calibration Board Com	6/5/2015	6/15/2015	6/5/2015	6/15/2015	0	0	2,211.28
1.01.01.01	FBP1270	Mechanical testing	6/16/2015	7/17/2015	6/16/2015	7/17/2015	0	0	448.40
1.01.01.01	FBP1280	Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,793.60
1.01.01.01	FBP1280T	Travel for Test mounting hole placement	7/20/2015	7/23/2015	7/20/2015	7/23/2015	0	0	1,557.36
1.01.01.01	FBP1290	Test electrical properties	7/20/2015	8/18/2015	7/20/2015	8/18/2015	0	0	3,464.32
1.01.01.01	FBP1400	FCal baseplane Components order	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	2,162.14
1.01.01.01	FBP1400M	Material for FCal Baseplane components	5/31/2016	8/31/2016	5/31/2016	8/31/2016	0	0	10,720.00
1.01.01.01	FBP1420	FCal baseplane Assembly	10/4/2016	1/9/2017	10/4/2016	1/9/2017	0	0	11,287.68
1.01.01.01	FBP1425	Assembly Certification jig	1/10/2017	2/7/2017	1/10/2017	2/7/2017	0	0	918.88
1.01.01.01	FBP1440	Production testing	2/8/2017	5/10/2017	2/8/2017	5/10/2017	0	0	6,334.24
1.01.01.01	FBP1450	Document test results	5/11/2017	8/9/2017	5/11/2017	8/9/2017	0	0	4,594.40
1.01.01.01	FBP1460	Ship FCal Baseplane to CERN	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	980.00
1.01.01.01	FBP1460M	Material cost for shipping FCal Baseplane to	10/17/2017	10/27/2017	10/17/2017	10/27/2017	0	0	284.00
1.01.01.01	FBP1090MP	Payment for Material cost for PCB Procurem	12/16/2014	12/16/2014	12/16/2014	12/16/2014	0	0	3,900.00
1.01.01.01	FPB20153FY14	Baseplanes FYf14 Actuals AZ-JR 20153	3/31/2014	3/31/2014	3/31/2014	3/31/2014	0	0	15,365.89
1.01.01.01	FPB20153FY14.1	Baseplanes APRIL 2014 Actuals AZ-JR 201	4/30/2014	4/30/2014	4/30/2014	4/30/2014	0	0	1,207.00
1.01.01.01	FPB20153FY14.2	Baseplanes SEPTEMBER 2014 Actuals AZ-	9/2/2014	9/2/2014	9/2/2014	9/2/2014	0	0	9,302.75
1.01.01.01	FPB20153FY14.3	Lag Payment for Prior Work	11/28/2014	11/28/2014	11/28/2014	11/28/2014	0	0	11,000.00
1.01.01.01	FBP1480	Document As-Built FCal Baseplanes	7/13/2017	9/13/2017	**7/13/2017**	**9/13/2017**	**0**	**0**	4,594.40
1.01.02.01	LSB1160M	Payment for Material for PCB prototype and	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
1.01.02.01	LSB1200M	Payment for Material for PCB prototype and	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	588.30
1.01.02.01	LSB1240	PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	169.95
1.01.02.01	LSB1240M	Material for PCB prototype and assembly	12/11/2014	1/9/2015	12/11/2014	1/9/2015	0	0	588.30
1.01.02.01	LSB1570M	Material for Deliverable shipped to CERN	10/5/2017	10/5/2017	10/5/2017	10/5/2017	0	0	8,650.00
1.01.02.01	LSB20649FY14.2	Layer Sum Boards SEPTEMBER 2014 Actu	9/2/2014	9/2/2014	9/2/2014	9/2/2014	0	0	2,786.69
1.01.02.01	LSB1340M8	Burn-in Oven - Procurement closeout Paym	6/26/2015	6/26/2015	6/26/2015	6/26/2015	0	0	19,570.00
1.01.02.01	LSB1370M	Material for order other LSB components	8/7/2015	8/13/2015	8/7/2015	8/13/2015	0	0	33,578.00
1.01.02.01	LSB1400M60	Procurement Closeout	12/4/2015	12/4/2015	12/4/2015	12/4/2015	0	0	21,200.00
1.01.02.01	LSB1470	test preproduction samples	2/19/2016	2/25/2016	2/19/2016	2/25/2016	0	0	1,167.00
1.01.02.01	LSB1515	LSB Assembly Procurement Closeout	9/15/2016	9/15/2016	9/15/2016	9/15/2016	0	0	59,360.00
1.01.02.01	LSB1520	PCB boards testing-part 1(50%)	6/7/2016	1/23/2017	6/7/2016	1/23/2017	0	0	11,993.35
1.01.02.01	LSB1540	PCB board testing-part 2 (remaining 50%)	1/24/2017	9/7/2017	1/24/2017	9/7/2017	0	0	12,174.22
1.01.02.01	LSB1290T	Travel for Final Design Review	3/13/2015	3/16/2015	3/13/2015	3/16/2015	0	0	3,975.00
1.01.02.01	LSB1300M8	IC order - Procurement closeout	8/7/2015	8/7/2015	8/7/2015	8/7/2015	0	0	114,845.00
1.01.02.01	LSB1320M	Material for IC radiation test	6/4/2015	8/6/2015	6/4/2015	8/6/2015	0	0	11,766.00

May evidence of P6/Cobra matching - edited to show only first page, all activities provided did not have deltas

ca1	wp	descrip	COBRA START DATE	COBRA FINISH DATE	P6 START DATE	P6 FINISH DATE	START DATE DELTA	FINISH DATE DELTA	bac
1.01.01.01	FBP1220MP	Payment for Material for Dummy LTDB PCB	4/23/2015	4/23/2015	4/23/2015	4/23/2015	0	0	5,850.00
1.01.01.01	FBP1390M	Material cost for FCal Baseplanes PCB orc	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	16,080.00
1.01.01.01	FPB20153FY13	Baseplanes FY13 Actuals AZ-JR 20153	9/30/2013	9/30/2013	9/30/2013	9/30/2013	0	0	3,248.10
1.01.03.01	TDB11330	Diagnostic Work @ CERN	1/4/2016	1/5/2018	1/4/2016	1/5/2018	0	0	17,498.99
1.01.03.02	TDB2380	Final chip submission preparation	5/29/2015	12/30/2015	5/29/2015	12/30/2015	0	0	61,109.28
1.01.03.02	TDB8150T	Travel for Radiation tests at MGH	10/6/2015	10/6/2015	10/6/2015	10/6/2015	0	0	670.00
1.03.03	FFP2020	Fiber Plant v2 design active	8/4/2016	10/27/2016	8/4/2016	10/27/2016	0	0	43,994.37
1.02.07	FEC9074T	Travel for Radiation / B Field TestsPB FD Pı	5/12/2015	6/23/2015	5/12/2015	6/23/2015	0	0	3,016.44
1.02.07	FEC9076	DCDC Converter Cooling Tests	6/24/2015	8/12/2015	6/24/2015	8/12/2015	0	0	4,051.91
1.02.07	FEC9076M	Material for Cooling Tests	6/24/2015	8/12/2015	6/24/2015	8/12/2015	0	0	1,300.00
1.02.07	FEC9078	Power Block Final Design	8/13/2015	9/30/2015	8/13/2015	9/30/2015	0	0	7,889.88
1.02.07	FEC9078T	Travel Power Block Final Design	8/13/2015	9/30/2015	8/13/2015	9/30/2015	0	0	6,985.44
1.01.03.01	TDB11165M	Material for Neutron radiation test	11/2/2015	9/29/2017	11/2/2015	9/29/2017	0	0	2,589.04
1.02.06	ALN5090	Calibrate second 25% of platforms	8/14/2015	10/14/2015	8/14/2015	10/14/2015	0	0	17,456.59
1.03.02	HUB2375MP	Payment for Material for Pre-Production Boa	11/30/2016	11/30/2016	11/30/2016	11/30/2016	0	0	52,697.00
1.03.02	HUB2390	Pre-production Electrical Tests Complete	12/1/2016	1/20/2017	12/1/2016	1/20/2017	0	0	43,040.62
1.03.02	HUB2400	Validation of Core functionality complete	1/23/2017	3/8/2017	1/23/2017	3/8/2017	0	0	38,808.19
1.03.02	HUB2410	L1Calo Joint Meeting at CERN	12/1/2016	12/20/2016	12/1/2016	12/20/2016	0	0	5,222.18
1.03.02	HUB2410T	Travel for L1Calo Joint Meeting at CERN	12/1/2016	12/20/2016	12/1/2016	12/20/2016	0	0	5,330.99
1.03.02	HUB2420	Pre-Production Board Acceptance Testing C	3/9/2017	4/24/2017	3/9/2017	4/24/2017	0	0	33,586.01
1.03.02	HUB2430	Production Board Design Sent for Manufacti	4/25/2017	5/5/2017	4/25/2017	5/5/2017	0	0	9,454.61
1.03.02	HUB2435	Production Board Manufacturing	5/8/2017	6/26/2017	5/8/2017	6/26/2017	0	0	38,808.19
1.03.02	HUB2435M8	Productino Board Manufacturing- Procurem	6/26/2017	6/26/2017	6/26/2017	6/26/2017	0	0	190,980.00
1.01.01.01	FBP1150	Order cables etc.for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	1,283.76
1.01.01.01	FBP1150M	Material cost for cables for test	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	819.00
1.01.01.01	FBP1170	LabVIEW coding	3/12/2015	3/24/2015	3/12/2015	3/24/2015	0	0	6,713.60
1.01.01.01	FBP1180	Dummy FEB Layout and Fabrication	10/1/2014	10/20/2014	10/1/2014	10/20/2014	0	0	545.14
1.01.01.01	FBP1190	Dummy FEB Assembly	3/25/2015	4/1/2015	3/25/2015	4/1/2015	0	0	2,211.28
1.01.01.01	FBP1190MP	Payment for Material for Dummy FEB Fabri	3/25/2015	3/25/2015	3/25/2015	3/25/2015	0	0	5,850.00
1.01.01.01	FBP1200	Dummy FEB Commission	4/2/2015	4/10/2015	4/2/2015	4/10/2015	0	0	2,211.28
1.01.01.01	FBP1210	Dummy LTDB PCB Layout and Fabrication	3/25/2015	4/22/2015	3/25/2015	4/22/2015	0	0	3,780.68
1.01.01.01	FBP1300	Document test results	8/19/2015	10/1/2015	8/19/2015	10/1/2015	0	0	3,467.67
1.01.01.01	FBP1320	FCal Baseplane Prototype design work	10/2/2015	11/5/2015	10/2/2015	11/5/2015	0	0	3,169.68
1.01.01.01	FBP1330	FCal Baseplane Prototype fabrication	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	2,277.60
1.01.01.01	FBP1330M	Material cost for FCal Baseplane Prototype	11/6/2015	12/7/2015	11/6/2015	12/7/2015	0	0	6,700.00
1.01.01.01	FBP1340	Preparation for Final Design Review	1/12/2016	1/21/2016	1/12/2016	1/21/2016	0	0	3,074.88
1.01.01.01	FBP1350	Revisit of Final design if necessary	1/25/2016	2/3/2016	1/25/2016	2/3/2016	0	0	1,784.16
1.01.01.01	FBP1360	Production Readiness Review	5/23/2016	5/27/2016	5/23/2016	5/27/2016	0	0	1,784.16
1.01.01.01	FBP1380	Final layout changes	1/12/2016	2/9/2016	1/12/2016	2/9/2016	0	0	2,707.84
1.01.01.01	FBP1390	FCal baseplane PCB order	5/31/2016	6/29/2016	5/31/2016	6/29/2016	0	0	1,731.90
1.01.01.01	FBP1220	Dummy LTDB Assembly	4/23/2015	4/30/2015	4/23/2015	4/30/2015	0	0	2,211.28
1.01.03.03	TDB12380	Revision of LTDB Schematics Design for Fir	5/1/2017	6/30/2017	5/1/2017	6/30/2017	0	0	65,705.60
1.01.03.03	TDB13150	Mockup Preparation of for LTDB Production	7/3/2017	8/30/2017	7/3/2017	8/30/2017	0	0	72,841.68
1.01.03.03	TDB1540T	Travel for Evaluation Test of LTDB Pre-Prot	10/1/2015	11/30/2015	10/1/2015	11/30/2015	0	0	6,600.00
1.01.03.04	TDB4150	design document and implement comments	10/20/2014	11/17/2014	10/20/2014	11/17/2014	0	0	9,155.75
1.01.03.04	TDB4415	LOCx2 design spec documentation	1/27/2016	3/22/2016	1/27/2016	3/22/2016	0	0	9,965.65
1.01.03.04	TDB5290	finalize hardware/firmware design for the tes	3/2/2015	3/27/2015	3/2/2015	3/27/2015	0	0	6,899.25
1.01.03.04	TDB6130	Design of MTx with LOCld of 2 chanenls	10/19/2015	10/23/2015	10/19/2015	10/23/2015	0	0	2,967.51
1.01.03.04	TDB7100T	Travel for integrate the circuit design to the I	10/1/2014	10/23/2014	10/1/2014	10/23/2014	0	0	1,031.75
1.01.03.04	TDB7280T	Travel for Integration with LTDB	3/29/2017	4/2/2018	3/29/2017	4/2/2018	0	0	2,515.61
1.01.04.02	DPS2110	ATCA v1 firmware	10/28/2014	1/9/2015	10/28/2014	1/9/2015	0	0	15,390.00
1.01.04.03	DPS1330	Develop Optical Test Card v2 FW - Monitor	3/18/2015	4/13/2015	3/18/2015	4/13/2015	0	0	4,542.30
1.01.04.03	DPS2440	Integrate FW for Carrier card v1	10/7/2015	11/19/2015	10/7/2015	11/19/2015	0	0	2,509.92
1.01.04.03	DPS3160	Optical Test Card v2 plus Carrier Card v1 te	8/18/2015	10/2/2015	8/18/2015	10/2/2015	0	0	6,002.46
1.02.01	VMM1126	VMM2 test at BNL -part 2	10/9/2014	12/19/2014	10/9/2014	12/19/2014	0	0	19,753.20
1.02.01	VMM2190	VMM3A Layout	2/3/2016	3/25/2016	2/3/2016	3/25/2016	0	0	5,918.00
1.01.03.03	TDB9080	Support POL Converter Prototype Irradiatior	6/15/2015	8/13/2015	6/15/2015	8/13/2015	0	0	16,933.08
1.01.03.03	TDB9080T	Travel for Support POL Converter Prototype	6/15/2015	8/13/2015	6/15/2015	8/13/2015	0	0	1,935.00
1.01.03.03	TDB9090	Support POL Converter Pre-production Des	8/14/2015	10/16/2015	8/14/2015	10/16/2015	0	0	8,857.17
1.01.03.03	TDB9100	Support POL Converter pre-production Test	10/19/2015	12/17/2015	10/19/2015	12/17/2015	0	0	8,640.28
1.01.03.04	TDB4140T	Travel for Preliminary Design Review (CERI	10/16/2014	10/17/2014	10/16/2014	10/17/2014	0	0	2,259.53
1.01.04.03	DPS2350	Payment for Develop Carrier switch/FPGA s	10/1/2014	10/1/2014	10/1/2014	10/1/2014	0	0	2,075.75

Response to Request for Further Information on CAR-01
U.S. ATLAS Project Team
July 10, 2015

Narrative:

- During the review, the committee brought to our attention a mismatch between the April P6 baseline and the April COBRA output.
- This mismatch was the result of correcting a few links in the April P6 file, which mistakenly resulted in a few changed dates to the P6 file only. (This was a result of a mistake made during the implementation of the correction.) This was the source of the mismatch between P6 and COBRA for April.
    - COBRA remained correct, and was untouched in all processes described here.
- There were no BCPs – changes to the baseline – in May. The baselines in COBRA, therefore are, and always were, identical in both April and May.
- The Project Office corrected the mistaken dates in the April P6 file, which then matched the April COBRA baseline -- the latter of which, again, had not been touched in any manner throughout this process.
- When we corrected the mistake in the P6 file for April, the original April P6 baseline was restored.
- **The April and May COBRA baselines have always been identical. With the correction to the April P6 file, the April and May P6 baselines both match COBRA. As no BCP was implemented in May, the April and May P6 baselines are identical.**
- **There is no change to the baseline as a result of the correction to the April P6 file. Therefore, a BCP to account for the changes to the April P6 file is not required.**
- **We believe that a correctable and relatively minor mistake does not rise to the level of an unauthorized change.** No unauthorized change exists in our baseline.
- In addition to the documents requested by the committee, we attach the COBRA baselines for April and May, which will allow the committee to verify that they are identical. The CAP reports for April and May are also provided, which demonstrates that there is no change to the baseline.

As requested by the committee, we provide the following supporting material, with their filenames, along with additional files containing complementary information:

- Comparison files showing COBRA matching for the months of April and May.
    - ATLAS COBRA April vs. May
- March evidence of P6/Cobra matching.
    - ATLAS COBRA vs P6 MARCH 2015
- April evidence of P6/Cobra not matching.
    - ATLAS P6-error-and COBRA- APRIL 2015
- April evidence of P6/COBRA matching (after correction).
    - ATLAS COBRA vs P6 APRIL 2015

- May evidence of P6/Cobra matching.
    - ATLAS COBRA vs P6 MAY 2015
- A revised P6 baseline schedule with working attached (fixed via May BCP).
    - ATLAS Upgrade - April 2015 Working Schedule – Final
    - ATLAS Upgrade - May 2015 Working Schedule - Final
    - As stated above, there was no BCP required for correcting this mistake.
- A revised Cobra CAP report of the baseline (fixed via May BCP).
    - ATLAS CAP APRIL 2015
    - ATLAS CAP MAY 2015
    - Again, there was no BCP required for correcting this mistake.

Appendix B – Surveillance Plan

SUBJECT:	EVMS Annual Surveillance Plan	Year	*2015*
RESPONSIBILITY:	Planning, Performance & Quality Assurance	REVISION:	2
APPROVED BY:	Project Management Proposal Center	EFFECTIVE:	

BSA
Earned Value Management System (EVMS)
Annual Surveillance Plan

June 29, 30, July 1, 2015

June, 2015

SUBJECT:	EVMS Annual Surveillance Plan	Year	*2015*
RESPONSIBILITY:	Planning, Performance & Quality Assurance	REVISION:	2
APPROVED BY:	Project Management Proposal Center	EFFECTIVE:	

Contents

SUBJECT:	EVMS Annual Surveillance Plan	Year	*2015*
RESPONSIBILITY:	Planning, Performance & Quality Assurance	REVISION:	2
APPROVED BY:	Project Management Proposal Center	EFFECTIVE:	

1. EVMS SURVEILLANCE PLAN OVERVIEW

BNL management maintains an effective and efficient EVMS which includes ensuring that projects with a Total Project Cost (TPC) over $20 million, or projects where EVMS is deemed appropriate, conduct Self-Assessments of continuing compliance with the EVMS requirements. These assessments continuously improve this EVMS process using the most current management techniques and processes to manage projects most efficiently. This review plan summarizes the approach to be used to complete the 2015 internal surveillance of the BSA certified EVM system to be conducted in June 2015.

2. SURVEILLANCE OVERVIEW

Surveillance is the process of reviewing the implementation and use of the EVMS process to one or more programs or projects. The purpose of this surveillance is to focus on using EVMS effectively to monitor and manage cost, schedule, and technical performance. An effective surveillance process provides assessment, training, and mentoring of the EVMS process so that the elements of the process are maintained over time and on subsequent applications. Through the process of surveillance, successful practices will be shared as part of the continuous improvement process.

3. OBJECTIVES OF REVIEW

The goal of this EVMS surveillance is twofold. First, it ensures that processes and procedures are being followed appropriately. Second, it confirms that processes and procedures continue to satisfy the guidelines in the American National Standards Institute/Electronic Industry Alliance's (ANSI/EIA) 748-B Standard for Earned Value Management Systems.

An overview of the surveillance process includes a review of each of the ANSI guideline categories:

1 Organization
2 Planning, Scheduling, and Budgeting
3 Accounting Considerations
4 Analysis and Management Reports
5 Revisions and Data Maintenance

4. SCOPE OF REVIEW

The table below lists all projects that may be required to comply with EVMS criteria either now or in the future. For purposes of the June 2015 self-assessment review, the criteria for a project within the scope of this review are:

1) Total Project Cost is $20 Million or greater, and
2) The project has an approved CD-2 cost/schedule baseline. (or equivalent)

The two projects which currently fit this criteria and are required to comply with the BSA EVMS, and therefore will be selected as part of the system surveillance plan. Two projects will be reviewed:

Project	Project Title	TPC (M$)	Project Manager
NEXT	NSLS-II Experimental Tools	90M	Steve Hulbert
US Atlas Upgrade	US Atlas Upgrade	45M	Jonathan Kotcher

5. SURVEILLANCE MEMBERSHIP

Surveillance membership consists of BSA and non-BSA staff; to ensure independence of the surveillance process none of the team members are associated with the two projects to be assessed. Individuals participating in the 2015 annual EVMS surveillance review include the following:

Team Leader

- Jennifer Fortner – Argonne National Laboratory (ANL) Project Support Program Manager

Team Participants

- Greg Capps – Oakridge National Laboratory (ORNL) Project Management Office Leader
- Laurie Casarole – Brookhaven National Laboratory (BNL) Senior Project Management Specialist
- Kelly Krug – Jefferson Laboratory (JLab) Project Management Office Manager
- Steve McAlary – Brookhaven National Laboratory (BNL) Business Operations Manager
- Deepa Rasalkar – Stanford Linear Accelerator (SLAC) Lead Project Controls Specialist

6. PROCESS AND GUIDELINE SELECTION

All aspects of EVM will be considered during this system surveillance. A comprehensive surveillance will address the full content of the EVM system description and will also rely on the results of other related reviews as appropriate.

This EVMS surveillance will be based upon the remaining work and content that is specific to the project being reviewed. The selection of EVM guidelines and processes reviewed will be relevant to the project phase.

Project Surveillance Execution

This surveillance will be organized to provide a structured setting to assess the approach to EVM process implementation and its consistency across the project. This can be facilitated by:

- A clear code of conduct;
- Understanding of how results will be used;
- Obtaining out-briefings and discussions of potential findings before a report is generated;
- A clearly defined format for reporting findings and recommendations.

Code of conduct

Responsibilities

The surveillance team will provide adequate advanced notification of specific control accounts and processes that will be reviewed. It is also the intent of this surveillance to not interfere with on-going work to the extent possible. The surveillance team will not require extensive presentations or preparations, and it can review and interpret data provided in the project's native formats. The review will be conducted in a professional manner and in a spirit of constructive assessment and discovery. The surveillance team leader is solely responsible for the final determination of findings and recommendations and ensuring that the results are communicated to the project and Laboratory management.

Project personnel should be prepared to demonstrate through objective project information that they are complying with applicable policies and procedures. The project team should coordinate with the surveillance team to ensure that control account managers (CAM) responsible for areas of specific interest are available and cause the least possible disruption of on-going efforts. The project personnel should also ensure that adequate data and project policies are available to the surveillance team sufficiently in advance of the review to allow for meaningful analysis.

The surveillance team leader will ensure that the review focuses on system compliance and does not become involved with non-system-related issues. Documented findings and corrective action plans are available and used to close out issues identified during the review.

Project Information

Successful surveillance is predicated upon demonstration of compliance with procedures through explanations and illustrations using objective project information consisting of documents, computer files, working papers, notes, or other forms of data and communication which demonstrate compliance/non-compliance with a policy, procedure, or process. Objective project information is created in the normal conduct of business and is not prepared solely for the review of a surveillance team. This surveillance team will be located in a central location that facilitates access to project information within the Laboratory. Examples of objective project information include work authorizations, cost and schedule status databases, variance analysis reports, and estimate-to-complete rationale.

Orientation

Orientation time will be established to introduce members of the surveillance and project teams and to discuss key EVMS-related forms and procedures. A brief overview of the nature of the projects will be beneficial to understand its unique language and goals and any unusual organizational relationships. The surveillance team will use the orientation period to explain the goals and scope of the review, the code of conduct, the disposition of finding/concerns, and the resolution process.

Data Gathering

The surveillance review will be conducted both through interviewing CAMs and project staff and verifying the integrity of objective project information. The initial number and schedule of interviews is defined in the surveillance review agenda and is balanced between obtaining sufficient data for an opinion, without overburdening the project.

Interviews will generally be conducted in a location close to the CAM's office, when possible, which will facilitate ease of access to objective project information. During each interview, the surveillance team assesses the level of understanding and compliance with company policies, procedures, and processes, and monitors local practices to assess how well they comply with the intent of the EVM guidelines. The interview team is comprised of staff internal and external to BNL. None of the surveillance team members are associated with the projects being reviewed.

The surveillance review will be thorough and structured. This involves developing a list of subject areas to facilitate scheduled interviews, ensuring that discussions address the complete EVMS process. The content of review topics and questions will be provided to appropriate project personnel prior to the review to facilitate responses and documentation availability.

CAM interviews are a key component of EVMS surveillance because CAMs are the source of much of the EVMS information. CAM interviews are supplemented with data integrity tests performed independently. The ultimate objective is to determine the CAMs' use of the information derived from the EVMS as an effective management tool. Eight CAMs on two projects will be interviewed based on the project's Responsibility Assignment Matrix. All reviews will incorporate common attributes based on the National Defense Industrial Association (NDIA) Program Management Systems Committee (PMSC) Intent Guide. The purpose of the interview is to assess the CAMs' understanding and implementation of the following subjects:

1. Organization
    a. Verify that the Work Breakdown Structure (WBS) contains (Guideline 1 Intent Guide)
        i. All project work, including revisions for authorized changes.
        ii. All contract line items and end items.
        iii. All external reporting elements.
        iv. Extended to the control account level.
        v. Map to WBS dictionary.
    b. Verify that a Work Authorization with scope, schedule, and budget exists at control account level (Guideline 2 Intent Guide).
    c. Verify that the Organizational Breakdown Structure (OBS) is documented (Guideline 3 Intent Guide).
    d. Verify that the same WBS is linked between schedules, work authorization, and control account plans (Guideline 3 Intent Guide).
    e. Verify that Responsibility Assignment Matrix or equivalent documents control accounts at appropriate level (Guideline 3 & 5 Intent Guide).

2. Planning, Scheduling, and Budgeting
    a. Ensure Project Schedule specifics (Guideline 6 Intent Guide)
        i. WBS/OBS identifiers exist in the project schedule at activity level for summarization.
        ii. Project schedule reflects entire WBS Dictionary.
        iii. Critical target/contractual dates are identified in the project schedule.
        iv. The project schedule identifies significant interdependencies.
        v. Task durations are meaningful and relatively short.
        vi. Longer tasks use objective earned value techniques.
        vii. Resource estimates are reasonable and consistent with the schedule.
        viii. The baseline is reasonable to achieve project requirements as demonstrated through schedule analysis techniques.
        ix. The project schedule baseline is established.

x. The schedule provides current status and forecasts of completion dates for all discrete work.
xi. The project has a critical path.

b. Verify that objective completion criteria are used as basis to determine achievement (Guideline 7 Intent Guide).
c. Verify that CAM updates schedule status (Guideline 7 Intent Guide).
d. Verify that the integration of scope, schedule and budget at the control account level (Guideline 8/9 Intent Guide).
e. Verify that the time-phased Performance Measurement Baseline (PMB) equals the work authorization and summarizes above the control account to the contract value (Guideline 8/9 Intent Guide).
f. Verify that control account budgets identify elements of cost including subcontractor (Guideline 9 Intent Guide).
g. Verify that management reserve and undistributed budget, if any, track to logs (Guideline 9/14 Intent Guide).
h. Verify that schedule and cost variances are collected at control accounts (Guideline 10 Intent Guide).
i. Verify the work packages are uniquely identified, have a budget, and have an earned value technique (Guideline 10 Intent Guide).
j. Verify that planning packages are not in the current month and reflect the manner in which the work will be performed (Guideline 10 Intent Guide).
k. Verify that the control account work packages and planning packages (if any) add to the control account total budget (Guideline 11 Intent Guide).
l. Identify level of effort designated work is appropriately categorized and identifiable (Guideline 12 Intent Guide).
m. Intent Guideline 13 is generally omitted in project surveillance.
n. Verify that management reserve and undistributed budget logs reconcile with last two months of Cost Performance Reports (CPR) (Guideline 14 Intent Guide).
o. Verify that baseline control logs reconcile with performance measurement baseline Guideline 15 Intent Guide).

3. Accounting Considerations
   a. Verify that Actual Cost of Work Performed (ACWP) in the CPR reconcile with books of record (Guideline 16 Intent Guide).
   b. Verify that WBS and OBS summarize direct costs from one control account (Guideline 17/18 Intent Guide).
   c. Verify that indirect costs are applied to the direct costs per Laboratory Policy (Guideline 19 Intent Guide).
   d. Verify that unit cost are identified when needed (Guideline 20 Intent Guide) – Not applicable for BNL projects in this review.

e. Verify that effective performance measurement is assessed on material no earlier than point of receipt and consistent with the method budgeted (Guideline 21 Intent Guide).
f. Verify that an established process exists for reporting subcontractor costs and material actual costs (Guideline 21 Intent Guide).

4. Analysis and Management Reports
   a. Verify that variance analysis is performed to the project thresholds as required (Guideline 22 Intent Guide).
   b. Verify that variance analysis contains cause, impacts, and corrective action as appropriate (Guideline 22/23 Intent Guide).
   c. Verify that corrective actions are assessed and closed in a timely manner (Guideline 23/26 Intent Guide).
   d. Intent Guideline 24 is normally omitted in project surveillance.
   e. Verify that variance analysis as reported to the customer reconciles with the analysis at the control account level (Guideline 25 Intent Guide).
   f. Verity the Estimate to Complete (ETC)/Estimate at Complete (EAC) (Guideline 26 Intent Guide)
      i. Verify that Comprehensive EACs are updated per requirements and take into account efficiencies.
      ii. Verify that CAMs review achievability of control account EAC monthly.
      iii. Verify that time-phased ETC reconciles with the EAC as reported externally.
      iv. Verify that risks and opportunities are integrated into summary schedule and ETC resource plans.

5. Revisions and Data Maintenance
   a. Verify that work authorization plus any baseline change documentation equal current control account budget (Guideline 28/29 Intent Guide).
   b. Trace a sample of change proposal authorized. Verify schedule and cost integration at control account level and that the WBS is updated as appropriate (Guideline 23/29 Intent Guide).
   c. Verify that change logs reconcile and contain justification (Guideline 28/29 Intent Guide).
   d. Verify that retroactive changes are made only for correction of errors, accounting adjustments, effects of customer management directed changes to improve accuracy of data. If any have been made, verify that they are consistent with disclosed EVMS policy (Guideline 30 Intent Guide).
   e. Verify, in at least one control account, last month's changes as reported to the customer and this month's Performance Measurement Baseline (PMB) reconcile to entries in the contractual baseline log (Guideline 30 Intent Guide).

f. Verify that negative earned value status, if any, has been adequately explained (Guideline 31/32 Intent Guide).
g. Verify that all baseline changes within a month reconcile to baseline control requests (BCRs) or the equivalent (Guideline 31/32 Intent Guide).

Additional interviewees will include the project manager, project controls representative(s), and the accounting/financial management as determined by the BNL EVMS PMPC Manager.

7. SURVEILLANCE RESULTS

Concerns Identified During the Surveillance

The surveillance team will gather data by reviewing documentation and interviewing members of the project Team. A key component of surveillance is communicating timely, pertinent, and candid feedback. Surveillance team members and project personnel should seek clarification to fully understand questions asked, the data sought, and the responses provided. If, after fully understanding the information provided, a surveillance team member believes that there may be a question of compliance; the surveillance team will discuss the observation. If the surveillance team agrees that observation is still a question of compliance; BSA and the project will be notified by the surveillance team of the concern no later than during Out-Briefs at the end of each day. This gives the BNL project the opportunity to supply the surveillance team additional information to clarify the observation. This may result in the concern of the observation being resolved, or may result in a Recommendation, or could be a Finding of non-compliance. Findings and Recommendations are defined as:

Findings (Corrective Action Requests – CAR)

Findings fall into two broad categories: 1) non-compliance with the accepted EVMS description and 2) non-compliance with the ANSI/EIA 748-B EVMS guidelines. Failure to resolve findings reduces confidence in the ability of project management to effectively use the EVMS process to achieve project goals and objectives of the stakeholders.

Findings must be communicated to the project team and EVMS Manager/officer on a daily basis. If the corrective action to the finding is implemented by the project during the review, the finding (CAR) will be downgraded to a CIO* (Continuous Improvement Opportunity*). The asterisk indicates it was downgraded from a CAR (Corrective Action Request) due to being implemented while onsite.

Recommendations – (Continuous Improvement Opportunities – CIO)

The team members may recommend EVM implementation enhancements such as sharing of successful practices, tools, or other items that come to their attention. Recommendations, however, are not the same as findings and, therefore, need not be tracked for closure unless in instances where a CIO has an asterisk (*). In the instance of a CIO*, the review members have elected that this practice is critical enough to require tracking to closure.

Surveillance Daily and Final Out-Brief

The Surveillance Team will evaluate what they have observed and the information received during the surveillance to come to a consensus if any Findings (CARs) or Recommendations (CIOs) should be issued. Also, the Surveillance Team should identify if the Findings are systemic rather than implementation issues. Any Findings and Recommendations are to be presented by the Surveillance Team Leader or designated review team member at the Daily and Final Out-Brief.

It is possible that the project team may disagree with the final surveillance results. When a finding is not due to a team's misunderstanding, the EVMS Surveillance Review team lead is responsible to make a final determination with concurrence of the BSA EVMS Manager/Officer.

Final Report

A Surveillance Team will develop a preliminary report and give BSA and the projects reviewed the opportunity to give any additional feedback and factual accuracy corrections in a reasonable timetable. The Surveillance Team will take into consideration any feedback received when developing the final report. The final report will be issued by the Surveillance Team Leader to the BSA EVMS Manager/Officer.

Corrective Action Plan

BSA EVMS Manager/Officer will develop a Corrective Action Plan (CAP) to address any Findings or Recommendations identified in the Final Report from the Surveillance Team. The CAP should include a schedule with realistic dates for when the corrective actions are to be completed. The project personnel will provide input regarding corrective actions, including estimated completion dates. The Surveillance Team will receive a copy of the CAP for information only; no further actions are required by the Surveillance Team.

Surveillance Review Close-out

BSA EVMS Officer is to insure that CAP has been acceptably completed. The close-out of the CAP and any follow-up verification performed should be document and retained for future EVMS surveillances.

EVMS Surveillance Team Assignments

Team Leader – Jennifer Fortner

Team Members	Responsible Area	Guidelines
Jennifer Fortner	Organization	1-5
Greg Capps	Planning & Budgeting	6-10
Laurie Casarole	Planning & Budgeting	11-15
Steve McAlary	Accounting	4, 13, 16-21, 24
Deepa Rasalkar	Analysis & Management	22-27
Kelly Krug	Revisions	28-32

Appendix C – Review Agenda

BSA Earned Value Management System (EVMS)
BNL Self Assessment Review
June 29- July 1, 2015

Monday, June 29, 2015			
Time	***Subject***	***Name***	***Location***
7:30-8:00	Arrival On-site Security/Badging	Review Team	Main Gate Badging Trailer
8:00 - 8:30	Review Team Meeting	Review Team	NSLS-II Bldg. 703, Large Conference
8:30 - 8:40	Welcoming Remarks	Diane Hatton	NSLS-II Bldg. 703, Large Conference
8:40 - 8:50	EVMS Review Team - In-Brief	Jennifer Fortner	NSLS-II Bldg. 703, Large Conference
8:50 - 9:10	EVMS Overview	C. Lavelle	NSLS-II Bldg. 703, Large Conference
9:10 - 9:40	NEXT Project Overview	S. Hulbert	NSLS-II Bldg. 703, Large Conference
9:40 - 10:10	US Atlas Upgrade Project Overview	J. Kotcher	NSLS-II Bldg. 703, Large Conference
10:10 - 10:30	Break	All	
10:30 - 12:00	NEXT CAM Interview #1 - I. Jarrige	Review Team	Bldg. 743, Rm. 156.4
12:00 - 1:00	**Lunch**		
1:00 - 2:30	US Atlas Upgrade CAM Interview #1 - MA Pleier	Review Team	Bldg. 703, Conf. Rm. 20 (upstairs).
2:45 - 4:15	NEXT CAM Interview #2 - E. Vescovo	Review Team	Bldg. 745, Rm. 156
2:45 - 4:15	Budget/Accounting - BJ. Carreras	Review Team	Building 460 Budget Office (Room. 111)
4:15 - 5:00	Review Team Meeting	Review Team	NSLS-II Bldg. 703, Large Conference
5:00 - 5:30	Outbrief	All	NSLS-II Bldg. 703, Large Conference room
6:00	**Team Dinner**		**Sea Basin Restaurant**

Tuesday, June 30, 2015			
Time	***Subject***	***Name***	***Location***
8:00 - 8:30	Team Preparation	Review Team	NSLS-II Bldg. 703, Large Conference
8:30 - 10:00	US Atlas Upgrade CAM Interview #2 - C. Blocker	Review Team	Bldg. 703, Conf. Rm. 20 (upstairs).
10:00 - 11:30	NEXT CAM Interview #3 - G. Fries	Review Team	Bldg. 703, Conf. Rm. 20 (upstairs).
10:00 - 11:30	US Atlas Upgrade Accounting Interview - X.Guo	Review Team	Bldg. 703, Large Conf. 1st. Floor
12:00 - 1:00	**Lunch**		
1:00 - 2:30	US Atlas Upgrade CAM Interview #3 - H. Takai	Review Team	Bldg. 703, Conf. Rm. 20 (upstairs).
1:00 - 2:30	NEXT Accounting Interview - Chris Madonia	Review Team	Bldg. 745, Rm. 156
2:45 - 4:30	Review Team Meeting	Review Team	NSLS-II Bldg. 703, Large Conference
4:30 - 5:00	Out-Brief	All	NSLS-II Bldg. 703, Large Conference

Wednesday, July 1, 2015			
Time	***Subject***	***Name***	***Location***
8:00 - 8:30	Team Preparation	Review Team	NSLS-II Bldg. 703, Large Conference
8:30 - 11:00	Team Meeting	Review Team	NSLS-II Bldg. 703, Large Conference
11:00 - 12:00	Closeout	All	NSLS-II Bldg. 703, Large Conference
12:00 - 1:00	**Lunch**	Review Team	
1:00-2:00	Tour	Review Team	NSLS-II Building