

Department of Energy
Office of Science
Office of Project Assessment

Surveillance Review

of the

JSA-JLAB
Earned Value Management
System (EVMS)

Thomas Jefferson National Accelerator
Laboratory

November 2011

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1. SUMMARY

During the week of November 14, 2011, the Department of Energy (DOE)/Office of Science (SC) conducted an Earned Value Management System (EVMS) surveillance review of Jefferson Science Associates, Thomas Jefferson National Laboratory (JSA-JLAB) in Newport News, Virginia. The review was led by the Office of Project Assessment (OPA) with committee members from the Office of Fusion Energy Sciences (FES), OPA, Office of Engineering and Construction Management (OECM), the Office of Environmental Management (EM), Brookhaven National Laboratory (BNL), and the Princeton Plasma Physics Laboratory (PPPL).

The focus of the review was to ensure that JSA-JLAB continues to implement its contract-wide certified EVMS in accordance with the ANSI/EIA-748B guidelines across all applicable DOE Order 413.3B capital asset projects.

The review was conducted in accordance with the OPA Earned Value Management System Surveillance Guide.

The Review Committee and the guidelines that they were responsible for are identified in Appendix A and the review schedule is shown in Appendix B.

The Committee identified two Corrective Action Requests (CARs) and six Continuous Improvement Opportunities (CIOs). Summaries of the CARs and CIOs are listed below with the supporting documentation attached to the report (Appendices C and D):

1.1 Corrective Action Requests (CARs)

CAR-01—Regarding the Control Account Plan (CAP), data contained in Primavera (P6) does not include the detailed schedule and budget information as defined within the Project Controls System Manual (PCSM) (GL #3). JSA-JLAB should ensure that as a minimum, the CAP contains a time-phased budget, work definition and schedule, and can be appended to the Work Authorization Document (WAD).

CAR-02—The subcontractor's schedules are not integrated into the project schedules. All capital asset projects must be able to produce a critical path schedule; neither of the projects reviewed can run the true critical path. The projects must be able to demonstrate horizontal and vertical integration of the schedule (GL #6).

1.2 Continuous Improvement Opportunity (CIOs)

CIO-01*—Regarding training, some Control Account Manager (CAM) responses were tentative and lacked an understanding of the EVMS process. Recommend more prescriptive, periodic, and interactive EVMS training including continuous refresher training.

CIO-02*—As stated in the PCSM, for DOE projects, the WBS Level 2 segments will normally be funding types. The standard expectation is that the WBS should be a product-oriented structure. Implement a product-oriented WBS on all future capital asset projects and revise in the System Description.

CAR/CIO-03*—Project Managers (PM)/CAMs cannot approve their own WADs. CAR (corrected on site during review) System Description requires updating.

CIO-04—Regarding Schedule Variances, procurement/work scheduled to be initiated but significantly delayed should be re-planned. Be proactive!

CIO-05—The 12 GeV WBS Dictionary lacks detail and is inconsistent with the PCSM. Ensure that future WBS dictionaries include the deliverables, resources and processes to produce each element.

CIO-06—Review and revise the PCSM (see recommendations below)

** Requires follow up with the Office of Project Assessment*

2. OVERVIEW

The primary documents reviewed included (but were not limited to):

- Change request log for the 12 GeV CEBAF Upgrade (12 GeV) and Technology and Engineering Development Facility (TEDF) projects
- 12 GeV Change Requests (CR) 11-49, 11-53, 11-54, 11-45, 11-51, 11-42, 11-43, 11-55, 11-59, 11-44, 11-41, 11-52, 11-57, and 11-58
- TEDF CRs 11-07, 11-08, 11-09, 11-12, 11-13
- Project Control System Manual, Rev 6, December 14, 2010
- PCS-004 Change Control Procedure
- Project Execution Plans (PEP) 12 GeV and TEDF
- Responsibilities Assignment Matrix (RAM) 12 GeV and TEDF
- Monthly Reports (July-Sept) 12 GeV and TEDF
- Primavera (P6) Schedules 12 GeV and TEDF
- Organizational Charts 12 GeV and TEDF
- WBS Dictionary 12 GeV and TEDF
- WADs 12GeV and TEDF
- Variance Analysis Reports (VAR) 12 GeV and TEDF
- Estimate at Completion (EAC) 12 GeV and TEDF
- Earned Value (EV) Charts 12 GeV and TEDF
- Baseline Change Analysis 12 GeV and TEDF
- Baseline Management (reconciliation) 12 GeV and TEDF

Staff interviewed included:

12GeV CAMs

Dana Arenius
Rebecca Yasky
John LeRose
Howard Fenker
John Hogan
Mike Bevins
Bill Mertz
C. Rode (CAM and PM)

TEDF (CAM and PM)

Keith Royston

Project Management & Integrated Planning Department

Dennis Miner
Heidi Derby
Kelly Krug
Lyn Wells

2.1 Organization

2.1.1 Findings

In the area of Organization (which is comprised of Guidelines (GL) #1-5) for the two projects being reviewed, the Committee noted the following findings:

Both the 12 GeV and TEDF projects had approved PEPs in place. Each of the PEPs contained sections that identified and detailed their respective WBS. The WBS can be found in Appendix B in the 12 GeV PEP and Section 5.2 in the TEDF PEP.

Based on the review of 12 GeV and TEDF project material and CAM interviews, the Committee found a single WBS and WBS dictionary that addressed all project scope and provided traceability for work authorization, tracking and reporting. Additionally, all contract work, as well as work funded by others (non-DOE) is included in the WBS.

The 12 GeV project was divided into segments (funding types at WBS Level 2) that admittedly facilitate reporting requirements of the project customer. The Committee did not view the current WBS to be in accordance with ANSI/EIA-748B Standard or a best practice (as depicted in GAO-09-3SP) and would expect to see a product-oriented WBS for future projects managed by JSA-JLAB. Although the WBS is not product-oriented, the WBS and its dictionary accurately represent the work scope at the level of detail necessary to ensure performance issues are recognized. This is discussed in CIO-02*.

JSA-JLAB has an Organizational Breakdown Structure (OBS) for 12 GeV and TEDF used to define project control covering all the scope. Through CAM interviews and reviews of Primavera (P6) schedules, the Committee found that CAMs understand their subcontractor scope and where their subcontractors fit within the WBS.

The Committee found that the RAM for 12 GeV and TEDF adequately integrated the WBS and OBS to define a Control Account and its responsible CAM. Further, the RAM and WADs note the amount of project budget allocated to each Control Account.

The WADs are not physically signed by all relevant parties and the PM approved his own WAD on the 12 GeV project. Even though this was corrected on-site during the review, the System Description must be adjusted to require approval of a WAD by next in-line of supervision for PMs serving as CAMs. This is discussed in CAR/CIO-03*.

CAPs, as referenced in the System Description, were not presented to the Committee. When asked to present a sample CAP, the project schedule was provided to the Committee. The Committee considered the project schedule to be insufficient as a CAP, since it did not meet the CAP definition provided in the system description. This is discussed in CAR-01.

According to the system description, the Chief Financial Officer (CFO) is responsible for controlling overhead (indirect costs) at TJNAF. As such, the Committee found overhead costs and the processes used for control of these costs documented in the Chief Operating Officer's Cost Accounting Standards (CAS) disclosure statement.

JSA's planning, scheduling, budgeting, work authorization and cost accumulation processes are integrated in a manner that enables cost and schedule measurement via the WBS and OBS for both 12 GeV and TEDF. JSA-JLAB captures Actual Cost of Work (ACWP) performed at the work package level. Based upon review of EVMS documents and CAM interviews, the Committee found that the Budgeted Cost of Work Scheduled (BCWS), and Budgeted Cost of Work Performed (BCWP), and ACWP are being captured at the correct levels to ensure effective control and analysis of performance data.

2.1.2 Conclusions and Recommendations

As a result of the review, there were some conclusions and recommendations that crossed all guidelines and the Committee determined they best fall within the Organization Section of this report. They are as follows:

- In the area of documentation, the Committee recommended that the System Description be reviewed and revised. The Committee noted the listed issues. This is discussed in CIO-06.
 - Clarify that the earned value effort code (e.g., E = Level of Effort (LOE)) for each activity is located in the schedule.
 - Ensure Sec 301.2.E, Working Detail Schedule, is consistent with change control procedures in Sec 800.
 - Discuss the field change order process.
 - Update references (e.g., Order 413.3B instead of Order 413.3A).
 - Use a product-oriented WBS on all capital asset projects.
 - Require the approval of a WAD by the next in line of supervision for PMs serving as CAMs.

- The Committee judged that general EVMS training appears insufficient as some CAM responses were tentative and lacked understanding of their responsibilities, accountabilities, and EVMS processes. The Committee recommended more prescriptive, periodic, and interactive EVMS training. This is discussed in CIO-01*.

Based on the Committee's findings, in the area of Organization, JSA-JLAB is maintaining its contract-wide EVMS in compliance with ANSI/EIA-748B Standard. However, the Project Management Office (PMO) will provide CAPs for CIO-01* and CIO-02* in addition to CAR-01.

2.2 Planning, Scheduling and Budgeting

2.2.1 Findings

In the area of Planning, Scheduling and Budgeting (GL #6-15) for the two projects being reviewed, the Committee noted the following findings:

Several CAMs were interviewed on both the 12 GeV and TEDF projects. The work included on the project schedules is sequenced and includes significant task interdependencies in order to meet the project's milestones. Both the 12Gev and TEDF projects have separate contractor schedules that are incorporated into their respective project schedule by the use of "peg points". These peg points are used as a method for capturing EV information; however, true critical path analysis (e.g., vertical and horizontal) cannot be performed because the contractor's detailed schedules are not integrated into JSA-JLAB project baseline schedule. Instead, the 12 GeV PM provides a monthly critical path overview schedule at a summary level but not the task level. As a consequence, the monthly critical path is determined by schedule contingency at a WBS Level 2 or Level 3, instead of the longest path of tasks necessary to complete the project. As a consequence, the impacts of schedule variations on the actual critical path are not analyzed. Several CAMs were questioned about the critical path and while some understood that a low total float value would be of concern they were generally unaware of the project critical path, see CAR-02.

Both projects incorporate milestones into their project schedules to ensure that the goals of the project are tracked and can be met. Each of the CAMs interviewed was aware they were directly supporting project milestones. Each PM is experienced and demonstrated a detailed understanding of project milestones and schedules.

On both projects, time phased budgets are available for Control Accounts, which allow for performance measurement. Project milestones are used to time phase the project work and are incorporated in each Control Account as necessary. A trace was performed on several requested activities (12 GeV WBS 1.3.4.1.6) showed consistent output of information from the scheduling tool through the cost tool.

CAMs were interviewed on both the 12 GeV and TEDF projects. Additionally, project schedule documentation was reviewed. It was noted that budgets for authorized work identify cost elements, such as labor, materials, etc. The significant cost elements from subcontractor schedules have been incorporated into the project schedules using “peg points”.

For both projects, the work for each Control Account is broken down into discrete work packages. The responsible CAM is identified, as well as the applicable WBS number and start and finish dates. Where enough detail is not yet available, the work is held in planning packages until there is enough information where the planning packages can be decomposed into discrete work. Additionally, the budget is delineated in terms of hours or dollars as appropriate.

In the cases that were reviewed, the sum of all work package budgets, plus planning package budgets within a Control Account, equals the Control Account budget. This was checked by performing correlation checks between the schedule tool (Primavera P6), the RAM, and the output of the cost tool (Cost Manager). It should be noted that that burdens and escalations are added in the cost tool and not the scheduling tool. The scheduling tool provides the budget hours or dollars only without burdens and escalation.

Level of Effort (LOE) is used on both projects to identify work that is not measurable. Additionally, the 12 GeV project provided a spreadsheet that presented the percentage of LOE tasks for each Control Account. In six of the Control Accounts the LOE percentage exceeded 20 percent. After reviewing the project schedule for each of the Control Accounts where the LOE exceeded 20 percent, it was determined that the LOE was not masking the EVMS data for the discrete work. It was noted that the Control Account was either closed or the LOE tasks were on the front end of the project schedule before the discrete work had begun and was not impacting the EVMS data. LOE for the TEDF project is held in the Project Management element and does not mask EVMS data for the discrete work.

Indirect costs on both projects are properly controlled and managed. Direct costs are captured using Primavera (P6) software while Primavera’s Cost Manager software applies burdens and escalations.

The JSA-JLAB PCSM identifies both Management Reserve (MR) and Undistributed Budget (UB). The 12 GeV project reports having \$2,662K of MR on hand, as of September 30, 2011. The MR amount represents three percent of the ETC cost. An additional \$4,578K of funding is authorized but pending distribution. The TEDF project reported no significant MR and \$849K of UB.

2.2.2 Conclusion and Recommendations

In the area of Planning, Scheduling, and Budgeting (GL #6-15), with the exception of the CAR below, JSA-JLAB is maintaining its contract-wide EVMS in compliance with the ANSI/EIA-748B standard and is employing its EVMS in an ANSI/EIA 748B compliant manner across all its applicable DOE Order 413.3B capital asset projects.

Relative to GLs #6-15, the following CAR has been submitted for disposition:

- CAR-02—The subcontractor’s schedules are not integrated into the project schedules. All capital asset projects must be able to produce a critical path schedule; however both projects cannot run the true critical path, and neither project can demonstrate horizontal and vertical integration of the schedule.

2.3 Analysis and Management Reports

2.3.1 Findings

The TJNAF project-specific documentation and procedures reviewed support compliance with the preparation of monthly Cost and Schedule Performance Indices (CPI and SPI). Interviews further indicate that the CAMs and PMs for the 12 GeV and TEDF projects are, on a monthly basis, preparing performance reports summarizing cost and schedule performance at the Control Account level and below. The documents summarize the monthly BCWS, BCWP, ACWP, Schedule Variance (SV), and Cost Variance (CV) for the current period and the performance to date. The documentation also includes historic performance trends for each Control Account. These documents are updated monthly and reviewed by the CAMs. A data trace was performed on WBS 1.3.4.1.6, Vacuum, and indicates that cost data is reconcilable between the data in the Cost Point system (accounting system) and the Cost Manager system.

Both projects prepare a monthly performance report summarizing cost and schedule performance at the Control Account level. The documents summarize the monthly BCWS,

BCWP, ACWP, SV, and CV for the current period and the performance to date. This document is updated monthly and reviewed by the CAMs, PMs, and Account Project Manager (APM). The TJNAF Red Flag Report is used by the PMs as the basis for evaluating all Control Accounts and identifying those performing outside the established performance thresholds for both SPI and CPI. Variance analysis reports are being prepared by the CAMs using a TJNAF-specific format. The Control Account level has been linked to WBS Level 4 although VARs may be prepared at lower levels of the WBS at the discretion of the PM. Variance reporting to DOE/TJSO is at WBS Level 2 and includes a rollup of lower level variance analyses. The quality of the VARs varies greatly and the level of detail ranges from acceptable to incomplete. Some variance analysis reports reference previous months VARs in the narrative section requiring that the previous reports be reviewed to fully understand the cause of the variance. In some instances, the VARs are incomplete and do not include a complete discussion.

This could prevent the project from effectively addressing the causes of the variance. It is recommended that both projects review the content of the VARs for completeness and that the Project Management and Integrated Planning organization provide an example of a well-written VAR to establish a minimum acceptable level of detail and include it in the PCSM.

The documentation provided by the 12 GeV and TEDF projects appropriately summarizes the project status, appropriate data elements, associated variances, and corrective actions through the program OBS and WBS to support both DOE and TJNAF management evaluation and decision-making.

TJNAF has established a rigorous Monthly Progress Review process for both the 12 GeV and TEDF Projects. Monthly performance meetings at both the Program Manager Level with the CAMs and Laboratory Director level with the Program Managers are ongoing. The documentation reviewed appropriately summarizes the project status, appropriate data elements, associated variances, and corrective actions through the program OBS and WBS to support both DOE and TJNAF management evaluation and decision-making. The variance analysis process established for both projects demonstrates responses to management direction in developing corrective actions.

Both the 12 GeV and TEDF projects are developing revised EACs based on the project performance to date, commitments, and estimates of future conditions on a monthly basis. The projects are comparing this information with the performance measurement baseline to identify variances at completion. The methodology used to prepare the EACs follows the TJNAF procedures and the CAMs are largely focused on developing accurate ETCs to support accurate

EACs. The revised EACs are reviewed at the Monthly Progress Meeting with the PMs. TJNAF has instituted a “rolling wave” annual EAC update vs. a single annual EAC update for the Control Accounts. The documentation appropriately summarizes the project status, appropriate data elements, associated variances, and corrective actions through the program OBS and WBS to support both DOE and TJNAF management evaluation and decision-making. The EAC analyses are conducted at the appropriate level and approved by both the CAM and the Associate Program Director (APD) for the projects.

2.3.2 Recommendations

It is recommended that both projects review the content of the VARs for completeness and that the Project Management and Integrated Planning organization provide an example of a well-written VAR to establish a minimum acceptable level of detail and include it in the PCSM.

2.4 Accounting Considerations

2.4.1 Findings

The 12 GeV and TEDF projects are recording and reporting financial data consistent with the JSA-JLAB Cost Accounting Standard Disclosure statement.

The accounting team validated that all accounts are mapped to one WBS element and one OBS element and the costs are collected consistent with these structure. All costs roll-up to the TPC for the WBS. The Financial System does not allow a mapping of a charge number to more than one WBS or OBS. The project actual cost was validated from the CostPoint Financial System through to the EVM Cost Manager System. The actual cost data is downloaded from CostPoint Financial System and is imported into EVMS as a flat file. The project controls group is responsible for validating the actual cost in the system match the CostPoint data. Labor (in-house and contracted) and purchased material/equipment represent the bulk of a project’s expenses.

The accounting team did a trace to validate actual costs and accruals. The actual costs trace was validated using several accounts for the 12 GeV Cryomodule Control Account.

The accrual trace was done using a TEDF major conventional construction subcontractor’s accruals (Mortenson). The accrual for the month of August contained appropriate line item detail and percent complete that was traceable through the Cost Point System, Cost Manager EV System and validated to the vendor request for payment. The

accounting system includes an automated accrual process for major contracts within the Financial System that allows the CAM to enter the percent complete for a line item on a contract and the system then calculates the accrued amount for that line item for the current month. The process of accumulating actual costs was found to be in accordance with the guidelines.

The CFO is responsible for management of the Indirect Rates. The process for applying indirect costs is documented in the TJNAF CAS Disclosure statement. Target indirect rates are calculated at the beginning of the fiscal year and monitored monthly. If there is a major deviation from the target, the rate is changed in the accounting system in the current month and charged retroactively to the beginning of the fiscal year.

Time reporting is captured daily in either hours or logged as a percentage in the timesheets. Labor costs are posted to CostPoint twice a month and are available to the project team for review.

The accounting system is project oriented and provides daily actual cost updates to the project staff from the Financial System via JSA-JLAB Management Information System (MIS) to the TJNAF managers. This is a real benefit to the project and CAMs as they have timely access to costs incurred on their respective projects.

2.4.2 Conclusions and Recommendations

There were no CARs or CIOs written for the accounting section of the JSA-JLAB EVMS. However, the project staff was not able to run a CPR Format 2 (by OBS) which illustrates the costs by Organization. This hampered the Committee's ability to assess whether the costs rolled-up the OBS were accurate. The Committee recommended that the Project Management and Integrated Planning staff review, and fix the problem within Cost Manager, that prevents them from running a CPR Format 2 to be able to verify that EV data is being reported accurately by OBS in the EVMS.

The Committee found the Financial/Accounting system "noteworthy" since the system provides project-oriented, timely, accurate accounting/financial data for the project management teams in support of the JSA-JLAB EVMS process and reporting. A Notable Practice within the Financial System is the accrual process and the ease with which the CAM can process timely accruals.

2.5 Revisions and Data Maintenance

The revision guidelines ensure that:

1. Authorized changes are incorporated into the baseline in a timely manner, recording the effects of the change on the budgets and schedules;
2. Prior budgets plus the authorized change can be reconciled with new budgets in enough detail for effective management control;
3. Retroactive changes to the BCWS, BCWP, and ACWP are prohibited, except for the corrections of errors;
4. Changes to the budgets are through authorized changes only; and 5) all changes to the performance measurement baseline are documented.

2.5.1 Findings

The PCSM, Revision 6, dated December 14, 2010, Section 800, Change Control and Project Control System Procedure PCS-04, Change Control provides the guidance and requirements for CAMs, PM and IP, change control board, PM, and other individuals involved in implementing change actions in the JSA-JLAB EVMS. The change process is divided into three phases: the request phase is the initial step where a proposed change is prepared, reviewed, assessed, logged, and classified. The second phase is the review phase where the change is evaluated and approved by the appropriated authority in accordance with the PEP's thresholds. There are five classes of change order approval authorities ranging from the Acquisition Executive (AE), class one change, to the CAM, for a class five change. Phase three is the documentation phase where all impacted documents are updated and the change action is implemented.

The five ANSI-748 revision guidelines are addressed in a number of statements contained in the PCSM. These included: the change order is expeditiously communicated to affected parties and incorporated in the project baseline documentation in an auditable manner.

“Retroactive changes to the performance measurement data are to be avoided. Actions should be taken promptly when errors are identified and will be controlled by the Project Management and Integrated Planning Department. Adjustment can be made to correct accounting and data entry errors and do not require instituting the formal change request process”. One of the

stated goals of the change control process is “To prevent unauthorized or unintended deviations from the approved project baseline.” Section 801.3, Documentation Phase, states “That once a Change Request (CR) is signed by the appropriate approval authority the CR becomes a change order”. “The Associate Project Manager is responsible for ensuring the relevant technical documentation is revised to reflect the change”. “PM and IP is responsible for revising the cost/schedule baseline documents for changes impacting these project baselines”. “When appropriate, a new project baseline will be generated for each approved Change Request”.

In addition, PCS-04 states: “The procedure defines the procedures and responsibilities for requesting, reviewing, and documenting changes to the Integrated Project Baseline, and to assure timely implementation of changes once they are approved.” And “Historical EV data will not be revised. To improve document traceability, a new project baseline will be generated for each approved Change Request.”

To improve the quality and understanding of the PCSM requirements it is recommended that several changes be incorporated into the document.

1. The PCSM and PCS-04 are in conflict and misleading. The PCSM states: “When appropriate, a new project baseline will be generated for each approved Change Request.” And PCS-04 states: To improve document traceability, a new project baseline will be generated for each approved Change Request.” One can interpret the PCSM to mean not all CRs require a new project baseline while PCS-04 states all CRs require a new project baseline. More importantly, one can interpret the statement as the approval of a CR allows the entire project to re-baseline, which is not the intent. The statements should be revised to indicate that the changes are incorporated into the existing project baseline or the impacted schedule activities will be revised to reflect the change.
2. The PCSM should address how field change orders are generated, approved, and incorporated into the baseline.
3. The PCSM should provide additional explanation to the statement “Adjustment can be made to correct accounting and data entry errors and do not require instituting the formal change request process”. And state that any correction or adjustment has to be made in the current month.

4. The PCSM should address when a planned procurement should be moved through a change request action (see CIO-04 and discussion below).
5. Finally, the PCSM should expand the explanation of “project baseline documentation in an auditable manner” to more closely align with guideline 29, and provide a time-frame, within one or two accounting periods, for “timely implementation of a CR”.

The Committee interviewed seven 12 GeV CAMs, who were responsible for 42 Control Accounts, valued at approximately \$174 million. Fourteen change orders, 11-41 through 11-45, 11-49, 11-51 through 11-55, and 11-57 through 11-59 were reviewed covering all five class type changes requiring approval ranging from the AE to the CAM. In addition, the Committee interviewed the sole CAM/PM responsible for TEDF and reviewed five change orders, 11-07 through 11-09, 11-12, and 11-13.

All 19 change orders were incorporated into the baseline in a timely manner. The Primavera (P6) schedule identified all of the activities that were impacted by the change including the new activities that were added to the baseline as a result of the change. The direct dollars were loaded into the schedule for each activity, while the cost processor added the indirect or burdened costs. In addition, if the new or revised scope of work crossed into a new physical year, the MR was adjusted accordingly to account for the escalation costs.

TJNAF was able to demonstrate and reconcile the current budgets of all impacted schedule activities in the Control Account with the prior budgets of the schedule activities from each Control Account including the addition of the burden costs and escalation, if applicable. The before and after schedules and cost data were provided and reconciled to the change order amounts and were accurately identified on the change control log.

TJNAF has a strict policy that retroactive changes are not allowed, except for the correction of accounting or data errors. In reviewing many of the subcontracts that were re-planned due to various reasons including delays in awarding the procurement or terminating a subcontract and awarding a new subcontract; there were no indications that scope, which was started, was moved from the past to the future. On any schedule activity that was started and incurred costs, that activity remained as originally planned. All other activities were re-planned to align the subcontractors working schedule with the TJNAF project schedule. In addition, upon award, the subcontractor’s planning package were subdivided into detailed activities and incorporated into the schedule in future months.

It should be noted that in a limited number of instances, TJNAF was aware that a planned procurement was not going to take place as scheduled, and took no action to move the procurement to future months through the CR process. This led to schedule variances being reported until the award was made and a change order approved. Once the change order was approved, the subcontractor's schedule activities were moved from the past months through a current month single point adjustment and re-planned in future months to coincide with the subcontractor's schedule of activities. Although this is an acceptable practice for unknown or unexpected events; when the CAM knows for sure a procurement is going to be delayed for a significant amount of time, the CAM should be proactive and submit a CR to move the scope of work to some future month(s), avoiding the reporting of a negative variance, and more importantly, a negative current month budgeted cost of work scheduled adjustment. This practice is further discussed in CIO-04 and should be addressed in detail in the PCSM.

In reviewing the various Control Accounts, WADs, WBS dictionary, PEP, and approved change orders, there were no indications that TJNAF or any CAM was performing a scope of work that was not authorized or outside the scope of the projects. As indicated above, all changes to the performance measurement baseline were identified and documented in the change control log, Primavera (P6) schedule, and cost processor. New schedule activities were created with budgets and were clearly identified to a specific change control number that tracked to the change order approval document.

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APPENDIX A

REVIEW

PARTICIPANTS

**DOE/SC Earned Value Management System (EVMS)
Surveillance Review of JSA-JLAB
November 14-16, 2011**

COMMITTEE PARTICIPANTS

Department of Energy

Kurt Fisher, DOE/OPA

Review Team (per ANSI Guidelines)

Organization / Analysis and Management Reports

Jay Glascock, DOE/OECM (GL #1-5)
Ethan Merrill, DOE/OPA (GL #22-27)

Planning, Scheduling and Budgeting

Steve Langish, PPPL (GL #6-15)
Ed Stevens, DOE/SC (GL #6-15)
Ray Won, DOE/OPA (GL #6-15)

Accounting Considerations

Cathy Lavelle, BNL (GL #16-21)
Sue Perino, BNL (GL #16-21)

Revisions and Data Maintenance

Lenny Mucciario, DOE/EM (GL #28-32)

APPENDIX B

REVIEW AGENDA

**DOE/SC Earned Value Management System (EVMS)
Surveillance Review of JSA-JLAB
November 14-16, 2011**

REVIEW AGENDA

Monday, November 14, 2011

- 8:00 a.m. DOE/SC Welcome/Safety Review/SC In-Briefing
- 8:30 a.m. JLab EVMS Overview
- 10:00 a.m. CAM Interview
- 12:00 p.m. Lunch
- 1:00 p.m. CAM Interview x 2
- 3:00 p.m. Review Committee: Training /Issues Review /Document Traces /
CAM Notebook Reviews
- 4:30 p.m. Informal Out-Brief of Day's Issues

Tuesday, November 15, 2011

- 8:00 a.m. CAM Interview x 2
Accounting Interviews
- 10:00 a.m. CAM Interview x 2
Management Interview
- 12:00 p.m. LUNCH
- 1:00 p.m. CAM Interview x 2
Management Interview
- 3:00 p.m. Review Committee Meeting / Issues Resolution and
CAR/CIO Identification
- 4:30 p.m. Informal Out-Brief of Day's Issues

Wednesday, November 16, 2011

- 7:30 a.m. Review Committee Deliberation / Consensus for any CARs,
CIOs / Documentation
- 9:30 a.m. Formal Out-Brief
- 10:30 a.m. Review Closeout / Security and Access / Materials Ship-Prep

APPENDIX C

CORRECTIVE

ACTION

REQUESTS (CARs)

Title: Corrective Action Request (CAR)		Page: 1 of 1	Encode: E1	Rev : #0
1. Subject: Control Account Plans	2. Guideline Ref (if applicable): 3	3. Control Number: CAR-01		
4. CA#, WBS#, or Functional Area: All Control Accounts (CAs)				
5. REQUIREMENT:				
<p>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 WBS and the program organizational structure.</p>				
6. DISCUSSION:				
<p>The intent of this Guideline is for JSA to integrate the technical, schedule, and cost elements of the project through project plans to include schedules, budgets, authorization of work, and accumulation of costs, and remain consistent with the budget. Critical to this effort, the CAM, in collaboration with project controls staff and the PM, should create a Control Account Plan (CAP) for all the work that will ultimately take place within their control account. The CAP defines the authorized scope, budget and schedule of a CAM's control account.</p>				
7. OBSERVATION/FINDING:				
<p>The CAP as defined in JSA's system description (Sec. 900, Pg. 87) was not presented to the team. The CAP is defined as "the enterprise suite project baseline document that contains the detailed schedule and budget information for the control account." Even if a CAP was presented to the team as defined, it would be deemed insufficient, because it lacks scope definition.</p> <p>The system description (Sec. 400, Pg. 32) states, "Work authorization is the specific mechanism where CAMs receive the authority to begin work defined in their validated and approved CAPs." When asked to present a sample CAP, the project schedule was provided to the team. The team considered the project schedule to be insufficient as a CAP, since it did not meet the CAP definition provided in the system description. The schedule captures all the project scope; however, the combination of the schedule and WBS dictionary is required to adequately reveal the entire scope. The schedule only captures direct costs, so the indirect costs would need to be extracted from the cost manager.</p>				
8. RECOMMENDATION:				
<p>At a minimum, recommend the CAP include scope of work definition (found in the WBS dictionary), a schedule (including resource planning), and a time-phased budget. Upon approval, the CAP may be appended to the Work Authorization Document (WAD). This confirms the agreement between the CAM and the PM to accomplish this plan and provides authorization to proceed with work. Also, the contents of the CAP should be documented in JSA's system description.</p>				
Prepared By: Jay Glascock	Date: 11/16/2011	Reviewed By: Kurt Fisher	Date: 11/17/2011	Contractor Reviewed: JSA
				Outbrief Date: 11/16/2011

Title: Corrective Action Request (CAR)		Page: 1of 2	Encode: E1	Rev : #0	
1. Subject: Schedule Integrity.		2. Guideline Ref (if applicable): 6		3. Control Number: CAR-02	
4. CA#, WBS#, or Functional Area: Scheduling - All Control Account activities -(ANSI GL #6)					
5. REQUIREMENT: Guideline 6 – (ANSI/EIA-748B) requires the following: “Schedule the authorized work in a manner that describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.”					
6. DISCUSSION: The NDIA EVMS Intent Guide states the following regarding GL #6: “Establishment of significant interdependencies between work packages and planning packages (or lower-level tasks/activities) that determine total work time and critical path through the project.” “There must be horizontal and vertical integration of the schedule through the framework of the WBS.” Vertical integration is critical to the accurate forecasting of start and finish dates for the activities in the schedule. Accurate calculation of dates is based on accurate definition of activity predecessor and successor relationship. “Significant interdependencies should be defined at a consistent level of detail to support development of a critical path. The schedule should be designed for effective management purposes and contain a critical path for the entire contractual period of performance. “ ”The schedule network relationships support the development of a critical path for development projects.” “Discrete activities/tasks along the critical path have the least amount of float.” The critical path is an important part of the monthly schedule analysis and management assessment. In order to have an accurate critical path, the logic ties must be accurate; the schedule must not be artificially constrained to ensure the schedule float is accurate. Accurate schedule float will correctly determine the project critical path and near critical activities.					
7. OBSERVATION/FINDING: Both the 12 GeV CEBAF Upgrade (12 GeV) and the Technology and Engineering Development (TEDF) Project schedules have been developed as a network of logically linked tasks organized by WBS and Control Account. The integrity of the project schedule is necessary in order to perform effective schedule analysis, critical path analysis and identification of near critical path activities. The accurate and thorough integration of the schedule activities ensures that the schedule tool can adequately calculate total float values to provide project management with an accurate assessment of the activities that are nearing or on the critical path. The calculation of the critical path is a valuable management tool for analyzing and forecasting project schedule progress. Incorrectly linking the schedule (or missing schedule linkages) may impact on the project scheduling process and provide an inaccurate projection of the critical path, near critical items, inaccurate assessment of the completion of milestones or possibly an inaccurate projection of the early project completion date. The 12 GeV and TEDF project schedules have been developed in Primavera version 6.0. The review team requested a copy of the 12 GeV project schedule in P6 to run the schedule diagnostics report to access the integrity of the project schedule. The Schedule Log Report was run from the XER file provided to the review team in P6 (See Attachment A). The schedule log report indicates the 12 GeV project schedule currently has 6,278 activities and 10,883 relationships with a total of 155 constraints.					
Prepared By: S. W. Langish	Date: 11/22/2011	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:

1. Subject: Schedule Integrity	2. Guideline Ref (if applicable): 6	3. Control Number: CAR-02
4. CA#, WBS#, or Functional Area: Scheduling - All Control Account activities -(ANSI GL #6)		

When the Critical Path was run by the project team using the XER file provided by the project and setting the criteria for Total Float ≤ 0 , the resulting activities did not represent discrete project work. (See Attachment B) The resulting critical path indicates management and oversight level of effort type activities rather than the discrete work that is needed to complete the project. It would have been expected to show a critical path of Hall B construction as advertised on the project's Critical Path graphic which was determined by a total float analysis. This is an example of how the schedule is not logically linked and is artificially constrained limiting the scheduling tool from correctly calculating the project critical path.

Additionally, both projects have not integrated subcontractor schedules into their respective project schedules. As required by Guideline 6; "there must be horizontal and vertical integration of the schedule through the framework of the WBS and OBS." The use of "peg points" derived from the contractor schedules prevents the accurate calculation of activity dates based on accurate definition of activity predecessor and successor relationship from the contractor schedules. The current project schedule for both 12 GeV and TEDF provide a summary level overview without providing an integrated activity-based representation of the project work.

In summary, the 12 GeV project schedule needs to be reviewed for schedule integrity. Project schedule integrity is necessary in order to ensure the schedule accurately represents all the project work scope and activity sequencing, to determine the correct forecast of schedule start and finish dates for all activities, milestones, and project early start finish dates. A review of all activities and logic will ensure that the project schedule provides an effective and valuable management tool for assessing and analyzing schedule progress; and will ensure that the project schedule represents the true critical path and near critical activities to assist project management in effectively managing the project schedule. The review team is not requesting that the projects change their approach, at this time, to integrate the subcontractor schedules into the project schedule. However, the team recommends that the projects evaluate and report to the review team what schedule improvement can be made with the current projects to: remove constraints that prevent critical path analysis from being performed, use Primavera P6 to calculate and report the critical path on a regular basis, and integrate subcontractor schedule and schedule updates into the project schedule. On future projects, the recommendation is to consider full implementation of the above improvements so that the entire project schedule (at the activity level) represents the full scope of work, and is logically linked to generate an accurate project critical path needed to manage the project.

Prepared By: S. W. Langish	Date: 11/22/2011	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
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APPENDIX D

**CONTINUOUS
IMPROVEMENT
OPPORTUNITIES (CIOs)**

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1	Encode: E1	Rev : #0	
1. Subject:		2. Guideline Ref (if applicable):		3. Control Number:	
Training		All		CIO-01*	
4. CA#, WBS#, or Functional Area:					
All Five ANSI/EIA-748B Process Areas					
5. REQUIREMENT:					
Effective implementation of an EVMS requires thorough training of CAMs, PMs, project control personnel and other applicable project team members in the EVMS guidelines and the institutional EVM systems and procedures.					
6. DISCUSSION:					
Deploying and maintaining effective implementation of a compliant EVMS requires a documented EVMS training program, including refresher training and 'on-boarding' training for new project personnel, that is consistent, accurate and aligned with overall organizational and project and program goals and objectives. EVMS training results in project and program participants that are capable of effectively executing the EVMS in a manner that is compliant with DOE Order 413.3B and the ANSI/EIA-748B standard.					
7. OBSERVATION/FINDING:					
Training appears insufficient and conducted on an ad-hoc basis. Some CAM responses were tentative and lacked an understanding of their responsibilities, accountabilities and EVMS processes. In the system description (Sec. 101, Pgs. 4-5), the roles and responsibilities of the Project Manager, Control Account Manager and the Project Management and Integrated Planning Department personnel are clearly outlined. Periodic and formal EVMS training that inculcates and refreshes project personnel as to their roles and responsibilities as project managers, control account managers and project controls personnel will assist in developing and ensuring that a strong EVMS culture is established throughout JSA, within functional organizations, and on projects that are required to employ an EVMS.					
8. RECOMMENDATION:					
Periodic and formalized EVMS training should be established. The training program would provide initial and refresher training and, as required, customized EVM training for established CAMs and PMs, as well 'on-boarding' training for new CAMs and PMs. Training should cover all EVMS areas, including variance analysis writing, variance analysis review and approval process, change control process, EAC calculations and the selection of appropriate earned value techniques.					
Prepared By:	Date:	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
Jay Glascock	11/16/2011	Kurt Fisher	11/17/2011	JSA	11/16/2011

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1	Encode: E1	Rev : #0	
1. Subject:		2. Guideline Ref (if applicable):		3. Control Number:	
Work Breakdown Structure		1		CIO-02*	
4. CA#, WBS#, or Functional Area: WBS					
5. REQUIREMENT: Define the authorized work elements for the program. A WBS, tailored for effective internal management control, is commonly used in this process.					
6. DISCUSSION: The WBS is used as the basic building block for the planning of all authorized work. The WBS is a product-oriented division of project tasks depicting the breakdown of work scope for work authorization, tracking, and reporting purposes that facilitates traceability and provides a control framework for management. As a result of the September 2008 EVMS Certification Review, the WBS was questioned, but ultimately deemed acceptable upon making the system description consistent with the WBS. The team did not agree with this earlier decision. The WBS should be product-oriented. The 12 GeV project is too far along (~53% complete) to make changes of this magnitude to the WBS. However, the team would expect to see a product-oriented WBS for future projects managed by JSA and the system description should be revised. The current WBS facilitates reporting requirements to the project customer. The team maintains these reports can still be generated when using a product-oriented WBS. As with applying an earned value effort code (e.g., E = Level of Effort) to an activity in P6, the same can be done to identify R&D activities. P6 can capture all the activities that are coded "E" as well as those coded "R&D" through filtering. This decentralizes R&D, but properly associates the work with its product (e.g., Hall A) versus a process (e.g., funding). If the customer wants to know the status of R&D, this can be quickly calculated using P6 and filtering.					
7. OBSERVATION/FINDING: The system description (Sec. 200, Pg. 9) states, "WBS Level 1 is the entire project and represents the total responsibility assigned to the Project Manager. For WBS Level 2, the overall project is divided into segments that depend upon the reporting requirements of the Project Customer. For DOE projects, these Level 2 segments will normally be funding types [Budget and Reporting (B&R) Classification Codes] while DOD projects will normally have product-oriented elements. WBS Level 3/4 elements are definable product-oriented components of Level 2 segments that accomplish a specific purpose." The team expected the WBS to be product-oriented in accordance with the ANSI/EIA-748B Standard. The 12 GeV project was divided into segments (funding types at WBS Level 2) that admittedly facilitate reporting requirements of the project customer. The team does not view the current WBS to be in accordance with ANSI/EIA-748B Standard or a best practice (e.g., GAO-09-3SP). In the case of R&D, the Hall A R&D effort should be captured under a Level 2 WBS element entitled "Hall A" versus being placed under a Level 2 WBS element entitled "R&D," along with all other R&D efforts across the project. Although the WBS is not product-oriented, the WBS and its dictionary in its current configuration accurately represent the work scope at the level of detail necessary to ensure performance issues are recognized.					
8. RECOMMENDATION: Implement a product-oriented WBS on all future capital asset projects and revise in the system description.					
Prepared By:	Date:	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
Jay Glascock	11/16/2011	Kurt Fisher	11/17/2011	JSA	11/16/2011

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1	Encode: E1	Rev : #0	
1. Subject:		2. Guideline Ref (if applicable):		3. Control Number:	
Work Authorization Documents		9 & 29		CIO-03	
4. CA#, WBS#, or Functional Area:					
Planning, Scheduling and Budgeting					
5. REQUIREMENT:					
REQUIREMENT					
ANSI/EIA-748B GL#9 states: "Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors"					
ANSI/EIA-748B GL#29 states: "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."					
DISCUSSION					
The intent of guideline #9 is to clearly identify scope, schedule and budgets of the identified control accounts and the associated work packages and planning packages. Through a work authorization process, establish budgets for all authorized work and identify the work to be done by the responsible organizational elements. No work should begin before the effort is authorized by an initial work authorization. As budgets and schedules are established and approved for all the authorized work at the control account level, the work authorization is updated as required.					
The intent of guideline #29 is that budget changes are controlled and understood in terms of scope, resources, and schedule. Budget reflects current levels of authorized work. Budget revisions are traceable to authorized contractual targets and control account budgets. Management reserve may be used for future work when additional in-scope work has been identified.					
OBSERVATION / FINDING					
In reviewing the 12 GeV Project work authorization documents (WAD), the WAD was being signed off by the same person for authorization as the CAM and the Project Manager, which gives the appearance of lack of independence when a person is authorizing himself.					
RECOMMENDATION:					
The WADs for which the Project Manager is also the CAM, the Project Manager should signoff as the CAM and have the Project Director or functional line management signoff where the Project Manager normally would.					
NOTE: The WADs in question were corrected by the PM and the Project Controls team during the review.					
Prepared By:	Date:	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
		Kurt Fisher		JSA	11/16/2011

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1	Encode: E1	Rev : #0	
1. Subject: Schedule Variances and Re-planning work		2. Guideline Ref (if applicable): Various	3. Control Number: CIO-04		
4. CA#, WBS#, or Functional Area: Various control accounts, Re-planning procurements					
5. Description: <p>It should be noted that in a limited number of instances, JLab was aware that a planned procurement was not going to take place as scheduled, and took no action to move the procurement to future months through the change request process. This lead to schedule variances being reported until the award was made and a change order approved. Once the change order was approved, the subcontractor's schedule activities were moved from the past months through a current month single point adjustment and re-planned in future months to coincide with the subcontractor's schedule of activities. Although this is an acceptable practice for unknown or unexpected events; when the CAM knows for sure a procurement is going to be delayed for a significant amount of time, the CAM should be proactive and submit a change request to move the scope of work to some future month(s), avoiding the reporting of a negative variance, and more importantly, a negative current month budgeted cost of work scheduled adjustment. This will also eliminate the reporting of a negative BCWS in the current month, avoid discussing negative schedule variances that will be adjusted once the procurement is awarded, and eliminate off setting variances. However, there is an exception to this practice and that is if the procurement is on the critical path. In that case, the CAM needs to take whatever is necessary to avoid the project from slipping.</p>					
6. Attachments:					
Prepared By:	Date:	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
		Kurt Fisher		JSA	11/16/2011

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1		Rev : #0	
1. Subject: WBS Dictionary – The 12 GeV WBS Dictionary lacks detail, and is inconsistent with the PCSM. Ensure that future WBS dictionary’s include the deliverables, resources and processes to produce each element.		2. Guideline Ref (if applicable): GL-1		3. Control Number: CIO-05	
4. CA#, WBS#, or Functional Area:					
5. Description: Section 202.2, WBS Dictionary of the JLAB Project Control Management System (PCMS) states the following: “A complete Work Breakdown Structure requires an associated dictionary (Exhibit 3) to provide descriptive information for each WBS element. The WBS dictionary thoroughly describes the scope of each work element (including deliverables) identified in the WBS. It also outlines the resources and processes required to produce each element. As with the WBS itself, the WBS dictionary is revised to reflect project changes via the Change Control process and is kept up todate during the life of the project.” The committee noted that the 12 GeV WBS Dictionary lacks detail, and is inconsistent with the PCSM as it does not include the deliverables, resources and processes to produce each element. Recommendation: Ensure that future WBS dictionary’s include the deliverables, resources and processes to produce each element					
6. Attachments:					
Prepared By:	Date:	Reviewed By:	Date:	Contractor Reviewed:	Outbrief Date:
Kurt Fisher		Kurt Fisher		JSA	11/16/2011

Title: Continuous Improvement Opportunity (CIO)		Page: 1 of 1	Rev : #0
1. Subject: Project Control System Manual		2. Guideline Ref (if applicable): Various	3. Control Number: CIO-6
4. CA#, WBS#, or Functional Area: Not applicable			
5. Description: Several opportunities exist to proactively improve Earned Value processes and procedures in the Jefferson Science Associates, LLC, Project Control System Manual.			
<ol style="list-style-type: none"> 1. The Project Control System Manual may be improved by stating that Earned Value methodology is identified in the applicable Primavera P6 Enterprise Project Portfolio Management file for a project. 2. The statement "A new project baseline will be generated for each approved Change Request" should be reviewed for consistency with the processes and procedures of PCS-04, Change Control, and clarified as needed. 3. Processes and procedures for Field Change Orders were not found in the Project Control System Manual and should be considered for addition. 4. References to DOE Order 413.3A should be updated to DOE Order 413.3B. 5. A product-oriented Work Breakdown Structure should be used on future capital asset projects and annotated in the System Description. 6. The system description for Work Authorizations should be updated to state that Project Managers cannot sign their own Work Authorization Documents. 			
6. Attachments:			
Prepared By:	Date:	Reviewed By:	Date:
Ray Won		Kurt Fisher	
Contractor Reviewed:		Outbrief Date:	
JSA		11/16/2011	

APPENDIX E

ACRONYM LIST

ACRONYM LIST

ACWP – Actual Coast of Work Performed	LOE – Level of Effort
APD - Associate Program Director	MIS – Management Information System
APM - Account Project Manager	MR – Management Reserve
BCWP – Budgeted Cost of Work Performed	OECM – Office of Engineering and Construction Management
BCWS – Budgeted Cost of Work Scheduled	OBS – Organizational Breakdown Structure
BNL – Brookhaven National Laboratory	OPA – Office of Project Assessment
CAM – Control Account Manager	PCS – Project Control Staff
CAP – Control Account Plan	PCSM - Project Controls System Manual
CAR – Corrective Action Request	PEP – Project Execution Plan
CAS – Cost Accounting Standards	PM – Project Manager
CIO – Continuous Improvement Opportunities	PMO – Project Management Office
CPI – Cost Performance Index	PPPL – Princeton Plasma Physics Laboratory
CPR – Contract Performance Reports	RAM – Responsibility Assignment Matrix
CR – Change Request	SC – Science
CV – Cost Variance	SPI – Schedule Performance Index
DOE – Department of Energy	SV – Schedule Variance
EAC – Estimate at Completion	TEDF – Technology and Engineering Development Facility
EM – Environmental Management	TJNAF – Thomas Jefferson National Accelerator Facility
EVMS – Earned Value Management System	UB – Undistributed Budget
EV – Earned Value	VAR – Variance Analysis Report
FES – Fusion Energy Sciences	WAD – Work Authorization Documentation
GL – Guideline	WBS – Work Breakdown Structure
JSA-JLAB – Jefferson Science Associates, Thomas Jefferson National Laboratory	