

Fermi Research Alliance
Corrective Action Plan Follow-up for
FRA EVMS Internal Surveillance
March 7-9, 2011

CAR #1

Subject:

Estimate at Completion is Not Utilized Correctly on the Project

Requirement:

ANSI/EIA-748 GL#27 states: "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."

The FRA EVMS System Description states in 5.2.7 Monthly Project Status Calculations and Forecasts: " As part of the monthly project status report, project management updates the EAC and analyzes it at the control account level to account for all changes from the baseline that have been identified. The EAC update reflects a current analysis of project risks and includes all proposed change requests.

Discussion:

The EAC reported in the monthly Cost Performance Report appears to be analyzed at the Project level; however, the individual CAMs have little, input understanding or ownership of the monthly EAC analysis. The EAC does not include the proposed change requests as stated in the FRA EVMS System Description.

Observation/Finding:

The EAC is being analyzed at the Project level. In interviews with the CAMs, the CAMs indicated they have no input to the EAC. It was found that when the CAMs do their monthly status report, they do not perform an analysis of the project risks (see CAR10) nor do the CAMs include proposed change requests in the EAC.

When asked how the ETC was calculated, it was mentioned that the ETC is calculated by Project Controls not the CAM based on the percent complete on the individual resources at the activities/work package level. CAM Interviews indicated that the CAMs provide little input into the ETC/EAC and have limited

understanding/ownership of their respective EACs. ETC is being used as the percent complete against an activity/work package and does not include the work that has been performed (ETC = BAC – BCWP).

Interviewed CAMs indicated that they do a bottoms-up EAC prior to major DOE reviews which appear to occur annually.

Also, as identified in CAR-10, the CAMs review/input into the Project risk registry is minimal. According to the system description, risk analysis should be a part of the monthly status report so it can be included in the EAC analysis.

FRA Corrective Action:

NOvA's L2's provide information and receive feedback to the changes in EAC:

- The EAC is shown on the CPR's each month and included in the monthly EVMS report.
- The Project Manager presents and explains changes each month in the Project Management Group meetings.
- The Project Manager holds regularly scheduled meetings with each L2. Information discussed at these meetings include the following items:
 - Significant variations in EAC/ETC
 - CAMs review future tasks (e.g. up to 6 months or even longer) in the schedule to identify anticipated current issues impacting future tasks and EAC/ETC

CAR #2

Subject:

Change Request to Eliminate Variances

Requirement:

ANSI/EIA-748 GL#30 states: "Changes that would arbitrarily eliminate existing cost and schedule variances should not be made."

FRA EVMS System Description 6.1.5 states: "Internal replanning is intended for in-scope changes that relate to future work."

FRA Change Control Procedure 12.PM-007 states: "Changes shall not be authorized to mask cost or schedule variances that can be corrected management attention or action. Requested changes to the project baseline to eliminate poor project performance issues and/or mitigate baseline variances are not approved."

Timing of CR Implementation

ANSI/EIA-748 GL#31 states: "Any changes to the project must be approved and implemented following the baseline management control process."

FRA EVMS System Description 6.1.5 states: "Approved changes are incorporated into the performance management baseline in a timely manner, usually before the end of the next reporting period."

FRA Change Control Procedure 12.PM-007 states: "An internal change must be approved before a budget revision can be formally incorporated into the performance measurement baseline and its associated work executed. The CAM must work with Project Controls to update all affected CAP and Project documents that reflect scope, schedule, and budget information and assure that these updates are consistent with the approved CR."

Discussion:

Change Request to Eliminate Variances

Internal replanning efforts are allowed on open work packages as long as the past portion of the work already completed is not affected. Changing budget or schedule within an open work package without splitting off the future work into a new activity and locking down the past work, changes history and eliminates variances.

Timing of CR Implementation

Changes to the project management baseline can only be enacted after the Change Request (CR) is formally approved by the Project Manager or designee consistent with the FRA EVMS System Description and Change Control Procedure 12.PM-007.

Observation / Finding:

Change Request to Eliminate Variances

CR276 "Schedule Adjustments for 53MHz RF System Fabrication and Testing" changes the baseline schedule according to a replanning effort for an ongoing activity. The fact that these changes were made without splitting the activity into past and future work packages jeopardizes the integrity of past performance data.

Timing of CR Implementation

CR238 "Schedule Adjustments for Selected Detector Assembly Tasks with Baseline Start Dates in Oct 2010" changes the baseline schedule from having start dates in Oct 2010 to start dates in Jan 2011. The CR was initiated on 11/16/2010, received "preliminary approval" on 11/16/2010" but did not receive final approval until 1/7/2011. According to discussions with the Project Scheduler during the interview process, changes to the PMB were made in Nov 2010 prior to the final approval of the CR. In discussions with Project personnel this practice is implemented in multiple areas within the project.

FRA Corrective Action:

NOvA Project Office personnel track the change requests (CRs) to show the timely completion and ensure that the CR is approved prior to implementing the change.

The OPMO EVMS documents are drafted to more clearly define and distinguish the timeframe between the creation/initiation, approval and implementation of a CR and the activities that may be changed. Changes will be finalized after incorporating any additional comments from the internal Surveillance.

The EVMS documentation provides:

- guidance on what is expected,
- require the project to interpret and specifically stipulate how the guideline will be met (e.g. what constitutes the past, timely and routinely),
- have Project and Fermilab management agree to the interpretation and
- publish the agreed upon project interpretation in the PMP.

CAR #3

Subject:

Variance Analysis – Not Timely, Not Consistently Used By Project

Requirement:

ANSI/EIA-748 GL#22 guideline states:

“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: 1) Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance. 2) 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.”

ANSI/EIA-748 GL#23 guideline states:

“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.”

Discussion:

The NDIA EVMS Intent Guideline 22 states the following: “On at least a monthly basis, generate schedule variance and cost variance data that supports management control needs by allowing the project manager to focus on those areas in need of attention. The intent of this guideline is to recognize that analysis must be accomplished on a regular, periodic basis.”

The NDIA EVMS Intent Guideline 23 states the following: “The purpose of this guideline is to ensure both significant schedule and cost variances are analyzed, at least monthly, at a level of detail required to manage the effort, i.e., to enable management decision-making and corrective action.”

The FRA System Description states the following in section 5.3.2 Monthly Reporting Cycle: “reports generated from the EVMS are updated and published monthly. The large amount of data, number of people providing input, processing time, and other considerations require that an orderly process is used to collect, review, report, and use the data generated by the system.”

The FRA EVMS Procedure 12.PM-006 Monthly Status Reporting states the responsibilities of the PM and CAM as “reviewing variance reports and providing acceptance or required corrective action” and “preparing variance reports and required corrective action plans” respectively.

Observation:

Based on an assessment of the project's document database, VARs are not completed in a timely manner during the monthly status cycle. VARs were sampled for WBS 2.0.1.2 and resulted in uncovering October, November, and December VARs were not prepared, approved, or fully signed until February. This lag in generation versus final approval implies that the information is not being reviewed in a timely manner and therefore not possibly being used by senior management. After further interviews with the PM, CAMS, and Project Controls it was determined that VARs have no formal deadline for completion or approval at the CAM and PM level. A clear project business process/monthly update cycle regarding the VAR process and utilization of its information for management decision-making is absent from the PEP.

Additionally, review of select VARs within multiple control accounts uncovered that the quality of the analysis does not allow for proper utilization by project management. Explanation of variance, description of the problem, impacts, and corrective actions are not identified in sufficient detail needed for project management. This could be due to lack of oversight from the project controls, a need for refresher training, or some combination of these and other issues. Regardless, it does not allow the project to use the VARs effectively.

FRA Corrective Action:

NOvA added personnel to the Project Office and made improvements in the time to closure. A flowchart with dates where activity completion is required was created. The flowchart is used to emphasize that participants in the VAR process understand the importance of their role and timely completion of activities to ensure corrective actions are implemented to correct variances in a timely fashion.

The OPMO EVMS documents are drafted to more clearly define and distinguish the timeframe when VARs are to be complete and when the monthly status reports are due. Changes will be finalized after incorporating any additional comments from the internal Surveillance. The EVMS documentation provides:

- guidance on what is expected,
- require the project to interpret and specifically stipulate how the guideline will be met (e.g. what constitutes the past, timely and routinely),
- have Project and Fermilab management agree to the interpretation and
- publish the agreed upon project interpretation in the PMP.

CAR # 4

Subject:

Variance Analysis Corrective Action Tracking

Requirement:

ANSI/EIA-748 GL# 26 guideline states: "Implement managerial action taken as the result of the earned value information.

FRA System Description/Procedure 12.PM-006 Monthly Status and Reporting – "The corrective action log status shall be monitored and updated."

Discussion:

The NDIA EVMS Intent Guideline 26 states the following:

Assess management actions and modify them as required to achieve project objectives. Earned value data must be utilized by all levels of management for effective project execution. Because of this, the data produced by the earned value management system must be available to managers on a timely basis and must be of sufficient quality to ensure that effective management decisions can be made as a result of its analysis. The project's internal reports and the reports forwarded to their customer must indicate the overall cost and schedule impacts of such problems on the project.

The FRA EVMS Procedure 12.PM-006 Monthly Status and Reporting states in section 4.2 CAM Variance Review and Analysis, that "After accepting the variance analysis, the Project Manager (or designee) will note any required corrective action on the corrective action log. The corrective action log status shall be monitored and updated when necessary, at least on a monthly basis until the action is closed".

Observation / Finding:

The CAMs interviewed prepare variance analysis reports based on thresholds established for the project. The variance analysis reports identify the cause, impact and corrective action (if required); and the variance analysis reports are reviewed and accepted by the project manager. Based on interviews with the CAMs and discussions with the project manager/project controls, the project does not currently maintain a corrective action log to track closure of the corrective actions documented on the variance reports as required by the FRA EVMS System Description and implementing procedure. The corrective actions identified in the variance analysis are not formally tracked to closure. The project personnel do not track the closure of corrective actions outlined in the project variance analysis.

A Corrective Action Log is not created or maintained and for this reason the FRA EVM System Description/Procedure requirement for a Corrective Action Log to track corrective actions to closure is non-compliant.

FRA Corrective Action:

NOvA revised the VAR corrective Action Log to only include VAR's that require corrective actions. Additional personnel have been added to the Project Office to review this log, ensure proper transmittal of information and track CAs to closure.

CIO #5

Subject:

Actual Cost Reconciliation

Requirement:

GAAP internal controls guideline "Segregation of Duties" states: no person will hold more than one role amongst the following business critical roles: authorization, recording, asset custody, and reconciliation.

Observation / Finding:

One person in Project Controls validates the Actual Cost file which comes from the accounting system. The same person in Project Controls also creates the final version of the file from data in the accounting system. Having one person or even one group perform both the recording (create final version) and the reconciliation (validation) functions for Actual Cost data violates the "Segregation of Duties" internal controls guideline.

The head of Fermilab OPMO stated in the March 07, 2011 Daily Outbrief that future experiments will separate the Field Financial Manager role and the Project Controls recording role. One person, however, currently is responsible for both roles for the NOvA project.

Recommendation:

It is recommended that the actual cost file be validated by the Finance Group and entered into the EV system by a person in Project Controls to ensure the integrity of the Actual Cost data reported on a monthly basis.

FRA Continuous Improvement Action:

NOvA has two individuals that will separately extract and load the actual costs going forward. NOvA is currently an exception to the normal Fermilab project process for handling actual costs, because the NOvA Financial Manager does the Cobra processing for the NOvA project. All other projects will have actual costs entered by the Project Controls scheduler into Cobra while the Project Finance person extracts and prepares the data.

CAR #6

Subject:

Uncosted Scientific Labor Charging Inaccurately

Requirement:

ANSI/EIA-748 GL#9 states: "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."

ANSI/EIA-748 GL#22 states: "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: (1) Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance. (2) Comparison of the amount of the work budget earned the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance."

ANSI/EIA-748 GL#23 states: "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."

DOE OECM EVMS Certification Review (May 2009) CAR-01 states: "It is recognized the unique nature of the support being provided by scientists at the various universities and that the science community culture at many places does not include accounting for their labor hours worked on project. However, accurate project status and projections of project completion schedule and costs cannot be determined without accounting for scientists' labor."

FRA EVMS System Description Section 5.1.2.1 states: "For projects where uncosted labor is utilized, actual hours of effort for those resources will be collected."

Discussion:

Collection of accurate data is required in order to fulfill the ANSI/EIA-748 guidelines 9, 22, 23. As a result of CAR-01 from the DOE OECM EVMS Certification Review held in May 2009, FRA EVMS System Description Section 5.1.2.1 was introduced to insure that Earned Value is recorded accurately for uncosted labor.

Observation / Finding:

CAMs interviewed that are uncosted scientists stated that they charge an estimated or an average time per week to the project. They do not report time based on the actual hours worked. They indicated that they work more hours for the project than they charge to the project.

FRA Corrective Action:

NOvA sent out a memo to all L2 managers and CAMs requesting actual hours be reported by Uncosted Scientific Labor. This was also mentioned in the annual CAM training. NOvA also revised the form for reporting hours to include specific reminders about the proper way to report all hours worked on the project.

CAR #7

Subject:

CAM Refresher Training Not Performed

Requirement:

FRA EVMS System Description section 2.6 Training states: "All personnel involved in planning or implementing the EVMS process, including existing staff and on-site contractor personnel, new hires, and transfers, are trained at the level applicable to their roles and responsibilities. At a minimum, EVMS training requires that Project Managers and Control Account Managers read the current version of this Earned Value Management System Description document and complete EVMS training when first associated with a project. These individuals may also be required to read additional EVMS reference materials or addendums as identified by specific project requirements. Refresher training for those involved in active projects will be required on an annual basis."

Discussion:

The Control Account Managers (CAMs) are required to undergo CAM Refresher Training on an annual basis per the FRA EVMS System Description. Based on the CAM Interviews and the presentations during the plenary sessions, the last CAM Refresher Training was held over one year ago.

EVMS Refresher Training is required to be conducted for the CAMs on an annual basis per the FRA EVMS System Description. The last refresher training class was held Sept/October 2009 per the plenary session presentation by the NOVA Project Manager. During their interviews, the CAMs were asked when they were given EVMS training and most CAMs stated they had not received any EVMS training after the initial training session.

Observation / Finding:

The CAMs would benefit from CAM Refresher Training on an annual basis consistent with the requirement in the FRA System Description. The CAMs would then be better prepared to generate variance analysis, prepare EACs, understand and better understand the project schedule, assess risks and prepare change requests with regular annual EVMS refresher training.

FRA Corrective Action:

EVMS refresher training class was conducted by OPMO for all active CAMs, project office personnel and the Project Manager. Personal and work conflicts prevented one active CAM from completing refresher training.

CIO #8

Subject:

Contingency/Management Reserve – Not Consistently Handled by the Project

Observation:

Based on the Fermi Research Alliance (FRA) Earned Value Management (EVM) System Description, Contingency and Management Reserve (MR) are very clearly defined as being established by unknown and known risks respectively.

The FRA System Description states in Section 3.6.1 Contingency and Management Reserve: “Management reserve and contingency are elements of the approved Total Project Cost (TPC) that are identified early in the project development and provide budget that covers future known risks (management reserve) and unknown risks (contingency) of the project, but are not part of the Performance Measurement Baseline.”

Based on interviews with the PM and CAMs, the NOvA project does not have these same definitions and it is encouraged to clarify this language in the Project Execution Plan (PEP), Risk Management Plan (RMP), and/or the NOvA Project Implementation of FRA EVMS document. The clarification should address the deviation, if any, from the FRA EVM System Description regarding how the NOvA project defines and uses Contingency and MR. Further, it should clarify how each relates to identified risks (see CAR10).

Also, in the Conventional Construction WBS, Contingency was entered into the Performance Measurement Baseline (PMB) and performance was earned on the task that contained the Contingency. This is inconsistent with the FRA EVM System Description and ANSI standard, as shown below.

The FRA System Description states in section 3.6.1 Contingency and Management Reserve: “Management reserve and contingency are elements of the approved Total Project Cost (TPC) that are identified early in the project development and provide budget that covers future known risks (management reserve) and unknown risks (contingency) of the project, but are not part of the Performance Measurement Baseline.”

The NDIA EVMS Intent Guideline 14 states the following: “Because management reserve is budget that is not yet tied to work, it does not form part of the performance measurement baseline.”

During CAM interviews, movement of more Contingency into the PMB was discussed as an upcoming change request. This cannot take place. This action was treated as a CIO since it was an isolated event within the NOvA project and not proven to be systemic.

FRA Continuous Improvement Action:

This specific task is complete. The use of the word contingency in the title of this task was not contingency in the sense that it represented Project contingency held by NOvA. The funding was a part

of the contract for undefined future work. If this kind of situation exists in future contracts, a Planning Package would be used until the time a change is defined and the work / dollars would be put into a work package.

CIO #9

Subject:

Use and Integrity of Scheduling Data

Observation:

ANSI/EIA-748 GL#6 states: "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."

Guideline 6 ensures that the project schedule provides a logical sequence of work leading to a milestone, event, and/or decision point needed to ensure that the schedule supports the project objectives.

The FRA EVMS System Description states that "Risks in achieving both performance and budget goals must be clearly recognized and actively managed through: Continual review of cost/performance/schedule risk tradeoffs."

Team members working to and understanding the current and baseline project schedule is essential for monitoring progress, analyzing variances, and tracking corrective actions. The Scheduling data/reports information is available and posted for the CAMs, but the Schedule appears to be minimally used or useful to the CAMs. The schedule had a significant number of tasks that were not logically linked (no inter-dependencies) with many tasks constrained so that the critical path could not be truly assessed.

Total tasks	6036
No Predecessors	23%
No Successors	28%

In some cases, the CAMs did not know what milestones they impact or what work outside of their WBS they would impact. They found it difficult to locate the Scheduling data/document(s) and how to use this data. Some could not identify the critical path or interfacing milestone. The project manager knows what this schedule impacts. The lack of a working schedule may be resulting in reactive rather than proactive practices and may be contributing to the creation of CR to eliminate variances. Also the large float may not create the sense of urgency that there are milestones and a schedule to follow. There appears to be minimal ownership of the Schedule at the CAM level. Related to insufficient utilizing/reviewing the schedule, the CAMs do not appear to review and retire risks in a formal or timely manner, but leave reviews of risks for the DOE reviews of the project.

Recommendation:

As a best practice, the CAMs should be required to understand their milestones and inter-dependencies of tasks and how they impact the project. The PM should be encouraged/trained in the development and use of relevant milestones. The NOvA project schedule should be adjusted to incorporate more meaningful internal milestones rather than the external scheduled milestones (e.g. DOE CD4) to allow the CAMs to understand the true critical path. Project controls and the CAMs should work together on the schedule with the CAMs actually taking ownership of the schedule.

FRA Continuous Improvement Action:

NOvA has over 500 "Internal" milestones to provide information to CAM's. Plots are generated to show progress for all milestones every month and distributed for CAM's to review. These plots are filtered to be presented in several different ways and show progress for all WBS sections. NOvA discusses the critical path for the Far Detector at every Technical Board meeting.

CAR #10

Subject:

Risk Assessment Not Formalized and Conducted Regularly

Requirement:

ANSI/EIA-748 GL# 27 guideline states:

“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.”

The FRA Earned Value System Description states, in section 3.2 Risk Management, “As the project progresses, new information and insights allow the Project Manager to refine the identified risks and mitigation strategies or remove the risk from consideration once it is no longer applicable. This is accomplished through regular review of project risks by Control Account Managers (CAM) as they analyze cost and schedule variances, develop corrective actions, and execute the corrective actions to completion. In addition, risks are considered during the development of Estimates to Complete (ETC) by the CAM.”

Discussion:

The NDIA EVMS Intent Guideline 27 states the following: “EACs should consider all emerging risks and opportunities within the project’s risk register (or other similar database) which will impact the integrated master schedule and resource plan for the remainder of the work.”

The NOVA Risk Management Plan, section 5. Risk Management Tools and Practices, section 5.3 Integration of Risk Management with Other Activities, states, “Risk management is a line activity in NOVA and, as such, will be a normal part of many activities and meetings. The NOVA Risk Management Board will meet regularly to discuss risk issues. NOVA Collaboration meetings will also regularly include reports from Level 2 managers that will address risk-related issues.”

NOVA’s Implementation of FRA’s Earned Value Management System states, “Calculate earned value and provided project management with earned value reporting and variance analysis information in a timely manner in order to identify potential risks and opportunities to the project and to efficiently and effectively manage those risks and opportunities regularly.”

Observation / Finding:

Following the interview with project management and CAMs, it appears that the project performs limited risk management; however, it is referred to as contingency management. However, the contingency application to activities is not contingency it is management reserve per the definitions in the System Description. It was explained that MR (assigned contingency) is assigned at the activity level

based on the remaining budget of the activity. As activities are completed, assigned contingency is transferred to unassigned contingency. However, not much is correlated to the risk event list that qualifies/quantifies management reserve.

During interviews with project management and CAMs, it was discovered that the projects discuss risk events, but the project does not formally conduct regular risk analysis. And, the most current evidence of risk analysis is an outdated risk list that was updated August 2010. It was also discovered that formal risk identification, analysis, modification and retirement are done prior to major reviews, which is when the last formal update was done. The risk registry that is loaded on the surveillance review webpage contains a lot of relevant information; however, it does not quantify those events.

Based on the requirement/expectation detailed in the project's Risk Management Plan, risk identification, retirement and updates are to occur on a regular basis; and the information derived from those regularly scheduled meetings be reported to the appropriate stakeholders. It was observed that the project does not meet regularly to formally document risk updates; again, this is only contingent upon major DOE reviews.

Based on the requirements/expectation detailed in the Laboratory's EVM-SD, "As the project progresses, new information and insights allow the Project Manager to refine the identified risks and mitigation strategies or remove the risk from consideration once it is no longer applicable. This is accomplished through regular reviews of project risks by Control Account Managers (CAM) as they analyze cost and schedule variances, develop corrective actions, and execute the corrective actions to completion. In addition, risks are considered during the development of Estimates to Complete (ETC) by the CAM." It is clear that the project manager is aware of potential impacts and/or opportunities; however, that awareness is not documented anywhere. There was no evidence provided to the team that a Risk Management Board exists for the project, nor is there clear evidence that the Level 2 managers are fully integrated into the formal process of risk management. There does not seem to be any evidence of fluctuations in remaining contingency.

FRA Corrective Action:

Reminders to evaluate and report each risk's status are sent to L2's. The way information is entered in the Change Request forms now have a box to check to indicate if there is any risk impacted. The Project Office reviews each change and contacts L2's to review risk and Basis of Estimate impacts.

The OPMO EVMS documents have draft changes that the frequency of risk reviews will be project specific and incorporated into the project's PMP and approved.

CIO #11

Subject:

Documentation Inconsistencies

Observation:

WBS Dictionary

The scope definition document in the WBS dictionary is the control point for the work-scope content in each element. The WBS Dictionary definitions are not consistent between the highest level of the WBS and the control account (lowest level of the WBS).

Inconsistencies were found while reviewing the WBS dictionary. There were similar scope definitions under two different WBS elements for design work. When the CAM was asked to show the team the WBS Dictionary he was not able to readily access the WBS dictionary to get clarification; he referenced the WBS descriptions from the scheduling tool. The team reviewed the WBS Dictionary posted on the website which was not consistent in scope content with the WBS description in the scheduling tool. There was further confusion upon reading the scope definitions in the project's PEP. The scope definitions in the PEP didn't match the WBS Dictionary posted on the website nor did it match the definitions in the scheduling tool. It is recommended that the team modify the WBS Dictionary so it clearly states the scope at the lowest level (control account). It is recommended that the WBS Dictionary be placed under configuration control (version control) and be posted in a location readily available to the project team. If this information is to be kept in the scheduling tool, it is recommended the definitions be updated in the tool as well.

ANSI Standard Reference

It is the review team's understanding that FRA is still contractually held to DOE 413.3A which references ANSI Standard 748-A. However, various documents (Monthly Status Reporting, EVMS Surveillance document) are inconsistent in referencing 748-A. Recommend keeping all documents consistent with contractual requirements.

FRA Continuous Improvement Action:

The WBS Dictionary definitions in NOVA DocDB #253 have been reviewed and are in agreement with the PEP. The WBS Dictionary is kept as part of the Open Plan scheduling tool. Updates to the WBS Dictionary will be generated from Open Plan and saved to DocDB so that both remain consistent. The Open Plan schedule is the controlled document.

CAR #12

Subject:

Objective Measurement of EV

Requirement:

ANSI/EIA-748 GL#7 states “Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.”

FRA System Description Section 5.1 Performance Measurement, 5.1.1 Performance Management Techniques (PMT)

Discussion:

The NDIA EVMS Intent Guideline 7 states, “Identify objective interim measures within tasks to enable accurate performance assessment each month. The master schedule includes key program and contractual requirements. It enables the team to predict when milestones, events, and program decision points can be expected to occur. In a development environment, lower tier schedules must contain specific task start and finish dates that are based on physical accomplishment and are clearly integrated with program time constraints. These tasks will align with the objective interim measures within long work packages to enable accurate performance assessment. A sufficient number of interim measures will be defined after the detailed schedule is established to ensure performance is measured as accurately as possible. Interim measures will be based on the completion criteria developed for each increment of work to provide a basis for objectivity, limiting the subjectivity of work accomplished. Accurate schedule status depends on the selection of objective measures of progress to indicate work completion. These measures are necessary to substantiate technical achievement against the schedule plan and justify progression to the next task. A key feature of an interdependent schedule is that it establishes and maintains the relationship between technical achievement and progress status.”

The FRA System Description states in section 5.1.1 Performance Measurement Techniques, that “Milestone: Milestones are defined, and relative weights are assigned to them. At any point, the value earned is the original work package budget multiplied by the combined weight of the completed milestones and divided by the total weight of all milestones. This method can be applied to any work package and is generally the preferred method for work packages that span more than two fiscal periods.”

FRA’s 12.PM-004 Project Scheduling Procedure, Desktop Instructions – 12.PM-004.DT-01 Guideline for Developing a Schedule states, “Milestones method is preferred for activities that are greater than 2 reporting periods (2 months for Fermi) and the activities are not Unit Type activities.”

NOVA’s Implementation of FRA’s Earned Value Management System states, “Activity not easily matching other PMTs; Tasks > 2 mos that use this method [% complete] should have EV "peg-points" specified for them up front, with each peg-point corresponding to a particular physical percent complete.”

NOvA's Implementation of FRA's Earned Value Management System, Control Account Manager Instructions for Providing Monthly SubProject Progress Information for Open Plan

Observation / Finding:

Based on the requirements set forth in FRA's System Description and guidelines from NOvA's Implementation of FRA's Earned Value Management System, CAMs are required to develop activities for their respective control account(s). While developing those activities, the CAMs are required to plan activities with durations that do not exceed two financial periods (two months); and if those durations exceeded two periods, an objective method for performance is to be used to effectively measure earned value. Based on interviews with the CAMs and the project controls personnel assigned to the project, it was discovered that there were activities that exceeded two periods without documented, objective milestones for objective performance measurement. Currently, there are 107 planned or in progress activities that have durations that range from 40 to 250 working days that do not have any objective performance measure documented. The total cost of these planned/in progress activities is ~\$9M, which is 3.8% of the project's cost (this percent does not include already completed activities; the total percent impact could be higher.) Occurrences of this lack of objective measurement were not limited to one control account; there were several instances throughout the schedule that were not in compliance with the documentation referenced above.

Effective, objective measurement was not established for all activities that exceeded a two month duration. This is not in line with FRA's EVMS System Description, and as a result non compliances exist for those activities without objective performance metrics.

FRA Corrective Action:

The FRA EVMS Description does not mandate a specific method, instead notes a "preferred method" to have peg points for tasks greater than two (2) months in duration. Since NOvA's implementation plan (NOVA-doc-1436) was inconsistent with the FRA EVMS Description, the NOvA EVMS implementation plan was modified to be in compliance.

CIO #13

Subject:

EVM Implementation

Observation:

The FRA Earned Value Management System Description, procedures, processes and tools are well documented with mature systems and tools for implementing effective performance measurement and reporting for Earned Value Management. The project personnel and CAMs are professional, knowledgeable managers who, when interviewed, largely understood the review team's questions and provided accurate informed responses regarding the processes/procedures and the intent of effective Earned Value Management and Reporting. The Project Controls staff takes direction from the NOVA Project Manager. This results in the Project Controls staff not being accountable to a supervisor who is responsible for implementing consistent EVMS principles and standards across all project. It is the observation of the team, that the Project Controls staff was somewhat limited in their effectiveness in providing objective assessment and reporting of performance. The review team believes the project and other Fermilab projects would benefit from the project controls function reporting to an organization outside of the project to permit independent assessments of performance and reporting and allow for more consistent and standardized implementation of Fermilab's Earned Value Management System across the Laboratory.

Recommendation:

In order for the Project Controls staff to implement Earned Value management for the benefit of the project, it is recommended that the project controls staff report organizationally to an autonomous group which would allow for the most effective, value added objective assessment of project performance. This recommendation would benefit the project enabling the Project Controls staff to provide objective performance measurement, reporting and oversight to the project. Centralizing Project Controls affords the project and future projects an opportunity to standardize tools, templates, performance assessment and reporting across the Laboratory.

FRA Continuous Improvement Action:

FRA has had long and successful experience of using a combination of personnel assignments, both centralized and distributed (over Divisions, Sections, Centers, and Project), for its ES&H, Finance & Budget, Administrative, Engineering, and Project Management functions. For NOVA, some of the Project Controls personnel organizationally belong to the project, while some other Project Controls personnel report to the parent Division which is responsible not only for projects, but also for many other activities. Coordination, training, and logistical support for project controls are provided by the centralized Office of Project Management Oversight (OPMO). Top-level evaluation of project performance is provided by the Program Management Group (PMG) for that project which typically meets monthly. The PMG consists of members of the Directorate, heads of the Divisions / Sections /

Centers supporting that project, OPMO, the Federal Project Director, and often by teleconference, the appropriate Federal Program Director. This group is additionally informed by the monthly Project and FRA EVMS Reports.

Review panels often recommend centralizing such activities. However, since the combined approach of having the persons actually performing the work reside close to that activity along with a centralized coordination group has proven successful over many such activities over 40 years, FRA is not considering a change to a completely centralized Project Controls group as recommended.