



Final Report

**Fermilab Director's
&
DOE Fermi Site Office's**

**Performance Management System
Review
of the
NOvA Project**

June 19-20, 2007

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Executive Summary

The committee's overall consensus is that the NOvA project has a considerable amount of the performance management system already in place, and is only lacking a few products or further development of existing materials. The performance management system consists of the software tools, Earned Value Management System (EVMS) descriptions, project management documents, and many processes which satisfy DOE Order 413.3A, DOE Manual 413.3-1 requirements, and the ANSI/EIA 748-A-1998 objectives. The committee interviewed eight of the nine NOvA Control Account Managers (CAMs) and found that their level of knowledge varied on earned value and the Fermilab Earned Value Management System. It was also apparent that the CAMs are willing to increase their knowledge of EVMS and ready to exercise the system by practicing with monthly reporting as soon as possible. The CAMs also demonstrated ownership of their work breakdown structure (WBS) scope, schedule and budget, and had a good understanding of their roles and responsibilities. However, most CAMs lacked experience in working with a performance management system. Further training will enhance the CAMs ability to fully understand and benefit from this system. As the NOvA project begins to use the performance management system, and as experience builds among the CAMs and the management team, the committee expects that existing bugs will be worked out and that project management will benefit from a successfully executed system.

The NOvA Project Management Team has begun to work out the arrangements that will be necessary for earned value reporting for work covered under the Cooperative Agreement (CA). The CA requires a Memorandum of Understanding (MOU) between NOvA/Fermilab and University of Minnesota (U of M). The agreed upon reporting arrangements will be described in the MOU. U of M has agreed to provide monthly status reports and financial information. Also, U of M has contracted with a professional project management organization to manage the CA activities. This organization could be the contact for NOvA to partner with on CA activities and establish appropriate EVMS procedures. The willingness of U of M to cooperate with Fermilab was demonstrated with the selection of a professional project management contractor. The Committee believes this provides a strong basis for developing an agreement that will get appropriate EVMS reporting in place on the CA activities.

The issues discussed in this report include the NOvA project's current production of detailed narrative project reports, which provide significantly more information and details than required and is not appropriate for Fermilab and DOE senior management. The use of two EVMS description documents, a Fermi document and a NOvA document, could be confusing to the certification team, making the certification difficult to obtain. The committee recommends that the project not maintain the NOvA document as a system description. This information may be preserved as a project-specific reference document. The Work Authorization Document as described in the Fermi National Accelerator Laboratory (FNAL) EVMS Description document meets the intent of the ANSI standard. The NOvA project must implement a work authorization process that is

compliant with the FNAL EVMS Description. The project management team then needs training on the project's established work authorization process.

As the project moves forward with working the EVMS and evaluating the schedule, the CAMs should keep in mind how value will be earned as tasks are accomplished. There is evidence that in some areas of the schedule, the CAMs did not consider how EV would be implemented. NOvA has selected to use a limited number of available performance measurement techniques (PMTs), limiting the techniques to three: percent complete, milestone, and level of effort. The committee was informed that the most frequently cited technique by the CAMs was the percent complete method. Whenever possible PMT's should be assigned in a manner that provides for the best discrete measurement of progress.

Finally, to further the EVMS preparation for the certification review, a follow up EVMS review, similar to this review, should be conducted to assess EVMS implementation.

1.0 Introduction

A Fermilab Director's and Department of Energy Fermi Site Office's Performance Management System (PMS) Review of the NOvA Project was held on June 19-20, 2007. The charge included a list of topics and questions to be addressed as part of the review. The assessment of the Review Committee is documented in the body of this closeout report.

Each section in this closeout report is generally organized by Findings, Comments and Recommendations. Findings are statements of fact that summarize noteworthy information presented during the review. The Comments are judgment statements about the facts presented during the review and are based on reviewers' experience and expertise. The comments are to be evaluated by the project team and actions taken as deemed appropriate. Recommendations are statements of actions that should be addressed by the project team. A response to the recommendations is expected prior to the next DOE Critical Decision (CD) review for CD-2/3a approval and actions taken will be reported on during future Working Group Meetings and reviews.

Reference materials for this review are contained in the Appendices. Appendix A is NOvA's response on how they are compliant with the EVMS 32 Criteria. The Charge for this review is shown in Appendix B. The review was conducted per the agenda shown in Appendix C. The Reviewer's assignments are noted in Appendix D and E, and their contact information is listed in Appendix F. The Review Participants are listed in Appendix G. Appendix H is a table that contains all the recommendations included in the body of this report.

2.0 Management

Findings

- The NOvA project has a comprehensive work breakdown structure that includes all project work scope.
- The NOvA project does not have a clear Responsibility Assignment Matrix (RAM) that integrates the project WBS and OBS, allows for reporting by WBS or organizational element or both; or that clearly assigns management responsibility and accountability to individual WBS elements.
- The Fermilab EVMS Description discusses formal work authorization via Work Authorization Documents. Several of the CAMs were aware of this requirement, and others were not. The Project Manager did not mention this as the trigger for CAMs to begin work.
- The NOvA Project has established variance thresholds at a greater level of rigor than required by the Fermilab EVMS Description document.
- NOvA has been submitting narrative monthly reports for more than a year.
- NOvA plans to analyze variances between planned and actual schedule and cost on a monthly basis.
- NOvA plans to prepare variance analysis reports and corrective action plans for management review and action where cost and schedule variances exceed threshold values established by the project.
- NOvA project scheduling and project controls tools are capable of providing earned value and actual cost data at several WBS levels and by the OBS.
- NOvA has many venues to ensure managerial control and action including weekly and monthly management meetings and an expectation that Level 2 managers are responsible for addressing and correcting unacceptable variances.
- The NOvA project has tools, processes and guidelines in place to complete estimates to complete and calculate estimates at completion based on current, updated and new information.
- CAMs were aware of the project's Change Control thresholds.
- CAMs are aware that a change control process exists and understand its importance relative to project control.
- NOvA escalates contingency assigned to future fiscal years.

- Planned costs (BCWS) are not categorized by expenditure type i.e. labor, subcontract, materials, etc.
- The project status report is described in the FNAL and NOvA EVMS Description documents. The Fermi document describes the purpose of the report is to provide NOvA, Fermilab, and DOE management with a monthly assessment of the project. The NOvA document describes the report as a narrative summary of progress along with EVMS data and graphs. The monthly reports we reviewed provided significantly more information than required.
- The EVMS is well documented in the FNAL EVMS Description. EVMS implementation is further specified by NOvA in an additional supplemental document titled “EVMS Description for the NOvA Project.” The NOvA specific document is a large document which tailors the Fermi document to the NOvA project repeating many of the same requirements.
- NOvA has a well defined EVMS and most of the CAMs were familiar with how the EVMS is to be implemented, but lack the experience performing the EVMS processes—statusing progress, analyzing earned value data and variances, etc.

Comments

- The project should develop a comprehensive Responsibility Assignment Matrix to the level of the WBS where a single organization is performing the WBS work scope. An example of this includes the PVC Extrusions Level 2 WBS Element, which is further broken down into the Resin and Extrusion elements, each led by a Level 3 manager managing a specific vendor.
- The project should develop CAM Notebooks at the control account level. Each Notebook should contain the control account technical baseline descriptions, assumptions, detailed schedule and budget and as a package, support the work authorization process. This will provide quick reference material for the CAM to use and show reviewers during the External Independent Review (EIR) and EVMS Certification Reviews.
- The project should include selected earned value PMTs (performance measurement techniques), major risks at an appropriate level and responsible organization. These items might be included in the schedule.
- To be prepared for an EIR and possible EVMS Certification Review, NOvA needs a work authorization process that meets ANSI/EIA 748 requirements, is auditable, and is useful.
- When EVMS Reporting begins following CD-2 approval, NOvA should reduce the narrative portion of the monthly report to a summary report and add the Cost Performance Report, Variance Analyses, and high level Milestone Status Report. The report should inform the reader of progress while taking a “management by exception approach” to reporting issues and variances from the plan. The NOvA

project should redesign the current monthly status report to satisfy the report description as defined in the EVMS Description document. Per the Fermi document, the status report should contain: financial summary, status of key milestones, summary progress narrative, baseline change control log actions, management comments, EVMS data, and variance explanations.

- The two EVMS System Description documents, FNAL and NOvA, created some confusion with the reviewers. It was the general opinion of the reviewers that the more generic system description, included in the FNAL document, would function better to describe the EVMS. If NOvA believes a project specific implementation description is required, this could be provided by a brief supplemental document or procedure which offers any additional required information.
- NOvA should examine its change control process to ensure that several small changes authorized by the Level 2 managers are reviewed for cumulative and downstream impacts to overall project cost and schedule. The lead scheduler and financial officer are the natural place to cover these aspects of change control.
- NOvA's CAMs should ensure that the remaining work contains up to date estimates to complete; or that management has been made aware of impending changes and these are documented in the monthly progress report.
- As soon as possible, the project should begin exercising the EVMS process and statusing progress.
- NOvA should develop a specific procedure for universities, subcontractors and vendors to follow to report accrued costs and schedule progress. This may require a L2 or L3 manager or other NOvA representative to be integrally involved in developing the monthly accruals.
- Planned and actual costs should be categorized by expenditure type such as labor, subcontract, materials, etc.
- Due to the large dollar amounts involved with the purchase, delivery and manipulation of materials, NOvA should examine its proposed processes for recording earned value for materials received and accruing costs for same, since many of the materials will not be received at Fermilab.
- Even though a variance may not exceed the threshold values that would require a variance analysis report, a variance still may require an analysis and corrective action.

Recommendations

1. Trim down the narrative portion of the monthly report to a summary when EVMS reporting begins following CD-2 approval. Generally, redesign the project status report per the EVMS Description documents.

2. Convert the EVMS Description for the NOvA Project to a much smaller supplemental document, which provides additional information or requirements specific to the project.
3. Develop a process for recording earned value for materials not received at Fermilab.

3.0 Schedule

Findings

- CAMs, working with their technical teams and the Fermi schedulers, developed the schedules contained in their WBS elements, understand the contents, and have taken ownership.
- CAMs and their teams used best judgment and real data (time and motion studies) to develop task durations. Learning curves on task durations were applied when needed.
- CAMs believed that milestone links between subsections were sufficient to alert them of problems resulting from late handoffs.

Comments

- This Committee did not sit with the schedulers to review the schedule, but the Director's Review comments on schedule were provided. The main focus right now is to scrub the schedule and bring it into line with the budget. In some cases the planning for the collection of earned value and actual costs has not been considered.
- The WBS Dictionary resides in the notes field of the Open Plan Schedule. However, no Milestone Dictionary was provided.
- This Committee did not conduct control account traces from the resource-loaded schedule to control account plans to work authorization documents, so consistent values could not be verified.
- Basis of Estimate (BOE) information resides in the notes field of the Open Plan Schedule. It is separated from vendor or other information that was used to develop the estimates. Also, information on how the estimate was developed, e.g., engineering estimate, budgetary quote, WAG, etc. was not examined during this review, but was evaluated during the Director's CD-2/3a Review. Comprehensive and accurate cost estimation information speaks to the validity of and the risk associated with the Estimate to Complete.

Recommendations

4. As the schedule is being scrubbed, CAMs should work with the schedulers to review task durations and resource loading spreads to facilitate the accurate reporting of planned and earned value and actual costs.
5. A Milestone Dictionary should be produced that presents milestones in a tiered view together with completion criteria.
6. Project staff should run trace exercises to verify that values in all project documents, from schedule on up, are consistent.

7. CAM Notebooks should be prepared and maintained in advance of the DOE EVMS assessment. These Notebooks should include all items/documentation that a CAM may need to refer to during an assessment interview – Project Schedule; Control Account Schedule; WBS; RAM; Control Account Plans; Work Authorization Documents; BOE support; Monthly Reports, to include the Cost Performance Report, earned value metrics and performance indicators, variance analysis and corrective actions planned, Change Requests; etc.

4.0 Earned Value

Findings

- The project will utilize Deltek Cobra software, the laboratory's standard tool for integrating actual costs, schedule data and cost estimate data for earned value reporting.
- The Deltek Cobra database is the official repository for the project cost estimate.
- The database appears to be fairly well developed and the Project Financial Manager seems to have a sound understanding of the software.
- Performance Measurement Techniques (PMTs) have not been assigned. Instead the intention is to do this concurrent with the work authorization process.
- The project plans to only use three of approximately a dozen PMTs: Milestone, Percent Complete and Level of Effort. The predominant choice appears to be Percent Complete.
- Time-phasing of costs, at the activity level, appears to be linear.
- Estimates to Complete will be generated monthly using standard Deltek Cobra functionality in addition to periodic "bottoms-up" assessments.

Comments

- The tools chosen to support earned value reporting are appropriate.
- Utilizing Deltek Cobra as the official repository for the project cost estimate is appropriate since this tool provides the functionality to calculate laboratory burdens and indirects in the same manner as the laboratory enterprise system, Oracle Project Accounting. In addition, rates are easily updated when necessary and rate adjustments can be applied with an effective date.
- It is not possible to make an assessment as to whether or not Performance Measurement Technique assignments are appropriate since this will not be done until the Work Authorization process is initiated. However examination of the Earned Value Management System Description for the project, and the above findings, suggest that the methodology could be improved to allow for more objective measurements.
- Postponing the assignment of PMTs until the Work Authorization process typically occurs when Planning Packages are used.
- Many of the project activities clearly lend themselves seamlessly to the use of the Units Complete PMT.

- Whenever possible PMT's should be assigned in a manner that provides for the best discrete measurement of progress. As a result, the use of the Percent Complete PMT should be the exception rather than the rule.
- This review did not provide sufficient time to review time-phasing of costs in detail so it is not possible to make an assessment as to whether or not this has been done in a manner that will support accurate earned value reporting. The general impression of the committee is that this has been done in a linear fashion. However, if activities have been defined in sufficient detail this may not pose a problem.
- The standard Deltek Cobra functionality for generating Estimates to Complete (ETC's) is heavily reliant on the ability to make comparisons of budgeted values to actual values at the expenditure type and/or resource level. At this time the laboratory enterprise system does not fully support this and therefore the committee is concerned that generating ETC's in this manner may not yield useful and accurate forecasts.

Recommendations

8. Performance Measurement Techniques should be assigned now using the most discrete method available given the nature of the activity. In those cases where a Percent Complete PMT is assigned to a task of long duration, the methodology for making the percent complete assessment should be documented.
9. The Work Authorization process should include an evaluation of the PMT assignment and if necessary changes should be made at this time prior to initiating work on the activity.
10. In the interim; if Deltek Cobra forecasting is used, the project management team should conduct a thorough review of the results to ensure these forecasts are in fact reliable.

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5.0 Charge Questions

5.1 Is the system effectively documented?

Two system documents were presented, one for Fermilab and one specific to the NOvA project. This may be confusing to reviewers. The EVMS description should represent a system that any project at Fermi would follow. This document can be supplemented by procedures (2-3 pages in length) that may be specific to one particular project.

There are documents mentioned in the NDIA Intent Guide that reviewers will be expecting that provide objective evidence that guidelines are being covered. These are: control account plans structured as a scope/schedule/budget integrating document, work authorization documents, RAM (responsibility assignment matrix), project organization/reporting structure charts, etc.

5.2 Will the system produce timely and accurate reports in a readable and meaningful format?

The tools selected for earned value reporting will facilitate the project's ability to do this; however, since the accuracy of the reports hinges on the underlying data, the determining factor from an accuracy perspective, will depend entirely on the accuracy of the cost estimate, the time-phasing of costs, having appropriate PMT assignments and objective progress assessments.

5.3 Will the system satisfy Fermilab's and DOE's information needs?

Yes, provided the committee's recommendations are implemented. This is especially true in terms of putting into place objective Performance Measurement Techniques. The project should set aside techniques that are considered subjective (that is, use of the percent complete method, which the EVMS community largely considers to be a subjective technique) and severely limiting the use of level of effort techniques to only those which truly cannot be practically measured. Overall, the impression is that the project controls staff are knowledgeable and experienced, and when combined with the presented processes and software systems, will be quite capable of providing useful and timely reports and information.

5.4 Are the relevant personnel adequately knowledgeable about operation of the system and do they make use of the information?

No. However, the CAMs appear ready, willing and eager to make the necessary improvements, as spelled out in other portions of this report, to make the system as implemented on NOvA compliant with the ANSI EVMS Standard. In addition to these improvements, some general project management/earned value training and CAM-specific coaching could prove useful.

5.5 Has the NOvA Project addressed how Earned Value will be handled for the work covered under the Cooperative Agreement (CA) and will it give project management the information needed to monitor progress?

The NOvA Project Management Team has begun to work out the arrangements that will be necessary for earned value reporting for work covered under the Cooperative

Agreement. The CA requires an MOU between NOvA/Fermilab and U of Minnesota (U of M). The agreed upon reporting arrangements will be described in the MOU. U of M has agreed to provide monthly status reports and financial information. Also, U of M has contracted with a professional project management organization to manage the CA activities. The Committee believes this provides a strong basis for developing an agreement that will get appropriate EVMS reporting in place on the CA activities.

5.6 Does the NOvA Project meet the objectives of the ANSI/EIA-748-A-1998 EVMS Guidelines under the:

5.6.a Organization category?

The NOvA project has a well defined and comprehensive WBS.

The project does not have a well defined and comprehensive responsibility assignment matrix that ensures traceability of integrated scope, cost and schedule to a definitive organizational or WBS element.

The project has not implemented a formal work authorization process which will be a recommendation of any independent review of the project's EVMS.

5.6.b Planning, Scheduling and Budgeting category?

A lot of work has already gone into meeting the objectives of the ANSI guidelines. Revision of documents reviewed at the Director's Review and producing documents that are required in the Intent Guide will satisfy this category.

5.6.c Accounting Considerations category?

Yes

5.6.d Analysis and Management Reports category?

As spelled out elsewhere in this report, Fermilab's current status against the six criteria in the Analysis and Management Reports category require improvement in the following areas:

Monthly reporting, at an appropriate level, of:

- Planned Value
- Earned Value
- Actual Costs
- Cost Variances, with underlying supporting detailed explanations with proposed corrective action(s) tracked to closure
- Schedule Variances, with underlying supporting detailed explanations with proposed corrective action(s) tracked to closure
- Estimates at Completion

5.6.e Revisions and Data Maintenance category?

The NOvA EVMS meets the ANSI/EIA-748-A-1998 objectives for Revisions and Data Maintenance category. A clear change control system is documented in the NOvA Configuration Management Plan. Upon approval of a CR the baselines are modified to reflect the scope, cost, and schedule impacts of the change. Clear controls, policies and processes are in place to prevent retroactive changes.

5.7 Does the proposed performance management system meet current DOE Earned Value Management System (EVMS) assessment and reporting requirements?

The performance management system as described in the EVMS description documents, the project management documents, and the review presentations will be able meet the DOE EVMS assessment and reporting requirements, once the committee's observations, comments, and recommendations made in this report are properly addressed.

Appendices

Earned Value Management Systems 32 Criteria

Charge

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Reviewers' Contact Information

Participant List

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Appendix A

NOvA’s Earned Value Management Systems 32 Criteria

Fermilab Director’s/DOE FSO’s Performance Management System Review of the NOvA Project, June 19-20, 2007

Category 1: Organization

Number	Criteria Discretion	Description on how NOvA complies with the criteria
1-1	Define the authorized work elements for the program. A work breakdown structure, tailored for effective internal management control, is commonly used in this process.	<p>1) NOvA uses Deltek Open Plan™ project planning software to generate the WBS structure. The WBS is defined to appropriate levels for all subprojects, typically to between levels 5-7.</p> <p>2) PPEP Section 5 describes the WBS to Level 2</p>
1-2	Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.	<p>1) PPMP figure 3.1 describes the OBS to Level 2. The WBS and OBS from Level 1 down are very similar.</p> <p>2) The NOvA organizational structure is further defined in NOvA-doc-533, which needs to be updated for the recent changes made to the project organizational structure.</p> <p>3) The Collaborating universities are major sub-contractors in the Project. Universities or Argonne National Laboratory (ANL) are the lead institution for 8 of the 11 Level 2 projects, which are led and staffed by collaborators from those universities. The MOU and SOW process for the universities and Fermilab will specify the authorized work, the organizational structure and detail all required reporting and accounting practices required.</p>

Category 1: Organization

Number	Criteria Discretion	Description on how NOvA complies with the criteria
1-3	Provide for the integration of the company’s planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.	1) PPMP Section 9.2 describes the use of Deltek Open Plan™ and Deltek Cobra™ for integrated cost and schedule management. 2) PPMP Section 9.3 describes the work authorization process.
1-4	Identify the company organization or function responsible for controlling overhead (indirect costs).	1) The Fermilab Directorate is responsible for controlling overhead. 2) Fermilab’s CASB Disclosure Statement Part IV described Fermilab’s treatment of indirect costs. 3) Allowable indirect costs at universities will be specified and agreed to in MOU’s between the universities or ANL and Fermilab.
1-5	Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.	1) The implementation of the NOvA EVMS using the Open Plan™ and Cobra™ tools allows for performance measurement by either or both WBS and OBS. 2) PPEP Section 5 describes the WBS to Level 2. 3) The project structures in Open Plan™ and Cobra™ are based on the WBS. Using Cobra® it is possible to extract budget information based on WBS or institution or both.

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how NOvA complies with the criteria
2-1	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.	1) PPMP Section 6.2 describes methodology used to create the schedule in Open Plan™, from identifying all work to be done, to resource loading, and identifying significant task interdependencies.
2-2	Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	1) PPEP Section 7.4 Identifies the Level 1 milestones agreed upon by the DOE, Fermilab management and the NOvA Project. 2) PPMP Section 9.5 describes project performance measurement. 3) PPMP Appendix B lists the Level 1, 2 and 3 milestones for the project.

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how NOvA complies with the criteria
2-3	<p>Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost, including estimates for authorized but undefinitized work. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.</p>	<p>1) PPMP Section 9.4 describes the project baseline development.</p> <p>2) PPMP Section 6.2 describes the development of the resource-loaded schedule.</p> <p>2) The higher level “planning package” budge allocation method is not used at Fermilab. Everything is planned in detail at the outset for the duration of the project. If more effective or efficient methods of performing the work are identified before work commences, the level 2 managers will use NOvA’s formal change control process to update the baseline plan.</p> <p>3) The Project Scheduler is responsible for maintaining the detailed schedule baseline in Open Plan™, and the Project Budget Officer is responsible for maintaining the cost estimate in Cobra™.</p>

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how NOvA complies with the criteria
2-4	Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.	<p>1) PPMP Section 6 describes the technical, schedule and cost baseline development by the managers and states that the estimate consists of the cost of items and services to be purchased plus an estimate of the labor effort (time and type) for work planned by Fermilab and personnel at universities and other national laboratories.</p> <p>2) NOvA EVMS Section 3.3 describes escalation rates</p> <p>3) PPMP Section 6.4 describes the contingency calculation process. The project contingency is not part of the base cost.</p>
2-5	To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.	<p>1) The resource loaded schedule in Open Plan™ is used to describe all work in project down to lowest level. All efforts can be rolled up to any level desired. Information from Open Plan™ is imported into Cobra™.</p> <p>2) All Control Accounts are made up of one or more Work Packages.</p>
2-6	Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.	<p>1) Cobra™ generates control account budgets by rolling up the budgets of all of the work packages associated with the control account.</p> <p>2) The Cost Performance Report generated in Cobra™ provides a method to verify that the roll up of work package budgets is equal to the control account budget.</p>

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how NOvA complies with the criteria
2-7	Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impractical may be classified as level of effort.	1) Fermilab's EVMSD Section 2.1.2 describes the LOE method for performance measurement.
2-8	Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.	1) Fermilab's EVMSD Section 3.2 describes Fermilab's indirect cost planning and control. 2) Overhead is applied in Cobra™ to generate the project cost.
2-9	Identify management reserves and undistributed budget.	1) The baseline does not include a management reserve. 2) The baseline does not have any undistributed budget.
2-10	Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.	1) The CPR will provide monthly verification of budgeted costs for the life of the project.

Appendix B

Charge

Fermilab Director's/DOE FSO's Performance Management System Review of the NOvA Project June 19-20, 2007

This charge is for the Committee to conduct the Fermilab Director's/Department of Energy's Performance Management System Review of the proposed NOvA project at Fermilab. This review is to ensure that the NOvA Project will employ an Earned Value Management System that meets the objectives of ANSI/EIA-748-A-1998 32 Guidelines in accordance with DOE O 413.3A and DOE M 413.3-1. This review is to ensure that policies, procedures, systems and practices for controlling and reporting of project performance is in place no later than CD-2.

NOvA received Critical Decision CD-1 "Approved Alternative Selection & Cost Range" on May 2, 2007. A Fermilab Director's CD-2/3a Review, chaired by Ed Temple, is scheduled for June 4-6, 2007 and the Department of Energy CD-2/3a Review, chaired by Dan Lehman, is being scheduled for late summer or early fall of this year. DOE's guidance to NOvA is to not exceed a Total Project Cost (TPC) of \$260M. The purpose of the NOvA project is to fabricate the NOvA near and far detectors and to provide a detector hall for the far detector, as well as upgrade the Fermilab Recycler and Main Injector accelerators and the NuMI beamline. The ensemble will permit the experimenters to study neutrino oscillations, in particular, to search for the oscillation of muon-type neutrinos to electron-type neutrinos. If these oscillations can be observed then the experimenters may be able to determine the mass-ordering of the neutrinos and to observe Charge Parity (CP) violation in the neutrino sector. Determination of the mass-ordering is a unique contribution made possible by NOvA's very long baseline.

The focus of this review is to assess whether NOvA is compliant with the performance management system standard as defined in DOE M 413.3-1. Specifically, the committee is to address the following items during the review:

1. Is the system effectively documented?
2. Will the system produce timely and accurate reports in a readable and meaningful format?
3. Will the system satisfy Fermilab's and DOE's information needs?
4. Are the relevant personnel adequately knowledgeable about operation of the system and do they make use of the information?
5. Has the NOvA Project addressed how Earned Value will be handled for the work covered under the Cooperative Agreement (CA) and will it give project management the information needed to monitor progress?
6. Does the NOvA Project meet the objectives of the ANSI/EIA-748-A-1998 EVMS Guidelines under the:
 - a. Organization category?
 - b. Planning, Scheduling and Budgeting category?
 - c. Accounting Considerations category?
 - d. Analysis and Management Reports category?
 - e. Revisions and Data Maintenance category?

7. Does the proposed performance management system meet current DOE Earned Value Management System (EVMS) assessment and reporting requirements?

Finally, the committee should present findings, comments, and conclusions at a closeout meeting with NOvA's and Fermilab's management and provide a written report soon after the review.

Appendix C

Agenda

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

Tuesday, Jun. 19

8:00 – 8:45 AM	45	Executive Session (Racetrack, WH7X)	Dean Hoffer and Frank Gines
8:45 – 8:55 AM	10	Welcome and Introductions (Racetrack – WH7X)	Dean Hoffer and Frank Gines
8:55 – 9:25 AM	30	Project Overview	John Cooper
9:25 – 10:00 AM	35	Performance Management System Overview	
		Specifics on Schedule (20)	Bill Freeman
		Specifics on Change Control (10)	Ron Ray
		Specifics on Earned Value (50)	Suzanne Pasek
10:00 – 10:15 AM	15	BREAK	
10:15 – 11:00 AM	45	Performance Management System Overview (continued)	Bill Freeman Ron Ray Suzanne Pasek
11:00 – 11:30 AM	30	Q&A with NOvA Project Office	John Cooper, Ron Ray, Nancy Grossman, Suzanne Pasek, Bill Freeman, Harry Ferguson Ken Domann
11:30 – 12:30 PM	60	LUNCH	
		CAM Interviews	
12:30 – 1:10 PM	40	Nancy Grossman – Accelerator & NuMI Upgrades (Racetrack, WH7X)	Sub-Team 1
	40	Stuart Mufson – Scintillator (Black Hole WH2NW)	Sub-Team 2
		Teleconference – (812) 855-6917	
1:10 – 1:50 PM	40	Carl Bromberg - Fiber (Racetrack,	Sub-Team 1

		WH7X)	
	40	Rich Talaga – PVC Extrusions (Black Hole WH2NW)	Sub-Team 2
1:50 – 2:30 PM	40	Ken Heller– PVC Modules (Racetrack, WH7X)	Sub-Team 1
		Teleconference – (612) 624-7314	
	40	Leon Mualem– Electronics, Trigger and DAQ (Black Hole WH2NW)	Sub-Team 2
		Teleconference – (612) 669-9688	
2:30 – 2:45 PM	15	BREAK	
2:45 – 3:25 PM	40	Dave Ayres – Detector Assembly (Racetrack, WH7X)	Sub-Team 1
	40	John Cooper – Project Management (Black Hole WH2NW)	Sub-Team 2
3:25 – 5:30 PM		Executive Session and Report Writing (Racetrack, WH7X)	

Wednesday, Jun. 20

	(Racetrack, WH7X)
8:00 – 10:15 AM	Committee Working Sessions and Report Writing
10:15 – 10:30 AM	BREAK
10:30 – 1:30 PM	Committee Closeout Dry Run with Working LUNCH
1:30 PM	Closeout

Appendix D

Report Outline and Reviewer Writing Assignments

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

Executive Summary	<u>Frank Gines</u> Dean Hoffer
1.0 Introduction	<u>Dean Hoffer</u>
2.0 Management Organization Change Control Reporting and Analysis	<u>Bob Swale</u> Frank Gines Ed Temple
3.0 Schedule Schedule Structure (Predecessor, Successors, Constraints, Task Durations) Resource Loading and Leveling WBS and Milestone Dictionary Schedule Status	<u>Fran Clark</u> Dean Hoffer Greg Hanson
4.0 Earned Value Performance Measurement Techniques Coupling to Schedule Coupling to Laboratory Accounting System	<u>Ann Nestander</u> Greg Hanson Fran Clark
5.0 Charge Questions	
5.1 Is the system effectively documented?	<u>Fran Clark</u>
5.2 Will the system produce timely and accurate reports in a readable and meaningful format?	<u>Ann Nestander</u>
5.3 Will the system satisfy Fermilab's and DOE's information needs?	<u>Bob Swale</u>
5.4 Are the relevant personnel adequately knowledgeable about operation of the system and do they make use of the information?	<u>Greg Hanson</u>
5.5 Has the NOvA Project addressed how Earned Value will be handled for the work covered under the Cooperative Agreement (CA) and will it give project management the information needed to monitor progress?	<u>Ed Temple</u>
5.6 Does the NOvA Project meet the objectives of the ANSI/EIA-748-A-1998 EVMS Guidelines under the:	
a. Organization category?	<u>Bob Swale</u>
b. Planning, Scheduling and Budgeting category?	<u>Fran Clark</u>
c. Accounting Considerations category?	<u>Ann Nestander</u>
d. Analysis and Management Reports category?	<u>Greg Hanson</u>
e. Revisions and Data Maintenance category?	<u>Ed Temple</u>
5.7 Does the proposed performance management system meet current DOE Earned Value Management System (EVMS) assessment and reporting requirements?	<u>Frank Gines,</u> Dean Hoffer

Note underlined names are the primary writer.

Appendix E

Reviewer Assignments for Breakout Sessions

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

Location	Interview Times	CAM	Interview Sub-Team
Racetrack, WH7X	12:30 – 1:10 PM	Nancy Grossman – Accelerator & NuMI Upgrades	<u>Sub-Team 1</u> Fran Clark Greg Hanson Dean Hoffer
	1:10 – 1:50 PM	Carl Bromberg - Fiber	
	1:50 – 2:30 PM	Ken Heller– PVC Modules Teleconference – (612) 624-7314	
	2:45 – 3:25 PM	Dave Ayres – Detector Assembly	
Black Hole, WH2NW	12:30 – 1:10 PM	Stuart Mufson – Scintillator Teleconference – (812) 855-6917	<u>Sub-Team 2</u> Frank Gines Ann Nestander Bob Swale Ed Temple
	1:10 – 1:50 PM	Rich Talaga – PVC Extrusions	
	1:50 – 2:30 PM	Leon Mualem– Electronics, Trigger and DAQ Teleconference – (612) 669-9688	
	2:45 – 3:25 PM	John Cooper – Project Management	

Appendix F
Reviewers' Contact Information

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

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Appendix G

Participant List

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

Reviewers:

Fran Clark
Frank Gines
Greg Hanson
Dean Hoffer
Ann Nestander
Bob Swale
Ed Temple

Presenters:

John Cooper
Bill Freeman
Ron Ray
Suzanne Pasek

CAM Interviews:

Nancy Grossman
Stuart Mufson *
Carl Bromberg
Rich Talaga
Ken Heller *
Leon Mualem *
Dave Ayres
John Cooper (noted twice)

DOE Observers:

Pepin Carolan
Steve Webster

Other NOvA Project Office:

Ken Domann
Harry Ferguson
Alan Wehmann

Other Participants:

Alicia Filak
Susan Meduga

* Participated by conference call

Appendix H

Table of Recommendations

**Fermilab Director's/DOE FSO's Performance Management System Review of the
NOvA Project
June 19-20, 2007**

#	Recommendation	Assigned To	Status/ Action	Date
	2.0 Management			
1	Trim down the narrative portion of the monthly report to a summary when EVMS reporting begins following CD-2 approval. Generally, redesign the project status report per the EVMS Description documents.			
2	Convert the EVMS Description for the NOvA Project to a much smaller supplemental document, which provides additional information or requirements specific to the project.			
3	Develop a process for recording earned value for materials not received at Fermilab.			
	3.0 Schedule			
4	As the schedule is being scrubbed, CAMs should work with the schedulers to review task durations and resource loading spreads to facilitate the accurate reporting of planned and earned value and actual costs.			
5	A Milestone Dictionary should be produced that presents milestones in a tiered view together with completion criteria.			
6	Project staff should run trace exercises to verify that values in all project documents, from schedule on up, are consistent.			

#	Recommendation	Assigned To	Status/ Action	Date
7	CAM Notebooks should be prepared and maintained in advance of the DOE EVMS assessment. These Notebooks should include all items/documentation that a CAM may need to refer to during an assessment interview – Project Schedule; Control Account Schedule; WBS; RAM; Control Account Plans; Work Authorization Documents; BOE support; Monthly Reports, to include the Cost Performance Report, earned value metrics and performance indicators, variance analysis and corrective actions planned, Change Requests; etc.			
4.0 Earned Value				
8	Performance Measurement Techniques should be assigned now using the most discrete method available given the nature of the activity. In those cases where a Percent Complete PMT is assigned to a task of long duration, the methodology for making the percent complete assessment should be documented.			
9	The Work Authorization process should include an evaluation of the PMT assignment and if necessary changes should be made at this time prior to initiating work on the activity			
10	In the interim; if Deltek Cobra forecasting is used, the project management team should conduct a thorough review of the results to ensure these forecasts are in fact reliable.			