

First Executive Session
Director's Follow-up CD-2/3a
Review of the NOvA Project

August 20-21, 2007

L. Edward Temple, Jr.

Agenda for Exec Session

- Charge to Reviewers
- Review Agenda
- DOE O 413.3 Critical Decision Table
- Cost/Schedule Review Guidance
- Reporting Out Structure
 - Findings, Comments, and Recommendations
- Assignments
 - Technical Reviewer Assignments
 - Breakout Groupings
- Cost / Contingency Table
- Discussion

Charge

Please conduct a Director's Review of NOvA to assess the project's readiness for a DOE Lehman CD-2/3a Baseline Review. This review is a follow-up to the June 2007 Director's Review. It should be a technical, cost, schedule, management, and risk review that assesses project progress on near term recommendations from the June review. Please answer the following questions.

1. Has each L2 manager completed a Risk Assessment? Have mitigation plans been incorporated in the Cost and Schedule Plan (CSP) and / or have appropriate contingencies been identified?
2. Has the NOvA project adequately addressed the 16 lines of inquiry (LOI) items?
3. Have the Bases of Estimate (BOEs) been generated and completed? Do they match the Resource Loaded Schedule (RLS)?
4. Has the schedule been adequately developed and is it ready to be baselined?
5. Is there a one page high-level schedule that depicts the critical path?
6. Does the obligation roll-up match the funding profile guidance? Is the cost profile from the baseline schedule consistent with the incurrence of actual costs in order to facilitate earned value management?
7. How is NOvA doing at addressing recommendations from the Director's CD-2/3a Review that are needed for Baseline Development?
8. How is NOvA doing at addressing the recommendations from the Fermi Director's/DOE Fermi Site Office's Performance Management System (PMS) Review needed for Baseline Development?

Please share your assessment with NOvA and Fermilab's management in a closeout briefing and submit a report to the Directorate soon after the review.

Agenda

Tuesday, August 21				
Start	End	Time	Subject	Presenter
8:30 AM	9:00 AM	0:30	Executive Session (Comitium, WH2SE)	Ed Temple
9:00 AM	9:10 AM	0:10	Welcome and Laboratory Overview	Hugh Montgomery
9:10 AM	10:10 AM	1:00	PM Presentation on Post CD-2/3a NOvA Actions - QA checks on 18 Ktons - Cost Reduction Efforts - Overview of Proposed Baseline - Status Recommendations from June 07 Director's Review	John Cooper
10:10 AM	10:25 AM	0:15	BREAK	
10:25 AM	11:10 AM	0:45	1) Scheduler's Presentation on Post CD-2/3a NOvA Actions - What scope changes were made? - What was done in the schedule? - Mechanical Clean-up of the schedule 2) Actions on PMS Review Recommendations	Bill Freeman
11:10 AM	12:00 PM	0:50	BREAKOUT SESSIONS	
			1) Accelerator NuMI Upgrades WBS1.0/ 2.0 (Hornet's Nest - WH8XO)	Elaine McCluskey*
			2) Farsite Building WBS 1.1/ 2.1 (ConFESSional - WH5E)	Steve Dixon*
			3) Scintillator/Fiber/PVC Extrusions WBS 1.2/2.2/1.3/2.3/1.4/2.4 (Snake Pit - WH2NE)	Rich Talaga*
			4) PVC Modules WBS 1.5/2.5(Racetrack - WH7XO)	Ken Heller*
			5) Front-end Electronics and DAQ WBS 1.6/2.6/1.7/2.7 (The Req Room - WH4NW)	Leon Mualem*
			6) Far Detector Assembly, Near Detector Assembly WBS 1.8/2.8/2.9 (Theory, WH3NW)	Dave Ayres*
			* Notes Breakout Session Lead	

Agenda (continued)

Tuesday, August 21 (continued)				
Start	End	Time	Subject	Presenter
12:00 PM	1:00 PM	1:00	LUNCH	
1:00 PM	2:45 PM	1:45	BREAKOUT SESSIONS 1-6 CONTINUE PLUS 7) Project Management, Cost and Schedule WBS 1.9/2.10 (Comitium, WH2SE)	John Cooper*
2:45 PM	3:00 PM	0:15	BREAK	
3:00 PM	5:00 PM	2:00	Executive Session	
Wednesday, August 22				
8:30 AM	9:45 AM	1:15	Subcommittee Working sessions and Report Writing (Comitium, WH2SE)	
9:45 AM	10:00 AM	0:15	BREAK	
10:00 AM	2:00 PM	4:00	Closeout Dry Run with working lunch (Comitium, WH2SE) Breaks taken as necessary.	
2:00 PM	3:00 PM	1:00	Closeout (, WH)	
* Notes Breakout Session Lead				

DOE O 413.3 Critical Decision Table

DOE O 413.3A (Updated 10/30/06)

Preconceptual Planning	Conceptual Design	Preliminary Design	Final Design	Construction	Operations
◇	◇	◇	◇	◇	◇
CD-0	CD-1	CD-2	CD-3	CD-4	
Approve Mission Need	Approve Alternative Selection & Cost Range	Approve Performance Baseline	Approve Start of Construction	Approve Start of Operations or Project Completion	
Actions Authorized by Critical Decision (CD) Approval					
<ul style="list-style-type: none"> Proceed with Conceptual Design Request PED funding Start monthly PARS & Quarterly Project Performance reporting 	<ul style="list-style-type: none"> Allow Expenditure of PED Funds for preliminary design Approval of long-lead procurement if necessary 	<ul style="list-style-type: none"> Establish Performance Baseline Continue design Request construction funding 	<ul style="list-style-type: none"> Approve expenditure of funds for construction 	<ul style="list-style-type: none"> Allow start of operations or project completion 	
Non-Nuclear Facilities--Prerequisite Activities for CDs					
<ul style="list-style-type: none"> Review of Mission Need Statement (MSN) by Office of Program Analysis & Evaluation (CF-20) for \$100M or greater. Perform Mission Need Independent Project Review (IPR) for Major System (MS) projects (>=\$750K) Perform Pre-conceptual Planning Evaluate Information Technology (IT) projects with Departmental Enterprise Architecture framework 	<ul style="list-style-type: none"> Review of Acquisition Strategy (AS) (OECM review for MS project) Review of Conceptual Design <ul style="list-style-type: none"> Requirements Analysis Risk Analysis Alternative Analysis Value Management determination Assess Requirements Analysis, Risk Analysis, Alternative Analysis, & Value Management. Appoint FPD Establish & charter Integrated Project Team Ensure compliance with One-for-One Replacement requirement for building square footage Ensure Integrated Safety Management Implementation Ensure consideration for High Performance Sustainable Building Assess if QA Program is acceptable 	<ul style="list-style-type: none"> Perform Baseline External Independent Review (EIR) & validation by OECM for \$100M or greater. Perform Independent Cost Review or Independent Cost Estimates for MS project as part of EIR Program IPR for \$20M to less than \$100M Review of Preliminary Design Establish compliant project EVMS for \$20M or more, & OECM certifiable EVMS for project TPC with \$50M or more Conduct Value Engineering (as applicable) Incorporate High Performance Sustainable Building provisions into design Determine if QA Program is acceptable 	<ul style="list-style-type: none"> Perform Executability EIR by OECM for MS projects Perform IPR for Non-MS projects by Program (SC) 	<ul style="list-style-type: none"> Verify Key Performance Parameter or Completion Criteria achieved Perform Readiness Assessment or Operational Readiness Review Revise environmental management system. <p>Post CD-4 Closeout</p> <ul style="list-style-type: none"> Perform Final Administrative & Financial Closeout Conduct Post Implementation Review for IT projects 	
Hazard Category 1, 2, and 3 Nuclear Facilities--Additional Prerequisite Activities/Documents for CDs					
	<ul style="list-style-type: none"> Perform Technical IPR Prepare Conceptual Safety Design Report (SDR) Prepare a Preliminary Safety Validation Report (PSVR) 	<ul style="list-style-type: none"> Prepare Preliminary SDR Prepare a PSVR based on updated design 	<ul style="list-style-type: none"> Prepare Prelim Documented Safety Analysis Report (SAR) Prepare SER 	<ul style="list-style-type: none"> Prepare Documented SAR with Technical Safety Requirements Prepare SER 	
Prerequisite Documents					
<ul style="list-style-type: none"> MNS Tailoring Strategy 	<ul style="list-style-type: none"> Acquisition Strategy Conceptual Design Report Risk Management Plan Risk Assessment Preliminary PEP Preliminary Hazard Analysis (HA) Preliminary Security Vulnerability Assessment Report (SVAR) Initial Cyber Security Plan for IT projects 	<ul style="list-style-type: none"> Performance Baseline Preliminary Design Updated Risk Assessment Updated PEP Updated HA (Approved at Field Level) Updated Preliminary SVAR NEPA Documentation Updated Initial Cyber Security Plan for IT projects 	<ul style="list-style-type: none"> Final Design Updated CD-2 documents Updated QA Program An Approved Construction Project Safety & Health Plan Updated Cyber Security Plan for IT projects 	<ul style="list-style-type: none"> Checkout, Testing & Commissioning Plan Project Transition/ Closeout Plan Transition-to-Operations Plan Finalized QA Plan, SVAR, HA Report, Construction Project Safety & Health Plan, Finalized Cyber Security Plan for IT projects & completed Certification & Accreditation, as required 	
<ul style="list-style-type: none"> AS-Acquisition Strategy EIR-External Independent Review EVMS-Earned Value Mgmt. System HA-Hazard Analysis IPR-Internal Project Review 	<ul style="list-style-type: none"> MSN-Mission Need Statement MS-Major Systems OECM-Office of Engr. & Const. Mgmt. QA-Quality Assurance PSVR-Prelim. Safety Validation Report 	<ul style="list-style-type: none"> SAR-Safety Analysis Report SDR-Safety Design Report SER-Safety Evaluation Report SVAR-Security Vulnerability Assess. Report TPC-Total Project Cost 		<ul style="list-style-type: none"> Post CD-4 Closeout Final Project Closeout Report Lessons Learned Report Required Operational Documentation 	
Budget Related Documents					
<ul style="list-style-type: none"> After CD-0 approval, Exhibit 300 for Projects >=\$20M: Annual submission initiated during the federal budget cycle when funds are requested. Project Data Sheets: Annual submission initiated during the federal budget cycle when TEC funds are requested. 					

21-Aug-07

Director's CD-2/3a Follow-up
Review of the NOvA Project

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Cost/Schedule Review Guidance

These are CD-2 Requirements.

The cost/schedule reviews are key elements of the CD-2 Performance (Technical, Cost, Schedule) Baseline Reviews.

- 1) This Director's Review*
- 2) Lehman DOE Review*
- 3) EIR – External Independent Review?*

21-Aug-07

Project Technical, Cost, and Schedule Baseline Development

To Succeed in Cost / Schedule Arena

Estimate must be

Complete

Scope well understood and defined

Technical goal must be clear

Technology to be used to meet this goal known

Designate how technical systems will be acquired

I.e. buy, have fabricated, self fabricated

Buy parts / fabricate / assemble

How will this be accomplished

Self fabricate / assemble – lab or university(ies)

How will person power requirements be met

And paid for

All tasks defined and specified in a work breakdown structure

WBS dictionary

Documented at lowest level of WBS and include

M&S – materials and services

SWF – salaries, wages, & fringes

Accompanied by schedule showing appropriate durations

Adders – overheads / G&A (general & administrative)

Escalated – shown both with and without escalation with funding

profile based on laboratory/DOE/Federal

budget/appropriation guidance

Director's CD-2/3a Follow-up
Review of the NOvA Project

Cost/Schedule Review Guidance

(Continued)

Reviewable

Estimate must “roll-up” from the lowest level to the total and reviewers must be able to drill down from the top to the lowest level

Credible

Basis of estimate must be specified

Catalog prices

Similar work, where cost is documented

Engineering estimates

WAG – wild ass guess

This material forms basis for DOE approving a baseline, for Fermilab/Collaboration Project Management to measure performance and take appropriate corrective actions during execution and for Laboratory Management and DOE to monitor progress.

Cost/Schedule Review Guidance

(Continued)

Baseline Reviews

When preparing a baseline, it can be helpful to be aware of and prepared for the types of things a Director's Technical/Cost/Schedule/Management Review Committee or a DOE Baseline Review Committee will be looking for. The following provides some insight into such reviews. Review Committees are frequently broken up into subgroups which are then assigned to look at specific systems or subprojects within a project.

To be available for reviewers one week prior to the review

- Conceptual &/or Technical Design Reports

- Design Review materials (web address was provided)

 - Materials presented at most recent design review for system

- Detailed schedule for system (to be looked at during breakout sessions)

- Cost Estimate Details for system (will be provided at low levels of the WBS)

 - Including WBS Dictionary and BOE – Basis of Estimate detail sheets

 - (BOE notebooks will be available in breakout rooms)

Tabbed hardcopies of review materials and presentations to be available at the review.
Enough for committee, observers, and a half dozen extras

Cost/Schedule Review Guidance

(Continued)

Technical / Cost / Schedule / Management Review Guidelines (things reviewers are asked to do)

Technical

Examine Design Review Materials (including TDRs & CDRs) for your system

Assess level at which **scope is understood and defined**

Assess level that **technical aspects of the system are understood, planned, designed, procured/fabricated and/or prototyped**

Cost

Choose >~5 top level WBS elements from your system

Drill down to successively lower levels of the WBS; while at each step

Understanding the **scope** of that element

Understanding the **schedule** for that element

Understanding the **basis of estimate (BOE)** for **both M&S and effort** for that element

Choose a few elements next lowest level of the WBS

And repeat this procedure until you get to the bottom level.

I.e., the lowest level of the WBS

Choose >~5 items in the system for which you have personal experience

Interact with the responsible managers to **determine if**

The Estimate is complete, documented, reviewable, and credible

Cost/Schedule Review Guidance

(Continued)

Check that there is a **detailed BOE for all work elements** in your system

Check whether the **estimate for your system “rolls-up”** from the lowest level WBS element to the total for your system

Does each level of the WBS contain all costs from lower level WBS elements

Assess the **“bottoms up” contingency that the WBS level 3 managers would assign** their components.

Assess the **“top down” contingency analysis assignments by the Project Manager**

Schedule

Is there a detailed schedule, including a critical path, for completing the project? Are milestones appropriate in number and type identified so that the project teams, Fermilab management, and DOE can effectively track and manage progress? Based on past experience, can the proposed schedules be met? Are appropriate schedule contingencies provided? Is there a “resource loaded schedule” and plan for providing the needed resources (M&S and technical support staff and physicists)?

Cost/Schedule Review Guidance

(Continued)

Funding

Have techniques such as forward funding by collaborators and phased funding of large contracts been appropriately incorporated into the planning? Does the anticipated funding profile support the resource requirements?

Management

Is an **appropriate / adequate project organizational structure** in place and **staffed** (or are plans in place) to do the job.

Has the **appropriate project management documentation** been prepared. Is it of a quality adequate for this stage of the project? Are **appropriate / adequate management systems** (Cost and Schedule Control System / Earned Value Reporting, Critical Path Management, Risk Management, etc.) in place or planned for use during project execution?

One-on-One Drilldowns

Slide 1 (+however many it takes)

How many lines are there in your part of the schedule (# of R&D, # of Construction)

What number of those lines have you checked?

Have you checked the predecessor links for your tasks? Do you have any tasks without predecessors? Why? (defend)

Do you have any tasks without successors? Why? (defend)

Do you have any tasks with Target Dates as start dates? Why? (defend)

Do you have any leads or lags in your part of the schedule? Why? Are they documented? Where?

Do you have any tasks in your part of the schedule with durations longer than 6 months? Why? (defend why you can't break them down into shorter tasks)

How many Milestones of each level are in their WBS? How are they distributed in time? (Plot) Are they defined in a dictionary? Show examples.

One-on-One Drilldowns (continued)

Slide 2

Show us the list of Design Review tasks in your part of the schedule

What Design Reviews have you done so far? These could be “30% level TDR reviews” How were they documented? e.g. show us a list of docdb notes

Slide 3

Does every line of your part of the schedule have a BOE?

If not, how many are left to do and when will they be done?

What level(s) of the WBS are the BOEs? Why?

Slide 4+

Show us the list of BOEs - WBS#, docdb #, Title of BOE

Slide 5+

Show us the full text of your largest cost BOE

One-on-One Drilldowns (continued)

Slide 6+

Show us the full text of another BOE (and we will drill down on some others later in the meeting)

Slide 7+

Have you documented all your risks at Level 3? Show us the list of risks (Name of risk, ordered by severity: high, medium, low)

Show us the list of risks (Name of risk, ordered by severity: high, medium, low) What mitigation plans came out of the risk analysis (any changes to cost and schedule)?

Slide 8+

Show us the full text on all high risks, one per slide

Slide 9

Has your chapter in the TDR been revised to match the new # kt & other cost savings measures?

What other revisions to your TDR chapter are required?

When will your part of the TDR be completed?

One-on-One Drilldowns (continued)

Slide 10

Have you defined the Performance Management Technique for each of the R&D tasks in your schedule? Describe the types used and why they were chosen.

Have you statused the schedule for May and June?

Is there a variance analysis from that status operation? What does it say?

Slide 11

Have you defined the Performance Management Techniques for the Construction Schedule? Describe the types used and why they were chosen.

Show us an example of a “unit” PMT. Discuss the unit.

How many “% complete” PMTs do you have? Defend them, since you know from the EVMS review that this method is disfavored

How many “Level of Effort” (LOE) PMTs do you have? Defend them, since you know from the EVMS that this method is disfavored.

One-on-One Drilldowns (continued)

Slide 12

List the recommendations from the Director's CD-2/3a Review of June 4 for your part of the schedule and comment on the status of addressing each such recommendation.

Slide 13

Do you have draft MOUs for each institution involved in your part of the construction schedule?

Show the list of MOUs needed and those with existing drafts.

Extra Question:

What is the projects critical and near critical path tasks for your branch of the WBS? If you don't have any activities on the baseline critical path, how much float does your branch before it could be on the project's critical path?

How was the duration for the tasks developed? What methodology was used?

Is there any contingency built into the schedule? If yes, explain what and why?

Reviewer Assignments

Executive Summary	<u>Ed Temple</u>
1.0 Introduction	<u>Dean Hoffer</u>
2.0 Accelerator NuMI Upgrades (WBS 1.0/ 2.0)	<u>Alireza Nassiri</u> John Maclean
3.0 Farsite Building (WBS 1.1/2.1)	<u>Karen Hellman</u> Jeff Sims
4.0 Scintillator/Fiber/PVC Extrusions (WBS 1.2/2.2/1.3/2.3/1.4/2.4)	<u>Linda Stutte</u> Joe Ingraffia
5.0 PVC Modules (WBS 1.5/2.5)	<u>Alan Bross</u> Heidi Schellman
6.0 Front-end Electronics and DAQ (WBS 1.6/2.6/1.7/2.7)	<u>Jonathan Lewis</u> Eric Gottschalk
7.0 Far Detector Assembly, Near Detector Assembly and Project Management (WBS 1.8/2.8/2.9)	<u>Charlie Cooper</u> Jerry Leibfritz
8.0 Cost ,Schedule including EV setup	<u>Bill Boroski</u> Fran Clark Dean Hoffer
9.0 Project Management (WBS 1.9 & 2.10)	<u>Mike Lindgren</u> Ed Temple

- Note underlined names are the primary writer.

Reviewer Assignments (continued)

10.0 Charge Questions	
10.1 Has each L2 manager completed a Risk Assessment? Have mitigation plans been incorporated in the Cost and Schedule Plan (CSP) and / or have appropriate contingencies been identified?	<u>Bill Boroski</u> and All
10.2 Has the NOvA project adequately addressed the 16 lines of inquiry (LOI) items?	<u>Mike Lindgren</u>
10.3 Have the Bases of Estimate (BOEs) been generated and completed? Do they match the Resource Loaded Schedule (RLS)?	<u>Bill Boroski</u> and All
10.4 Has the schedule been adequately developed and is it ready to be baselined?	<u>Bill Boroski</u> and All
10.5 Is there a one page high-level schedule that depicts the critical path?	<u>Mike Lindgren</u>
10.6 Does the obligation roll-up match the funding profile guidance? Is the cost profile from the baseline schedule consistent with the incurrence of actual costs in order to facilitate earned value management?	<u>Mike Lindgren</u>
10.7 How is NOvA doing at addressing recommendations from the Director's CD-2/3a Review that are needed for Baseline Development?	<u>Ed Temple</u> and All
10.8 How is NOvA doing at addressing the recommendations from the Fermi Director's/DOE Fermi Site Office's Performance Management System (PMS) Review needed for Baseline Development?	<u>Dean Hoffer</u> and All

- Note underlined names are the primary writer.

Reviewer Assignments for Breakouts

1) Accelerator NuMI Upgrades WBS1.0/ 2.0 (Hornet's Nest - WH8XO)	Ali Nassiri, John Maclean, Ed Temple*
2) Farsite Building WBS 1.1/ 2.1 (ConFESSional - WH5E)	Karen Hellman, Jeff Sims
3) Scintillator/Fiber/PVC Extrusions WBS 1.2/2.2/1.3/2.3/1.4/2.4 (Snake Pit - WH2NE)	Joe Ingraffia, Linda Stutte, Bill Boroski*
4) PVC Modules WBS 1.5/2.5(Racetrack - WH7XO)	Alan Bross, Heidi Schellman, Fran Clark*
5) Front-end Electronics and DAQ WBS 1.6/2.6/1.7/2.7 (The Req Room - WH4NW)	Eric Gottschalk, Jonathan Lewis, Dean Hoffer*
6) Far Detector Assembly, Near Detector Assembly WBS 1.8/2.8/2.9 (Theory, WH3NW)	Charlie Cooper, Jerry Leibfritz, Mike Lindgren*
7) Project Management, Cost and Schedule WBS 1.9/2.10 (Comitium, WH2SE)	Bill Boroski, Fran Clark, Mike Lindgren, Dean Hoffer, Ed Temple

* Attend Morning Session Only

Reporting Structure

- Review findings, comments, and recommendations should be presented in writing at a closeout with the Collaboration and Fermilab management.
- Section for each “Level 2” WBS plus Cost, Schedule, Management sections.

Findings, Comments, and Recommendations

- Findings
 - Findings are statements of fact that summarize noteworthy information presented during the review.
- Comments
 - Comments are judgment statements about the facts presented during the review. The reviewers' comments are based on their experiences and expertise.
 - The comments are to be evaluated by the project team and actions taken as deemed appropriate.
- Recommendations
 - Recommendations are statements of actions that should be addressed by the project team.
 - A response to the recommendation is expected and that the actions taken would be reported on during future reviews.

Examples of Findings, Comments, and Recommendations

[NOvA CD-1 Director's Review @ Fermilab]

Findings

- Adhesive choice has an impact on work schedule and ventilation system design. The baseline adhesive was listed as 3M2216 and was said to have a safety factor of 5 for buckling. However a Devcon adhesive was discussed a great deal also. The Devcon adhesive has a sheer strength which was approximately 150% better but it contained a toxic solvent which the 3M2216 did not.
- An adhesive dispenser will be used to apply the adhesive to attach the modules together and to attach the blocks together. The adhesive dispenser can't be defined until the adhesive is chosen.

Examples of Findings, Comments, and Recommendations (continued)

[NOvA CD-1 Director's Review @ Fermilab]

Comment

- Adhesive needs to be determined as quickly as possible to meet timelines. If the 3M2216 meets the design SF of 5 for buckling and over a SF of 4 for shear stress between the planes it seems like it should be used over the Devcon adhesive which has toxic solvent vapors. Adhesive choice will affect assembly and the building (exhaust required) requirements.

Recommendation

1. Determine which adhesive to use as soon as possible. This affects building design and assembly time.

Project's Cost & Contingency Estimate

		NOvA 's Cost Estimate AY \$M										
WBS	Items	Estimated Cost (with indirects)			Contingency Estimate			Contingency %			Total	
		M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total	Cost	
TEC	2.0	Accelerator & NuMI Upgrades			\$ -			\$ -	0%	0%	0%	\$ -
	2.1	Far Detector Site and Building			\$ -			\$ -	0%	0%	0%	\$ -
	2.2	Liquid Scintillator			\$ -			\$ -	0%	0%	0%	\$ -
	2.3	Wave-Length-Shifting Fiber			\$ -			\$ -	0%	0%	0%	\$ -
	2.4	PVC Extrusions			\$ -			\$ -	0%	0%	0%	\$ -
	2.5	PVC Modules			\$ -			\$ -	0%	0%	0%	\$ -
	2.6	Electronics Production			\$ -			\$ -	0%	0%	0%	\$ -
	2.7	Data Acquisition System			\$ -			\$ -	0%	0%	0%	\$ -
	2.8	Near Detector Assembly			\$ -			\$ -	0%	0%	0%	\$ -
	2.9	Far Detector Assembly			\$ -			\$ -	0%	0%	0%	\$ -
	2.10	Project Management			\$ -			\$ -	0%	0%	0%	\$ -
	Subtotal Construction	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ -	
OPC		R&D - Accelerator			\$ -			\$ -	0%	0%	0%	\$ -
		R&D - Detector			\$ -			\$ -	0%	0%	0%	\$ -
		Cooperative Agreement			\$ -			\$ -	0%	0%	0%	\$ -
		Operating			\$ -			\$ -	0%	0%	0%	\$ -
		Total OPC:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ -
	TPC:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ -	
Notes:												
¹ Labor costs presented here include all project labor from Fermilab, other DOE facilities and Universities.												

Project's Cost & Contingency Estimate

WBS	Items	NOvA 's Cost Estimate AY \$M										
		Estimated Cost (with indirects)			Contingency Estimate			Contingency %			Total	
		M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total	Cost	
TEC	2.0	Accelerator & NuMI Upgrades	\$ 10.6	\$ 21.1	\$ 31.7	\$ 3.6	\$ 5.2	\$ 8.8	34%	25%	28%	\$ 40.5
	2.1	Far Detector Site and Building	\$ -	\$ 2.2	\$ 2.2	\$ -	\$ 0.3	\$ 0.3	0%	14%	14%	\$ 2.5
	2.2	Liquid Scintillator	\$ 19.4	\$ 0.3	\$ 19.7	\$ 5.3	\$ 0.2	\$ 5.5	27%	59%	28%	\$ 25.2
	2.3	Wave-Length-Shifting Fiber	\$ 9.0	\$ 0.9	\$ 9.9	\$ 2.5	\$ 0.1	\$ 2.6	28%	10%	26%	\$ 12.5
	2.4	PVC Extrusions	\$ 24.6	\$ 1.8	\$ 26.4	\$ 6.7	\$ 0.4	\$ 7.2	27%	24%	27%	\$ 33.6
	2.5	PVC Modules	\$ 6.2	\$ 3.8	\$ 10.0	\$ 1.5	\$ 1.1	\$ 2.6	24%	29%	26%	\$ 12.6
	2.6	Electronics Production	\$ 11.7	\$ 0.9	\$ 12.6	\$ 4.0	\$ 0.4	\$ 4.4	34%	42%	34%	\$ 17.0
	2.7	Data Acquisition System	\$ 1.8	\$ 1.8	\$ 3.6	\$ 0.5	\$ 0.5	\$ 1.0	27%	29%	28%	\$ 4.6
	2.8	Near Detector Assembly	\$ 3.7	\$ 0.5	\$ 4.2	\$ 3.4	\$ 0.3	\$ 3.8	94%	58%	90%	\$ 7.9
	2.9	Far Detector Assembly	\$ 5.5	\$ 5.6	\$ 11.1	\$ 3.3	\$ 4.7	\$ 8.0	60%	84%	72%	\$ 19.1
	2.10	Project Management	\$ 0.5	\$ 5.4	\$ 5.9	\$ 0.1	\$ -	\$ 0.1	25%	0%	2%	\$ 6.1
	Subtotal Construction	\$ 93.1	\$ 44.4	\$ 137.4	\$ 31.0	\$ 13.2	\$ 44.2	33%	30%	32%	\$ 181.6	
OP C	R&D - Accelerator	\$ 1.4	\$ 6.7	\$ 8.1	\$ 0.4	\$ 2.3	\$ 2.7	28%	34%	33%	\$ 10.8	
	R&D - Detector	\$ 4.4	\$ 5.1	\$ 9.5	\$ 0.6	\$ 0.2	\$ 0.8	14%	4%	8%	\$ 10.3	
	Cooperative Agreement	\$ 44.7	\$ -	\$ 44.7	\$ 9.8	\$ -	\$ 9.8	22%	0%	22%	\$ 54.5	
	Operating	\$ 0.2	\$ 1.1	\$ 1.2	\$ 0.1	\$ 0.5	\$ 0.5	34%	42%	41%	\$ 1.7	
	Total OPC:	\$ 50.7	\$ 12.8	\$ 63.5	\$ 10.8	\$ 2.9	\$ 13.8	21%	23%	22%	\$ 77.3	
	TPC:	\$ 143.8	\$ 57.2	\$ 201.0	\$ 41.8	\$ 16.2	\$ 58.0	29%	28%	29%	\$ 258.9	
Notes:												
¹ Labor costs presented here include all project labor from Fermilab, other DOE facilities and Universities.												

Reviewer Write-ups

- Write-up template is posted on Director's Review Webpage.

http://www.fnal.gov/directorate/OPMO/Projects/NOvA/DirRev/2007/08_21/CloseoutPresentationsNOvA08-22-07template.doc

- Write-ups are to be sent to Terry Erickson at terickson@fnal.gov prior to 9:30 AM on Wednesday, August 22 for the Closeout Dry Run
- A final report will be issued within 2 weeks after the closeout.

Discussion

- Questions and Answers