



EVMS Update and Refresher Training

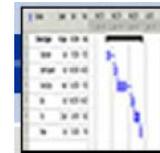
October 2009



Office of Project Management and Oversight



Training Purpose



- This training is provided as part of the Fermilab Office of Project Management Oversight EVMS training series.
 - Annual updating of users on changes to the FRA EVM system, as well as refresher of basic concepts
 - Given in person to NOvA Project CAMs and project office staff this year, but will be online in the future
 - Non-NOvA EVMS-trained staff will take it online this year
 - Will be recorded in Fermilab TRAIN database and become part of your training record
- This training will include
 - Changes to the FRA EVMS are due to response to DOE certification review CARs and CIOs, as well as other improvements initiated internally
 - Review of basics of FRA EVMS



FRA EVMS Changes

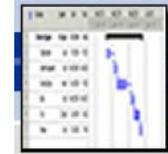
Outline of Changes to FRA EVMS



Changes are due to EVMS Certification Review Corrective Action Requests (CAR) and Continuous Improvement Opportunities (CIO), as well as internally identified gaps

- Changes due to Corrective Actions
 - Provision for performance management on collaborator uncosted labor (CAR1) - **changed in System Description**
 - Revised variance thresholds for doing variance analysis and reporting in hours as well as dollars – **changed in procedure 12.PM-006**
 - Provision for undistributed budget (CAR2) – **changed in System Description**
- Changes due to CIOs
 - Revised Work Authorization form to include a revision date and a table to track change requests (CIO1) – **changed in procedures 12.PM-002 and 12.PM-003**
 - Revised definitions for contingency and management reserve (CIO3) to eliminate “slash term.” - **changed in procedure 12.PM-007 and System Description**
 - Management reserve is budget for known risks and Contingency is budget for unknown risks
 - Revised variance thresholds (CIO5) to have different levels for current and cumulative periods. – **changed in procedure 12.PM-006**
- FRA identified gap: Provision for use of authorized, unpriced work for changes – **changed in procedure 12.PM-007**

Uncosted Scientific Labor - CAR1



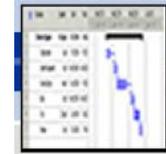
- From CAR1:
 - “Since scientists’ hours are budgeted, schedule variances for this work could be determined using hours rather than dollars. However, the team did not find that this is currently being done. The EVMS standard allows cost and schedule performance to be measured using either dollars or hours. Therefore, **planned, earned, and actual hours could be used for determining schedule and cost variances**. Because FRA does not capture actual hours worked by its scientists, this is not possible.”
- To respond to CAR1, uncosted scientific labor (scientists, post-docs, grad students) is to be tracked using hours instead of dollars.
 - Reports are generated showing these hours
 - Variance analysis is performed on hours for this effort
 - **Variance thresholds have been developed for variance analysis by hours**

CAR1 response – Tracking & Reporting Uncosted Labor



- Fermilab uncosted scientific labor is reported to a project number (and chargeable task codes) specifically for this effort, using the FTL system.
 - Chargeable task codes (CTC) correspond directly to the normal CTCs within a control account .
 - Example: scientist charges to 425P/1.0.1.1, while engineer charges to 425/1.0.1.1
 - Actual hours are extracted from the Fermilab accounting system directly to Cobra.
- Collaborator uncosted scientific labor is collected on Excel spreadsheets and sent back to the project office
 - Project financial officer uploads this to Cobra directly
- Cobra combines collaborator and Fermilab scientific effort in reports.

CAR1 Response – Tracking & Reporting Uncosted Labor



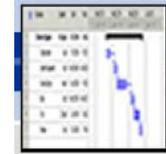
- CPR1 and CPR5 reports are generated just like \$ EVMS reporting. This indeed doubles the amount of reports total.
- CPR1 hours example:

Program:NOVA-HRS

Report:NOVA-HRS F

CONTRACT PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													
1. CONTRACTOR			2. CONTRACT			PROGRAM			4. REPORT PERIOD				
a. NAME Fermi National Accelerator Laboratory			a. NAME			NAME NOvA Project			FROM 01-Aug-2009 TO 31-Aug-2009				
8. PERFORMANCE DATA													
Control Acct[21] Chargeable Task Code Results... ITEM (1)	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED	ESTIMATED	VARIANCE
	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	(14)	(15)	(16)
1.0.1 RR Upgrades													
1.0.1.1 ANU RR Upgrades R&D HOURS	5	9	180	4	(171)	805	382	563	(423)	(181)	1,292	1,501	(209)
1.0.1.2 ANU RR Upgrades Op HOURS	42	81	42	39	39	516	393	435	(123)	(42)	1,232	1,349	(117)
Control Acct[21]Totals:	47	90	222	43	(132)	1,321	775	998	(546)	(223)	2,524	2,850	(326)
1.0.2 MI Upgrades													
1.0.2.1 ANU MI Upgrades R&D HOURS	8	0	0	(8)	0	79	40	40	(38)	0	464	477	(13)
1.0.2.2 ANU MI Upgrades Op HOURS	17	0	17	(17)	(17)	79	52	69	(28)	(17)	172	223	(51)
Control Acct[21]Totals:	25	0	17	(25)	(17)	158	92	109	(66)	(17)	636	700	(64)
1.0.3 NUMI Upgrades													
1.0.3.1 ANU NUMI Upgrades R&D HOURS	22	60	128	38	(68)	1,034	626	754	(408)	(128)	1,917	1,977	(60)
1.0.3.2 ANU NUMI Upgrades Op HOURS	0	0	0	0	0	528	528	528	0	0	934	934	0
Control Acct[21]Totals:	22	60	128	38	(68)	1,562	1,154	1,282	(408)	(128)	2,851	2,911	(60)

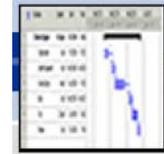
CAR1 Response – Tracking & Reporting Uncosted Labor



- CPR5 hours example:

CLASSIFICATION (When Filled In)									
CONTRACT PERFORMANCE REPORT								FORM APPROVED	
FORMAT 5 - EXPLANATIONS AND PROBLEM ANALYSES								OMB No. 0704-0188	
1. CONTRACTOR		2. CONTRACT			3. PROGRAM			4. REPORT PERIOD	
a. NAME Fermi National Accelerator Labora		a. NAME			a. NAME NOvA project for testing scientific hours EVMS			a. FROM (YYYYMMDD) 2009/08/01	
b. LOCATION (Address and ZIP Batavia, Illinois		b. NUMBER			b. PHASE			b. TO (YYYYMMDD) 2009/08/31	
		c. TYPE	d. SHARE RATIO		c. EVMS ACCEPTANCE (YYYYMMDD) NO X YES				
2.0.4 Project Management - ANU - Construction									
	BCWS	BCWP	ACWP	SV in \$	SV in %	CV in \$	CV %	SPI	CPI
Current:	387	387	405	0	0%	-18	-5%	1.00	0.96
Cumulative:	3,931	3,931	408	0	0%	3,523	90%	1.00	9.64
	BAC	EAC	VAC in \$	VAC in %	CPI to BAC	CPI to EAC			
At Complete:	27,750	24,244	3,506	13%	0.87	1.00			
Thresholds Exceeded: Cumulative Cost									
Explanation of Variance/Description of Problem:									
Impact:									
Corrective Action:									
Monthly Summary (to include technical causes of VARs, Impacts) and Corrective Action(s):									
Prepared by:				Date:		Approved by:		Date:	

CAR1 Response – Tracking & Reporting Uncosted Labor



- Variance reporting on hours is required from CAMs just as it is for dollars, starting with October 2009 reporting cycle.
 - Variance thresholds for hours (from procedure 12.PM-006):

Variance Analysis Thresholds for Control Accounts		
Green Thresholds – Cost and Schedule Performance falling outside of yellow or red thresholds		
Yellow Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$50K$
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$100K$
Hours	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 350 hrs
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 700 hrs
Red Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 10\%$ and $\geq \$100K$
	Cumulative	$\geq \pm 10\%$ and $\geq \$200K$
Hours	Current Period	$\geq \pm 10\%$ and ≥ 700 hrs
	Cumulative	$\geq \pm 10\%$ and ≥ 1400 hrs

Note: This applies to SV% (Schedule Variance in %) or CV% (Cost Variance in %) and the SV or CV in \$ or hours.

Undistributed Budget – CAR2



- From CAR2:
 - “ The FAR has provisions for contract letters of authorization to proceed which authorize **additions/deletions of scope and budget**. Should DOE issue a letter of authorization to proceed pending the preparation, review, and approval of a BCP, the **FRA projects currently have no process for managing such budget until the BCP is approved**. Contract authorizations to proceed could direct additional scope and budget or the removal of scope and budget. **Without a provision for UB, the projects have no process for segregation and management of such budget into a temporary holding account**. The EVMS description should have a provision for UB and a process for the managing a UB holding account.”
- This would normally apply if the TPC is increased. Language to allow for this has been added, though it’s unlikely to be used.

CAR2 Response – Undistributed Budget in System Description



Revised EVM System Description:

3.6.2 Undistributed Budget

Undistributed Budget [UB] is budget applied to contractually authorized effort not identified in Work Breakdown Structure elements at or below the level of reporting to the customer. A typical use of Undistributed Budget is to account for authorized changes for which there has not been adequate time to plan the change in detail at the control account level (Authorized Unpriced Work). Normally, authorized changes are incorporated into control account planning in the current or the following accounting period, or as soon as practical. Undistributed Budget is tracked in the Project Baseline Log.

In order to assure that budget for newly authorized efforts remains tied to the associated scope during the initial planning process, undistributed budget has been designated as the short term holding account. Once the responsible organization(s) has been identified, the budget will transfer from undistributed budget to the appropriate control account(s). This ensures budget and scope will not be transferred independently.

CAR3 and Response – Capturing Actual Hours for Exempt Labor



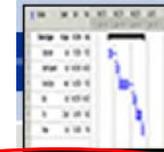
- From CAR3:
 - “...there is not an auditable trail beyond submitted employee time records that would validate whether salaried exempt employees’ efforts are allocated to multiple projects proportionate to their actual effort. Hours recorded may or may not represent total hours actually worked.”
- Response:
 - Actual hours are recorded by exempt employees in Fermilab Time & Labor.
 - In addition, actual hours for collaborator effort is also reported outside of FTL.

Revised WAD Form – CIO1



- From CIO1:
 - “The team recommends the FRA Office of Project Management Oversight (PMO) review the current Work Authorization Document and consider the following changes:
 - Remove guidance information of WAF from document and provide this information as a reference.
 - Add the responsible Cost Account Manager name to the Work Authorization Document.
 - Include recent changes to budget by WAF, in chronological order, effective dates, and CR numbers. This would provide a history and comprehensive overview of the WAF. This would be very helpful for the CAMs.
 - Add a field on the WAF that identifies the approver and latest revision date.”
- These changes have resulted in a revised Work Authorization Form – see next slide
- For NOvA, new forms will be used with changes requests originated 28-Sep-09 and after (and subsequent changes to WADs), but past baseline changes will not be retroactively included.

Revised Work Authorization Form



- Revisions to document
 - Revision date (handled prior only by docdb version date);
 - CAM (handled prior by docdb author assignment)
 - Budgeted hours for uncosted labor included
 - Revision history (more difficult to determine previously)
 - For NOvA, approvals will still be done in DocDB, so this information will not be added to the form
 - Working with Computing Division to better identify actual date associated with approvals in DocDB

REVISED: DAY-MONTH-YEAR

WORK AUTHORIZATION FORM

[Redacted] Project

Control Account Title: [Redacted]

Control Account Number: [Redacted]

Control Account Manager: [Redacted]

Work Breakdown Structure Element: **WBS X.X.X**

Period of Performance: / / to / /

Current Authorized Budget (in AYS with all burdening): \$ [Redacted]

Current Authorized Budget for Uncosted Scientist Labor : [Redacted] hours

REVISION HISTORY:

CR#	APPROVAL DATE	CR DOCDB FILE #	PRIOR BUDGET IN \$	NEW BUDGET IN \$	PRIOR UNCONSTED LABOR BUDGET IN HOURS	NEW UNCONSTED LABOR BUDGET IN HOURS	PRIOR PERIOD OF PERFORMANCE

This Work Authorization, including all attachments, represents the agreement between the Project Manager and Control Account Manager (CAM) to perform, or to have performed, efforts defined by the following:

- 1) A WBS Dictionary sheet that defines the scope of work for this WBS element/Control Account. If additional definition is warranted, or required for a particular WBS element, (e.g., QA reasons, Work Orders for third party services, etc) attach applicable documentation.
- 2) A detailed Control Account schedule showing all work packages and planning packages.
- 3) A detailed resource report by WBS and schedule activity.
- 4) Budgeted cost by month at the Work Package level (Control Account Plan)
- 5) Budgeted uncosted labor hours by month at the Work Package level (Control Account Plan)

This Work Authorization is for the lifecycle of the project. Funding will be authorized incrementally based on schedule status and funding availability, and communicated by other means to CAMs. Any change to this document will be implemented through the Change Control procedures.

Reviewed by: _____ Date _____
 Project Controls Group

Approvals: _____ Date _____
 Control Account Manager

_____ Date _____
 Project Manager

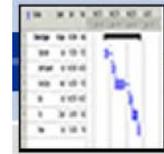
THE CHARGEABLE TASK CODE(S) FOR A CONTROL ACCOUNT WILL NOT BE OPENED WITHOUT A SIGNED WORK AUTHORIZATION FORM.

Revised Contingency & MR – CIO3



- From CIO3:
 - “The review team found the use of both terms (management reserve/contingency) confusing and belies the fact that **management reserve and contingency do not exist as separate entities**. Further the notation of what does and does not correspond to DOE and ANSI or NDIA guidance belies the fact of a conflict in terms and lack of compatibility for processes across FRA and DOE, its client.”
- Since traditional definitions of management reserve & contingency (held by contractor/held by customer) don't work for our non-profit organization, these definitions will be used:
 - Management Reserve – budget reserve identified for known risks
 - Contingency – budget reserve for unknown risks
- Change control thresholds will apply to each of these reserves equally
- Available contingency = $TPC - ACWP - MR$

Revised Variance Thresholds – CIO5



- From CIO5:
 - “The team recommends that the FRA Office of Project Management Oversight (PMO) **establish different variance thresholds for current month versus the cumulative variances.**”
- Cumulative period variance thresholds were revised, effective with October 2009 reporting:

Variance Analysis Thresholds for Control Accounts		
Green Thresholds – Cost and Schedule Performance falling outside of yellow or red thresholds		
Yellow Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq + 5\%$ to $< + 10\%$ and $\geq \$50K$
	Cumulative	$\geq + 5\%$ to $< + 10\%$ and $\geq \$100K$
Hours	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 350 hrs
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 700 hrs
Red Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 10\%$ and $\geq \$100K$
	Cumulative	$\geq \pm 10\%$ and $\geq \$200K$
Hours	Current Period	$\geq \pm 10\%$ and ≥ 700 hrs
	Cumulative	$\geq \pm 10\%$ and ≥ 1400 hrs

Authorized, Unpriced Work



- This is a deficiency identified by Fermilab OPMO that should be part of the FRA EVMS.
- Authorized, unpriced work is a holding account that allows for segregating funds identified for a change, but for which a negotiated price is not yet known. Example:
 - When digging a building foundation, unexpected human remains are uncovered. Work stops to do archaeological dig.
 - A change is expected, but details are not yet known.
 - Contractor estimates an approximate cost – say \$100,000
 - CAM does a change request for this amount, but the \$100k is moved from contingency (unknown risk) to AUW budget, until the actual cost is known. When cost is known, budget is moved to control accounts.
 - This properly accounts for all project costs at any one time.



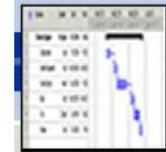
FRA EVMS Refresher

FRA EVMS Refresher Outline



- EVMS Concepts
 - EVMS based on ANSI 748 and DOE O413.3A
 - Basic components of ANSI standard are:
 - Organization
 - Planning, Budgeting, Scheduling
 - Accounting Considerations
 - Analysis and Management Reports
 - Revisions and Data Maintenance

FRA EVMS Documents



- Fermilab projects are under FRA EVM System
 - Documentation found at <http://www.fnal.gov/directorate/OPMO/PolProc/home.htm>
 - System Description, 8 implementing procedures, desktop instructions

Office of Project Management Oversight
Policies and Procedures

Policies
[Earned Value Management System Description](#)

OPMO Project Management Procedures

12.PM-001	Project WBS, OBS, RAM	
12.PM-002	Control Accounts, Work Packages, Planning Packages	
12.PM-003	Work Authorization	
12.PM-004	Project Scheduling	Desktop Instructions
12.PM-005	Cost Estimating	
12.PM-006	Monthly Status Reporting	Desktop Instructions
12.PM-007	Change Control	Desktop Instructions
12.PM-008	EVMS Surveillance and Maintenance	

DOE Documents
[DOE Policies, Orders, and Guides](#)

EVMS Data Elements



Performance Formulas

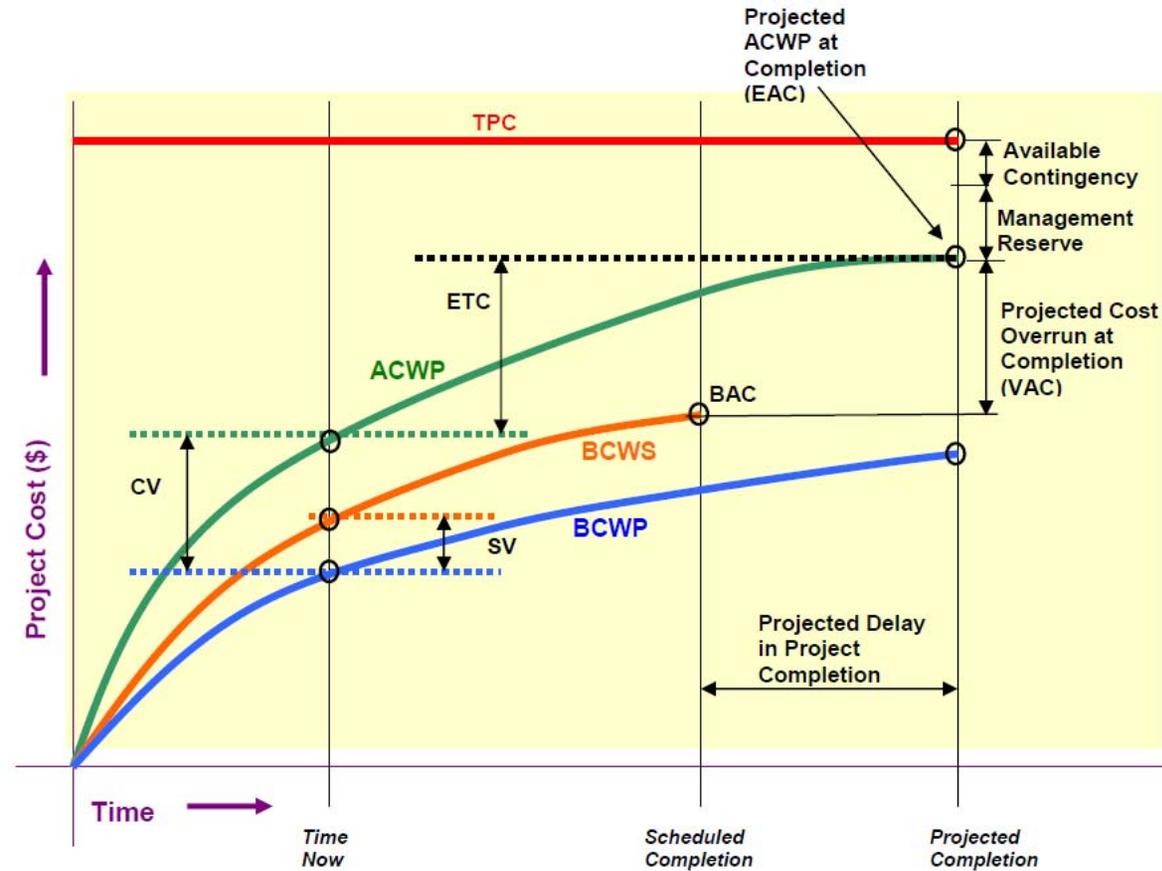
$$CV = BCWP - ACWP$$

$$SV = BCWP - BCWS$$

$$CPI = BCWP / ACWP$$

$$SPI = BCWP / BCWS$$

$$VAC = BAC - EAC$$



Overall Status

$$\text{Percent Complete} = \frac{BCWP_{CUM}}{BAC}$$

$$\text{Percent Spent} = \frac{ACWP_{CUM}}{BAC \text{ (OR EAC)}}$$

Organization



Work Breakdown Structure developed with a product-oriented focus

WBS Dictionary defines the scope of each WBS element

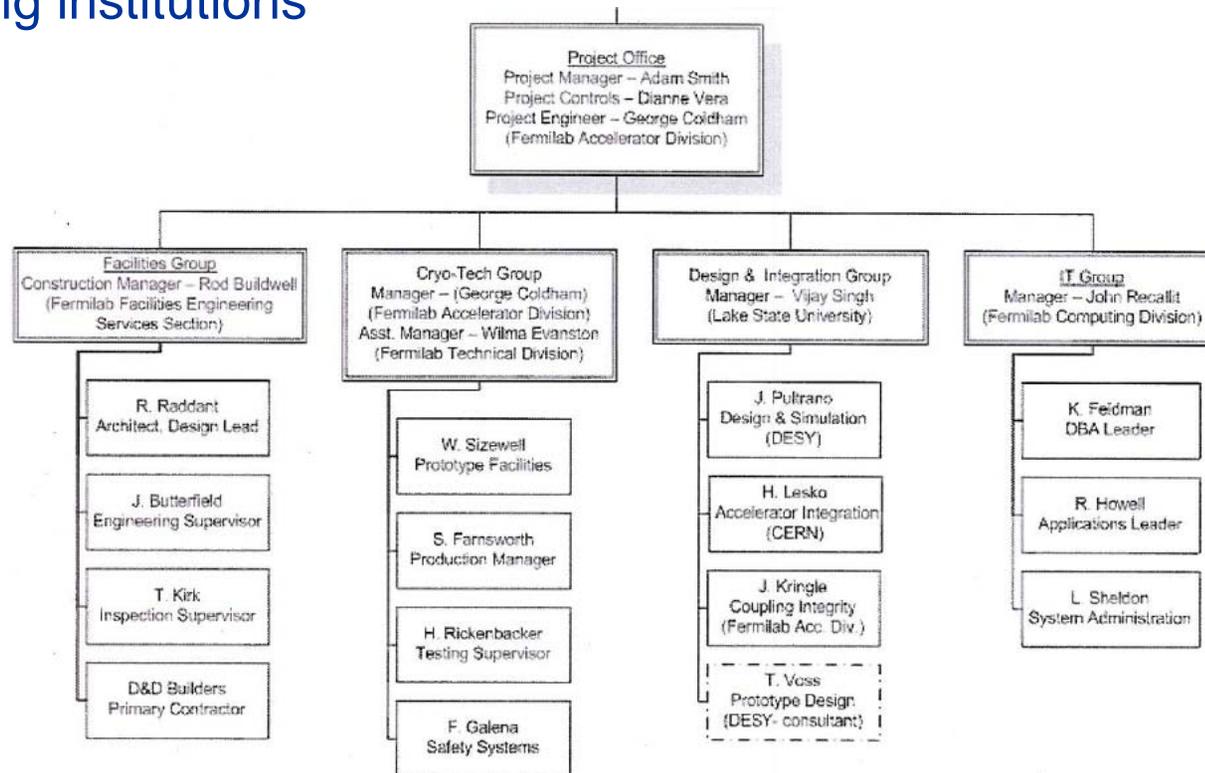
1. 3.			Cryomodule with Quad
1. 3. 1.	Y	25/25.1.3.1	Cryomodule Final Design
1. 3. 2.	Y	25/25.1.3.2	Cryomodule Prototype (CM1)
1. 3. 2. 1.			EDIA for CM1 Components
1. 3. 2. 2.			CM1 Dressed Cavities (8/CM)
1. 3. 2. 2. 1.			Raw Niobium for CM1 Cavity
1. 3. 2. 2. 2.			CM1 Cavity & Helium Vessel
1. 3. 2. 2. 3.			CM1 Cavity Processing
1. 3. 2. 2. 4.			CM1 Cavity Qualification
1. 3. 2. 2. 5.			CM1 Cavity Tuners
1. 3. 2. 2. 6.			CM1 Cavity Dressing
1. 3. 2. 2. 7.			CM1 Cavity Shipping & Handling
1. 3. 2. 3.			CM1 Magnetic
1. 3. 2. 3. 1.			EDIA for CM
1. 3. 2. 3. 2.			CM1 Quad 8
1. 3. 2. 3. 3.			CM1 BPM
1. 3. 2. 3. 4.			CM1 Helium
1. 3. 2. 3. 5.			CM1 Current
1. 3. 2. 3. 6.			CM1 Magnet

Contained in Control Account		Proj/Task # 25/25.1.3.3
WBS Element Title		Cavity Processing
Assumptions	1	Cavities are fabricated by a qualified cavity vendor and are free of weld defects
	2	Cavity delivery from vendors is sufficient to always keep processing facility operational
	3	Maximum number of process cycles/cavity is three
	4	60% of the cavities receive 1 cycle, 30% 2 cycles and 10% 3 cycles
	5	BCP and EP process procedures are performed per PN-12345
Relates to Requirements	1.2.2	Linac technical design parameters
	1.5.5.6	Maximum accelerating gradient in the Linac
Scope of Work		The Scope of Work includes all activities associated with cavity processing including
	1	Receive cavities from vendors and perform QC per PN-23456
	2	Setup and perform BCP and EP cycles as defined in PN-12345
	3	Perform final HPR per PN-45678
	4	Leak check and seal cavity per PN-78910
	5	Ship sealed cavity to VTS
Deliverables	1	Cavities that are processed, sealed and ready for vertical testing
	2	Total number of cavities processed equals 320

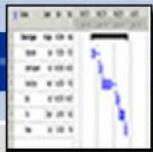
Organization



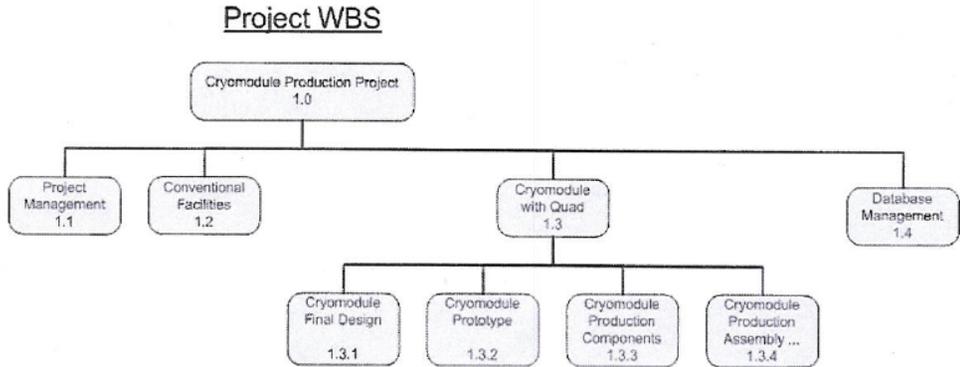
Organizational Breakdown Structure is established to ensure the project's scope of work can be efficiently managed (likely to include collaborating institutions)



Organization



Responsibility Assignment Matrix establishes the key control points (Control Accounts) and the managers of the entire project scope



Project OBS

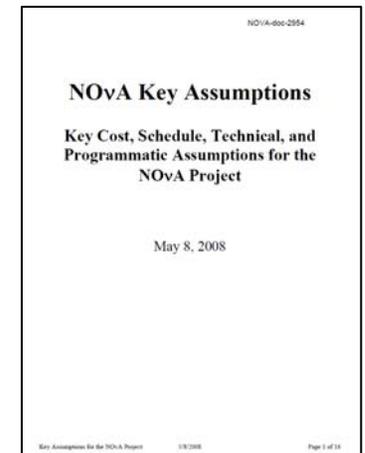
Project Office	25/25.1.1 A. Smith \$300k						
Facilities Group		25/25.1.2 R. Buildwell \$10,000k					
Design & Integration Group			25/25.1.3.1 V. Singh \$200k				
Cryo-Tech Group				25/25.1.3.2 W. Sizewell \$4,500k	25/25.1.3.3 S. Farnsworth \$9,000k	25/25.1.3.4 S. Farnsworth \$1,500k	
IT Group							25/25.1.4 J. Recallit \$250k

Control Accounts (CA)

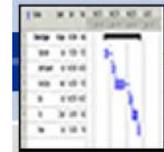
Planning, Scheduling and Budgeting



- A key part of baseline planning is establishing the project assumptions
 - This should be initially documented early in the project, and evolve as time progresses.
- Schedule development is an iterative process among the CAM, Functional Managers, Project Controls and the Project Manager
- Work packages and planning packages
 - Work should be planned into detailed planning packages where possible, otherwise, use planning packages to establish a budget, but not work details.
- Risk management is an integral part of the planning process and is key driver in establishing cost and schedule management reserve and contingency
 - Risk register should total to management reserve budget
- A consistent approach should be used in developing and documenting cost estimates across a project



Planning, Scheduling and Budgeting



- **Setting a baseline**
 - Establishes point at which formal change control to the cost, schedule, and technical baseline must start
 - Earned value reporting must begin
- **Work Authorization**
 - Work must be authorized from the Project Manager to the CAMS before it begins
 - Work authorization documentation contains
 - **Scope**
 - **Schedule**
 - **Time-phased budget (Control Account Plan)**
- **Work sent to collaborators requires**
 - MOU documenting expected institutional contributions & responsibilities
 - Statement of Work for each fiscal year detailing costs expected to be covered by Fermilab, and executed through purchase requisition/order process

REVISED: DAY-MONTH-YEAR

WORK AUTHORIZATION FORM
Project

Control Account Title: _____
 Control Account Number: _____
 Control Account Manager: _____
 Work Breakdown Structure Element: **WBSXXX**
 Period of Performance: ____/____/____ to ____/____/____
 Current Authorized Budget (in AYS with all burdenings): \$ _____
 Current Authorized Budget for Uncosted Scientist Labor: _____ hours

REVISION HISTORY:

CR#	APPROVAL DATE	CR DOC#	FILE #	PRIOR BUDGET IN \$	NEW BUDGET IN \$	PRIOR UNCOSTED LABOR BUDGET IN HOURS	NEW UNCOSTED LABOR BUDGET IN HOURS	PRIOR PERIOD OF PERFORMANCE

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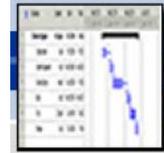
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Reviewed by: _____ Project Controls Group _____ Date _____
 Approvals: _____ Control Account Manager _____ Date _____
 _____ Project Manager _____ Date _____

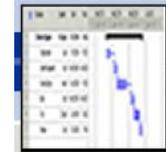
THE CHARGEABLE TASK CODE(S) FOR A CONTROL ACCOUNT WILL NOT BE OPENED WITHOUT A SIGNED WORK AUTHORIZATION FORM

Accounting Considerations

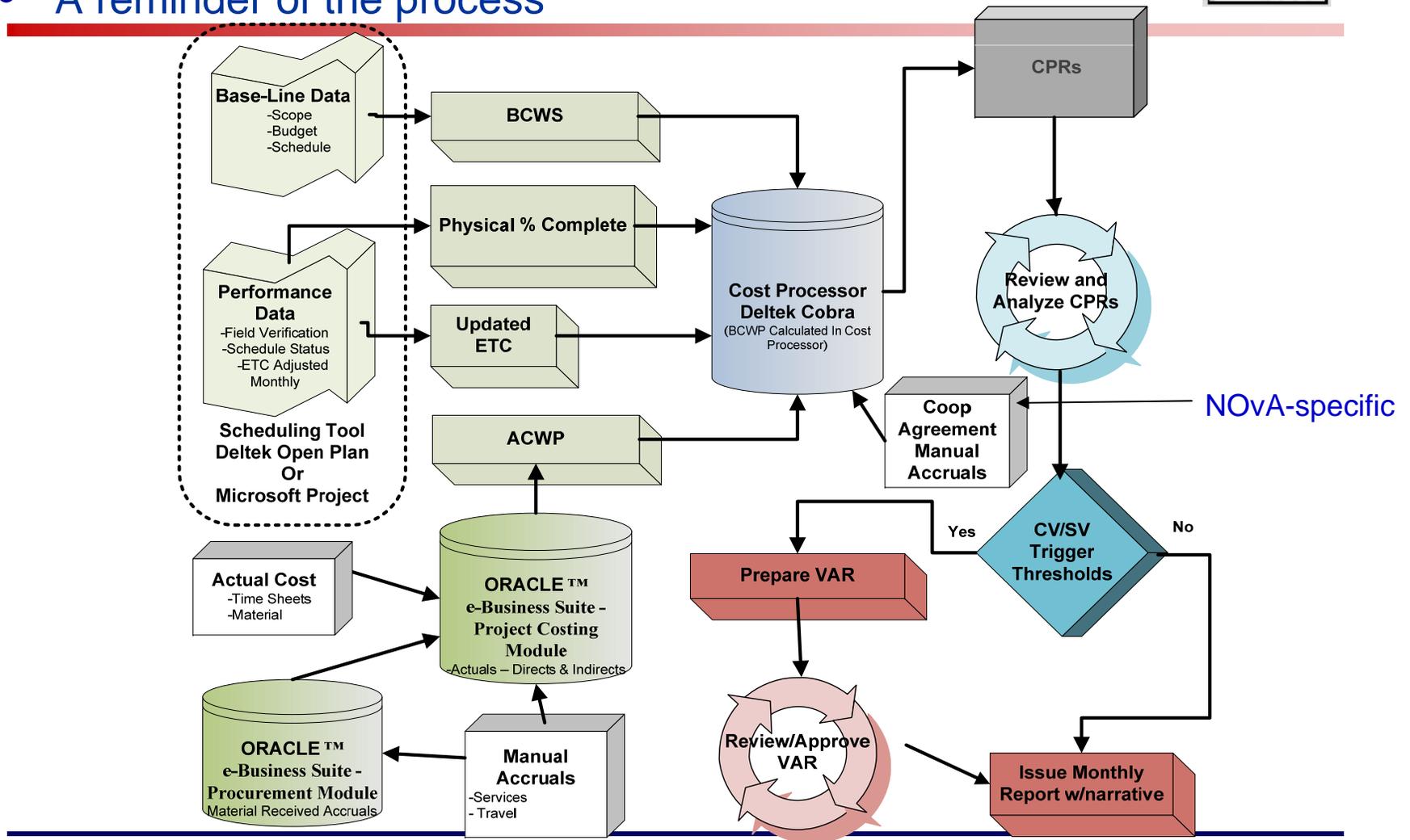


- Fermilab's Oracle eBS (electronic Business Suite) used to collect actual costs
- Accruals done in Oracle eBS
 - Automatic for material received at Fermilab, manual for services & materials received elsewhere
- Fermilab Time and Effort Reporting used for Fermilab labor
 - Labor at other institutions appears as M&S to Fermilab managers, but is scheduled as "labor" in the Open Plan schedule
- Indirects are applied in Oracle eBS
 - Rates set at least annually by CFO, adjusted at fiscal year end to reflect actual indirect costs at Fermilab, may be adjusted at interim dates
 - opportunities for pass-through rates
 - cap on indirects for large purchase orders at \$500K.
- Actual hours are collected from collaborators on spreadsheets and entered via upload to Cobra monthly
- Actual costs and hours are extracted from eBS and loaded into Cobra monthly (see upcoming graphic on Monthly Status Reporting Cycle)
 - Cobra and eBS totals are reconciled

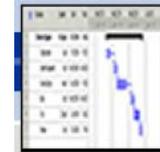
Monthly Analysis and Management Reporting



- A reminder of the process



Cost Performance Report CPR1



- Produced monthly for CAMs and project manager
- Shows current period and cumulative performance
- Example (partial) from NOvA:

COST PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE														
CONTRACTOR				CONTRACT				PROGRAM				4. REPORT PERIOD		
NAME Fermi National Accelerator Laboratory				NAME NOvA Project				NAME NOvA Project				FROM 01-June-2009 TO 30-June-2009		
PERFORMANCE DATA														
CTC-FndSrc WBS[2] Results... ITEM (1)	CURRENT PERIOD						CUMULATIVE TO DATE				AT COMPLETION			
	BUDGETED COST		ACTUAL COST	VARIANCE			BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED	LATEST REVISED ESTIMATE	VARIANCE
	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST				
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		
DA DOE-ACEL MIE														
2.0 ANU Construction														
Fully Burdened AY\$k	376	250	106	(126)	144	1,933	1,099	921	(834)	178	31,759	31,720	39	
CTC-FndSrcTotals:	376	250	106	(126)	144	1,933	1,099	921	(834)	178	31,759	31,720	39	
DC DOE-CA														
2.1 Site and Building														
Fully Burdened AY\$k	664	230	1,177	(434)	(947)	3,342	1,940	2,306	(1,402)	(366)	30,456	30,534	(78)	
CTC-FndSrcTotals:	664	230	1,177	(434)	(947)	3,342	1,940	2,306	(1,402)	(366)	30,456	30,534	(78)	
DD DOE-ACEL R&D														
1.0 ANU R&D														
Fully Burdened AY\$k	310	345	117	35	229	3,921	2,905	2,592	(1,016)	313	7,863	7,609	254	
CTC-FndSrcTotals:	310	345	117	35	229	3,921	2,905	2,592	(1,016)	313	7,863	7,609	254	
DE DOE-DET MIE														
2.1 Site and Building														
Fully Burdened AY\$k	67	67	23	0	44	466	466	136	0	331	1,930	1,430	500	
2.10 Project Management - Nova Project - Construction														
Fully Burdened AY\$k	76	76	51	0	25	1,022	1,022	810	0	212	6,029	5,824	205	
2.2 Liquid Scintillator														
Fully Burdened AY\$k	112	6	7	(106)	(1)	153	28	15	(125)	12	18,544	19,588	(1,044)	
2.3 WLS Fiber														
Fully Burdened AY\$k	1	14	0	13	14	5	38	0	34	38	10,084	10,957	(873)	
2.4 PVC Extrusions														
Fully Burdened AY\$k	20	10	0	(10)	10	336	46	0	(290)	46	25,325	24,858	467	

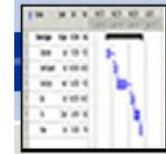
Cost Performance Report by Control Account



- Produced monthly for CAMs and project manager
- Colors indicate threshold trigger – red requires VAR to be written
- Example (partial) from NOvA for costed resources:

Control Account	Current Period										Cumulative									
	BCWS (AY\$)	BCWP (AY\$)	ACWP (AY\$)	SV (AY\$)	SV (%)	CV (AY\$)	CV (%)	SPI	CPI	BCWS (AY\$)	BCWP (AY\$)	ACWP (AY\$)	SV (AY\$)	SV (%)	CV (AY\$)	CV (%)	SPI	CPI	BAC (AY\$)	
R&D																				
1.0.0 ANU CDR COSTS	0	0	0	0	0%	0	0%	1.00	1.00	0	0	18,630	0	0%	-18,630	-100%	1.00	0.00	0	
1.0.1 RR Upgrades	28,885	36,082	62,095	7,197	25%	-26,013	-72%	1.25	0.58	2,661,297	1,695,121	1,900,417	-965,175	-36%	-265,296	-12%	0.64	0.89	5,498,231	
1.0.2 MI Upgrades	34,939	49,021	4,036	14,083	40%	44,985	129%	1.40	12.15	337,232	239,910	250,134	-97,322	-29%	-10,224	-4%	0.71	0.96	1,112,863	
1.0.3 NUMI Upgrades	104,177	18,049	46,294	-86,128	-83%	-28,243	-27%	0.17	0.39	1,161,268	1,034,181	655,258	-127,086	-11%	318,923	34%	0.88	1.58	2,151,876	
1.0.4 ANU Beam Physics	1,767	0	0	-918	-52%	-1,158	-66%	0.65	N/A	75,253	78,843	4,666	3,396	4%	74,176	94%	1.05	16.90	83,252	
1.0.5 ANU Project Management	0	0	0	0	0%	0	0%	1.00	1.00	344,538	344,698	258,695	0	0%	86,006	25%	1.00	1.33	344,698	
1.1 Site and Building R&D	0	0	0	0	0%	0	0%	1.00	1.00	2,274,519	2,274,519	1,626,970	0	0%	647,549	28%	1.00	1.40	2,274,519	
1.2 Liquid Scintillator R&D	2,353	2,310	2,633	-44	-2%	-323	-14%	0.98	0.88	276,064	268,427	257,536	-7,637	-3%	-10,891	-4%	0.97	1.04	297,296	
1.3 WLS Fiber R&D	962	0	-962	-962	-100%	0	0%	0.00	1.00	339,617	313,149	297,127	-26,468	-8%	16,022	5%	0.92	1.05	340,909	
1.4 PVC Extrusion R&D	18,368	7,883	84,714	-10,484	-57%	-76,831	-97%	0.43	0.09	1,347,527	1,134,800	1,505,342	-212,727	-16%	-370,542	-33%	0.84	0.75	1,368,849	
1.6 PVC Module R&D	36,941	11,847	63,796	-25,094	-68%	-51,949	-43%	0.32	0.19	1,474,219	694,361	1,278,582	-779,858	-53%	-584,221	-84%	0.47	0.54	1,860,947	
1.8 Electronics R&D	46,197	54,358	-21,134	8,162	19%	75,493	130%	1.18	-2.57	1,308,939	505,339	792,587	-803,600	-61%	-287,247	-57%	0.39	0.64	1,843,797	
1.7 DAG R&D	27,519	42,743	83,396	15,224	55%	-40,633	-69%	1.55	0.51	962,783	352,724	1,166,542	-610,058	-63%	-813,818	-231%	0.37	0.30	1,406,960	
1.8 Detector Assembly R&D	4,891	67,650	103,099	62,760	1283%	-35,449	-62%	13.83	0.66	2,183,002	1,239,216	2,429,557	-943,786	-43%	-1,190,341	-96%	0.57	0.51	2,997,719	
1.8 Project Management R&D	0	0	0	0	0%	0	0%	1.00	1.00	9,184,127	9,184,127	9,359,785	0	0%	175,658	2%	1.00	0.98	9,184,127	
Construction																				
2.0.1.1 Recycler Ring Modifications	62,725	2,668	32,169	-60,057	-96%	-29,501	-103%	0.04	0.08	380,947	51,006	56,055	-329,941	-87%	-5,049	-10%	0.13	0.91	8,548,382	
2.0.1.2 Recycler Kicker System	45,481	25,224	12,890	-20,297	-45%	12,934	28%	0.55	1.96	895,065	180,217	132,374	-714,848	-80%	-47,848	-5%	0.20	1.36	8,383,974	
2.0.1.3 Recycler Instrumentation	0	197,339	2,595	194,744	100%	151,314	50%	N/A	78.11	6,022	332,192	6,294	-32,110	5,411%	323,893	98%	55.17	52.78	1,563,578	
2.0.2 MI Modifications	13,796	939	0	-13,857	-100%	998	103%	0.07	N/A	96,456	160,047	184,690	61,591	63%	-24,848	-26%	1.63	0.97	387,063	
2.0.2.2 MI RF Cavities	18,370	32,803	14,573	14,433	78%	18,229	100%	1.79	2.25	74,795	80,044	109,561	5,249	7%	-29,518	-40%	1.07	0.73	1,417,766	
2.0.2.1 NuMI Primary Proton Beam	30,351	16,743	21,997	-13,608	-45%	-5,254	-17%	0.55	0.76	333,138	115,796	217,448	-217,383	-65%	-161,892	-88%	0.35	0.53	1,520,354	
2.0.2.3 NuMI Target Hall Technical Components	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	1,731,802	
2.0.2.3 NuMI Target Hall Infrastructure	35,970	0	-35,970	-100%	0	0%	0.00	1.00	66,801	61,662	34,677	-5,139	-8%	26,385	43%	0.92	1.78	1,679,794		
2.0.3.4 NuMI Decay Pipe/Hadron Absorber/Utilities	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	986,507	
2.0.4 Project Management - ANU - Construction	77,012	77,012	46,176	0	0%	30,837	40%	1.00	1.67	729,899	729,899	432,959	0	0%	296,940	41%	1.00	1.69	5,938,307	
2.1.1 Site Preparation Package	89,567	1,367,433	1,457,474	1,277,866	1,427%	-90,041	-7%	15.27	0.94	2,788,393	4,405,064	4,444,799	1,616,671	58%	-39,735	-1%	1.58	0.99	11,769,937	
2.1.2 Far Detector Building	465,706	693,328	375,885	227,622	49%	317,443	68%	1.49	1.84	1,747,139	2,342,784	1,169,460	593,645	34%	1,173,323	50%	1.34	2.00	20,955,138	
2.1.4 Management - Site and Building - Construction	0	18,592	13,679	18,592	100%	4,913	26%	N/A	1.36	244,753	181,576	70,233	-63,177	-26%	111,343	61%	0.74	2.59	556,370	
2.10 Project Management - Nova Project - Construction	72,467	72,467	42,755	0	0%	29,712	41%	1.00	1.69	1,169,894	1,169,894	918,788	0	0%	251,106	21%	1.00	1.27	6,028,357	
2.2.1 Mineral Oil	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	12,685,556	
2.2.2 Pseudocoumrene	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	1,292,777	
2.2.3 Waxes/Resins and Stadis 426	101,090	0	0	-101,090	-100%	0	0%	0.00	1.00	332,060	0	0	-332,060	-100%	0	0%	0.00	1.00	2,245,865	
2.2.4 Blending	3,525	3,525	7,476	0	0%	-3,951	-112%	1.00	0.47	25,013	25,013	22,717	0	0%	2,296	9%	1.00	1.10	753,129	
2.2.5 Transport - Liquid Scintillator - Construction	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	1,462,105	
2.2.6 Management - Liquid Scintillator - Construction	1,946	1,946	2,424	0	0%	-477	-24%	1.00	0.80	13,810	13,810	2,424	0	0%	11,387	82%	1.00	5.70	93,824	
2.3.1 Procurement - WLS Fiber	0	20,963	0	20,963	100%	20,963	100%	N/A	N/A	0	63,411	0	63,411	100%	63,411	100%	N/A	N/A	84,374	
2.3.2 Production - WLS Fiber	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	9,961,576	
2.3.3 Management - WLS Fiber - Construction	906	906	0	0	0%	906	100%	1.00	N/A	6,426	6,426	0	0	0%	6,426	100%	1.00	N/A	37,646	
2.4.1 Procurement - PVC Extrusions	4,765	2,721	0	-2,043	-43%	2,721	100%	0.57	N/A	18,371	10,771	0	-7,600	-41%	10,771	100%	0.59	N/A	178,697	
2.4.2 Extrusion Pre-Production	0	0	0	0	0%	0	0%	1.00	1.00	0	0	0	0	0%	0	0%	1.00	1.00	1,177,552	

Cost Performance Report at Customer Reporting Level



- To be included in monthly report
- Colors indicate threshold trigger
- Example from NOvA (WBS L2) for costed resources:

Report Period: Jun-09	Curent Period							Cumulative						
	BCWS (AY\$)	BCWP (AY\$)	ACWP (AY\$)	SV (AY\$)	SV (%)	CV (AY\$)	CV (%)	BCWS (AY\$)	BCWP (AY\$)	ACWP (AY\$)	SV (AY\$)	SV (%)	CV (AY\$)	CV (%)
WBS Level 2														
R&D														
1.0 ANU R&D	310,369	353,815	124,333	43,445	14%	229,482	65%	4,233,200	3,191,938	2,762,635	-1,041,262	-25%	429,302	13%
1.1 Site and Building R&D	0	0	3,925	0	0%	-3,925	-100%	2,274,519	2,274,519	1,638,963	0	0%	635,556	28%
1.2 Liquid Scintillator R&D	0	0	15,518	0	0%	-15,518	-100%	271,245	263,551	241,258	-7,694	-3%	22,293	8%
1.3 WLS Fiber R&D	10,934	5,866	10,545	-5,068	-46%	-4,679	-80%	337,692	313,149	297,127	-24,544	-7%	16,022	5%
1.4 PVC Extrusion R&D	29,435	71,385	45,150	41,950	143%	26,235	37%	1,286,072	1,069,567	1,143,714	-216,505	-17%	-74,147	-7%
1.5 PVC Module R&D	30,081	54,308	45,120	24,226	81%	9,187	17%	1,390,153	673,307	1,132,406	-716,846	-52%	-459,099	-68%
1.6 Electronics R&D	156,635	25,605	150,594	-131,030	-84%	-124,989	-49%	1,126,168	449,127	730,462	-677,041	-60%	-281,335	-63%
1.7 DAQ R&D	155,720	24,126	81,512	-131,593	-85%	-57,385	-38%	834,048	261,621	1,020,368	-572,426	-69%	-758,746	-290%
1.8 Detector Assembly R&D	261,308	66,551	179,189	-194,757	-75%	-112,638	-18%	2,004,466	1,144,490	2,262,902	-859,976	-43%	-1,118,412	-98%
1.9 Project Management R&D	0	0	0	0	0%	0	0%	9,184,127	9,184,127	9,359,785	0	0%	-175,658	-2%
Construction														
2.0 ANU Construction	376,171	250,046	105,661	-126,125	-34%	144,385	58%	1,932,996	1,099,212	920,862	-833,784	-43%	178,350	16%
2.1 Site and Building	731,573	297,128	1,199,990	-434,445	-59%	-902,862	-304%	3,808,256	2,406,618	2,442,185	-1,401,638	-37%	-35,567	-1%
2.10 Project Management - Nova Project - Construction	75,918	75,918	51,269	0	0%	24,649	32%	1,021,510	1,021,510	809,802	0	0%	211,708	21%
2.2 Liquid Scintillator	111,636	5,732	7,152	-105,904	-95%	-1,419	-2%	152,686	27,620	15,241	-125,066	-82%	12,379	4%
2.3 WLS Fiber	949	13,527	0	12,578	1328%	13,527	100%	4,571	38,112	0	33,541	734%	38,112	100%
2.4 PVC Extrusions	19,906	9,701	0	-10,205	-51%	9,701	100%	336,104	45,976	0	-290,129	-86%	45,976	100%
2.5 PVC Modules	15,879	15,879	38,240	0	0%	-22,361	-141%	115,642	115,642	38,240	0	0%	77,402	67%
2.6 Electronics	826	826	879	0	0%	-53	-6%	3,982	3,982	879	0	0%	3,103	78%
2.7 DAQ	235	235	0	0	0%	235	100%	1,128	16,983	0	15,855	1405%	16,983	100%
2.8 Near Detector Assembly	1,774	1,774	0	0	0%	1,774	100%	96,250	84,160	46,427	-12,090	-13%	37,733	49%
2.9 Far Detector Assembly	10,939	10,939	26,997	0	0%	-16,057	-147%	267,041	83,030	36,357	-184,012	-69%	46,672	58%
R&D SubTotal (WBS 1.0-1.9)	954,482	601,656	655,886	-352,826	-37%	-54,230	-9%	22,941,690	18,825,396	20,589,619	-4,116,294	-18%	-1,764,223	-9%
Construction SubTotal (WBS 2.0-2.10)	1,345,807	681,705	1,430,187	-664,102	-49%	-748,482	-110%	7,740,168	4,942,845	4,309,993	-2,797,323	-36%	632,851	13%
Project Total	2,300,288	1,283,361	2,086,073	-1,016,927	-44%	-802,713	-63%	30,681,858	23,768,240	24,899,613	-6,913,618	-23%	-1,131,372	-5%

Variance Analysis

Control Account Reporting Thresholds



Variance Analysis Thresholds for Control Accounts		
Green Thresholds – Cost and Schedule Performance falling outside of yellow or red thresholds		
Yellow Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$50K$
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$100K$
Hours	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 350 hrs
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 700 hrs
Red Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 10\%$ and $\geq \$100K$
	Cumulative	$\geq \pm 10\%$ and $\geq \$200K$
Hours	Current Period	$\geq \pm 10\%$ and ≥ 700 hrs
	Cumulative	$\geq \pm 10\%$ and ≥ 1400 hrs

Note: This applies to SV% (Schedule Variance in %) or CV% (Cost Variance in %) and the SV or CV in \$ or hours.

- Apply at Control Account level
- Red trigger requires variance analysis report to be written
- Default thresholds – more restrictive thresholds can be used with customer and senior management approval

Variance Analysis

Customer Reporting Thresholds

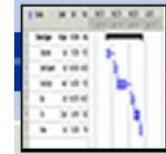


Customer Variance Analysis Report Thresholds		
Green Thresholds – Cost and Schedule Performance falling outside of yellow or red thresholds		
Yellow Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$125K$
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$250K$
Hours	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 875 hrs
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and ≥ 1750 hrs
Red Thresholds		
Cost Variance Schedule Variance	Type	Threshold limit
Dollars	Current Period	$\geq \pm 10\%$ and $\geq \$250K$
	Cumulative	$\geq \pm 10\%$ and $\geq \$500K$
Hours	Current Period	$\geq \pm 10\%$ and ≥ 1750 hrs
	Cumulative	$\geq \pm 10\%$ and ≥ 3500 hrs

Note: This applies to SV% (Schedule Variance in %) or CV% (Cost Variance in %) and the SV or CV in \$.

- Apply at project/customer determined level – NOvA is WBS L2
- Red trigger requires variance analysis report to be written
- Default thresholds – more restrictive thresholds can be used with customer and senior management approval

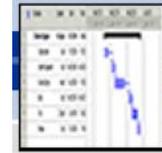
Variance Analysis Reports (VAR)



- To be written when red threshold is triggered
- VARs to be reviewed by Project Manager and iterated if necessary
- VARs to be signed when complete (NOvA uses DocDB sign-off feature for approvals in electronic CAM notebook)
- Corrective actions to be reviewed at project meetings (with all CAMs to look for impacts across separate Control Accounts)
- Corrective Action Log to be statused regularly

VARIANCE REPORT CORRECTIVE ACTION LOG						
ID#	Control Account (CA) #	FOR REPORT MONTH/YR		APPROVAL DATE	CLOSED DATE	RESPONSIBILITY (CAM)
1	1.0.1	Oct-08	None needed. In future, will work with Project Controls office to schedule accruals to mitigate variance effects.	2-Jan-09	17-Mar-09	Derwent
2	1.0.2	Oct-08	The CAM had an extensive talk with the level 4 managers about the importance of using the correct codes for effort reporting. We are taking every effort to communicate to everyone working for the project what appropriate codes to use. There was no incorrect effort reporting in October. The CAM also will be looking at the monthly effort reports now available to check that people are reporting their efforts correctly.	22-Dec-08	17-Mar-09	Kourbanis
3	1.0.3	Oct-08	The labor efforts under Control Account 1.0.3 will continued to be monitored to determine if the over-estimates of labor remain consistent. If so, the estimates for future tasks can be reviewed.	16-Dec-08	17-Mar-09	Martens
4	1.0.4	Oct-08	The CAM will monitor these tasks knowing that the schedule and cost variances should eventually come within the limits, and are not (presently) indicative of true progress.	16-Dec-08	17-Mar-09	Zwaska
5	1.0.5	Oct-08	We will correct the ~thousand dollars of incorrect charges in FY09. We can not correct the incorrect charges in past FY's and thus most of this variance will remain. I have sent out e-mail to all the people working on this project speaking to the importance of using the correct codes for effort reporting. I have clarified with people the items that are considered "management" and should be charged to the 2.0.4 code (1.0.5 is now closed).	29-Dec-08	17-Mar-09	Derwent
6	1.2	Oct-08	The IU SOW will soon be in place and this work will take place starting in the second quarter of FY09. Since this work took only 1/2 time tech hours, 1.2 can catch up with the most of the planned work by the end of the June 30, 2009.	20-Dec-08	17-Mar-09	Mufson

Variance Analysis Report Example



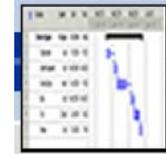
By Control Account →

Explanation addresses triggered variances →

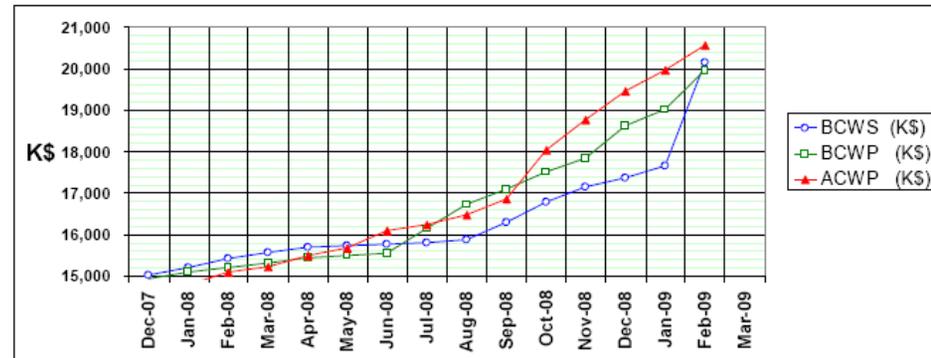
Provides corrective action →

CLASSIFICATION (When Filled In)									
CONTRACT PERFORMANCE REPORT								FORM APPROVED	
FORMAT 5 - EXPLANATIONS AND PROBLEM ANALYSES								OMB No. 0704-0188	
1. CONTRACTOR		2. CONTRACT			3. PROGRAM			4. REPORT PERIOD	
a. NAME Fermi National Accelerator		a. NAME			a. NAME NOvA Project			a. FROM (YYYYMMDD) 2009/02/01	
b. LOCATION (Address and City) Batavia, Illinois		b. NUMBER		b. PHASE		b. TO (YYYYMMDD) 2009/02/28			
		c. TYPE	d. SHARE RATIO	c. EVMS ACCEPTANCE (YYYYMMDD)					
				NO	X	YES			
1.0.3 NUMI Upgrades									
	BCWS	BCWP	ACWP	SV in \$	SV in %	CV in \$	CV %	SPI	CPI
Current:	238,849	20,992	31,614	-217,857	-91%	-10,622	-4%	0.09	0.66
Cumulative	411,941	771,482	426,192	359,540	87%	345,290	45%	1.87	1.81
	BAC	EAC	VAC in \$	VAC in %	CPI to BAC	CPI to EAC			
At Complete	2,118,285	1,761,275	357,010	17%	0.80	1.01			
Thresholds Exceeded: Current Period Schedule, Current Period Cost, Cumulative Schedule, Cumulative Cost									
Explanation of Schedule Variance:									
<p>In December 2008 the NOvA project was rebaselined to start in February 2009 with the expectation that funding would be restored by the US Congress at that time. In the summer of 2008 a supplemental appropriations bill provided funding for the NOvA project earlier than expected but the project was not rebaselined. With funding and resources available, work began within control account 1.0.3 ahead of schedule. Beginning work early helps mitigate NOvA risk #95 (see Nova docdb 2841) which is the potential lack of Accelerator Division personnel. Therefore the work is cumulatively ahead of schedule.</p> <p>Starting in February 2009, the amount of scheduled work for the month was greater than the amount actually performed for the month, but there still remains a cumulative positive schedule variance. The plot (seen below) of the BCWP and ACWP shows that we have not ramped up the pace of work on control account 1.0.3 to match the start of the baseline schedule.</p>									
Explanation of Cost Variance:									
<p>The cost variance has been steadily growing and is due to a systematic over estimate of the manpower needed to complete the tasks. The plot (seen below) shows that the CPI has consistently remained between about 1.7 and 2.1.</p>									
Corrective Action:									
<p>To address the schedule progress the CAM for 1.0.3 will work with the support departments and Level 4 managers to make sure that labor resources are assigned to the upcoming tasks. To address the cost variance, the best choice is to revise the estimate at completion (EAC) downward by \$300k to \$1.82M.</p>									
Monthly Summary (to include technical causes of VARs, Impacts) and Corrective Action(s):									
<p>The tasks under Control Account 1.0.3 are ahead of schedule, but the recent pace of progress has not kept up with the scheduled pace. The task are under budget since there has been a systematic over-estimate of the manpower requirements. The CAM for 1.0.3 will work to make sure resources are assigned to the upcoming tasks and recommends revising the EAC from \$2.11M to \$1.81M.</p>									
Prepared by: Mike Martens			Date: 03/25/09		Approved by:		Date:		

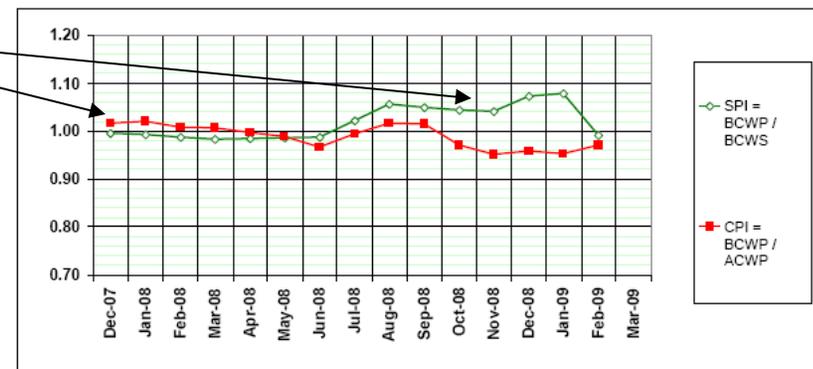
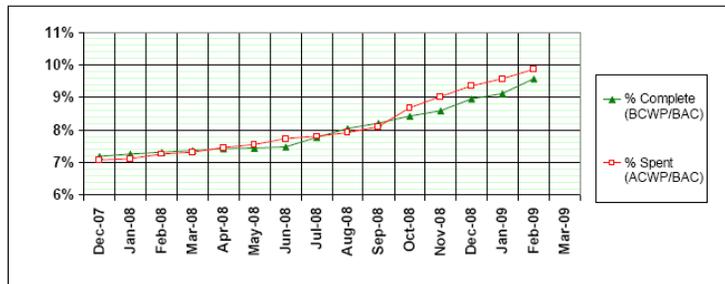
Other Useful EV Charts



Earned Value data can be tracked by the project office to monitor project performance and look at trends.



Trending downward - warning!
Close to 1.0 - good!



Monthly Reports



- Monthly project reports must include earned value information
- Earned value information to be included:
 - Status of key milestones
 - Progress narrative
 - Baseline change control log actions
 - Project management comments
 - EVMS data
 - Variance explanations (if required)
- Narratives may be included to provide more information about the project

Estimate to Complete/Estimate at Completion



- Provides a forecast by the project manager and CAMS of cost of the project at completion

Est. At Comp.

Act. Cost of Work Perf.

Est. To Comp.

- $EAC = ACWP + ETC$

– ETC is a forecast. There are multiple ways to forecast using Open Plan/Cobra

Budgeted Cost of Work Remaining

- “Statistical” → $ETC = PF * (BAC - BCWP)$
- “Manual” → ETC based on re-estimate (if any) of remaining work quantities/M&S direct costs
- NOvA uses a manual method, calculated at the work package level, based on specifying remaining quantities/costs on each lowest-level activity.

- EACs should become baseline changes when they are no longer estimates

EAC/ETC Process Summary



- EAC/ETC changes are a forecast, not changes to the baseline.
- CAMs and the Project Manager should evaluate ETC on a regular basis and discuss
- When substantive changes to the ETC appear on the horizon, CAMs submit the necessary ETC changes to the PM for approval and for subsequent incorporation into the schedule and Cobra by Project Controls. ETC changes may also be initiated directly by the Project Manager.
- In addition to changes in resource assignments that affect the ETC, use this change process to incorporate and document
 - Major schedule changes outside the usual ones that occur monthly thru progress reporting
 - Significant labor rate or indirect rate adjustments
 - Changes to bottoms-up contingency estimate percentages*
- Log the ETC changes
- Update BOE documentation

NOVA Log of Estimate to Complete Changes						27-Apr-09
ETC#	Item	WBS items	CAM	estimated amount	approved?	date of email approval
1	Labor reductions on 1.0.3	1.0.3.2, 1.0.3.3	Martens	< \$100K decrease in base estimate	yes	15-Apr-09
2	Near Cavern updated estimate following Conceptual design by Harza, checked by Wightman	2.8.1.4.5, 2.8.1.4.6	Lukens	only \$20K increase in base estimate, but a change in contingency estimate from 100% to 50%	yes	15-Apr-09

Revisions and Data Maintenance (Change Control Process)



- Changes are only done on work in the future, not to change past performance
- Change Control Thresholds are project specific
 - High level thresholds (DOE's) are identified in the Project Execution Plan (PEP).
 - Lower level thresholds (FRA's) are identified in the Project Management Plan (PMP)
- NOvA example

DOE THRESHOLDS **FRA THRESHOLDS**

	Secretarial Acquisition Executive (Level 0-A) Deputy Secretary	Acquisition Executive (Level 0-B) SC-1	Associate Director OHEP (Level 1)	DOE NOvA Federal Project Director (Level 2)	Fermilab Associate Director (Level 3)	NOvA Project Manager (Level 4)	Subproject Manager (Level 5)
Technical	A change in scope that affects the ability to meet a Key Performance Parameter (KPP) and the ability to satisfy the mission need.	A change in scope that affects the ability to meet a KPP and the ability to satisfy the mission need.	Any change in the KPPs as referenced in PEP section 3.2.	Any significant change to the technical scope (as described in PEP sect. 5) that affect ES&H requirements or meeting Project Closeout definitions in PEP Table 7.2.	Major technical changes that are significant departures from the technical baseline. Changes that affect ES&H or impact PoT projections by more than 10%. Out-of-scope changes to upgrade physics capabilities.	Related technical changes to multiple subprojects that do not diminish performance	Minor technical changes to a single subproject that does not diminish performance
Schedule	≥ 6 month (cumulative) delay in the CD-4 completion date.	a 3 to 6 month (cumulative) delay in the CD-4 project completion date.	Any change to a level 1 milestone > 3 months, or up to a 3 month delay in CD-4 project completion date .	Any change to a Level 2 milestone > 1 month or a Level 1 milestone < 3 months.	Any change that results in the delay of a Level 3 Director's milestone.	Any change that results in the delay of a Level 4 milestone by more than one month.	Any change that results in the delay of a Level 5 milestone by more than one month
Cost	Increase in excess of \$25M or 25% (cumulative) of the CD-2 Total Project Cost baseline.	Any increase in the CD-2 Total Project Cost baseline.	Any change in Total Estimated Cost or Total Project Cost.	Any cumulative use of contingency of > \$1M.	Increase in the cost of a single item by more than \$250k. Increase in the Project base cost exceeding \$500k during the previous 12 months.	Increase in the cost of a single item by more than \$100k.	Increase in the cost of a single item by more than \$25k.

